Saitek™

Doc. No.	:	ST19-PG-006
Rev.	:	0
Date	:	10.12.95

GK2100 GENERAL PRODUCT SPECIFICATIONS

A.	Battery Requirement	:	1.5V (size 'C' or 'UM-2') X 6 pcs. Alkaline type recommended
B.	Operating Voltage	:	6.6 - 10.2 Volts
C.	Adaptor Operating Voltage	:	8 - 12 volts
D.	Current Consumption	:	a) Normal mode at V90 = 9V (with two LEDs on) 27mA typical 50mA max b) Memory mode at V90 = 9V 1.6uA typical 3.0uA max
E.	Power Consumption	:	243mW typical 450mW max
F.	System Clock Frequency	:	20MHz +/-5% (AT V90 = 9V)

Remarks: Data measured with EPROM version controller.

PREPARED BY : 16/12/95
ALBERT LEE

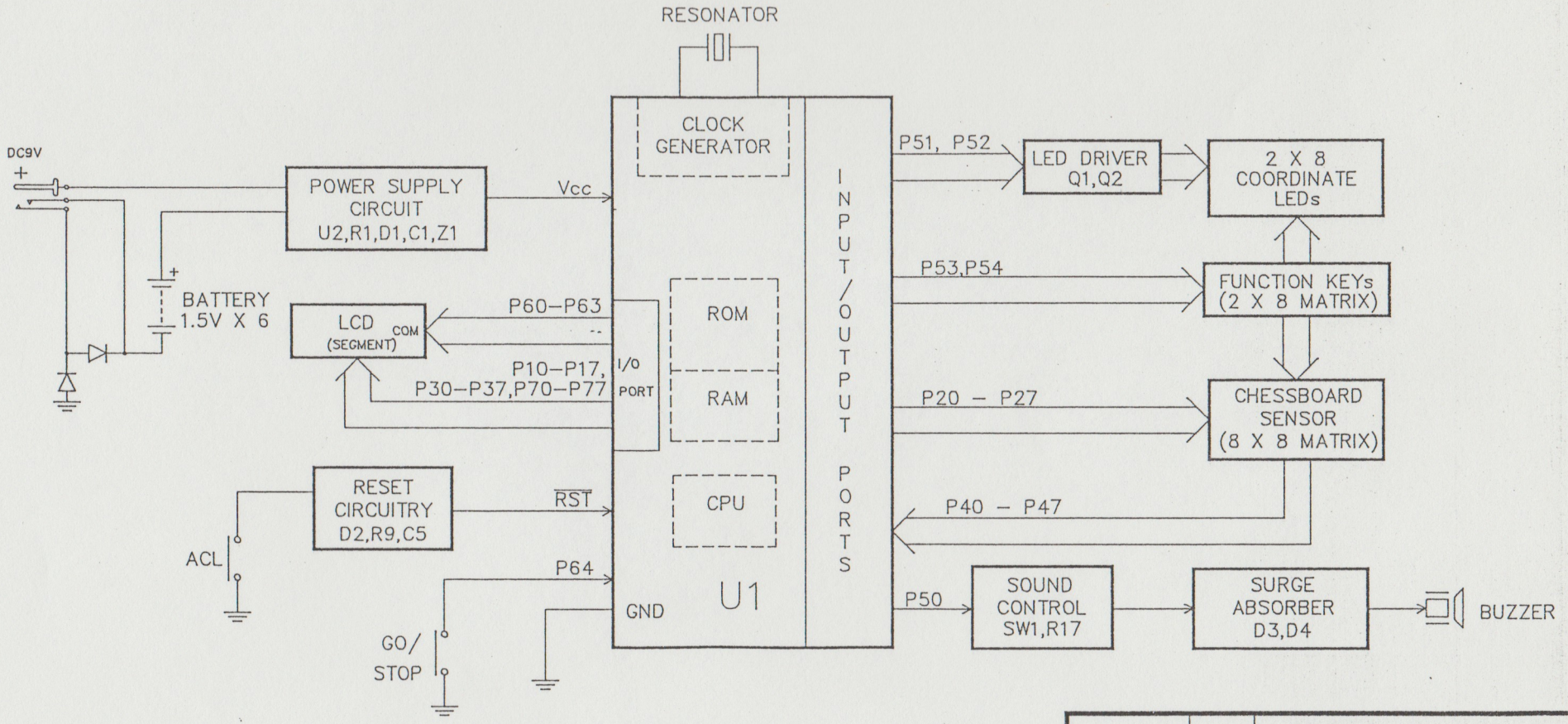
APPROVED BY Alfred

DIST : FD, QAM, IEM, SEE, SEA

FILENAME : \ED#01\ST19

ORIGINAL

REVISION			
DATE	DESCRIPTION	ECN NO.	REV. NO.



APPROVALS	DATE	Saitek Ltd.	
DRAWN	26/6/96	BLOCK DIAGRAM	
BDD1/2	26.6.96	TITLE:	GK2100
E.D.		273	
Q.A.	27.4.97	DWG. NO. ST19–PE–016	REV. 0

PROJECT : GK2100

DOC. NO. : ST19-PS-007

REV. : 0

DATE : 10.12.93

ADJUSTMENT PROCEDURE FOR ST19

OBJECTIVE : To adjust system clock frequency.

EQUIPMENT REQUIRED : Frequency counter or Oscilloscope which is capable for frequency measurement up to 20 MHz.

PROCEDURE :

1. Disassemble unit by removing the six screws at bottom cabinet.
2. Power up the unit (V90 = 9V).
3. Place probe of counter/scope at pin 9 of U1.
   If frequency messured is out of specified range (19-21MHz), replace C4 or C3 (S.O.T.) until counter/scope reading is within specification.
4. Re-assemble the unit.

