H/Z37 H89 SOFT SECTOR CONTROLLER 11/86

Thank you from purchasing this H37 double density soft sector controller for your H/Z89/90 computer system. Since this board is no longer available from Zenith, we did our own production run, just as we did for the soft sector board for the H8 a few years ago. The board is functionally identical to Heaths, although some parts and board layout have changed somewhat. If you remember the original Heath boards sold for $495 (I believe), your $195 is a super buy. We were able to keep the price down in several ways:

1) We second sourced many parts getting them at a better price than Heath could.

2) Parts prices have dropped since the original design; i.e., the WD1795 originally went for over $50, this part is now around $15.

3) In some cases, we used parts left over from our H8 soft sector controller and "made them fit" the board. Although the appearance may not be the best in all cases, the board will operate correctly.

4) Whereas Heath supplied all "extra parts" (i.e., heat sinks, heavy duty regulators, etc.) whether needed or not, we broke them up into separate package items so those not needing them did not have to pay for them.

In any case, we guarantee the board to operate properly and will warranty the board for a full year (vs Heaths 90 days). All repairs will be done at Quikdata by our technicians.

Please note that in order for this board to be used in the H/Z89/90 **these parts must be present in the computer:**
I/O DECODE ROM AT U550 MUST BE P/N 444-61
MONITOR CODE ROM (MTR-90) AT U518 MUST BE 444-82 or 444-142
SECONDARY ADDRESS DECODER AT U516 MUST BE 444-83
JUMPER WIRE BETWEEN CENTER PIN OF JJ506 (or JJ505) AND PIN 14 OF P508
78H12 REGULATOR required on power supply at U103 if internal drive is installed
78H05 at U101 on power supply if more than the H37 card is on the right slot

Notes: The 78H05 is a 5 Amp 5V regulator providing more current to the CPU board. If this mod has been installed, there should also be three heat sinks on the power supply heat sink assembly – one on each regulator. If not, the heat sinks and the 78H05 should be installed. Newer machines, machines with the Z67, Z37 or Z47 mods previously installed should already have these parts installed. This power supply mod is generally a good mod to install in all H89's anyway.

Following is a price list of all parts available from Quikdata for the H37 board:

H37 BARE BOARD ONLY - no manual, parts, etc.	$ 50	H37BB
H37 KIT of hard to find parts (see below).	100	H37K
H37 soft sector controller board	195	H37
H37 ROM SET 444-142, 444-83, 444-61, JUMPER	45	H37ROM
REGULATOR UPGRADE (78H05 & 3 heat sinks)	19	H89PUG

DISK DRIVE CABLES from card to internal drive(s) and external drive(s) can be purchased from Quikdata. Refer to our current catalog for cable prices and availabilities. Cables can be made to any specifications upon request.

Included with the controller set for $195 is the assembled and tested controller set, instruction manual set, 16pin dip jumper cable, diagnostic disks, H17 and H37 format with HDOS driver on H17 disk. It does not come with any disk drive cables.

