Doc. No. : SM18-PG-005

Rev. : 0.1

Date : 12.11.92

BRUTE FORCE MODULE GENERAL PRODUCT SPECIFICATIONS

A. Current Consumption :

a) Noraml mode at V.Ad (SW6) = 9V
Measured at V+ of PIO Connector
84mA typical
140mA max.

b) Memory mode at V.Ad = 9.0V
Measured at V+ of PIO connector
Smaller than 50µA.

B. Power Consumption : 0.76W typical
1.26W max.

C. System Clock Frequency : 20MHz +/- 1%

PREPARED BY : D.<FONG

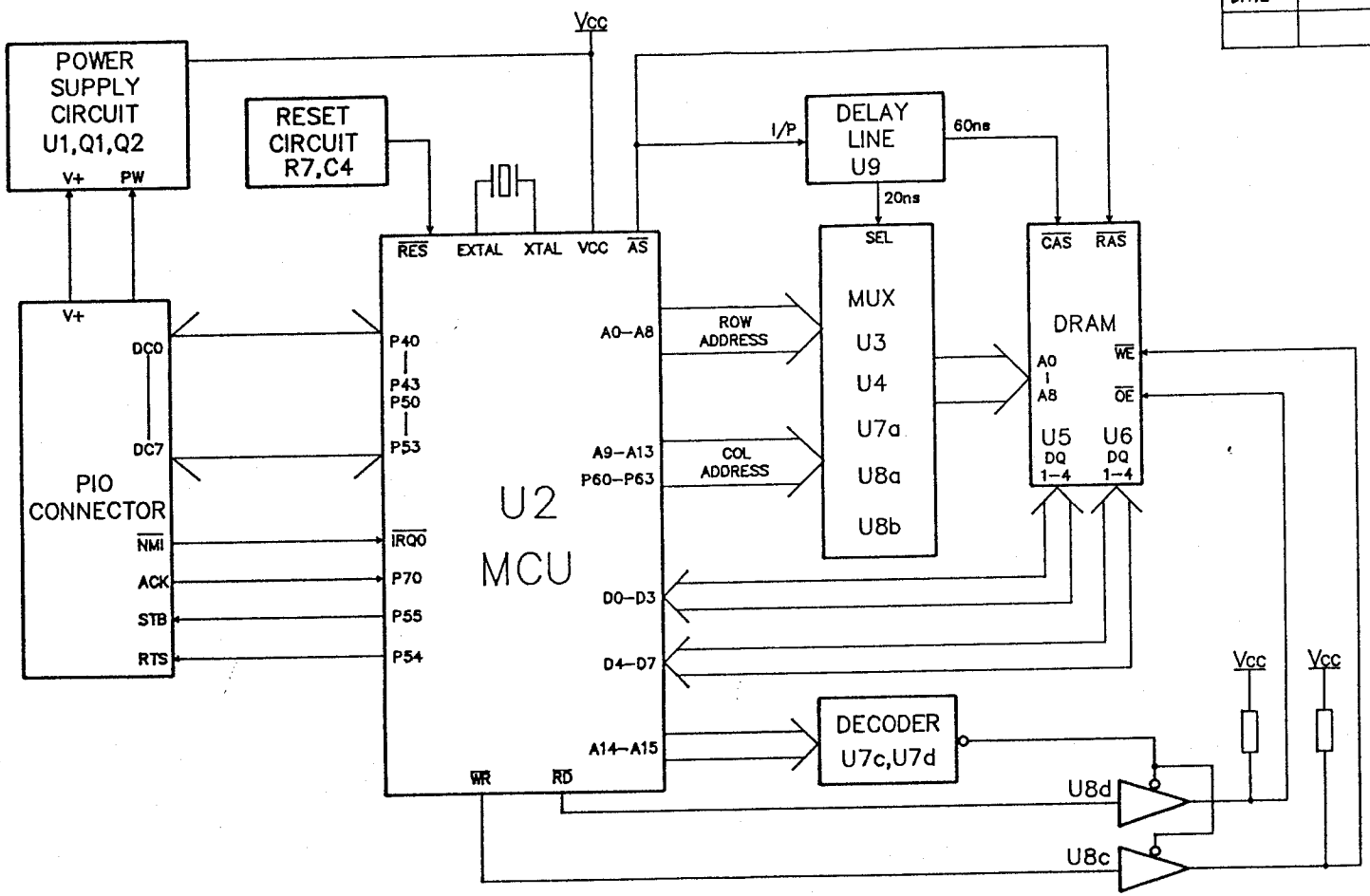
APPROVED BY :

DIST : ED, QAM, ASSEMBLER [SEA]

FILENAME : \ED101\SM18

ORIGINAL

REVISION			
DATE	DESCRIPTION	ECN NO.	REV. NO.