PREPARED BY : 14/12/93
ALBERT LEE

APPROVED BY : Alfred

DIST : ED, QAM, IEM, SEE, SEA

FILENAME : \ED\01\ST19

PROJECT : ST19
DOC. NO. : ST19-PS-014
REV. : 0
DATE : 29.12.93
PAGE : 1 OF 2
C.C. : QA, ED

ST19 TROUBLE SHOOTING CHART

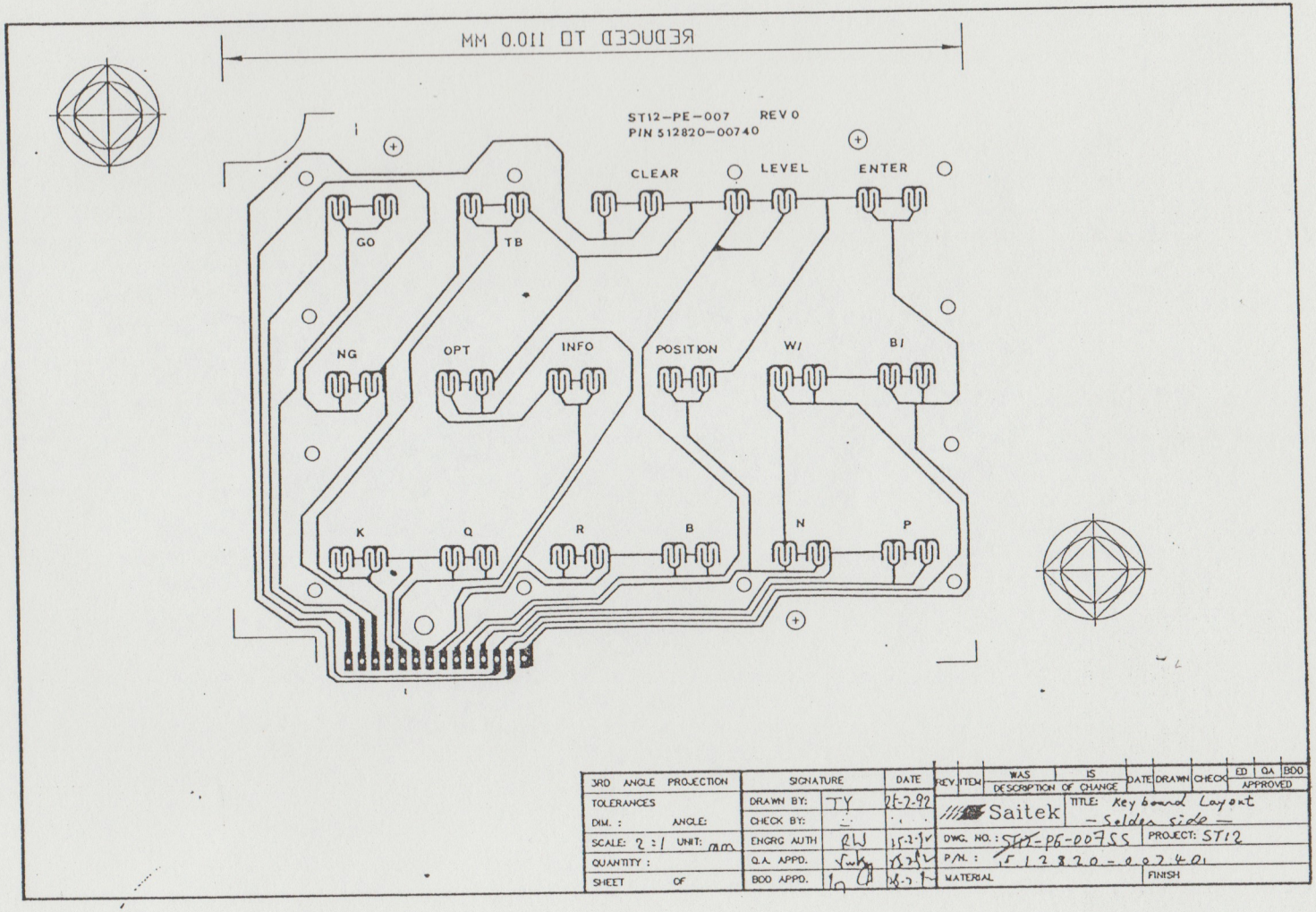
SYMPTOMS		HINTS FOR TROUBLE SHOOTING
1. Unit will not turn on	i)	If batteries are used, a) Check battery level is between (6.6 - 10.2)V. b) Check D6/D7 functionally good.
	ii)	If power adaptor is used, a) Check power adaptor functionally good. b) Check D6/D7/Z1/D1/R1 functionally good.
	iii)	Check no broken wiring connection.
	iv)	Check U2/C1 functionally good.
	v)	Check L1/L2 not broken.
	vi)	Check R9/C5 functionally good.
	vii)	Check ACL is not short to GND.
	viii)	Check U1 pin 9/10 is oscillating
2. No sound	i)	Check no broken wiring connection.
	ii)	Check buzzer/D3/D4 functionally good.
	iii)	Check U1 pin 25. - A train of pulses is output at the time sound should be emitted.
3. LCD missing or wrong LCD on	i)	Check for no short circuit.
	ii)	Check R5-R8 functionally good.
	iii)	Check misalignment of LCD.
	iv)	Check for dust/oxide on gold fingers.
	v)	Check if U1/LCD defective.
4. No LED or wrong LED lighted.	i)	Check LED functionally good.
	ii)	Check no short circuit.
	iii)	Check Q1/Q2 functionally good.
	iv)	Check U1 functionally good.
5. Excessive current drain. Current>60mA at powerup. Current>300µA at memory mode.	i)	Check for no short circuit.
	ii)	Check C1 functionally good.

ST19 TROUBLE SHOOTING CHART

SYMPTOMS		HINTS FOR TROUBLE SHOOTING
6. Improper response	i) ii) iii) iv)	Check sensor PCB not broken. Check no dust/oxide on sensor PCB. Check battery level is within specification. Check U2/U1 is functionally good.
7. No memory.	i) ii)	Check battery level is within specification. Check U2/U1 is functionally good.

