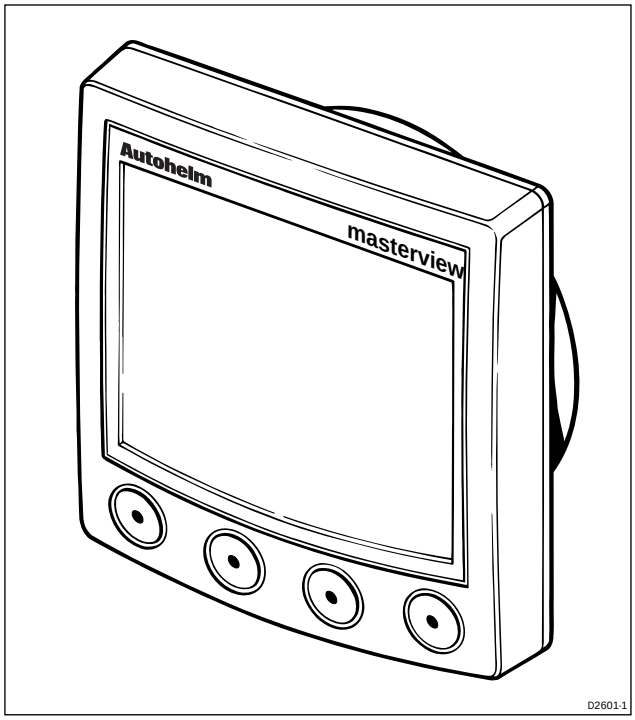

Z211 ST80 Masterview Service Procedures

CE MARKING OF EQUIPMENT / REPLACEMENT PARTS

WARNING

If the Autohelm equipment under repair, test, calibration, installation or setting to work carries the European CE mark, only parts and components supplied or approved for such use by Autohelm should be used in order to maintain compliance with the relevant CE requirements.

Incorporation, use or attachment, by any means, of parts or components not supplied for or not approved for such use by Autohelm or, if supplied or approved for use by Autohelm, not properly fitted in accordance with instructions published, provided or recommended by Autohelm, may cause the equipment to malfunction and, in particular, to become unsafe or to no longer meet the relevant CE requirements. In these circumstances, Raytheon Marine Europe Ltd excludes liability to the fullest extent permissible in law for any loss or damage including any liability for its contribution to such loss or damage by its negligent acts or omissions .

Contents

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Z211

1. Description

The item covered by this section of the Maintenance Manual is the ST80 Masterview Head, Product Code Z211.

Masterview is a multifunction instrument which displays SeaTalk data in alphanumeric and graphic formats.

2. Operation

There are no operational activities required to set up or calibrate the Masterview for testing except as detailed in Chapter 5.

3. Disassembly

Refer to Figure 1, Exploded View.

1. Unscrew and remove the six No. 2 x 1/2 screws (6). Separate the rear cover (5) from the front cover (1) using the ST80 Case Separation Tool (T041).
2. If an ST80 Case Separation Tool is not available, separate the covers by hand. To avoid shattering the case, DO NOT use screwdrivers or other tools to prise the covers apart. (Note: If they are still attached, it is helpful to leave the brass mounting studs screwed into the unit rear cover, or to insert studs if a spare pair are available, to gain a purchase on the rear cover)
3. When handling the PCB/LCD subassembly, linen or other suitable material (*not* nylon) gloves should be worn to avoid leaving fingerprints or other marks on the front label. If gloves are not worn, handle the subassembly by the edges only. If the label is marked, clean using a soft static - free cloth only. Do not use solvents or detergents of any type. Pull the PCB subassembly (3) off the connector pins in the rear cover. Work round the PCB, lifting each side a little at a time to avoid distortion of the PCB and solder bucket connectors. Do not attempt to separate the LCD from the PCB, as it is not possible to re - align and connect the flexiconnector
4. Unplug the buzzer connector (4) from the PCB (Note: the buzzer is glued into the recess in the rear cover and is not removeable)
5. Take the keypad mat (2) out of the front cover.

4. Assembly

Refer to Figure 1, Exploded View.

1. Place the keypad mat (2) into the front cover (1)
2. See notes in Disassembly #2 on handling the PCB/LCD subassembly. Plug the buzzer connector (4) into the PCB (3). Position the PCB subassembly (3) into the rear cover (5), ensuring that the connector pins in the rear cover line up with the solder buckets on the PCB before pressing the PCB into place. Work round the edges as much as possible, pressing gently but firmly so that the subassembly settles into place a little at a time and the EL panel/LCD surround are not damaged or distorted

3. Assemble the rear cover (5) to the front cover. Hold the instrument in both hands face down and clear of the work surface. Use moderate thumb pressure, or preferably heel of the hand pressure which spreads the area of contact, to press the front cover into the rear cover a little at a time. Work first on the sides, then top and bottom and back to the sides as many times as necessary to bed down the assembly. Finally go round the edges and corners to ensure that the covers are fully mated and form a good seal
4. Insert and screw in the six No. 2 x 1/2 screws (6), using a hand screwdriver only. Start with the screws in diagonally opposite corners and finish off with the central top and bottom screws.

