

# Seaeye Tiger

## Technical Manual Book 2 of 2



## System 880

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**Saab Seaeye Ltd**

Address & Registered Office  
20 Brunel Way  
Segensworth East  
Fareham  
PO15 5SD  
United Kingdom

Telephone  
+44 (0) 1489 898000  
Fax  
+44 (0) 1489 898001

Internet Address  
[www.seaeye.com](http://www.seaeye.com)  
E-mail  
[rovs@seaeye.com](mailto:rovs@seaeye.com)

Registered in  
England & Wales  
No 02022671

VAT No  
566 6513 17

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# WARNING

## System Compatibility Issues

SAAB SEAEYE Systems utilise major assemblies that may appear, on casual external examination, to be generic items common to all systems in the modern SAAB SEAEYE fleet.

However, the use of increasingly complex technology and the frequent implementation of customer-requested system-specific modifications above baseline specifications may result in a Health and Safety Risk to personnel and damage to equipment and material should such modified equipment be substituted between systems.

CONSEQUENTLY, SEAEYE TECHNICAL DIRECTORATE ADVISE THAT SERIAL NUMBERED MAJOR ASSEMBLIES SUPPLIED WITH A VEHICLE SYSTEM SHOULD AT ALL TIMES REMAIN WITH THAT SYSTEM.

SAAB SEAEYE ARE UNABLE TO ACCEPT RESPONSIBILITY OR LIABILITY FOR EQUIPMENT IF THIS IS NOT OBSERVED.

Should major assemblies (e.g. SI-SCU, SI-PSUs, Junction Boxes, Umbilicals, Software etc) from one system be utilised (as spares provisions or as repair-by-replacement items in the field) on another system, Health and Safety risks to personnel and risks of damage to equipment and material exist.

Operators possessing SAAB SEAEYE ROV Systems who wish to interchange major assemblies between one system and another do so at their own risk. Where any doubt exists as to the compatibility of major assemblies between one system build and another, SAAB SEAEYE may be contacted for advice prior to attempting such operational interchange.



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In respect of the Electromagnetic Compatibility Directive 89/336/EEC, attention is drawn to the following:

- The SEAEYE TIGER system 'as delivered' complies with the essential protection requirements of the EMC Directive 89/336/EEC.
- In order to ensure that the SEAEYE TIGER system complies with the Directive when installed for operational use, the installation instructions contained within this Technical Manual must be adhered to and the surface equipment installed within the screened enclosures with which they were supplied.
- The end user of (or authority responsible for) the installation of the SEAEYE TIGER system becomes responsible for the complete installation's compliance with the Directive, particularly under the following circumstances:
  - additional equipments are used in conjunction with the system (unless they are supplied by SAAB SEAEYE LTD), or
  - modifications are made to the system (or part thereof), or
  - surface equipment is removed from its 'as-built' enclosures for subsequent installation in third-party racks or consoles.
- During Maintenance Procedures, when the system is operated outside its normal operating environment and/or screened enclosures are opened for access, the equipment may emit, or be susceptible to, electromagnetic interference (EMI). The equipment should be sited away from safety critical, essential communication, or navigation systems during such activities. It is advisable to site the surface equipment away from critical electronic systems at all times.
- It is recommended that electrical power for the SEAEYE TIGER system is provided using a dedicated supply which is not also used to power safety critical, essential communication, or navigation equipment.
- Any questions in respect of the Compliance of any SAAB SEAEYE LTD equipment with the EMC Directive, or any field reports of EMC related faults, should be addressed to the Engineering Director at SAAB SEAEYE LTD.



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## PREFACE

The purpose of this Technical Manual is to provide the Remotely Operated Vehicle (ROV) maintainer/operator with concise information and instructions on the operating, technical and maintenance aspects of the ROV system. The book is written for a maintainer/operator with a reasonable understanding of electrical and mechanical principles and a sound understanding of safe working practices. It is recommended that on receipt of the ROV system that the handbooks are read in their entirety prior to assembly, installation and first operational use. If a specialist understanding of the technical and maintenance aspects of the system is required a training course can be provided by Saab Seaeye Ltd.

The Technical Manual consists of the following:

### **BOOK ONE**

System Overview - Provides a general description of the main units as an introduction to the system, the ROV system technical specification and any related information.

Operating Information - Provides a description of unit controls and indicators for easy reference. Instructions on how to assemble, install, configure and operate the system.

Functional Description - Provides functional descriptions and block diagrams of the power distribution, video and control systems.

Maintenance Information - Provides maintenance instructions on how to remove, dismantle, assemble and refit the major units, procedures and diagnostics.

Parts Lists - Provides the ROV system parts lists.

### **BOOK TWO**

Technical descriptions and drawings - Provides a series of technical descriptions with associated drawings of the system units and printed circuit boards.

## DRAWINGS

The following table is a list of Tiger 880 drawings contained in the respective chapters of this manual:

### Surface Equipment Drawings

| PSU Type 9PSU-2 Drawings  |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| Drawing No                | Description                                                                  |
| S0572021                  | SPSU-4 35A Supply Wiring Diagram Sheet 1 of 3                                |
| S0572022                  | SPSU-4 35A Supply Wiring Diagram Sheet 2 of 3                                |
| S0572023                  | SPSU-4 35A Supply Wiring Diagram Sheet 3 of 3                                |
| S0084061                  | 9PSU Interconnection Diagram                                                 |
| SU Type 10PDU-1 Drawings  |                                                                              |
| Drawing No                | Description                                                                  |
| S0527411                  | 10PDU - 1 Rack Positions Showing Guide Location                              |
| S0527511                  | 10PDU - 1 Terminal Block Assignment                                          |
| S0527611                  | 10PDU - 1 Umbilical and Power Connector Layout                               |
| S0527931                  | 10PDU - 1 Component General Layout                                           |
| S0513331                  | 10PDU - 1 Power Section Circuit Diagram Sheet 1 of 5                         |
| S0513332                  | 10PDU - 1 Electronic Section Circuit Diagram Sheet 2 of 5                    |
| S0513333                  | 10PDU - 1 Ribbon Cables Circuit Diagram Sheet 3 of 5                         |
| S0513334                  | 10PDU - 1 Auxiliary and Video Circuit Diagram Sheet 4 of 5                   |
| S0513335                  | 10PDU - 1 Power Distribution Unit Video Options Circuit Diagram Sheet 5 of 5 |
| S0527721                  | 10PDU - 1 Front Panel General Assembly Front View                            |
| S0527811                  | 10PDU - 1 Rear Panel General Assembly Outside View                           |
| HCU Type HC(D)/5 Drawings |                                                                              |
| Drawing No                | Description                                                                  |
| S0119711                  | HCU HCD/5 - Circuit Diagram                                                  |
| S0119722                  | HCU HCD/5 - Circuit Diagram                                                  |
| S0120021                  | HCU - Inside Views                                                           |
| S0119911                  | HCU - General Arrangement                                                    |

**Table. 1 Surface Equipment Drawings**

## Vehicle Drawings

| <b>8EPM-3D Vehicle EPOD Drawings</b> |                                                  |
|--------------------------------------|--------------------------------------------------|
| <b>Drawing No</b>                    | <b>Description</b>                               |
| S0902521                             | 8EPM-3D – Tiger EPOD Rack General Arrangement    |
| S0902621                             | 8EPM-3D – Tiger EPOD PCB Arrangement             |
| S0902421                             | 8EPM-3D – Tiger EPOD Bulhead General Arrangement |
| S0902721                             | 8EPM-3D– Tiger EPOD Wiring Diagram Sheet 1 of 7  |
| S0902722                             | 8EPM-3D – Tiger EPOD Wiring Diagram Sheet 2 of 7 |
| S0902723                             | 8EPM-3D– Tiger EPOD Wiring Diagram Sheet 3 of 7  |
| S0902724                             | 8EPM-3D – Tiger EPOD Wiring Diagram Sheet 4 of 7 |
| S0902725                             | 8EPM-3D – Tiger EPOD Wiring Diagram Sheet 5 of 7 |
| S0902726                             | 8EPM-3D – Tiger EPOD Wiring Diagram Sheet 6 of 7 |
| S0902727                             | 8EPM-3D – Tiger EPOD Wiring Diagram Sheet 7 of 7 |

**Table. 2 Vehicle EPOD Drawings**

## Umbilical and Whip Drawings

| <b>Umbilical and Whips</b> |                                                                           |
|----------------------------|---------------------------------------------------------------------------|
| <b>Drawing No</b>          | <b>Description</b>                                                        |
| S0889511                   | Mainlift,Umbilical,Winch, Generic CJB to TMSEPM-2B Wiring Diagram Sheet 1 |
| S0889512                   | Mainlift,Umbilical,Winch, Generic CJB to TMSEPM-2B Wiring Diagram Sheet 2 |
| S0816521                   | Generic Control Cabin Junction Box Wiring Diagram Sheet 1                 |
| S0816522                   | Generic Control Cabin Junction Box Wiring Diagram Sheet 2                 |
| S0257651                   | Tiger Metal Shell Tether with Dual TP Using 5601 Wiring Diagram Sheet 1   |
| S0257652                   | Tiger Metal Shell Tether with Dual TP Using 5601 Wiring Diagram Sheet 2   |
| S0080441                   | ML05-3xnnnn Y Lead 3 Way Male Metal Shell Connector to Two 3 way Female   |
| S0084351                   | Cable Whip ML09-nnnn Wiring Diagram                                       |
| S0055351                   | SM4 Whip Cable Wiring Diagram                                             |
| S0671931                   | Cable Whip ML220-nnnn Wiring Diagram                                      |
| S0542241                   | ML168-nnn 9 Way Metal Shell to Kongsberg Cameras Wiring Diagram.          |
| S0155551                   | ML17-nnnn Metal Shell Connector whip Wiring Diagram                       |
| S0075341                   | Metal Shell Connector Plugs and Receptacle Pinout                         |
| S0080681                   | Standard Female and Male Leads                                            |
| S0080881                   | Standard Male Whips                                                       |
| S0080981                   | Standard Female Whips                                                     |

**Table. 3 Umbilical and Whip Drawings**

## Surface Unit PCB Drawings

| PCB and Module Drawings |                                            |             |
|-------------------------|--------------------------------------------|-------------|
| Drawing No              | Description                                | PCB/MODULE  |
| S0302511                | Video Overlay Circuit Diagram              | 6037P/VIDOL |
| S0302522                | Video Overlay Component Layout             | 6037P/VIDOL |
| S0302611                | SBC68 Video Processor CPU Circuit Diagram  | 6038P/SBC68 |
| S0302612                | SBC68 Video Processor CPU Component Layout | 6038P/SBC68 |
| S0302711                | 8 bit Analogue Input Component Layout      | 6040P       |
| S0302712                | 8 bit Analogue Input Circuit Diagram       | 6040P       |
| S0302811                | Digital I/O Component Diagram              | 6041P       |
| S0302812                | Digital I/O Circuit Diagram                | 6041P       |
| S0303011                | Expansion Input/Output PCB Sheet 1 of 2    | 6046P       |
| S0303012                | Expansion Input/Output PCB Sheet 2 of 2    | 6046P       |
| S0303121                | CPU Component Layout                       | 6047P       |
| S0303122                | CPU Circuit Diagram                        | 6047P       |
| S0303123                | CPU Circuit Diagram                        | 6047P       |
| S0303114                | CPU Circuit Diagram                        | 6047P       |
| S0050031                | Switch Adaptor PCB Circuit Diagram         | 6052AP      |
| S0303411                | 12 Bit A/D Component Layout                | 6081P       |
| S0303412                | 12 Bit A/D Circuit Diagram                 | 6081P       |
| S0242811                | IBM Keyboard Adaptor Circuit Diagram       | 6099P       |
| S0242911                | IBM Keyboard Adaptor PCB Layout            | 6099P       |

**Table. 4 Surface Unit PCB Drawings**

## Vehicle EPOD PCB Drawings

| PCB Drawings |                                              |        |
|--------------|----------------------------------------------|--------|
| Drawing No   | Description                                  | PCB    |
| S0302311     | Thruster Control Circuit Diagram             | 6034P  |
| S0302312     | Thruster Control Circuit Diagram             | 6034P  |
| S0302313     | Thruster Control Component Layout            | 6034P  |
| S0303121     | CPU Circuit Diagram                          | 6047P  |
| S0303122     | CPU Circuit Diagram                          | 6047P  |
| S0303123     | CPU Circuit Diagram                          | 6047P  |
| S0303114     | CPU Component Layout                         | 6047P  |
| ECBO32-1     | Light Fet Suppressor PCB Component Layout    | 6050P  |
| ECBO34       | Light Fet Suppressor PCB Circuit Diagram     | 6050P  |
| S0004161     | PSU/Stabiliser Circuit Diagram               | 6051AP |
| S0004112     | PSU/Stabiliser Component Layout              | 6051AP |
| S0000131     | Aux Switch/Manip Circuit Diagram Sht. 1 of 5 | 6055P  |
| S0000132     | Aux Switch/Manip Circuit Diagram Sht. 2 of 5 | 6055P  |
| S0000143     | Aux Switch/Manip Circuit Diagram Sht. 3 of 5 | 6055P  |
| S0000114     | Aux Switch/Manip Circuit Diagram Sht. 4 of 5 | 6055P  |
| S0000115     | Aux Switch/Manip Circuit Diagram Sht. 5 of 5 | 6055P  |
| S0146711     | Fuse & Filter Component Layout               | 6056P  |
| S0007251     | Fuse & Filter Circuit Diagram                | 6056P  |

**Table. 5 Vehicle EPOD PCB Drawings**



| PCB Drawings |                                   |        |
|--------------|-----------------------------------|--------|
| S0014521     | Tilt Integration Component Layout | 6058P  |
| S0014821     | Tilt Integration Circuit Diagram  | 6058P  |
| S0303311     | MFIO Circuit Diagram              | 6059P  |
| S0303312     | MFIO Circuit Diagram              | 6059P  |
| S0303313     | MFIO Circuit Diagram              | 6059P  |
| S0303314     | MFIO Component Layout             | 6059P  |
| S0051531     | Leak Detector Circuit Diagram     | 6068P  |
| S0253011     | Leak Detector Component Layout    | 6068P  |
| S0061631     | Video Line Driver PCB             | 6071AP |
| S0155311     | CP Relay Component Layout         | 6082P  |
| S0155211     | CP Relay Circuit Diagram          | 6082P  |

**Table. 5 Vehicle EPOD PCB Drawings (Continued)**

## WARRANTY STATEMENT

Products sold by SAAB SEAEYE LIMITED (hereafter referred to as SEAEYE) are guaranteed to the **original** purchaser as follows:

Subject to the exceptions and upon the conditions stated hereafter, SEAEYE agrees to correct, either by way of repair, or at SEAEYE's sole discretion, by way of replacement, any defect of material or workmanship which develops as follows:

- SEAEYE Remotely Operated Vehicle (ROV) Systems : 12 months,
- SEAEYE SM4/M Thruster Motors : 24 months,
- SEAEYE parts returned on completion of Repair : 3 months,

from dispatch of the product to the **original** purchaser by SEAEYE or its authorised representative, provided that the investigation and factory inspection by SEAEYE disclose that such defect developed under normal and proper use and not due to fair wear and tear or misuse by the user for its intended purpose. Repair or replacement are the exclusive remedies under this guarantee, and further provided that the guarantee granted hereby shall not include parts, materials, or spare parts that SEAEYE considers as expendables under normal operating conditions.

The exceptions and conditions mentioned above are as follows:

- a SEAEYE make no guarantee concerning components or accessories that are not of its own manufacture. All goods sold and manufactured by other manufacturers are sold subject to the manufacturer's guarantee, which shall be assigned to the purchaser or authorised representative. SEAEYE in so far as it is appointed by the agents of a manufacturer to carry out repair work under such guarantees will, where it considers it appropriate, carry out the necessary repair work on terms agreed by SEAEYE and purchaser or authorized representative having regard to the liability of the manufacturer under its guarantee. Notwithstanding anything in this paragraph, any goods sold but not manufactured by SEAEYE are not supplied with any warranty whether express or implied and warranty imposed by common law or statute including the warranty of merchantable quality and the implied warranty of fitness for a particular purpose contained in the UK Sales of Goods Act 1979 Section 14 is expressly excluded although SEAEYE undertakes to take reasonable care in supplying suitable goods and giving particulars of performance.
- b SEAEYE shall be released from all obligations under its guarantee in the events that repairs or modifications are made by persons other than its own authorised service personnel or trained and authorized representative, unless such repairs or modifications by others are made with prior written consent by a Director of SEAEYE. In the event of a failure, and the purchaser or agent authorized by the purchaser or the operator fails to take prompt and reasonable action to prevent further damage, SEAEYE will not accept any responsibility for consequent damage. "Normal and Proper use" of a product includes without limitation performing routine preventative maintenance in accordance with the appropriate instructions within the appropriate service and/or maintenance manual.
- c SEAEYE products, systems and parts are Ex-works at the company's UK site. SEAEYE is not responsible for carriage/shipment/duty/taxes/insurance or any other costs for any product, system or part either dispatched to or from the company's UK site.

- d There are no guarantees which extend beyond those expressly provided for herein and the aforesaid guarantee and SEAEYE's obligations and liabilities there under are in lieu of, and the customer waives, all other guarantees, express or implied, and all other liabilities therefore arising by law or otherwise, including without limitation any implied guarantee of merchantability or fitness for a particular purpose, and all obligations and liabilities with respect to loss of use, revenue or profit, or indirect, consequential or incidental damages of any kind and from manufacture, sale, handling, shipment, repair, maintenance or replacement of said products.
- e Representations and warranties made by any person, including dealers and representatives of SEAEYE that are inconsistent or in conflict with the terms of this guarantee (including but not limited to the limitations of the liability of SEAEYE as set forth previously), shall not be binding upon SEAEYE unless reduced to writing and approved by an officer of SEAEYE.
- f SEAEYE's liability arising from the sale or use of a product sold by SEAEYE shall be limited to SEAEYE's cost of correcting defects, as provided herein, or the total cost of such product as shown on the purchase order pursuant to which it was purchased, whichever is less. All such liabilities will terminate upon expiration of the guarantee period.
- g This guarantee shall be provided for and governed by the prevailing laws of England.

## General Information

**Specifications:** SEAEYE reserves the right to change specifications at any time without due notice and without incurring any obligation to incorporate any new features in any of its previous products, whether or not they have been sold.

**Damage in Shipment:** Each new product is carefully examined and checked prior to dispatch from SEAEYE's premises. It should be carefully examined and operationally tested on receipt by the receiving party. If the product is damaged in any way, then a claim should be lodged with the carrier. New or repaired product that has been damaged in transit should not be returned to SEAEYE without first obtaining specific shipping instructions from SEAEYE.

**Repairs:** If any fault develops, the following steps should be taken:

- Notify SEAEYE and give full details of the difficulty. Include in this notification the model type and its serial number. On receipt of this information SEAEYE may elect to either issue service instructions or provide full shipping data for the return of the equipment.
- After shipping instructions are supplied, forward the product(s) prepaid and repairs will be estimated and the client informed prior to any repairs to the fault(s) being carried out.
- The client may then issue SEAEYE an approved purchase order to cover the costs of the repair, if the fault has been caused by misuse or is not under guarantee.

## Notes to Readers

### Warnings, Cautions and Notes

Throughout this Publication warnings and notes are used to direct the readers attention to specific information.

A **WARNING** is used to alert the reader to operational or maintenance activities that may, under certain circumstances, represent a threat to safety and health. A warning precedes the paragraph or procedure which gives rise to such a threat.

A **Caution** is used to alert the reader to operational or maintenance activities which, may under certain circumstances, cause damage to equipment and/or material. A caution precedes the paragraph or procedure to which it refers.

A **Note** contains information of a specific or general nature and is printed immediately after the paragraph to which it refers.

The following symbols are used through this document:



**WARNING – Risk of Personal Injury**



**WARNING – Take precautions against Static Electricity**



**WARNING – Risk of Electric Shock**



**WARNING – Heavy Object**



**WARNING – Moving Parts**



**WARNING – Chemical Hazard**



**CAUTION – Wear Protective Equipment**

## List of abbreviations

|              |                                        |               |                                                      |
|--------------|----------------------------------------|---------------|------------------------------------------------------|
| <b>A</b>     | Ampere                                 | <b>SM4</b>    | Thrusters                                            |
| <b>AC</b>    | Alternating Current                    | <b>MCB</b>    | Mains Circuit Breaker                                |
| <b>ADC</b>   | Analogue to Digital Converter          | <b>MFIO</b>   | Multi-function Input/Output                          |
| <b>CCD</b>   | Charge-coupled Device                  | <b>NAV</b>    | Navigation Unit                                      |
| <b>CP</b>    | Cathode Potential                      | <b>TILT</b>   | Tilt Unit                                            |
| <b>CPU</b>   | Central Processing Unit                | <b>PCB</b>    | Printed Circuit Board                                |
| <b>DAC</b>   | Digital to Analogue Converter          | <b>PDU</b>    | Power Distribution Unit                              |
| <b>DC</b>    | Direct Current                         | <b>PSU</b>    | Power Supply Unit                                    |
| <b>Deg.</b>  | Degree(s)                              | <b>PWM</b>    | Pulse Width Modulated                                |
| <b>EPOD</b>  | Electronics Pod                        | <b>ROV</b>    | Remotely Operated Vehicle                            |
| <b>FET</b>   | Field Effect Transistor                | <b>SCR</b>    | Silicon-Controlled Rectifier                         |
| <b>Fig.</b>  | Figure                                 | <b>SIT</b>    | Silicon-Intensifier Target                           |
| <b>GRP</b>   | Glass-reinforced Plastic               | <b>SSRS</b>   | Solid-state Rate Sensor                              |
| <b>HCU</b>   | Hand Control Unit                      | <b>STU</b>    | Surface Transformer Unit                             |
| <b>Hz</b>    | Hertz                                  | <b>SU</b>     | Surface Unit                                         |
| <b>IGFET</b> | Insulated Gate Field Effect Transistor | <b>TMS</b>    | Tether Management System                             |
| <b>I/O</b>   | Input/Output                           | <b>Toggle</b> | Change to one of two states.<br>Hardware or Software |
| <b>JB</b>    | Junction Box                           | <b>VAC</b>    | Volts AC                                             |
| <b>Kbd</b>   | Kilo baud                              | <b>VDC</b>    | Volts DC                                             |
| <b>LIM</b>   | Line Insulation Monitor                | <b>W</b>      | Watts                                                |

## WARNINGS



**DANGER OF FATAL ELECTRIC SHOCK.** BEFORE REMOVING OR OBTAINING INTERNAL ACCESS TO THE EQUIPMENT, ISOLATE ALL THE UNITS POWER SUPPLIES.



**DANGER OF FATAL ELECTRIC SHOCK AND DANGER TO PERSONNEL.** WHEN THE SUPPLY CANNOT BE DISCONNECTED, FUNCTIONAL TESTING, MAINTENANCE AND REPAIR OF THE ROV SYSTEM IS TO BE UNDERTAKEN ONLY BY PERSONS FULLY AWARE OF THE DANGERS INVOLVED AND HAVE TAKEN ADEQUATE PRECAUTIONS.



**POSSIBILITY OF FATAL ELECTRIC SHOCK AND DANGER TO PERSONNEL AND EQUIPMENT.** BEFORE SWITCHING ON THE ROV SYSTEM, ENSURE THAT THE SYSTEM IS FULLY ASSEMBLED AND OPERABLE AND NO MAINTENANCE ACTIVITY IS IN OPERATION.



**POSSIBILITY OF TOXIC HAZARDS.** DURING MAINTENANCE OR REPAIR IT IS POSSIBLE TO COME INTO CONTACT WITH SUBSTANCES HARMFUL TO HEALTH. PRIOR TO ALL MAINTENANCE OR REPAIR TASKS ENSURE THAT THE RELEVANT DATA HAZARD SHEETS AND LOCAL COSHH PROCEDURES HAVE BEEN READ AND UNDERSTOOD.



**POSSIBLE DANGER TO PERSONNEL AND DAMAGE TO EQUIPMENT.**

THE ELECTRONICS POD WEIGHS APPROXIMATELY 16 KG RESPECTIVELY AND CARE SHOULD THEREFORE BE TAKEN WHEN LIFTING THE POD FOR SLINGING PURPOSES.



**DANGER TO PERSONNEL AND EQUIPMENT.** THE THRUSTER MOTORS MAY OPERATE WITHOUT WARNING WHEN THE SYSTEM DC SUPPLY IS ENERGISED. ENSURE THAT THE VEHICLE IS CLEAR OF ANY OBSTRUCTION AND PERSONNEL PRIOR TO ENERGISING THE DC SUPPLY.

## Cautions



**Danger of damage to PCBs.** Do not remove or replace PCBs unless the supply is switched off. PCBs must be handled in accordance with electrostatic discharge handling procedures. Damage to PCBs could affect the safe operation of the equipment.



**Danger of damage to equipment.** When checking connections, care is to be taken not to slacken them, otherwise their watertight integrity may be breached.



**Danger of damage to equipment.** When using an insulation meter, ensure that the cable under test is disconnected at both ends.



**Danger of damage to Thruster Motor.** Do not operate the Thruster Motor in air for longer than one minute.



**Danger of damage to lights.** Do not operate the vehicle lights for longer than ten seconds in air.



**Possibility of damage to equipment.** Ensure all vent plugs are securely fitted and shut prior to immersing the vehicle.



**Possibility of damage to equipment.** Ensure that the Surface Power Supply Unit (PSU) transformer tapplings correspond to the external input power supply.



**Possibility of poor vehicle handling.** Addition of equipment or poor vehicle ballast or trim will affect vehicle performance. Ensure the vehicle trim and ballast is correct after adding or removing equipment.

## **ENGINEERING ADVICE NOTES (EANs)**

The purpose of an engineering advice note is to bring to the operator/maintainer's attention any safety, maintenance or operational related information that may present a threat to health or cause damage to equipment and are to be used in conjunction with the manual.

Any relevant EANs raised after the publication of this handbook will be issued by letter and are to be inserted into this manual.

## **IMPORTANT ADVICE NOTICE**

### **ADDITIONAL RECOMMENDATIONS**

The following recommendations and instructions have resulted from observations and reports experienced by operators in the field:

- Do not subject the ROV or associated equipment to shock or impact; do not drop, or allow objects to impact the equipment.
- To prevent damage to or unnecessary stress on chassis components, always use the lifting point(s) factory fitted to ROV vehicles and TMS launch-systems.
- Operating an ROV in close proximity to pile drivers will subject the vehicle to high levels of shock and pressure. This may well result in destruction of lamp unit filaments due to severe vibration. Over-pressure created by underwater equipment such as pile drivers or explosive processes may exceed the ROV's proof-pressure test certificate, resulting in damage to seals and enclosures and subsequent flooding.
- Do not remove electrical components, equipment or PCB's while the system is electrically live.
- Permitting thrusters or ROV lamps to operate in air for periods in excess of that described in the Technical Manual may cause irreparable damage. Observe the cautions obtained in the relevant sections of the Technical Manual.
- Equipment should not be left exposed to direct sunlight as extreme temperatures can damage the electronic components.
- Equipment should not be left exposed to freezing conditions. Provide suitable covers or stow in a protected area.
- Do not disassemble equipment, particularly thrusters beyond the level described in the maintenance section.
- Do not attempt to increase the performance of the thrusters by subjecting them to voltages in excess of specified levels. Ensure that the SPSU is set up and compensated correctly for the umbilical being used.
- System modifications carried out by customers or operators will not appear in either the Technical Manual or associated Wiring Diagrams Manual or in amendments issued by Seaeye.
- Adding or removing equipment from an ROV alters the vehicles payload and ballast, and therefore changes ROV performance. Always re-ballast and trim the ROV prior to operations when such payloads changes have been made.
- Ensure that all surface and subsea connectors are securely mated. Subsea neoprene connectors must be totally dry, clean and their end faces lightly coated with silicone grease before mating.
- It is usually necessary to carry out a complete Configuration procedure if PCB's and items of control equipment have been removed or replaced in the system.
- Conducting pre and post-operational checks reduces operational downtime.
- Check for the security of fasteners, fixtures and fittings prior to and on completion of operational use.

# **CHAPTER 1**

## **POWER SUPPLY UNIT**

### **TYPE 9PSU-2**

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## 1. POWER SUPPLY UNIT TYPE 9PSU-2

This Chapter describes the Tiger 875 Power Supply Unit (PSU) Type 9PSU-2 and also contains the respective diagrams.



**Figure. 1.1 Power Supply Unit**

### 1.1 Power Supply Unit PSU General Description

The PSU provides the supplies required by the ROV system as follows:

- **110 VAC** – This supply is used by the PSU for internal electronics and contactor control.
- **240 VAC** – This supply is used by the surface equipment and is protected by a fuse and an earth leakage circuit breaker (ELCB).
- **240 and 440 VAC** – This supply is used by the subsea equipment and is protected by a mains circuit breaker (MCB) and a Line Insulation Monitor (LIM).
- **250-350 VDC** – This supply is used to power subsea equipment (e.g. thrusters and lights) and is protected by a MCB and LIM. The supply has current compensation to maintain a constant subsea voltage irrespective of the varying losses in the umbilical.

The PSU components are chassis mounted and housed in a self contained steel cabinet. The PSU requires a three phase 50/60 Hz electrical supply in the range 220/380/410/440/475 VAC. An interlocked hinged door allows access to the inside of the unit. The PSU comprises:

- 3-phase isolation transformer.
- Thyristor bridge circuit.
- Single-phase transformer.
- Logic control circuitry.

- Line insulation monitoring protection devices.
- Digital DC volts and current meters.
- Contactor and control circuits.
- Front panel control switches and indicators.
- Fuses.
- Fan.

**NOTE.**

The 9PSU transformers are factory set for a 415 VAC input supply.

## **1.2 Power Distribution System**

Circuit diagrams for the following technical description can be found in a pocket on the inside of the PSU cabinet.

### **1.2.1 AC System**

When the MAINS ISOLATOR switch is switched to “ON”, two phases of the 3-phase input power supply are routed to the single-phase transformer via two 10 Amp fuses, FS1 & FS2. The single-phase transformer has two secondary windings producing the following outputs:

- Surface 240 VAC & 110 VAC for internal contactor and control circuits.
- 240-280 & 440-480 VAC for subsea.

When the AC SURFACE REMOTE switch is selected to “ON”, 110 VAC from the single-phase transformer energises contactor 2 (CON2) and its two associated contacts make, routing the 240 VAC from the transformer via ELCB1 and filter to the PSU Surface output terminals. Relay RL2 wired across the 240 VAC output is also energised when the AC SURFACE REMOTE switch is selected to “ON”. A contact of RL2 provides part of the DC REMOTE switching circuit.

The 110 VAC is routed to the AC Line Insulation Monitor (LIM) pin 21 and output on pin 22 energising contactor 5 (CON5). Contactor 5 contacts make, routing the subsea supplies from the secondary winding of the single-phase transformer through CON2 contacts, the 6A MCB and 440 volt filter to the PSU subsea output terminals.

The 110 VAC is also routed to the DC Line Insulation Monitor (LIM) pin 21 and output on pin 22 when a fault condition is detected energising contactor 4 (CON4).

### **1.2.2 DC System**

When relay RL2 has been energised, the 3-phase input supply is routed through RL2 contacts to the primary of the 3-phase transformer. The voltage is stepped down to produce 260 VAC and routed to the thyristor bridge rectifier via a 32 Amp MCB. On operation of the key operated switch and START switch, relay RL1 energises and its associated contacts make. RL1 contacts provide the hold on circuit for the START switch and part of the DC remote switching circuit. At this point, the DC supply has been initialised. The remote circuit is completed when the remote MASTER DC switch is selected to “ON” and contactor 1 energises.

Providing that no AC or DC insulation problem has been detected on the power lines by the LIMS, contactors 1, 4 and 5 contacts make completing the logic control circuit (CN). The Logic Control circuit controls the Thyristor Bridge to increase or decrease the DC voltage in response to current consumption from the vehicle. The DC output from the bridge is routed to contactor 3 which must be energised to allow DC distribution. In a non-fault condition contactor 3 is made.

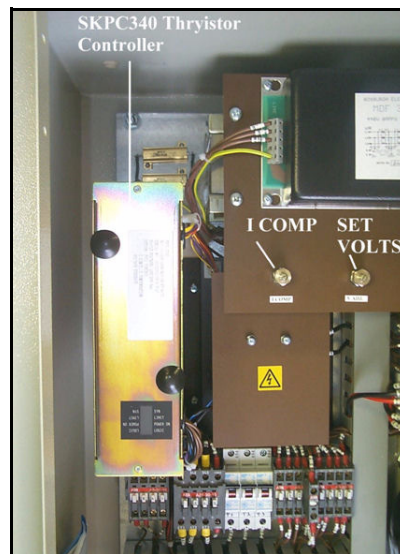
System current consumption is sensed by the I-Sense PCB located in the PSU (Fig. 1.2). A DC power conductor is routed through a ferrite ring, which is induced by the magnetic field generated by the current passing through the conductor. The size of the field is proportional to the amount of vehicle current consumption and used by the Thyristor Controller.



**Figure. 1.2 Current Sensing PCB**

The SKPC340 Thyristor Controller (Fig. 1.3) has two adjustable potentiometers (SET I COMP & SET VOLTS), which are used to compensate the DC power supply for losses in the DC transmission path from the Surface Unit to the ROV electronics pod. The DC Compensation setting up procedure is detailed in Book 1, Chapter 7 and is to be carried out in the following circumstances:

- System Installation or system relocation.
- Main lift umbilical or tether change.
- Significant changes in tether or umbilical cable lengths.



**Figure. 1.3 Thyristor Controller**

**NOTE.**

The SKPC340 is a factory-sealed unit and is repaired by replacement. Under no circumstances should the unit be adjusted or any attempt to gain internal access.

If the current compensation setting is inadequate for the umbilical type/length used, vehicle performance is degraded. Should the current compensation be set too high, the vehicle and/or equipment fitted may be damaged or destroyed.

### 1.2.3 Line Insulation Monitors

All Seaeeye ROV systems utilise isolated power supplies which may be AC, DC or both. A Power Distribution Unit (PDU) will provide these isolated power supplies; this may be an integral part of the surface equipment, or a separate unit. The isolated power is then distributed via the umbilical (or main-lift and tether) to the ROV, TMS and any additional tooling etc.

Providing an isolated supply removes the supplies' relationship to earth (vessel, structures, etc), and greatly reduces the risk of electrical shock. This method provides a safe system under normal conditions, as with a single fault no current will flow to earth.

If the supply becomes connected to earth, either directly or indirectly through a resistive path due to a fault or failure within the system, then the system becomes potentially unsafe if a second fault is introduced. Seaeeye systems use Line Insulation Monitoring (LIM) devices to continuously monitor the resistance between the power conductors and earth, giving warning of potential faults. LIMs on Seaeeye ROV systems typically provide both Off-line and On-line monitoring; this means that the systems continuously monitor the insulation resistance regardless of the ROV power being on or off. The LIM will disable the supply when the line insulation resistance falls below a set alarm level. This disable function may be directly operated from the LIM contacts or through the system's control software.

The use of ungrounded isolated power supplies and a LIM is in accordance with recommendations for acceptable practice in the IMCA Code of Practice for the Safe Use of Electricity Under Water AODC 035 (September 1985).



**DANGER TO PERSONNEL AND EQUIPMENT.** IT IS IMPORTANT TO NOTE THAT LIM'S DO NOT FUNCTION AS PERSONAL SAFETY PROTECTION DEVICES. A LIM MONITORS THE STATUS OF THE SYSTEM AND WARNS OF A POTENTIAL FAULT, THE LIM CAN CUT SUPPLY FEED TO HELP PROTECT PERSONAL AND EQUIPMENT, BUT THE REACTION TIME OF THE LIM IS GENERALLY TOO SLOW TO PREVENT ELECTRICAL SHOCK.

NOTE. The LIM does NOT negate the requirement to check the condition of all equipment before use and the carrying out of regular maintenance to ensure safe operation of the system.

#### Definition:

Line Insulation Monitoring (LIM) - also known as Ground Fault Monitor or Insulation Resistance Monitor. These devices monitor the condition of a system's power to earth insulation. The output may be in the form of a meter reading, an alarm, contactors or any combination of these. AC and DC Line Insulation Monitors (LIM) monitor the AC and DC power supply lines. If the insulation resistance of a power line to earth falls below the threshold set on the LIM, the supply is automatically cut off and either or both the AC and DC O/P Earth Fail lamps illuminate. If an insulation problem is detected by the AC LIM, an internal relay trips disabling BOTH AC and DC circuits. A fault detected on the DC power lines will ONLY disable the DC circuits.



**Figure. 1.4 AC and DC Line Insulation Monitors**

When the DC LIM senses an insulation problem across the DC lines, the relay in the LIM energises completing the circuit at connections 21 and 22 causing contactor 4 contacts to break. Contactor 3 de-energises isolating the DC output and the logic control circuit is broken. A DC O/P Earth Fail light in parallel with Contactor 4 illuminates indicating a fault condition.

When the AC LIM senses an insulation problem across the SUBSEA AC power lines, the relay in the LIM de-energises isolating the 110 VAC to contactor 5, breaking its associated contacts and isolating the SUBSEA AC supplies. The AC O/P Earth light illuminates to indicate a fault condition.

NOTE.

The LIMS are factory set to 200kΩ.

The DC LIM measures the capacitance value of the insulation. When a fault is detected the DC LIM may take up to 40 seconds to trip the DC circuits. This time measurement is factory set using the internal LIM circuitry.

The DC and AC LIMs are factory set as detailed in Table 1 and 2. Each LIM is factory set to operate at 200kΩ. In the event of a LIM trip the resistance can be adjusted by changing the dial settings on the potentiometers in order to recover the vehicle in an emergency. On vehicle recovery, a full investigation should be carried out to ascertain the reasons for the LIM tripping and the resistance setting immediately dialled back to 200 kΩ.

| DIP Switch    | 1          | 2    | 3    | 4    | 5  | 6    |
|---------------|------------|------|------|------|----|------|
| Position      | Down       | Down | Down | Down | Up | Down |
| Potentiometer | Setting kΩ |      |      |      |    |      |
| Alarm 1       | N/A        |      |      |      |    |      |
| Alarm 2       | 200        |      |      |      |    |      |

**Table 1.1 DC LIM DIP Switch Positions**

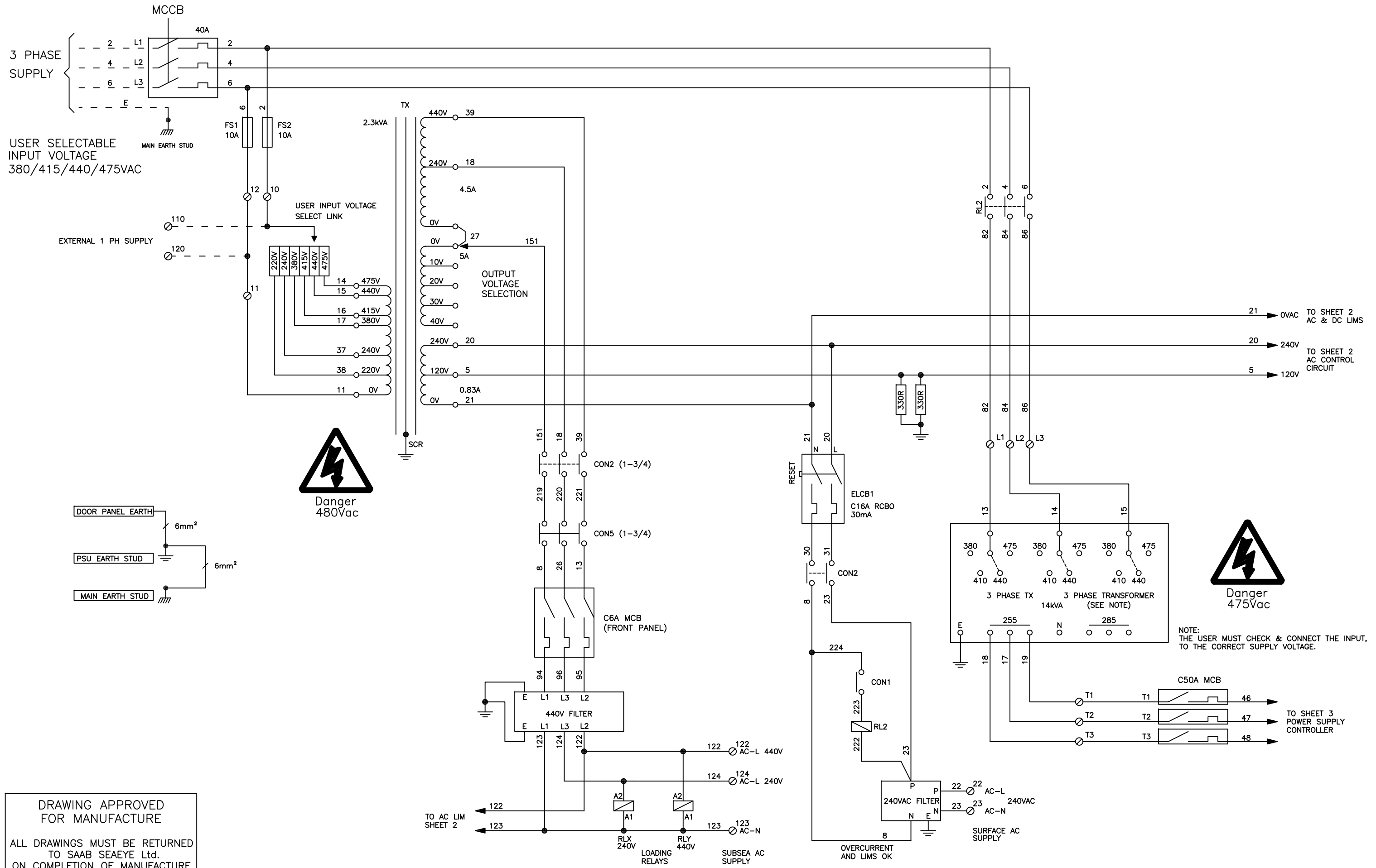
| DIP Switch    | 1          | 2    |
|---------------|------------|------|
| Position      | Up         | Down |
| Potentiometer | Setting kΩ |      |
| Alarm         | 200        |      |

**Table 1.2 AC LIM DIP Switch Positions**

The PSU incorporates two LIM TEST pushbuttons that check for correct functionality of the AC and DC LIMs.



**DANGER TO PERSONNEL AND EQUIPMENT.** IT IS IMPORTANT TO NOTE THAT LIM'S DO NOT FUNCTION AS PERSONAL SAFETY PROTECTION DEVICES. A LIM MONITORS THE STATUS OF THE SYSTEM AND WARNS OF A POTENTIAL FAULT, THE LIM CAN CUT SUPPLY FEED TO HELP PROTECT PERSONAL AND EQUIPMENT, BUT THE REACTION TIME OF THE LIM IS GENERALLY TOO SLOW TO PREVENT ELECTRICAL SHOCK.



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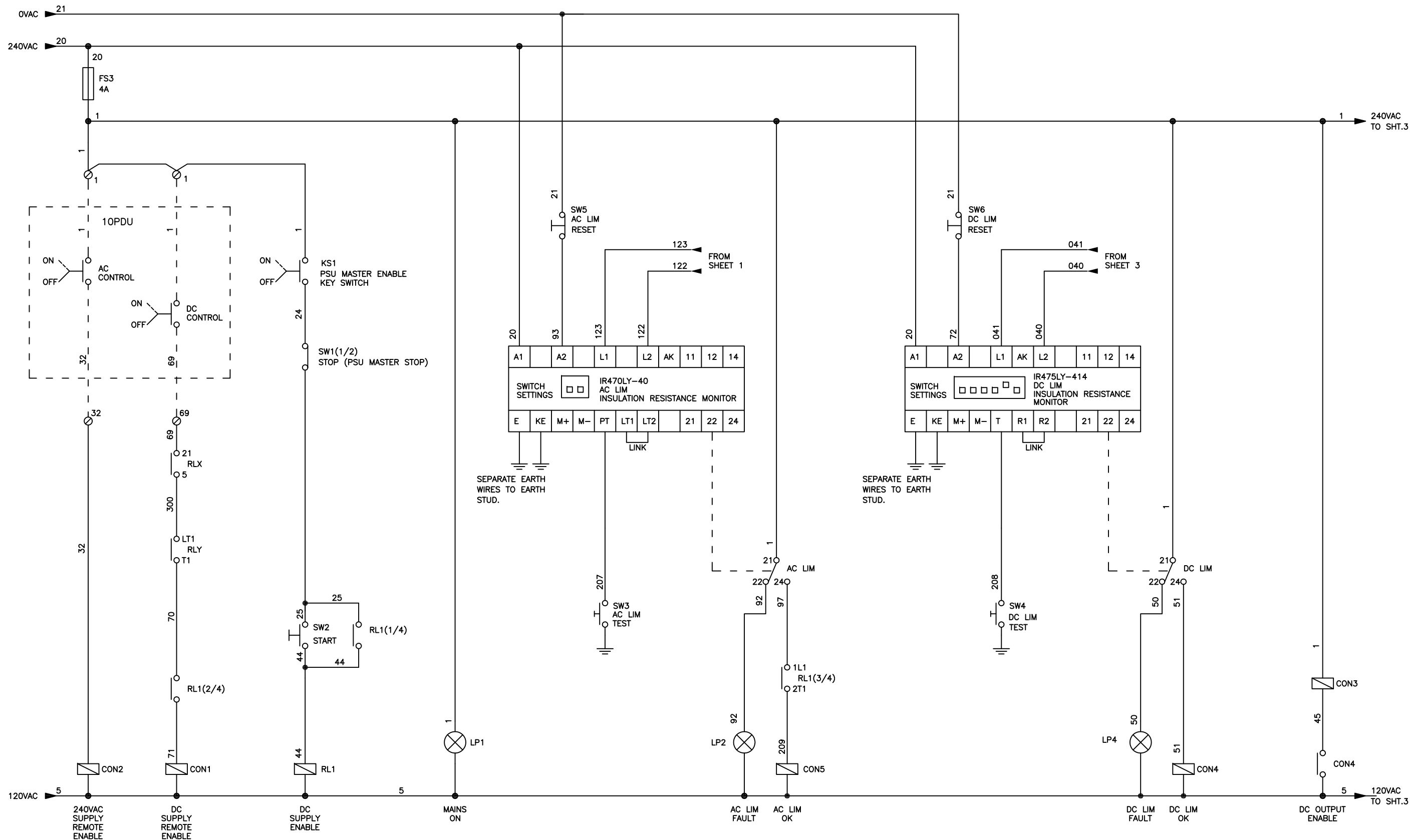
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**Seaeeye**

Saab Seaeeye Ltd.  
20 Brunel Way  
Segensworth East  
Fareham  
Hampshire  
PO15 5SD  
United Kingdom  
Tel: +44 (0)1489 898000

**TITLE**  
9PSU-2  
ROV PSU 250VDC  
(SPSU/4)  
WIRING DIAGRAM  
SHEET 1 OF 3

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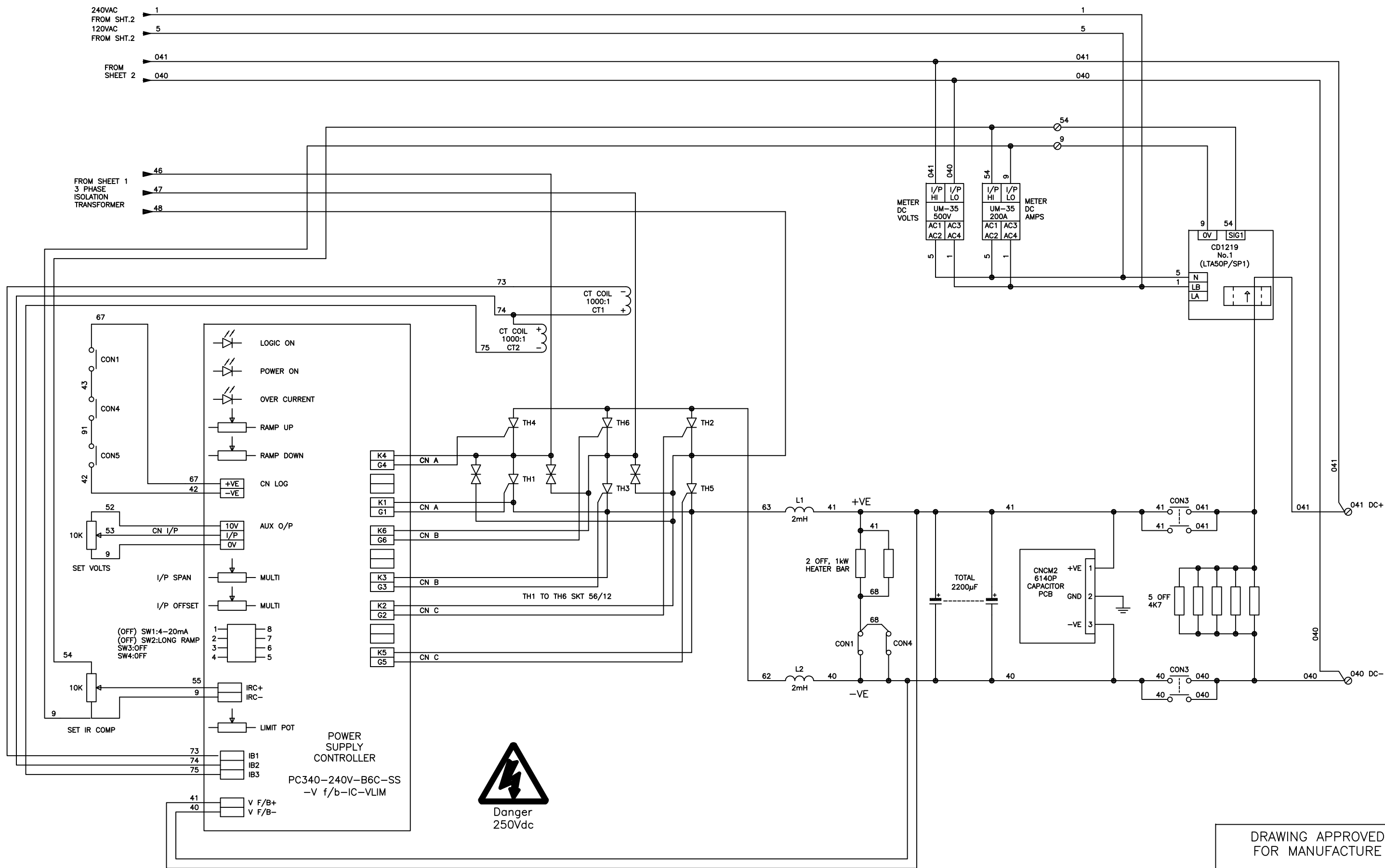
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**Seaeye**

Saab Seaeye Ltd.  
20 Brunel Way  
Segensworth East  
Fareham  
Hampshire  
PO15 5SD  
United Kingdom  
Tel: +44 (0)1489 898000

**TITLE**  
9PSU-2  
ROV PSU 250VDC  
(SPSU/4)  
WIRING DIAGRAM  
SHEET 2 OF 3

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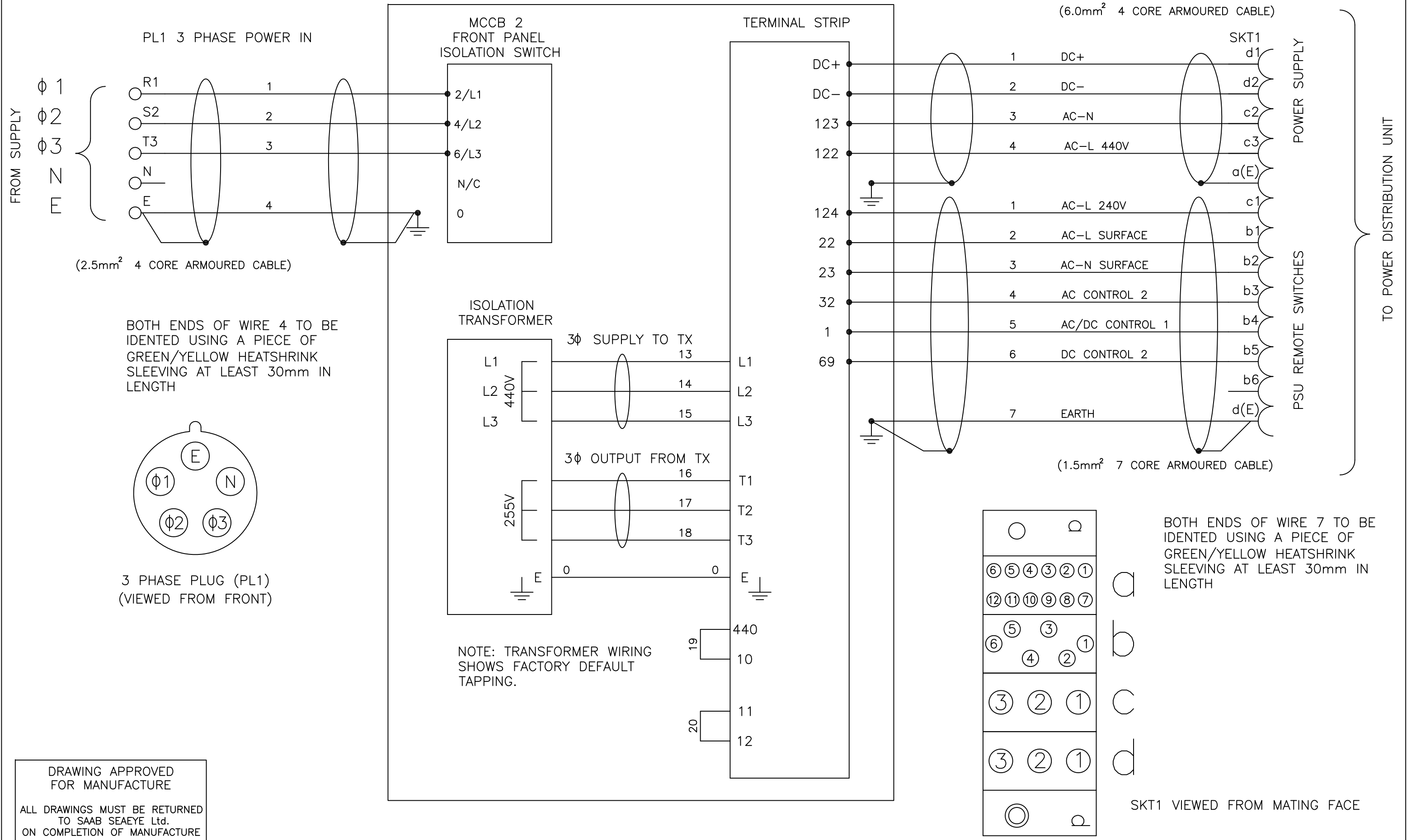
**Seaeye**

Saab Seaeye Ltd.  
20 Brunel Way  
Segensworth East  
Fareham  
Hampshire  
PO15 5SD  
United Kingdom  
Tel: +44 (0)1489 898000

**TITLE**  
9PSU-2  
ROV PSU 250VDC  
(SPSU/4)  
WIRING DIAGRAM  
SHEET 3 OF 3

| DRAWN          | APPROVED | DATE      |
|----------------|----------|-----------|
| A CATHERY      | AW       | 22.07.09  |
| DWG.No. S05720 |          | Rev. Sht. |
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POWER SUPPLY UNIT



| ISS | DESCRIPTION                     | CHECKED | DATE     | REF            |
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| 3   | HARTING LOCATING PINS CORRECTED |         | 16/05/02 | DCR557-DW      |
| 4   | DRAWING RETITLED FOR BF UPDATE  |         | 20/02/03 | DCR674-DW      |
| 5   | WIRE COLOURS ADDED TO 3 PHASE   | AS      | 08/01/07 | ECR1271-LM     |
| 6   | CHANGES AS PER CR               | AS      | 02/11/09 | CR-0000422-JFP |

Seaeeye

Saab Seaeeye Ltd.  
20 Brunel Way  
Segensworth East  
Fareham  
Hampshire  
PO15 5SD  
United Kingdom  
Tel: +44 (0)1489 898000

TITLE  
9PSU & 9PSU-2  
SURFACE POWER SUPPLY UNIT  
INTERCONNECT DIAGRAM  
SHEET 1 OF 1

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# **CHAPTER 2**

## **SURFACE UNIT**

### **TYPE 10PDU-1**

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## 2. SURFACE UNIT TYPE 10PDU-1

This Chapter describes the Tiger 880 Surface Unit (SU) Type 10PDU-1 and also contains the respective diagrams.