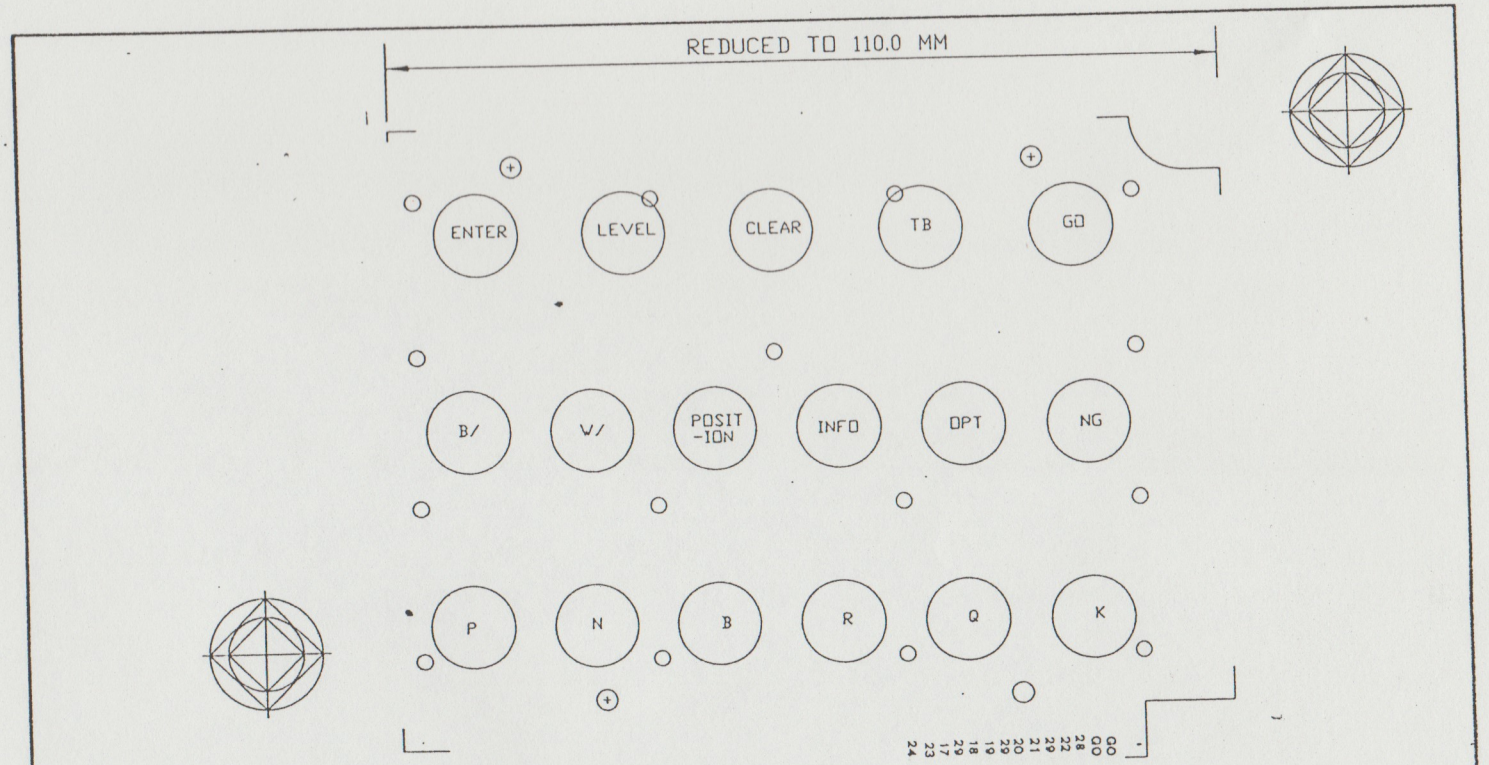
Filename : /ED#10A/ST19PS14

See notes



suitable for ST19

AL 3/3/94



3RD ANGLE PROJECTION	SIGNATURE		DATE
TOLERANCES	DRAWN BY:	TY	26-7-92
DIM. : ANGLE:	CHECK BY:		
SCALE: 2:1 UNIT: mm	ENGRG AUTH		
QUANTITY :	Q.A. APPD.		
SHEET OF	BDO APPD.		

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

Saitek

TITLE: Key PCB Component layout

DWG. NO.: ST12-PE-007CL

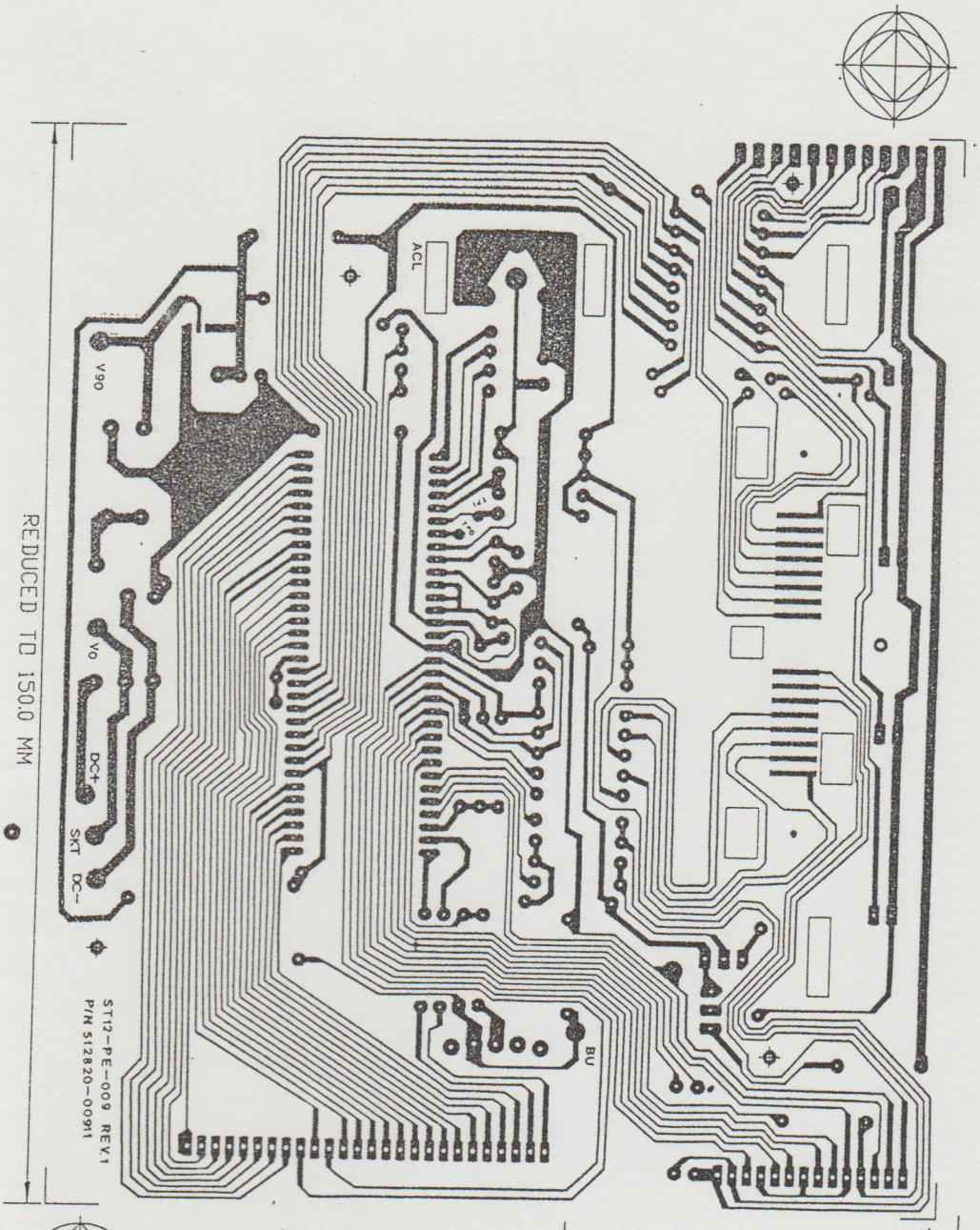
PROJECT: ST12

P/N. :