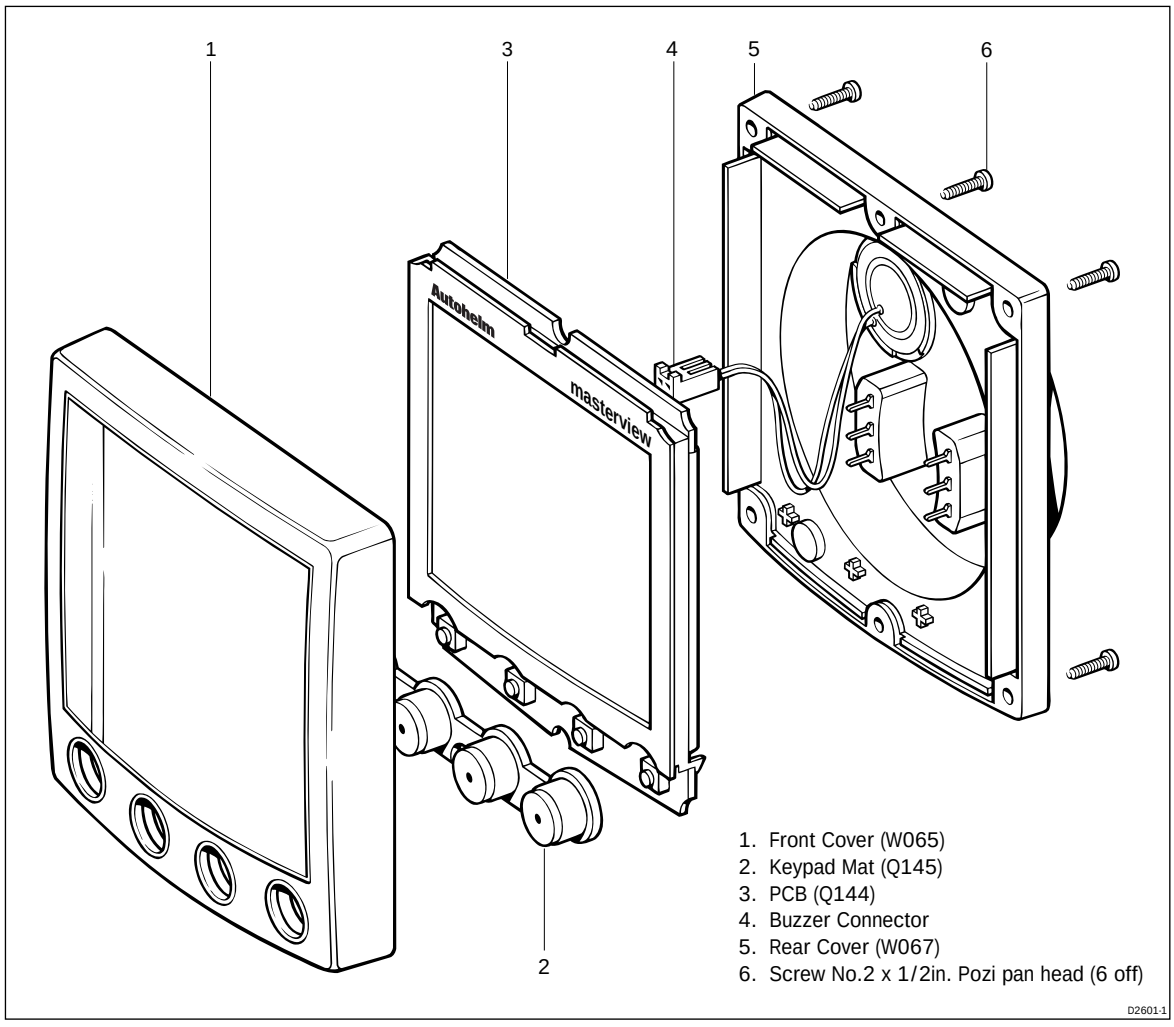


Figure 1 Exploded View

5. Functional Test

5.1 Preliminary Inspection

Before testing, inspect the instrument for physical damage (cracked or broken screen, case, bent connector pins, etc.).

Take off the rear cover and check for signs of water ingress. Check for damage to the PCB, in particular, overheating on the power supply input and output pins and PCB tracks.

Clean off any grease, dirt or deposits in or on the instrument.

Check the connectors on the rear case for corrosion and burning. Clean or replace as required.

Press each button in turn; check that all have a positive feel to the action and give an audible click when pressed.

5.2 Test Equipment

Connect the equipment as shown in Figure 2.

Before testing, ensure that the instrument is not grouped (i.e. tied in to a particular system) by carrying out the ungrouping procedure set out in the Operations manual.