**Figure. 2.1 Surface Distribution Unit**

### 2.1 General Description

The SU contains the surface control electronics, which provide the switching and distribution of electrical supplies and acts as the main interface between the Remote Operated Vehicle (ROV) system equipment units. The SU components are mounted on an aluminium chassis and card frame contained within a portable ZERO flight case. The SU comprises:

- Video isolation transformers and filters.
- A Keypad, which provides operator to system interfacing.
- Control switches, lamps, meters, fuses and plug and socket assemblies.
- Contactors and relays.
- Video, Electronics and TMS PSU's, which provide the backplane power requirements for the video and control PCBs.
- Eurocard Card rack.
- A Central Processing unit (CPU) PCB, which contains a microprocessor and EPROMS containing the vehicle surface firmware.
- A Central Processing unit (CPU) PCB, which contains a microprocessor and EPROMS containing the TMS surface firmware (when a TMS is supplied).
- A Digital I/O PCB, which interfaces HCU switches and the keypad to the CPU PCB.
- An 8 & 12-bit ADC PCB, which converts the analogue HCU control signals into a digital format for the CPU.
- A video overlay PCB, which overlays the ROV data onto the video signal.
- A video CPU, which provides the video processing and EPROM's.

**NOTE.**

Full technical descriptions and drawings of PCBs, modules and power supply units can be found in Chapter 6 of this handbook.

## 2.2 Power Supplies

The power output supplies from the PSU are switched, controlled and distributed by the SU to the ROV system. The Surface Unit switches, AC SURFACE and MASTER DC, provide remote controlled switching for the PSU AC and DC supplies. Surface AC is used by the SU itself for internal electronics, the subsea AC is distributed for use by the 3PHPSU and TMS. The DC circuits are split into DC1, DC2 and TMS DC. The DC circuits are split to provide redundancy in the event of a single defect on one of the ROV DC circuits affecting the whole DC system.

When the remote AC SURFACE switch is selected to “ON”, SURFACE and SUBSEA AC is made available at the SU, PL1 (pins B1 & B2 for the surface 240 VAC circuit, pins C1 & C2 for the subsea 240 VAC circuit and pins C3 & C2 for the subsea 440 VAC circuit). The SURFACE AC lamp wired across the 240 VAC input circuit supply illuminates red indicating surface AC is available. Surface AC is used for the Electronics, Video, TMS and video receiver option PSU's. Each PSU is protected on their live input by a fuse F1, F5, F9 and F13 respectively. Surface AC also provides the supply for a fan via F16 and SKT15, switches, indicators and contactor coils.

When the AC VEHICLE switch (SW3) is selected to “ON”, contactor (CON4) energises and its associated contacts make, routing subsea 240 VAC through to umbilical SKT1 pins C5 & D6. After contactor 4 has been energized, the 440 AC is also used to energise relay RL5 and subsea 240 VAC used to energise RL6. Their associated contacts make, allowing surface AC to be routed to the VEHICLE AC lamp, which illuminates red to indicate Vehicle AC has been initialised and available for use by the vehicle. A second contact set of RL5 and RL6 are in series with the MASTER DC switch (SW4) to provide an interlock for the DC supply.

When the AC TMS switch (SW2) is selected to “ON”, contactor (CON5) energises, routing 440 VAC through to SKT 1 pins D3 & D4. After contactor 5 has been energized, the 440 VAC is also used to energise RL4 and subsea 240 VAC used to energise RL7. Their associated contacts make, allowing surface AC to be routed to the TMS AC lamp, which illuminates red to indicate TMS AC has been initialised and available for use by the tether management system. A second contact set of RL4 and RL7 are in series with the MASTER DC switch (SW4) to provide an interlock for the DC supply.

DC1, DC2 and TMS DC switches must be pre-selected prior to selecting the MASTER DC switch to “ON”. When the DC MASTER switch is selected to “ON”, (provided SURFACE AC switch is “ON”), surface AC energises relays RL1, RL2 and RL3. RL1 and RL2 associated contacts make, providing the hold circuit for DC 1 (and DC 2) and TMS DC respectively. RL3 relay contacts open to provide a switch disabling circuit to prevent further DC1, DC2 or TMS DC switching once the MASTER DC switch has been selected to “ON” and the DC supply is energised.

When the DC1 ENABLE switch (SW7) is selected to “ON”, contactor (CON1) energises and its associated contacts make, routing DC1 through to SKT1 pins E1 to E3 (DC+) and pins E4 to E6 (DC-). Lamp DC1 wired across the DC1 Contactor coil illuminates red to indicate that the DC1 switch has been enabled.

When the DC2 ENABLE switch (SW8) is selected to “ON”, contactor (CON2) energises and its associated contacts make, routing DC2 through to SKT1 pins F1 to F3 (DC+) and pins F4 to F6 (DC-). Lamp DC2 wired across the DC2 Contactor coil illuminates red to indicate that the DC2 switch has been enabled.

When the TMS ENABLE switch (SW6) is selected to “ON”, contactor (CON3) energises and its associated contacts make, routing TMS DC through to SKT1 pins D1 (TMS DC+) & pin D2 (TMS DC-). Lamp TMS DC wired across the TMS DC Contactor coil illuminates red to indicate that the TMS DC switch has been enabled.

Contactors CON1, CON2 and CON3, once energized, are held in the energised state by a hold on circuit provided by a contact of each contactor.

When the MASTER DC switch is set to “ON”, the DC lamp (LP4) illuminates red to indicate that the DC supply is energised.

## 2.3 Backplanes

The Eurocard card rack provides computer, video and TMS (if fitted) backplane connections to the Eurocard PCB 96 way edge connectors for the following:

- PCB power supplies are connected to pins 1, 2, 31 & 32 and are common to rows a, b & c.
- Address, control and data signals are connected to their own dedicated pins (3 to 30) and are not common to rows a, b & c.

The Electronics PSU (PSU1) provides three fused outputs to the computer backplane:

- -15 VDC via fuse F2 to pin 5.
- +5 VDC via fuse F3 to pin 2.
- +15 VDC via fuse F4 to pin 1.
- 0 VDC to pin 4.

The Video PSU (PSU2), which is identical to the Electronics PSU, provides three fused outputs for the video backplane:

- -15 VDC via fuse F6 to pin V1.
- +5 VDC via fuse F7 to pin V4.
- +15 VDC via fuse F8 to pin V3.
- 0 VDC to pin V2.

The TMS PSU (PSU3), also identical to the Electronics PSU, provides three fused outputs for the TMS backplane:

- -15 VDC via fuse F10 to pin 5.
- +5 VDC via fuse F11 to pin 2.
- +15 VDC via fuse F12 to pin 1.
- 0 VDC to pin 4.

The address, control and data signals for the control PCBs also make up the backplane wiring.

The Video Module PSU (PSU4) provides a 12V output for the Twisted pair Video Module or Video Through Module whichever is fitted.

## 2.4 ROV Control Signals

Vehicle control data is processed by the electronics CPU and transmitted as a part of the control data string over a single twisted pair RS485 communication link via the umbilical connector, Tele A and Tele B. Signals from the HCU rotary controls and switches are routed from the HCU socket via a ribbon cable to the PCBs located in the card rack. The CPUs also process data received via the RS485 communication link, TELE A and TELE B.

The analogue signals (Table 3.1) from the HCU rotary controls are fed to the 8-bit ADC PCB (6040P) on eight channels. Each channel receives a voltage between 0 to 5 VDC depending on the position of the rotary control. The voltage is routed to the PCB via a 16-way connector, PL2 and converted into an 8 bit digital number (0 to 255) where it is output onto the backplane data bus for use by the CPU.

| 8-bit Channel Designation |              |        |
|---------------------------|--------------|--------|
| Channel                   | Signal       | Pin    |
| 1                         | Turn set     | PL2-1  |
| 2                         | Rate of turn | PL2-3  |
| 3                         | F/R Set      | PL2-5  |
| 4                         | F/R Speed    | PL2-7  |
| 5                         | Lat set      | PL2-9  |
| 6                         | Lights 1     | PL2-11 |
| 7                         | Tilt         | PL2-13 |
| 8                         | Pan          | PL2-15 |

**Table 2.1 8-bit Channel Designation**

The 12-bit ADC PCB (6081P) functions in a similar manner as the 8-bit ADC PCB but provides greater resolution to enable precise control of the vehicle in the water. The analogue signals (Table 2) from the HCU rotary controls are fed to the 12-bit ADC PCB on eight channels. Each channel receives a voltage between 0 to 5 VDC depending on the position of the rotary control. The voltage is routed to the PCB via a 20-way connector, CN2 and converted into a 12 bit digital number (0 to 2047) where it is output onto the backplane data bus for use by the CPU.

| 12-bit Channel Designation |        |       |
|----------------------------|--------|-------|
| Channel                    | Signal | Pin   |
| ADC 1                      | Vert   | CN2-4 |

**Table 2.2 12-bit Channel Designation**

| 12-bit Channel Designation |           |        |
|----------------------------|-----------|--------|
| ADC 2                      | F/R       | CN2-6  |
| ADC 3                      | Lat       | CN2-8  |
| ADC 4                      | Turn      | CN2-10 |
| ADC 5                      | Lat Speed | CN2-12 |
| ADC 6                      | Lights 2  | CN2-14 |
| ADC 7                      | Not Used  | CN2-16 |
| ADC 8                      | Not Used  | CN2-18 |

**Table 2.2 12-bit Channel Designation (Continued)**

HCU and surface unit front panel keypad switch positions are routed to the Digital I/O PCB (6041) via a 50-way connector, CN2. The status of the HCU switches are fed via channels (Table 3) and output to the control data bus for use by the CPU. The Digital I/O PCB also provides 0 & 5 V from the backplane to supply the hand control unit.

| Digital I/P Port Designation |                         |             |     |
|------------------------------|-------------------------|-------------|-----|
| Port/Bit                     | Control Signal          | Pin         | I/O |
| A, 0                         | Tooling Control B       | CN2-3       | I   |
| A, 0                         | Auto-head               | CN2-4       | I   |
| A, 1                         | Tooling Control A       | CN2-5       | I   |
| A, 1                         | Auto-depth              | CN2-6       | I   |
| A, 2                         | Sonar                   | CN2-8       | I   |
| A, 3                         | Stills                  | CN2-10      | I   |
| A, 4                         | Altimeter/Depth Control | CN2-11      | I   |
| A, 4                         | Thruster Enable         | CN2-12      | I   |
| A, 5                         | AUX AC Control          | CN2-13      | I   |
| A, 5                         | Camera select           | CN2-14      | I   |
| A, 6                         | Compass Turns Reset     | CN2-15      | I   |
| A, 6                         | Light 2 switch          | CN2-16      | I   |
| A, 5                         | Remote 3 Phase          | CN2-17      | I   |
| B, 0 & 1                     | Function switch 1       | CN2-20 & 22 | I   |
| B, 2 & 3                     | Function switch 2       | CN2-24 & 26 | I   |
| B, 4 & 5                     | Function switch 3       | CN2-28 & 30 | I   |

**Table 2.3 Digital I/O Channel Designation**

| Digital I/P Port Designation |                     |             |   |
|------------------------------|---------------------|-------------|---|
| B, 6 & 7                     | Function switch 4   | CN2-32 & 34 | I |
| C, 0                         | Keypad column 3     | CN2-35      | I |
| C, 1                         | Keypad column 2     | CN2-37      | I |
| C, 2                         | Keypad column 1     | CN2-39      | I |
| C, 3                         | Keypad dummy column | CN2-41      | I |
| C, 4                         | Keypad row 1        | CN2-43      | O |
| C, 5                         | Keypad row 2        | CN2-45      | O |
| C, 6                         | Keypad row 3        | CN2-47      | O |
| C, 7                         | Keypad row 4        | CN2-49      | O |

**Table 2.3 Digital I/O Channel Designation (Continued)**

#### **2.4.1 Sonar, Manipulator and Auxiliary**

Sonar data is routed via the umbilical SKT1 on a dedicated twisted pair and output on the sonar connector on the surface unit rear panel.

AUX1, AUX3 and AUX5 also have their own dedicated twisted pairs and can be used for specific customer requirements. They are routed from the SKT1 umbilical to their respective auxiliary connector on the surface unit rear panel.

AUX2 has a quad interconnection between the umbilical SKT1 and the auxiliary AUX2 connector on the surface unit rear panel.

#### **NOTE.**

[Availability of auxiliary pairs is dependent on system configuration.](#)

A manipulator telemetry link is connected through the SU, manipulator telemetry is input from the umbilical socket SKT1 pins B1 & B2 via a twisted pair to the manipulator connector PL2 pins 1 & 2.

Sonar telemetry is connected through the SU and is routed from the umbilical socket SKT1 pins c7 & c8 to the sonar socket SKT2 pins 1 & 2.

#### **2.4.2 CP Probe**

The CP voltage, measured by the probe, is part of the digital data stream and is processed by the electronics and video CPUs and displayed on the system monitor as CP voltage data.

Two types of probe can be fitted, contact or proximity. With a proximity probe, only one wire is connected to the probe, the probe return path being provided by a reference earth connected to the SU front panel Reference terminal and the structure under survey. With a contact probe fitted, no earth connection is required. CP probe type is selected during system configuration (Chapter 4).

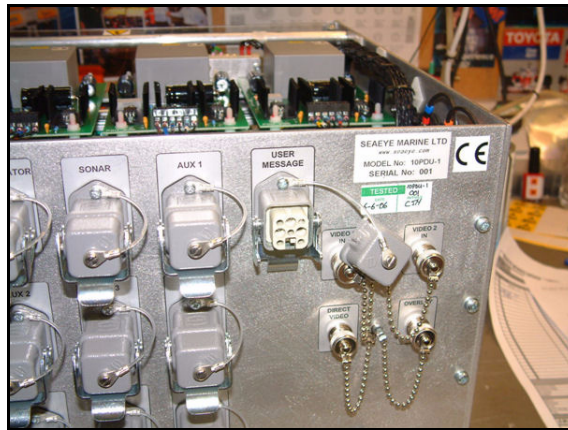
#### **2.4.3 Auxiliary AC Control, Remote 3-Phase Control and Compass Turns Reset**

Operation of the AUX AC CONTROL switch (SW9), REMOTE 3PHASE #2 (SW17) and COMPASS TURNS RESET switch (SW11) applies zero V (logic low) to the Digital I/O PCB via the 50-way connector, CN2 and PL9.

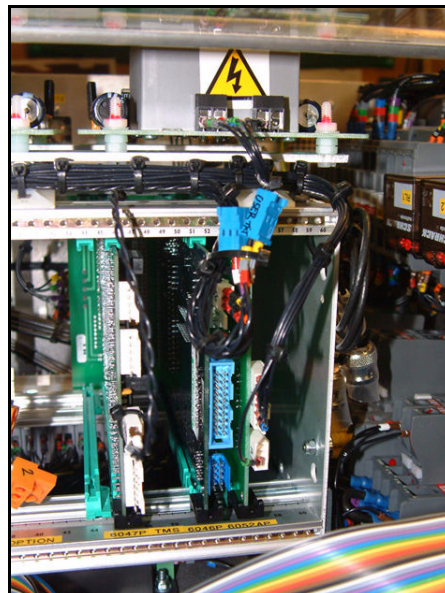
When the REMOTE 3PHASE #1 (SW16) is switched on, 240 VAC is routed from the ROV AC sub-sea supply to energise contactor CON6. Its contacts close to route a 240 VAC output to SK1 pins a11 and a12.

## 2.5 Text Messaging

The system can accept text messaging data for display on the overlay text monitor. The input signal is connected to the USER MESSAGE connector on the rear of the unit and the unit needs to be fitted with the 6048P PCB in place of the 6046P PCB and connected using the blue connector identified as text messaging. For details on the data string input requirement, contact Saab Seaeye Ltd.



**Figure. 2.2 User Message Connection**



**Figure. 2.3 PCB 6048P User Message Connection (Shown Stowed)**

## 2.6 TMS Control Signals

This function is only operational when a TMS is fitted to the system. TMS control data is processed by the TMS CPU and transmitted as a part of the control data string over a single twisted pair RS485 communication link via the umbilical connector, TMS Tele A and TMS Tele B.

TMS Hand Control Unit and TMS Surface unit front panel switch positions are routed to the Switch Adaptor PCB (6052AP) via PL3. The status of the switch positions, representing either +5 VDC (switch open) or 0 V (switch closed) are read by the TMS CPU.

| Switch Adaptor Input Designations |         |
|-----------------------------------|---------|
| Function                          | Pin No  |
| Switch 1 – Unlock                 | PL1-29a |
| Switch 2 – Lock                   | PL1-28a |
| Switch 3 – Bail In                | PL1-27a |
| Switch 4 – Bail Out               | PL1-26a |
| Switch 5 – Enable Bailing         | PL1-25a |
| Switch 6 – Reset Bail Count       | PL1-24a |
| Switch 7 - Lights                 | PL1-16a |

**Table 2.4 Switch Adaptor Input Designations**

| Switch Adaptor Output Designations |        |
|------------------------------------|--------|
| Function                           | Pin No |
| + 5 VDC Power Supply               | PL3-1  |
| 0 VDC                              | PL3-8  |
| Switch 1 – Unlock                  | PL3-2  |
| Switch 2 – Lock                    | PL3-3  |
| Switch 3 – Bail In                 | PL3-4  |
| Switch 4 – Bail Out                | PL3-5  |
| Switch 5 – Enable Bailing          | PL3-6  |
| Switch 6 – Reset Bail Count        | PL3-7  |
| Switch 7 - Lights                  | PL2-2  |

**Table 2.5 Switch Adaptor Output Designations**



## 2.7 Video System

The video signals from the ROV cameras are routed to the VIDEO1/VIDEO2 switch (SW14) via BNC connectors 1 & 2. One video channel can be directly routed to the system monitor via a video isolation transformer (VT) and a second video channel routed to the VIDOL PCB and output with video and overlay genlocked for subsequent display on the system monitor.

Video and video overlay, or video overlay only, can be displayed on the system monitor by operation of the SU VIDEO SURFACE/SUBSEA switch. Operating the switch grounds one of two +5 V lines, depending on the switch position, on the Vidmod PCB (located on the video overlay PCB), switching and routing the required video combination from the video overlay PCB to the system monitor for subsequent display.

The video CPU monitors the telemetry data being transmitted by the control CPU and processes ROV data and keypad selections from the telemetry and keyboard operations. The Vidol PCB acts as a display driver and genlocks the overlay data to the video signal. The following data is transmitted to the Video overlay via a dedicated 16-bit bus:

- Compass and depth data.
- Tilt information.
- Compass status byte.
- CP probe voltage reading.
- Auto heading and auto depth lock.
- TMS data if fitted.
- Keypad switch selection.
- Error/warning messages.

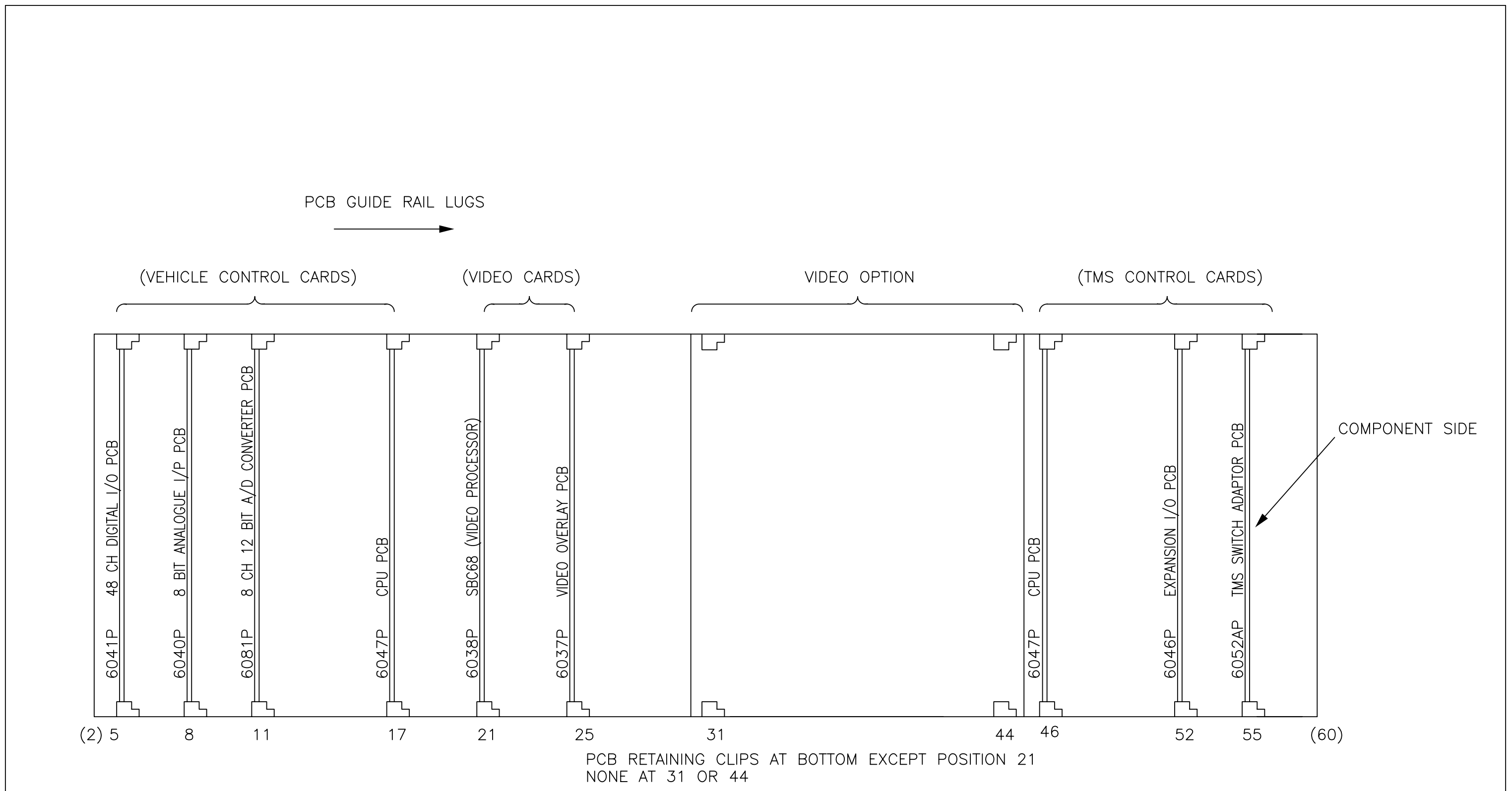
The extracted data is added to the video signal as overlay data and routed to the monitor.

Keyboard and TMS data is also directly read in by the video CPU and becomes part of the overlay. TTL keyboard data is received at SKT3 and routed to the video CPU via J6. RS232 TMS data is routed to J4 on the video CPU via J6 on the Expansion I/O PCB (6046P).

| Expansion Output Designations          |        |
|----------------------------------------|--------|
| Function                               | Pin No |
| RS232 TXD (Overlay data transmitted)   | J6-1   |
| RS232 0 V                              | J6-2   |
| RS232 CTS (Clear to send overlay data) | J6-3   |

**Table 2.6 Expansion Output Designations**

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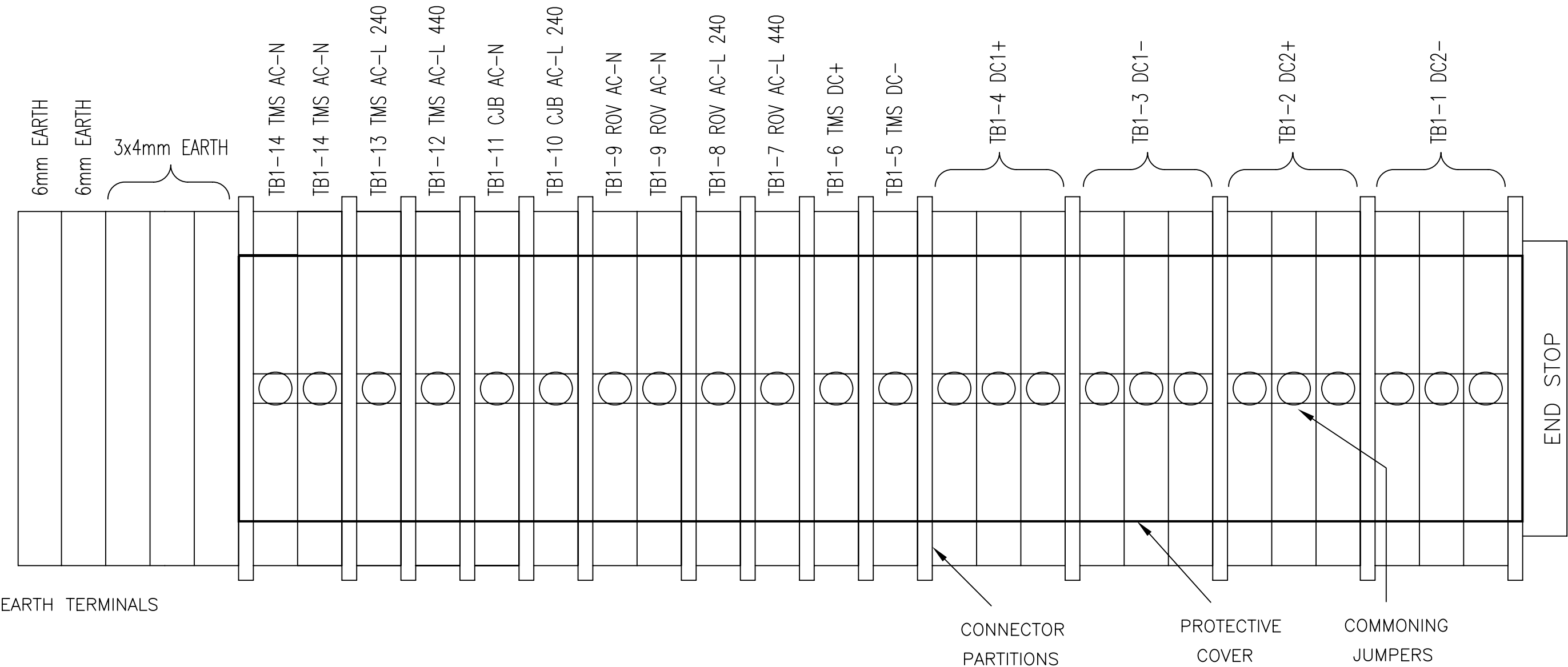


Seaeye Marine Ltd.  
Seaeye House  
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TITLE  
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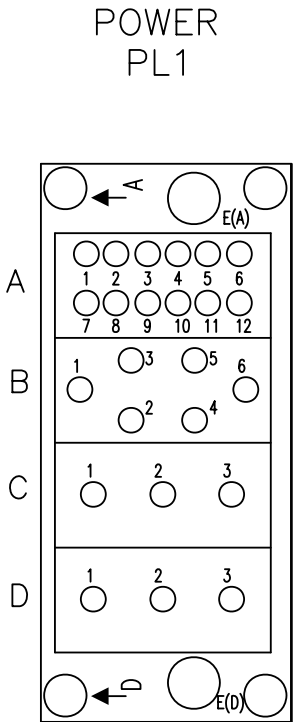
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| PARTITIONS       | — | 149—305 | — | 12EF | — | 15    | OFF |
| END STOPS        | — | 147—503 | — | 10EF | — | 1     | OFF |
| EARTH TERMINALS  | — | 147—486 | — | 07EF | — | 3     | OFF |
| EARTH TERMINALS  | — | 147—487 | — | 05EF | — | 2     | OFF |
| COMMONING JUMPER | — | 147—499 | — | 09EF | — | 16    | OFF |
| PROTECTIVE COVER | — | 149—451 | — | 11EF | — | 200mm |     |



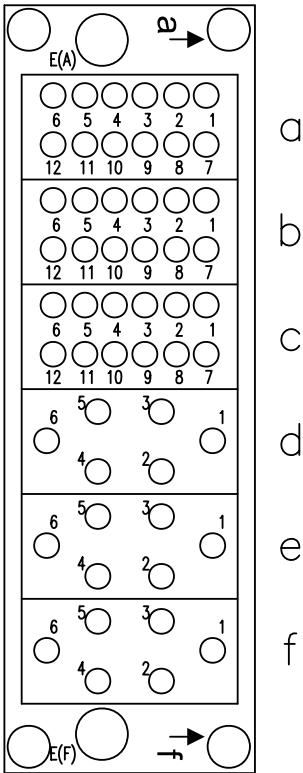
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|                  |                                                                                                                               |                                                                   | Rev. 2<br>Sht. 1  |          |                  |

| PIN  | FUNCTION              |
|------|-----------------------|
| A1   | N/C                   |
| A2   | N/C                   |
| A3   | N/C                   |
| A4   | N/C                   |
| A5   | N/C                   |
| A6   | N/C                   |
| A7   | N/C                   |
| A8   | N/C                   |
| A9   | N/C                   |
| A10  | N/C                   |
| A11  | N/C                   |
| A12  | N/C                   |
| B1   | AC-L 240V SURFACE     |
| B2   | AC-N 240V SURFACE     |
| B3   | AC REMOTE             |
| B4   | DC REMOTE / AC REMOTE |
| B5   | DC REMOTE             |
| B6   | N/C                   |
| C1   | AC-L 240V SUBSEA      |
| C2   | AC-N SUBSEA           |
| C3   | AC-L 440V SUBSEA      |
| D1   | DC+                   |
| D2   | DC-                   |
| D3   | N/C                   |
| E(A) | EARTH                 |
| E(D) | EARTH                 |



## UMBILICAL SKT1



## \*WARNING

ALWAYS CHECK TMS AND ROV AC  
VOLTAGE REQUIREMENTS FOR CORRECT  
OUTPUT CONNECTIONS

| PIN | FUNCTION     | PIN  | FUNCTION       |
|-----|--------------|------|----------------|
| a1  | AUX4 A       | c5   | ROV AC-L 240 * |
| a2  | AUX4 B       | c6   | TMS AC-L 240 * |
| a3  | AUX5 A       | c7   | SONAR A        |
| a4  | AUX5 B       | c8   | SONAR B        |
| a5  | N/C          | c9   | AUX3 A         |
| a6  | AUX6 1       | c10  | AUX3 B         |
| a7  | AUX6 2       | c11  | N/C            |
| a8  | AUX6 3       | c12  | CP REF         |
| a9  | CJB AC-L 240 | d1   | TMS DC+        |
| a10 | CJB AC-N     | d2   | TMS DC-        |
| a11 | AUX AC-L     | d3   | TMS AC-L 440 * |
| a12 | AUX AC-N     | d4   | TMS AC-N       |
| b1  | MANIP A      | d5   | ROV AC-L 440 * |
| b2  | MANIP B      | d6   | ROV AC-N       |
| b3  | AUX2 A       | e1   | DC1 +          |
| b4  | AUX2 B       | e2   | DC1 +          |
| b5  | VIDEO1 A     | e3   | DC1 +          |
| b6  | VIDEO1 B     | e4   | DC1 -          |
| b7  | AUX1 A       | e5   | DC1 -          |
| b8  | AUX1 B       | e6   | DC1 -          |
| b9  | SPARE A      | f1   | DC2 +          |
| b10 | SPARE B      | f2   | DC2 +          |
| b11 | VIDEO2 A     | f3   | DC2 +          |
| b12 | VIDEO2 B     | f4   | DC2 -          |
| c1  | ROV TELE A   | f5   | DC2 -          |
| c2  | ROV TELE B   | f6   | DC2 -          |
| c3  | TMS TELE A   | E(A) | SIGNAL EARTH   |
| c4  | TMS TELE B   | E(F) | EARTH (CPC)    |

MALE MODULE FRAME  
INSERTS VIEWED FROM  
MATING FACE

VIEW FROM MATING FACE OF CONNECTORS

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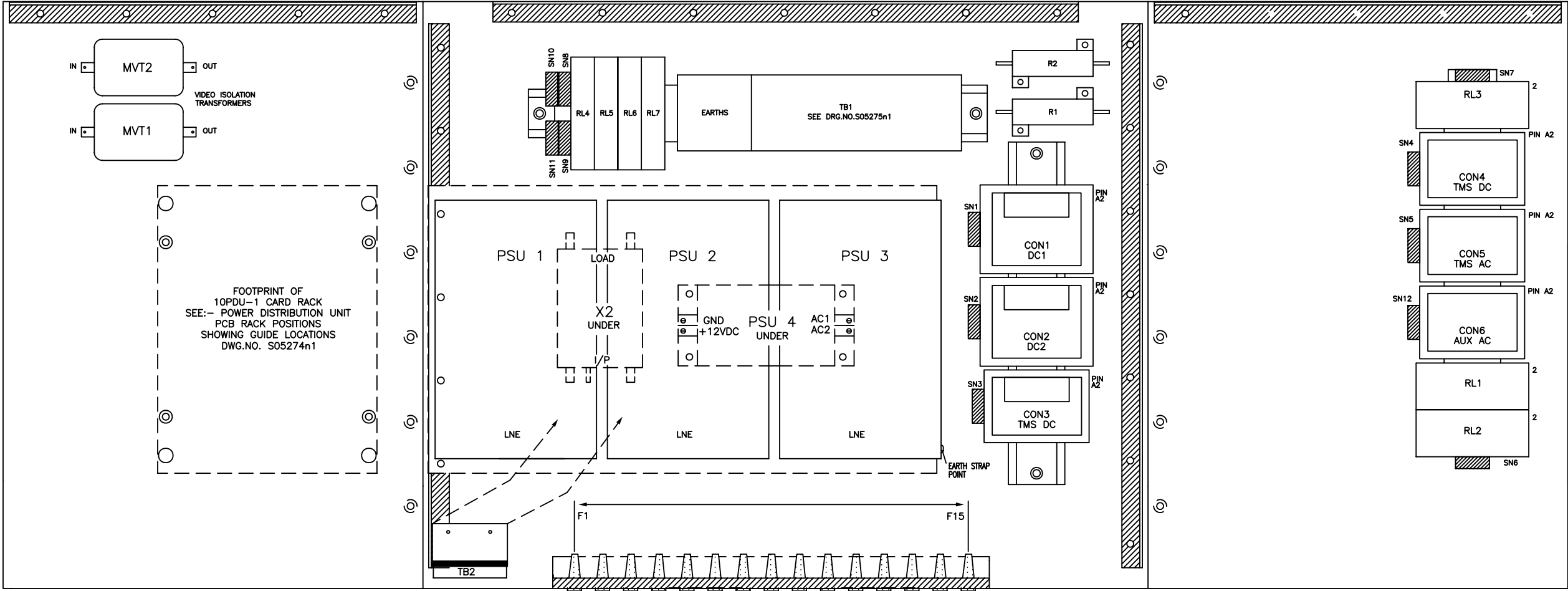
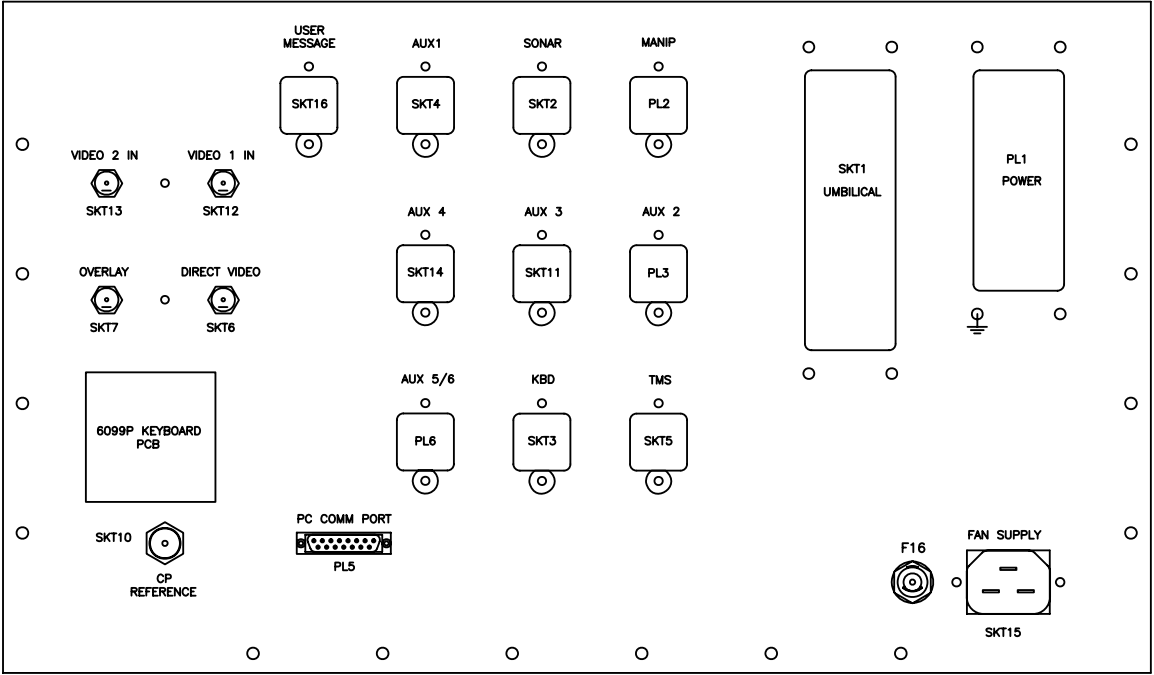
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UMBILICAL AND POWER  
CONNECTOR LAYOUT  
SHEET 1 OF 1

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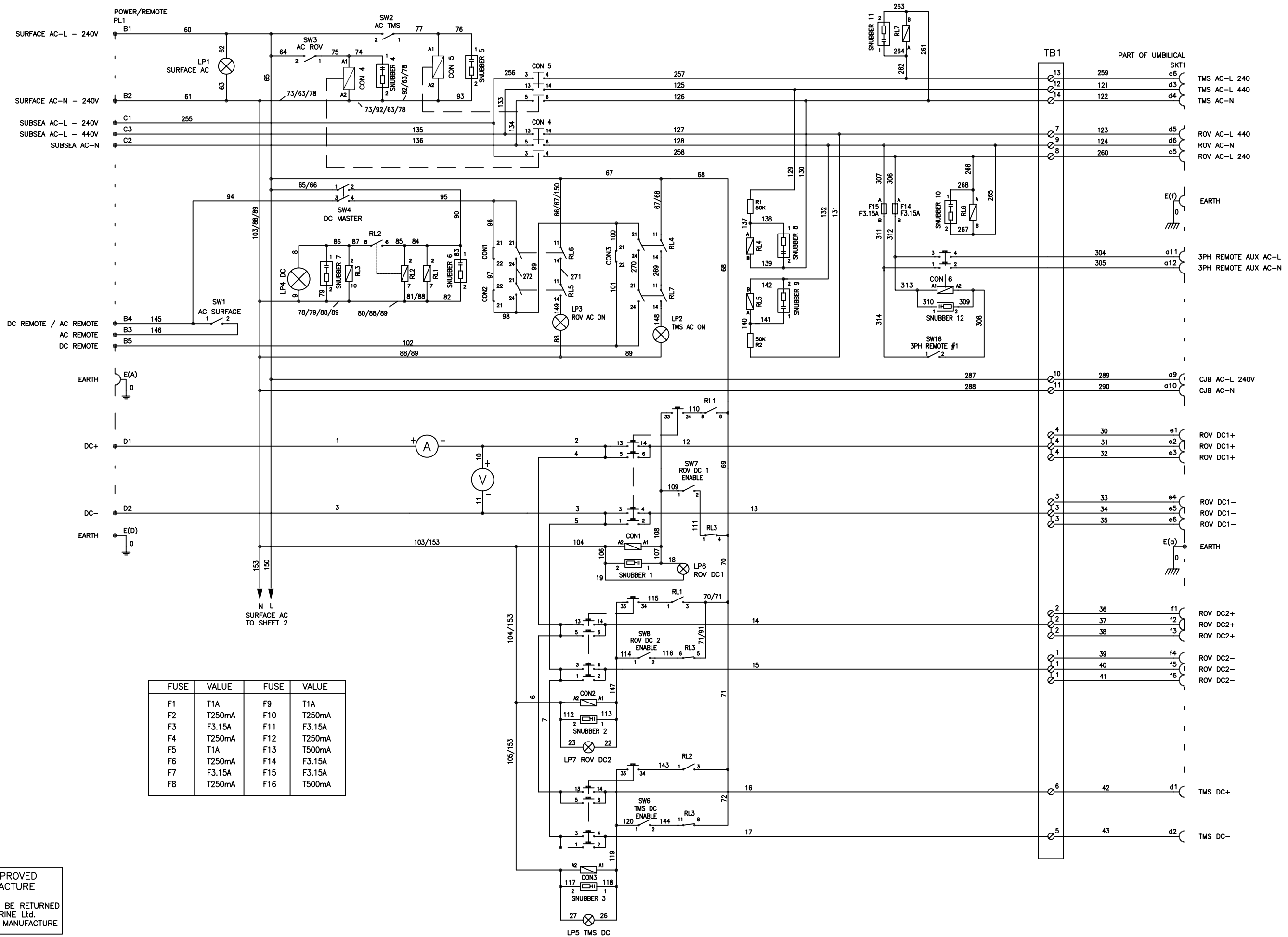
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UNIT COMPONENT  
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| FUSE | VALUE  | FUSE | VALUE  |
|------|--------|------|--------|
| F1   | T1A    | F9   | T1A    |
| F2   | T250mA | F10  | T250mA |
| F3   | F3.15A | F11  | F3.15A |
| F4   | T250mA | F12  | T250mA |
| F5   | T1A    | F13  | T500mA |
| F6   | T250mA | F14  | F3.15A |
| F7   | F3.15A | F15  | F3.15A |
| F8   | T250mA | F16  | T500mA |

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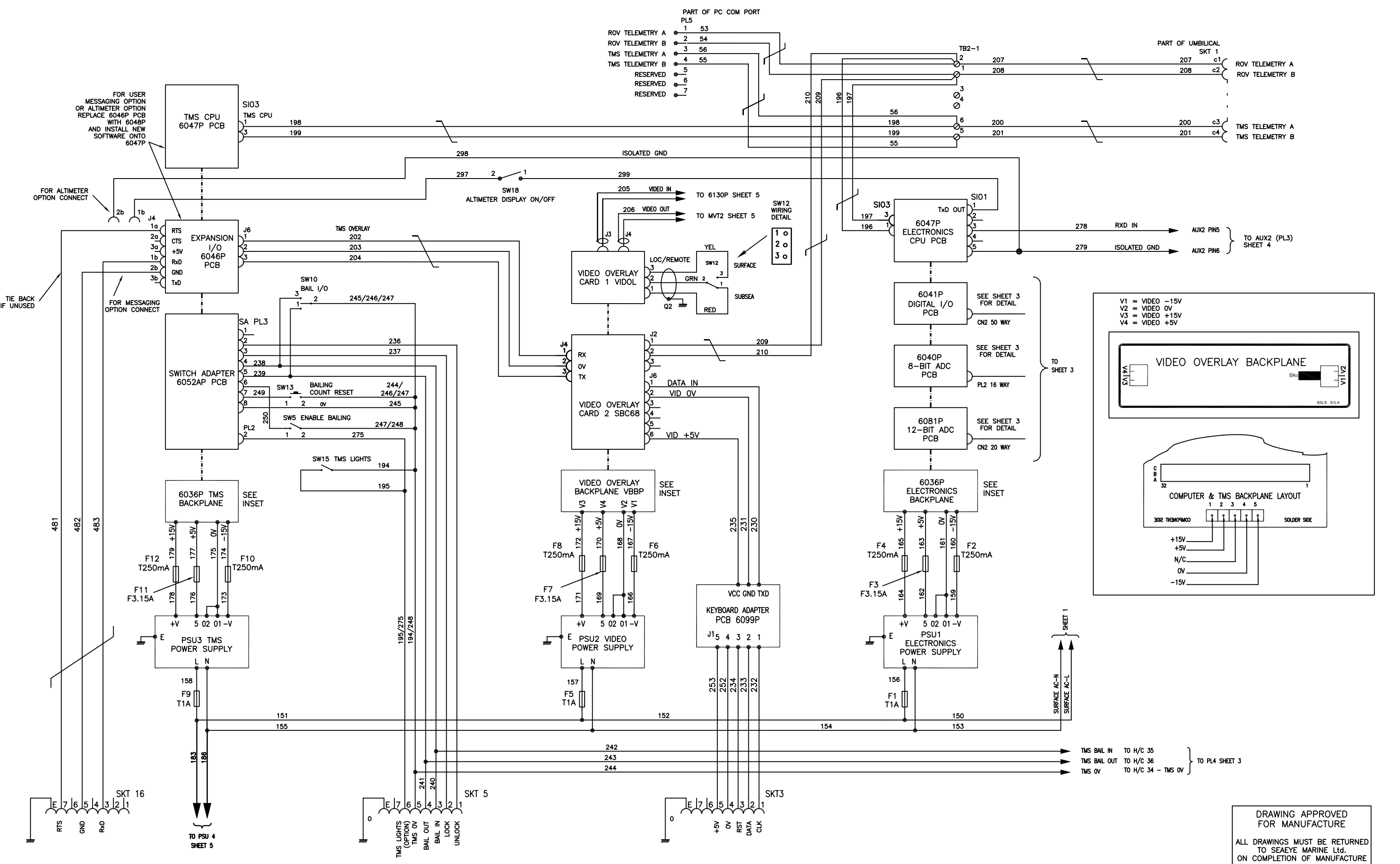
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WIRING DIAGRAM