APPROVALS	DATE	Saitek Ltd.
E.E.	2/11/92	
DRAWN CHENG	2/11/92	BLOCK DIAGRAM
E.D.	2/11/92	TITLE: BRUTE FORCE MODULE
B.D.D.	2/11/92	517
Q.A.	10/11/92	DWG. NO. SM18 – PE – 004 REV. 0

PROJECT : BRUTE FORCE MODULE - 20MHz

DOC. NO. : SM18-PS-006

REV. : 0

DATE : 06.10.92

ADJUSTMENT PROCEDURE FOR SM18

OBJECT : To adjust system clock frequency.

EQUIPMENT NEEDED : Frequency counter or Oscilloscope capable of frequency measurement up to 30 MHz.

PROCEDURE :

1. Disassemble unit by removing screws (6) on bottom cover.
2. Power on unit.
3. Place probe of counter/scope at pin 9 of U2. If frequency measured is out of specified range (19.8-20.2MHz), replace C5,C6,X1 until counter/scope reading is within specification.
4. Reassemble unit.

PREPARED BY : D. FONG

APPROVED BY :

DIST : QAM, ASSEMBLER [SL]

FILENAME : \ED$01\SM18

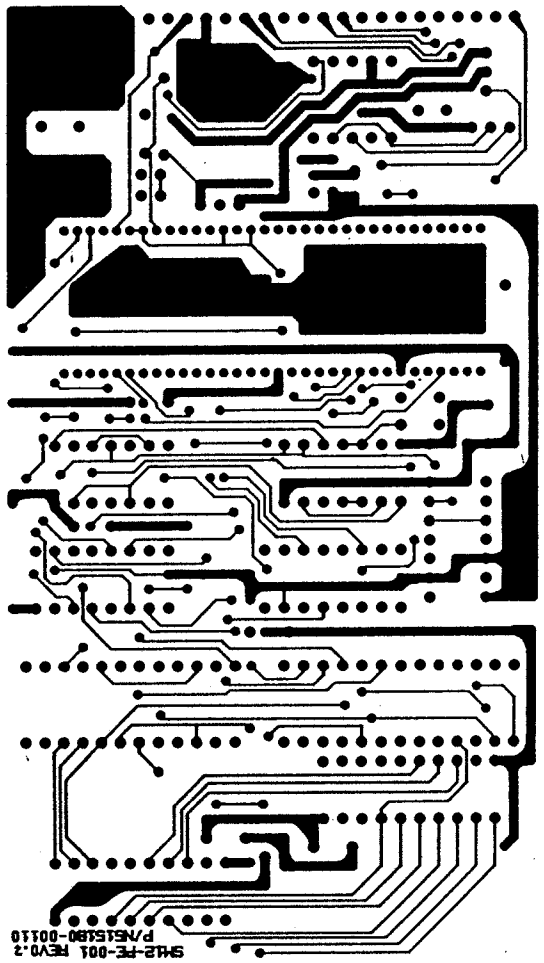
PROJECT : SM18
DOC. NO. : SM18-PS-009
REV. : 0
DATE : 29.12.92
C.C. : QA, ED

SM18 TROUBLE SHOOTING CHART

SYMPTOMS		HINTS FOR TROUBLE SHOOTING
1. Module cannot connect with unit	i)	Check PIO connector is good.
	ii)	Check VCC is 5V ±10%. Check Q1,Q2,U1,R1,R3,R4,C1 & C2 are functionally good.
	iii)	Check no broken wires/traces.
	iv)	Check no short circuit.
	v)	Check U2 pin8 rises from low to high with a time delay when power is just on.
	vi)	Check U2 pin 9/10 are oscillating.
	vii)	Check all the ICs are functionally good.
2. Excessive current drain	i)	Check no short circuit.
	ii)	Check C1,C2 & C9 are functionally good.
	iii)	Check delay line is functionally good.
3. Improper response	i)	Check PIO connector is good.
	ii)	Check no broken wires.
	iii)	Check all the ICs are functionally good.
4. Module cannot disconnect with unit.	i)	Check no short circuit around PIO connector. Q1 & Q2.

Filename : /ED#10A/SM18PS009

KW Chan



3RD ANGLE PROJECTION	SIGNATURE		DATE
TOLERANCES	DRAWN BY:		21-1-91
DIM. : ANGLE:	CHECK BY:		30-1-91
SCALE: 2:1 UNIT: M.M.	ENGRG AUTH		4.2.91
QUANTITY :	Q.A. APPD.		4.2.91
SHEET OF	R.D. APPD.		4.2.91