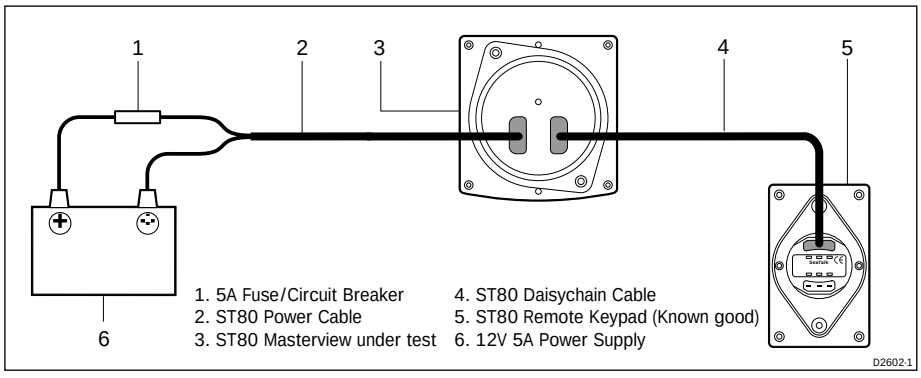
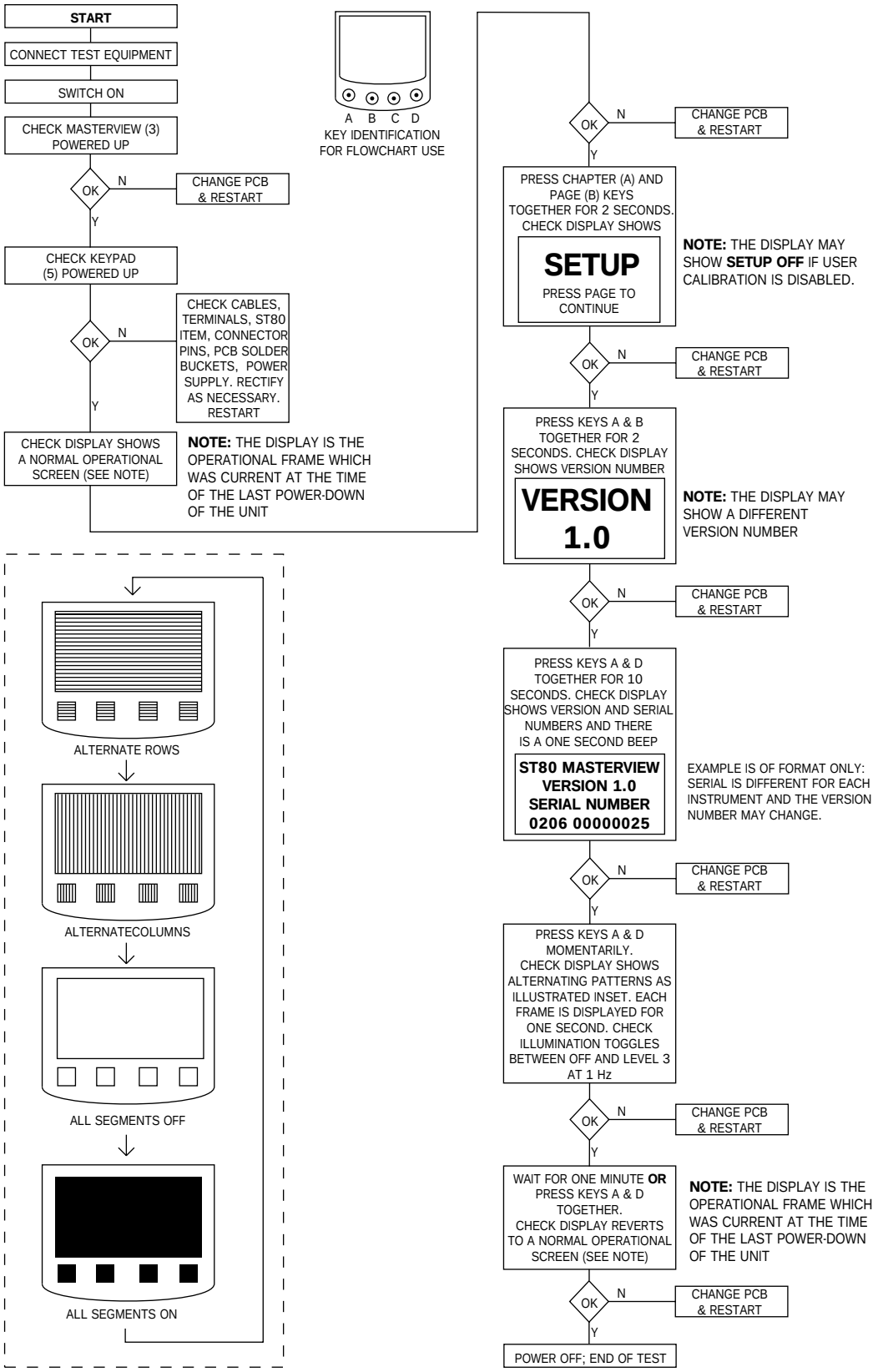


Figure 2 Test Equipment Connection

The keypad is present only to act as a receiver and transmitter of SeaTalk information and could be replaced by any known good ST80 instrument or keypad.

References to key operations in the flowchart are to Masterview keys.

5.3 Functional Test Flowchart



Z211

6. Spares Numbers

Item	Cat. No.	Part No.	Comments
Printed Circuit Board	Q154	3	
Keypad	Q149	2	
ST80 Case Separation Tool	T041		
Front Cover	W065	1	
Rear Label	W066		
Rear Cover	W067	5	

7. Circuit Description

Refer to Figure 3, Block Diagram and Figures 4 and 5, Circuit Diagram.