MATERIAL

FINISH

suitable for ST19 dl 3/3/94



suitable for ST19

3RD ANGLE PROJECTION	SIGNATURE		DATE
TOLERANCES	DRAWN BY:	TY	25-2-92
DIM. : ANGLE:	CHECK BY:		
SCALE: 2:1 UNIT: mm	ENGRG AUTH		27-2-92
QUANTITY :	Q.A. APPD.		25.2.92
SHEET OF	R.D. APPD.		26.2.92

REV	ITEM	WAS	IS	DATE	DRAWN	CHECK	ED	QA	RD
		DESCRIPTION OF CHANGE					APPROVED		
1	1	—	[illegible]	[illegible]	TY	[illegible]	[illegible]		
0.1	1	change U2 pinout		25/5	TY	[illegible]	[illegible]		

Saitek

TITLE: Logic PCB layout — Solder Side —

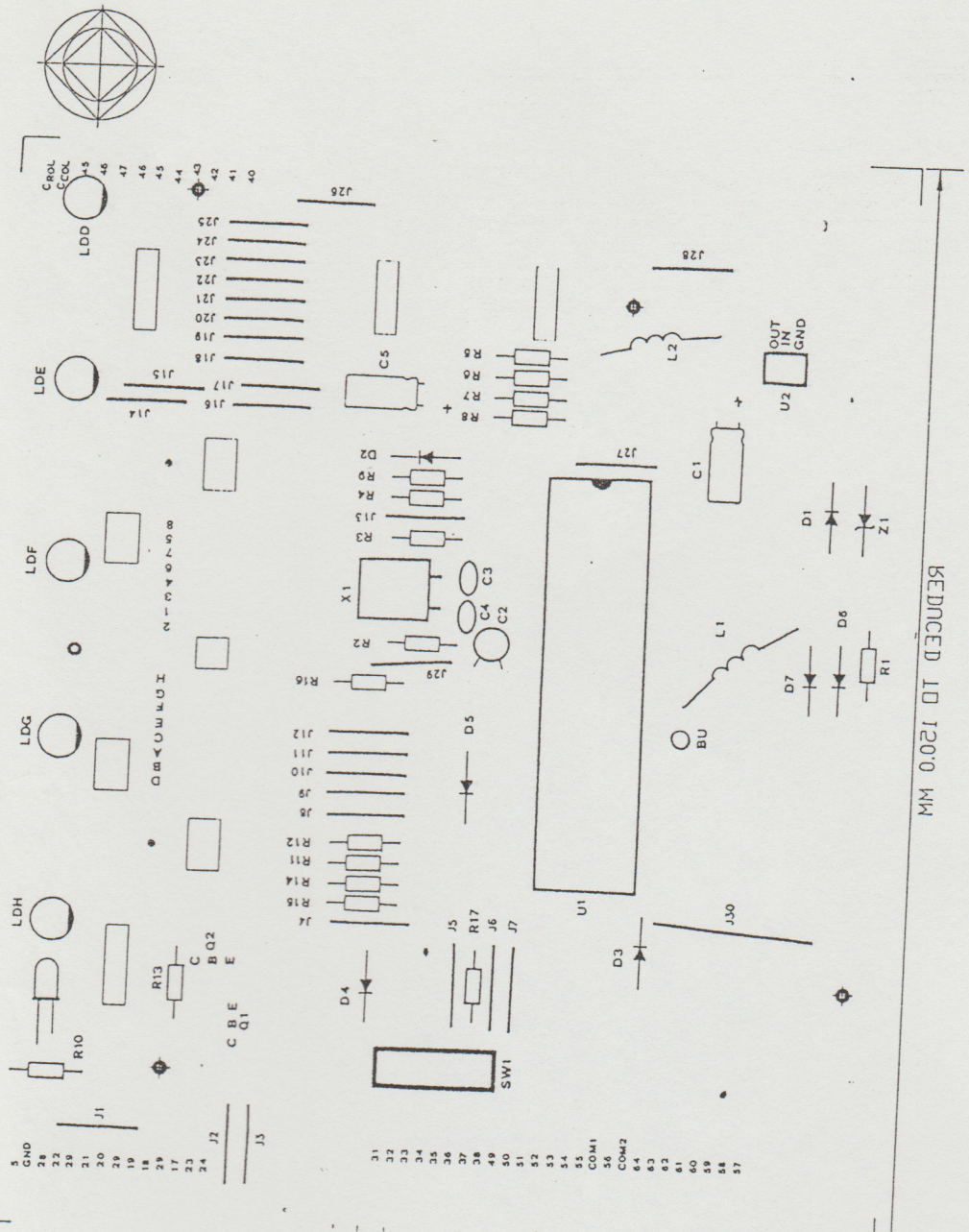
DWG. NO. ST12-PE-009SS

PROJECT: ST12

P/N. : 512820000910

MATERIAL

FINISH



suitable for STI

AL 3/3/99

3RD ANGLE PROJECTION	SIGNATURE	DATE	REV	ITEM	WAS / IS DESCRIPTION OF CHANGE	DATE	DRAWN	CHECK	ED	QA	PO
TOLERANCES	DRAWN BY: TY	26-2-97							APPROVED		
DIM. : ANGLE:	CHECK BY:										
SCALE: 2:1 UNIT: mm	ENGRG AUTH										
QUANTITY	Q.A APPD										
SHEET OF	R.D APPD										