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20/02/06

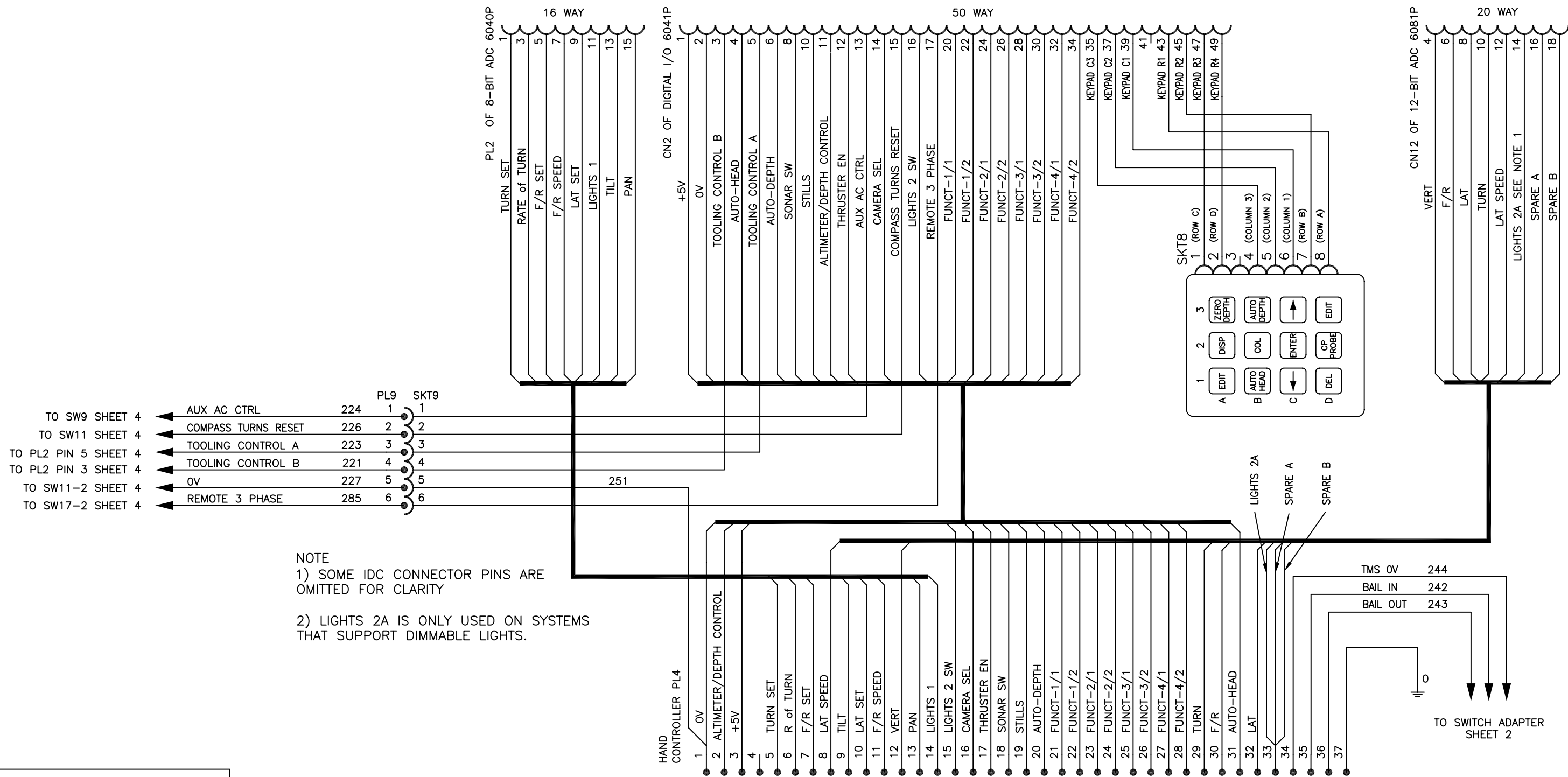
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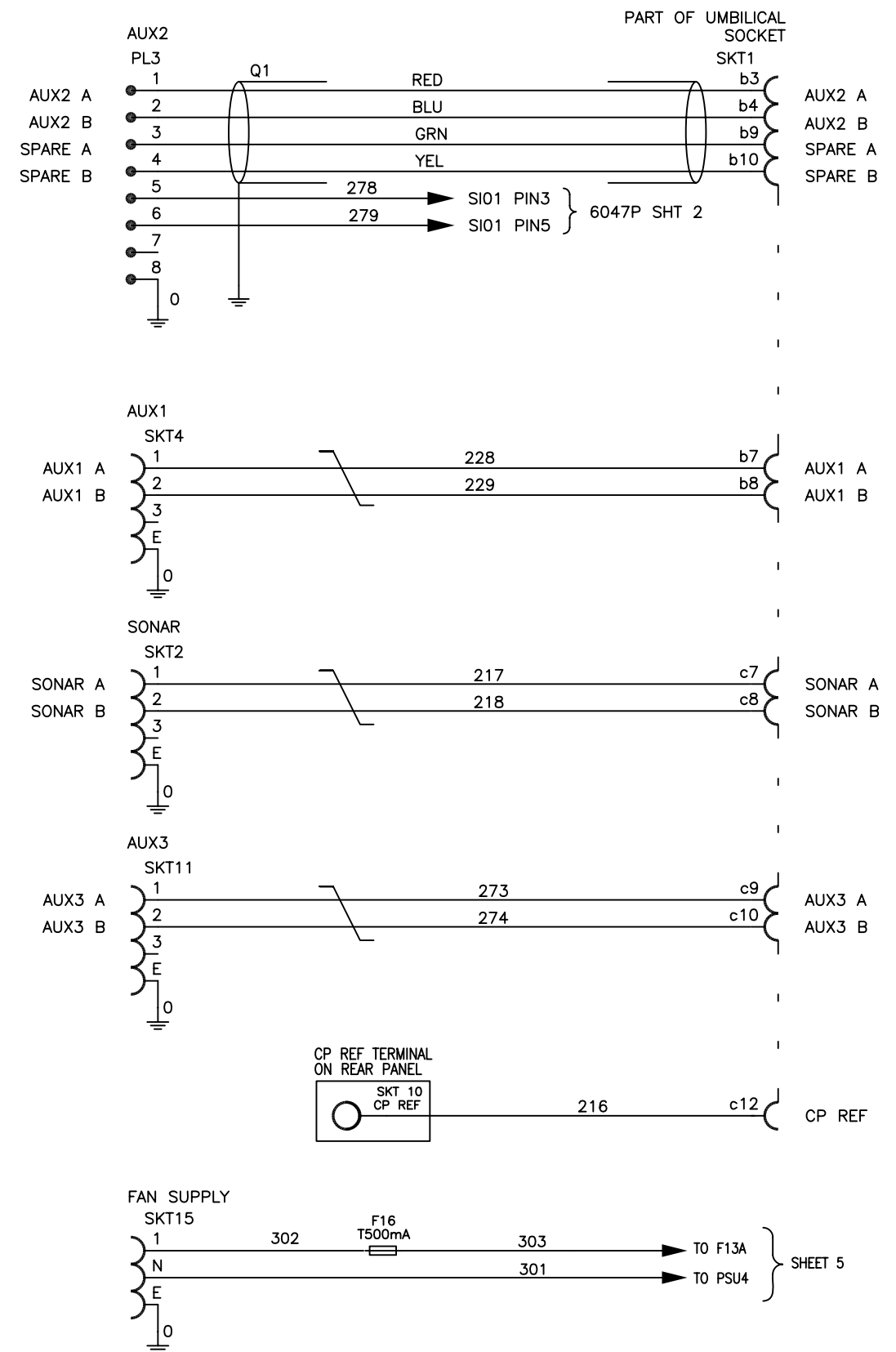
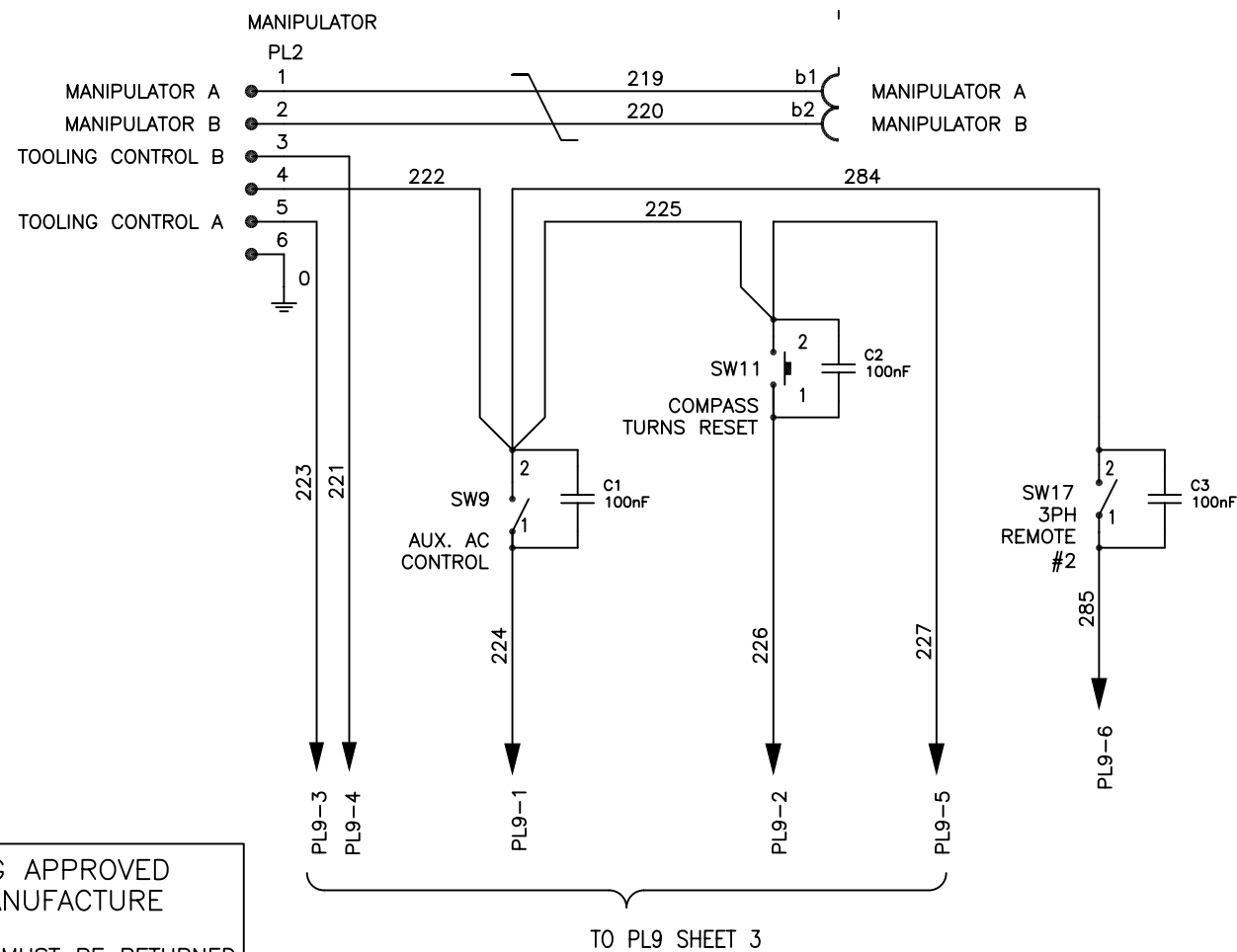
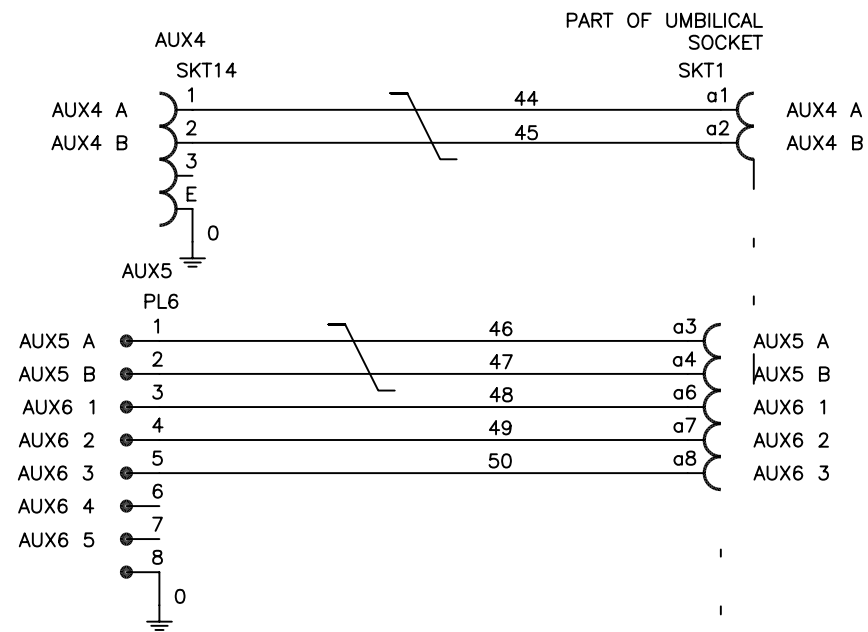


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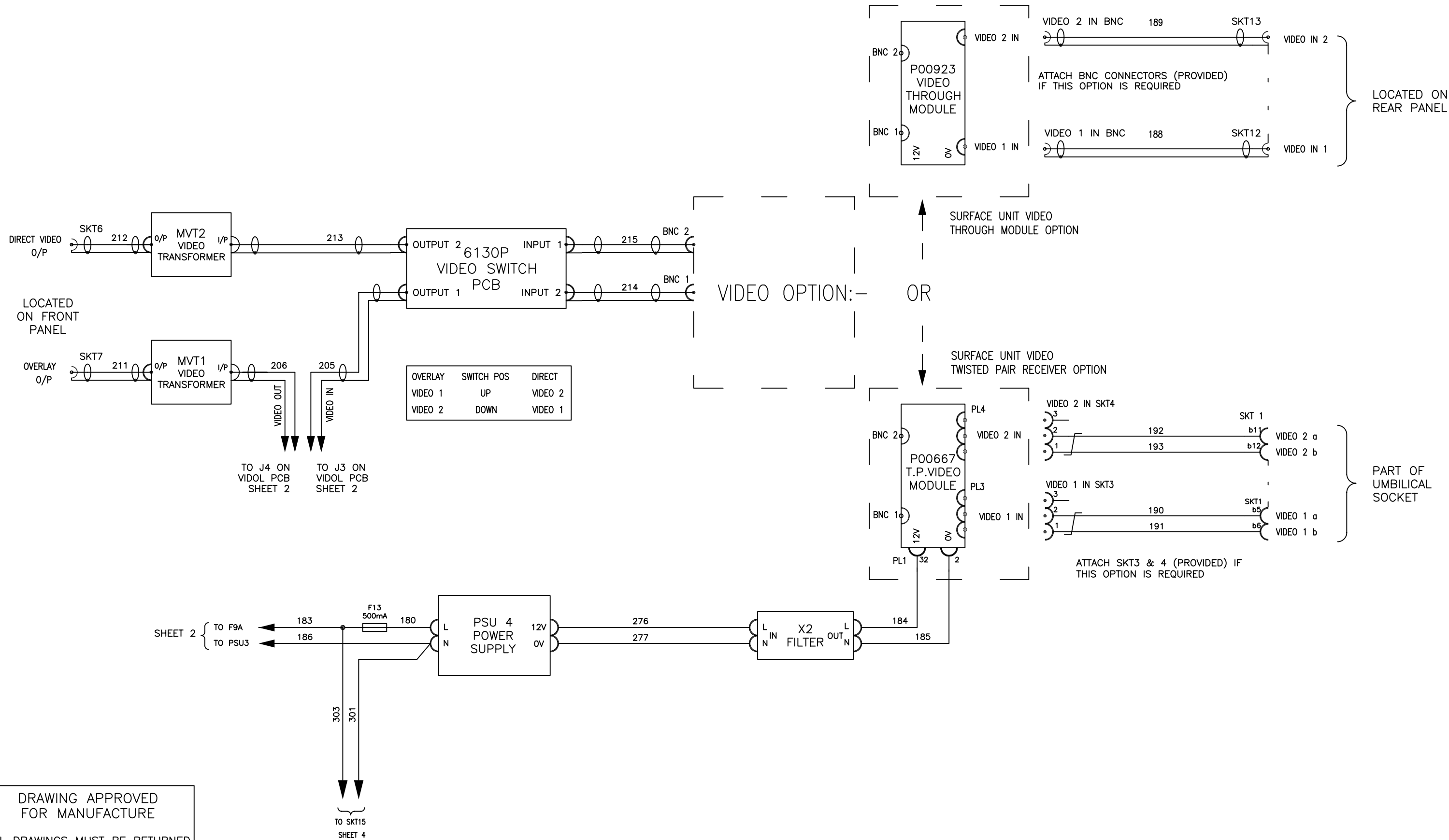
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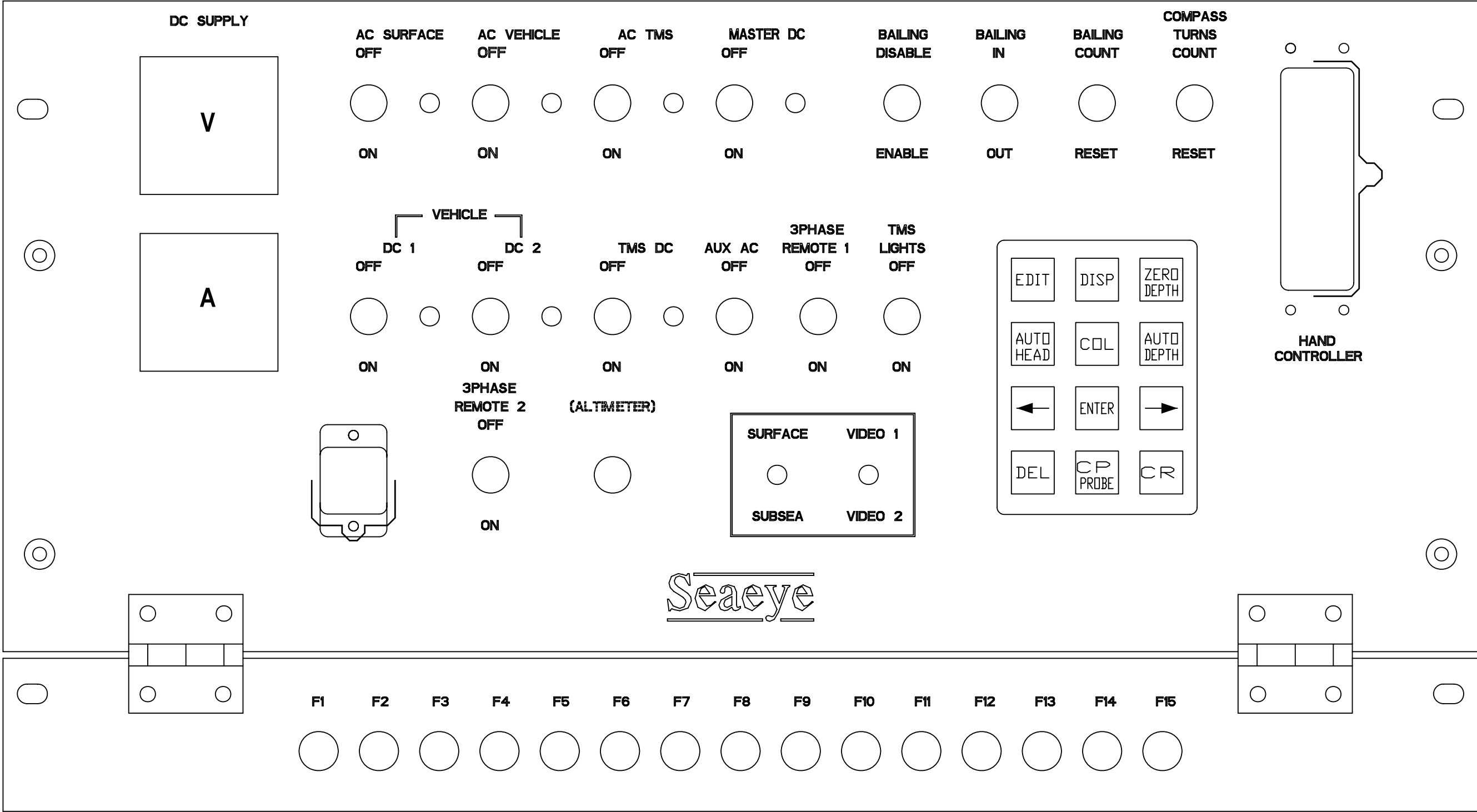
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VIDEO OPTIONS  
UNIT WIRING DIAGRAM

SHEET 5 OF 5

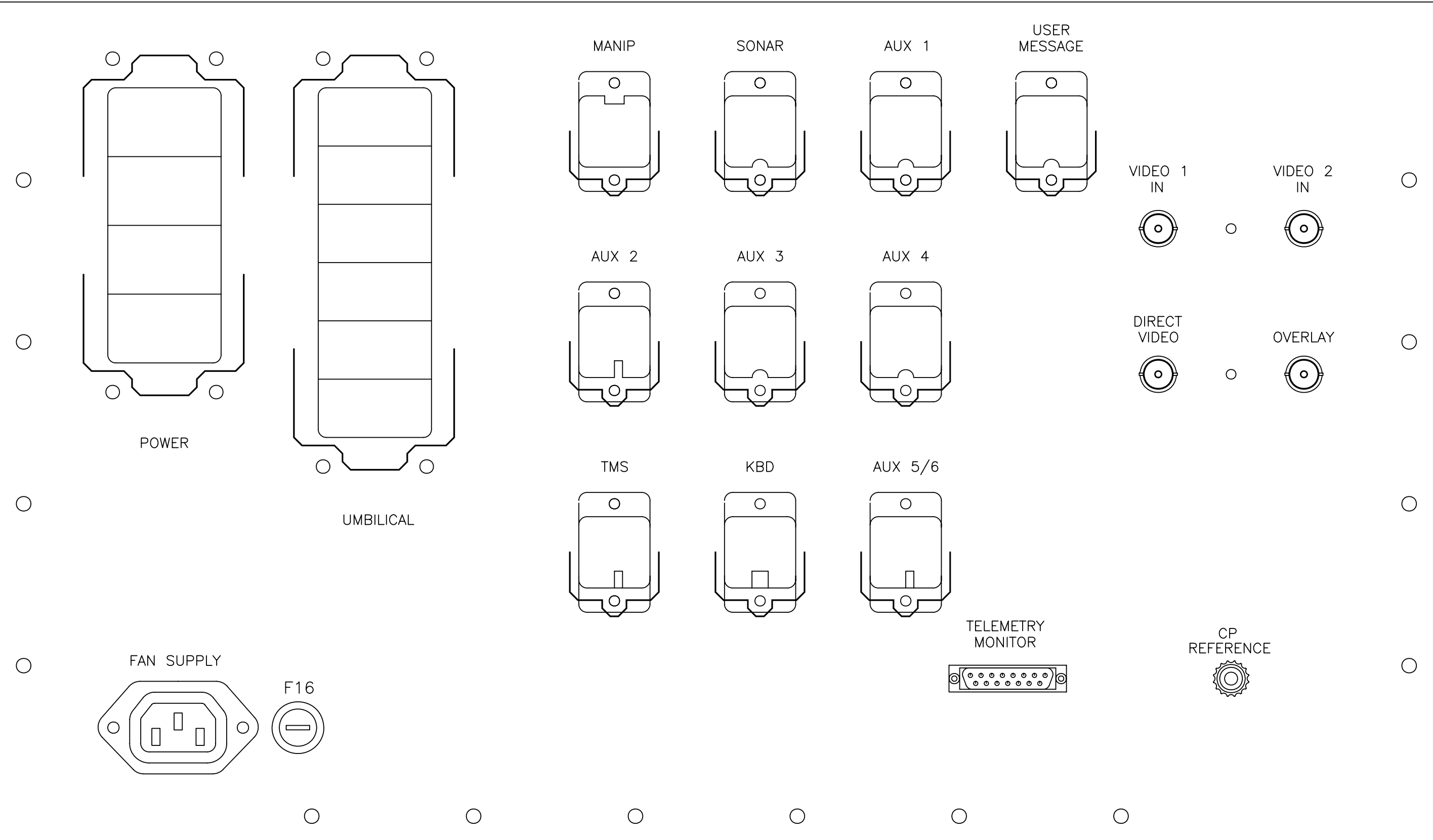
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# **CHAPTER 3**

## **HAND CONTROL UNIT**

### **TYPE HC(D)/5**

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### 3. HAND CONTROL UNIT TYPE HC(D)/5

This Chapter describes the Tiger 880 Hand Control Unit (HCU) Type HC(D)/5 and also contains the respective diagrams.



**Figure. 3.1 Hand Control Unit (HC(D)/5)**

#### 3.1 HCU General Description

The HCU provides the interface between the operator and the vehicle. Switches and controls are mounted on a hand held aluminium case that is electrically connected by a six-metre lead to the surface unit.

#### 3.2 HCU Technical Description

The HCU is supplied with 0 and +5 VDC taken from the Surface Unit Digital I/O PCB (6041P) at HCU SKT2 pin 1 (0 VDC) and pin 3 (+ 5VDC), the supply is tapped off and routed to a LED which illuminates red when supplies to the HCU are available.

Switches on the HCU when operated, route the 0 VDC line to the corresponding pins on SKT1. The status of the HCU switches are read by the Surface Unit I/O PCB and routed to the Surface Unit CPU for processing.

Rotary movement of the potentiometers change their resistance to provide a corresponding analogue voltage between 0 and +5 VDC that is fed via SKT 1 to the Surface Unit 8-bit and 12-bit ADC PCBs for analogue to digital conversion. Joystick movement is controlled by three potentiometers in the same way as the rotary potentiometers, providing voltages for movement in the x, y and z planes. Capacitors are connected across the 0 VDC lines and the wiper connections to reduce noise on the outputs.

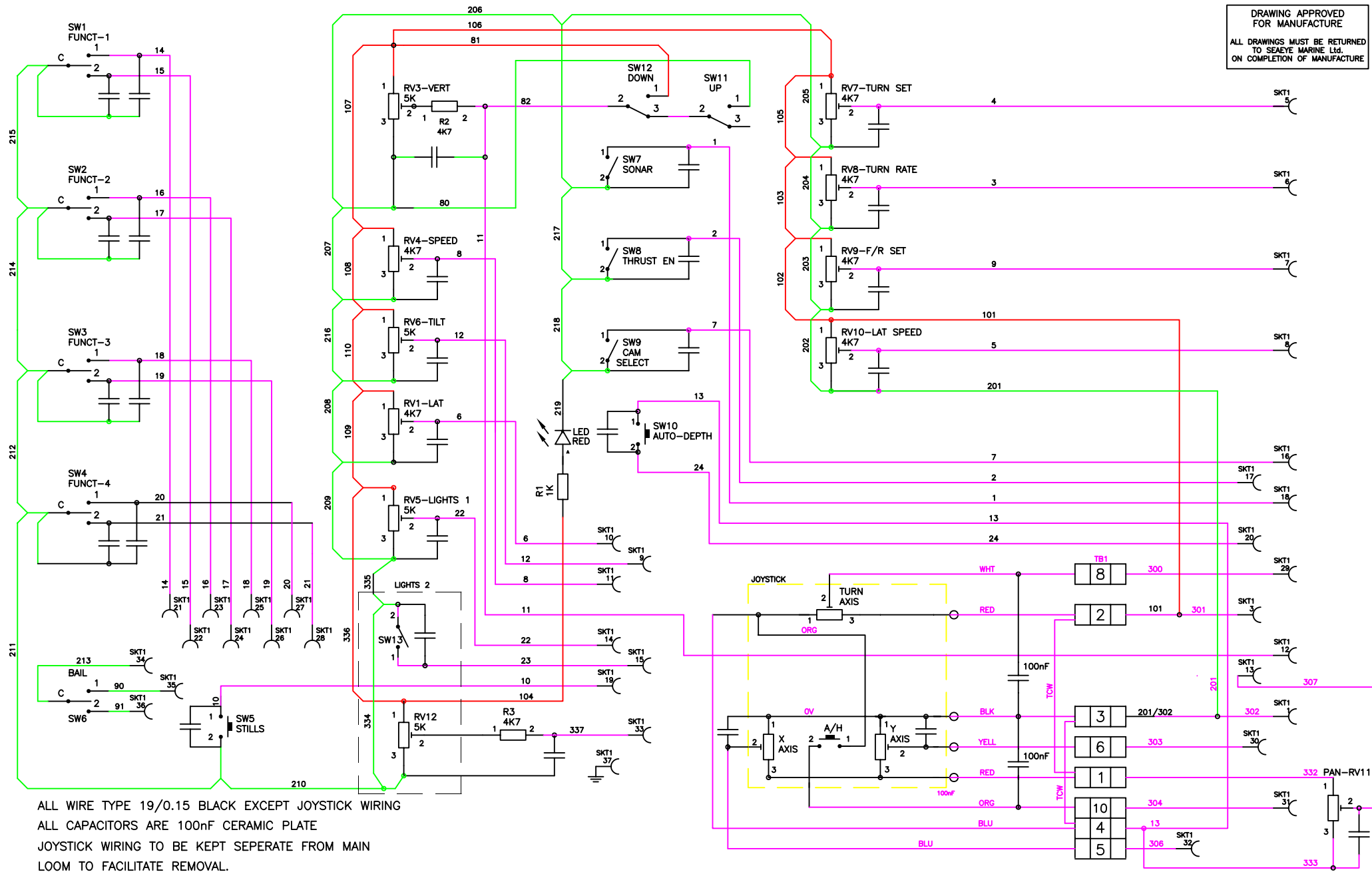
When the UP or DOWN switches are made, the output of potentiometer RV3 is shorted to 0 or +5 VDC for maximum vehicle speed in the up or down directions respectively.

The TMS bail switch is connected through to the TMS Switch Adaptor PCB in the Surface Unit. The 0 V line for this switch is isolated from the supply feeding the remainder of the HCU controls.



## NOTE.

During system configuration, the HCU controls are configured for operator preference. If the HCU is replaced a full system configuration is required (Book 1 Chapter 4).



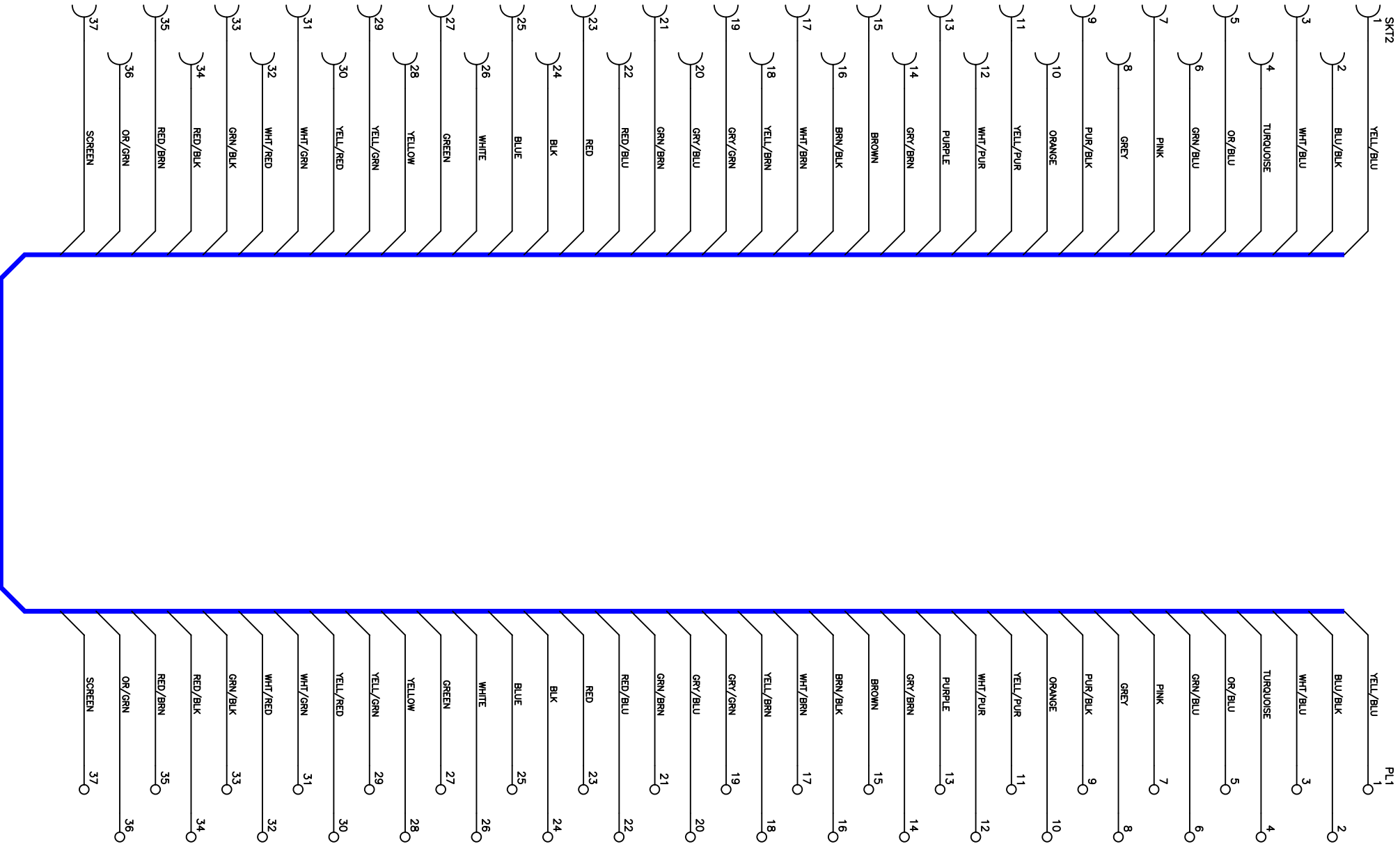
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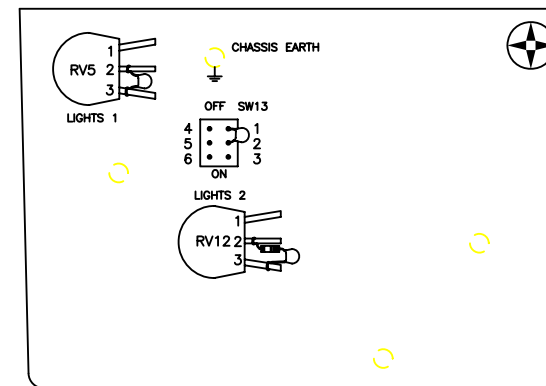
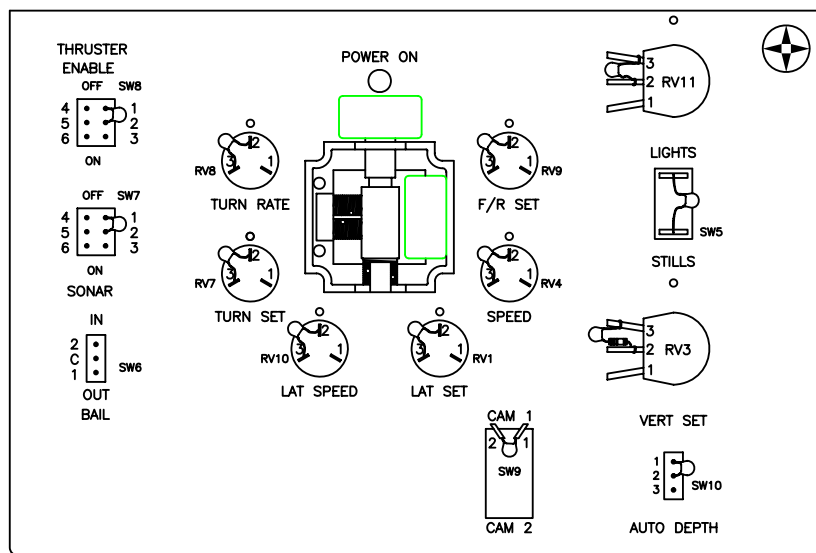
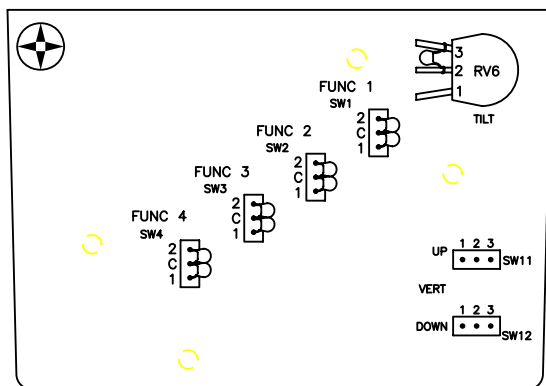
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CIRCUIT DIAGRAM  
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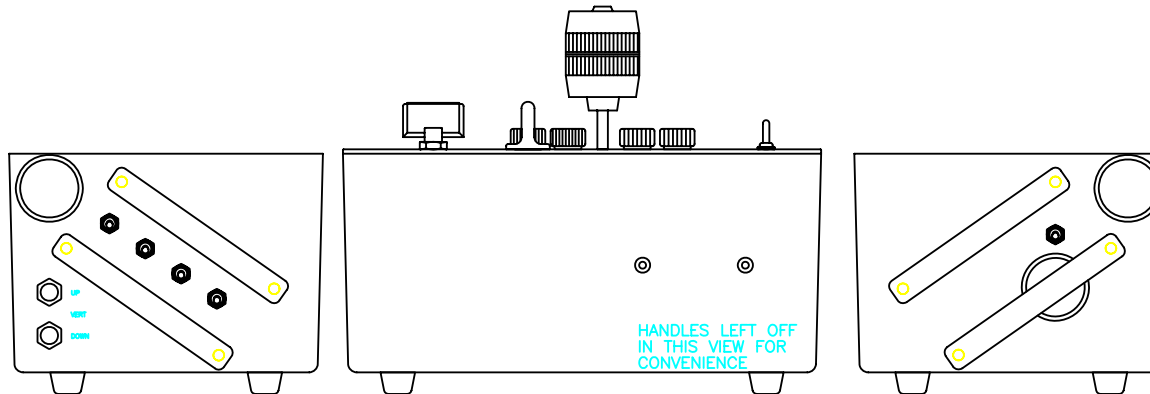
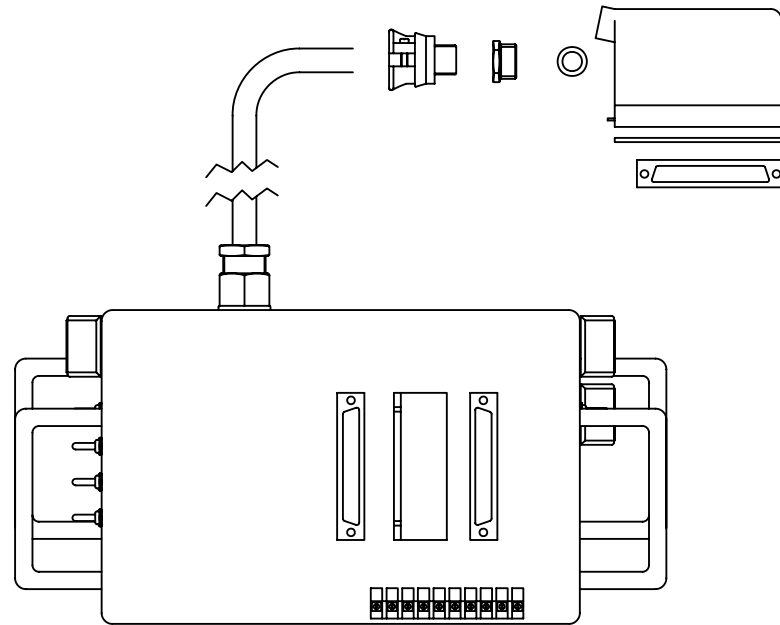
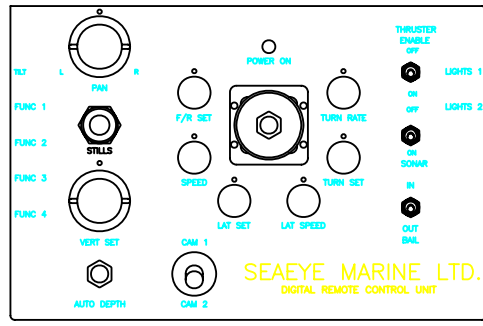
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# **CHAPTER 4**

## **VEHICLE ELECTRONICS**

### **POD TYPE 8EPM-3D-1**

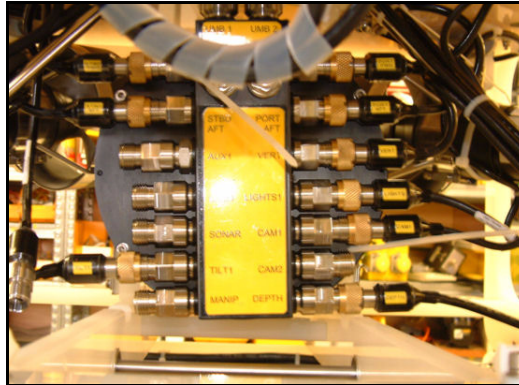
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## 4. VEHICLE ELECTRONICS POD TYPE 8EPM-3D-1

This Chapter describes the Tiger 880 Vehicle Electronics Pod (EPOD) Type 8EPM-3D-1, and also contains the respective diagrams.

### 4.1 General Description

The electronics pod consists of a hard-anodised aluminium cylinder housing fitted with a hard anodised aluminium end-plate. The end-plate accommodates bulkhead connectors providing the interface for all vehicle equipment.



**Figure. 4.1 Tiger Electronics EPOD**

The cylinder housing contains an aluminium chassis, which is used to mount components and to provide a card rack for the pods PCBs.

The end-plate is secured to the cylinder by screws and sealed with an O-ring. A vent fitted to the dome end, which by opening, allows the pod to be equalised.

The power, control and vehicle functions are communicated from the surface through the umbilical to the 8EPM-3D bulkhead connectors and distributed within the pod for processing.

### 4.2 Power Supplies

The supplies used by the pod can be split into AC and low power DC used for pod electronics and high power DC used to operate the thrusters and lighting. Power supplies are routed from the surface over the umbilical and tether to the pod end-plate penetrator, U1.

#### 4.2.1 AC and Low Power DC

Subsea AC from the surface unit is routed to transformer TF1 and TF2 primary windings via fuses F1, F2, F3 & F4 (T500mA) and umbilical connector U1, pins 9 & 10. The transformer 240 VAC is stepped down to 25 VAC and applied to the Power Supply and Stabiliser PCB (6051AP). The 6051AP consists of five individual power supply units (producing regulated 24 VDC outputs), a solid-state rate sensor, fan and two guard circuits.

The outputs of the 6051AP PSUs are routed directly to the circuit they are supplying, with the exception of:

- The depth sensor supply, which is routed to the depth unit bulkhead connector pins 1 & 3 via the Compass and two fuses, F11 & F12 (T250mA).

The Video supply, which is routed to Cameras 1 and 2 bulkhead connectors pins 1 (0 VDC) and pin 3 (24 VDC), is tapped off the input to the cameras and fed to IC1 (mounted on the pod chassis below TF1). IC1 converts the 24 VDC input into 12 VDC and is routed to the Balanced Video Line Driver PCBs via Molex connectors MV1 and MV2 pins 4 (+12 V) and pins 2 (0 V).

Smoothed unregulated DC (CAP) from PSU1-1 is routed to the DC-DC converter and converted to +5, +15 and –15 VDC for use by the control backplane.

PCB 6051AP supplies the following:

| PSU     | Function Supplied                                                                                                                                                                                                                                                                |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SSRS    | Solid State Rate Sensor routed from MFIO PCB (6059P) connector J3-4 pin A and J3-5 pins A and B                                                                                                                                                                                  |
| Guard 1 | Not used                                                                                                                                                                                                                                                                         |
| Guard 2 | Routed to the Sonar penetrator pins 1 and 3 (used when a sonar head is fitted)                                                                                                                                                                                                   |
| PSU1-1  | Routed to the Thruster Control PCBs No.1 and No.2 (6034P) terminal TB5                                                                                                                                                                                                           |
| PSU1-2  | Routed to Guard 2 PSU                                                                                                                                                                                                                                                            |
| PSU1-3  | Routed to Compass 4 Supply (TM2 pin 1) and MFIO PCB 6059P J2-6 pin B (0V)<br>Routed to Camera 1 and Camera 2 penetrators pins 1 and 3 via TB3-1 and TB3-2<br>Routed to IC1 IN and COM terminal via TB3-1 and TB3-2<br>Routed to 4-Axis Manipulator PCB (6055P) SKT2 pins 1 and 2 |
| PSU1-4  | Routed to MFIO PCB 6059P connector J4-6 pins A and B<br>AUX2 bulkhead connector pins 1 and 3<br>Routed to Cooling Fan<br>Routed to PSU1-5                                                                                                                                        |
| PSU1-5  | Routed on Board Cooling Fan                                                                                                                                                                                                                                                      |

**Table 4.1 6051AP Outputs**

PSU1-4 smoothed unregulated DC supplies PSU1-5, which provides the regulated 24 VDC for the on-board-cooling fan.

#### 4.2.2 High Power DC

DC is applied to bulkhead connector U1 as DC± and routed to the Fuse & Filter PCB (6056P). Filters and capacitors on the 6056P PCB filter out electrical noise generated by the loads, which could interfere with the video signals.

The Fuse & Filter PCB provides five DC channel outputs routing DC± to the thruster bulkhead penetrators, DC- pins 1 and DC+ pins 3.

DC± is tapped off the input to the Fuse & Filter PCB and routed to the Light FET Suppressor PCB (6050P) via filter LC1. The live input to the Light Suppressor PCB is protected by fuse F10. The DC output of the 6050P PCB supplies a lighting channel consisting of two vehicle lamps. The DC+ line of the lighting channel is fused (F8) and routed with DC- to a lights penetrator and further routed via an electrical whip to individually fused lamp housings.

DC± is tapped off the input to the Fuse & Filter PCB and routed to the Manipulator bulkhead connector pins 3 (DC+) and 2 (DC-). DC+ is protected by fuse F13 and DC- by fuse F14.

### 4.3 Control Electronics

Telemetry data is transmitted and received through the umbilical and processed by the CPU PCB (6047P). Additional PCBs, connected to the CPU PCB via the passive backplane; provide the interfaces for the vehicle sensors and actuators.

#### 4.3.1 Thruster Motor Control

Thruster demands from the surface are transmitted to the two thruster drive PCBs (6034P) via the backplane under control of the CPU. Each thruster control PCB has four channels, each capable of producing a speed and direction signal.

The speed signal to the thruster control PCB is a 12 bit digital signal, which is converted into a TTL 50 Hz base frequency pulse width modulated (PWM) signal of which its duty cycle is proportional to the required speed. For example a 100% duty cycle represents a continuous 0 V signal causing the motor to run at full speed, no duty cycle causes the motor to stop (10-12 Volt signal) and 50% duty cycle the motor runs at half speed. The duty cycle is referenced to the direction 0 volt line. The speed signal is fed to the thruster via the bulkhead connector pin 5.

Direction is controlled by a 24 VDC signal (derived from 6051AP, PSU1-1), DIR+ & DIR- of which the polarity decides thruster direction. The 24 VDC is routed to the thruster motor via the motor bulkhead, pins 4 & 6 providing a supply to the motor electronics as well as thruster direction.

When the thruster enable switch is set to OFF, a bit in the RS484 telemetry link is decoded by the CPU which puts the thruster direction signals DIR + and DIR – both low to disable the thrusters.

#### 4.3.2 Thruster Motor Control PCB IC Population and Link Setting

To reduce heat build up within the electronics pod, Motor Drive PCB No 2 has been partly populated. IC9, IC16, IC17 and IC18 have been removed and are part of the spares kit.

The Thruster Control PCB (6034P) has link settings that are adjusted to configure the system to the number of thrusters used. Each PCB can provide signals to control up to four thrusters.

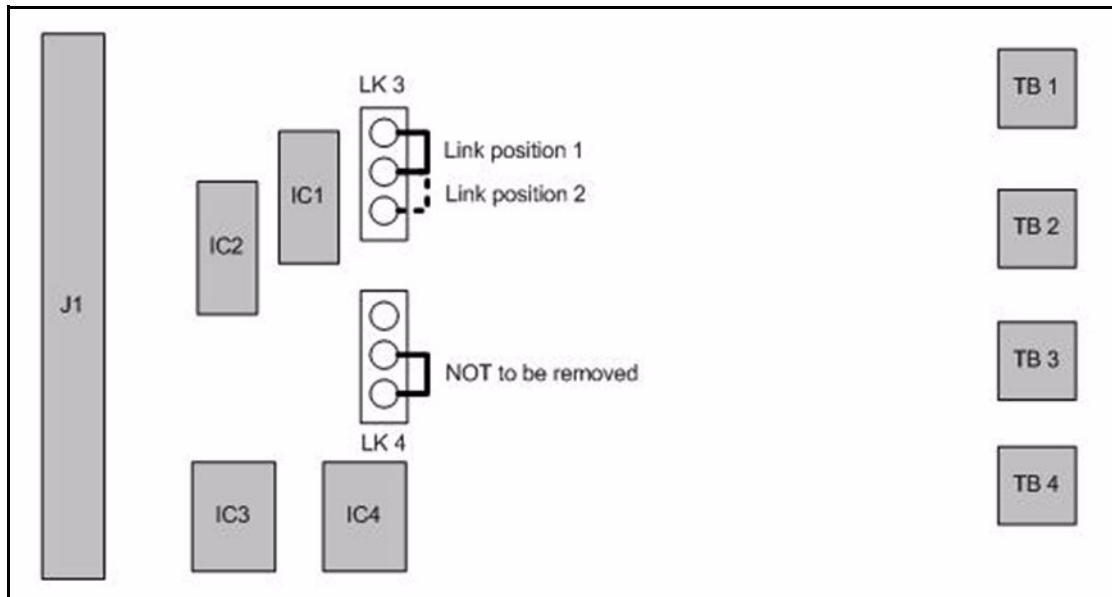
**NOTE.**

All other links are to remain in the factory set condition.

When exchanging 6034P PCBs, ensure the link position is correct and the PCB is correctly populated.

| System Thruster card link configuration |                                     |                                     |
|-----------------------------------------|-------------------------------------|-------------------------------------|
| No of Thrusters                         | Thruster card No1 LK3 link position | Thruster card No2 LK3 link position |
| 5                                       | Position 1                          | Position 2                          |

**Table 4.2 Thruster PCB Link Configuration**



**Figure. 4.2 Thruster Control PCB Link Setting**

#### 4.3.3 Lights Control

The vehicle has one lighting channel, LIGHTS 1, which can be dimmed under control from the surface.

LIGHTS 1 light intensity demand from the surface is an 8-bit digital signal decoded from the RS485 telemetry link by the CPU and input to the MFIO PCB (6059P) to convert the digital signal into a 2 KHz pulse width modulated signal (PWM). The PWM signal is routed to the Light FET Suppressor PCB pins A3 & A6, which turns the MOSFET (TR1) on and off at 2kHz. The DC is output from the Light FET Suppressor PCB on pins A2 & A4 and routed to the lights penetrator, LIGHTS 1 via fuse F8. For example, a 100% duty cycle will be full brilliance (250 VDC), 50% duty cycle will be half brightness (125 VDC) and 0% duty cycle the lamps will be off (no voltage).

#### 4.3.4 Tilt Operation

Tilt demand from the surface is transmitted over the RS485 telemetry link and decoded by the CPU and input to the MFIO PCB (6059P), which compares the new demand position with the current position and outputs  $\pm 24$  VDC to drive the tilt motor. For small differences a 2 kHz PWM signal is output to provide a smooth acceleration or deceleration of the tilt system. The output from the MFIO (pins J4-1 A & B) are fed to the input of the Tilt Integration PCB (6058P), SK1 pins 1 & 2, which provides smoothing to eliminate noise that could affect video quality, when the tilt motor signal is modulating.

As the tilt mechanism operates a feedback voltage is generated by a potentiometer mechanically linked to the tilt platform which is routed to the MFIO PCB J4-3 A and J4-4 A & B. When the feedback and tilt demand angle are equal the output of the MFIO is zero and the tilt motor is stopped.

In the event of a short circuit on the feedback lines a self-resetting 100 mA fuse, F9 trips isolating the +5 V feedback supply from the MFIO PCB.



#### **4.3.5 Depth Sensor**

Seawater pressure acting on the depth sensor face generates an RS232 digital signal proportional to the depth of the water in which the vehicle is operating. The depth sensor signal enters the compass pod (10CP/6) at the bulkhead penetrator, pin 2 and is routed to the compass unit to be combined with compass data to form one data string. The data string is routed to the MFIO PCB (6059P) J2-5 A via a 9 way bulkhead fitted on the vehicle pod lid, the MFIO transmits the data to the surface when polled by the CPU. The CPU also processes the Auto depth facility.

#### **4.3.6 Altimeter**

When an Altimeter is fitted, it is located on the vehicle chassis and sends its telemetry back to the surface via the CPU(6047) using RS485 and is powered by the same 24V supply as the depth sensor and protected by 250mA fuses F11 and F12.

#### **4.3.7 Compass**

The compass is fitted to the vehicle chassis. Serial heading output data from the compass unit is input to the MFIO PCB (6059P) J2-5. The data is transmitted to the surface via by the CPU PCB. The compass data is also used by the CPU for Auto heading.

A compass calibration request from the surface is routed to the CPU via the RS485 communications link. The calibration request is sent to the MFIO PCB to be converted into serial format and routed to the vehicle compass unit.

#### **4.3.8 Solid State Rate Sensor**

A differential voltage representing angular velocity data is output from the SSRS (located on the 6051AP PCB) pins 1c & 2a and routed to the MFIO (6059P) PCB J3. The analogue voltage is converted into a digital format and used by the system software to modify the amount of thruster drive to provide vehicle stability when turning in manual control and Auto heading.

#### **4.3.9 Sonar**

Sonar transmit/receive data is transmitted over a dedicated twisted pair. Sonar transmission data from the surface sonar electronics enters the pod at bulkhead connector U2 pins 1 & 2 and is routed to the sonar head via the sonar bulkhead connector pins 2 & 4. Data received from echoes by the sonar head follows the same twisted pair path back to the surface for processing by the sonar surface unit.

#### **4.3.10 Manipulator**

When a manipulator is fitted, it receives instructions from the surface manipulator control box over a dedicated twisted pair and enters the pod at U2 pins 11 and 12. The manipulator telemetry is routed through the pod on a twisted pair to the MANIPULATOR bulkhead penetrator pins 4 and 5.

#### **4.3.11 Leak Detection**

The leak detection circuit consists of a water probe connected to a Leak Detection PCB (6068P), PL5 pins 1 & 2. The PCB monitors the resistance of the probe and when the probe becomes wet, a fault is detected by the PCB. The fault condition is read by the subsea CPU and transmitted to the surface as a warning for display on the system monitor.

#### **4.3.12 CP Probe**

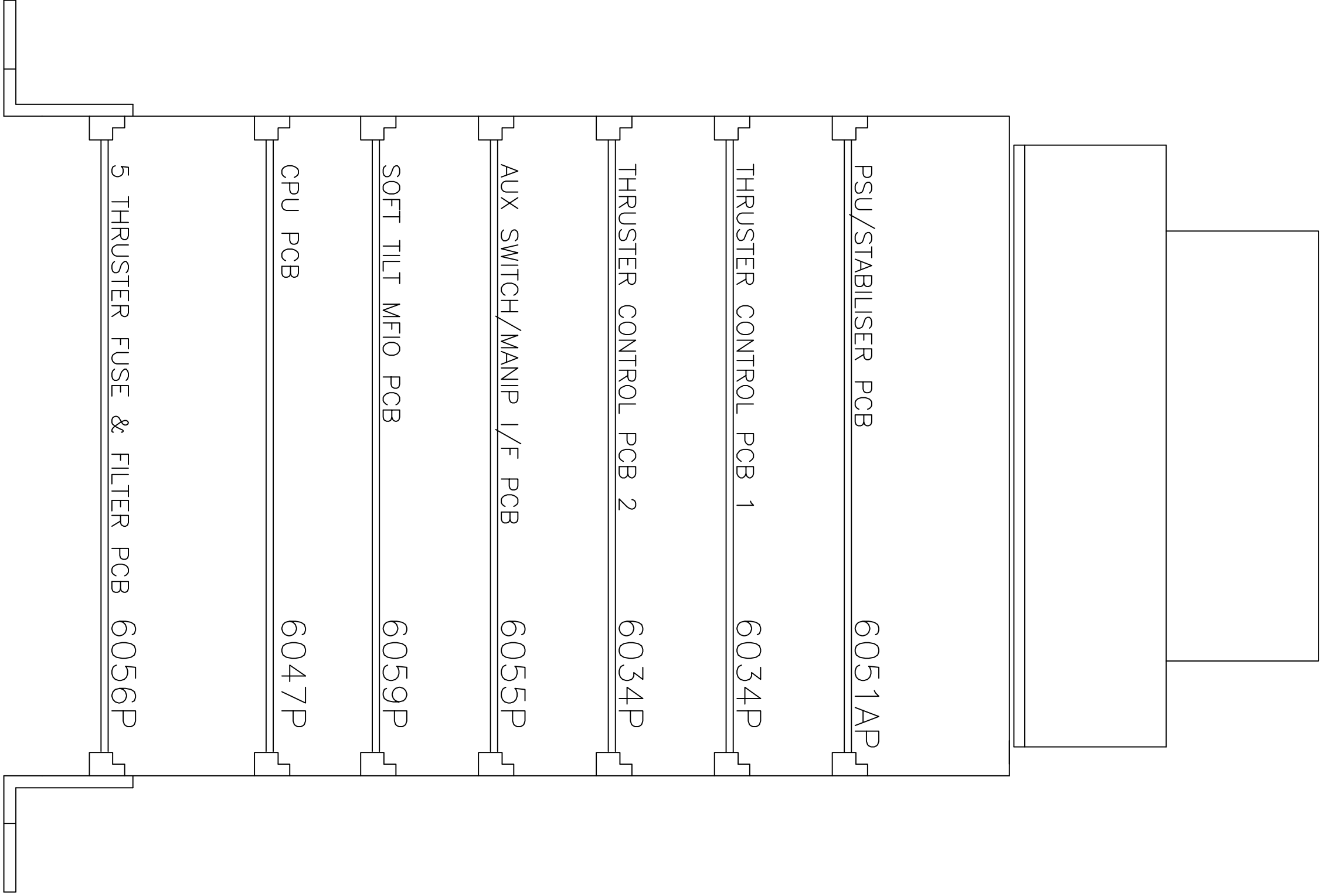
When a contact CP probe is fitted, a voltage generated by the probe (–2.5 to +2.5 VDC) is routed from the CP bulkhead connector pin 2 to the MFIO PCB (6059P) J2-1 B where the voltage is converted into a digital format and output to the system data bus when polled by the CPU. The probe 0 VDC reference is connected at the CP bulkhead connector pin 1 and is routed to the MFIO PCB J2-1 A.

### **4.4 Video**

#### **4.4.1 Vehicle Video Path**

Composite video from the camera CAM1(V1) and CAM2(V2) are routed through the MFIO card and on to the Balanced Line Video Driver PCB1, which converts the video into balanced video for transmission to the Surface Unit 10PDU-1 via VIDEO1.

Depending on the VIDEO1/VIDEO2 switch position on the Surface Unit, one path is routed directly to a monitor via an isolation transformer, and the other to the Video Overlay PCB to be genlocked with overlay data.