Included in the kit (**H37K**) is bare board, manual, diskettes, 16 pin jumper, and hard to find parts such as edge connectors, PALs, odd resistor packs, odd capacitors, oscillator, ferrite beads, etc. There is no assembly manual for the H37 board. We advise this option only if you are familiar with building kits from scratch, have some good test equipment, hopefully have another board you can refer to, and you know what you are doing!
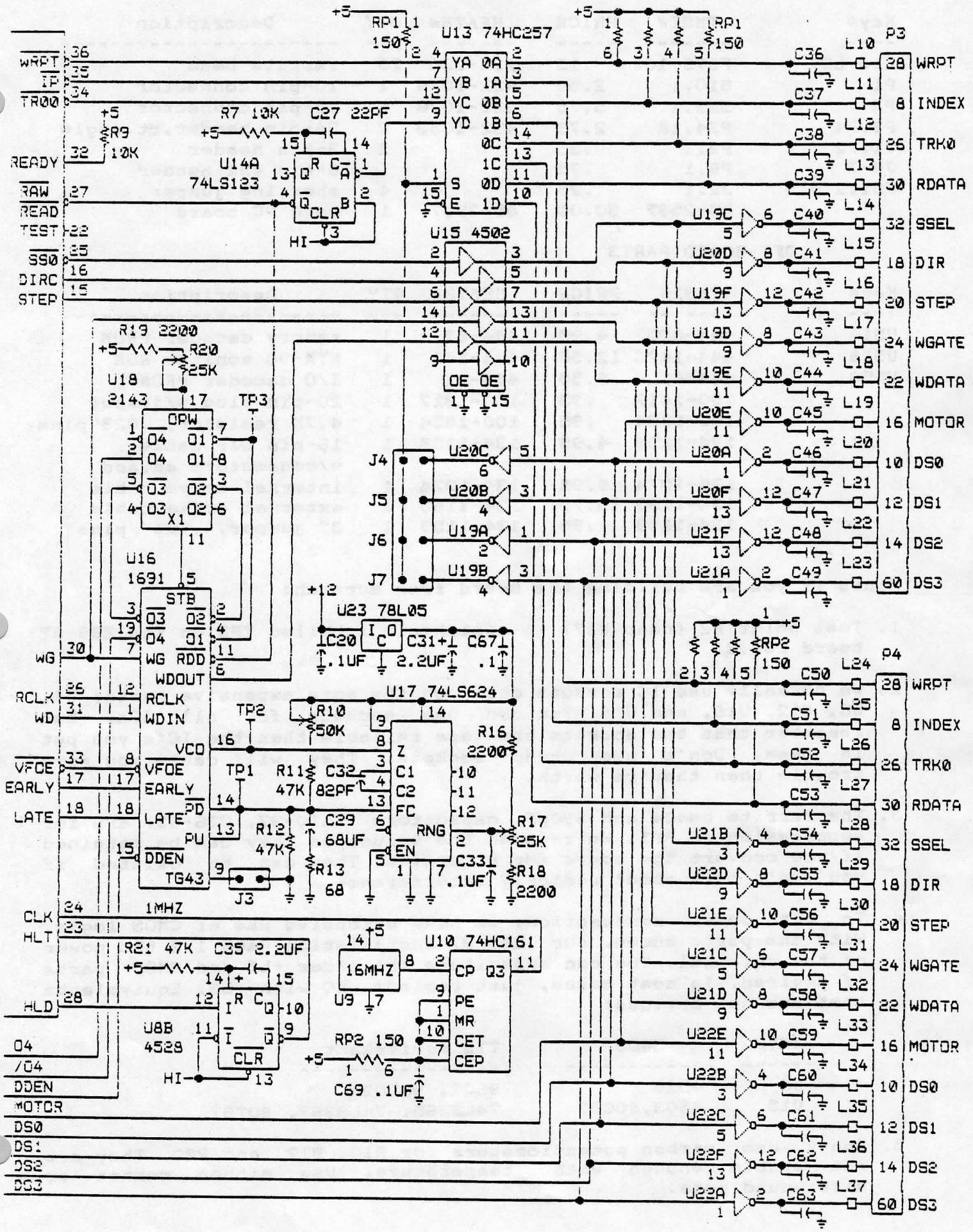
APPENDIX A
Z89-37 PARTS LIST

This is the parts list for the TMSI Z89-37. The Key# is the part designation on the board. Equivalent Heath part numbers are given. When ordering parts, please identify them as described below. Parts are available from TMSI. Prices shown are in effect at the time of printing, and may be changed without notice.