Saitek

TITLE: Logic PCB Component Layout

DWG. NO.: ST12-PE-0009CL

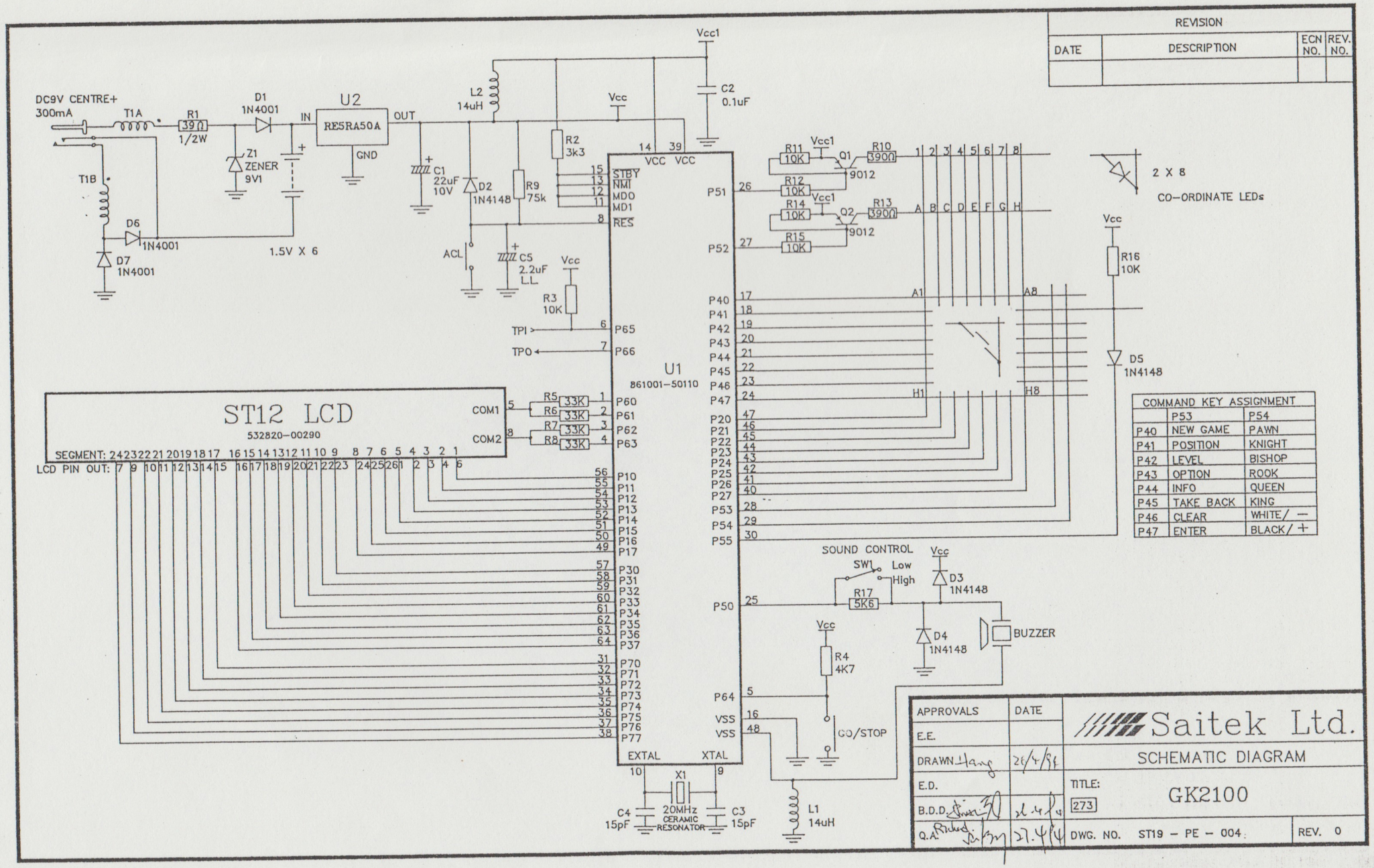
PROJECT: ST12

P/N

MATERIAL

FINISH

ORIGINAL



COMMAND KEY ASSIGNMENT		
	P53	P54
P40	NEW GAME	PAWN
P41	POSITION	KNIGHT
P42	LEVEL	BISHOP
P43	OPTION	ROOK
P44	INFO	QUEEN
P45	TAKE BACK	KING
P46	CLEAR	WHITE/ −
P47	ENTER	BLACK/ +

APPROVALS	DATE
E.E.	
DRAWN Hang	26/4/94
E.D.	
B.D.D.	26.4.94
Q.A. Richard	27.4.94

Saitek Ltd.

SCHEMATIC DIAGRAM

TITLE: GK2100

273

DWG. NO. ST19 - PE - 004

REV. 0

SAITEK

BILL OF MATERIALS

PROJECT	:	ST19	(GK 2100)
ART.NO.	:	273	
SHIP VER.	:	EV	
REVSION	:	P2	NAME : \ED#02B\ST19

REVISION HISTORY

REVISION	DATE	BY	DESCRIPTION OF CHANGES
P1	06.12.93	ALBERT LEE	Preliminary BOM.
P2	27.01.94	ALBERT LEE	Preliminary BOM with updated ALC.

RELATED DOCUMENTS	REV
Schematic dwg : ST19-PE-004	0

Prepared BY : 27/1/94
ALBERT LEE

Approved by : 22.2.94
EM

Distribution :
+1.00 [X] MMM, IEM ; FAM ; QAM, SEE
+0.10 [ ] MMM, IEM ; FAM ; QAM, SEE
+0.01 [ ] MMM, IEM
Circulation : MSM->GM->BDM2->BDM1

Date issue : ~ 2 FEB 1994

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

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PRODUCT COSTING - SAITEK BOM FORMAT