0.2

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

Saltek

TITLE: Logic PCB Layout Solder side

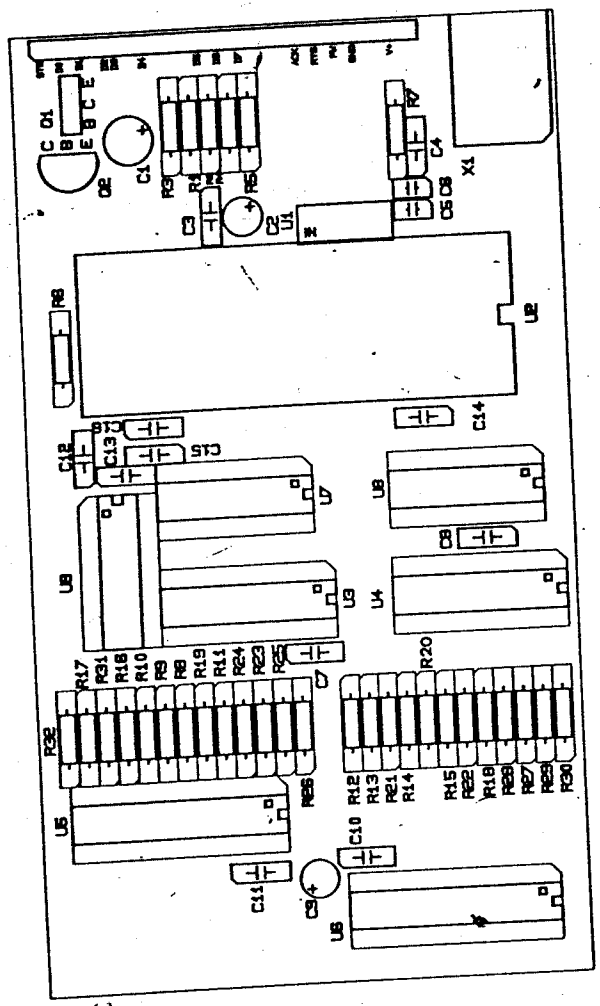
DWG. NO.: SM2-PE-00155

PROJECT: SM2V

P/N.: 5158180-00110

MATERIAL

FINISH



3RD ANGLE PROJECTION	SIGNATURE		DATE	REV.	ITEM	DESCRIPTION OF CHANGE WAS	DESCRIPTION OF CHANGE IS	DATE	DRAWN	CHECK	APPROVED ED	APPROVED QA	APPROVED RD
TOLERANCES	DRAWN BY:	Joseph	21-1-91	a1	x1	change location		21/1	DP				
DIM. : ANGLE:	CHECK BY:	RLo	20-1-91										
SCALE: 2:1 UNIT: M.M.	ENGRG AUTH	KW	4-2-91										
QUANTITY :	Q.A. APPD.												
SHEET OF	R.D. APPD.		30.1.91										

Saitek

TITLE: Logic PCB Component layout (Component side)