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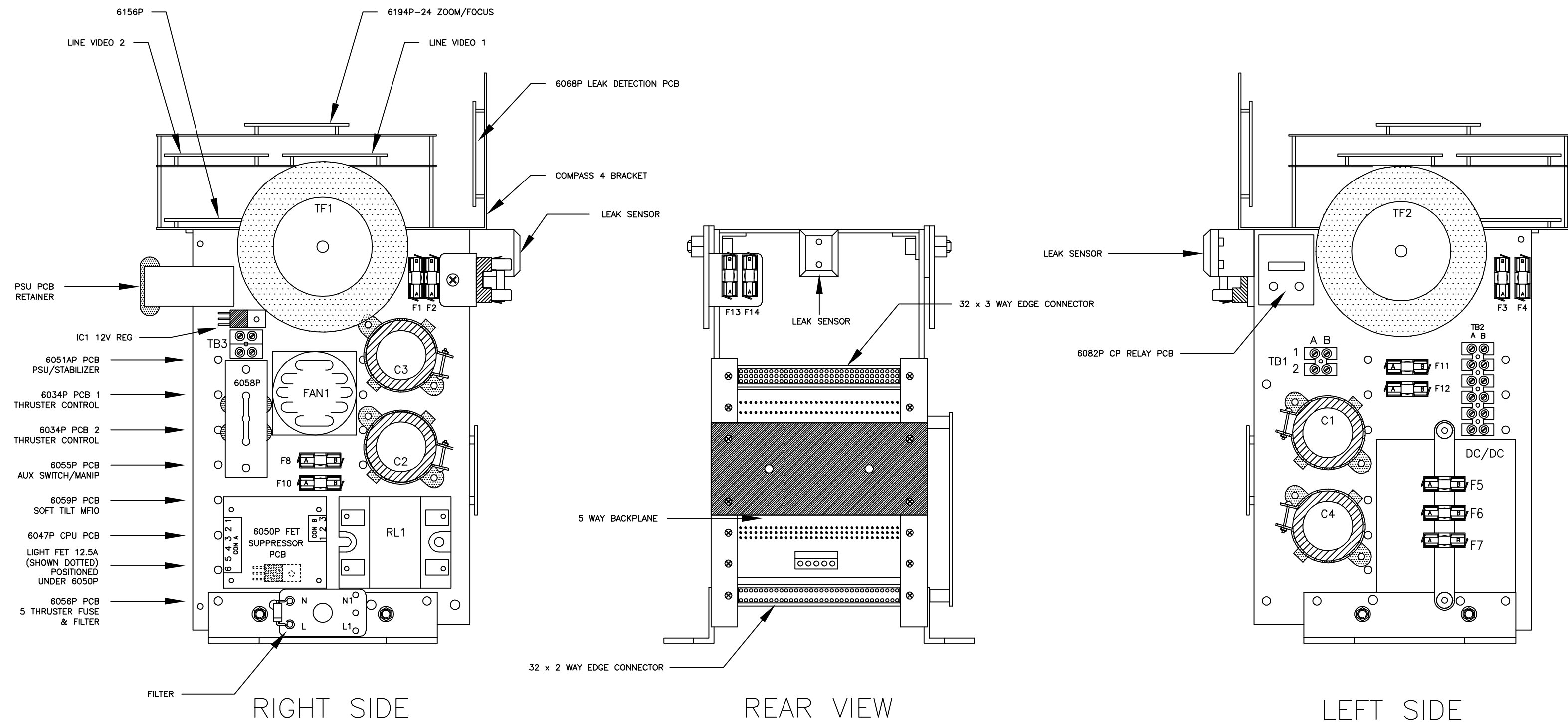
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TITLE  
8EPM-3D-1 TIGER ROV EPOD  
WITH TWISTED PAIR VIDEO  
AND 10CP-6  
PCB LAYOUT  
SHEET 1 OF 1

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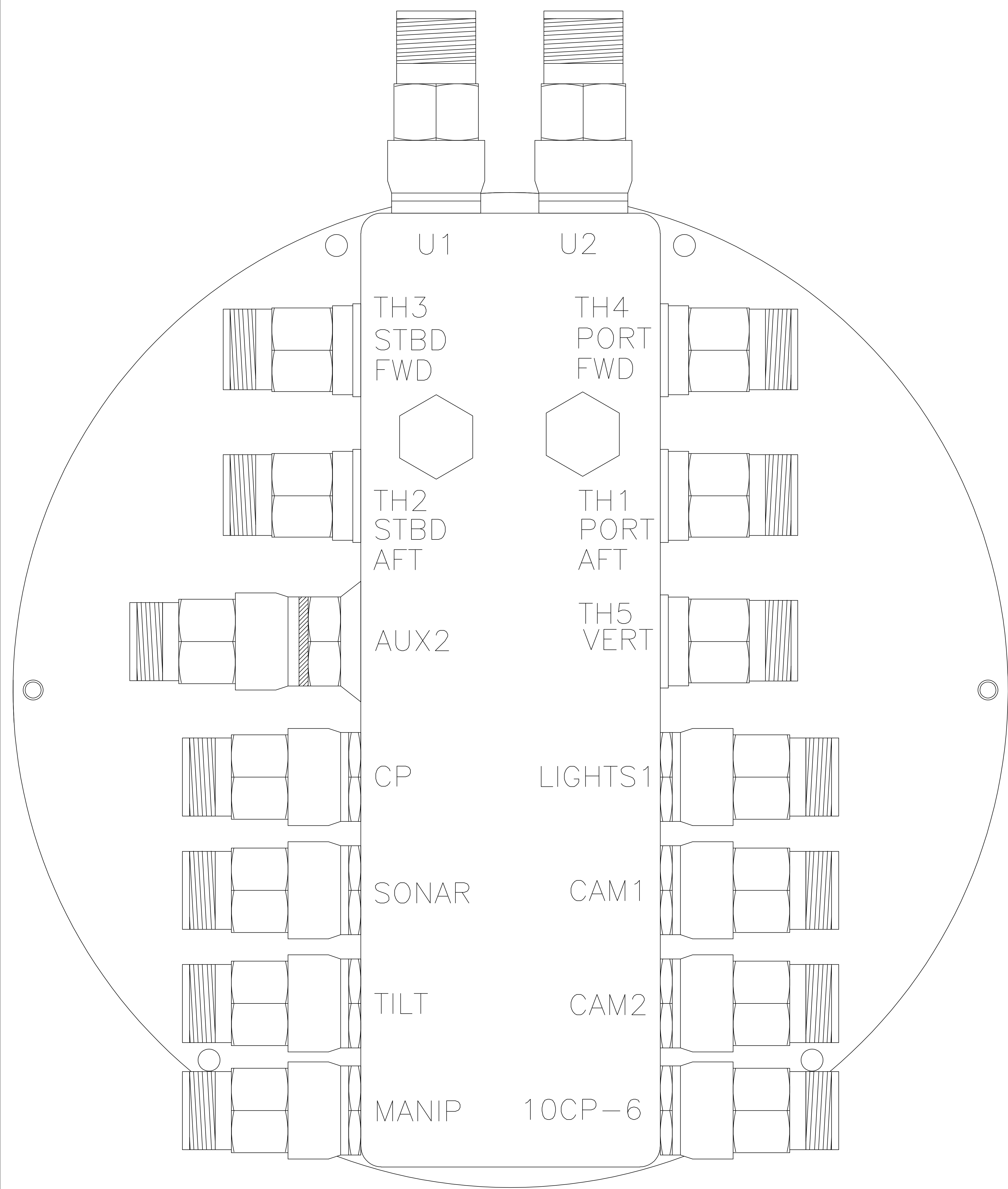
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**TITLE**  
8EPM-3D-1 TIGER ROV EPOD  
WITH TWISTED PAIR VIDEO  
AND 10CP-6  
GENERAL ARRANGEMENT  
SHEET 1 OF 1

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| CONNECTOR         | DESCRIPTION                        | STOCK CODE | INTERNAL IDENT |
|-------------------|------------------------------------|------------|----------------|
| UMBILICAL U1      | BULKHEAD SIZE3, 12 WAY MALE 5/8"   | M3BH12M    | U1             |
| UMBILICAL U2      | BULKHEAD SIZE3, 12 WAY FEMALE 5/8" | M3BH12F    | U2             |
| PORT AFT THRUSTER | BULKHEAD SIZE2, 7 WAY FEMALE 5/8"  | M2BH7F     | TH1            |
| STBD AFT THRUSTER | BULKHEAD SIZE2, 7 WAY FEMALE 5/8"  | M2BH7F     | TH2            |
| STBD FWD THRUSTER | BULKHEAD SIZE2, 7 WAY FEMALE 5/8"  | M2BH7F     | TH3            |
| PORT FWD THRUSTER | BULKHEAD SIZE2, 7 WAY FEMALE 5/8"  | M2BH7F     | TH4            |
| VERT THRUSTER     | BULKHEAD SIZE2, 7 WAY FEMALE 5/8"  | M2BH7F     | TH5            |
| AUXILIARY 2       | BULKHEAD SIZE2, 4 WAY FEMALE 7/16" | M2ABH4F    | A2             |
| AUX2 ADAPTOR      | 5/8" TO 7/16"                      | EP089      | —              |
| C.P. PROBE        | BULKHEAD SIZE2, 2 WAY FEMALE 7/16" | M2ABH2F    | CP             |
| LIGHTS 1          | BULKHEAD SIZE2, 3 WAY FEMALE 7/16" | M2ABH3F    | L1             |
| SONAR             | BULKHEAD SIZE2, 4 WAY FEMALE 7/16" | M2ABH4F    | SN             |
| TILT & F/BACK     | BULKHEAD SIZE2, 5 WAY FEMALE 7/16" | M2ABH5F    | T              |
| MANIPULATOR       | BULKHEAD SIZE2, 5 WAY FEMALE 7/16" | M2ABH5F    | MN             |
| 10CP-6            | BULKHEAD SIZE2, 9 WAY FEMALE 7/16" | M2ABH9F    | CSP            |
| CAMERA 1          | BULKHEAD SIZE2, 4 WAY FEMALE 7/16" | M2ABH4F    | C1             |
| CAMERA 2          | BULKHEAD SIZE2, 9 WAY FEMALE 7/16" | M2ABH9F    | C2             |
| BLANK             | 7/16" SS C/W O RING 200014         | EP081      | —              |
| BLANK             | 7/16" SS C/W O RING 200014         | EP081      | —              |

ALL CONNECTORS & BUNGS ARE TO BE FITTED  
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8EPM-3D-1 TIGER ROV EPOD  
WITH TWISTED PAIR VIDEO  
AND 10CP-6  
BULKHEAD LAYOUT  
SHEET 1 OF 1

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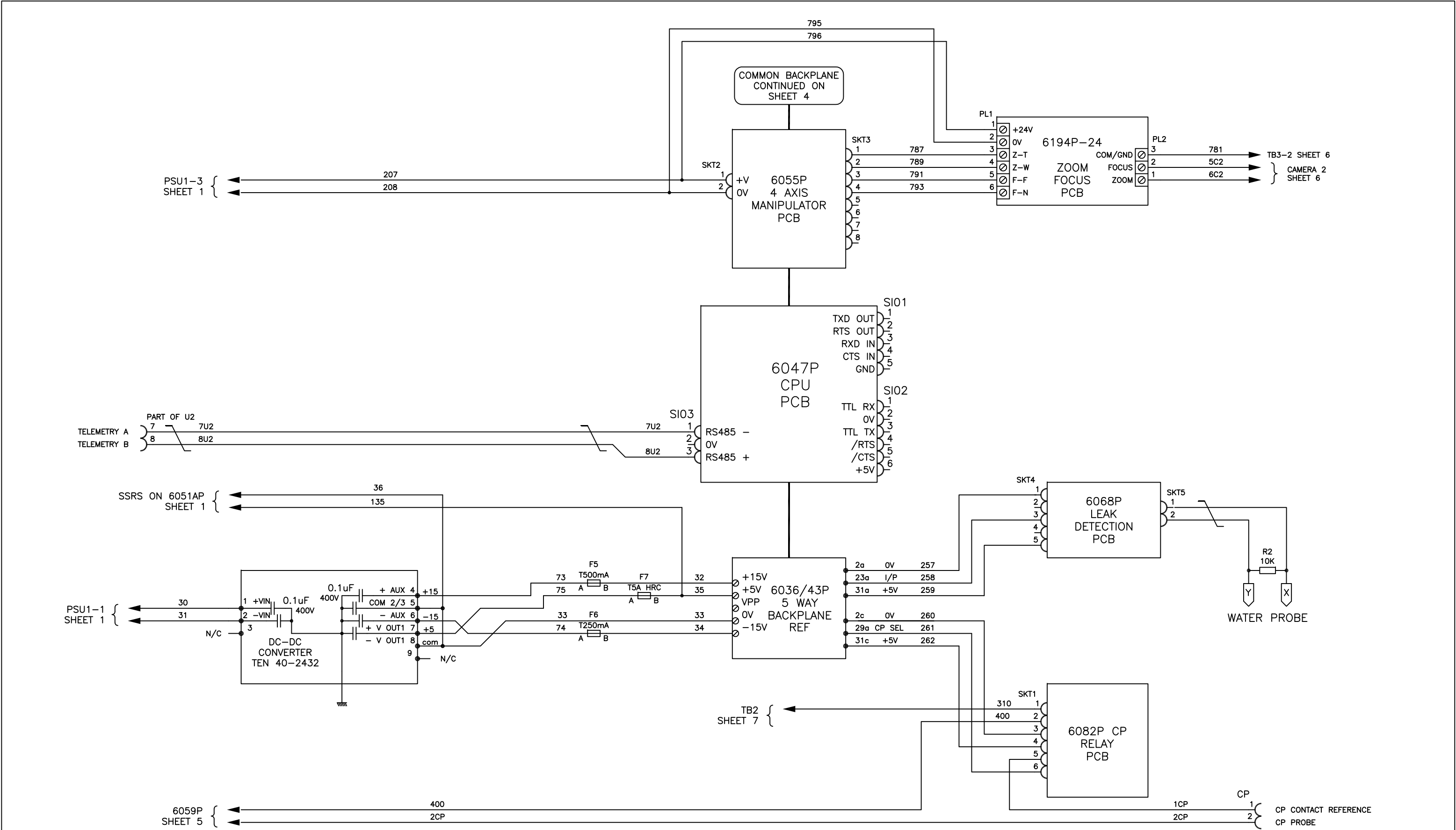
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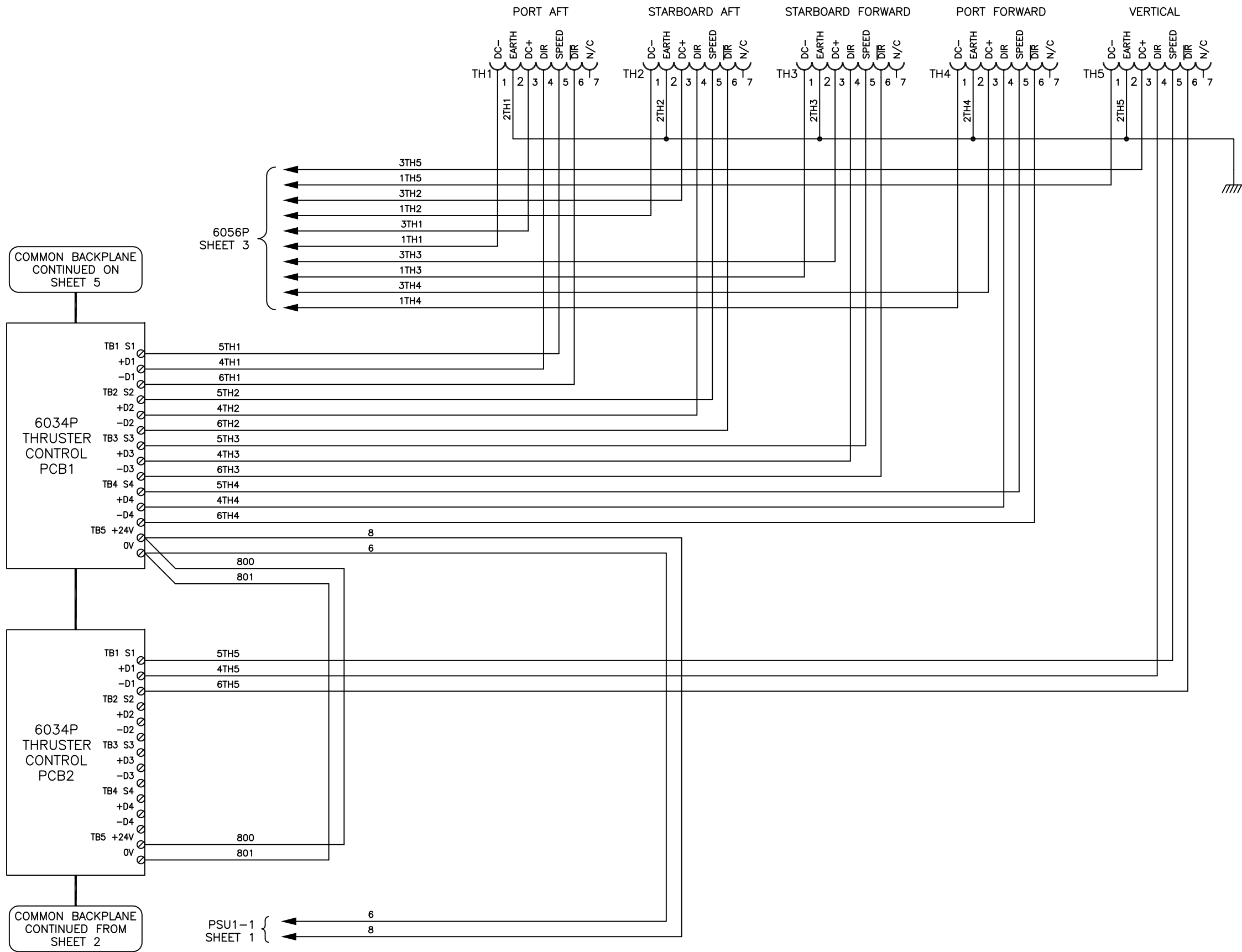
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8EPM-3D TIGER ROV EP0D  
WITH TWISTED PAIR VIDEO  
CPU, CP AND LEAK DETECTOR  
WIRING DIAGRAM  
SHEET 2 OF 7

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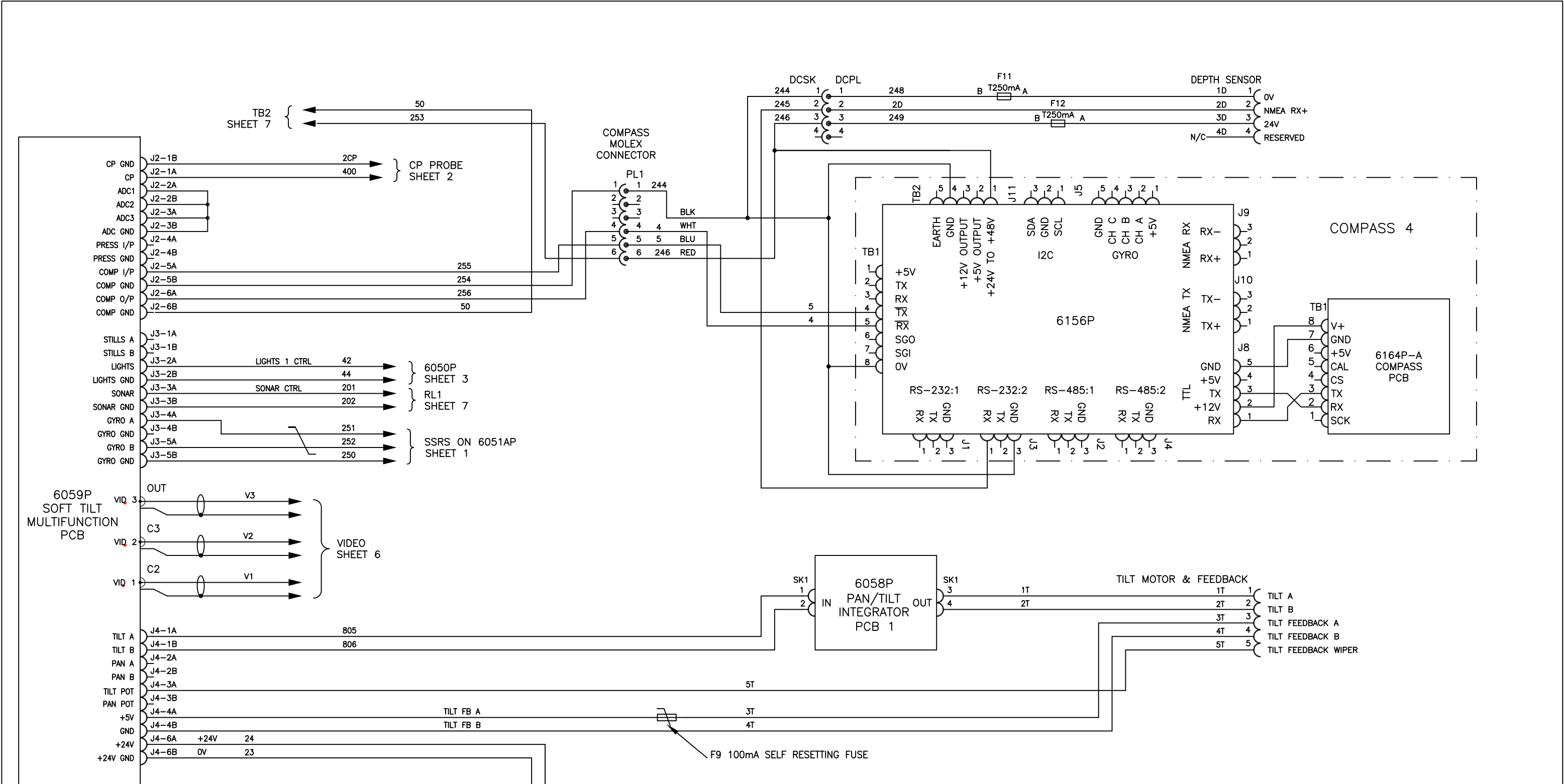
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TITLE  
8EPM-3D TIGER ROV EPOD  
WITH TWISTED PAIR VIDEO  
THRUSTER CONTROL  
WIRING DIAGRAM  
SHEET 4 OF 7

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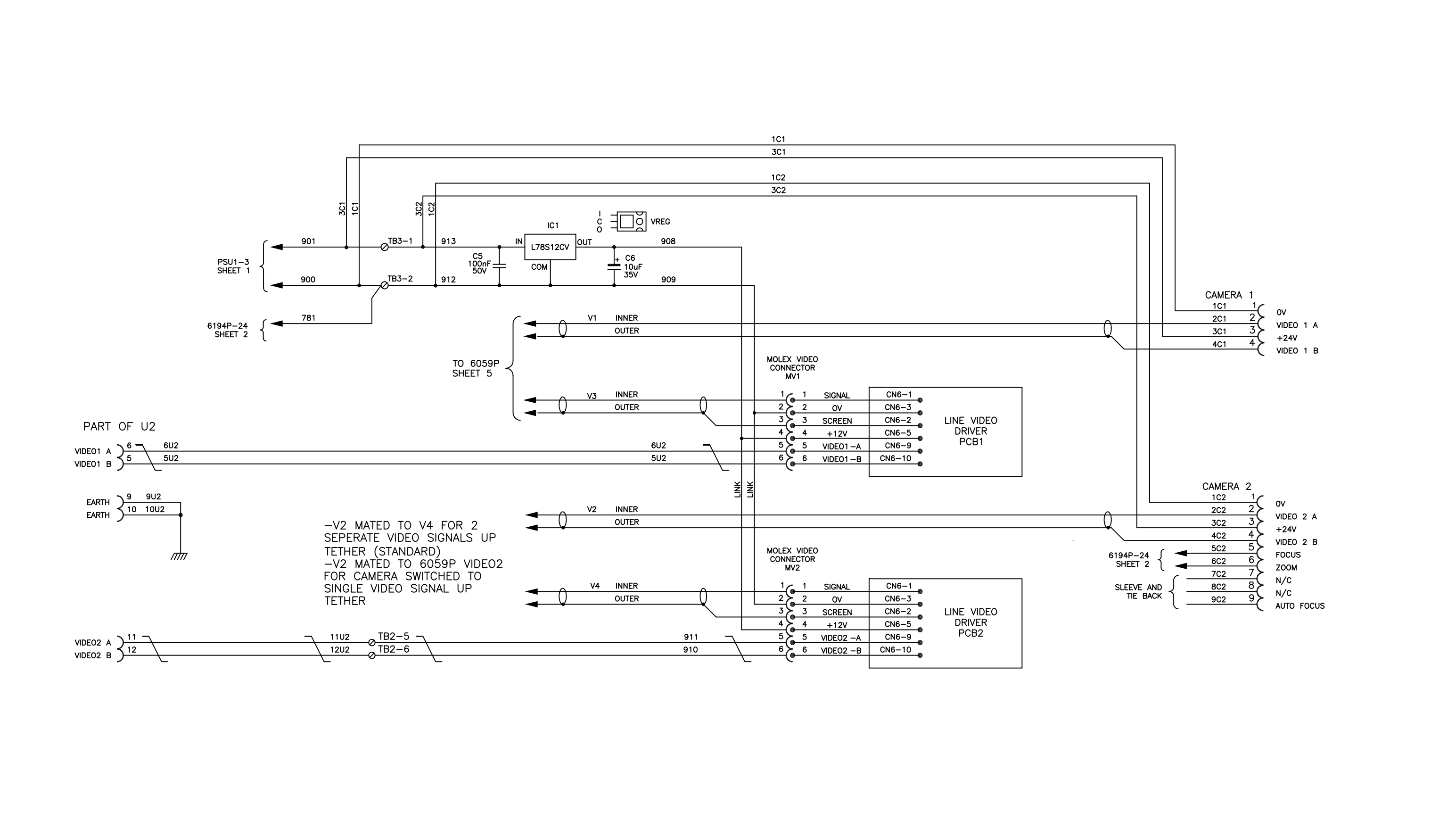
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8EPM-3D TIGER ROV EPD  
WITH TWISTED PAIR VIDEO  
MF I/O, DEPTH AND TILT  
WIRING DIAGRAM  
SHEET 5 OF 7

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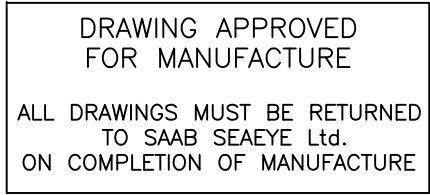
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SONAR AND VIDEO  
WIRING DIAGRAM  
SHEET 6 OF 7

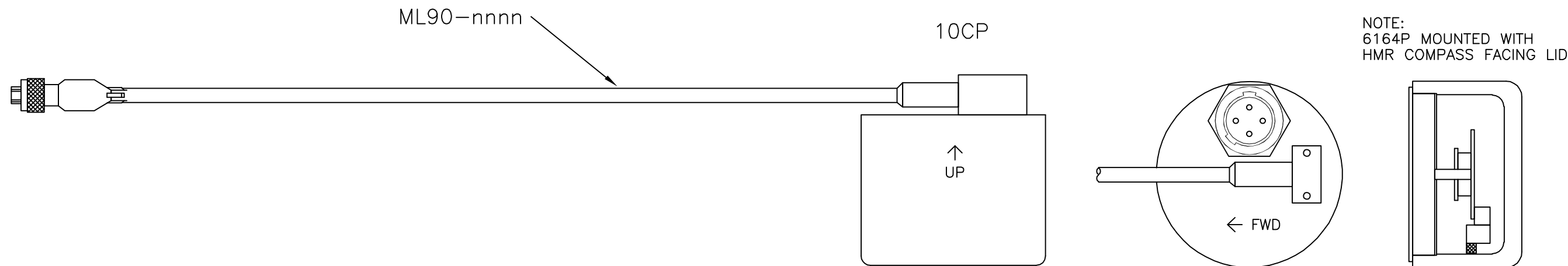
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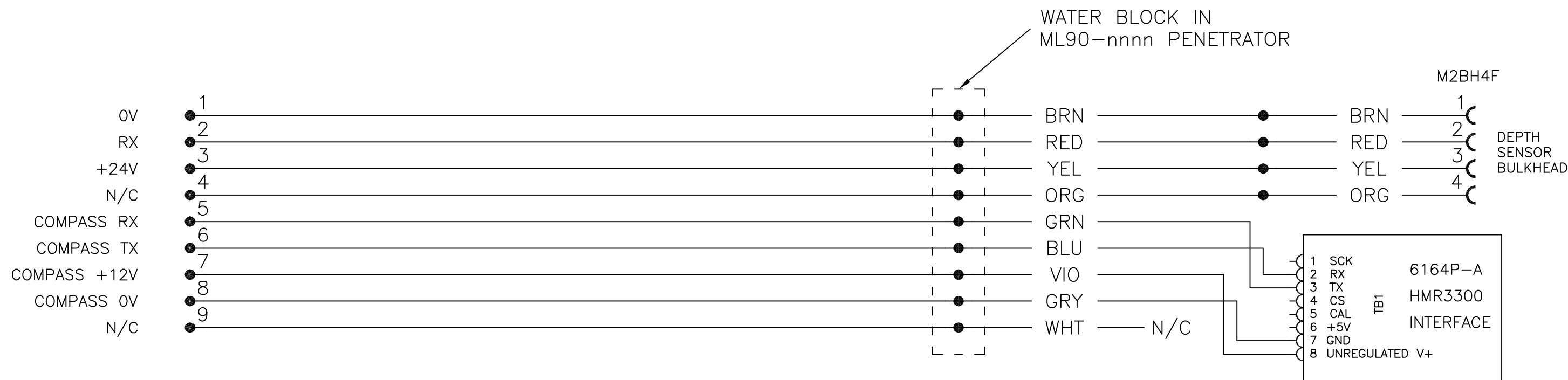
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SONAR AND AUX  
WIRING DIAGRAM  
SHEET 7 OF 7

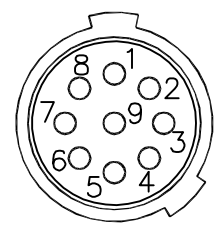
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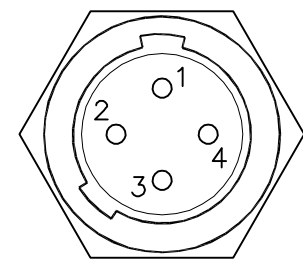
NOTE:  
6164P MOUNTED WITH  
HMR COMPASS FACING LID



SLEEVE AND  
TIED BACK  
UNUSED WIRES



CONNECTOR SHOWN  
FROM MATING FACE



CONNECTOR SHOWN  
FROM MATING FACE

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**TITLE**  
10CP-6 COMPASS SENSOR POD  
WITH HMR3300 SENSOR AND  
ML90-nnnn LEAD  
WIRING DIAGRAM  
SHEET 1 OF 1

|                    |                |                  |
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# **CHAPTER 5**

## **MAIN LIFT UMBILICAL,**

## **TETHER AND CABLE**

## **WHIPS**

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## **5. TETHER AND CABLE WHIPS**

This Chapter provides a description of Tiger 880 System umbilical and cable whips.

### **5.1 Maintenance of Cables**

#### **5.1.1 Plastic Coated Tether Cables**

Plastic materials commonly used in ROV cables should not be exposed to solvents for prolonged periods of time. However, the use of solvents for cleaning is frequently required, for example in conjunction with termination work.

Solvents that can be regarded as safe at the indicated temperatures are details as follows. Maximum exposure time is ½ hour at elevated temperatures, 1 hour at room temperatures. Other safety measures, such as breathing precautions and flammability must be adhered to when using solvents.

- Course removal: White Spirit (Best at maximum 40 °C).
- Finish: Isopropanole or Genklene or Triclorethane.

### **5.2 Main Lift Umbilical**

The Tiger system uses the Type ADU3 deck cable that consists of a 30 metre multi-cored cable and is used to route the power and telemetry from the Cabin Junction Box to the winch. An ADU3 main lift cable is also supplied for connection from the winch to the TMS.

- TMS and Vehicle DC power.
- TMS and Vehicle AC power.
- Video signals.
- TMS and Vehicle telemetry.
- Sonar data.
- Auxiliary power and telemetry signals.
- Earths.

The ADU3 consists of the following cores:

- One fibre optic element with four G50/125/250µm.
- Three Twisted Pair 0.56 mm<sup>2</sup> cables with copper braid and foil wrapping.
- Three Twisted Pair Quad 0.56 mm<sup>2</sup> cables with drain wire, foil screen and PE jacket.
- Six cores 0.56 mm<sup>2</sup> cable with PE insulation.
- Drain wire and foil screen.
- Sixteen cores 3 mm<sup>2</sup> cables with XLPE insulation.
- Sixteen drain wires.
- TPE jacket.
- Two layers of galvanised steel wires.

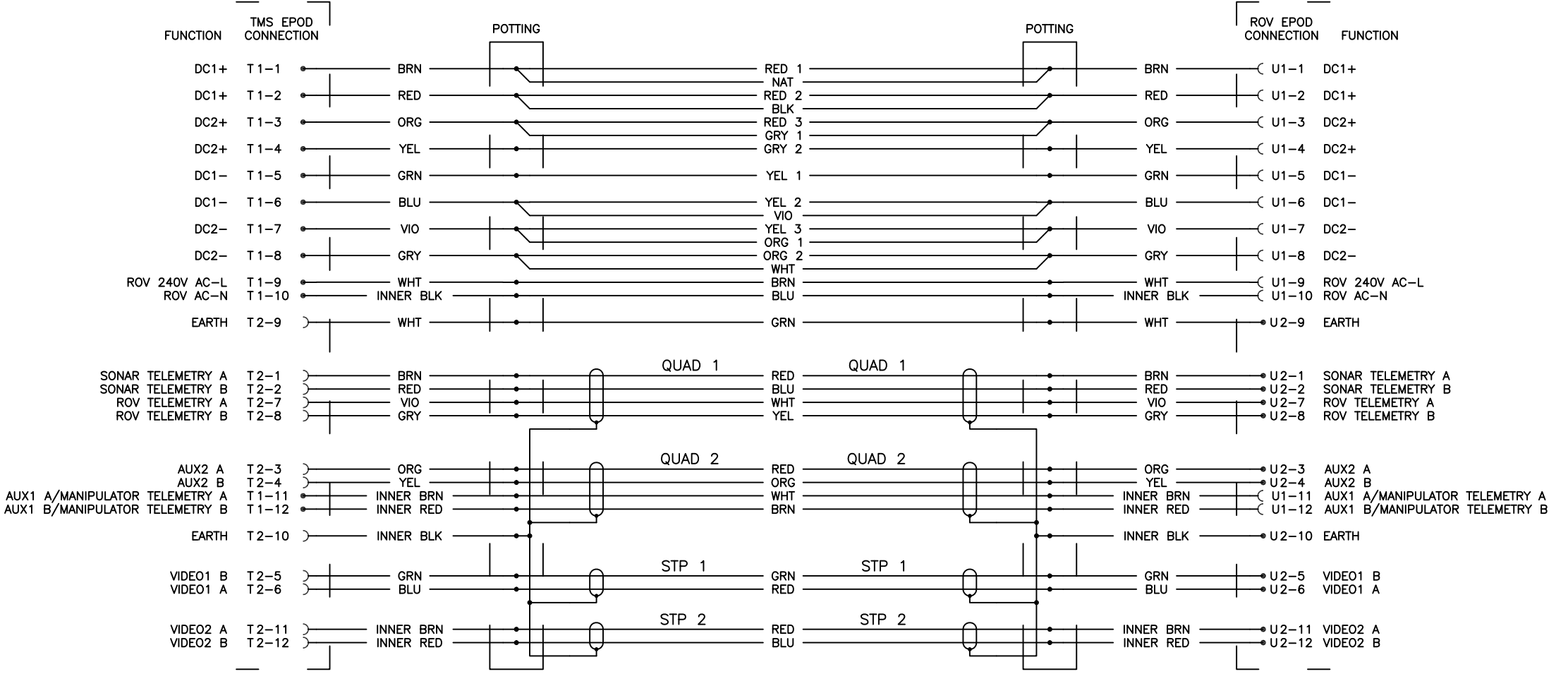
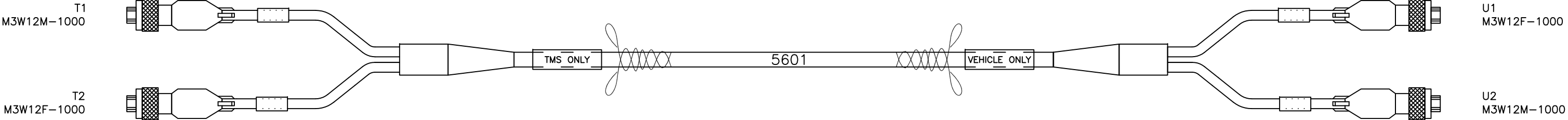
### **5.3 Tether**

The Tiger ROV uses the Type 5601 Tether, which is a multi-cored polyurethane tether cable and is the electrical communicating medium between the Surface and the vehicle.

### **5.4 Cable Whips and Connectors**

Cable whips and connectors used on the Tiger 880 are shown in the circuit diagrams included at the end of this chapter.

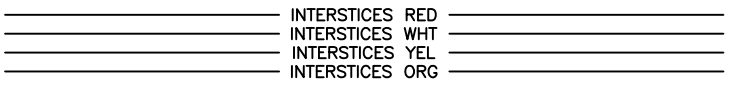




NOTES

- 1. ALL UMBILICAL QUAD & STP SCREEN WIRES ARE TERMINATED IN T2-10 AND U2-10.
- 2. ALL WHIP DRAIN WIRES ARE CONNECTED TO THEIR RESPECTIVE METAL SHELLS AND TERMINATED IN T2-9 OR U2-9 AS APPROPRIATE.
- 3. CHECK O RINGS ARE CORRECTLY FITTED TO ALL WHIPS.
- 4. CONNECTORS TO BE IDENTED U1/T1, U2/T2, ETC. THE TETHER IS TO BE LABELLED 'TMS ONLY' AT THE T1/T2 END AND 'VEHICLE ONLY' AT THE U1/U2 END

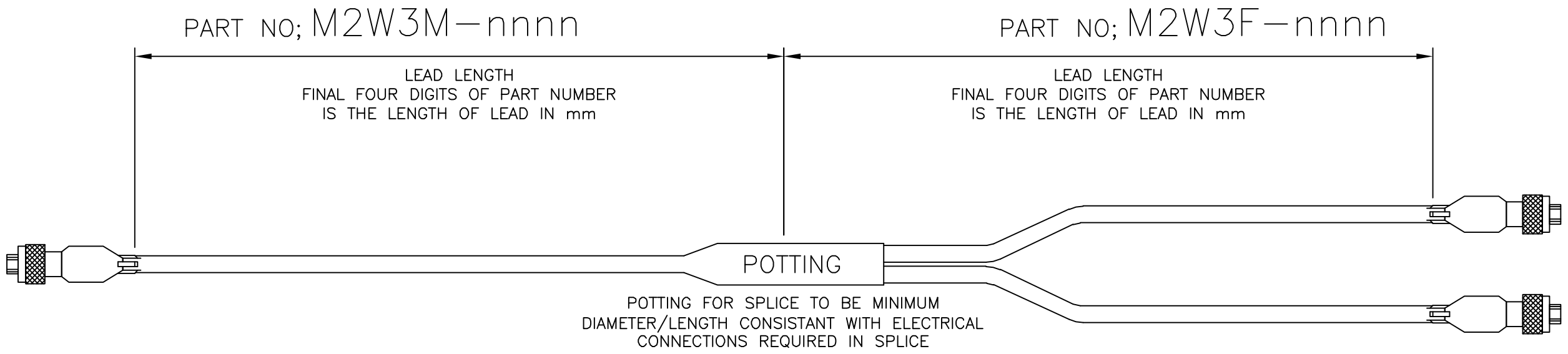
UNUSED CONDUCTORS



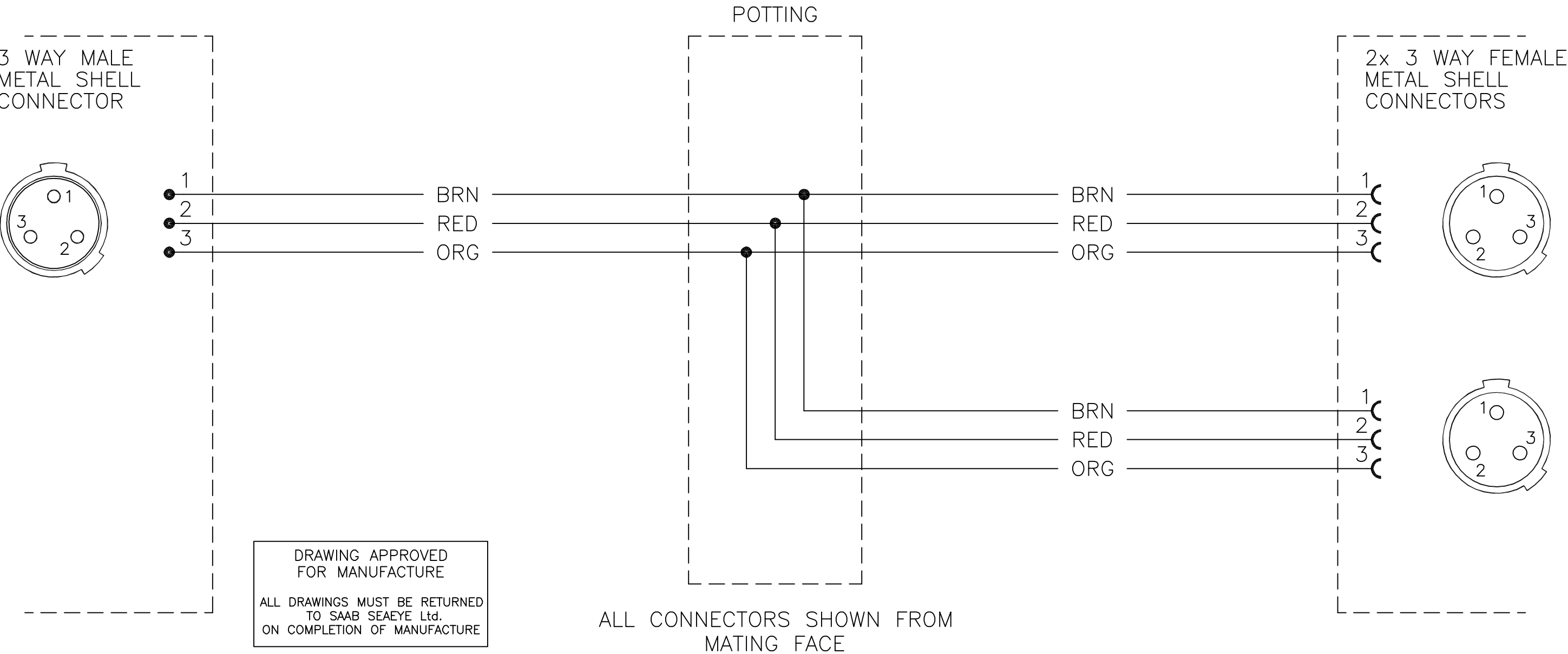
DRAWING APPROVED  
FOR MANUFACTURE

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ON COMPLETION OF MANUFACTURE

| ISS | DESCRIPTION                            | CHECKED | DATE     | REF         |  | Seaeye Marine Ltd.<br>Seaeye House<br>Lower Quay Road<br>Fareham<br>Hampshire<br>PO16 0RQ<br>England<br>Tel: +44 (0)1329 289000 | TITLE<br>TIGER METAL SHELL TETHER WITH DUAL TP<br>USING 5601<br>WIRING DIAGRAM<br><br>SHEET 1 OF 2 | DRAWN          | APPROVED | DATE    |      |      |
|-----|----------------------------------------|---------|----------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------|----------|---------|------|------|
| 5   | TAIL COLOURS CORRECTED                 | RAL     | 28/08/07 | ECR1702-RAL |                                                                                       |                                                                                                                                 |                                                                                                    | D. Waite       | AW       | 15/2/02 |      |      |
| 4   | Pins rearranged for core consistency   |         | 06/09/06 | ECR1163-LM  |                                                                                       |                                                                                                                                 |                                                                                                    | DWG.No. S02576 |          |         | Rev. | Sht. |
| 3   | Revised notes & cable grip etc.redrawn |         | 31/8/05  | DCR877-DW   |                                                                                       |                                                                                                                                 |                                                                                                    |                |          |         | 5    | 1    |
| 2   | Title ammendment                       |         | 23/4/03  | DCR688-AP   |                                                                                       |                                                                                                                                 |                                                                                                    |                |          |         |      |      |



- \* NOTES:
- 1) IF PART NUMBER STARTS WITH DR THEN USE DEEP RATED METAL WORK.
  - 2) SCREEN CONNECTED TO METAL SHELL.



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ON COMPLETION OF MANUFACTURE

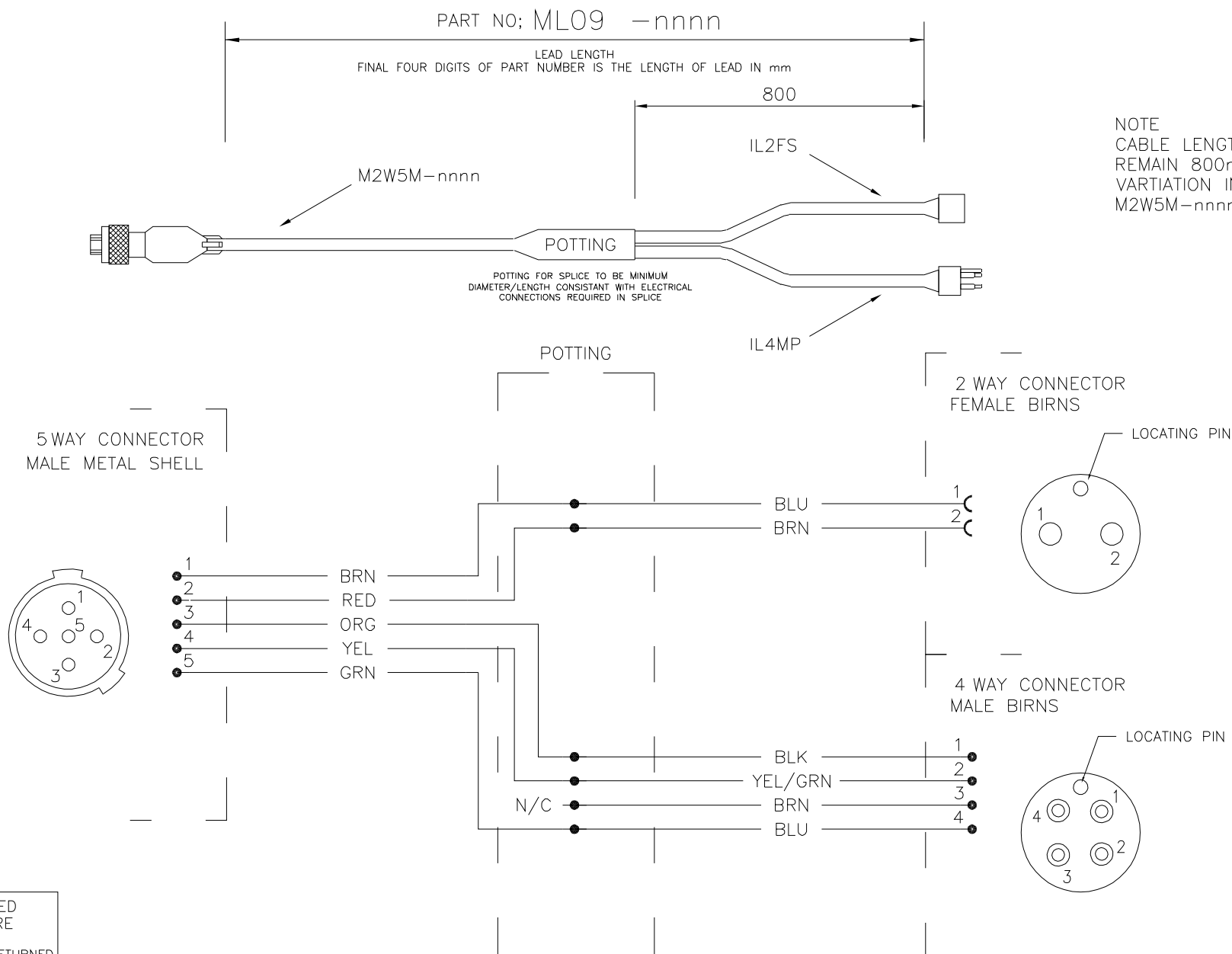
| ISS | DESCRIPTION                            | CHECKED | DATE      | REF         |
|-----|----------------------------------------|---------|-----------|-------------|
| 4   | Redrawn in line with Current Standards | AW      | 20.11.08  | ECR2066-AJC |
| 3   | MS Part numbers deleted, drg retitled  |         | 12/3/02   | DW          |
| 2   | COLOUR CODING CHANGED                  |         | 28-09-00  | DCR462-LAH  |
| 1   | FIRST ISSUE                            |         | 12.MAR.98 | N/A         |

**Seaeeye**

Saab Seaeeye Ltd.  
20 Brunel Way  
Segensworth East  
Fareham  
Hampshire  
PO15 5SD  
United Kingdom  
Tel: +44 (0)1489 898000

**TITLE**  
ML05-3xnnnn Y LEAD 3 WAY MALE  
METAL SHELL CONNECTOR TO TWO  
3 WAY FEMALE METAL SHELL  
CONNECTORS WIRING DIAGRAM  
SHEET 1 OF 1

| DRAWN          | APPROVED | DATE      | Rev. | Sht. |
|----------------|----------|-----------|------|------|
| D.WAITE        | AW       | 12.MAR.98 |      |      |
| DWG.No. S00804 |          |           | 4    | 1    |



NOTE  
CABLE LENGTH OF IL2FS & IL4MP TO  
REMAIN 800mm AT ALL TIMES, ANY  
VARTIATION IN ML09 LENGTH TO BE IN  
M2W5M-nnnn.