Run : 27/
Prog: PSP

992730-11EV - ST19,EV, GK2100

Rev : 1

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
1			982730-00000	1		UNIT ASSEMBLY,FOR ST19	1.000	
2			912730-00001	1		GUTS ASSEMBLY - LOGIC	1.000	
3	1		512720-00911			PCB,LOGIC,S.SIDED,PAPER PHENOLIC	1.000	
3	2		870003-4325A		RC	ZTAT,8 BIT,32K ROM,HD6473258P-10,SDIP	1.000	U1
3	3		670290-12GB0		RC	TRANSISTOR,PNP,9012G,CENTRE B	2.000	Q1,Q2
3	4		654001-20000			DIODE,RECTIFIER,1N4001	3.000	D1,D6,D7
3	5		654148-10000			DIODE,SWITCHING,1N4148	4.000	D2-D5
3	6		650000-39115			DIODE,ZENER 9V1,5%,1/2W	1.000	Z1
3	7		613905-41102			RESISTOR,FIXED,C-FILM,39,5%,1/2W	1.000	R1
3	8		613915-31102			RESISTOR,FIXED C-FILM,390,5%,1/4W	2.000	R10,R13
3	9		613325-31102			RESISTOR,FIXED C-FILM,3K3,5%,1/4W	1.000	R2
3	10		614725-31102			RESISTOR,FIXED C-FILM,4K7,5%,1/4W	1.000	R4
3	11		615625-31102			RESISTOR,FIXED C-FILM,5K6,5%,1/4W	1.000	R17
3	12		611035-31102			RESISTOR,FIXED C-FILM,10K,5%,1/4W	1.000	R3
3	13		611035-31102			RESISTOR,FIXED C-FILM,10K,5%,1/4W	5.000	R11,R12,R14-R16
3	14		613335-31102			RESISTOR,FIXED,C-FILM,33K,5%,1/4W	4.000	R5-R8
3	15		617535-31102			RESISTOR,FIXED C-FILM,75K,5%,1/4W	1.000	R9
3	16		62104Z-02511			CAPACITOR,C-CAP,0.1UF,+80%-20%,25V	1.000	C2
3	17		62225Z-01615			CAPACITOR,E-CAP,2.2UF,+80-20%,16V	1.000	C5
3	18		62226Z-01615			CAPACITOR,E-CAP,22UF,+80-20%,16V	1.000	C1
3	19		62150J-05014			CAPACITOR,C-CAP,NPO,15PF,+/-5%,50V	2.000	C3-C4,S.O.T.
3	20		642000-03250		RC	RESONATOR,20MHZ,30PPM	1.000	X1
3	21		690014-00000		RC	ELECT REGULATOR,5V RE5RA50AC	1.000	
3	22		660005-12205		RC	LED,RED,RECT,2X5MM,TOSHIBA,TLR208	5.000	LDD-LDH
3	23		52A107-00210			SWITCH,1P2T,FOR PS3A,PIC#SS12F23G5	1.000	SW1
3	24		000051-20155			JUMPER,L=12MM,LL=15MM,D=0.5MM	29.000	J1-J29
3	25		000010-00100			ACL,RESET CONTACT,D=10MM,CR STEEL	1.000	
3	26		630007-20000		RC	INDUCTOR,RFI,14UH,+/-10%,Q=44MIN	2.000	L1-L2
3	27		000101-01002			SPONGE,10X10X2MM	1.000	FOR ACL
3	28		000052-20155			JUMPER,L=22MM,LL=15MM,D=0.5MM	1.000	J30
2			91A103-00002	1		GUTS ASSEMBLY - LED	1.000	
3	29		51A103-02520			PCB,LED,S.S,1.6MM,PAPER PHENOLIC	1.000	
3	30		660005-12205		RC	LED,RED,RECT,2X5MM,TOSHIBA,TLR208	11.000	LED1-8,A-C
3	31		000030-00150			CONN ARRAY,N=12,L=17MM,P=2.54MM,E=3.5MM	1.000	
2			912720-00003	1		GUTS ASSEMBLY - LCD	1.000	
3	32		512720-00830			PCB,LCD,S-SIDED,1.6MM,PAPER PHENOLIC	1.000	
3	33		000030-00870			CONN ARRAY,N=26,L=130MM,P=2MM,E=3.5MM	1.000	
2			912720-00004	1		GUTS ASSEMBLY -KEYBOARD	1.000	
3	34		512720-00740			PCB,K-BOARD,S.S,1.6MM,PAPER PHENOLIC	1.000	
3	35		000030-00860			CONN ARRAY,N=14,L=65MM,P=2MM,E=3.5MM	1.000	
3	36		252710-01000		RC	RUBBER,CONDUCTIVE RUBBER,GREY,ST8	1.000	
2			912720-00005	1		GUTS ASSEMBLY - RFI	1.000	
3	37		512720-01150			PCB,RFI,S.S,1.6MM,PAPER PHENOLIC	1.000	
3	38		630003-10000		RC	INDUCTOR,TOROID,16T	1.000	
3	39		000220-00002			SOCKET,DC POWER JACK,TC 18-014	1.000	
3	40		000062-26043			STRAND WIRE,RED,L=260MM,E=3.5MM,AWG28	1.000	FOR DC+