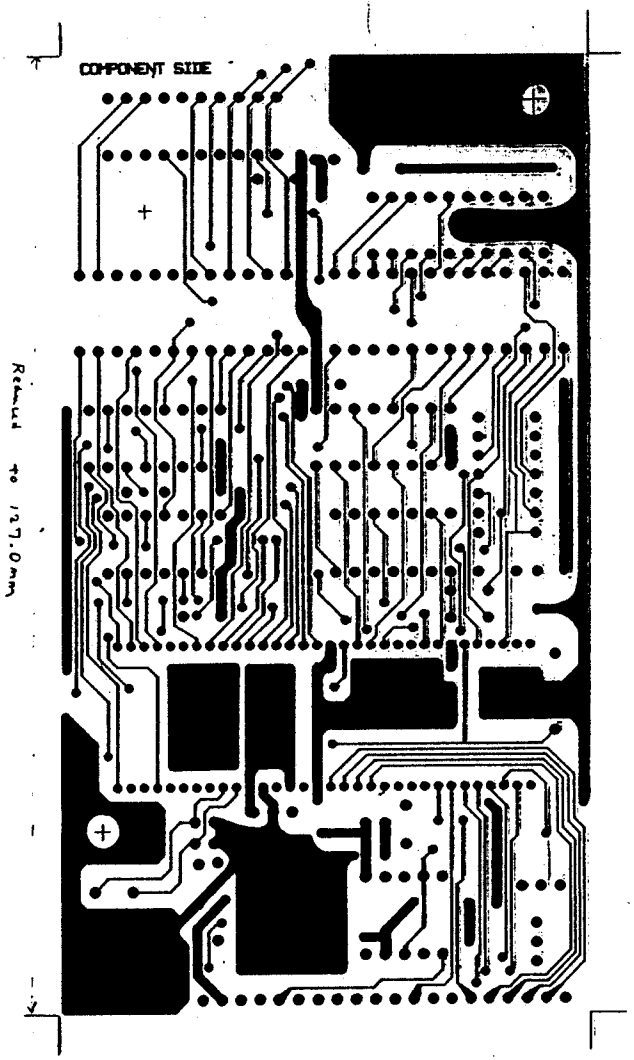
DWG. NO. : SM12-PE-00102

PROJECT: SM12

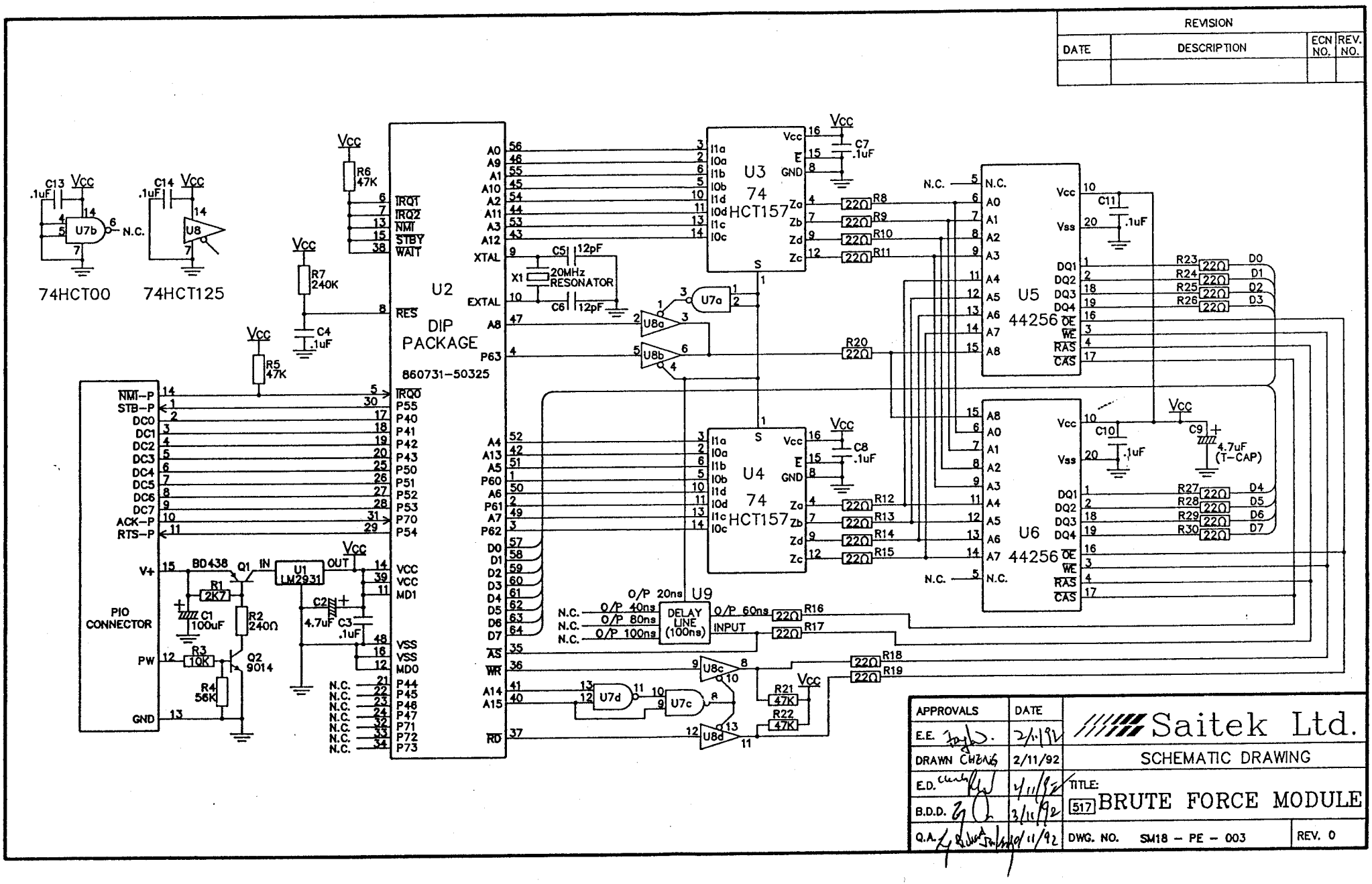
P/N. :

MATERIAL

FINISH



ORIGINAL


REVISION
DATE
DESCRIPTION
ECN NO.
REV. NO.
74HCT00
74HCT125
U2
DIP PACKAGE
860731-50325
U3 74 HCT157
U4 74 HCT157
U5 44256
U6 44256
U9 DELAY LINE (100ns)
U1 LM2931
BD438
PIO CONNECTOR
20MHz RESONATOR
4.7uF (T-CAP)
Saitek Ltd.
SCHEMATIC DRAWING
TITLE:
517 BRUTE FORCE MODULE
APPROVALS
DATE
E.E.
DRAWN CHENG
2/11/92
E.D.
B.D.D.
Q.A.
DWG. NO. SM18 - PE - 003
REV. 0

SAITEK

BILL OF MATERIALS

PROJECT : SM18 (BRUTE FORCE MODULE)