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| ISS | DESCRIPTION                                  | CHECKED | DATE     | REF        |
|-----|----------------------------------------------|---------|----------|------------|
| 5   | Dimension & Note added for Birn cable length |         | 21/12/06 | ECR1262-LM |
| 4   | Birns wire colour code changed. Redrawn      |         | 2/2/04   | ECR843-DW  |
| 3   | M2W5M colour code changed                    |         | 29/6/98  | ECR304-NJP |
| 2   | Gender change of Birns connectors            |         | 15/5/98  | None       |

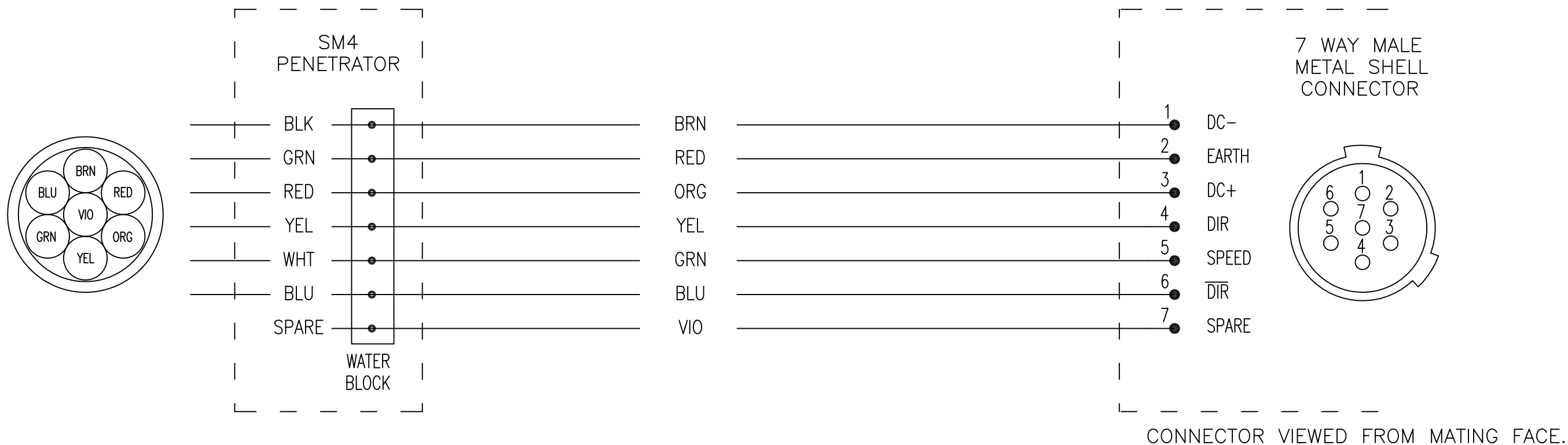
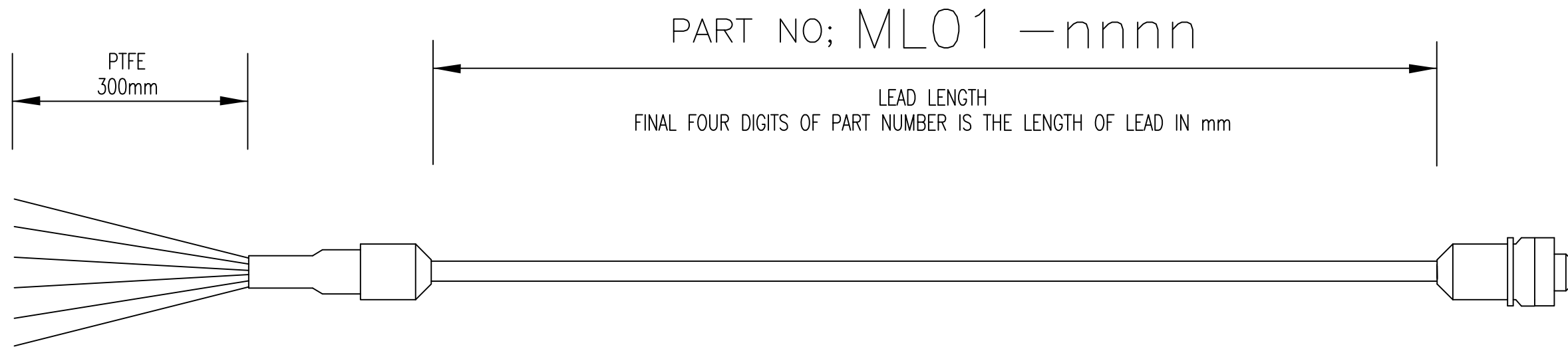
**Seaeeye**

Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**

ML09-nnnn; 5 WAY MALE METAL SHELL  
CONNECTOR TO 1-2 WAY FEMALE BIRNS &  
1-4 WAY MALE BIRNS CONNCTORS  
WIRING DIAGRAM  
SHEET 1 OF 1

| DRAWN          | APPROVED | DATE         |
|----------------|----------|--------------|
| D. Waite       | JMR      | 11/5/04      |
| DWG.No. S00843 |          | Rev. Sht. 51 |



| ISS | DESCRIPTION                           | APPD | DATE      | REF         |
|-----|---------------------------------------|------|-----------|-------------|
| 5   | MS Part numbers deleted, drg retitled |      | 26/2/02   | DW          |
| 4   | METAL SHELL DETAIL REVISED            |      | 18.NOV.97 | DCR292/NJP  |
| 3   | PART NUMBER DETAIL REVISED            |      | 16.MAR.98 | ECR0282/NJP |
| 2   | COLOUR CODE REVISED                   |      | 24.JUL.98 | ECR0304/NJP |

**Seaeye**

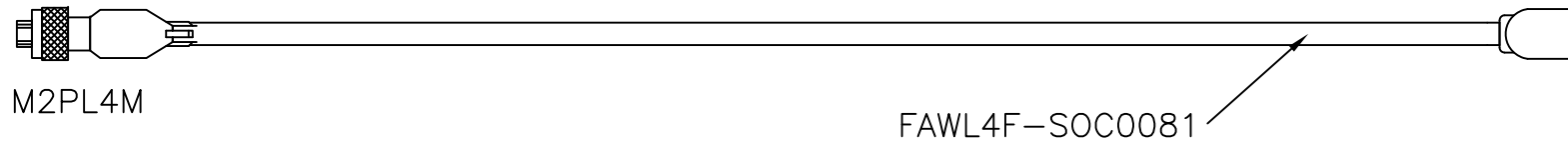
Seaeye Marine Ltd.  
Seaeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

TITLE  
SM4/M WHIP; SM4 PENETRATOR TO  
7 WAY MALE METAL SHELL  
PART NUMBER; ML01–nnnn  
SHEET 1 OF 1

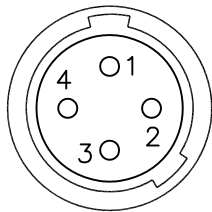
|                   |          |                 |
|-------------------|----------|-----------------|
| DRAWN<br>D. Waite | APPROVED | DATE<br>25/2/02 |
| DWG.No. S00553    |          | Rev. Sht.<br>51 |

PART NO; ML220-nnnn

LEAD LENGTH  
FINAL FOUR DIGITS OF PART NUMBER IS THE LENGTH OF LEAD IN mm

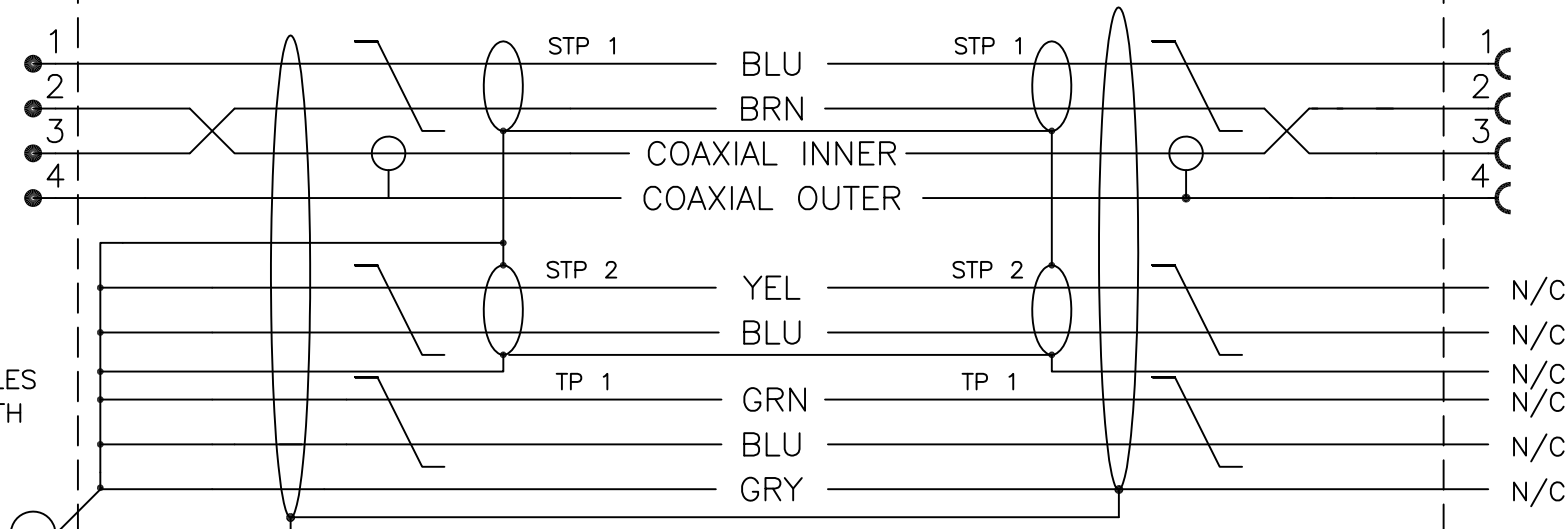
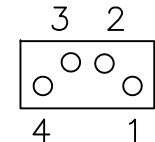


4 WAY MALE  
CONNECTOR  
METAL SHELL



ALL NON USED CABLES  
ARE LINKED TO EARTH

4 WAY FEMALE  
FAWL  
CONNECTOR



CONNECTOR SHELL

TAPE SCREEN DRAIN WIRE

ALL CONNECTORS SHOWN FROM  
MATING FACE

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| ISS | DESCRIPTION              | CHECKED | DATE     | REF         |
|-----|--------------------------|---------|----------|-------------|
| 3   | REMOVE LINKS AT FAWL END | RAL     | 24/06/08 | ECR1814-JFP |
| 2   | FERRITE BEADS REMOVED    | RAL     | 01/02/08 | ECR1606-JFP |
| 1   | First Issue              | RAL     | 15/11/07 | N/A         |

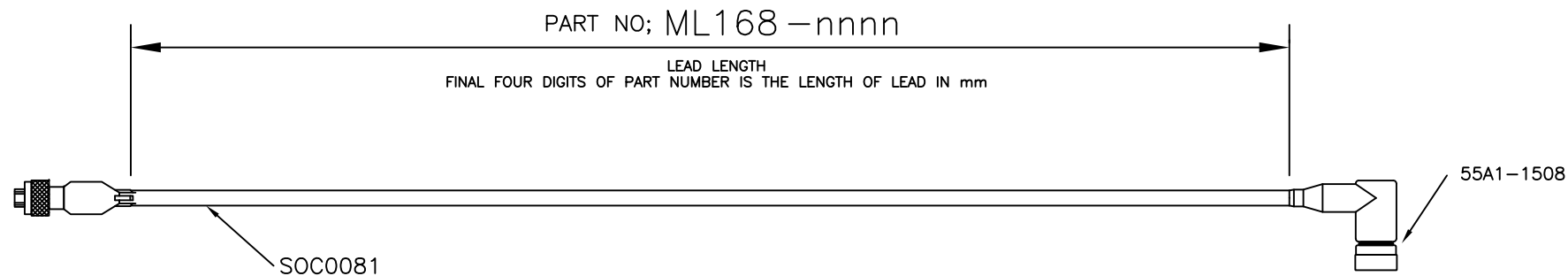
**Seaeeye**

Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**

ML220-nnnn 4 WAY MALE METAL SHELL  
CONNECTOR TO 4 WAY FEMALE FAWL  
CONNECTOR USING SOC0081  
WIRING DIAGRAM  
SHEET 1 OF 1

| DRAWN          | APPROVED | DATE          |
|----------------|----------|---------------|
| J PURNELL      | AW       | 15/11/07      |
| DWG.No. S06719 |          | Rev. Sht. 3 1 |

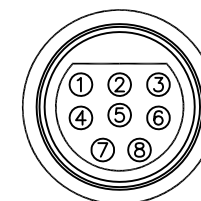


9 WAY CONNECTOR  
MALE METAL SHELL

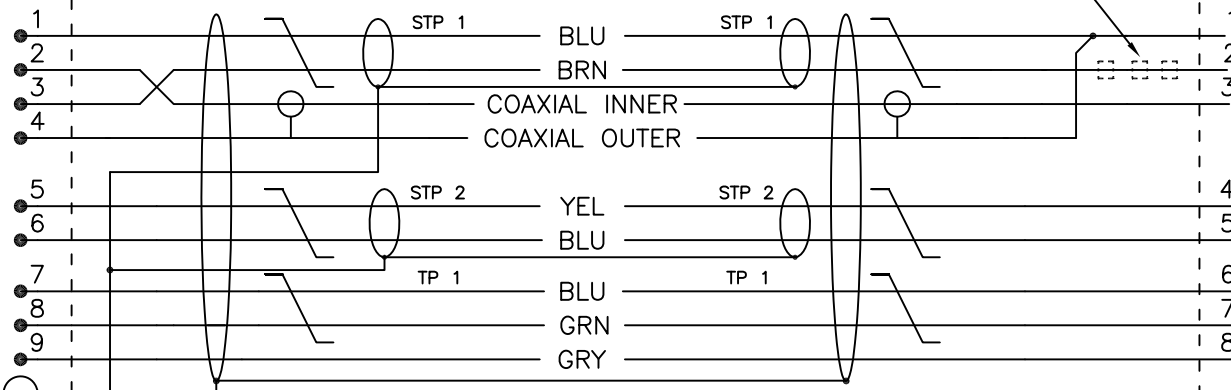


M2PL9M

8 WAY CONNECTOR  
FEMALE 55A1-1508



3 FERRITE BEADS IN POTTING PLACED OVER  
INSULATION AND SLEEVED WITH HEATSHRINK



CONNECTOR SHELL

TAPE SCREEN DRAIN WIRE

| PIN | WIRE       | FUNCTION          |
|-----|------------|-------------------|
| 1   | STP1-BLU   | 0V/RS232 GND      |
| 2   | COAX INNER | VIDEO INNER       |
| 3   | STP1-BRN   | +24V              |
| 4   | COAX OUTER | VIDEO OUTER       |
| 5   | STP2-YEL   | FOCUS             |
| 6   | STP2-BLU   | ZOOM              |
| 7   | TP1-BLU    | SHUTTER/RS232 RXD |
| 8   | TP1-GRN    | RS232 TXD         |
| 9   | GRY        | AUTOFOCUS         |

NOTES FOR SCREENS:-

1) SCREENS FOR THE TPs TO BE CONNECTED WITH THE OVERALL SCREEN

2) DO NOT CONNECT CO-AXIAL OUTER TO SCREENS

3) IF CUSTOMER SUPPLIES 5501-1508 TAIL THEN A POTTING SHOULD BE ARRANGED, OTHERWISE CONNECTION SHOULD BE MADE DIRECTLY TO THE 55A1-1508 CONNECTOR

4) SLEEVE ALL UNUSED WIRES

| PIN | WIRE                | CAMERA FUNCTION                           |
|-----|---------------------|-------------------------------------------|
| 1   | STP1-BLU/COAX OUTER | 0V/VIDEO OUTER/RS232 GND                  |
| 2   | STP1-BRN            | +24V                                      |
| 3   | COAX INNER          | VIDEO                                     |
| 4   | STP2-YEL            | FOCUS (OR RS232 RXD FOR DIGI STILL)       |
| 5   | STP2-BLU            | ZOOM (OR RS232 TXD FOR DIGI STILL)        |
| 6   | TP1-BLU             | SHUTTER (FOR DIGI STILL)/RS232 RXD/RS485- |
| 7   | -                   | RS232 TXD/RS485+                          |
| 8   | GRY                 | AUTO FOCUS                                |

NOTE:

THE KONGSBERG CAMERA HAS AN INTERNAL JUMPER SETTING FOR OPTIONS, "RS232" OR "RS485"

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| ISS | DESCRIPTION                         | APPD | DATE     | REF         |
|-----|-------------------------------------|------|----------|-------------|
| 1   | First Issue                         |      | 13/07/06 |             |
| 2   | Added OE14-114 information          |      | 11/12/06 | ECR1167-LM  |
| 3   | ARRANGEMENT, TEXT AND TITLE CHANGES | RAL  | 22/11/07 | ECR1546-JFP |
| 4   | MODS TO ENHANCE OPTIONS             | GD   | 04/06/08 | ECR1773-JFP |

**Seaeye**

Seaeye Marine Ltd.  
Seaeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

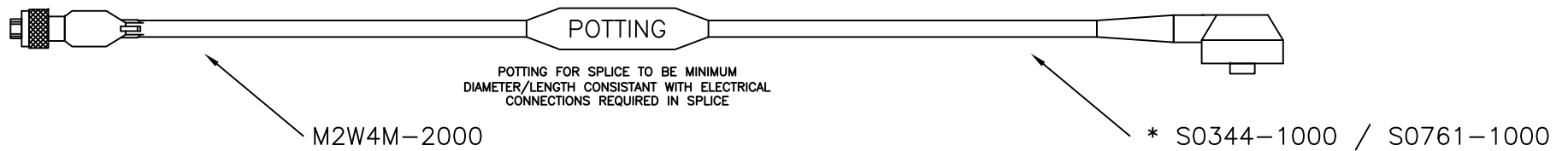
**TITLE**  
ML168-nnnn 9 WAY METAL SHELL  
TO 55A1-1508 USING SOC0081  
FOR MULTIFUNCTION KONGSBERG  
CAMERAS WIRING DIAGRAM  
SHEET 1 OF 1

| DRAWN    | APPROVED | DATE     | Rev. | Sht. |
|----------|----------|----------|------|------|
| L.Morton | AW       | 13/07/06 | 4    | 1    |

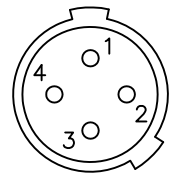
DWG.No. S05422

PART NO; ML17-nnnn

LEAD LENGTH  
FINAL FOUR DIGITS OF PART NUMBER IS THE LENGTH OF LEAD IN mm



4 WAY CONNECTOR  
MALE METAL SHELL



1  
2  
3  
4

BRN  
RED  
ORG  
YEL

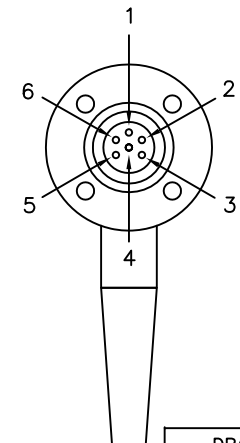
POTTING

N/C  
N/C

YEL  
BLU  
RED  
BLK  
GRN  
SCR

1  
2  
3  
4  
5  
6

6 WAY CONNECTOR  
FEMALE TRITECH



ALL CONNECTORS SHOWN FROM  
MATING FACE

\* FOR ML17-nnnn-RA USE S0344-1000.  
FOR ML17-nnnn-S USE S0761-1000.

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| ISS | DESCRIPTION                | CHECKED | DATE     | REF        |
|-----|----------------------------|---------|----------|------------|
| 4   | Note added                 |         | 01/09/06 | ECR1161-LM |
| 3   | Whip stock codes corrected |         | 17/1/05  | DCR825-DW  |
| 2   | Updated & redrawn.         |         | 20/5/04  | DCR780-DW  |
| 1   | First Issue                |         | 26/11/99 | N/A        |

**Seaeeye**

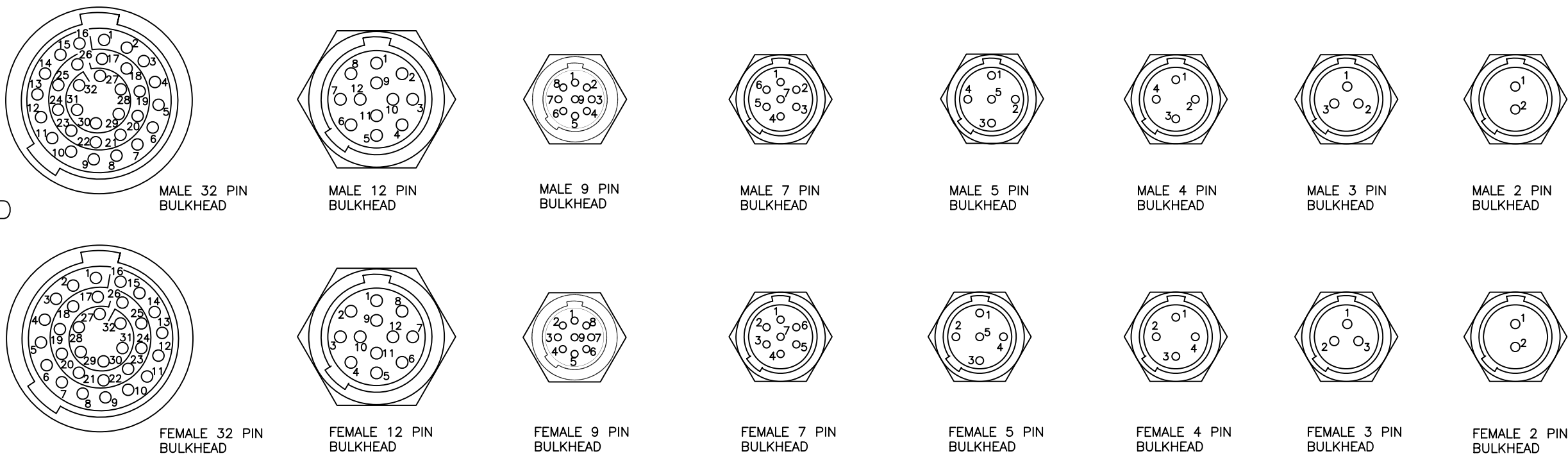
Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**  
ML17-nnnn 4 WAY METAL SHELL CONNECTOR  
TO 6 WAY TRITECH 90°/STRAIGHT CONNECTOR  
WHIP WIRING DIAGRAM

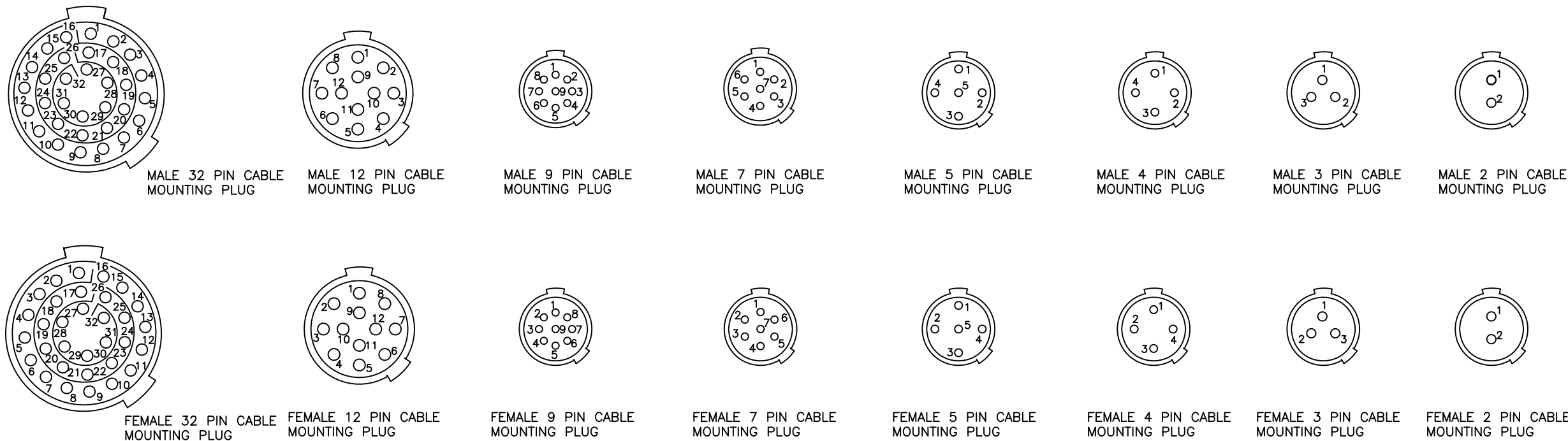
SHEET 1 OF 1

| DRAWN          | APPROVED | DATE     |
|----------------|----------|----------|
| D. Waite       | CGP      | 26/11/99 |
| DWG.No. S01555 |          | 41       |

BULKHEAD MOUNTED CONNECTORS



CABLE MOUNTED CONNECTORS



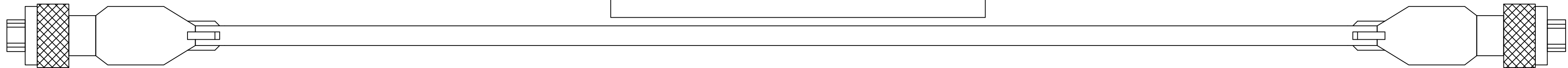
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| ISS | DESCRIPTION                            | APPD | DATE     | REF         | <div>Seaeye</div> | Seaeye Marine Ltd.<br>Seaeye House<br>Lower Quay Road<br>Fareham<br>Hampshire<br>PO16 0RQ<br>England<br>Tel: +44 (0)1329 289000 | TITLE<br>METAL SHELL CONNECTOR<br>PLUGS AND RECEPTALS<br>PINOUT DIAGRAM<br><br>SHEET 1 OF 1 | DRAWN          | APPROVED | DATE    |   |   |
|-----|----------------------------------------|------|----------|-------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------|----------|---------|---|---|
|     |                                        |      |          |             |                   |                                                                                                                                 |                                                                                             | DW             | CGP      | 22/2/02 |   |   |
| 3   | hex nut on bulheads and 9 way added    | RAL  | 18/01/08 | ECR1635-JFP |                   |                                                                                                                                 |                                                                                             |                |          |         |   |   |
| 2   | Revised to show pinout only & retitled |      | 25/2/02  | DW          |                   |                                                                                                                                 |                                                                                             |                |          |         |   |   |
| 1   | First Issue                            |      | 27/11/97 | N/A         |                   |                                                                                                                                 |                                                                                             |                |          |         |   |   |
|     |                                        |      |          |             |                   |                                                                                                                                 |                                                                                             | DWG.No. S00753 |          |         | 3 | 1 |

PART NO; MaDb – nnnn

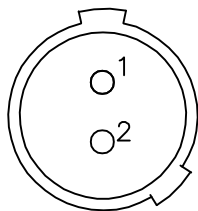
PART No. MaDb – nnnn  
a IS THE SHELL SIZE  
b IS THE No. OF PINS  
nnnn IS THE LENGTH IN mm



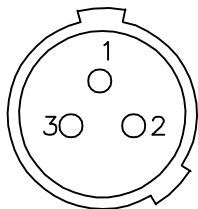
MALE CONNECTOR

FEMALE CONNECTOR

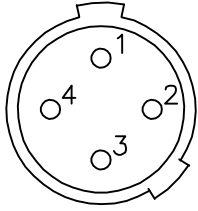
M2D2 – nnnn



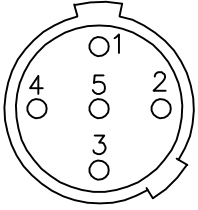
M2D3 – nnnn



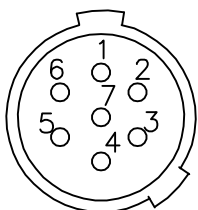
M2D4 – nnnn



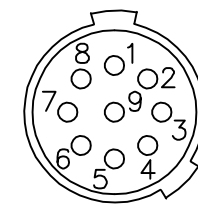
M2D5 – nnnn



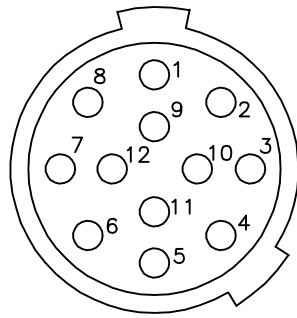
M2D7 – nnnn



M2D9 – nnnn



M3D12 – nnnn



2,3,4,5,7,9,12  
PIN COLOUR CODE

BRN

RED

ORG

YEL

GRN

BLU

VIO

GRY

WHT

INNER BLK

INNER BRN

INNER RED

1

2

3

4

5

6

7

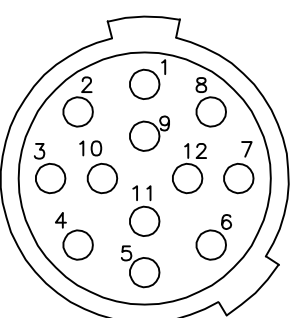
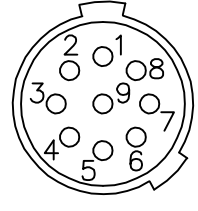
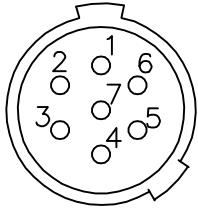
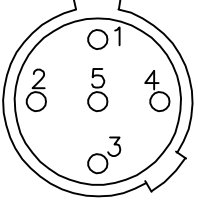
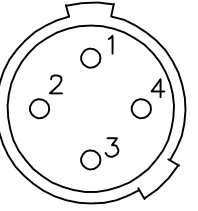
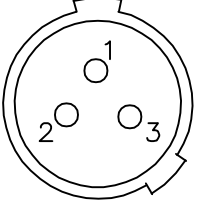
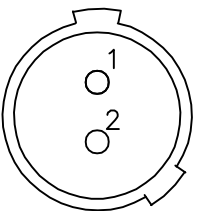
8

9

10

11

12



ALL CONNECTORS VIEWED FROM MATING FACE

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| ISS | DESCRIPTION                           | APPD | DATE     | REF         |
|-----|---------------------------------------|------|----------|-------------|
| 8   | Added 9 way male/female connectors    | RAL  | 13/11/07 | ECR1213-JFP |
| 7   | Standard Lengths note removed         |      | 23/7/03  | DCR715-DW   |
| 6   | MS Part numbers deleted, drg retitled |      | 12/3/02  | DW          |
| 5   | First Issue                           |      | 7.SEP.99 | ECR394-JW   |

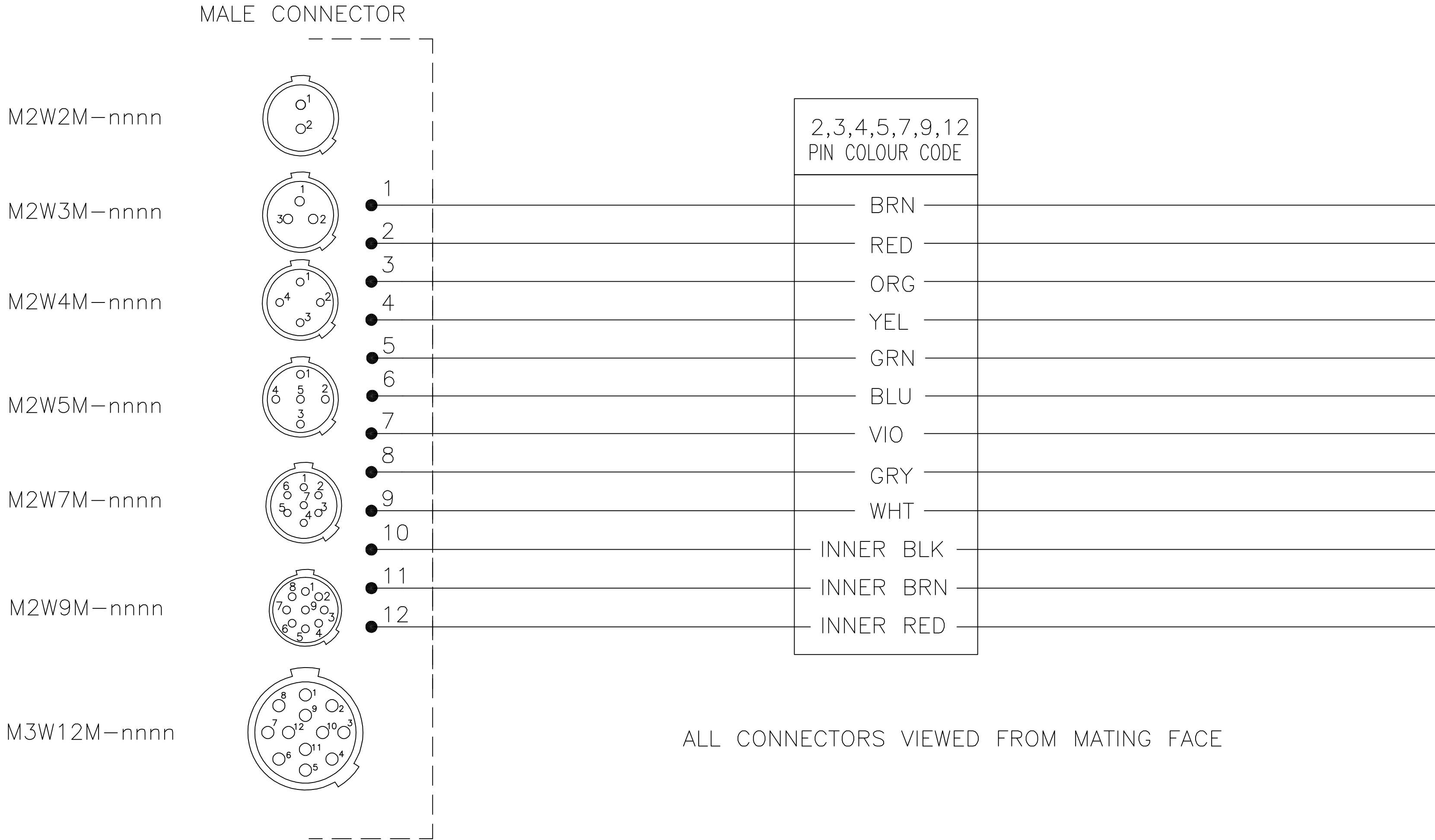
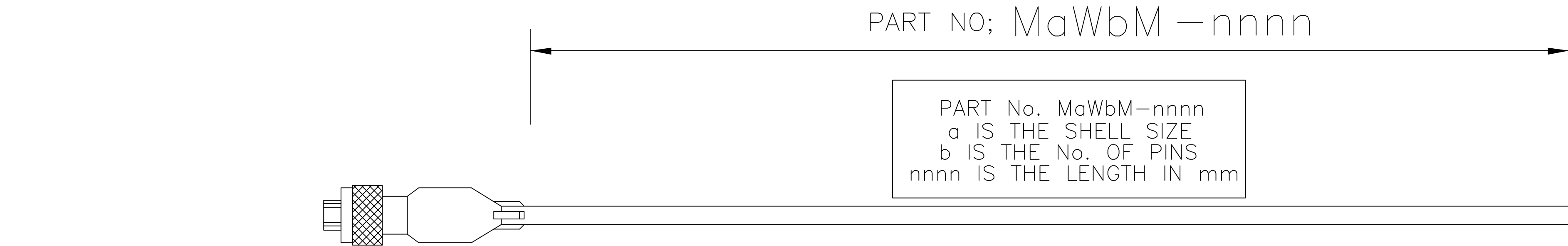
**Seaeeye**

Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

TITLE

PART NUMBER; MaDb – nnnn  
STANDARD MALE – FEMALE LEADS; 2M–2F,  
3M–3F, 4M–4F, 5M–5F, 7M–7F, 9M–9F.  
12M–12F. WIRING DIAGRAM  
SHEET 1 OF 1

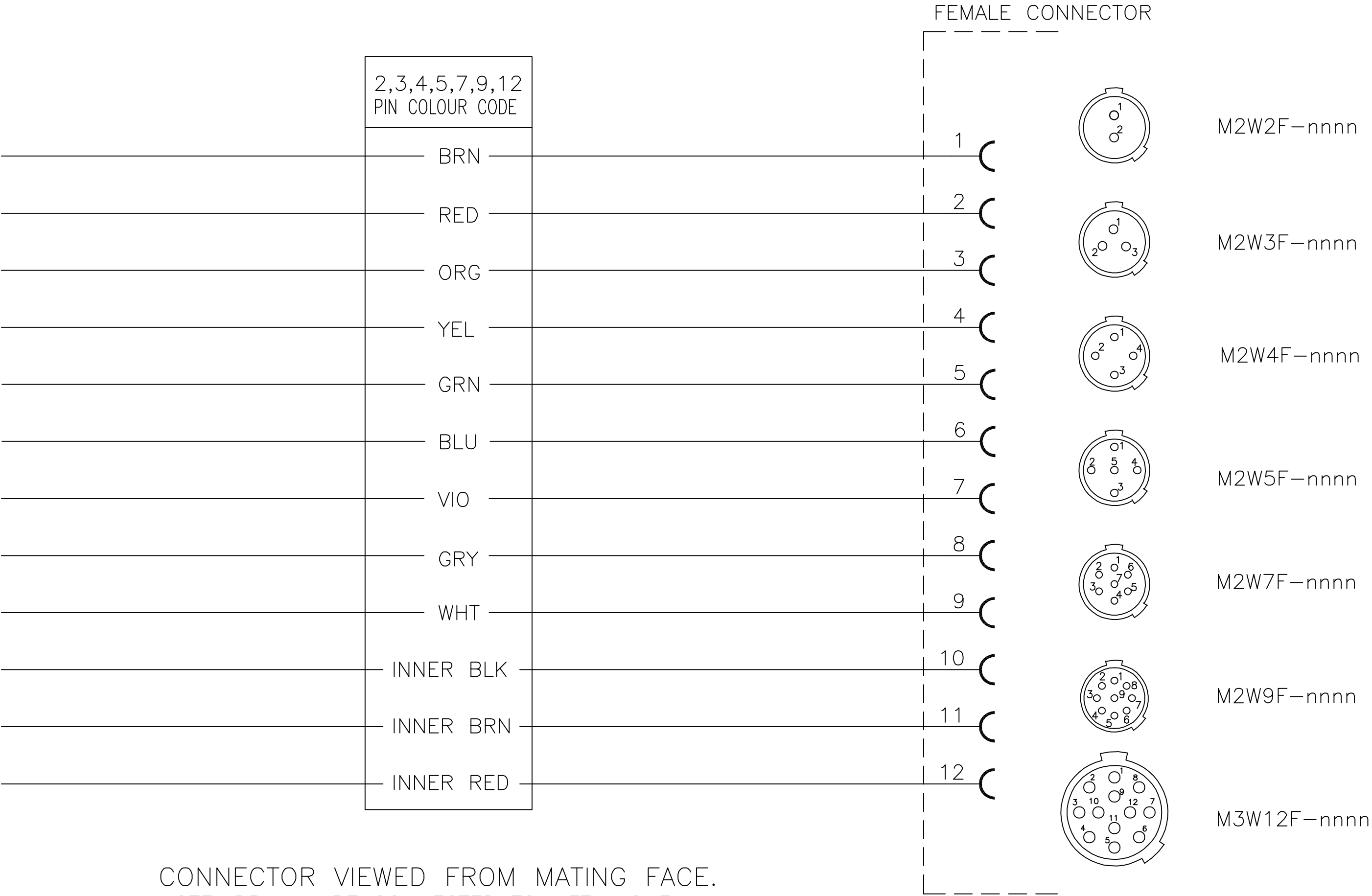
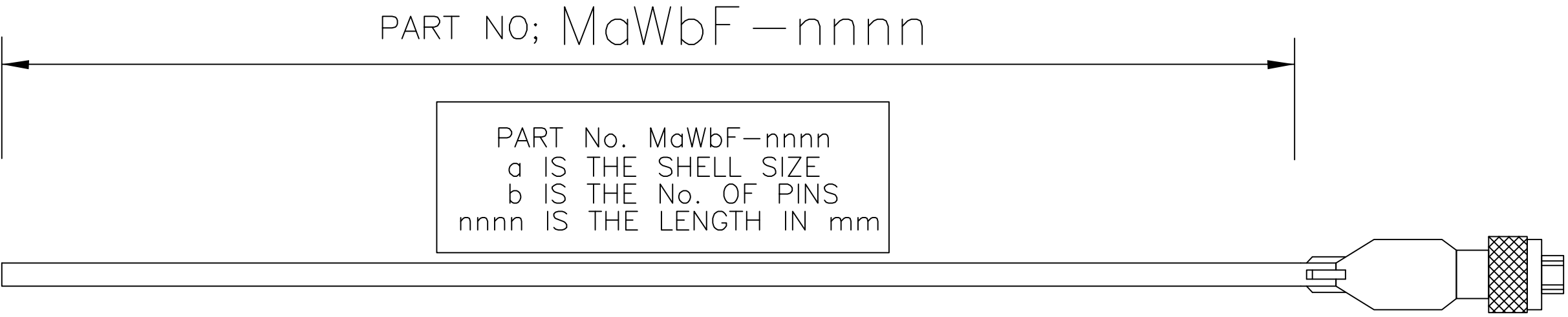
| DRAWN            | APPROVED | DATE   | Rev. | Sht. |
|------------------|----------|--------|------|------|
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| DWG.No. S0080681 |          |        |      |      |



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|-----|---------------------------------------|------|----------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|-----------|----------|--------|------------------|--|
| 8   | Added 9 way Male Connector            | RAL  | 13/11/07 | ECR1213–JFP |                                                                                                                                                                                                                                                                                                                |  |  | D. Waite. | CGP      | 8/3/02 |                  |  |
| 7   | Standard Lengths note removed         |      | 23/7/03  | DCR715–DW   |                                                                                                                                                                                                                                                                                                                |  |  |           |          |        |                  |  |
| 6   | MS Part numbers deleted, drg retitled |      | 12/3/02  | DW          |                                                                                                                                                                                                                                                                                                                |  |  |           |          |        |                  |  |
| 5   | First Issue                           |      | 7.SEP.99 | ECR394–JW   |                                                                                                                                                                                                                                                                                                                |  |  |           |          |        |                  |  |



CONNECTOR VIEWED FROM MATING FACE.  
NOTE: DRAIN WIRE CONNECTED TO METAL SHELL

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|-----|---------------------------------------|------|----------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------|----------|--------|------------------|------|------|
| 8   | Added 9F information                  | RAL  | 06/11/06 | ECR1213–LM |                                                                                                                                                                     |                                                                                                                                | D. Waite. | CGP      | 8/3/02 |                  |      |      |
| 7   | Standard Lengths note removed         |      | 23/7/03  | DCR715–DW  |                                                                                                                                                                     |                                                                                                                                |           |          |        |                  |      |      |
| 6   | MS Part numbers deleted, drg retitled |      | 12/3/02  | DW         |                                                                                                                                                                     |                                                                                                                                |           |          |        |                  |      |      |
| 5   | First Issue                           |      | 7.SEP.99 | ECR394–JW  |                                                                                                                                                                     |                                                                                                                                |           |          |        |                  |      |      |

# CHAPTER 6

## PCB MODULES

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## **6. PCB MODULES**

This Chapter describes the Tiger 880 PCBs, modules and ancillary units fitted to the system controllers and vehicle. The chapter also contains the respective diagrams.

### **6.1 Surface Unit PCBs**

| <b>Drawing No</b> | <b>Description</b>                         | <b>PCB/MODULE</b> |
|-------------------|--------------------------------------------|-------------------|
| S0302511          | Video Overlay Component Layout             | 6037P/VIDOL       |
| S0302512          | Video Overlay Circuit Diagram              | 6037P/VIDOL       |
| S0302611          | SBC68 Video Processor CPU Circuit Diagram  | 6038P/SBC68       |
| S0302612          | SBC68 Video Processor CPU Component Layout | 6038P/SBC68       |
| S0302711          | 8 bit Analogue Input Component Layout      | 6040P             |
| S0302712          | 8 bit Analogue Input Circuit Diagram       | 6040P             |
| S0302811          | Digital I/O Component Diagram              | 6041P             |
| S0302812          | Digital I/O Circuit Diagram                | 6041P             |
| S0303011          | Expansion Input/Output PCB Sheet 1 of 2    | 6046P             |
| S0303012          | Expansion Input/Output PCB Sheet 2 of 2    | 6046P             |
| S0303121          | CPU Component Layout                       | 6047P             |
| S0303122          | CPU Circuit Diagram                        | 6047P             |
| S0303123          | CPU Circuit Diagram                        | 6047P             |
| S0303114          | CPU Circuit Diagram                        | 6047P             |
| S0050031          | Switch Adaptor PCB Circuit Diagram         | 6052AP            |
| S0303411          | 12 Bit A/D Component Layout                | 6081P             |
| S0303412          | 12 Bit A/D Circuit Diagram                 | 6081P             |
| S0242811          | IBM Keyboard Adaptor Circuit Diagram       | 6099P             |
| S0242911          | IBM Keyboard Adaptor PCB Layout            | 6099P             |

**Table. 6.1 Surface Unit PCBs**

### **6.2 Video Overlay PCB (Part No. 6037P/VIDOL)**

#### **6.2.1 Function**

The Video Overlay PCB superimposes the overlay data onto the video image and switches either overlay and video images or overlay only to a monitor.

#### **6.2.2 Technical Description**

The overlay PCB consists of two circuits, one digital the one analogue.

The digital circuits are designed around an SCC66470 video system controller (VSC) IC. The VSC communicates directly with the video CPU PCB via a buffered 16-bit data bus, and is provided with 256k x 16 video dynamic RAM. The clock signals for the VSC are derived from the analogue section of the PCB.

The digital RGB signals output by the VSC are applied to a resistor network. Analogue RGB is derived from the resistor network for application to the analogue circuitry. In addition, the RGB digital signals are applied to a fast OR gate to provide an overlay/video-keying signal for use by the analogue circuits.

Circuits comprising the analogue section of the overlay PCB are designed around an MC1378 video chroma locker. This contains fast video switches and accepts video signal inputs from the ROV camera(s) and the RGB video overlay signal from the VSC.

The overlay/video switching signal from the digital section of the PCB is applied to this IC. Any logical high on the digital RGB signals causes it to route the overlay RGB information to its video output and the overlay is displayed on the system monitor. When the digital RGB signals are all at a logical low, IC3 switches to route remote camera video images to the system monitor.

The switching rate of the IC is such that both the video image and the computer-generated overlay data appear to be displayed on the system monitor simultaneously. The output video signals are buffered by a video amplifier and routed to the video output connector J4. J3 is the remote video input, and J4 is the buffered video system output.

### 6.2.3 Daughter Board Source Selection SW1

The Daughter Board is fitted to the Video Overlay PCB to enable selection of internal (LOCAL) or external (REMOTE) video source.

In the REMOTE position (pins 1 and 2 joined), the output at J4 will comprise the video signal at J3 with the overlay superimposed on it.

In the LOCAL position (pins 2 and 3 joined), the output at J4 will comprise a blank screen (black) with the overlay. This setting is used in the absence of a video signal without which video overlay cannot lock and becomes unreadable.

### 6.2.4 Vidol setting up

The Video Overlay PCB setting up procedure can be found in the Maintenance Section of the Technical Handbook and is to be carried out when the video overlay is unstable but with a stable video picture.

| Function      | Pin No.        |
|---------------|----------------|
| <b>Inputs</b> |                |
| +15 VDC       | A32, B32 & C32 |
| -15 VDC       | A1, B1 & C1    |
| +5 VDC        | A31, B31 & C31 |
| 0 VDC         | A2, B2 & C2    |
| Video         | J3 centre      |

**Table. 6.2 PCB 6037P Inputs and Outputs**

| Function             | Pin No.   |
|----------------------|-----------|
| Video screen         | J3 screen |
| <b>Outputs</b>       |           |
| Video overlay        | J4 centre |
| Video overlay screen | J4 screen |

**Table. 6.2 PCB 6037P Inputs and Outputs (Continued)**

### 6.3 Video CPU PCB (Part No. 6038P/SBC 68)

#### 6.3.1 Function

The Video CPU PCB (6038P/SBC68) is a single board computer using a SCC68070 microprocessor and it is fitted with the following:

- RS485 communications hardware – Electrically isolated, it monitors the data stream on the umbilical communication lines from the surface control system CPU to the ROV control system CPU.
- TTL Serial hardware – The TTL serial interface permits using an external serial keyboard to control the video system.
- RS232 serial hardware – The RS232 serial interface receives overlay information from the TMS system if fitted.

#### 6.3.2 Technical Description

The video system software is held in the 128k x 16 EPROM consisting of IC11 and IC12. IC11 is designated to provide the odd EPROM byte and IC12 designated to provide the even EPROM byte. The processor communicates via 16-bit data and address buses and is provided with 128k x 16 static RAM and 8k x 8 of battery backed static RAM complete with system time-of-day clock.

#### 6.3.3 Software reset

A red reset button located on the PCB, when operated, restarts the operational software.

| Function      | Pin No               |
|---------------|----------------------|
| <b>Inputs</b> |                      |
| +15 VDC       | CON32 A32, B32 & C32 |
| -15 VDC       | CON32 A1, B1 & C1    |
| +5 VDC        | CON32 A31, B31 & C31 |
| 0 VDC         | CON32 A2, B2 & C2    |
| RS232 data    | J4-1                 |
| TTL signal    | J6-1                 |

**Table. 6.3 PCB 6038P Inputs, Outputs and Telemetry**

| Function         | Pin No |
|------------------|--------|
| <b>Outputs</b>   |        |
| RS232 data       | J4-3   |
| TTL signal       | J6-3   |
| <b>Telemetry</b> |        |
| Function         | Pin No |
| RS485 Tele A     | J2-2   |
| RS485 Tele B     | J2-1   |

**Table. 6.3 PCB 6038P Inputs, Outputs and Telemetry (Continued)**

## 6.4 8-BIT Analogue I/O PCB (Part No. 6040P)

### 6.4.1 Function

The 6040P PCB provides eight channels of analogue to digital conversion (ADC) and eight channels of digital to analogue conversion (DAC).

### 6.4.2 Technical Description

The eight analogue input channels (PL2) accept input signals in the range of 0 to 5 VDC. The input signals are buffered and input to an eight channel 8-bit ADC that converts each signal to a value of 0 to 225 representing 0 to 5 VDC. The output values are read by the CPU connected via the backplane.

Two four channel 8-bit DAC's convert a digital number in the range of 0-255 into an analogue voltage output in the range 0-5 VDC. The digital data is derived from the CPU connected to the backplane. The analogue signal outputs from the DAC are buffered and fed to the output connector (PL1).

| Function              | Pin No       |
|-----------------------|--------------|
| <b>Inputs</b>         |              |
| -15 VDC               | CN1-1a & c   |
| 0 VDC                 | CN1-2a & c   |
| +5 VDC                | CN1-31 a & c |
| +15 VDC               | CN1-32 a & c |
| Analogue input (AIN1) | PL2-1        |
| Analogue input (AIN2) | PL2-3        |
| Analogue input (AIN3) | PL2-5        |
| Analogue input (AIN4) | PL2-7        |
| Analogue input (AIN5) | PL2-9        |

**Table. 6.4 PCB 6040P Inputs and Outputs**

| Function               | Pin No |
|------------------------|--------|
| Analogue input (AIN6)  | PL2-11 |
| Analogue input (AIN7)  | PL2-13 |
| Analogue input (AIN8)  | PL2-15 |
| <b>Outputs</b>         |        |
| Analogue output (DAC1) | PL1-1  |
| Analogue output (DAC2) | PL1-3  |
| Analogue output (DAC3) | PL1-5  |
| Analogue output (DAC4) | PL1-7  |
| Analogue output (DAC5) | PL1-9  |
| Analogue output (DAC6) | PL1-11 |
| Analogue output (DAC7) | PL1-13 |
| Analogue output (DAC8) | PL1-15 |

**Table. 6.4 PCB 6040P Inputs and Outputs**

## 6.5 Digital I/O PCB (Part No. 6041P)

### 6.5.1 Function

The 6041P PCB provides 48 digital input/output channels, which can be read by a CPU.

### 6.5.2 Technical Description

The circuit comprises two programmable parallel interface (PPI) ICs and buffer ICs.

Each PPI IC has three ports (designated port A, port B, and port C). Ports A and B are 8-bit, bi-directional input/output ports and port C is split into a pair of 4-bit bi-directional I/O ports. The two PPI ICs thus provide 48 digital I/O channels.

Ports A and B of each PPI pass through octal bus transceiver ICs and port C passes through quad bus transceiver ICs. The direction of signal flow through each transceiver IC is set by links on the PCB, permitting the ports to be configured as either data inputs or data outputs. Resistors are connected across the PCB connector to tie floating inputs to a known state (0 V). The direction links are set to correspond with the direction of ports A, B and C as set by the CPU.

| Function       | Pin No      |
|----------------|-------------|
| <b>Inputs</b>  |             |
| +5 DC          | CN1-31a & c |
| 0 VDC          | CN1-2a & c  |
| <b>Outputs</b> |             |

**Table. 6.5 PCB 6041P Inputs and Outputs**

| Function              | Pin No          |
|-----------------------|-----------------|
| +5 DC                 | CN2-1           |
| 0 VDC                 | CN2-2           |
| Input Output Channels |                 |
| Input/Output          | CN2-3 to CN2-50 |

**Table. 6.5 PCB 6041P Inputs and Outputs**

## 6.6 Expansion I/O PCB (Part No. 6046P)

### 6.6.1 Function

The 6046P PCB provides an additional RS232 serial interface for a CPU.

### 6.6.2 Technical Description

The PCB converts TTL signals (0 and 5 VDC) from a CPU connected via the backplane connections into RS232 data format (+ 12 and &-12 VDC) and output from the PCB on connector J6. The PCB backplane connections also provide its power requirements of +5 & 0 VDC.

| Function                  | Pin No      |
|---------------------------|-------------|
| Inputs                    |             |
| 0 VDC                     | CN1-2a & c  |
| +5 VDC                    | CN1-31a & c |
| Outputs                   |             |
| RS232 TXD (Transmit data) | J6-1        |
| RS232 0 V                 | J6-2        |
| RS232 CTS (Clear to send) | J6-3        |

**Table. 6.6 PCB 6046P Inputs and Outputs**

## 6.7 CPU PCB (Part No. 6047P)

### 6.7.1 Function

The CPU PCB is firmware driven and controls, communicates and processes system data.

### 6.7.2 Technical Description

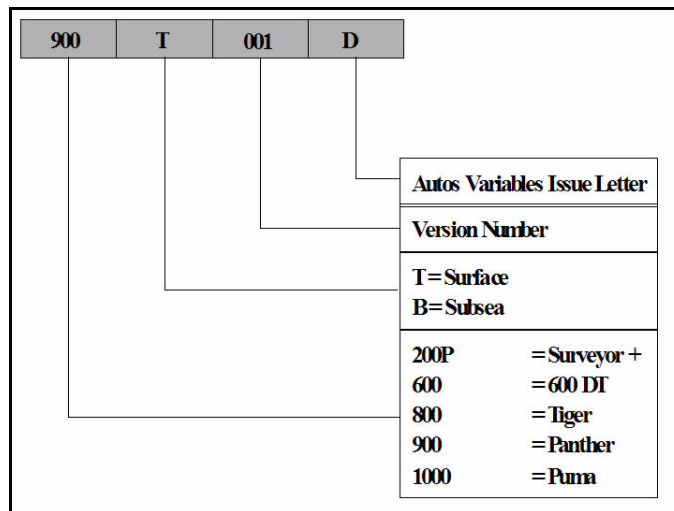
The CPU PCB is based on a 16-bit Intel microcontroller. In conjunction with the non-volatile RAM and the isolated RS485 serial port, this PCB meets the processing and communication requirements of the Seaeye systems. The program and operating system for the CPU are specific to the installed system and contained on the EPROM mounted on the PCB.

### 6.7.3 Software Reset

A red reset button located on the PCB, when operated, restarts the operational software.

| Function         | Pin No         |
|------------------|----------------|
| <b>Inputs</b>    |                |
| -15 VDC          | CN1-1a, b & c  |
| 0 VDC            | CN1-2a, b & c  |
| +5 VDC           | CN1-31a, b & c |
| +15 VDC          | CN1-32a, b & c |
| <b>Telemetry</b> |                |
| Telemetry A      | S103-1         |
| Telemetry B      | S103-2         |
| Common           | S103-3         |

**Table. 6.7 PCB 6047P Inputs and Telemetry**



**Figure. 6.1 Software Identification**

## 6.8 Switch Adaptor PCB (Part No. 6052AP)

### 6.8.1 Function

The 6052AP PCB electrically interfaces up to seven switches to a CPU.

### 6.8.2 Technical Description

Each switch is connected between 0VDC and the junction of the decoupling capacitors and pull-up resistors. When a switch is closed, the junction between the capacitors and resistors is pulled low (0 VDC) to signal that the switch is closed. When the switch is open, the junction is pulled high (+5 VDC) to signal the switch is open. The status of the switches are detected by a CPU PCB connected via the backplane.

| Function                    | Pin No         |
|-----------------------------|----------------|
| <b>Inputs</b>               |                |
| + 5 VDC                     | PL1 31a, b & c |
| 0 VDC                       | PL1 2a, b & c  |
| Switch 1 – Unlock           | PL1-29a        |
| Switch 2 – Lock             | PL1-28a        |
| Switch 3 – Bail In          | PL1-27a        |
| Switch 4 – Bail Out         | PL1-26a        |
| Switch 5 – Enable Bailing   | PL1-25a        |
| Switch 6 – Reset Bail Count | PL1-24a        |
| Switch 7 - Lights           | PL1-16a        |
| <b>Outputs</b>              |                |
| + 5 VDC Power Supply        | PL3-1          |
| 0 VDC                       | PL3-8          |
| Switch 1 – Unlock           | PL3-2          |
| Switch 2 – Lock             | PL3-3          |
| Switch 3 – Bail In          | PL3-4          |
| Switch 4 – Bail Out         | PL3-5          |
| Switch 5 – Enable Bailing   | PL3-6          |
| Switch 6 – Reset Bail Count | PL3-7          |
| +5 VDC                      | PL2-1          |
| 0 VDC                       | PL2-4          |
| Switch 7 - Lights           | PL2-2          |

**Table. 6.8 PCB 6052AP Inputs and Outputs**

## 6.9 12-BIT Analogue I/P PCB (Part No. 6081P)

### 6.9.1 Function

The 6081P PCB provides eight channels of analogue to digital conversion, which can be read by a CPU.

### 6.9.2 Technical Description

The eight analogue channels (CN2) accept input signals in the range of 0 to 5 VDC. The input signals are buffered and input to one of two 4 channel 12-bit ADC's, which convert each signal to a value of 0 to 4096 representing 0 to 5 VDC. The output values are read by a CPU connected via the backplane.

| Function | Pin No      |
|----------|-------------|
| Inputs   |             |
| -15 VDC  | CN1-1a & c  |
| 0 VDC    | CN1-2a & c  |
| +5 VDC   | CN1-31a & c |
| +15 DC   | CN1-32a & c |
| AIN 1    | CN2-4       |
| AIN 2    | CN2-6       |
| AIN 3    | CN2-8       |
| AIN 4    | CN2-10      |
| AIN 5    | CN2-12      |
| AIN 6    | CN2-14      |
| AIN 7    | CN2-16      |
| AIN 8    | CN2-18      |

**Table. 6.9 PCB 6081P Inputs**

## 6.10 IBM/AT Keyboard Adaptor PCB (Part No. 6099P)

### 6.10.1 Description

The 6099P IBM/AT Keyboard Adaptor PCB translates the codes from a standard IBM/AT keyboard to ASCII format. The PCB has five terminal posts for connection to the keyboard and three terminal posts for connection to the system.