992730-11EV - ST19,EV, GK2100 Rev : 1

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
3	41		000060-26043			STRAND WIRE,BLACK,L=260MM,E=3.5MM,AWG28	1.000	FOR DC-
3	42		000061-26043			STRAND WIRE,BROWN,L=260MM,E=3.5MM,AWG28	1.000	FOR SKT
2			962730-00000		1	CASING ASSEMBLY,FOR ST19	1.000	
3	43	—	312710-05200		RC	SENSOR,CHESSBOARD,COMBO ST8(REV.1)	1.000	
3	44	—	322710-01570		RC	OVERLAY,FOR ST19,CHESSBOARD,COMBO,LEXAN	1.000	+
3	45		352710-04001		RC	INLAY,FOR JACK,PVC,BLACK,ST8	1.000	+
3	46		220000-00605		RC	METAL,PLATE,191.2X191.2,W/D-TAPE,ST8	1.000	
3	47		222700-03700		RC	METAL,B-CONT,"-",PH BRONZE,NI-PLT,ST5	1.000	
3	48		222700-03800		RC	METAL,B-CONT,"+",PH BRONZE,NI-PLT,ST5	1.000	
3	49		224200-03001		RC	METAL,B-CONT,COM'A',PH BRONZE,NI-PLT,W1	1.000	
3	50		250000-00150		RC	RUBBER ROD,48X2.9X2.8MM,COMPRESS KE951U	1.000	
3	51		215120-02502		RC	PLASTIC,SENSOR CLAMP LARGE,PC,CLEAR	1.000	
3	52		214210-03500		RC	PLASTIC,LOCK PIN,NYLON 66,WHITE	1.000	
3	53		21A103-06000		RC	PLASTIC,ACL SW.PIN,HIPS,BLACK	1.000	
3	54		000106-04003			SPONGE,60X40X3MM	1.000	FOR BATT. LID
3	55		000073-21434			SCREW,S/T,+PAN,M2.6X8MM,A	2.000	FOR LOGIC PCB
3	56		000073-21434			SCREW,S/T,+PAN,M2.6X8MM,A	2.000	FOR PANEL
3	57		000130-00270			BUZZER,D=27MM	1.000	
3	58		000068-16043			STRAND WIRE,GREY,L=160MM,E=3.5MM,AWG28	2.000	FOR BUZZ.
3	59		000073-21554			SCREW,S/T,+PAN,M3.0X12MM,A	6.000	FOR CAB
3	60		000073-21424			SCREW,S/T,+PAN,M2.6X6MM,A	4.000	FOR LCD PCB
3	61		000073-21434			SCREW,S/T,+PAN,M2.6X8MM,A	4.000	FOR KB PCB
3	62		000021-00010			RUBBER FOOT,3M,D12X3.2MM,ADHESIVE	4.000	
3	63		000062-20043			STRAND WIRE,RED,L=200MM,E=3.5MM,AWG28	1.000	BATT +
3	64		000060-20043			STRAND WIRE BLACK,L=200MM,E=3.5MM,AWG28	1.000	BATT -
3	65	+	342710-03900		RC	NAME PLATE,KASPAROV,ELECT FORMING	1.000	
3	66		000090-00210		RC	FOAM PAD,FOR ST12,52X24.8X2.7MM	1.000	FOR LCD
3	67		532820-00290		RC	LCD,FOR ST12	1.000	
3			952730-00000		1	CABINET SET,FOR ST19	1.000	
4	68		212710-00119		RC	PLASTIC,T.CAB,HIPS,SPY.BLACK	1.000	
4	69		212710-00216		RC	PLASTIC,B.CAB,HIPS,BLACK,CHINA	1.000	
4	70		212720-00230		RC	PLASTIC,PANEL,HIPS,SPY BLACK,S.SCREEN	1.000	
4	71		212710-00700		RC	PLASTIC,BATT.LID,HIPS,BLACK	1.000	
4	72		212710-00600		RC	PLASTIC,PIECE DOOR,HIPS,BLACK	1.000	
4	73		213100-00102		RC	PLASTIC,EPROM COVER,HIPS,BLACK	1.000	
4	74		212710-00402		RC	PLASTIC,SWITCH CAP,HIPS,BLACK,ST8	1.000	
4	75		212710-00801		RC	PLASTIC,KEY TOP,SMALL	12.000	
4	76		212710-00901		RC	PLASTIC,KEY TOP,LARGE	5.000	
3	77	—	250000-00524		RC	ZEBRA CONNECTOR,SG,52X2.2X4.7,P=0.18MM	1.000	
3	78		352720-00310		RC	INLAY,FOR LCD,LEXAN,ST19	1.000	
3	79		292720-03000		RC	DOUBLE SIDED TAPE,FOR ST12 LCD LENS	1.000	
3	80		352720-01410		RC	INLAY,FOR LOGO,LEXAN,ST19	1.000	
3	81		352710-02700		RC	INLAY,FOR SLIDE VOL.,(L),PVC,BLACK,ST8	1.000	
3	82		352710-02710		RC	INLAY,FOR SLIDE VOL.,(S),PVC,BLACK,ST8	1.000	
1			942730-10000		1	PACKING ASSEMBLY,FOR ST19	1.000	
2	83		000123-00200			POLYBAG,300X200X0.045MM	1.000	FOR MANU
2	84		000125-40320			POLYBAG,540X320X0.045MM	1.000	FOR CAB
2	85		452720-02100			CARTON,FOR ST12,5PCS/CTN	.200	

SAITEK

PRODUCT COSTING - SAITEK BOM FORMAT

992730-11EV - ST19,EV, GK2100

Rev : 1

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per Referenc
2	86		452710-03600			POLYFOAM SET,FOR ST8	1.000
2			242730-20400	1		CHESSMEN SET,ST19,1&2,199+203,RUG MAG	1.000
3	87	—	242050-20310		RC	CHESSMEN,YO1C,16,GLOSSY BLACK,RUG MAG	1.000
3	88	—	242050-19911		RC	CHESSMEN,YO1C,16,COOL GREY,RUB MAGNET	1.000
2	89		370000-XXXXX		RC	LABEL,COMMON,CUSTOMER LABELS	1.000
2	90		360000-00200			LABEL,FOR SERIAL NO, ADHESIVE	1.000
1			972730-10EV	1		OPTIONS ASSEMBLY,EV,FOR ST19	1.000
2	91		332730-00500		RC	RATING PLATE,FOR ST19,PVC,SWL	1.000
2	92		412730-61000		RC	MANUAL,FOR ST19,E/F/G/D/S/I,SWL	1.000
2	93		422730-61000		RC	GIFTBOX,FOR ST19,E/F/G/S/D/I,SWL	1.000
2	94		430016-01004		RC	LEAFLET,CONSUMER,1993,ENGLISH,SWL	1.000
2	95		430004-51000		RC	CARD,WARRANTY,E/G/F/D/S,SWL,CHESS	1.000

1.3 Pin Assignments and Functions

1.3.1 Pin Arrangement

Figure 1-2 shows the pin arrangement of the H8/325 Series in the DC-64S and DP-64S packages. Figure 1-3 shows the pin arrangement in the FP-64A package. Figure 1-4 shows the pin arrangement in the CP-68 package.