ART.NO. : 517

SHIP VER. : EV

REVISION : 2.3 FILENAME : \ED#02B\SM18

REVISION HISTORY

REVISION	DATE	BY	DESCRIPTION OF CHANGES
0	13.05.92	D. FONG	New Release.
1	09.07.92	D. FONG	Change Component.
1.1	23.07.92	D. FONG	Change Component
2	03.08.92	D. FONG	Update Manual/Giftbox.
2.1	14.09.92	D. FONG	Foam pad added.
2.2	24.09.92	D. FONG	Change Component.
2.3	02.10.92	D. FONG	Add IC socket.

so that we can put in the chip later & can move up the guts assembly earlier

RELATED DOCUMENTS REV

Schematic dwg : SM18-PE-003 0

Prepared BY : _____ Approved by : _____ EM
D FONG

Distribution :
+1.00 [ ] BDD1, MMM, CM ; QAM, Store, Assembler [ ]
+0.10 [X] MMM ; QAM, Store, Assembler [SZED→SWL]
+0.01 [ ] BDD1, MMM

Date issue :- 7 OCT 1992

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

995170-11EV - SM18,EV BRUTE FORCE MODULE Rev : 2

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
1			985170-00000	1		UNIT ASSEMBLY,FOR SM18	1.000	
2			915170-00001	1		GUTS ASSEMBLY-LOGIC	1.000	
3	1		515180-00110			PCB,LOGIC,DS,1.6MM,FR4	1.000	
3	2		860731-50325		RC	MICROPROCESSOR,SM18,DIP	1.000	
3	3		822100-44256		RC	DRAM,44256,256KX4,100NS,CMOS	2.000	U5,U6
3	4		822080-44256		RC	DRAM,44256,256KX4,80NS,CMOS	.000	U5,U6 ALT.PART
3	5		740655-00000		RC	TTL,-00,QUAD 2-INPUT NAND GATES,HCT	1.000	U7
3	6		741015-00125		RC	TTL,-125,QUAD BUFFER/LINE DRIVER,HCT	1.000	U8
3	7		741220-00157		RC	TTL-157,QUAD 2-INPUT MULTIPLEXER HCT	2.000	
3	8		690001-02931		RC	ELECT,REGULATOR,5V,150MA,TO-220,LM2931AT	1.000	U1
3	9		642000-03250		RC	RESONATOR,20MHZ,50PPM	1.000	X1
3	10		670190-14CB0		RC	TRANSISTOR,NPN,9014,C,CENTRE B	1.000	Q2
3	11		67128D-43800		RC	TRANSISTOR,PNP,BD438,CENTRE C	1.000	Q1
3	12		690012-00000		RC	ELECT,DELAY LINE,100NS,14PIN DIL	1.000	U9
3	13		62104K-01611			CAPACITOR,C-CAP,0.1UF,+/-10%,16V	9.000	C3,4,7,8,10-14
3	14		62107Z-01615			CAPACITOR,E-CAP,100UF,+80-20%,16V	1.000	C1
3	15		62475Z-01615			CAPACITOR,E-CAP,4.7UF,+80-20%,16V	1.000	C2
3	16		62475K-01012			CAPACITOR,TAN-CAP,4.7UF,+/-10%,10V	1.000	C9
3	17		62120J-05014			CAPACITOR,C-CAP NPO,12PF,+/-5%,50V	2.000	C5,C6
3	18		612725-31102			RESISTOR,FIXED C-FILM,2K7,5%,1/4W	1.000	R1
3	19		612415-31102			RESISTOR,FIXED C-FILM,240,5%,1/4W	1.000	R2
3	20		611035-31102			RESISTOR,FIXED C-FILM,10K,5%,1/4W	1.000	R3
3	21		615635-31102			RESISTOR,FIXED C-FILM,56K,5%,1/4W	1.000	R4
3	22		614735-31102			RESISTOR,FIXED C-FILM,47K,5%,1/4W	4.000	R5,R6,R21,R22
3	23		612445-31102			RESISTOR,FIXED C-FILM,240K,5%,1/4W	1.000	R7
3	24		612205-31102			RESISTOR,FIXED C-FILM,22,5%,1/4W	21.000	R8-R20,R23-R30
3	25		229910-02300			METAL,HEAT SINK,ALUMINIUM,PS2	1.000	
3	26		000140-64178			IC SOCKET,DIP,64 PINS,1.78MM	1.000	FOR MCU
2			915170-00007	1		GUTS ASSEMBLY-CONNECTOR	1.000	
3	27		51520A-01972			PCB,CONNECTOR,D.S,FR4	1.000	
3	28		000190-00004		RC	CONNECTOR,EDGE,FEMALE,15 PINS	1.000	
3	29		000030-00430			SYNN ARRAY,N=19,L=90MM,P=2.54MM,E=3.5MM	1.000	
2			965170-00000	1		CASING & PACKING ASEMBLY,FOR SM18	1.000	
3	30		000073-22534			SCREW,S/T,+PAN,M3.0X8MM,BT	6.000	FOR CAB
3	31		295150-00900			SPACER STRIP,M6A,63.5X13,FOR LCD HOLE	1.000	
3	32		295200-01100		RC	SPEAKER NETTING FELT,M6L	1.000	
3	33		000071-20524			SCREW,M/S,+PAN,M3.0XP0.5X6MM,FLAT	1.000	FOR HEAT SINK
3	34		000110-00050			NUT,M3.0XP0.5X1.8MM,MILD STEEL	1.000	FOR HEAT SINK
3	35		000073-91414			SCREW,S/T,+WASHER,M2.6X5MM,A	2.000	FOR PCB
3	36		225180-00700		RC	METAL,ZINTEC SWEET,SPY, BLACK,SM18	1.000	
3	37		000073-21434			SCREW,S/T,+PAN,M2.6X8MM,A	2.000	FOR ZINTEC
3	38		295150-00900			SPACER STRIP,M6A,63.5X13,FOR LCD HOLE	1.000	
3	39		000090-00070			FOAM PAD,72X22X15MM	1.000	
3	40		000090-00080			FOAM PAD,35X16X15MM	1.000	
3	41		000090-00240			FOAM PAD,33X6.4X5.2MM,ADHESIVE	2.000	
3			95517D-00000	1		CABINET SET, FOR SM12 MODULES	1.000	
4	42		215200-00306		RC	PLASTIC,T.CAB,HIPS,BLACK	1.000	