### 6.10.2 Serial Output

The output is 7-bit ASCII code as TTL Serial Data. Function keys are not implemented. (Optionally, function keys may be factory programmed to send single ASCII codes).

- 2400 baud
- 8 data bits



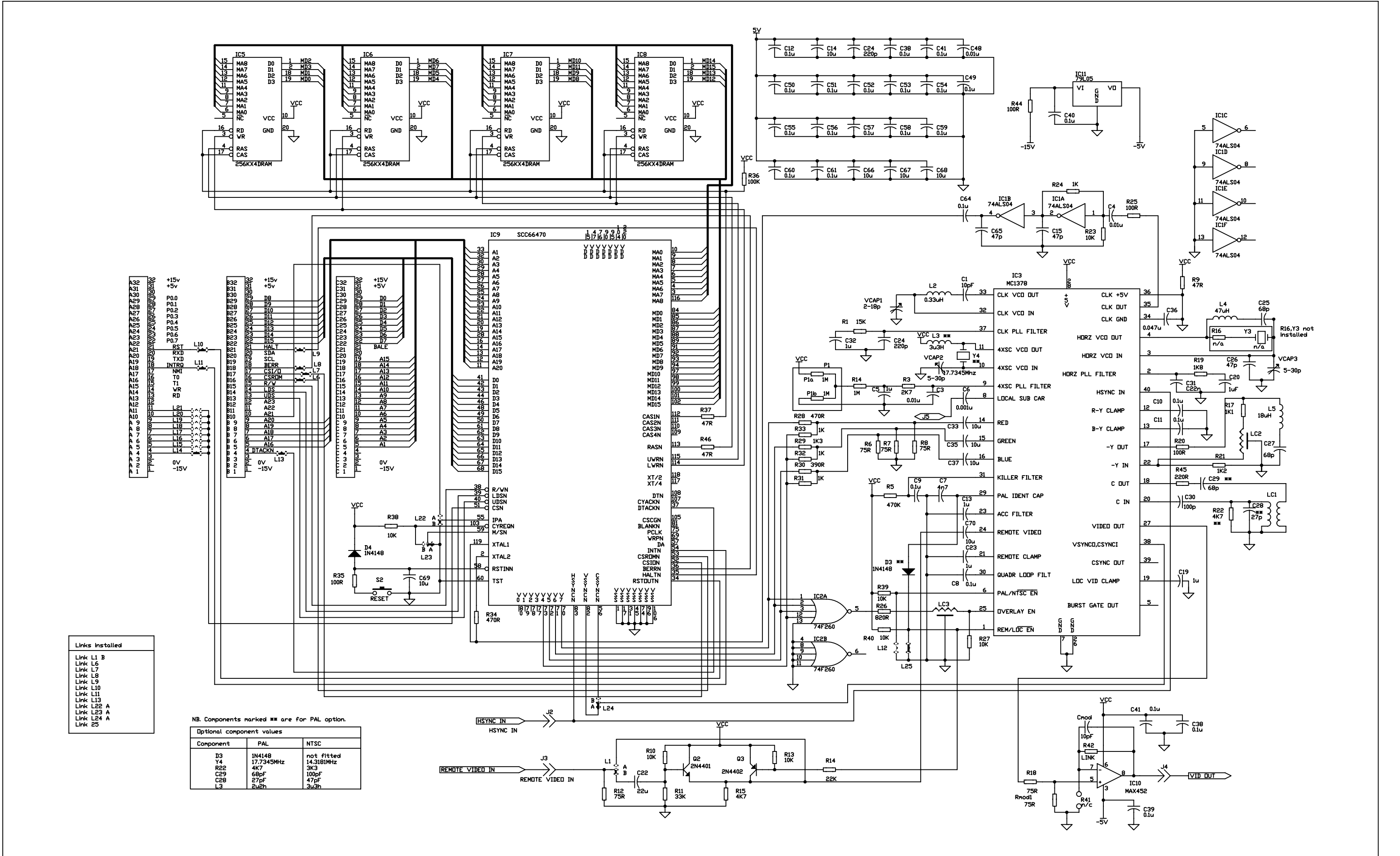
- No Parity
- 1 Stop bit

| Key | ASCII Code | Function                      |
|-----|------------|-------------------------------|
| F1  | <CTRL B>   | Change Colour Scheme          |
| F2  | <CTRL D>   | Display Text Screens          |
| F3  | <CTRL E>   | Edit Text Screens             |
| F4  | <CTRL W>   | Wipe Screen and Redraw        |
| F5  | <CTRL Z>   | Zero Depth                    |
| F6  | <CTRL C>   | Toggle Visibility of CP Icon  |
| F7  |            | Not Defined                   |
| F8  | <CTRL P>   | Toggle Visibility of Pan Icon |

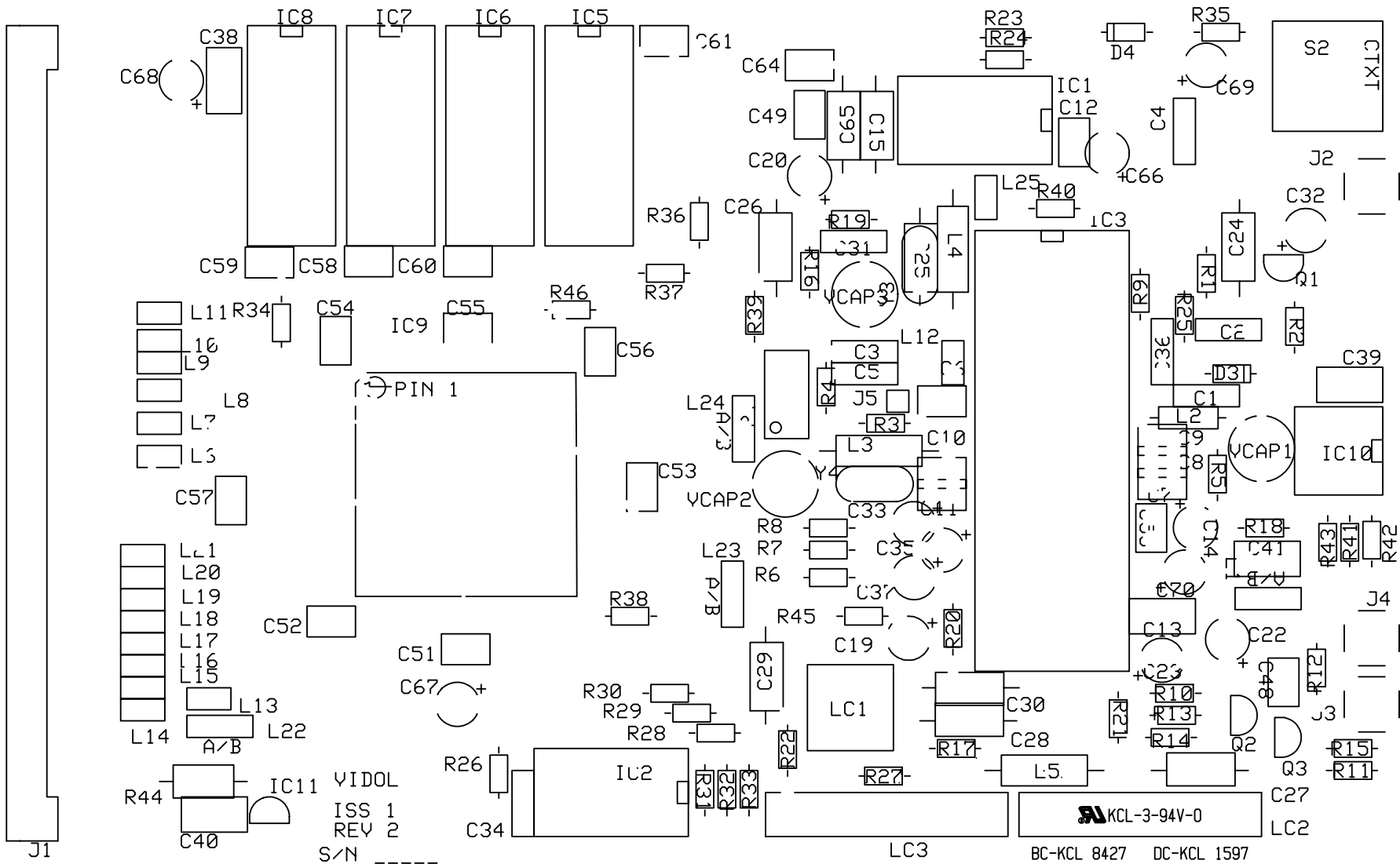
**Table. 6.10 Keyboard Function Keys**

| Terminal Ref | Function         | Type   |
|--------------|------------------|--------|
| 1            | Clock            | Input  |
| 2            | Data             | Input  |
| 3            | Reset            | Input  |
| 4            | 0 V              | Common |
| 5            | Power Supply +5V | Input  |
| VCC          | Power Supply +5V | Input  |
| TXD          | TTL Serial Data  | Output |
| GND          | Power Supply 0V  | Common |

**Table. 6.11 PCB 6099P Inputs and Outputs**



| ISS | DESCRIPTION               | CHECKED | DATE    | REF | Seaeeye                                                                                                                           |  | TITLE                            | DRAWN    | APPROVED | DATE    | DWG.No. S03025 |  | Rev. Sht. |  |
|-----|---------------------------|---------|---------|-----|-----------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------|----------|----------|---------|----------------|--|-----------|--|
|     |                           |         |         |     |                                                                                                                                   |  | VIDOLP (6037P) VIDEO OVERLAY PCB | D. Waite |          | 30/1/03 |                |  |           |  |
| 1   | First Issue as CI drawing |         | 30/1/03 | N/A | Seaeeye Marine Ltd.<br>Seaeeye House<br>Lower Quay Road<br>Fareham<br>Hampshire<br>PO16 0RQ<br>England<br>Tel: +44 (0)1329 289000 |  | CIRCUIT DIAGRAM                  |          |          |         | SHEET 1 OF 2   |  |           |  |



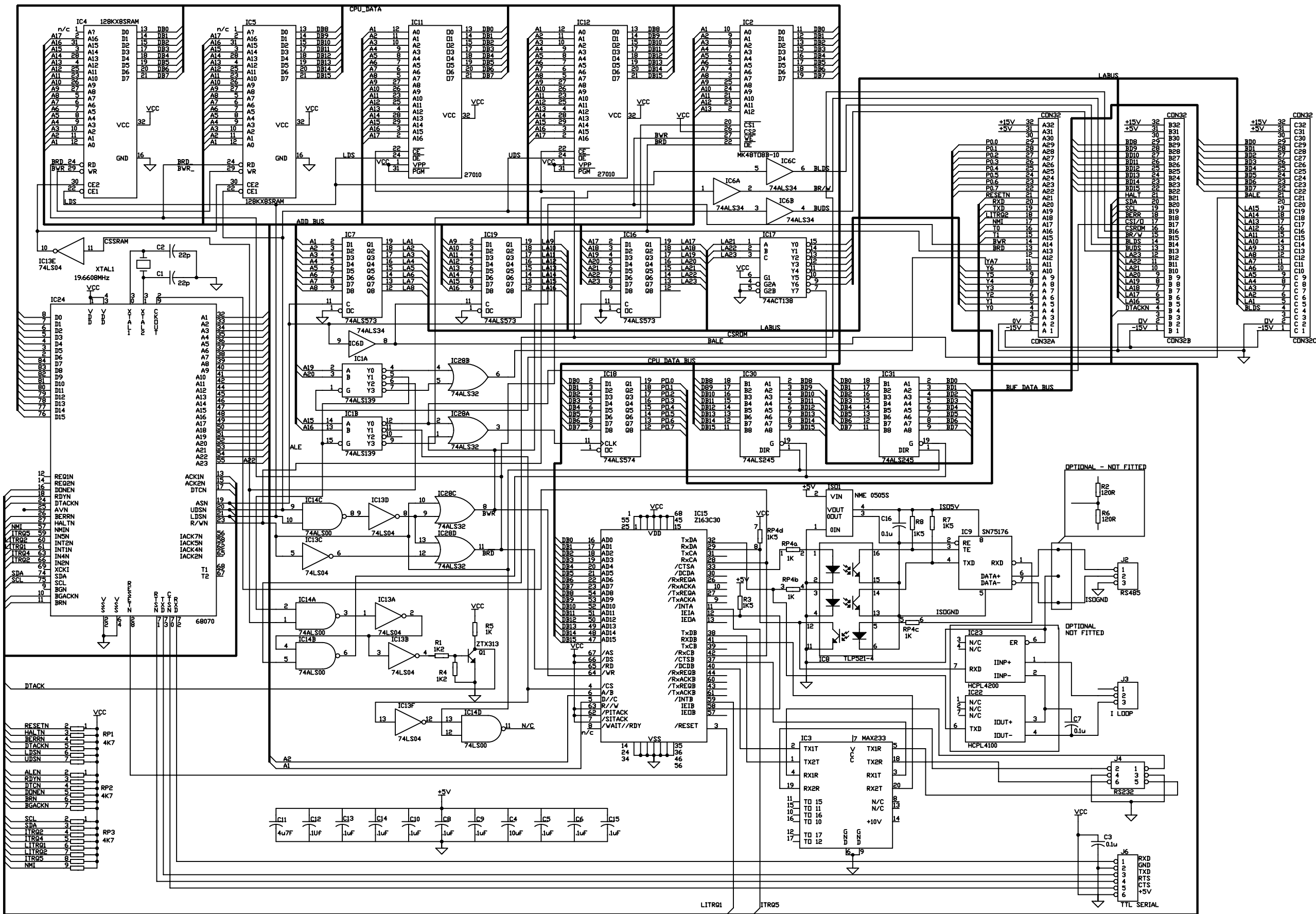
| ISS | DESCRIPTION                      | CHECKED | DATE    | REF |
|-----|----------------------------------|---------|---------|-----|
| 2   | Layout replaced with DXF drawing |         | 25/8/04 |     |
| 1   | First Issue as CI drawing        |         | 31/1/03 | N/A |

**Seaeye**

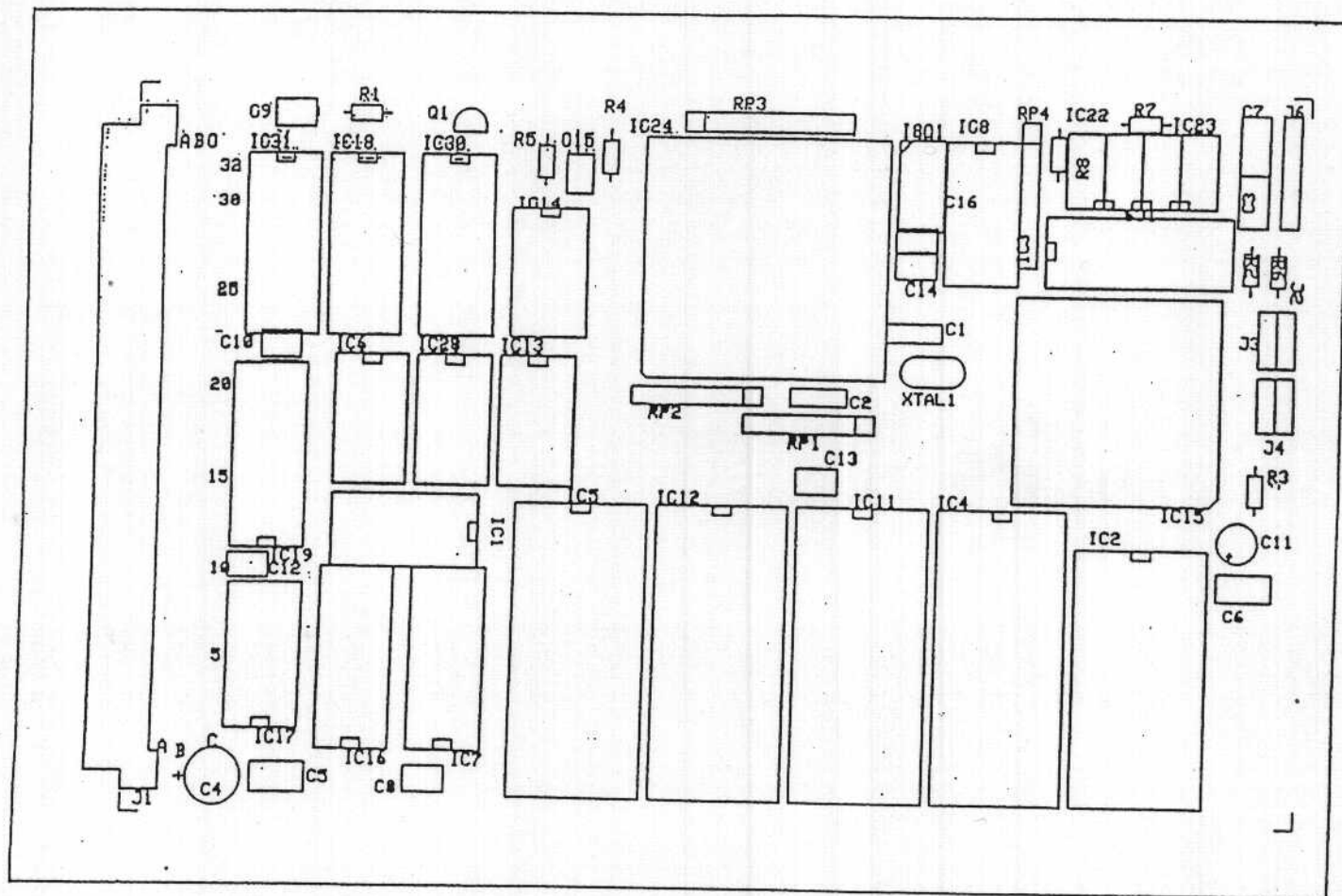
Seaeye Marine Ltd.  
Seaeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**  
VIDOLP (6037P) VIDEO OVERLAY PCB  
COMPONENT LAYOUT  
SHEET 2 OF 2

|                   |          |                 |
|-------------------|----------|-----------------|
| DRAWN<br>D. Waite | APPROVED | DATE<br>31/1/03 |
| DWG.No. S03025    |          | Rev. Shd<br>22  |



| ISS | DESCRIPTION               | CHECKED | DATE    | REF | <div>Seaeeye</div> | Seaeeye Marine Ltd.<br>Seaeeye House<br>Lower Quay Road<br>Fareham<br>Hampshire<br>PO16 0RQ<br>England<br>Tel: +44 (0)1329 289000 | TITLE<br>SBC68P (6038P) VIDEO PROCESSOR PCB<br><br>CIRCUIT DIAGRAM<br><br>SHEET 1 OF 2 | DRAWN<br>D. Waite | APPROVED | DATE<br>30/1/03 | Rev. Sht. |
|-----|---------------------------|---------|---------|-----|--------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------|----------|-----------------|-----------|
|     |                           |         |         |     |                    |                                                                                                                                   |                                                                                        |                   |          |                 |           |
|     |                           |         |         |     |                    |                                                                                                                                   |                                                                                        |                   |          |                 |           |
|     |                           |         |         |     |                    |                                                                                                                                   |                                                                                        |                   |          |                 |           |
| 1   | First Issue as CI drawing |         | 30/1/03 | N/A |                    |                                                                                                                                   |                                                                                        |                   |          | DWG.No. S03026  | 11        |



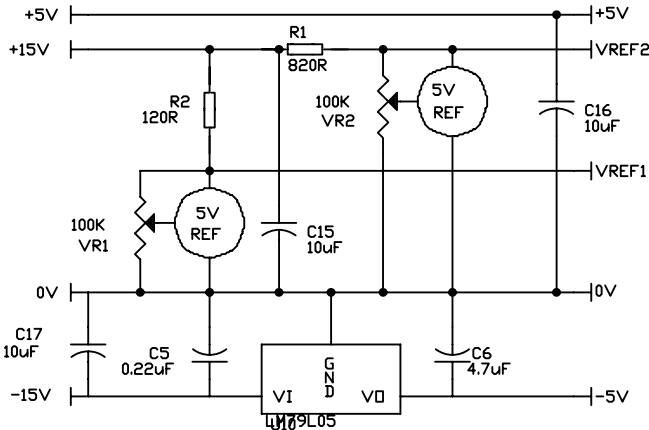
| ISS | DESCRIPTION               | CHECKED | DATE    | REF |
|-----|---------------------------|---------|---------|-----|
| 1   | First Issue as CI drawing |         | 31/1/03 | N/A |

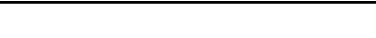
**Seaye**

Seaye Marine Ltd.  
Seaye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**  
SBC68P (6038P) VIDEO PROVESSOR PCB  
COMPONENT LAYOUT  
SHEET 2 OF 2

| DRAWN          | APPROVED | DATE    |
|----------------|----------|---------|
| D. Waite       |          | 31/1/03 |
| DWG.No. S03026 |          | 12      |

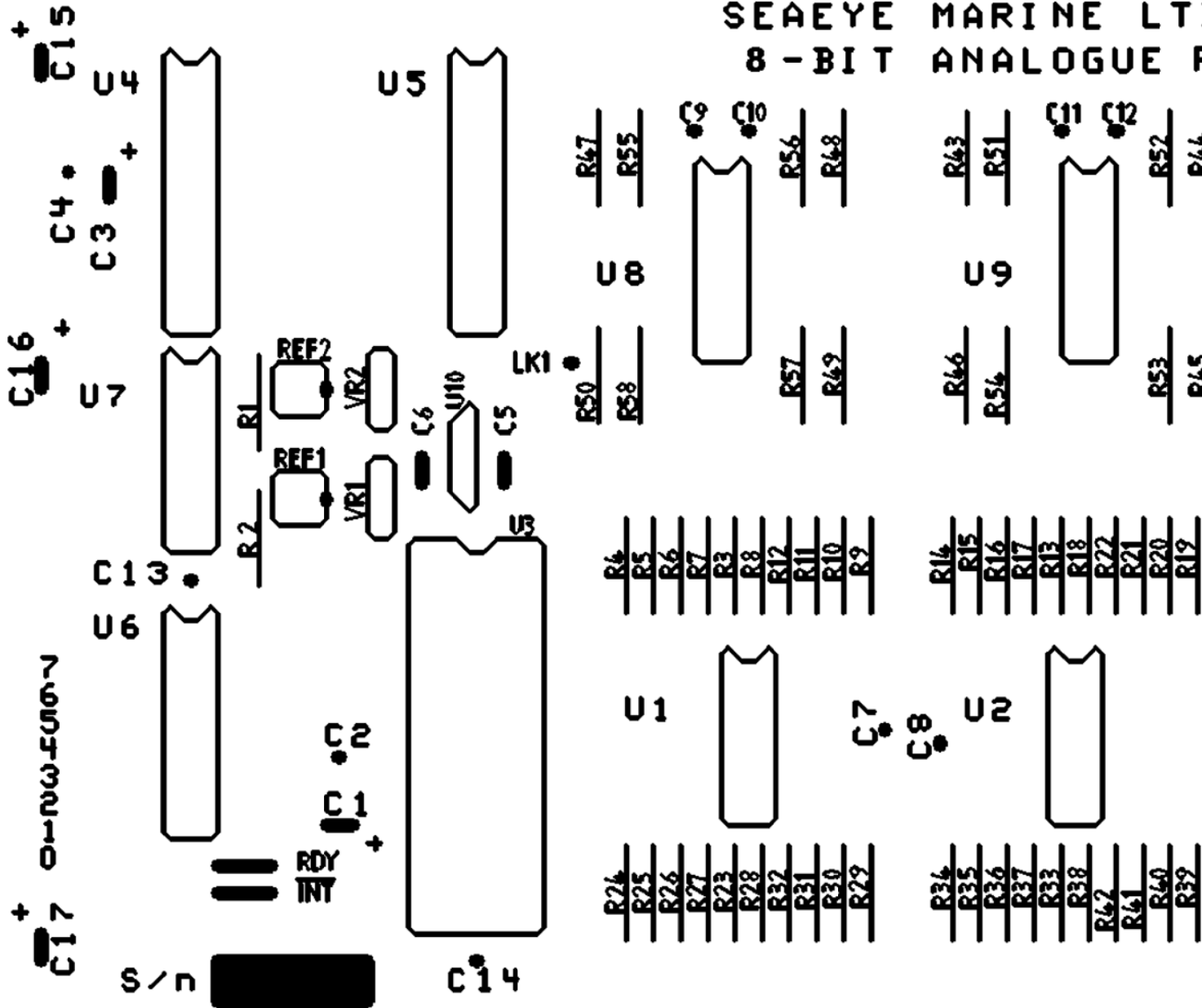


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|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------|----------|-----------------|------|------|
|  | Seaye Marine Ltd.<br>Seaye House<br>Lower Quay Road<br>Fareham<br>Hampshire<br>PO16 0RQ<br>England<br>Tel: +44 (0)1329 289000 | TITLE<br>6040P 8 BIT ANALOGUE I/O PCB<br><br>CIRCUIT DIAGRAM<br><br>SHEET 1 OF 2 | DRAWN<br>D. Waite | APPROVED | DATE<br>28/1/03 | Rev. | Sht. |
|                                                                                      |                                                                                                                               |                                                                                  | DWG.No. S03027    |          |                 | 1    | 1    |

# SEA EYE MARINE LTD 8 - BIT ANALOGUE PCB 6040

PL 1

PL 2



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|-----|---------------------------|---------|---------|-----|
| 1   | First Issue as CI drawing |         | 31/1/03 | N/A |

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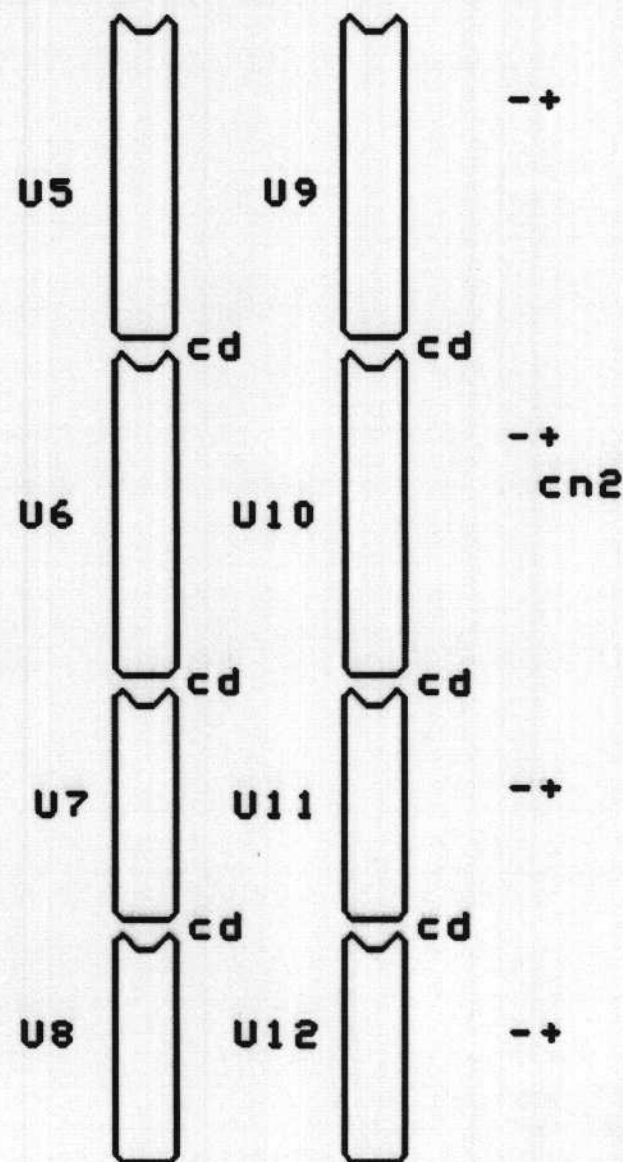
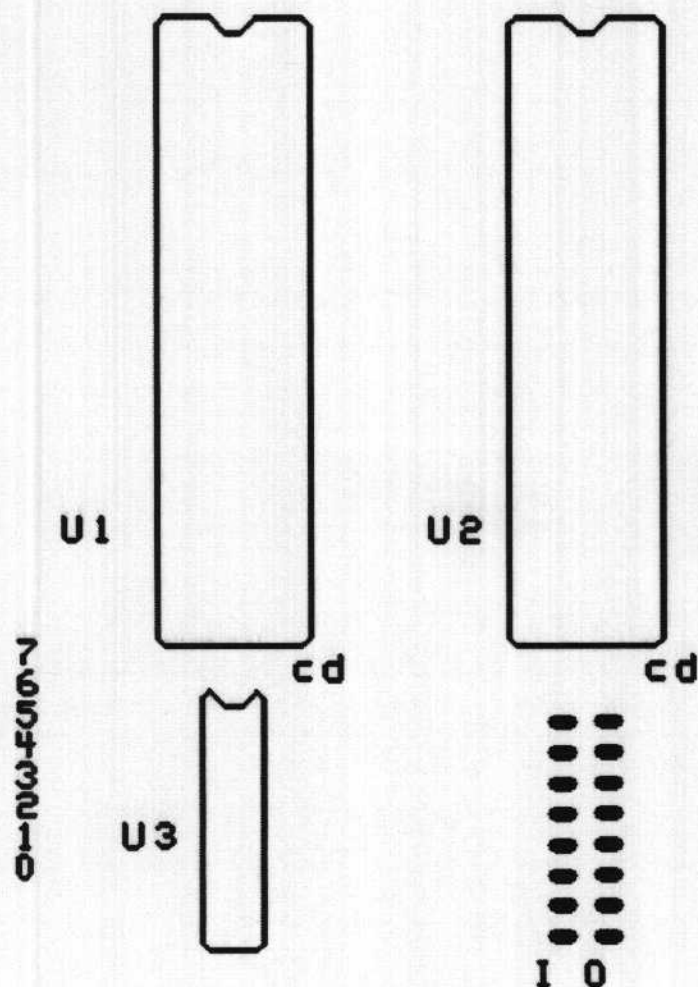
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TITLE  
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COMPONENT LAYOUT  
SHEET 2 OF 2

| DRAWN          | APPROVED | DATE    |
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| D. Waite       |          | 31/1/03 |
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cn1 SEAEYE MARINE LTD.  
DIGITAL I/O PCB 6041



S/N [REDACTED]

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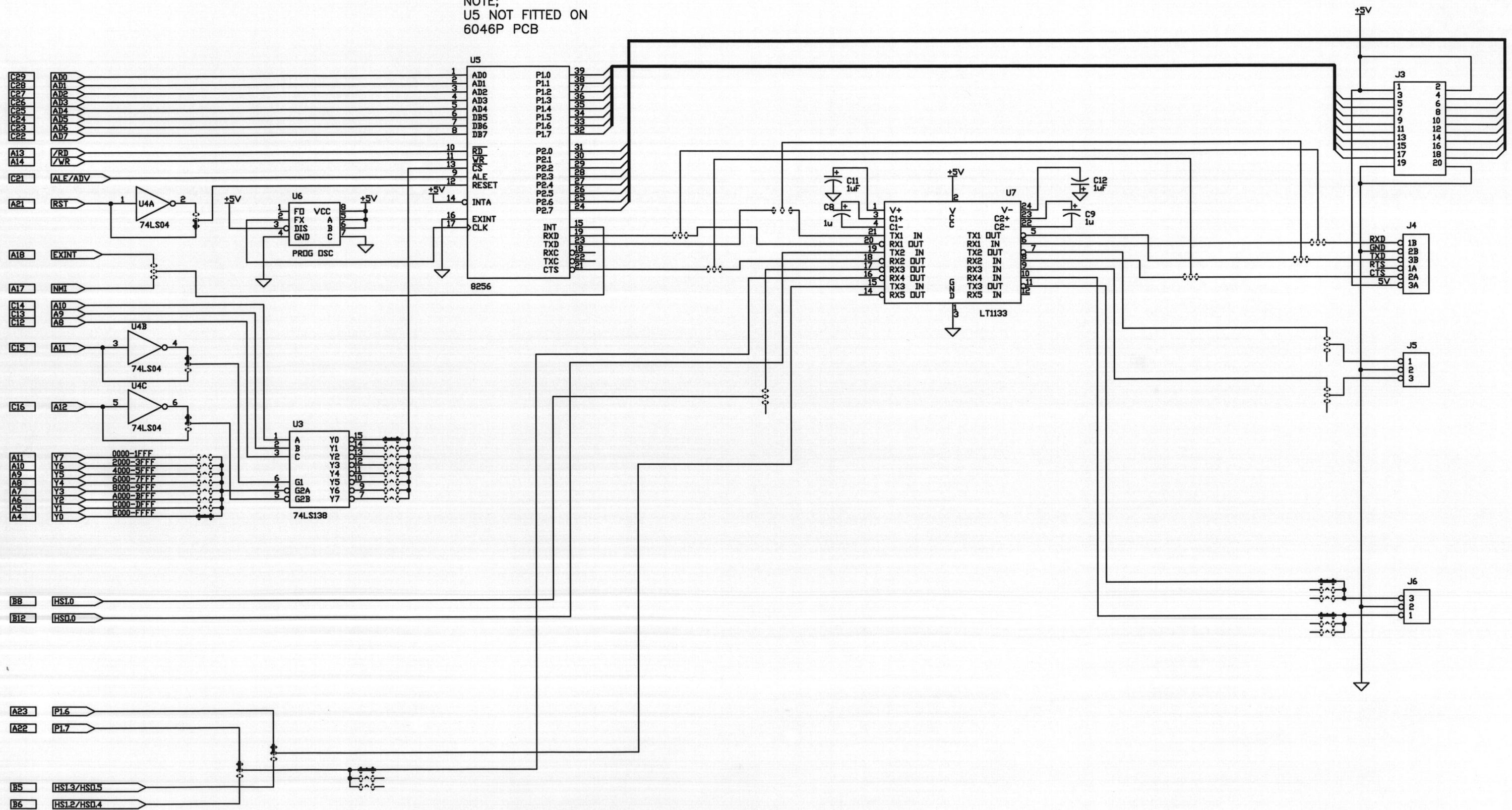
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COMPONENT LAYOUT  
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NOTE;  
U5 NOT FITTED ON  
6046P PCB



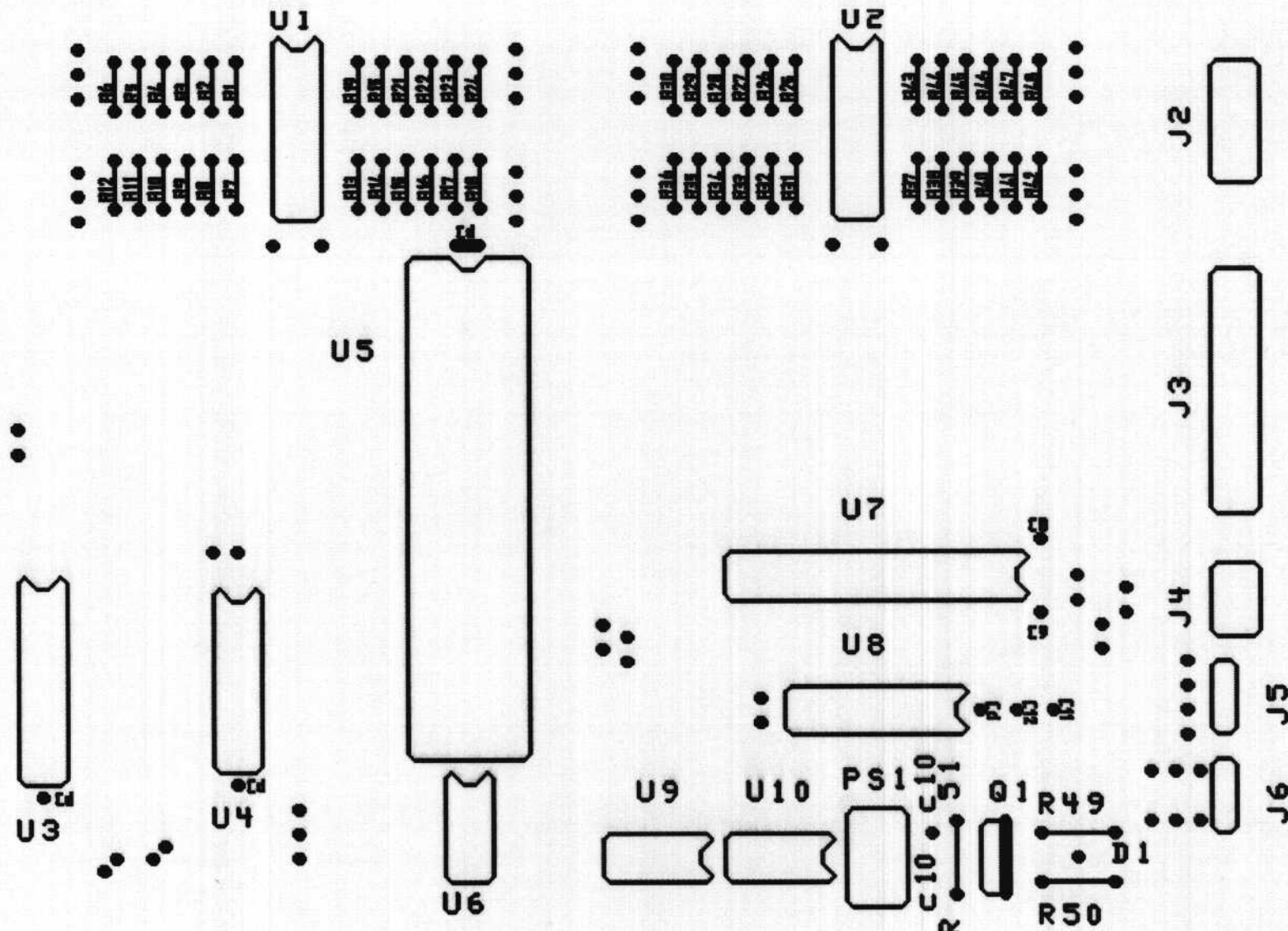
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**TITLE**  
6046P EXPANSION I/O PCB  
CIRCUIT DIAGRAM  
SHEET 1 OF 2

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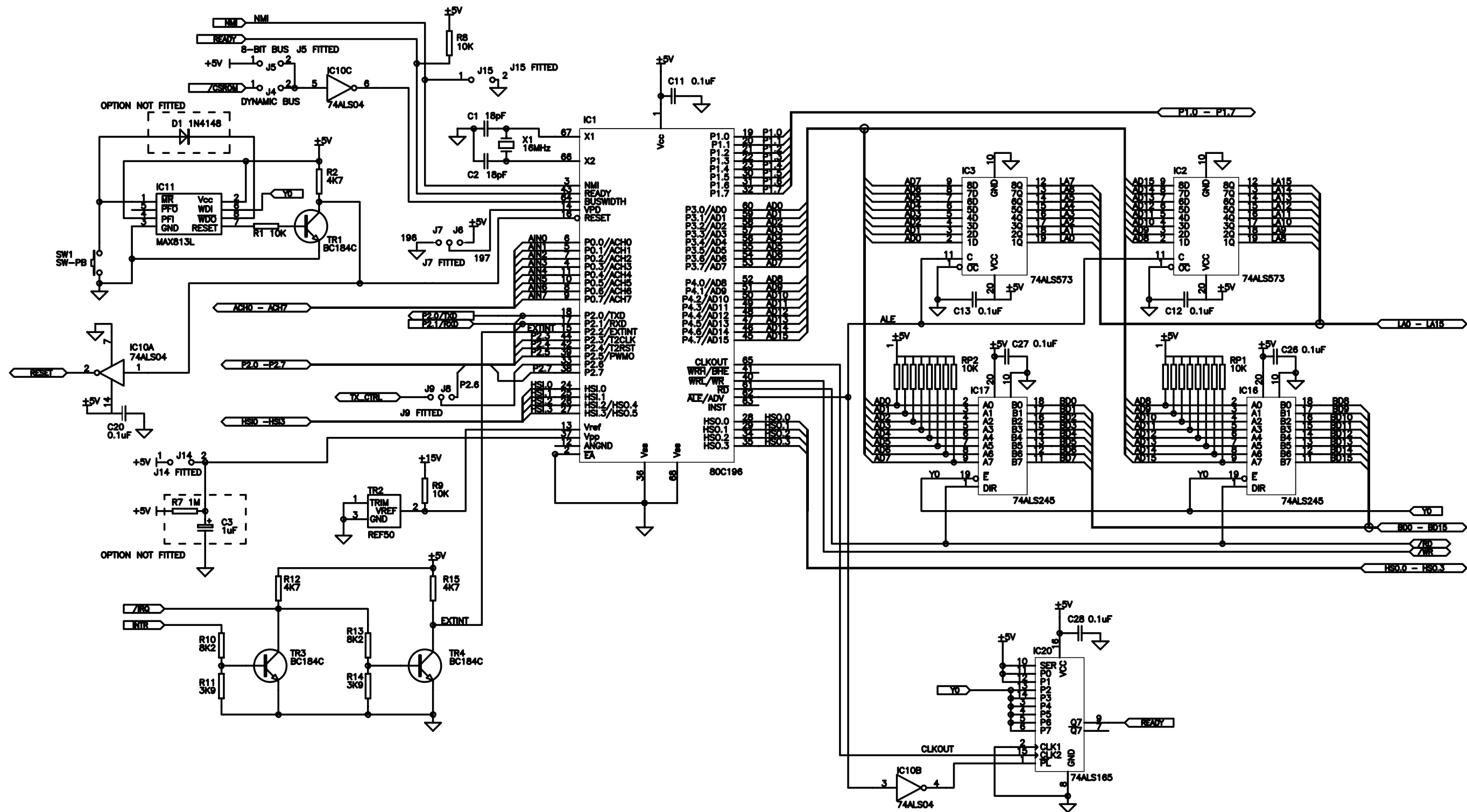
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**TITLE**  
6046P EXPANSION I/O PCB  
COMPONENT LAYOUT  
SHEET 2 OF 2

|                          |                                       |                        |
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| 2   | D1 boxed & shown not fitted |         | 28/10/05 | DCR883-DW |
| 1   | First Issue as CI drawing   |         | 29/1/03  | N/A       |

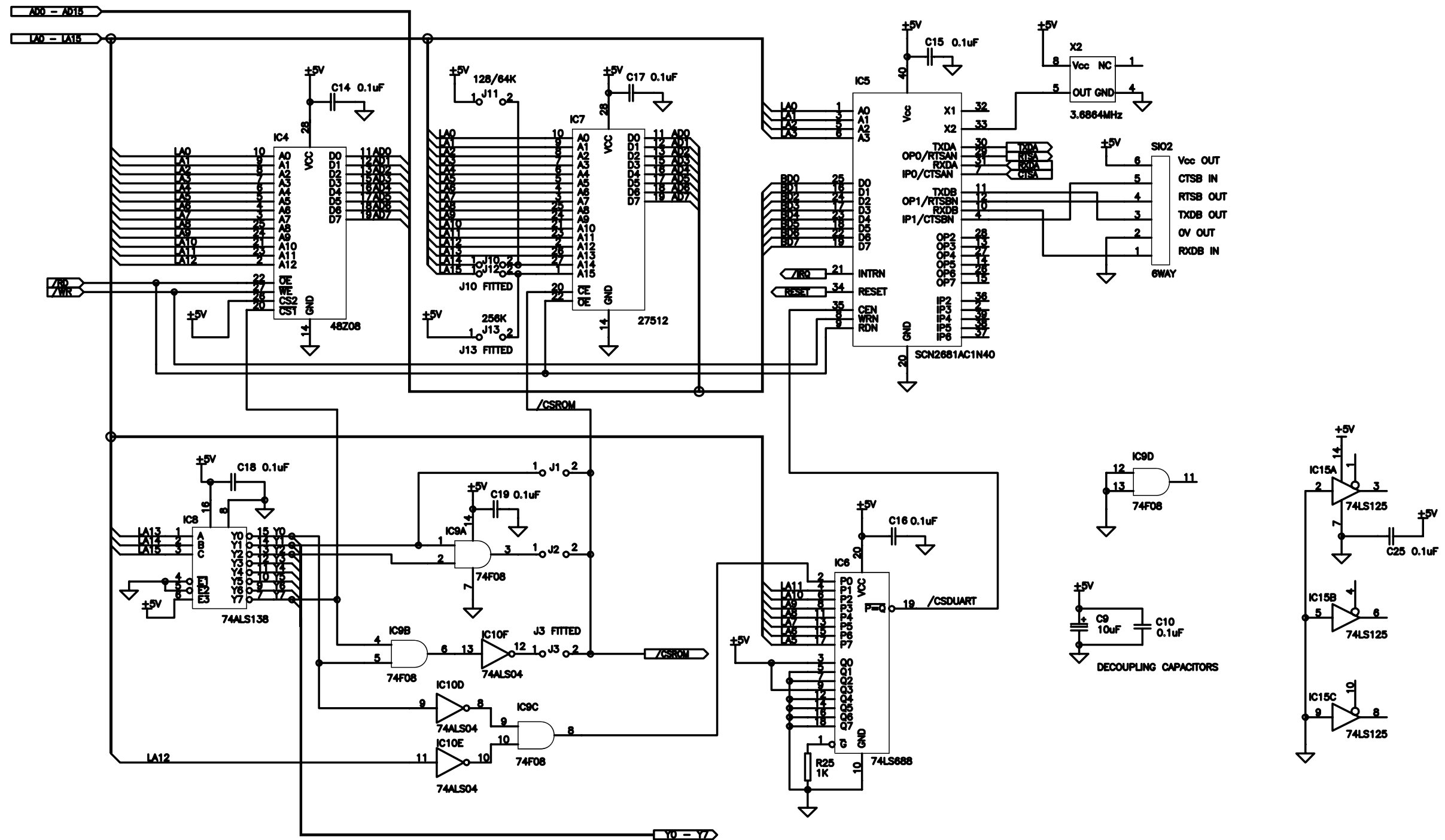
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TITLE

6047P CPU PCB WITH DUART  
CPU AND BI-DIRECTIONAL BUS CONTROL  
CIRCUIT DIAGRAM

SHEET 1 OF 4

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| 2   | Jumpers J10 & 15 shown 'FITTED' |         | 28/10/05 | DCR883-DW |
| 1   | First Issue                     |         | 29/1/03  | N/A       |

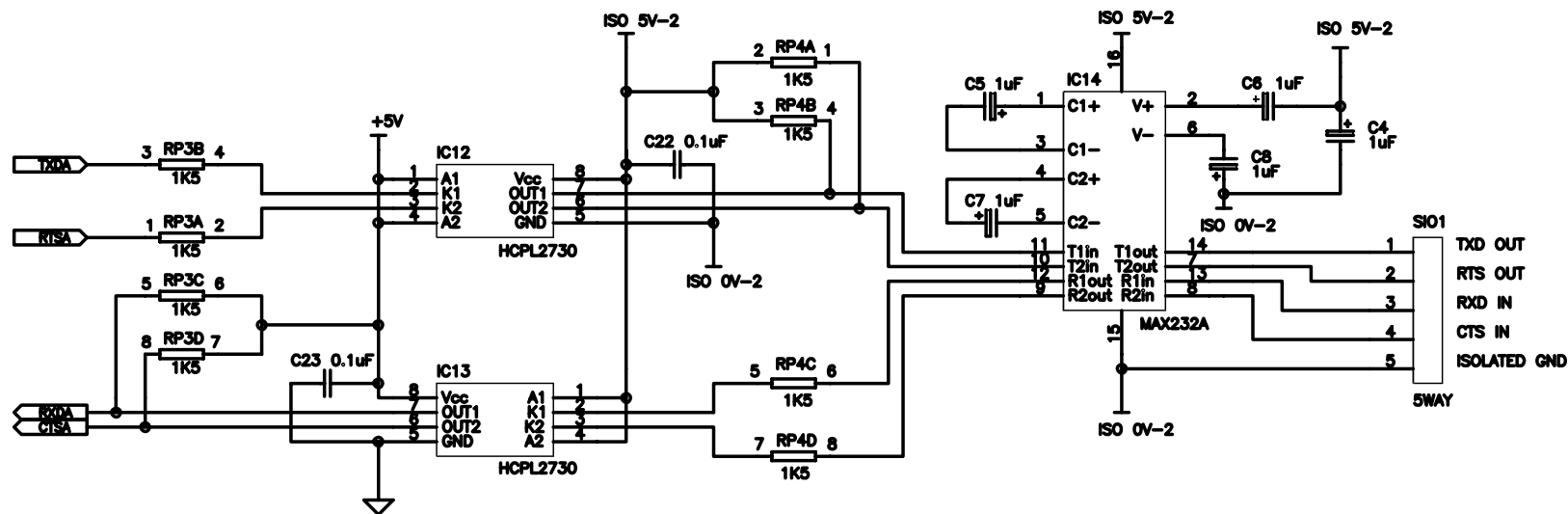
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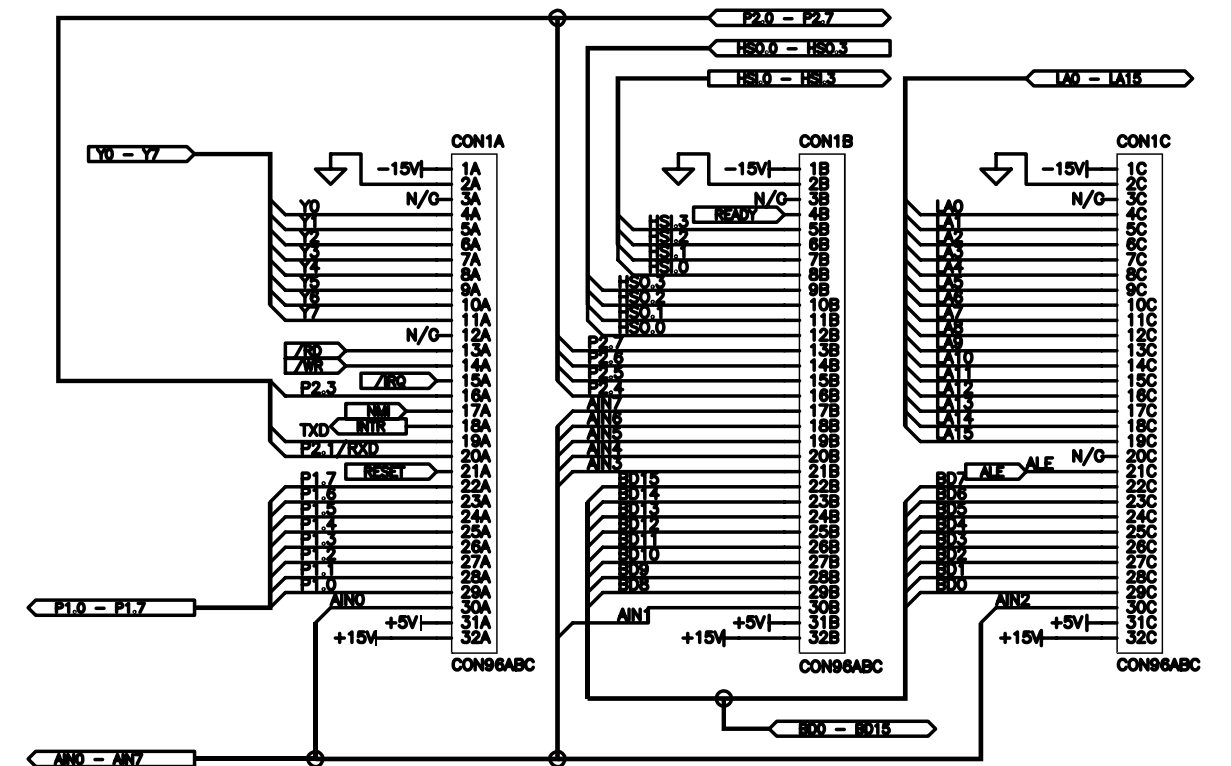
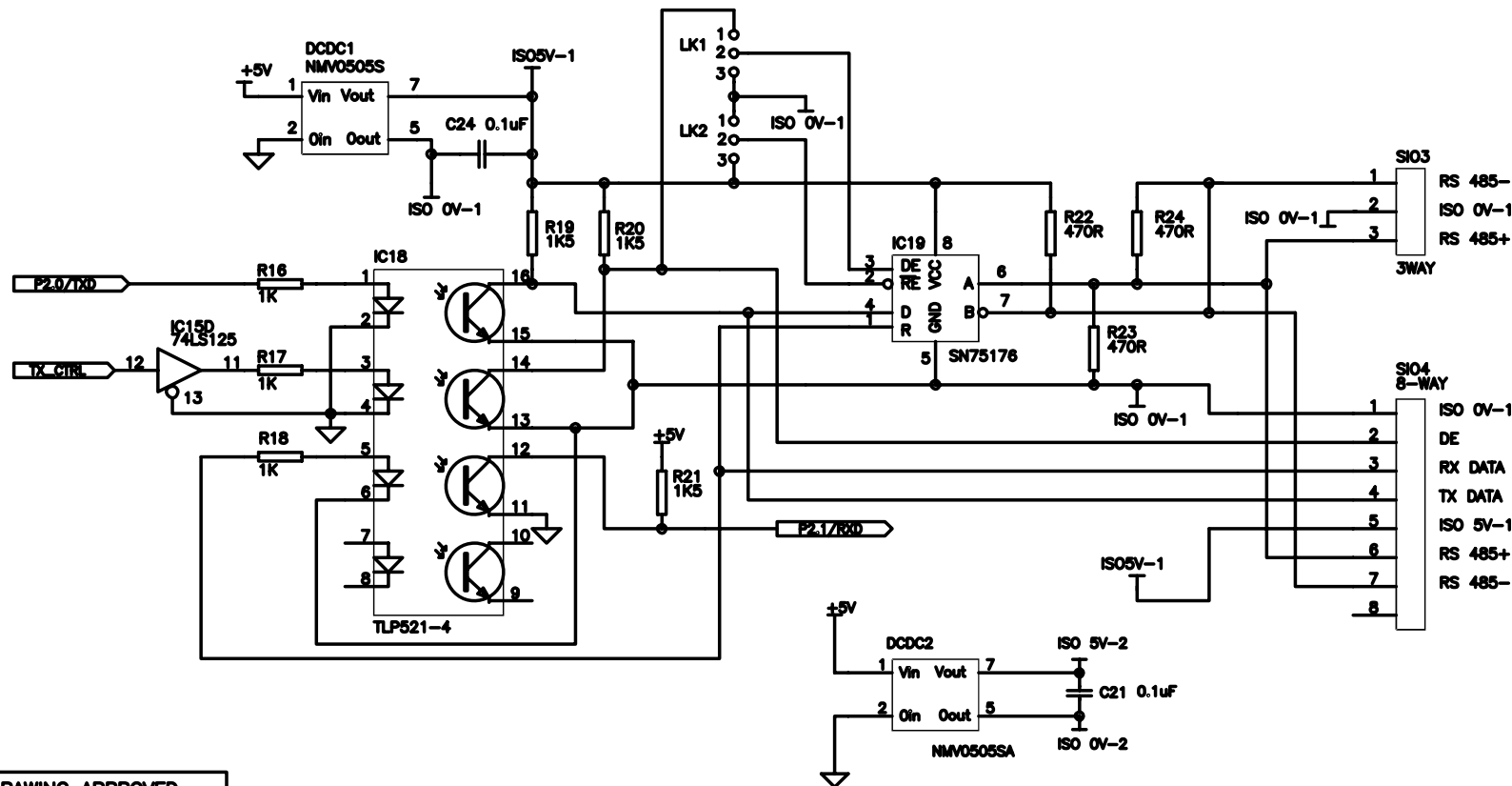
**TITLE**  
6047P CPU PCB WITH DUART  
MEMORY DUART AND ADDRESS DECODING  
CIRCUIT DIAGRAM