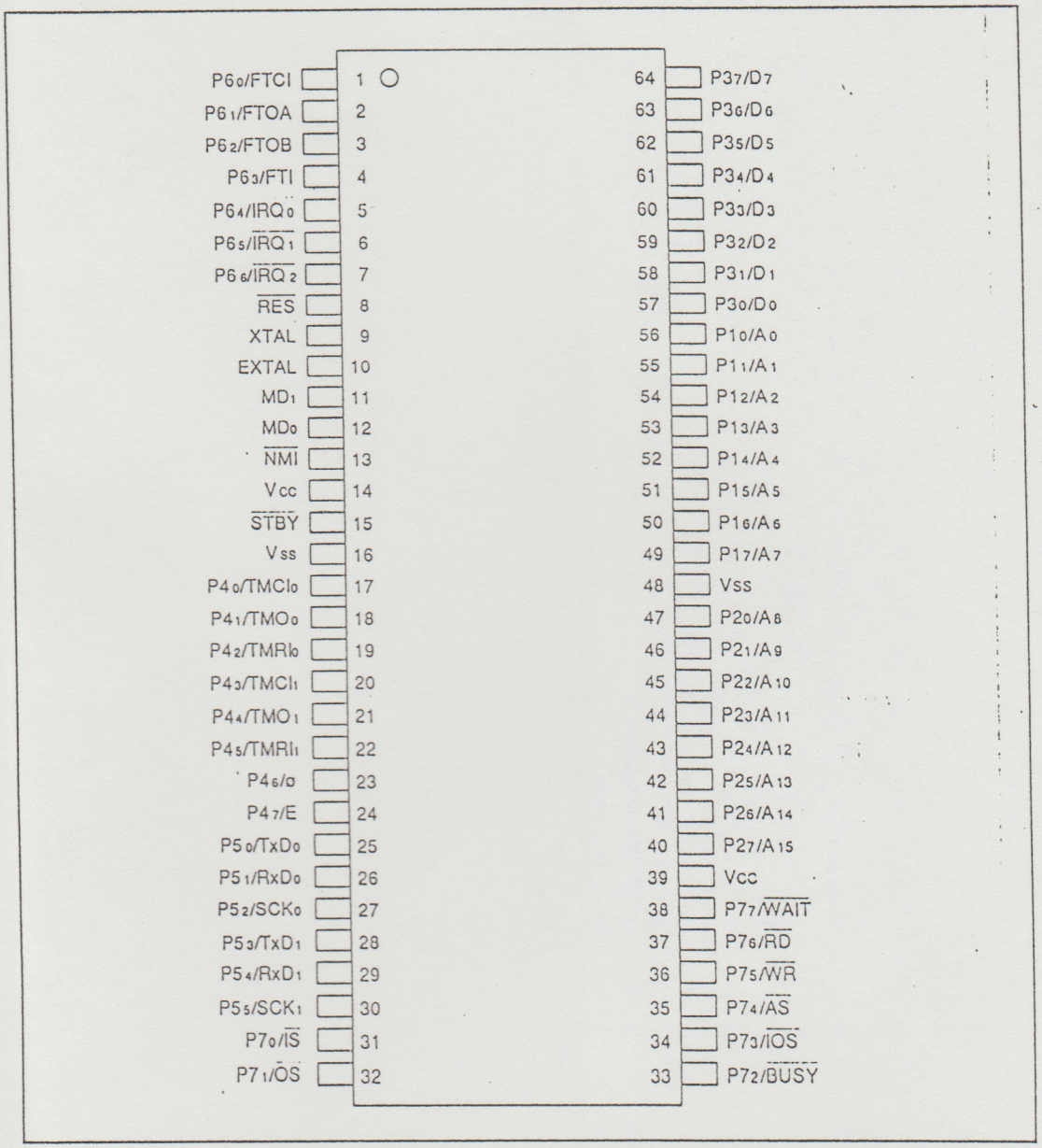
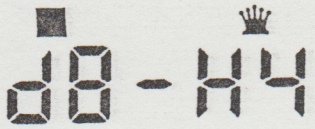
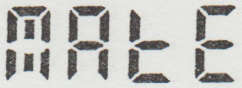
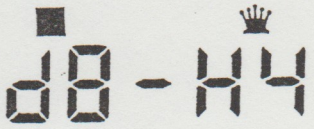


Figure 1-2. Pin Arrangement (DC-64S, DP-64S, Top View)

8. FUNCTIONAL TEST PROCEDURE FOR GK2100

Purpose	Procedure	Observation
1. Power up	- Insert six C size batteries into the battery compartment	- See Table 1 - New game sound is emitted after scanning of LEDs and LCD. - LCD shows 0:00:00
2. QC test mode	- Press ACL - Press and hold ENTER for one second while LCD and LEDs scanning as Table 1	- See Table 1 - LCD shows tESt for a while. - LCD and LEDs scanning according to Table 1 repetitively.
	- Press ENTER	- LCD shows F: 10 and LEDs of square A6 is turned ON.
	- Press function key according to Table 2	- See Table 2

Purpose	Procedure	Observation
	- Press 64 chessboard in sequences	- A beep sound is emitted for each key pressed. - LCD shows CHS:-- where -- means the coordinates of the chessboard square pressed. - The corresponding square LEDs are turned on steadily.
3. Reset unit	- Press ACL	- Same as 1
4. Multimove	- Press OPTION	- LCD shows +Auto
	- Press ENTER	- LCD shows -Auto
	- Press CLEAR	- The white clock starts counting.
	- Press square F2, F4, E7, E5, G2, G4 in sequences	- Coordinate LEDs come on with a beep sound for each keypressed and LCD shows the corresponding move.
	- Press ENTER	- D8 LEDs are on and LCD shows d8-H4
	- Press D8	- H4 LEDs are on and LCD shows as above

Purpose	Procedure	Observation
	- Press H4	- LCD shows  and  alternatively, then after a white, white clock is displayed on LCD
5. Check memory	- Press GO/STOP	- All LEDs come off - LCD blank
	- Press NEWGAME twice - Insert non-energized adapter	- No response
	- Press GO	- White clocks counting up
6. Check adapter + batteries	- Press GO/STOP	- LCD blank - All LEDs come off
	- Insert an energized adapter - Press GO	- Same as above - White clocks counting up
7. Check adapter	- Press GO/STOP	- LCD blank - All LEDs come off
	- Remove batteries - Press GO/STOP - Press TAKEBACK	- Same as above - White clock counting up - H4 LEDs are on - LCD shows 
	- Press H4	- D8 LEDs are on and LCD shows as above
	- Press D8	- Black clock stop counting

Purpose	Procedure	Observation
8. Check speaker	- Slide the speaker switch towards the LCD	- "  " appears under the switch.
	- Press NEWGAME	- NEWGAME sound is given out.
	- Slide the speaker switch away from the LCD	- "  " appears above the switch.
	- Press NEWGAME	- NEWGAME sound is given out but the volume is lowered.
9. Test finished	- Remove the adapter	

Table 1

Sequences	LCD shows	Column LEDs ON
1		A1
2		B2
3		C3
4		D4
5		E5
6		F6
7		G7
8		H8

Table 2

Function Key Pressed	LEDs turned on
♔	A1
♕	B1
♖	C1
♗	D1
♘	E1
♙	F1
NEWGAME	A2
OPTION	B2
INFO	C2
POSITION	D2
WHITE	E2
BLACK	F2
TAKEBACK	A3
CLEAR	B3
LEVEL	C3
ENTER	D3

Note:
1. LCD is blanked during function key test.
2. A beep sound is emitted for each keypressed.