INTEGRATED CIRCUITS

Key#	TMSI#	PRICE	HEATH#	QTY	Description
U1	74HC245	1.95	443-885	1	octal bus driver
U2	74HC240	1.50	443-754	1	octal 3-state inverter
U3	74LS148	.75	443-912	1	8-bit priority encoder
U4	444-82	9.50	444-82	1	custom programmed PAL
U5	74LS03P	.45	443-745	1	quad OC NAND gate
U6	444-81	9.50	444-81	1	custom programmed PAL
U7	74HC74	.75	443-730	1	dual D flip-flop
U8	4528B	.75	443-727	1	dual one-shot
U9	LOCO2-16	4.95	150-107	1	16MHz crystal osc.
U10	74HC161	1.25	443-757	1	4-bit binary counter
U11	74HC273	1.95	444-805	1	octal latch
U12	WD1797	7.95	443-997	1	floppy disk controller
U13	74HC257	.75	443-799	1	quad multiplexer
U14	74LS123	.50	443-90	1	dual one-shot
U15	4503B	.75	443-857	1	hex buffer
U16	WD1691	6.00	443-998	1	floppy support logic
U17	74LS624	2.45	443-999	1	volt-controlled osc.
U18	WD2143	5.50	443-1000	1	4-phase clock gen.
U19-22	7406	.35	443-73	4	hex OC inverter
U23	78L05	.50	442-627	1	+5 voltage regulator

RESISTORS AND CAPACITORS

Key#	TMSI#	PRICE	HEATH#	QTY	Description
R1,4,5	102R5.25	.05	6-102-12	3	1K 1/4W 5% carbon film
R2,3,7,9	103R5.25	.05	6-103-12	4	10K " " " "
R6	105R5.25	.05	6-104-12	1	100K " " " "
R10	504RP1	1.45	10-1180	1	50K cermet pot
R11,12,21	473R5.25	.05	6-473-12	3	47K 1/4W 5% carbon
R13	680R5.25	.05	6-680-12	1	68 ohm " " " "
R16,19,21	222R5.25	.05	6-222-12	3	2200 1/4W 5% carbon
R17,20	254RP1	1.45	10-1154	2	25K cermet pot
RP1,2	RP151.5	.50	9-120	2	5x150 SIP res.network
C1-12,14,20, 22,25,28,33,34,67,69	104C250	.20	21-192	21	.1uF 20% ceramic
C15,17,65, 66,68	106C16	.49	25-841	5	10uF 16v electrolytic
C21	332C50	.39	21-141	1	.0033 uF mono. ceramic
C27	330C50	.39	20-96	1	22 pF 10% NPO ceramic
C29	684C25	.75	27-217	1	.68uF 10% polyester
C31,35	226C15	.35	25-195	2	2.2uF 16v tantalum
C32	820C50	.35	21-744	1	82 pF 10% NPO ceramic
C36-C63	392C100	.30	21-773	28	390 pF ceramic