7.1 Power Supplies

A nominal 12V supply enters the unit on P1 or P4. A varistor placed across the supply and 0V IN (P2 and P5) provides protection against power surges and voltage spikes.

The 12V is routed as follows:

1. Through reverse protection diode D5 to IC14, a 5V regulator, and ASIC IC4, as signal VHELD
2. Through diode D4 as signal VUNREG which supplies button illumination LED drive transistors TR5, TR6, negative voltage generator IC16 via transistor TR12, buzzer BZ1 and ASIC IC4
3. Through diode D7 to electroluminescent panel driver via TR7 as signal VEL. This supply and the corresponding return 0V EL use special PCB tracks which start very close to connector pins P1, P2, P4 and P5 because of high currents when the panel is activated

IC14 provides +5V (Vcc) to the circuitry on the PCB.

Reverse diode D1 ensures a floating 0V for the circuitry by isolating 0V IN.

7.2 External Signals

SeaTalk

SeaTalk signals from P3 or P6 are routed direct to the Autohelm ASIC IC4. Incoming signals are converted by the ASIC from SeaTalk duplex line format to Received Data (DATA Rx) format for the microprocessor. Outgoing signals are converted from DATA Tx format at CMOS voltage levels to SeaTalk format at 12V level by the ASIC.

Connector Signals

Pin Nos.	Signal	
1 & 4	+12V	Nominal 12V dc
2 & 5	0V	0V Screen
3 & 6	SeaTalk	Irregular Pulse Trains, nominal 12V amplitude

7.3 Signal Processing

Microprocessor

IC13 has a clock rate of 16MHz, determined by crystal XL1.

External and internal inputs, SeaTalk data and signals from the Autohelm ASIC are processed and the appropriate commands and responses are generated by the microprocessor.

Outputs from the microprocessor to ASIC IC4 are:

1. Data for the SeaTalk bus (DATA Tx)
2. SeaTalk Enable/Disable (ST_EN)
3. Beeper enable

Other output signals include:

1. Scan signals to keypad switches SW1 - 4
2. Keypad LEDs 1 - 8 illumination through drive transistors TR5, TR6
3. LCD Contrast control is achieved by signals applied to negative voltage generator IC16 via a current amplifier/integrator formed by transistors TR3, 12 and capacitor C8. IC16 generates VEE which is supplied to the row and column LCD drivers. Contrast control signals V1 - V6 are produced by a resistor network (R17 - 21) and the four elements of current amplifier IC10. The signals are applied to LCD row driver IC9 and column drivers IC5, 6, 7, 8
4. Control (D_RES, D/L, R/W) and column/row address (L0 - L7) signals are supplied to LCD decoder/drivers IC5, 6, 7, 8, 9. Row driver IC9 also generates control signals which are applied internally and to the column drivers
5. Electroluminescent panel brightness signals are applied through the RC filter formed by R64 and C45 to the driver circuit based on transistors TR7, 20, 21 22 and 23

Data Storage

Programs and 'fixed' data (including factory - set default values) are held in FLASH MEMORY IC2.

Other data storage is provided by RAM IC15 which is supplied with a maintaining voltage from battery B1 in the event of power loss either by failure or intentional switch - off of the system.

In normal operation, both RAM and FLASH MEMORY are supplied with VCC through transistors TR18 (FLASH MEMORY) and TR11 (RAM). If the supply fails, the ASIC, IC4, issues a reset signal which cuts off TR18 via TR17.

At the same time, TR13 is cut off and stops TR11 conducting.

Battery B1 supplies RAM IC15 through diode D16, thus preserving the data in the memory for the next power - up.

The reset signal ($\overline{\text{RESET}}$) to the RAM is protected from spurious triggering by integrator C31/R57 on the input to transistor TR10.

Checks on the charge state of battery B1 are made by signal B_SENSE applied to transistor TR19, which generates signal B_LEVEL to ASIC IC4.

Autohelm ASIC

The ASIC is a custom-designed IC which provides specific facilities and functions. These are:

1. Conversion of duplex SeaTalk data to Transmit and Receive format (STDATA)
2. Beeper drive signals
3. Monitoring of VHELD, VUNREG and VCC, giving an orderly shutdown of the software in the event of supply failure or intentional switch-off, via signal PWR_FAIL
4. Watchdog timing (WDOG)
5. Reset. (RST)

Buzzer frequency and watchdog interval are set by R - C networks external to the ASIC.