SAITEK PRODUCT COSTING - SAITEK BOM FORMAT Run : 02
Prog: PS

995170-11EV - SM18,EV BRUTE FORCE MODULE Rev : 2

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
4	43		215200-00405		RC	PLASTIC,B.CAB,HIPS,BLACK	1.000	
4	44		215200-00500		RC	PLASTIC,BATT.LID,HIPS,BLACK	1.000	
3	45		465200-04000			ACCESSORY,BUBBLE BAG,500X175MM,FOR M6L	2.000	
3	46		000122-10130			POLYBAG,210X130X0.045MM	1.000	FOR MANUAL
3	47		325170-00800		RC	OVERLAY FOR SM12,FRONT PANEL,LEXAN	1.000	
3	48		455230-04600			CARTON,FOR MD-10,20PCS/CTN	.050	
1			975170-10EV	1		OPTIONS ASSEMBLY,EV,FOR SM18	1.000	
2	49		335170-00200		RC	RATING PLATE,FOR SM18,PVC,SWL,CN	1.000	
2	50		415170-01100		RC	MANUAL,FOR SM18,ENGLISH,SWL	1.000	
2	51		425170-41100		RC	GIFTBOX,FOR SM18,E/G/F/D,SWL	1.000	
2	52		430004-51000		RC	CARD,WARRANTY,E/G/F/D/S,SWL,CHESS	1.000	

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.