SHEET 2 OF 4

| DRAWN          | APPROVED | DATE    | Rev. | Sht. |
|----------------|----------|---------|------|------|
| D. Waite       | JMR      | 29/1/03 |      |      |
| DWG.No. S03031 |          |         |      | 22   |



LINK LK1 & LK2 DETAILS  
 1-2 INTERNAL RS-485 FITTED (DEFAULT)  
 2-3 EXTERNAL TTL



| JUMPERS |        |
|---------|--------|
| J1      |        |
| J2      |        |
| J3      | FITTED |
| J4      |        |
| J5      | FITTED |
| J6      |        |
| J7      | FITTED |
| J8      |        |
| J9      | FITTED |
| J10     | FITTED |
| J11     |        |
| J12     | FITTED |
| J13     | FITTED |
| J14     | FITTED |
| J15     | FITTED |

| LINK 1 |        |
|--------|--------|
| 1-2    | FITTED |
| 2-3    |        |

| LINK 2 |        |
|--------|--------|
| 1-2    | FITTED |
| 2-3    |        |

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| 2   | LK1 & LK2 links, Jumper & Link table added |         | 28/10/05 | DCR883-DW |
| 1   | First Issue                                |         | 29/1/03  | N/A       |

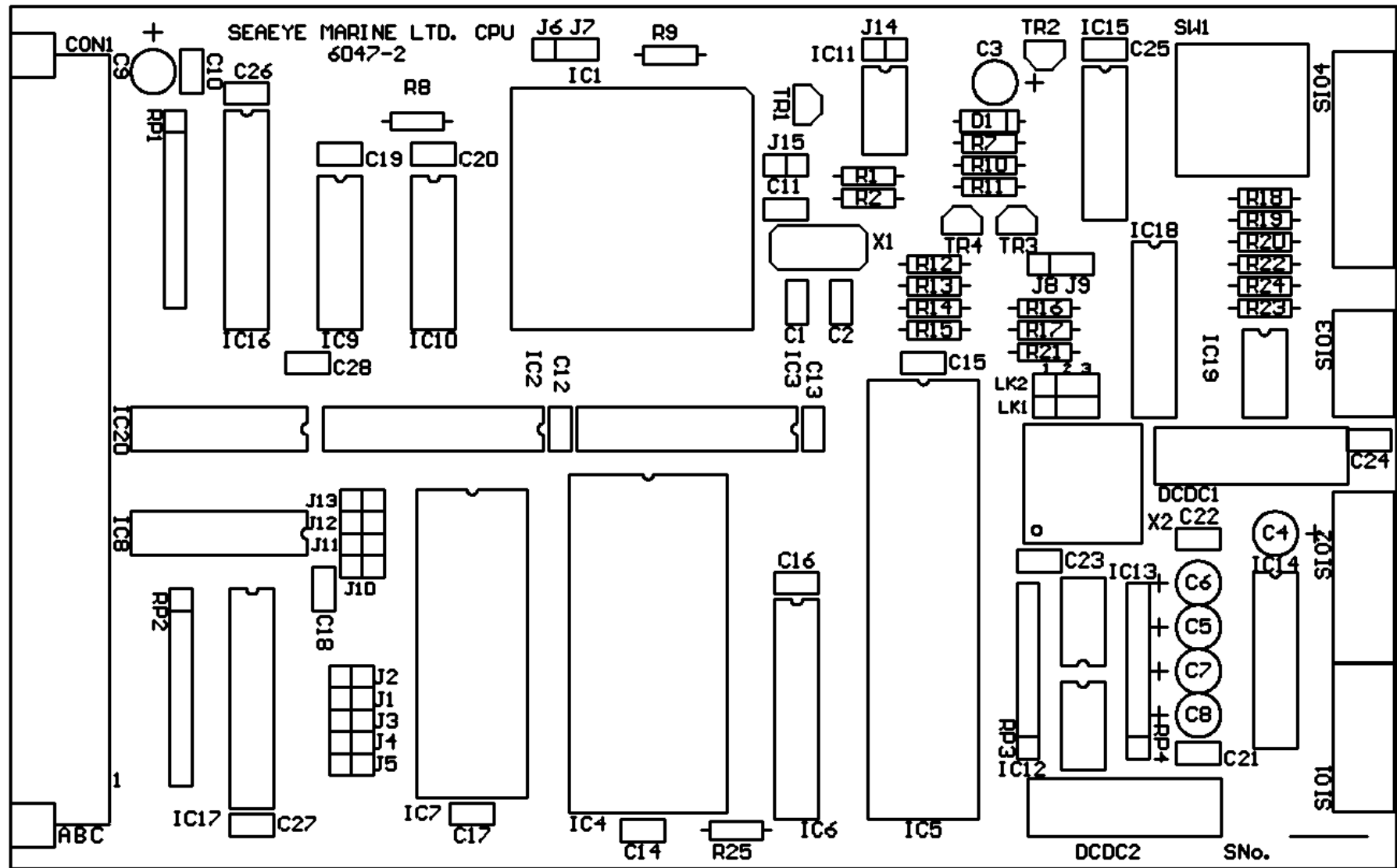
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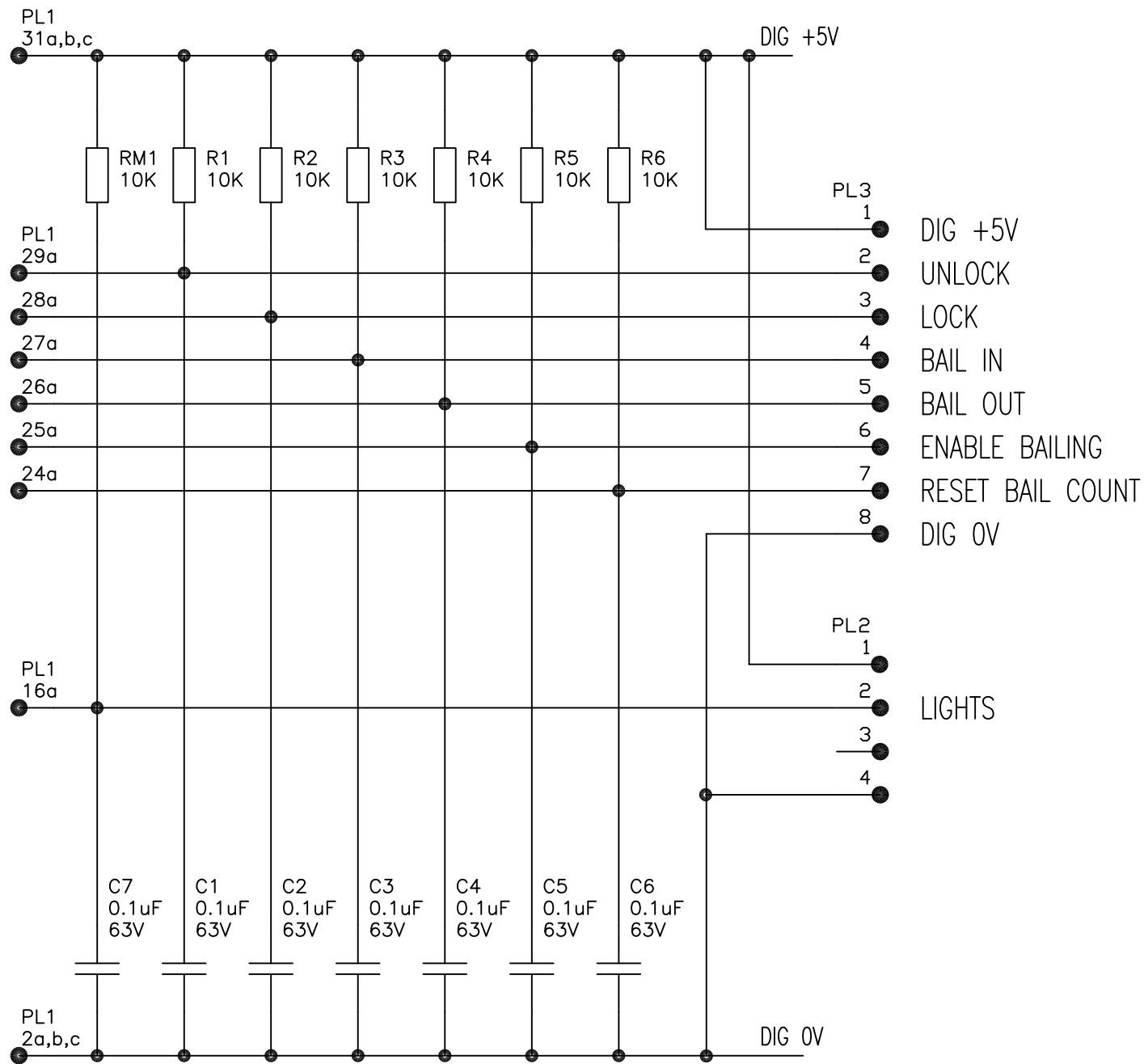
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TITLE  
6047P CPU PCB WITH DUART  
BUS CONNECTOR AND COMMUNICATONS  
CIRCUIT DIAGRAM

SHEET 3 OF 4

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| 3   | LIGHTS INPUT VIA PL2 ADDED |      | 21/09/99  | ECR0350/CGP |
| 2   | FUNCTIONS ADDED TO PL3     |      | 15.SEP.97 | ECR226/ESS  |
| 1   | FIRST ISSUE                |      | 8.AUG.97  |             |

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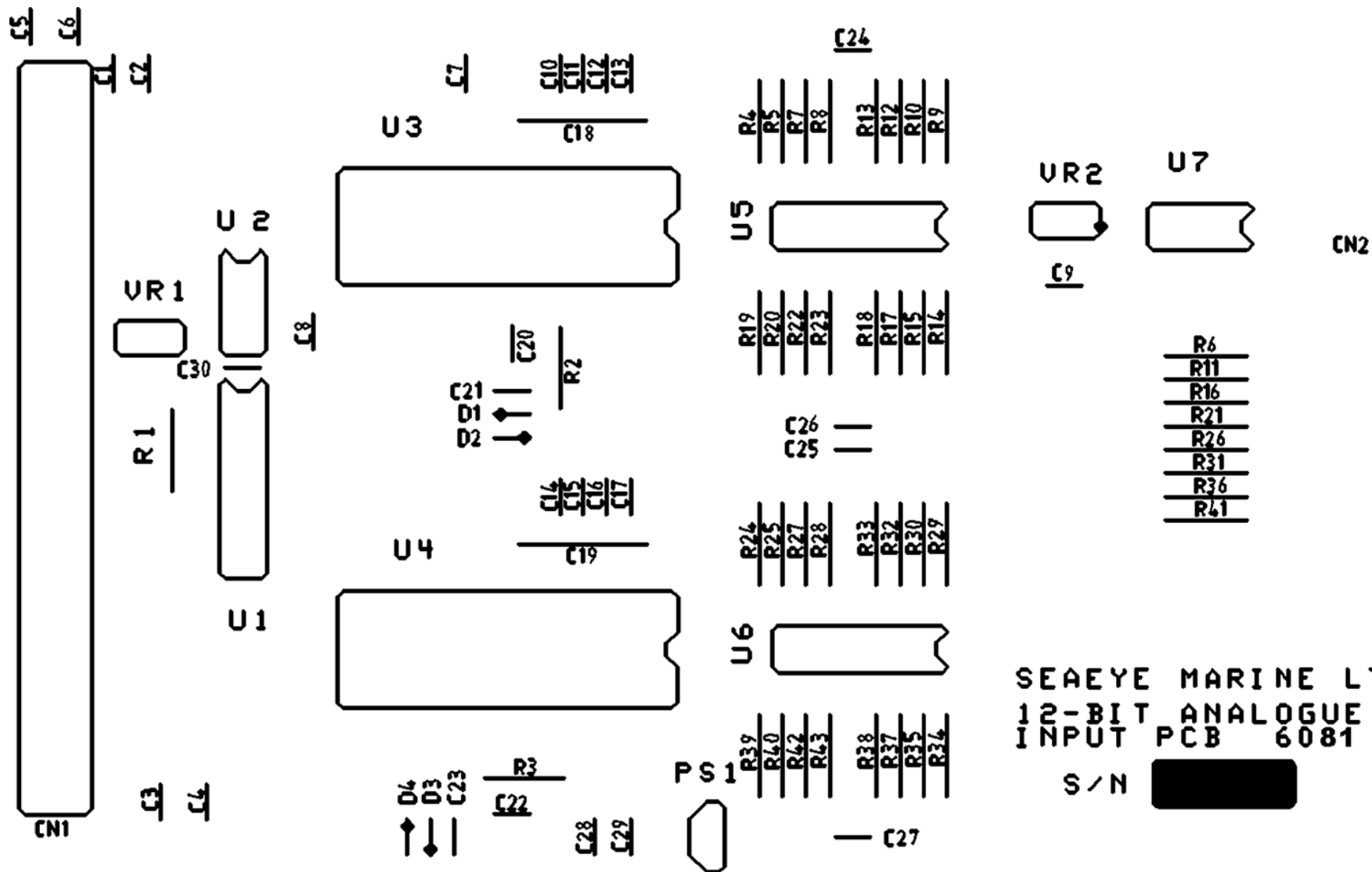
TITLE  
6052AP  
TMS SWITCH ADAPTOR PCB

SHEET 1 OF 1

|              |                 |                  |
|--------------|-----------------|------------------|
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DWG.No. S00500





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12-BIT ANALOGUE  
INPUT PCB 6081  
S/N [REDACTED]

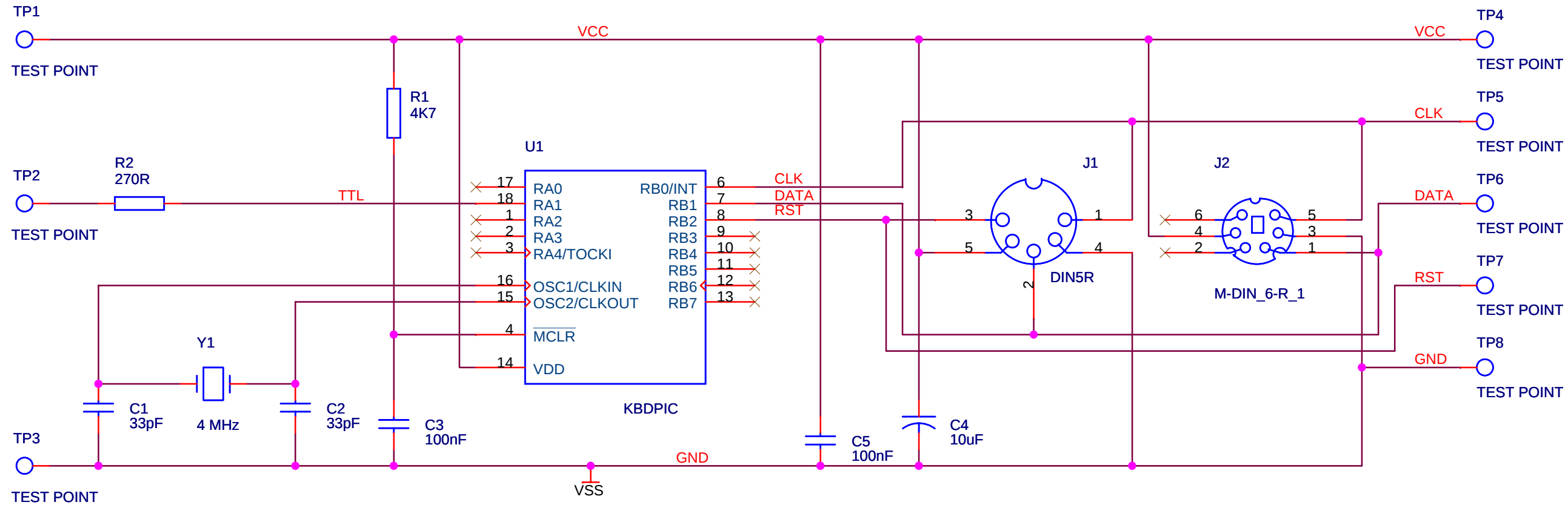
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**TITLE**  
6081P 8 CHANNEL 12 BIT A/D PCB  
WITH LIGHTS2 FUNCTION  
COMPONENT LAYOUT  
SHEET 2 OF 2

|                   |          |                 |
|-------------------|----------|-----------------|
| DRAWN<br>D. Waite | APPROVED | DATE<br>31/1/03 |
| DWG.No. S03034    |          | Rev/Shr<br>1/2  |



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Lower Quay Road  
Fareham  
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England  
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**TITLE**

6099P IBM KEYBOARD  
ADAPTOR  
CIRCUIT DIAGRAM

<Variant Name>

SHEET 1 of 1

DRAWN

C.G.PETTIT

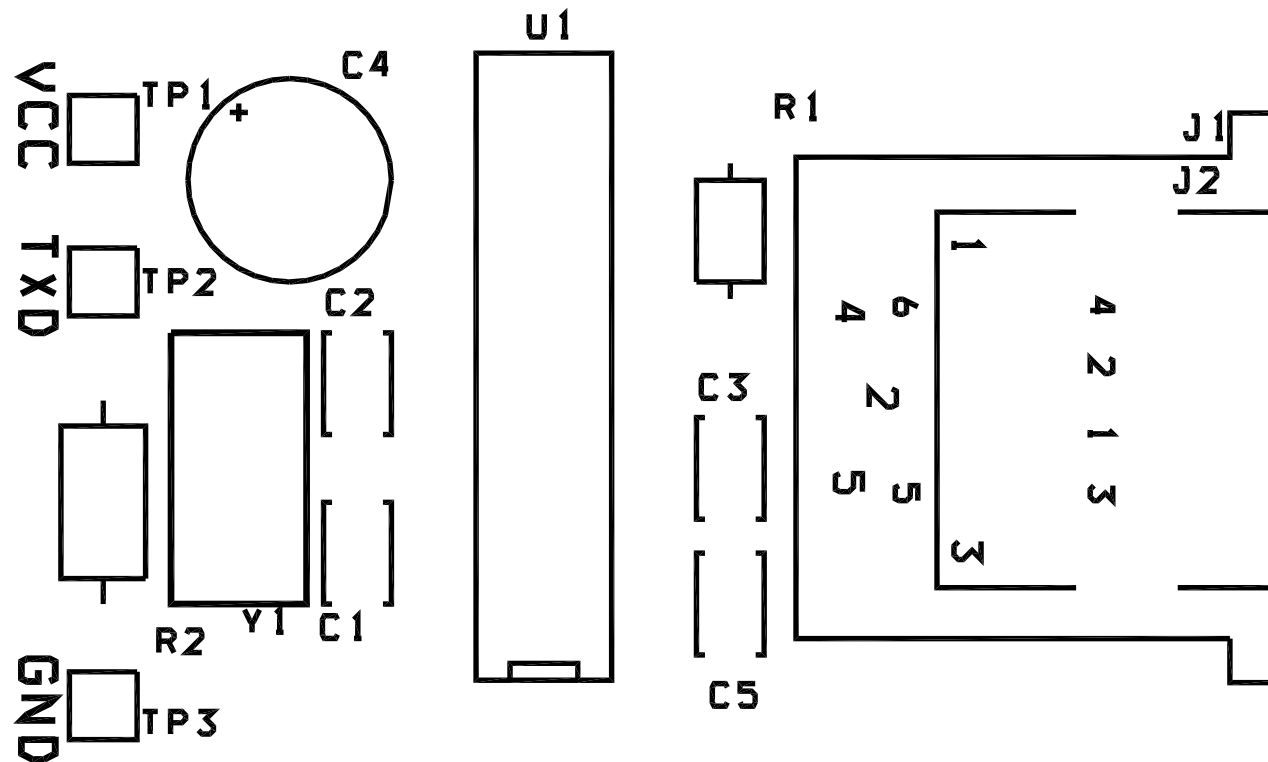
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TITLE  
IBM/AT KEYBOARD  
ADAPTOR  
COMPONENT LAYOUT DIAGRAM  
SHEET 1 OF 1

|                       |                 |                  |
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DWG.No. S02429 1 1

**6.11 EPOD PCBs**

| <b>PCB Drawings</b> |                                              |            |
|---------------------|----------------------------------------------|------------|
| <b>Drawing No</b>   | <b>Description</b>                           | <b>PCB</b> |
| S0302311            | Thruster Control Circuit Diagram             | 6034P      |
| S0302312            | Thruster Control Circuit Diagram             | 6034P      |
| S0302313            | Thruster Control Component Layout            | 6034P      |
| S0303111            | CPU Circuit Diagram                          | 6047P      |
| S0303112            | CPU Circuit Diagram                          | 6047P      |
| S0303113            | CPU Circuit Diagram                          | 6047P      |
| S0303114            | CPU Component Layout                         | 6047P      |
| ECBO32-1            | Light Fet Suppressor PCB Component Layout    | 6050P      |
| ECBO34              | Light Fet Suppressor PCB Circuit Diagram     | 6050P      |
| S0004112            | PSU/Stabiliser Component Layout              | 6051AP     |
| S0004161            | PSU/Stabiliser Circuit Diagram               | 6051AP     |
| S0000131            | Aux Switch/Manip Circuit Diagram Sht. 1 of 5 | 6055P      |
| S0000132            | Aux Switch/Manip Circuit Diagram Sht. 2 of 5 | 6055P      |
| S0000143            | Aux Switch/Manip Circuit Diagram Sht. 3 of 5 | 6055P      |
| S0000114            | Aux Switch/Manip Circuit Diagram Sht. 4 of 5 | 6055P      |
| S0000115            | Aux Switch/Manip Circuit Diagram Sht. 5 of 5 | 6055P      |
| S0146711            | Fuse & Filter Component Layout               | 6056P      |
| S0007251            | Fuse & Filter Circuit Diagram                | 6056P      |
| S0014521            | Tilt Integration Component Layout            | 6058P      |
| S0014821            | Tilt Integration Circuit Diagram             | 6058P      |
| S0303311            | MFIO Circuit Diagram                         | 6059P      |
| S0303312            | MFIO Circuit Diagram                         | 6059P      |
| S0303313            | MFIO Circuit Diagram                         | 6059P      |
| S0303314            | MFIO Component Layout                        | 6059P      |
| S0051531            | Leak Detector Circuit Diagram                | 6068P      |
| S0253011            | Leak Detector Component Layout               | 6068P      |
| S0061631            | Video Line Driver PCB                        | 6071AP     |

**Table. 6.12 Vehicle EPOD PCB Drawings**

| PCB Drawings |                           |       |
|--------------|---------------------------|-------|
| S0155311     | CP Relay Component Layout | 6082P |
| S0155211     | CP Relay Circuit Diagram  | 6082P |

**Table. 6.12 Vehicle EPOD PCB Drawings (Continued)**

## 6.12 Thruster Control PCB (Part No. 6034P)

### 6.12.1 Function

The Thruster Control PCB provides the electronics power supply, speed and direction controls for up to four thruster motors.

### 6.12.2 Technical Description

The outputs are isolated from the control electronics to prevent a fault on the load affecting the rest of the system.

- **Speed** - Two counter/timer IC's each produce a TTL pulse width modulated (50Hz) signal for two thrusters. The signal is amplified and converted from TTL to +12 V (10-12V) for output to the thrusters. The speed is referenced to the 0 Volt direction line. Fuses protect against excess load on each speed output and a zener diode connected across the signals output provides over-voltage protection.
- **Direction** - Thruster direction is controlled by two digital bits per thruster. The four pairs of bits are simultaneously latched and used by a direction control circuit to produce TTL signal outputs. The outputs are used by a differential driver circuit to provide the required thruster direction as follows:
  - DIR+ High & DIR- Low give clockwise direction.
  - DIR+ Low & DIR- High give anticlockwise direction.

The direction voltage range is 21-24 VDC.

Fuses protect each direction output and a zener diode provides over-voltage protection.

### 6.12.3 Fuses

Direction and speed fuses F1 to F12 – wire ended 250 mA.

24 VDC input supply fuse, F13 – wire ended 1.5 A.

### 6.12.4 Link Settings

The PCB has links, which are adjusted according to the type of system fitted Link settings can be found in the electronic pod descriptions found in this handbook.

| Function       | Pin No |
|----------------|--------|
| Inputs         |        |
| +24 VDC supply | TB5-1  |
| 0 VDC          | TB5-2  |

**Table. 6.13 PCB 6034P Inputs and Outputs**

| Function  |       | Pin No |
|-----------|-------|--------|
| Outputs   |       |        |
| Channel 1 | Speed | TB1-3  |
|           | DIR+  | TB1-2  |
|           | DIR-  | TB1-1  |
| Channel 2 | Speed | TB2-3  |
|           | DIR+  | TB2-2  |
|           | DIR-  | TB2-1  |
| Channel 3 | Speed | TB3-3  |
|           | DIR+  | TB3-2  |
|           | DIR-  | TB3-1  |
| Channel 4 | Speed | TB4-3  |
|           | DIR+  | TB4-2  |
|           | DIR-  | TB4-1  |

**Table. 6.13 PCB 6034P Inputs and Outputs (Continued)**

## 6.13 CPU PCB (Part No. 6047P)

### 6.13.1 Function

The CPU PCB is firmware driven and controls, communicates and processes system data.

### 6.13.2 Technical Description

The CPU PCB is based on a 16-bit Intel microcontroller. In conjunction with the non-volatile RAM and the isolated RS485 serial port, this PCB meets the processing and communication requirements of the Seaeye systems. The program and operating system for the CPU are specific to the installed system and contained on the EPROM mounted on the PCB.

### 6.13.3 Software Reset

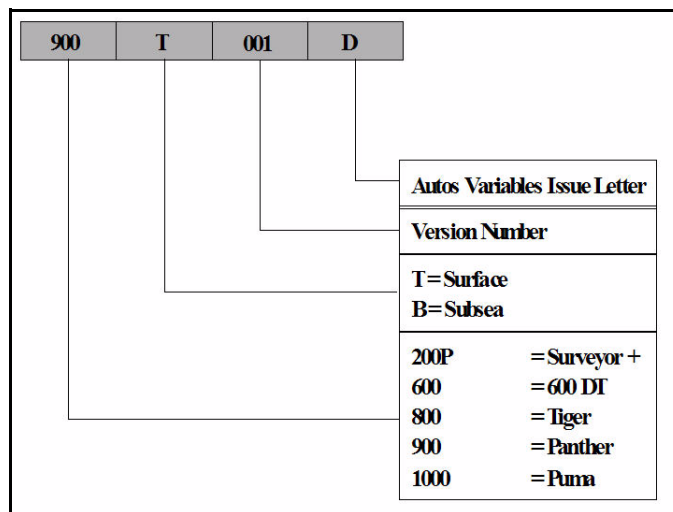
A red reset button located on the PCB, when operated, restarts the operational software.

| Function | Pin No         |
|----------|----------------|
| Inputs   |                |
| -15 VDC  | CN1-1a, b & c  |
| 0 VDC    | CN1-2a, b & c  |
| +5 VDC   | CN1-31a, b & c |

**Table. 6.14 PCB 6047P Inputs and Telemetry**

| Function         | Pin No         |
|------------------|----------------|
| +15 VDC          | CN1-32a, b & c |
| <b>Telemetry</b> |                |
| Telemetry A      | S103-1         |
| Telemetry B      | S103-2         |
| Common           | S103-3         |

**Table. 6.14 PCB 6047P Inputs and Telemetry (Continued)**



**Figure. 6.2 Software Identification**

## 6.14 Light FET Suppressor PCB (Part No. 6050P)

### 6.14.1 Function

The 6050P PCB provides the control for filament lamps using a HT DC supply to power the lamp and a signal to control the lamps intensity or on/off. A chassis mounted IGFET which is part of the controlling circuit is switched on and off by the control signal.

### 6.14.2 Technical Description

The rise and fall time of the signal applied to the PCB control input is slowed down by R1 and the intrinsic capacitance of the FET. R2 reduces the input impedance of the circuit to eliminate switching due to noise. Zener diodes protect the gate of the FET from back EMF produced by the lamps at switch off.

The FET has one or more lamps as its Drain load and is connected in series with the lamps across the HT DC supply input to act as a current switch. Capacitors C1 and C2 smooth any switching spikes generated by the switching of the load. Thermistor, TH1, reduces the initial current flow due to the cold resistance of the lamps at switch on.

| Function               | Pin No |
|------------------------|--------|
| <b>Inputs</b>          |        |
| HT DC +                | A1     |
| HT DC-                 | A5     |
| Control signal, DRIVE+ | A3     |
| Control signal, DRIVE- | A6     |
| <b>Outputs</b>         |        |
| LAMP+                  | A2     |
| LAMP-                  | A4     |

**Table. 6.15 PCB 6050P Inputs and Outputs**

## 6.15 Power Supply and Heading Stabiliser PCB (Part No. 6051AP)

### 6.15.1 Function

The 6051AP PCB provides five independent power supply circuits, one solid rate sensor circuit and two under/over voltage protection circuits.

### 6.15.2 Technical Description

#### PSU

Each power supply channel accepts a 25 VAC input, which is rectified by a bridge rectifier to produce a DC voltage. Connected across the DC output of the bridge rectifier is a capacitor, which is mounted off board. The capacitor connects between CAP and 0 V and smoothes the DC voltage that is then fed to the input of a variable voltage regulator. The output voltage of the regulator is set by means of links on the PCB. A fuse in the supply output provides load-overcurrent protection.

#### Heading Stabiliser

This circuit measures the rate and direction of rotation of the PCB. The axis of measurement runs parallel with the length of the PCB. The circuit produces a differential output signal corresponding to the rate and direction of the turning moment.

The rate of rotation is detected by a solid-state rate sensor (SSRS). The sensing element of the SSRS (a piezo-electric device) outputs a rate output signal and a reference signal. The two signals are converted into a single differential signal by an amplifier circuit. The signal output from the amplifier is a differential signal in the range of  $\pm 2.5\text{VDC}$  centred about a 2.5VDC offset.

### Under/Over Voltage Protection (Guard Circuits)

The two Under/Over Voltage protection circuits are identical in operation. Each contains a Power Supply Supervisory IC, a relay, two preset potentiometers and associated components. The relay interrupts the positive connection between the power input and output pins.

A DC input voltage supplied to the power input pins of the circuits is monitored by the Power Supply Supervisory IC. When the supply is within the limits defined by the preset potentiometers, the IC energises the relay connecting the positive power input and output pins. If the supply is out of limits then the connection is interrupted.

### Cooling Fan

A cooling fan mounted on the PCB heat sink provides cooling by blowing air across the heat sink.

#### 6.15.3 Link settings

The PSU links are factory set to provide an output of 24 VDC.

#### 6.15.4 Fuses

F1 to F5 are Radial Lead Micro TR5 fuses, rated at 2A.

| Function               |        | Pin No         |
|------------------------|--------|----------------|
| Inputs                 |        |                |
| Power supply circuit 1 | AC     | PL1 11a, b & c |
|                        | AC     | PL1 9a, b & c  |
| Power supply circuit 2 | AC     | PL1 16a, b & c |
|                        | AC     | PL1 14a, b & c |
| Power supply circuit 3 | AC     | PL1 21a, b & c |
|                        | AC     | PL1 19a, b & c |
| Power supply circuit 4 | AC     | PL1 26a, b & c |
|                        | AC     | PL1 24a, b & c |
| Power supply circuit 5 | AC     | PL1 32a, b & c |
|                        | AC     | PL1 30a, b & c |
| Guard circuit 1        | +24VDC | PL1 3a         |
|                        | 0V     | PL1 4a & 4b    |
| Guard circuit 2        | +24VDC | PL1 6a         |
|                        | 0V     | PL1 5a & 5b    |

**Table. 6.16 PCB 6051AP Inputs and Outputs**

| Function               |       | Pin No         |
|------------------------|-------|----------------|
| SSRS                   | +5VDC | PL1 1a         |
|                        | 0 V   | PL1 1b         |
| <b>Outputs</b>         |       |                |
| Power supply circuit 1 | 24VDC | PL1 8a, b & c  |
|                        | 0V    | PL1 7a, b & c  |
| Power supply circuit 2 | 24VDC | PL1 13a, b & c |
|                        | 0V    | PL1 12a, b & c |
| Power supply circuit 3 | 24VDC | PL1 18a, b & c |
|                        | 0V    | PL1 17a, b & c |
| Power supply circuit 4 | 24VDC | PL1 23a, b & c |
|                        | 0V    | PL1 22a, b & c |
| Power supply circuit 5 | 24VDC | PL1 29a, b & c |
|                        | 0V    | PL1 28a, b & c |
| Gyro SSRS signal       | A     | PL1 1c         |
| Gyro SSRS signal       | B     | PL1 2a         |

**Table. 6.16 PCB 6051AP Inputs and Outputs (Continued)**

## **6.16 Auxiliary Switch/Manip I/F PCB (Part No. 6055P)**

### **6.16.1 Function**

The 6055P PCB provides 8 solid state switched outputs under software control.

### **6.16.2 Technical Description**

The PCB contains two Output Driver ICs, eight opto-isolators and bus interface circuitry. The power requirements of the bus interface circuits are supplied from the backplane to which the PCB is connected. A CPU controls the state of each output via the backplane.

Each output can source or sink 1 Amp and is protected against the back-EMF of inductive loads by a zener diode and against overcurrent by a fuse.

The state of each output is indicated by an LED. Nominally, the supply to PL2 is 24 V. If the outputs are driving non-inductive loads, the supply may be in the range of 5 to 24 VDC, yielding corresponding output levels. If any of the loads are inductive, then either the supply must be 24 VDC or external back-EMF protection must be provided.

Loads may be connected between outputs, or between an output and the 0 V input of the supply to PL2.

| Function       | Pin No |
|----------------|--------|
| <b>Inputs</b>  |        |
| +24 DC         | PL2-1  |
| 0 VDC          | PL2-2  |
| <b>Outputs</b> |        |
| Channel 0      | PL3-1  |
| Channel 1      | PL3-2  |
| Channel 2      | PL3-3  |
| Channel 3      | PL3-4  |
| Channel 4      | PL3-5  |
| Channel 5      | PL3-6  |
| Channel 6      | PL3-7  |
| Channel 7      | PL3-8  |

**Table. 6.17 PCB 6055P Inputs and Outputs**

## 6.17 Fuse and Filter PCB (Part No. 6056P)

### **CAUTION.**

**Danger of damage to equipment.** PCB 6056P is not compatible with PCB 6008P.

### 6.17.1 Function

The Fuse and Filter PCB is responsible for protecting the vehicle's DC supply.

### 6.17.2 Technical Description

The PCB provides outputs for up to five loads. A fuse is fitted on the positive and negative of each channel. A short circuit causing a fuse to rupture on any one of the loads prevents the other channels being affected by the defect.

Capacitors and filter networks provide noise filtering and supply smoothing. A Tranzorb zener diode protects upstream circuits from high voltage spikes that may be generated by the loads.

### 6.17.3 Fuses

Fuses F1 to F5 – 20mm x 5mm T5A.

| Function            | Pin No             |
|---------------------|--------------------|
| <b>Inputs</b>       |                    |
| DC HT +             | 2a, 2c, 4a, 4c     |
| DC HT -             | 30a, 30c, 32a, 32c |
| <b>Outputs</b>      |                    |
| Channel 1 - DC HT + | 14a, 14c           |
| Channel 1 - DC HT - | 16a, 16c           |
| Channel 2 - DC HT + | 18a, 18c           |
| Channel 2 - DC HT - | 20a, 20c           |
| Channel 3 - DC HT + | 22a, 22c           |
| Channel 3 - DC HT - | 24a, 24c           |
| Channel 4 - DC HT + | 26a, 26c           |
| Channel 4 - DC HT - | 28a, 28c           |
| Channel 5 - DC HT + | 10a, 10c           |
| Channel 5 - DC HT - | 12a, 12c           |

**Table. 6.18 PCB 6056P Inputs and Outputs**

## 6.18 Tilt/Pan Integrator PCB (Part No. 6058P)

### 6.18.1 Function

The 6058P reduces electrical switching noise and contains a balanced L-C filter comprising two torroid inductors and a ceramic capacitor. The components integrate a pulse width modulated (PWM) input signal to produce a relatively smooth DC level output signal. The DC level output is proportional to the duty of the incoming PWM signal.

| Function       | Pin No |
|----------------|--------|
| <b>Inputs</b>  |        |
| Signal A, IN A | PL1-2  |
| Signal B, IN B | PL1-1  |
| <b>Outputs</b> |        |
| Signal A, OUT  | PL1-4  |
| Signal B, OUT  | PL1-3  |

**Table. 6.19 PCB 6058P Inputs and Outputs**

## 6.19 Soft Tilt Multifunction Input/Output PCB (Part No. 6059P)

### 6.19.1 Function

The Soft Tilt Multi-Function Input/Output (MFIO) PCB is responsible for interfacing input or output signals to/from the following equipments:

- Cathodic Potential (CP) Input.
- Depth Sensor (Pressure Input).
- Compass Input/Output.
- Stills Camera Trigger.
- Lights.
- Solid State Rate Sensor (SSRS) Input.
- Tilt Motor and Feedback.
- Video Channel Select.
- Spare ADC Channels.

The MFIO PCB provides functions as described in the following paragraphs.

- **Cathodic Potential (CP) Input (Applies to both proximity and contact type CP probes).** The CP voltage input from a CP Probe is in the range -1.5 VDC to +1.5 VDC. This voltage is fed via MFIO input pin J2-1A/B to an isolation amplifier, the output of which is processed by a dual op-amp to produce a corresponding voltage in the range 0-5 VDC. This voltage is fed to an ADC IC. The ADC is controlled by system software in the CPU PCB. When the ADC is polled, the CP voltage at its input is converted to a digital format and output to the data bus.
- **Depth Sensor (Pressure Input) (Model EAF Depth Sensors ONLY).** This input (J2-4 A/B) is an audio signal in the frequency range 1-6 KHz, derived from a pressure sensor. The frequency of the signal is proportional to the pressure at the sensor's pressure port, a 6 KHz tone representing the maximum pressure. The actual range of pressure depends on the sensor type. The signal is opto-coupled and fed into a counter/timer IC which, operating under software control, produces a digital output signal representative of the pressure. The pressure input is designed to be driven by an open collector-driving source and its pull-up is via the diode of the opto-coupler.
- **Compass Input/Output.** This input (J2-5 A/B) is a TTL serial signal derived from a compass unit. The signal is opto-coupled with a communications IC. This IC operates under control of the system software and, when interrupted, permits the compass serial data to be read onto the data bus. Data for transmission to the compass unit (calibration data, for example) is transmitted by this communications IC. When polled, this IC converts the parallel data from the databus to a TTL serial signal, which is output at connector J2-6A/B through an opto-coupler.
- **Stills Camera Trigger.** A relay under software control provides the momentary closure of a no-volt contact suitable for use by most still camera systems. The closure lasts one second and cannot be repeated for approximately 8 seconds, to allow time for the film to wind on and the strobe to recharge. Connections are via J3-1A and J3-1B.



- **Lights.** The lights output provides a PWM control signal suitable for the control of one channel of variable intensity lighting. This signal is a 2 KHz pulse-width modulated (PWM) signal in the voltage range -1.7 V to +11 V. Lamp intensity is derived from an 8-bit DAC IC, which converts digital lighting data on the data bus to an analogue signal output. This output is in the range 0-5 VDC that is converted to a variable duty-cycle PWM signal. The PWM signal is opto-isolated, converted to a level of -1.7 V to +11 V and output through pins J3-2A and J3-2B.
- **Solid State Rate Sensor (SSRS) Input.** The SSRS input comprises a balanced differential signal fed to two channels of an ADC via pins J3-4a and J3-5a. Pins J3-4b and J3-5b provide the signal return paths.
- **Tilt.** Tilt angle demand is presented on the system data bus. A DAC IC converts the digital information into an analogue voltage representing tilt angle demanded. This voltage and a feedback voltage signal produced by a tilt feedback potentiometer (a potentiometer mechanically linked to the tilt platform) are compared to produce the required output drive. When the voltage derived from the DAC (demand angle) matches the feedback voltage (platform angle), the output has low impedance and disables the drive to the tilt motor. The low impedance provides dynamic braking and stops the platform from "sagging" or "drifting on".

When the demand angle is much greater or much less than the tilt angle (DAC voltage much greater than or much less than feedback voltage), the outputs are  $\pm 22$  VDC with respect to each other to drive the tilt motor in the required direction. If the difference between demand and actual angle is small, however, these outputs are pulse-width modulated at a frequency of 8 to 10 KHz to produce smooth acceleration and deceleration of the tilt system. The duty of the PWM is proportional to the error between the demand and actual angle. When the motor stalls, the sudden increase in motor current trips the drive circuit disabling the output to the tilt motor.

- **Video Channel Select.** The Video channel select circuit comprises three coaxial SMB connectors designated (VIDEO1, VIDEO2 and VIDEO3) and a double pole changeover relay under software control. The relay contacts are isolated from all other circuits on the PCB and provide a means of selecting one of two video signals. The two video signals are connected to VIDEO1 (NC contact) and VIDEO2 (NO contact). The selected output appears at VIDEO3 (Pole).

### 6.19.2 Spare ADC Channels

Three 12-bit ADC channels are available on the MFIO PCB edge connector J2-2 pins A and B, and J2-3 pin B.

| Function | Pin No     |
|----------|------------|
| Inputs   |            |
| -15 VDC  | J1-1a & b  |
| 0 VDC    | J1- 2a & c |
| +5 VDC   | J1-31a & c |

**Table. 6.20 PCB 6059P Inputs and Outputs**



| Function                          | Pin No     |
|-----------------------------------|------------|
| +15 VDC                           | J1-32a & c |
| CP Probe                          | J2-A1      |
| CP Probe Ref.                     | J2-A2      |
| Pressure Signal                   | J2-A4      |
| Pressure signal Gnd.              | J2-A4      |
| Compass Signal                    | J2-A5      |
| Compass Gnd.                      | J2-B5      |
| Stills Trigger                    | J3-A1      |
| Gyro A Signal                     | J3-A4      |
| Gyro A Signal Gnd.                | J3-B4      |
| Gyro B Signal                     | J3-A5      |
| Gyro B signal Gnd.                | J3-B5      |
| Tilt Feedback Signal              | J4-A3      |
| Pan Feedback Signal               | J4-b3      |
| 24 VDC Pan/Tilt Power Supply      | J4-A6      |
| 24 VDC Pan/Tilt Power Return      | J4-B6      |
| Outputs                           |            |
| Compass Signal                    | J2-A6      |
| Compass Gnd.                      | J2-B6      |
| Stills Trigger                    | J3-B1      |
| Lights Control Signal             | J3-A2      |
| Lights Control Gnd.               | J3-B2      |
| Sonar Power Control Signal        | J3-A3      |
| Sonar Power Control Signal Return | J3-B3      |
| Tilt Motor Power A                | J4-A1      |
| Tilt Motor Power B                | J4-B1      |
| Pan Motor Power A                 | J4-A2      |
| Pan Motor Power B                 | J4-B2      |
| Tilt Feedback Power               | J4-A4      |

**Table. 6.20 PCB 6059P Inputs and Outputs (Continued)**

| Function                             | Pin No  |
|--------------------------------------|---------|
| Tilt Feedback Power Gnd.             | J4-B4   |
| Pan Feedback Power                   | J4-A5   |
| Pan Feedback Power Gnd.              | J4-B5   |
| <b>Video</b>                         |         |
| Video Select Normally Closed contact | VIDEO 1 |
| Video Select Normally open contact   | VIDEO 2 |
| Video Select Signal Pole Contact     | VIDEO 3 |

**Table. 6.20 PCB 6059P Inputs and Outputs (Continued)**

## 6.20 Leak Detection (Standalone) PCB (Part No. 6068P)

### 6.20.1 Function

The Leak Detection PCB is an environmental device using a water leak sensor to monitor the watertight integrity of electronic pod.

### 6.20.2 Technical Description

The PCB contains an isolation interface and a leak detector, which works in conjunction with a water sensing probe.

### 6.20.3 Water Leak Detection

This circuit monitors the resistance of the detector probe connected to PL5. If a nominal dry value is measured, the green 'dry' LED on the 6068 is lit and logic 1 is set on PL4-3. If the probe becomes wet (red 'wet' LED is lit) or becomes open-circuited (amber 'open' LED is lit) then logic 1 is set on PL4-3 signalling a fault condition.

| Function            | Pin No |
|---------------------|--------|
| <b>Inputs</b>       |        |
| Leak Detector Probe | PL5-1  |
| Leak Detector Probe | PL5-2  |
| <b>Outputs</b>      |        |
| +5 VDC Supply       | PL4-5  |
| 0 VDC Supply        | PL4-1  |
| <b>Sensors</b>      |        |

**Table. 6.21 PCB 6068P Inputs and Outputs**

| Function                           | Pin No |
|------------------------------------|--------|
| Leak sensor: 1=Dry; 0=Wet/<br>open | PL4-2  |
| Vacuum monitor                     | PL4-3  |

**Table. 6.21 PCB 6068P Inputs and Outputs (Continued)**

## 6.21 Balanced Line Video Driver PCB (Part No. LINEVIDEO)

### 6.21.1 Function

The Balanced Line Video Driver PCB converts a single unbalanced video signal into a balanced video signal for the transmission of video over a twisted pair cable.

### 6.21.2 Technical Description

The PCB consists of circuitry to boost the video signal to compensate for attenuation due to the length of cable the signal is transmitted over. The PCB compensation circuit overcomes the losses by pre-emphasising the signal thereby reducing distortion and maintaining picture quality and amplitude adjustment overcomes resistive losses in the cables.

### 6.21.3 Video Adjustments

Procedures on how to pre-emphasise the video signal and adjust the signal amplitude are detailed in the maintenance section of the Technical Handbook (Maintenance Tasks). The maintenance must be carried out in the following instances:

On initial installation if the tether/umbilical has not been supplied with the system:

- Change of umbilical or tether.
- Significant changes to the tether or umbilical length.
- Change of camera.

| Function                | Pin No       |
|-------------------------|--------------|
| <b>Inputs</b>           |              |
| Unbalanced Video        | CN6-1        |
| Unbalanced Video return | CN6-2        |
| +12 VDC Power supply    | CN6-5        |
| 0 VDC Power Supply      | CN6-6, 3 & 2 |
| <b>Outputs</b>          |              |
| Balanced Video A        | CN6-9        |
| Balanced Video B        | CN6-10       |

**Table. 6.22 PCB LINEVIDEO Inputs and Outputs**

## 6.22 CP Relay PCB (Part No. 6082P)

### 6.22.1 Function

The CP Relay PCB is used to switch, under software control, between a proximity and contact probe.

### 6.22.2 Technical Description

The PCB in its default condition has a logic low keeping transistor Q1 in the off position, and RL1 in its NC position routing proximity probe reference signal from J1-5 to J1-2. When a logic high is applied to the base of Q1, Q1 turns on, D1 illuminates, RL1 energises, and its associated contacts make into the NO position routing contact probe reference signal from J1-1 to J1-2.

| Function                  | Pin No |
|---------------------------|--------|
| <b>Inputs</b>             |        |
| +5 VDC                    | J1-4   |
| 0 VDC                     | J1-3   |
| Input signal input (CTRL) | J1-6   |
| Proximity probe reference | J1-1   |
| Contact probe reference   | J1-5   |
| <b>Outputs</b>            |        |
| CP reference output       | J1-2   |

**Table. 6.23 PCB 6082P Inputs and Outputs**

## 6.23 Compass (Part No. COMPASS/4)

### 6.23.1 Function

The Fluxgate Compass is a factory sealed unit, mounted on the EPOD chassis end plate. The compass automatically corrects for magnetic deviations and communicates via the MFIO PCB and umbilical to the surface CPU.

### 6.23.2 Compass Calibration

The calibration procedure is contained in the Maintenance Instructions Section and is carried out under the following circumstances.

- Loss of compass calibration (indicated by an “O” displayed on the system monitor overlay.
- When additional metal equipment has been fitted to the vehicle.
- Change of compass.

Document Number: Tiger 880 Book 2 of 2 Issue 1

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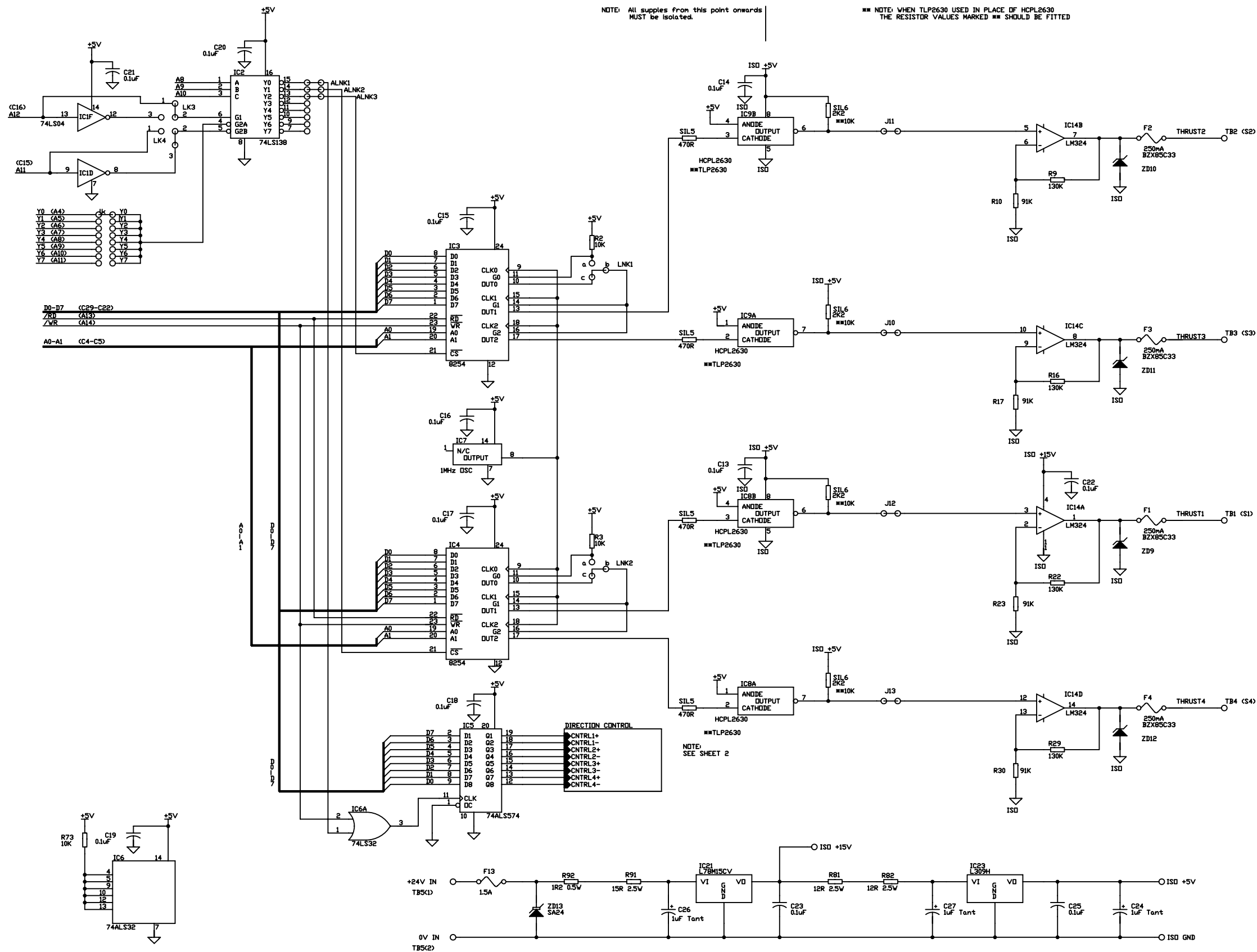
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+44 (0) 1489 898001

Internet Address  
[www.seaeye.com](http://www.seaeye.com)  
E-mail  
[rovs@seaeye.com](mailto:rovs@seaeye.com)

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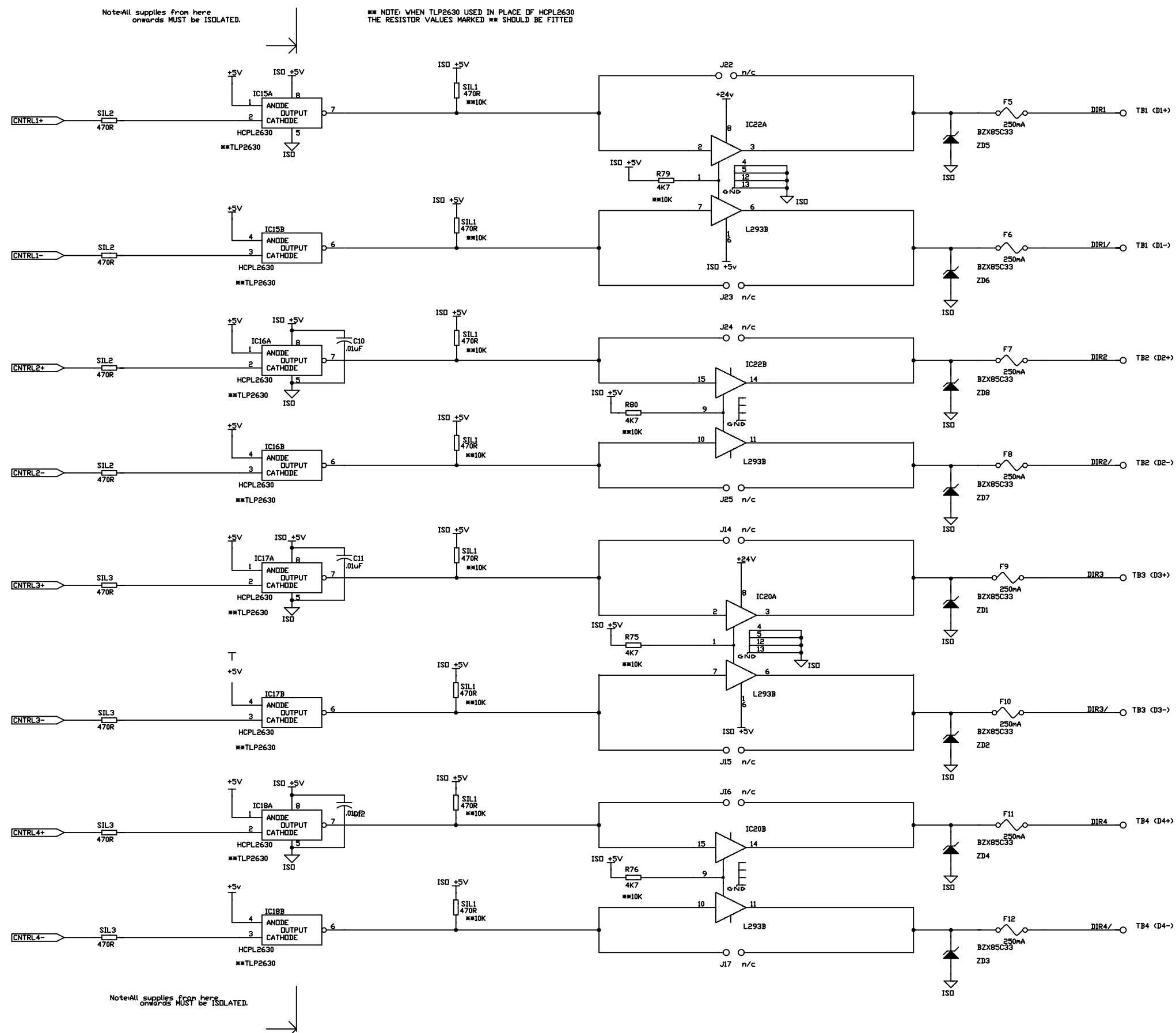
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|                   |                                                                                                                                 |                                                                       |                   |          |                 | DWG.No. S03023 | 1    |
|                   |                                                                                                                                 | SHEET 1 OF 3                                                          |                   |          |                 |                |      |

Note: All CNTRL Signals from ICS Sheet 1.