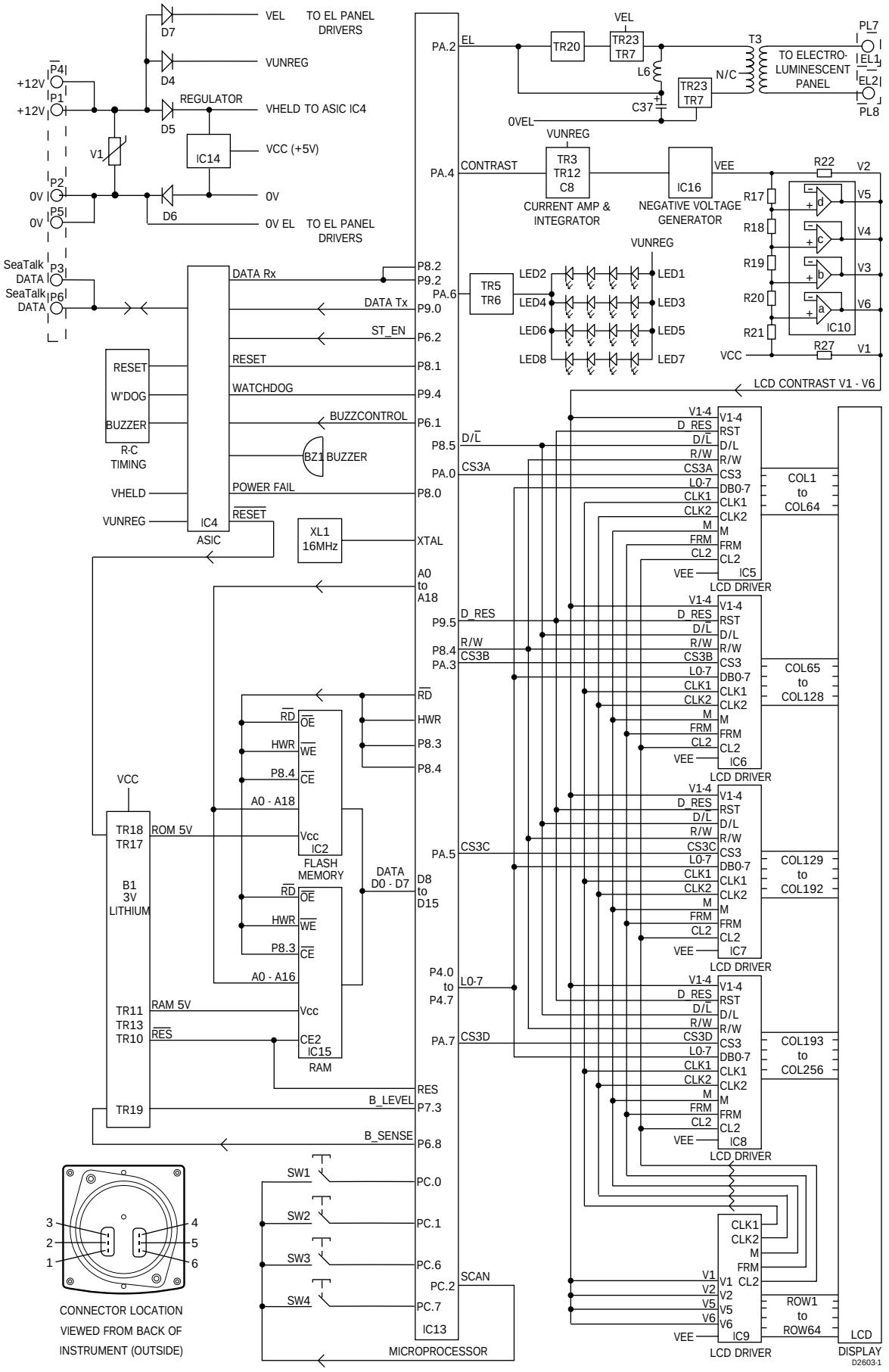


Figure 3 Block Diagram
Signal flow is left to right except where indicated.