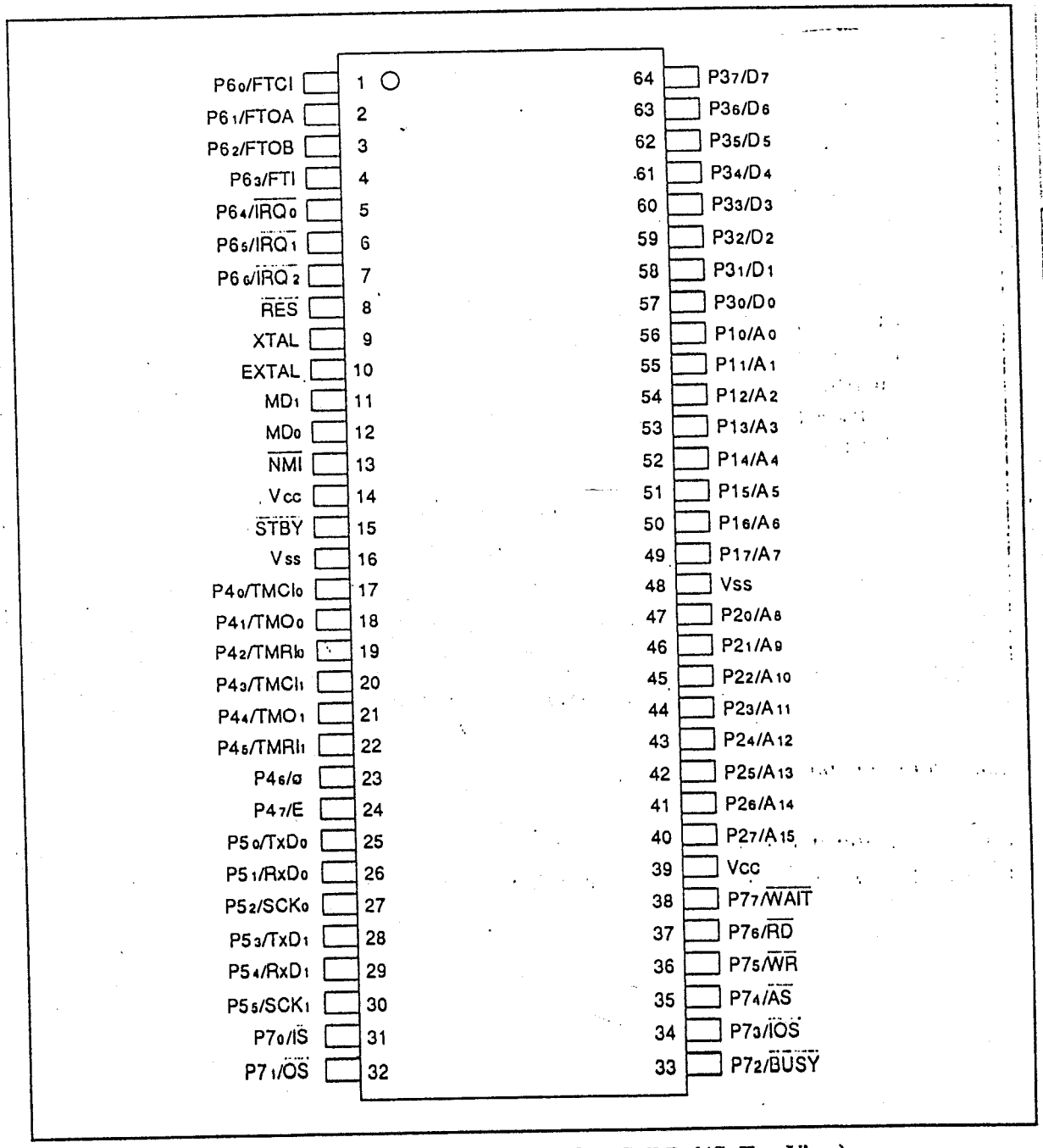
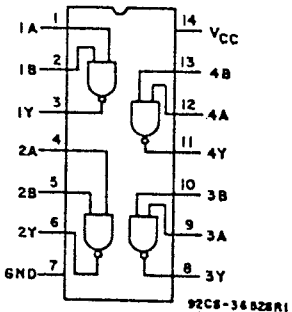


Figure 1-2. Pin Arrangement (DC-64S, DP-64S, Top View)

High-Speed CMOS Logic



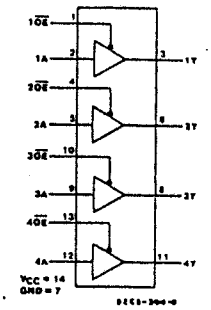
FUNCTIONAL DIAGRAM AND TERMINAL ASSIGNMENT

Quad 2-Input NAND Gate

Type Features:

- *Buffered inputs*
- *Typical propagation delay = 7 ns @ V_{CC} = 5V C_L = 15 pF, T_A = 25° C*

High-Speed CMOS Logic



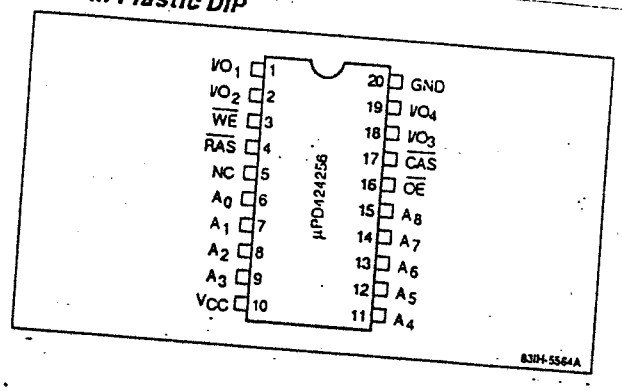
FUNCTIONAL DIAGRAM

Quad Buffer, 3-State

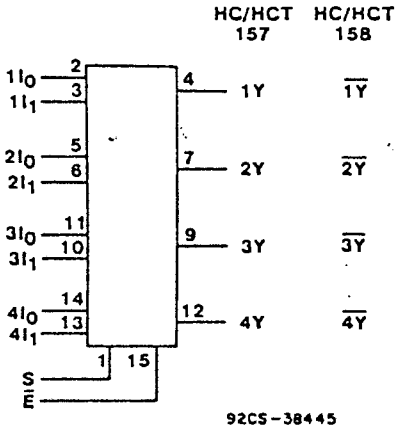
Type Features:

- *Separate output enable inputs*
- *3-state outputs*

20-Pin Plastic DIP

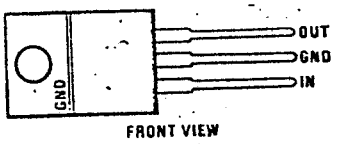


High-Speed CMOS Logic



FUNCTIONAL DIAGRAM

TO-220 3-Lead



Order Number LM2931AT-5.0
See NS Package T03B

8. FUNCTIONAL TEST PROCEDURE FOR BRUTE FORCE MODULE

8.1 Functional test with SW6/SW6.1/SW7

Purpose	Procedure	Observation
1. Preset SW6/SW6.1/SW7	- Power up SW6/SW6.1/SW7 (by pressing ACL)	- "Module" LED is OFF
	- Press LEVEL	- Red solid "A1" LEDs (SW6/SW6.1) or "A3" LEDs (SW7) come on
	- Press STOP	- All LEDs come off
2. Check SM18 connection	- Install SM18 into SW6/SW6.1/SW7	
	- Press GO	- "Module" LED is ON
3. Check SM18 level F1	- Press LEVEL	- Red solid "F1" LEDs come on
	- Press NORMAL	
4. Check CHECKMATE	- Press NEWGAME	
	- Press ANALYSIS	
	- Move F2, F4, E7, E5, G2, G4	
	- Press PLAY	
	- Move D8, H4	- "Check, end" LEDs come on.
5. Remove SM18	- Press STOP	- All LEDs come off
	- Reinstall SM18 into SW6/SW6.1/SW7	
	- Wait for 10 seconds	
	- Press GO then press LEVEL	- Red solid "E1", and "module" LEDs come on
6. Finish	- Press STOP	- All LEDs come off
	- Remove SM18	

8.2 QC test mode on SM18

A. Objective

- To check ROM, RAM and DRAM
- To check data / address / CE / OE / V+ / GND lines

B. Procedure

1. Connect an electronic device (No. M6A-PE-001) to SM18 to enable QC test mode. SM18 program will execute the internal RAM/ROM, DRAM and PIO check.
2. Switch on the tester via a +9V DC 300mA adapter.

C. Result

1. DATA LINE LEDs 1-8:
   - Scanning one by one in cycle (2-3 sec. per second) then all.

   Cycle LEDs A & B:
   - Change one state after data line LEDs having completed one scanning cycle.

   NMI LED V+, GND:
   - Normally off, lights up (fail) if the pin is shorted to either V+ or ground.
2. After scanning DATA LINE LEDs
   LED 1, 2, 3, 4, 5, 6, 7, 8
   - Should light up simultaneously for 6 seconds.

8.3 Burn-in test for production line

This test is mainly an actual functional test on the module that execute automatically with SW6/SW6.1/SW7 connected together.

Procedure	Observation
1. Connect the module (after casing) to the SW6/SW6.1 installed with a special self play ROM or to SW7 (OSA1.4 H0317.B autoplay function for SW6/SW6.1)	
2. Power up the unit	- Module LED turn on
3. Press LEVEL	- Red solid "F1" LEDs come on
4. Press NORMAL	
5. Press FUNCTION, SETUP, NEW GAME for SW6/SW6.1. Press PAWN, FUNCTION, LEVEL, NEW GAME for SW7 The computer will start playing for both sides automatically.	
6. Press INFO Watch for any hang up, disconnection within burn-in test.	
7. Observe the module LED	- Module LED should still be on and white or black LED blinks
8. Press PLAY before exiting the test	- White/Black LEDs toggle. Module LED should still be on.
9. Press STOP to exit the test	
10. Remove the module	

Note:
If the module LED turns off within the burn-in test or after pressing PLAY in step 8, the unit fails.
Test in production : burn-in for 4 hours.
Test for QA : burn-in for 4 hours.

Saitek™

4 Bridge Studios, 318-326 Wandsworth Bridge Road, London SW6 2TZ, England

Tel: (71) 731-7596/8
Fax: (71) 731-7684

Fax to	KUPFER ELECTRONICS	Date	16-Dec-92
Attn	RUDI KUPFER	Ref. No.	1219
From	BARBARA SCHMIDT	Page	1 of 1

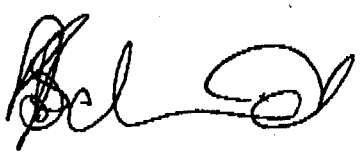
SUBJECT: OSA UPGRADE

The Brute Force Module will work on *all* Galileo and Renaissance computers. It will work on the *newer* Leonardo's. However there are some older Leonardo's out there that will require an upgrade to our "OSA 1.4" standasrds to work with the Brute Force Module.

The OSA upgrade is only necessary on the older versions of the Leonardo. Unfortunately you are not able to tell which Leonardo machines require upgrading by looking at the serial numbers. The easiest way to test is to try a Brute Force Module on it. If the Leonardo does not recognize the Brute Force (ie: the MODULE LED does not light), you can upgrade the EPROM inside the Leonardo to OSA 1.4.

The part to do this is available as spare part #850180-800SA (EPROM, SW6.1, SW61-OSA14-510) directly from Hong Kong at US$14.51.

Best Regards



Barbara

	NGG	KH								
C.C.										