P1

GND	1
D0	2
D1	3
D2	4
D3	5
D4	6
D5	7
D6	8
D7	9
GND	10

U1 74LS245

U12 1797

A0 B0	DAL0 7
A1 B1	DAL1 8
A2 B2	DAL2 9
A3 B3	DAL3 10
A4 B4	DAL4 11
A5 B5	DAL5 12
A6 B6	DAL6 13
A7 B7	DAL7 14
CS DIR	

U2 74LS240   U3 74LS148   U4 444-82   P5

GS I0
E0 I1
A0 I3
A1 I4
A2 I5
E1 I7

O1 I1
O2 I2
O3 I3
O4 I4
O5 I5
O6 I6
O7 I7
O8 I8
I10
I9

TO U557

U7B 74HC74

S Q D
R T
HI

+12 40 VDD
+5 21 VCC

10K R2   R3 10K

U5B 74LS03
38 DRQ

39 INTRQ

U5A 74LS03

U5C 74LS03

P2

2MHZ	13
A0	3
A1	4
A2	5
READ	6
WRITE	7
ODSK	12
OFLP	11
RESET	15

+5 R4 1K

5 A0
6 A1

U5D 74LS03
+5 R5 1K

J1 170 174

U6 444-81

I1 O1 19
I2 O2 13
I3 O3 17
I4 O8 12
I5 I10 11
I6 O4 16
I9 O7 13
I8 O5 15
I7 O6 14

2 WE
4 RE

37 DDEN

19 MR

J2 170 174

R1 1K
HI SOURCE

+5V 1 +5V SOURCE
+5V 23
C17 10UF

+12 21 +12V SOURCE
+12 24
C15 10UF

U7A 74HC74
S Q D
R T

20 VSS

3 CS

U11 74LS273

D0	Q0	O4
D1	Q1	/O4
D2	Q2	DDEN
D3	Q3	MOTOR
D4	Q4	DS0
D5	Q5	DS1
D6	Q6	DS2
D7	Q7	DS3
CLK R		

C21 .0033UF
R6 100K
U8A 4528
R C Q
I CLR Q
HI

OTHER ON-BOARD PARTS

Key#	TMSI#	PRICE	HEATH#	QTY	Description
L10-L37	FB73-101	.15	235-230	28	ferrite bead
P1	S10.1	2.50	432-1074	1	10-pin connector
P2	S25.1	5.75	432-1076	1	25-pin connector
P3,P4	P34.1R	2.75	432-1053	2	34-pin header,rt.angle
J1,J2	P3.1	.35		2	3-pin header
J4-7	P8.1	.75		1	8-pin 4x2 header
JS1,2,4,5	J2.1	.25		4	shorting jumper
	85-2597	30.00	85-2597	1	bare PC board

OFF-BOARD PARTS

Key#	TMSI#	PRICE	HEATH#	QTY	Description
U516	444-83L	4.95	444-83	1	memory decoder PROM
U518	444-142C	12.50	444-142	1	MTR-90 monitor ROM
U550	444-61L	8.50	444-61	1	I/O decoder PROM
	100-1817	.95	100-1817	1	20-pin plug w/jumper
	100-1834	.95	100-1834	1	4.7K resistor, .025"pins
	134-1158	4.95	134-1158	1	16-pin DIP cable, w/connectors ea.end
	134-1074	8.95	134-1074	1	internal drive cable
	134-1163	15.75	134-1163	1	external drive cable
	134-1159	.95	134-1159	1	3" jumper, .025" pins

Hints if you are building the board from scratch:

1. Test point #2 (near U17) is mistakenly labelled TP3 on the Z89-37 board rev.B.

2. We normally use IC sockets only on the more expensive parts; U4, U6, U12, U16, and U18. You can use sockets for all ICs, but remember that the sockets are less reliable than the IC's you put in them. Don't use cheap sockets. They will cause you more trouble than they're worth.

3. The ferrite beads and 390pF capacitors (L10-37, C36-63) are for suppression of RFI. We reduced the values so they can be retained if you convert the board for 8" drives. They can be omitted if you don't care about radio/TV interference.

4. To cut power consumption, we make extensive use of CMOS logic. With the parts shown, our Z89-37 installation uses 1/2 the power of the original. You can substitute the older -LS and NMOS parts if desired. In most cases, just replace -HC with -LS. Equivalents that are not obvious:

KEY#	CMOS	TTL equivalent
U8	4528	9602, 96L02
U15	4503,80C97	74LS365, 74LS367, 80T97

5. Don't use carbon potentiometers for R10, R17, and R20. They are not stable enough with temperature. Use either cermet or wire-wound pots.
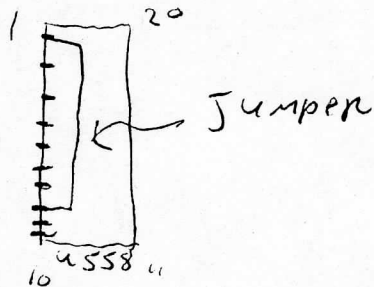
FOR H37

REMOVE IC AT U558

INSTALL A JUMPER WIRE BETWEEN

PIN 1 AND 8