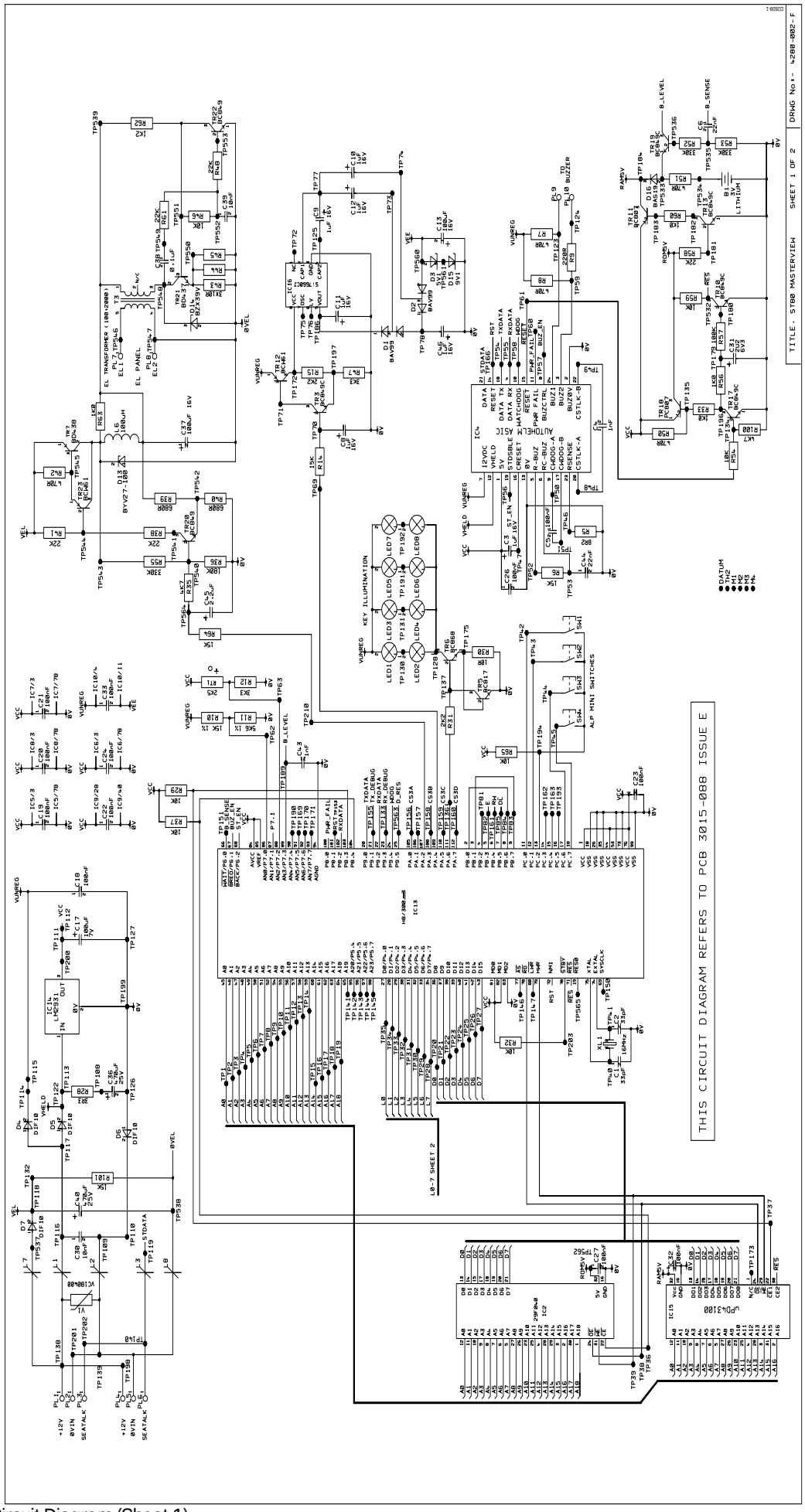


Figure 4 Circuit Diagram (Sheet 1)

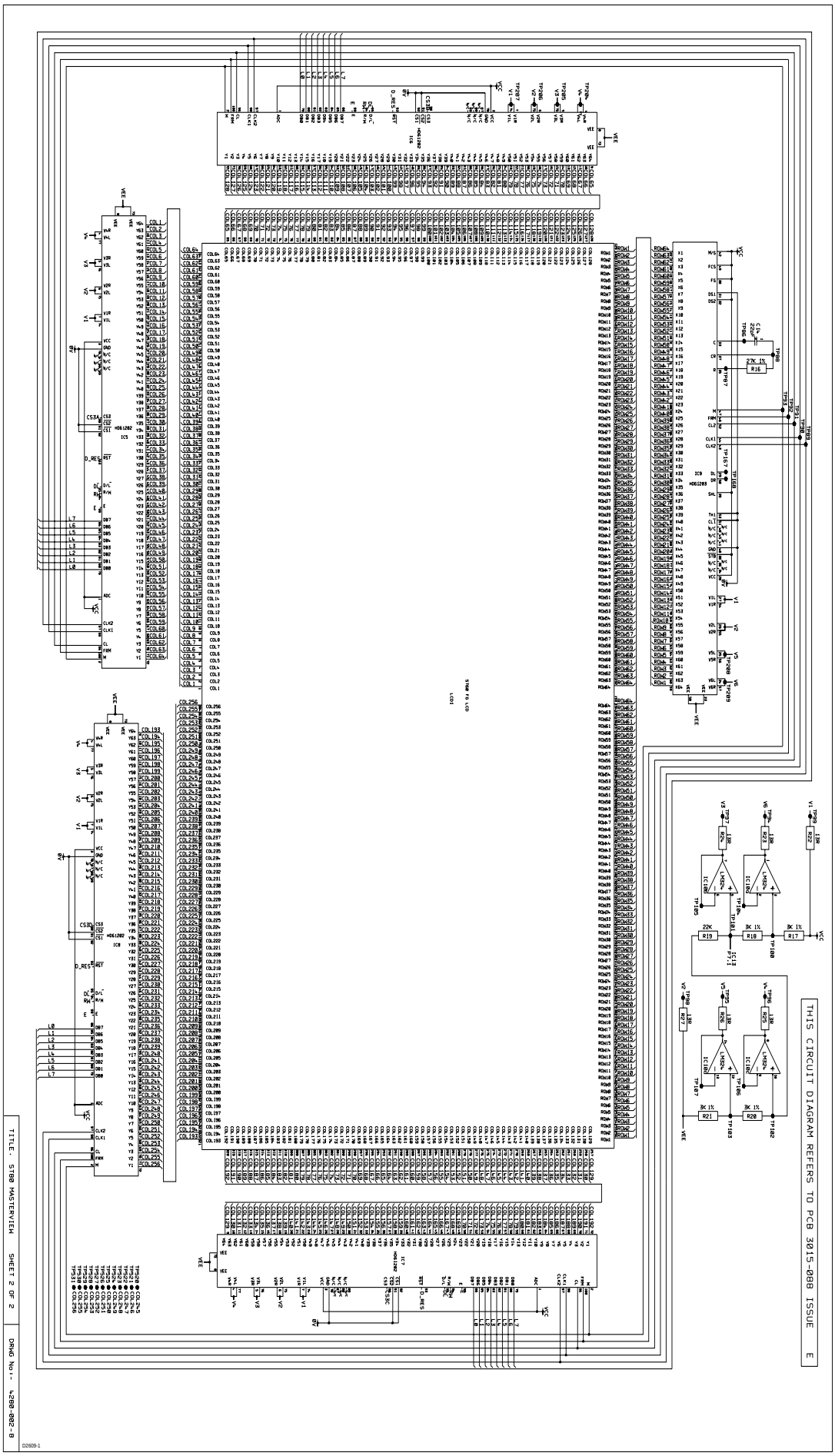


Figure 5 Circuit Diagram (Sheet 2)

8. PCB Detail

8.1 PCB Layout

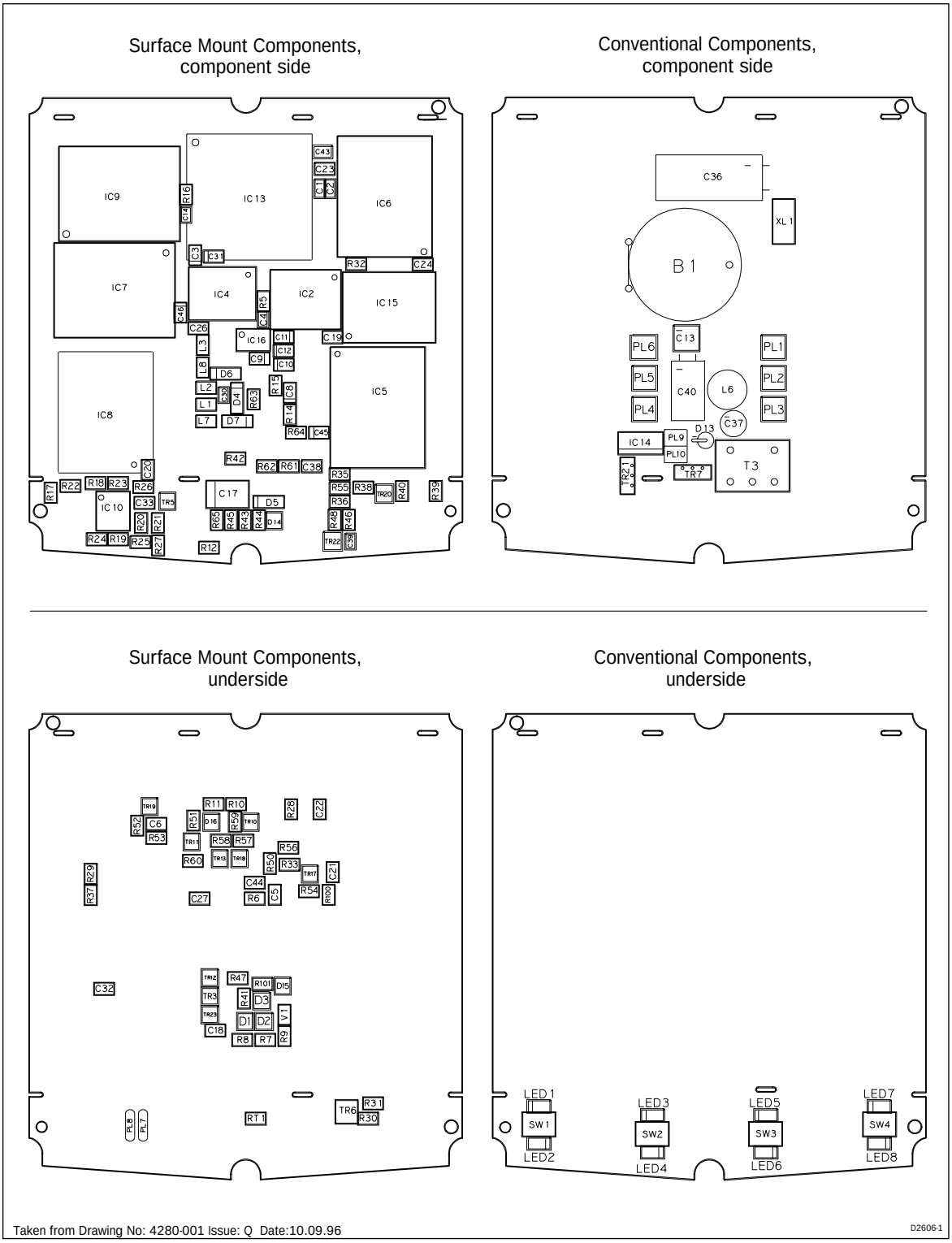


Figure 6 PCB Layout

8.2 PCB Component Lists

Surface Mount Components, component side

SOLID CHIP INDUCTOR	L1-3,7,8
IC SRAM 431000 128K NEC	IC15
IC NEGATIVE VOLTAGE GENERATOR SI7660CJ SO8	IC16
IC MEMORY FLASH 29F040	IC2
IC LCD DISPLAY DRIVER HD61603	IC9
IC LCD DISPLAY DRIVER HD61602	IC5-8
IC MICROPROCESSOR H83003	IC13
IC RAYTHEON ASIC VERSION 1	IC4
IC QUAD OPAMP LM324	IC10
TRANSISTOR SOT23 BC849C	TR20,22
TRANSISTOR SOT23 BC817 MULLARD	TR5
CAPACITOR TANT 100uF 20% 7V TANTE	C17
CAPACITOR TANT 2U2 20% TANTA	C31,45
CAPACITOR CER 22pF 5% 50V 0805	C14
CAPACITOR CER 33pF 0805	C1,2
CAPACITOR CER 10nF 0805	C30,39
CAPACITOR CER 1000pF 10% 50V 0805	C4,43
CAPACITOR CER 0.1uF 20% 50V 1206	C19,20,23,24,26,33,38
CAPACITOR TANT 1uF 10% 16V TANTA	C3,8-12,46
DIODE RECTIFIER DIF10 1A 100V	D4-7
DIODE ZENER BZX84C39	D14
RESISTOR WCR 1206 4K7 5% 0.125W	R35
RESISTOR WCR 1206 27K 1% 0.125W	R16
RESISTOR WCR 1206 680R 5% 0.125W	R39,40
RESISTOR WCR 1206 13R 1% 0.125W	R22-27
RESISTOR WCR 1206 10R 1% 0.125W	R43,44,45
RESISTOR WCR 1206 1KO 1% 0.125W	R63
RESISTOR WCR 1206 3K 1% 0.125W	R17,18,20,21
RESISTOR WCR 1206 180K 1% 0.125W	R36
RESISTOR WCR 1206 3K3 5% 0.125W	R12
RESISTOR WCR 1206 1K2 1% 0.125W	R62
RESISTOR WCR 1206 22K 5% 0.125W	R19,38,48,61
RESISTOR WCR 1206 330K 5% 0.125W	R55
RESISTOR WCR 1206 2K2 5% 0.125W	R15
RESISTOR WCR 1206 470R 5% 0.125W	R42
RESISTOR WCR 1206 15K 1% 0.125W	R14,64
RESISTOR WCR 1206 8R2 5% 0.125W	R5
RESISTOR WCR 1206 10K 5% 0.125W	R32,46,65
PCB ST80 MASTERVIEW	3015-088

Taken from Drawing No: 4280-001 Issue: Q Date:10.09.96 D3961-1

Conventional Components, component side

SOLDER BUCKETS	PL1-6
CRYSTAL 16MHz LK16000H	XL1
TRANSFORMER EL PANEL 'AIR GAPPED' TYPE	T3
IC REGULATOR LM2931	IC14
CAPACITOR 100uF 16V	C13,37
CAPACITOR 470uF 25V	C36,40
BATTERY 3V	B1
CONNECTOR 2 WAY	PL9,10
INDUCTOR 100uH	L6
TRANSISTOR BD437	TR21
TRANSISTOR BD438	TR7
DIODE BYV27-100	D13

Taken from Drawing No: 4280-001 Issue: Q Date:10.09.96 D3962-1

Surface Mount Components, underside

TRANSISTOR SOT89 BC868 MULLARD	TR6
TRANSISTOR SOT23 BCW61D	TR12,23
TRANSISTOR SOT23 BC849C	TR3,10,13,17,19
TRANSISTOR SOT23 BC807	TR11,18
CAPACITOR CER 0.1uF 20% 50V 1206	C5,18,21,22,27,32
CAPACITOR CER 22nF 5% 50V 1206	C6,44
DIODE BAV99 SOT23	D1,2
DIODE ZENER BZX84C9V1 SOT23	D15
DIODE BAS19 SOT23	D16
DIODE ZENER BZX84C5V1 SOT23	D3
THERMISTOR 2K5	RT1
RESISTOR WCR 1206 15K 1% 0.125W	R6,10,101
RESISTOR WCR 1206 5K6 1% 0.125W	R11
RESISTOR WCR 1206 22K 5% 0.125W	R41,58
RESISTOR WCR 1206 330K 5% 0.125W	R52,53
RESISTOR WCR 1206 3R3 5% 0.125W	R28
RESISTOR WCR 1206 1K0 1% 0.125W	R33,56,60
RESISTOR WCR 1206 3K3 5% 0.125W	R47
RESISTOR WCR 1206 100K 5% 0.125W	R57
RESISTOR WCR 1206 10R 1% 0.125W	R30
RESISTOR WCR 1206 4K7 5% 0.125W	R100
RESISTOR WCR 1206 2K2 5% 0.125W	R31
RESISTOR WCR 1206 220R 5% 0.125W	R9
RESISTOR WCR 1206 470R 5% 0.125W	R7,8,50,51
RESISTOR WCR 1206 10K 5% 0.125W	R29,37,54,59
VARISTOR VC180400	V1

Taken from Drawing No: 4280-001 Issue: Q Date:10.09.96 D3963-1

Conventional Components, underside

SWITCH ALPMIN TACTILE	SW1-4
LED GREEN	LED1-8

Taken from Drawing No: 4280-001 Issue: Q Date:10.09.96 D3964-1

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