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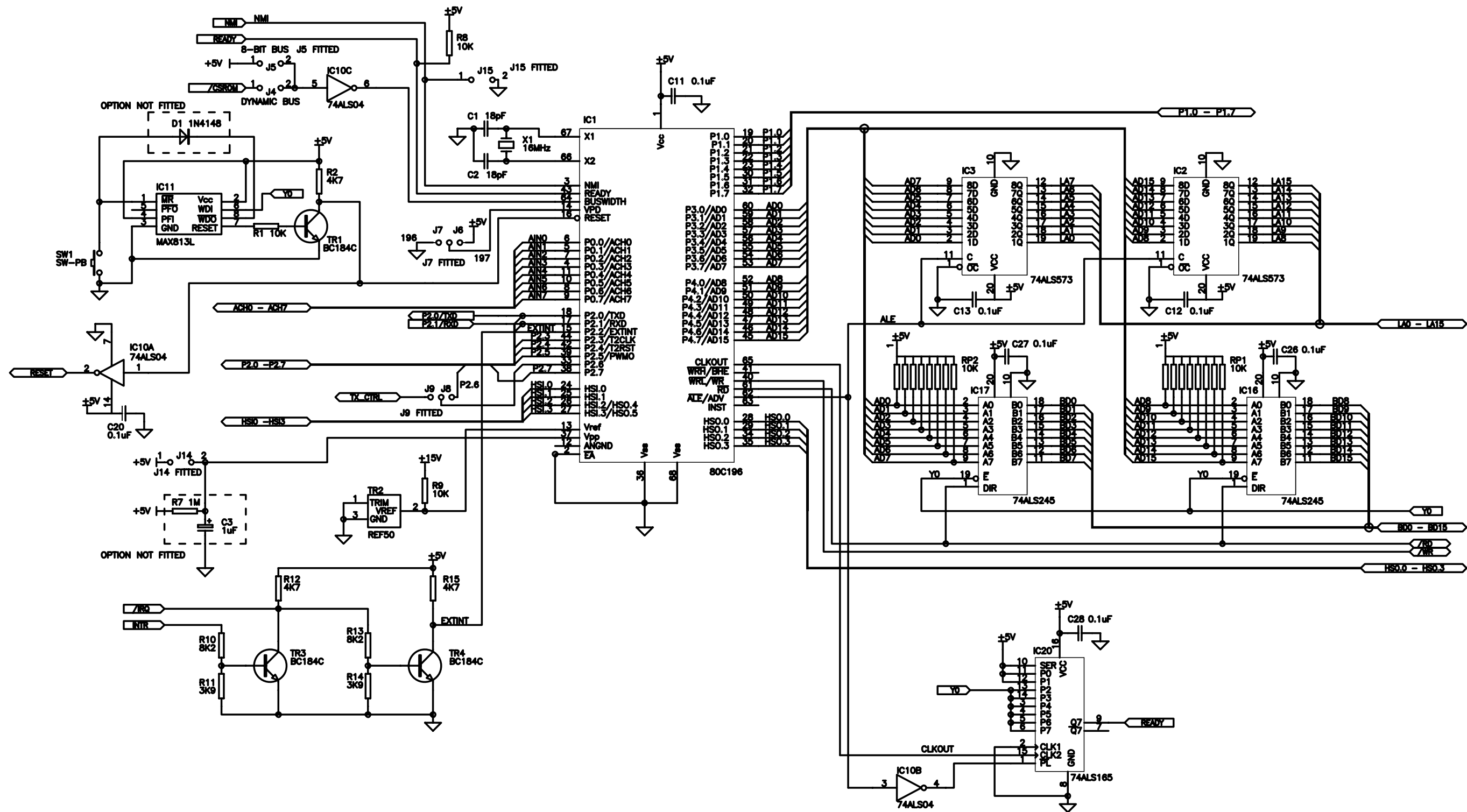
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**TITLE**  
6034P THRUSTER DRIVE PCB  
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CIRCUIT DIAGRAM  
SHEET 2 OF 3

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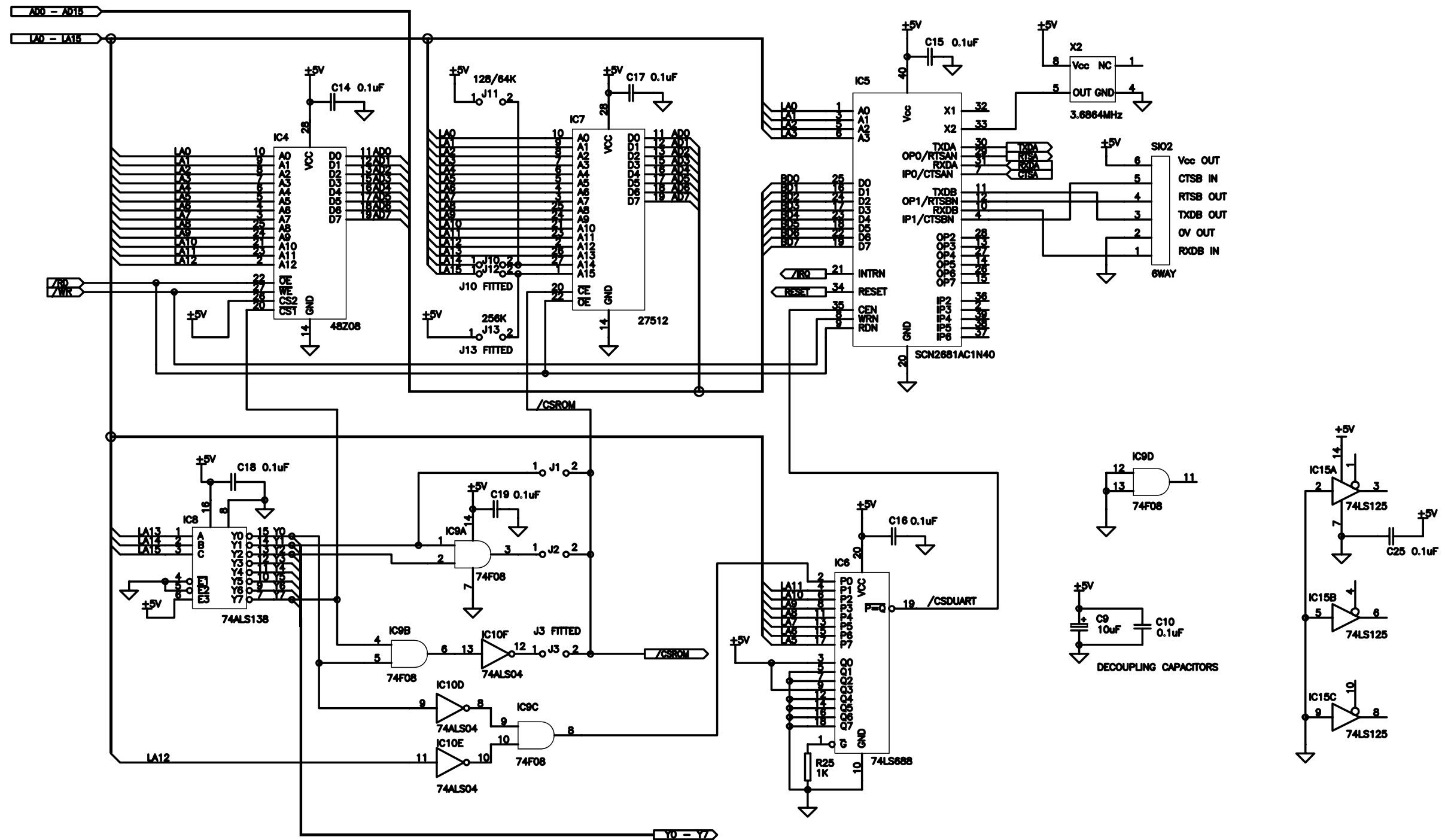
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England  
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TITLE  
6047P CPU PCB WITH DUART  
CPU AND BI-DIRECTIONAL BUS CONTROL  
CIRCUIT DIAGRAM

SHEET 1 OF 4

| DRAWN          | APPROVED | DATE         |
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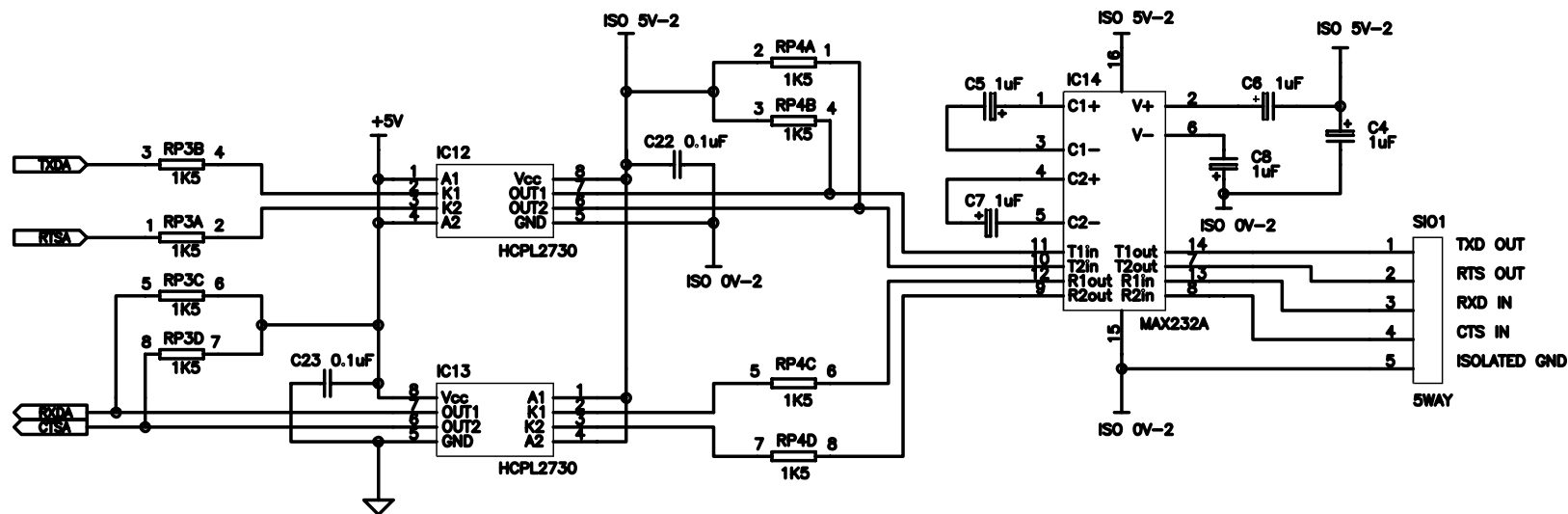
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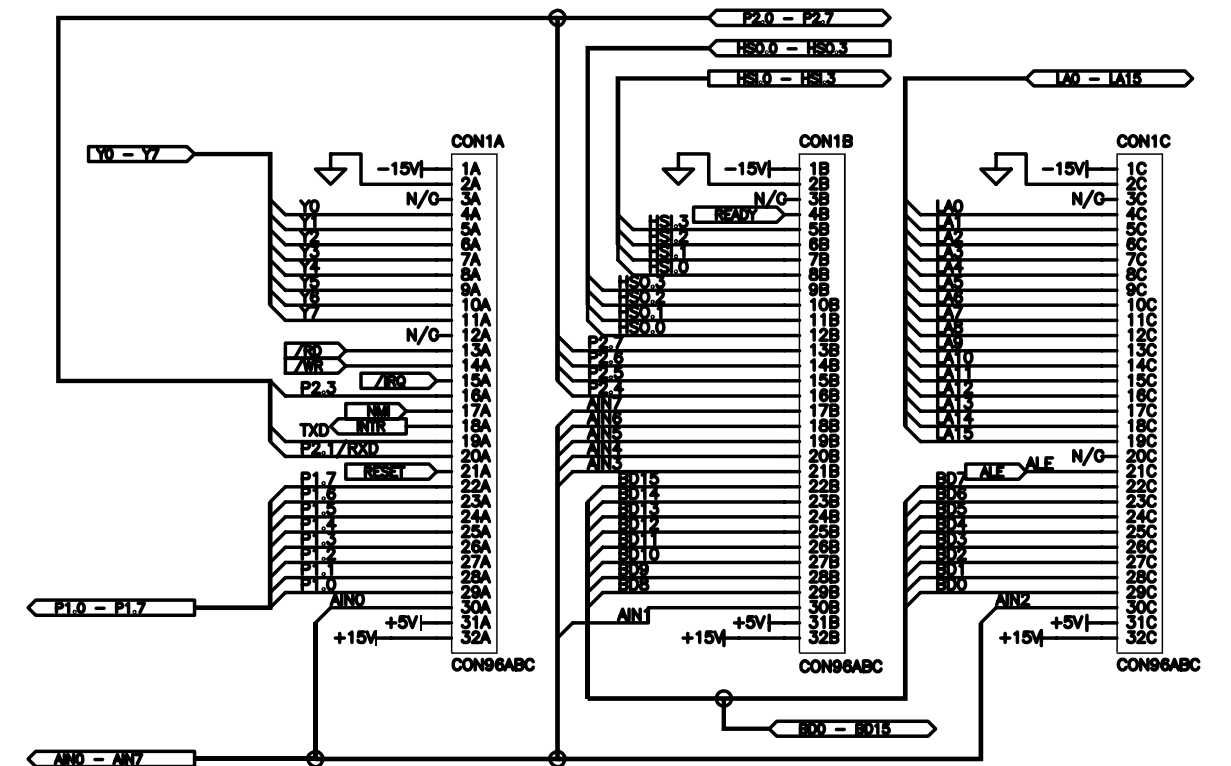
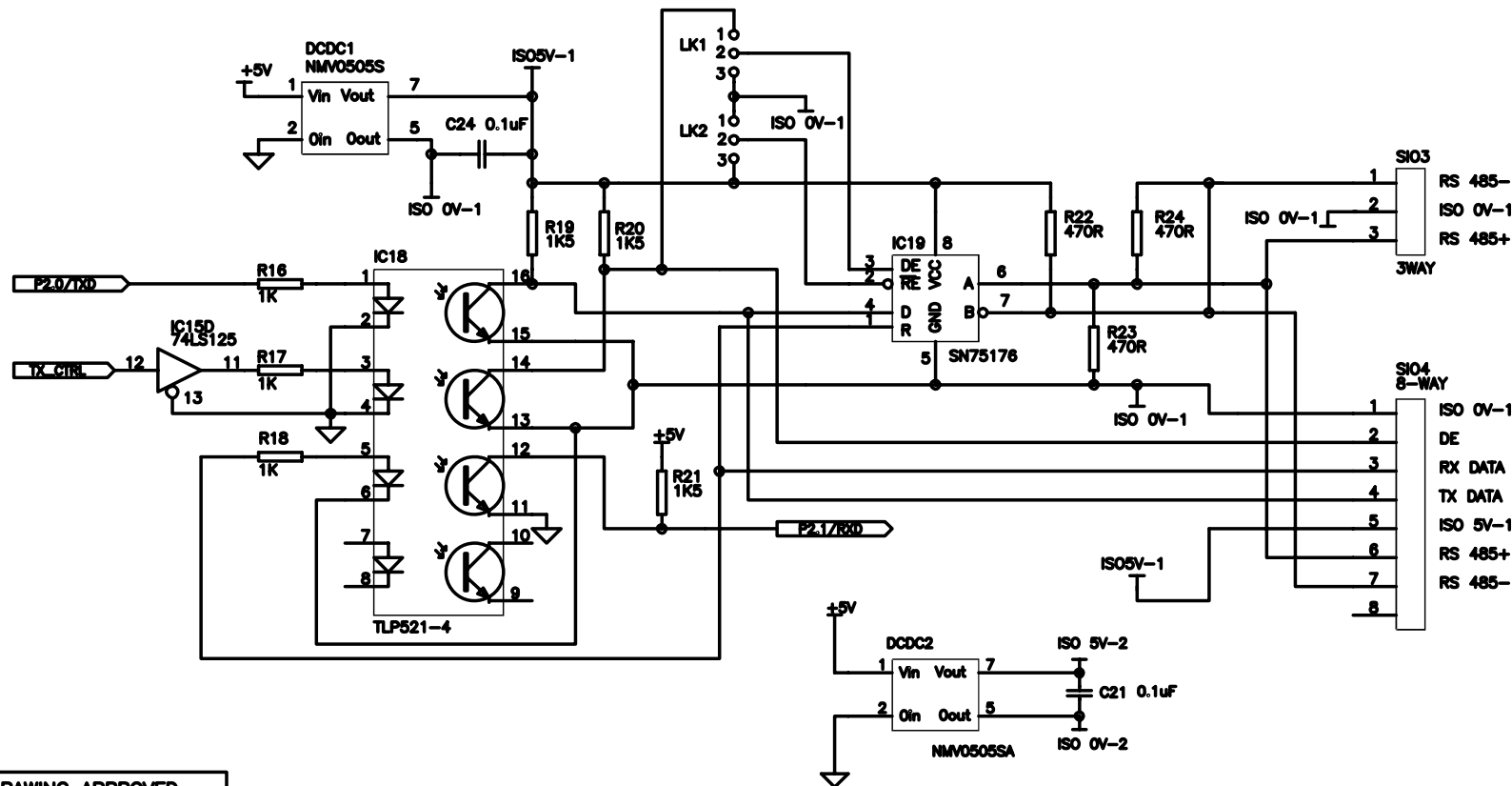
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6047P CPU PCB WITH DUART  
MEMORY DUART AND ADDRESS DECODING  
CIRCUIT DIAGRAM

SHEET 2 OF 4

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|----------------|----------|---------|------|------|
| D. Waite       | JMR      | 29/1/03 |      |      |
| DWG.No. S03031 |          |         |      | 22   |



LINK LK1 & LK2 DETAILS  
 1-2 INTERNAL RS-485 FITTED (DEFAULT)  
 2-3 EXTERNAL TTL



| JUMPERS |        |
|---------|--------|
| J1      |        |
| J2      |        |
| J3      | FITTED |
| J4      |        |
| J5      | FITTED |
| J6      |        |
| J7      | FITTED |
| J8      |        |
| J9      | FITTED |
| J10     | FITTED |
| J11     |        |
| J12     | FITTED |
| J13     | FITTED |
| J14     | FITTED |
| J15     | FITTED |

| LINK 1 |        |
|--------|--------|
| 1-2    | FITTED |
| 2-3    |        |

| LINK 2 |        |
|--------|--------|
| 1-2    | FITTED |
| 2-3    |        |

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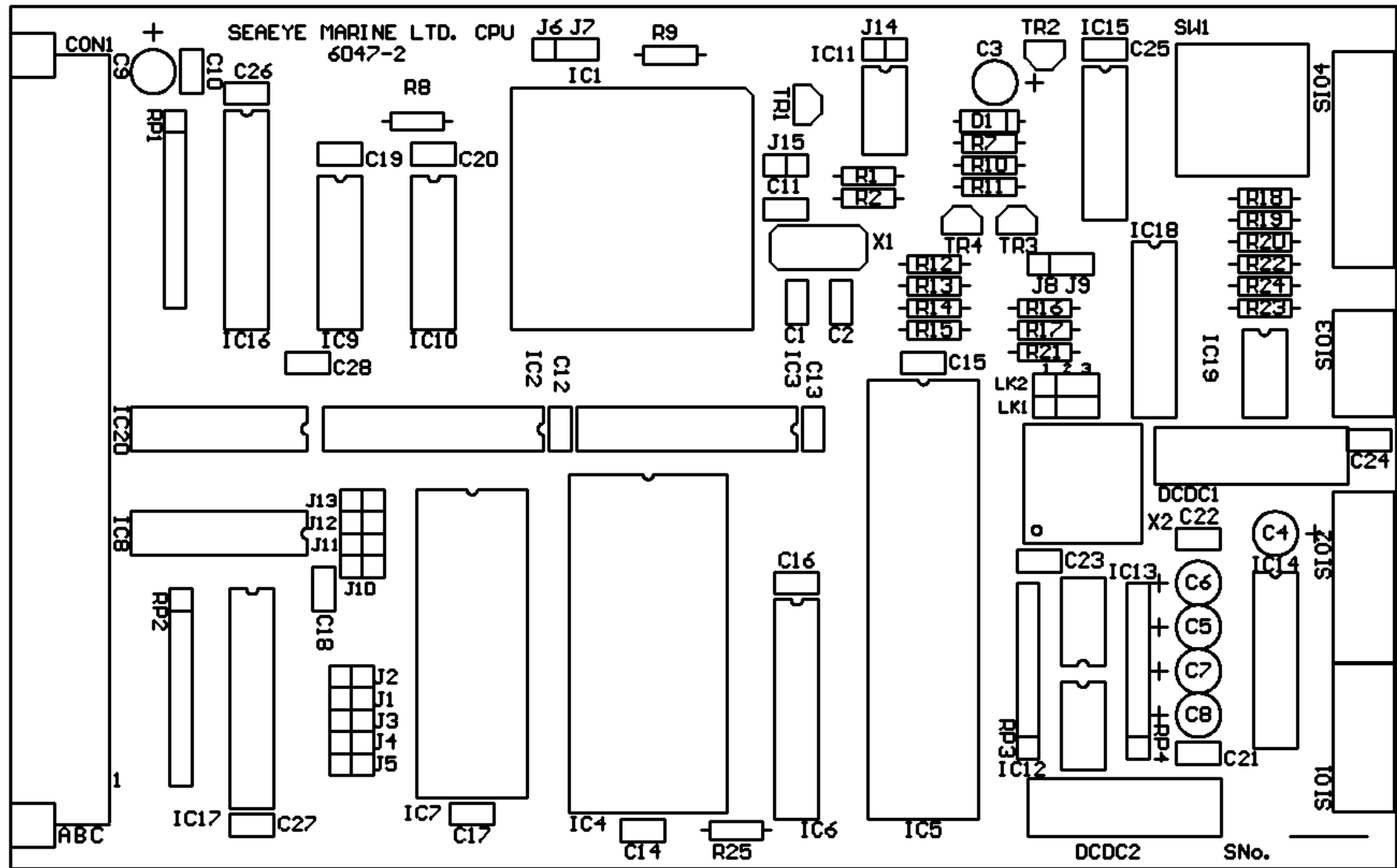
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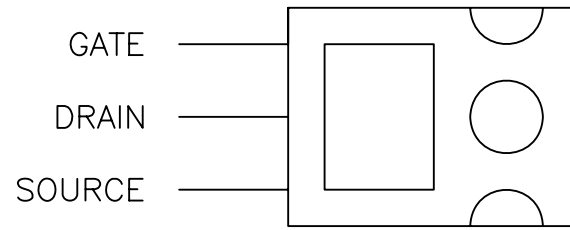
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6047P CPU PCB WITH DUART  
BUS CONNECTOR AND COMMUNICATONS  
CIRCUIT DIAGRAM

SHEET 3 OF 4

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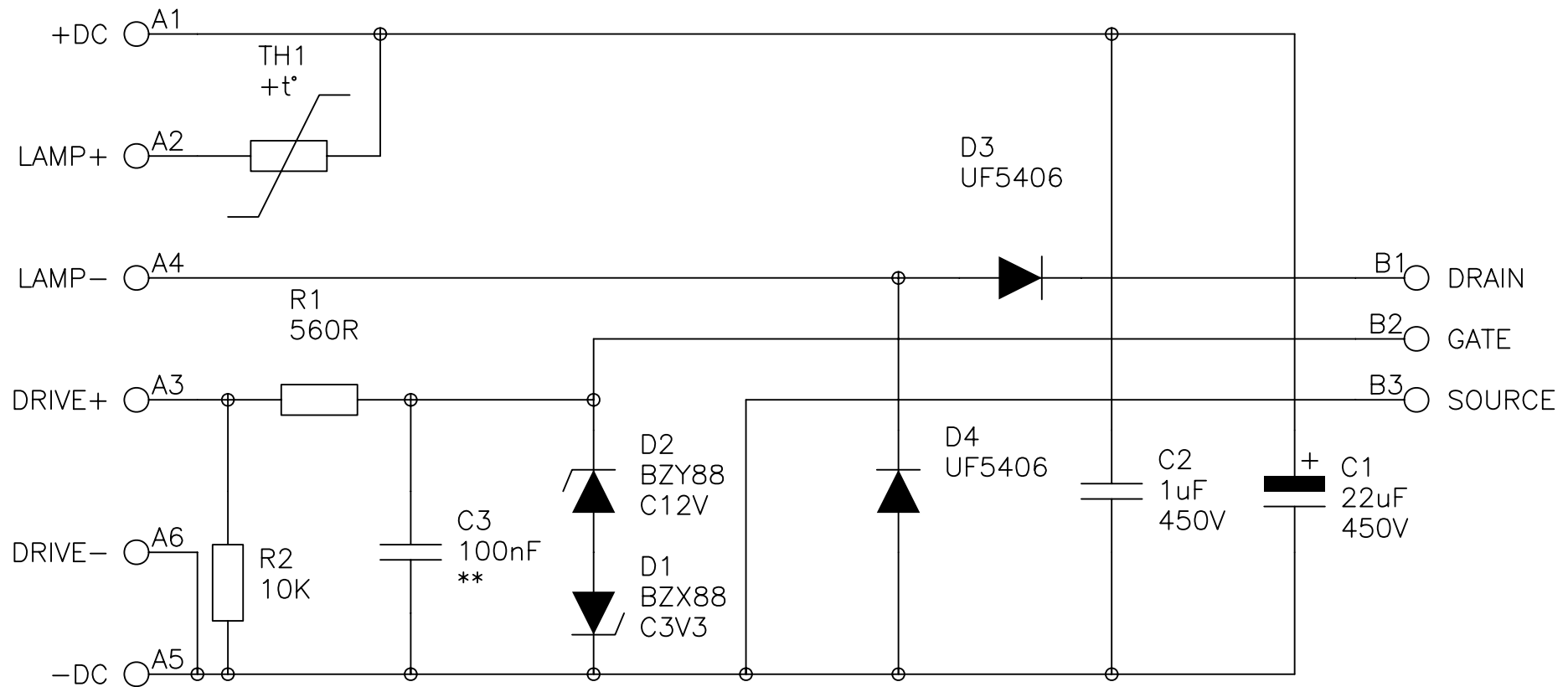






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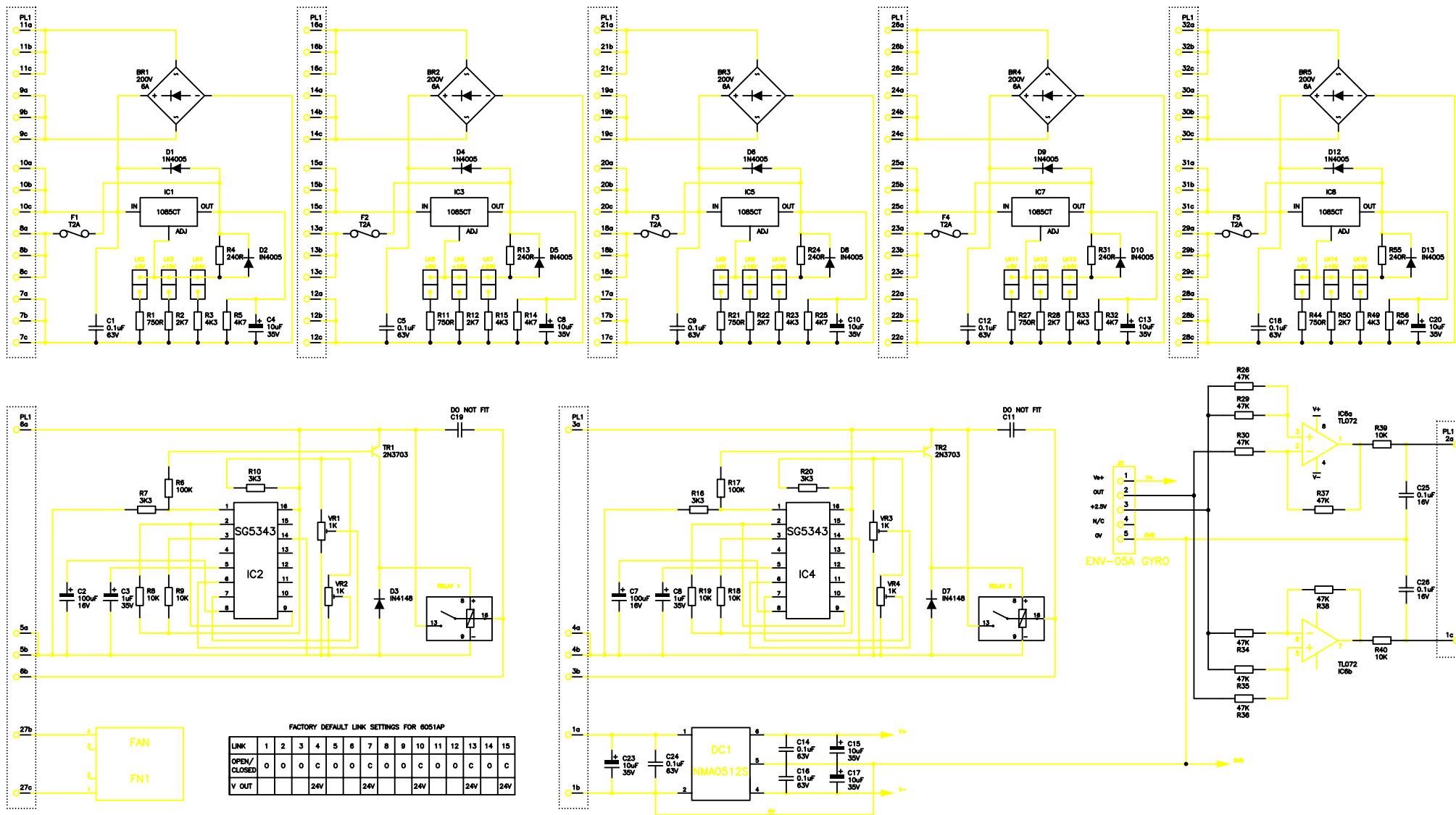


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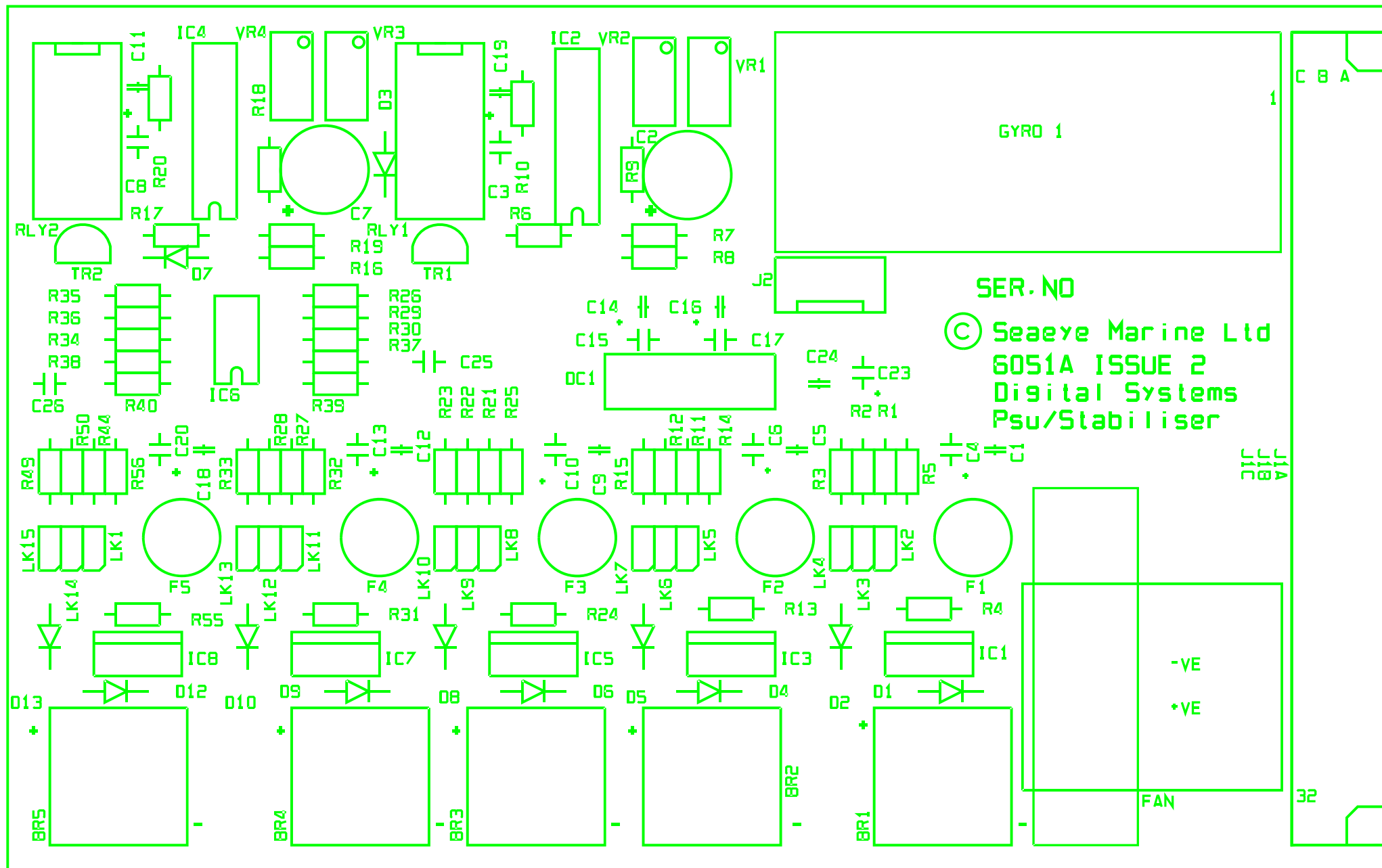
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| 6   | PL1 CLARIFICATION                      |      | 27-09-00  | DCR460-LAH  |
| 5   | COMPONENT VALUE CORRECTIONS            |      | 14.APR.98 | DCR0329/ESS |
| 4   | C15, 17, 23 CHANGED TO 10uF FROM 0.1uF |      | 11.MAR.97 | DCR0235/ESS |
| 3   | C4,6,10,13,20 VOLTAGE UPATED           |      | 10.OCT.96 | DCR0182     |

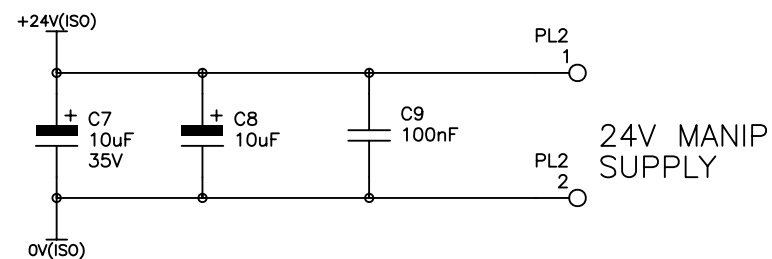
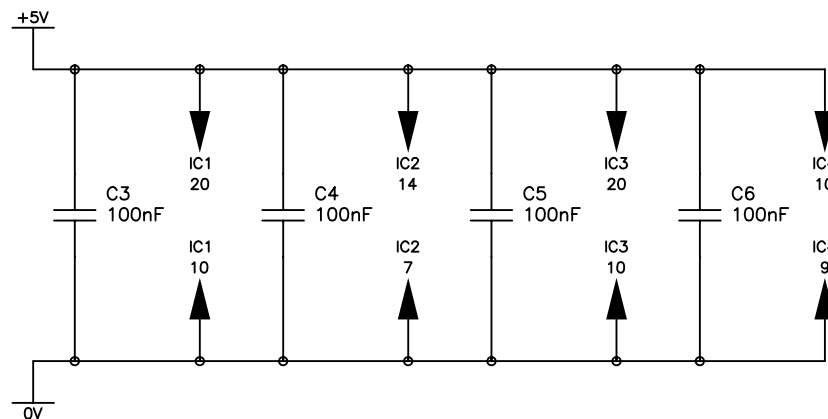
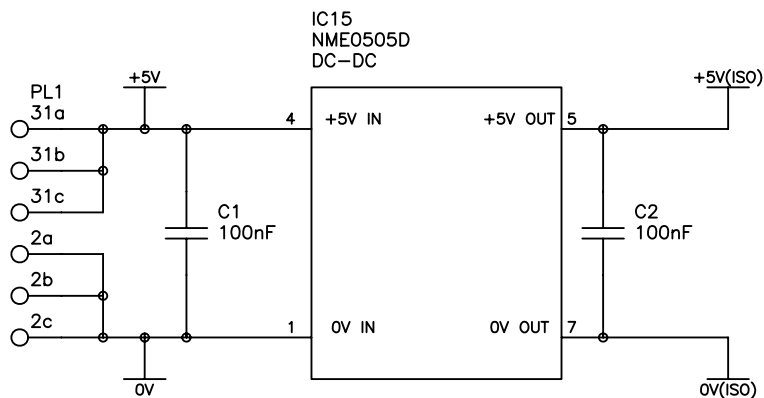


| ISS | DESCRIPTION | APPD | DATE     | REF |
|-----|-------------|------|----------|-----|
| 1   | FIRST ISSUE |      | 24/09/99 |     |

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AWARD WINNERS FOR INNOVATIVE DESIGN

TITLE  
DIGITAL SYSTEM  
6051A PSU/STABILISER PCB  
COMPONENT LAYOUT  
SHEET 2 OF 2

DRAWN  
C.G.PETTIT  
APPROVED  
DATE  
24/09/99  
DWG.No. S0004112



| ISS | DESCRIPTION          | APPD | DATE     | REF         |
|-----|----------------------|------|----------|-------------|
| 3   | TITLE CORRECTED      |      | 20/09/99 | DCR0395/CGP |
| 2   | 6074P ADDED TO TITLE |      | 9.OCT.97 | ESS/DCR???? |
| 1   | ORIGINAL             |      | 04/11/94 |             |

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AWARD WINNERS FOR INNOVATIVE DESIGN

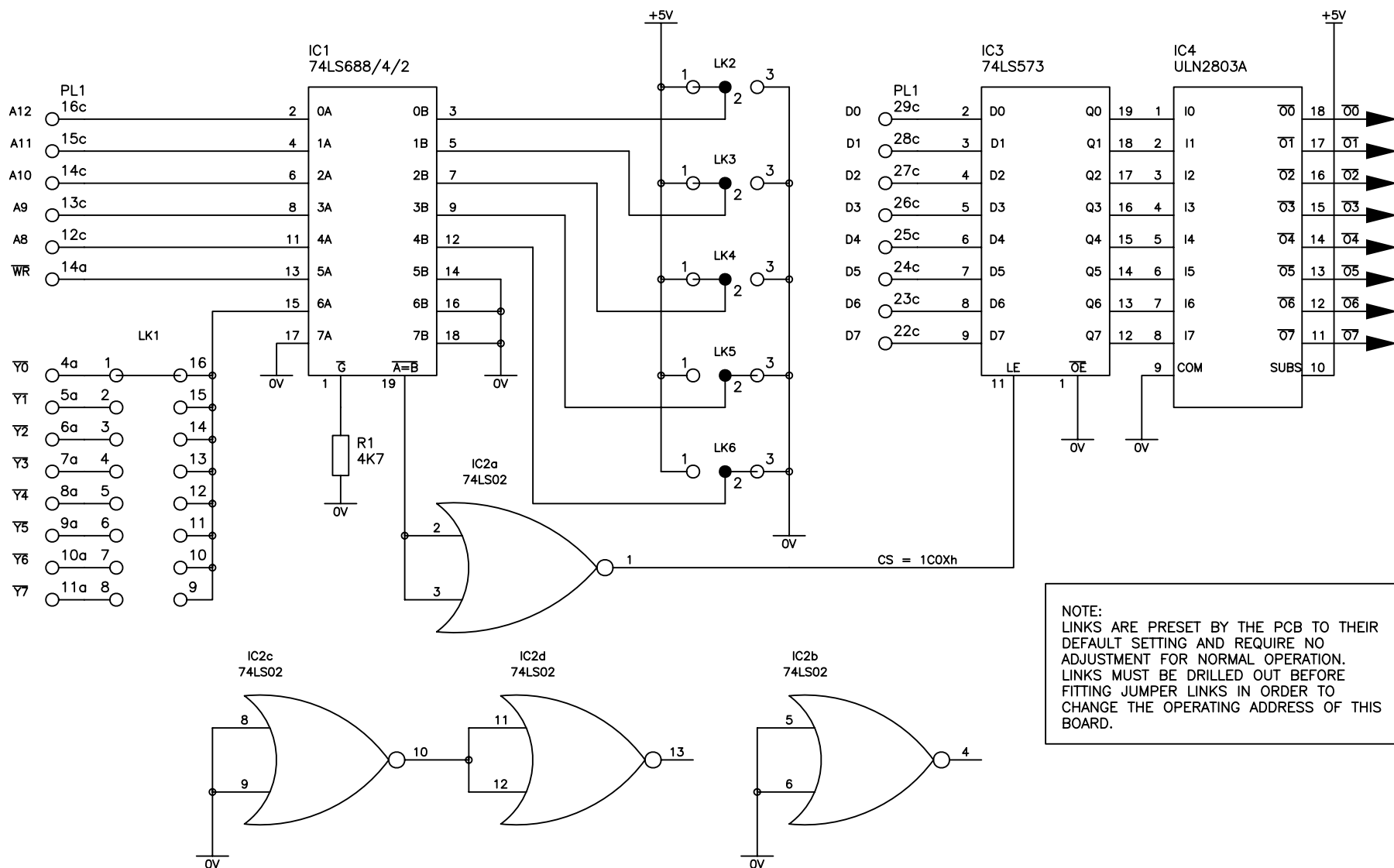
TITLE  
DIGITAL SYSTEM  
6055P AUX SWITCH/MANIP PCB  
CIRCUIT DIAGRAM  
PSU SECTION  
SHEET 1 OF 5

DRAWN  
C.G.PETTIT

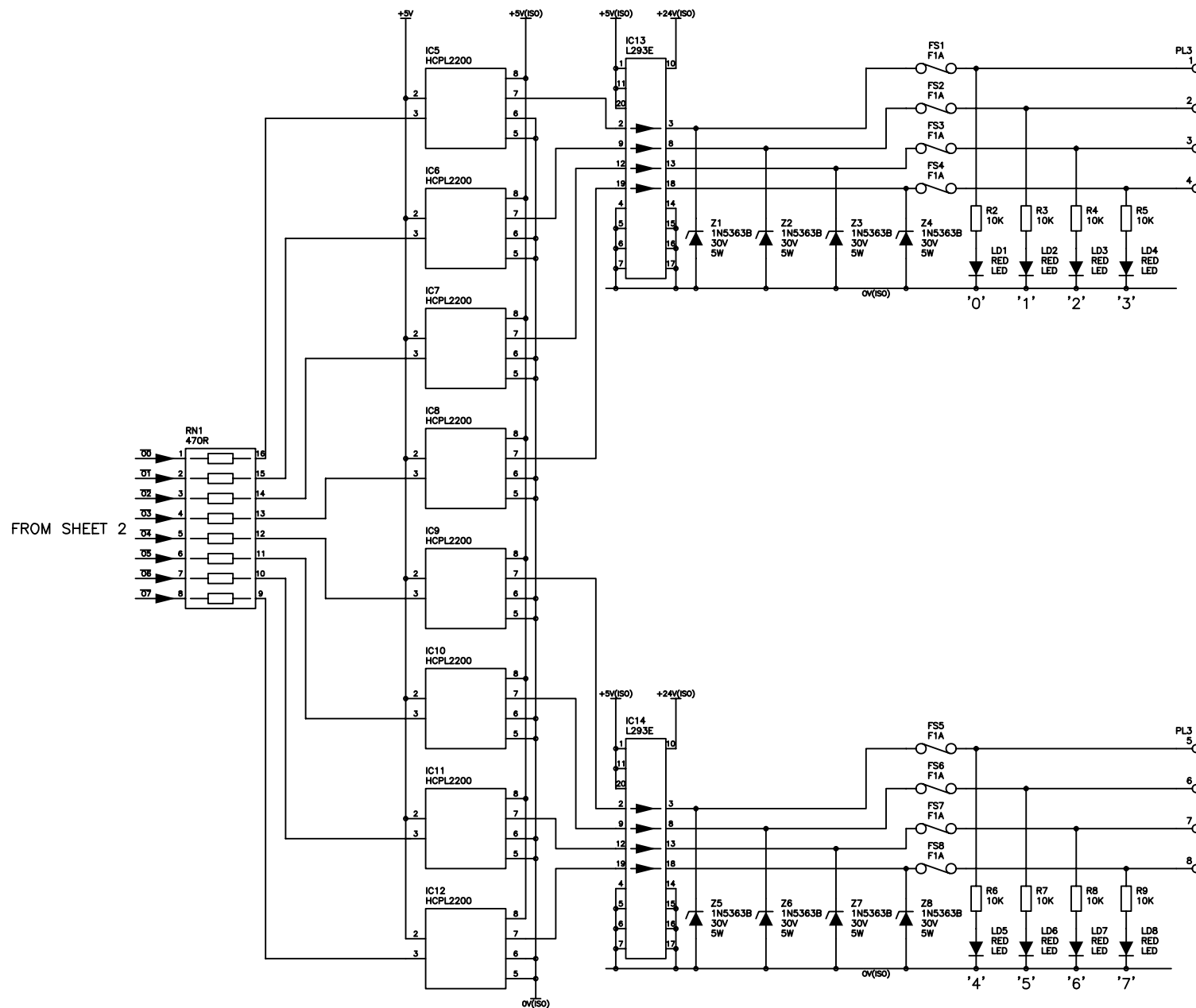
APPROVED

DATE  
04/11/94

DWG.No. S0000131



| ISS | DESCRIPTION                | APPD | DATE     | REF         |
|-----|----------------------------|------|----------|-------------|
| 3   | TITLE CHANGED              |      | 20/09/99 | DCR0395/CGP |
| 2   | DWG No. CHANGED FROM S.121 |      | 13NOV96  | DCR-196-ESS |
| 1   | ORIGINAL                   |      | 04/11/94 |             |



| ISS | DESCRIPTION                    | APPD | DATE      | REF         |
|-----|--------------------------------|------|-----------|-------------|
| 4   | TITLE CHANGED                  |      | 20/09/99  | DCR0395/CGP |
| 3   | DRAWING No. CHANGED FROM S.132 |      | 13.NOV.96 | DCR-196-ESS |
| 2   | LD5-8 LEGENDS CORRECTED        |      | 15/11/94  | 0017        |
| 1   | ORIGINAL                       |      | 15/11/94  |             |

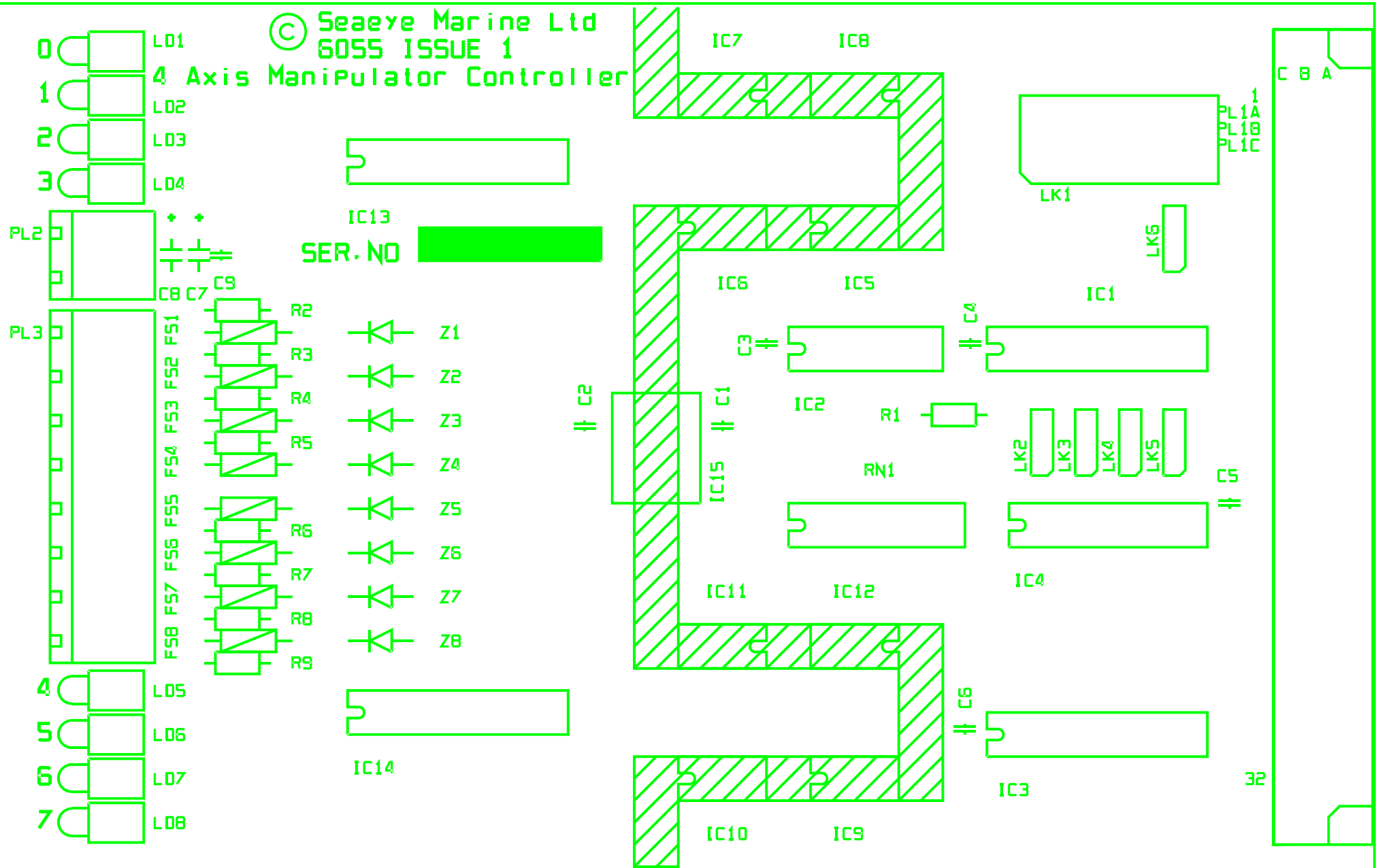
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AWARD WINNERS FOR INNOVATIVE DESIGN

TITLE  
DIGITAL SYSTEM  
6055P AUX SWITCH/MANIP PCB  
CIRCUIT DIAGRAM  
OPTO ISOLATION & POWER SECTION  
SHEET 3 OF 5

DRAWN C.G.PETTIT  
APPROVED  
DATE 15/11/94

DWG.No. S0000143

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6055 ISSUE 1  
4 Axis Manipulator Controller



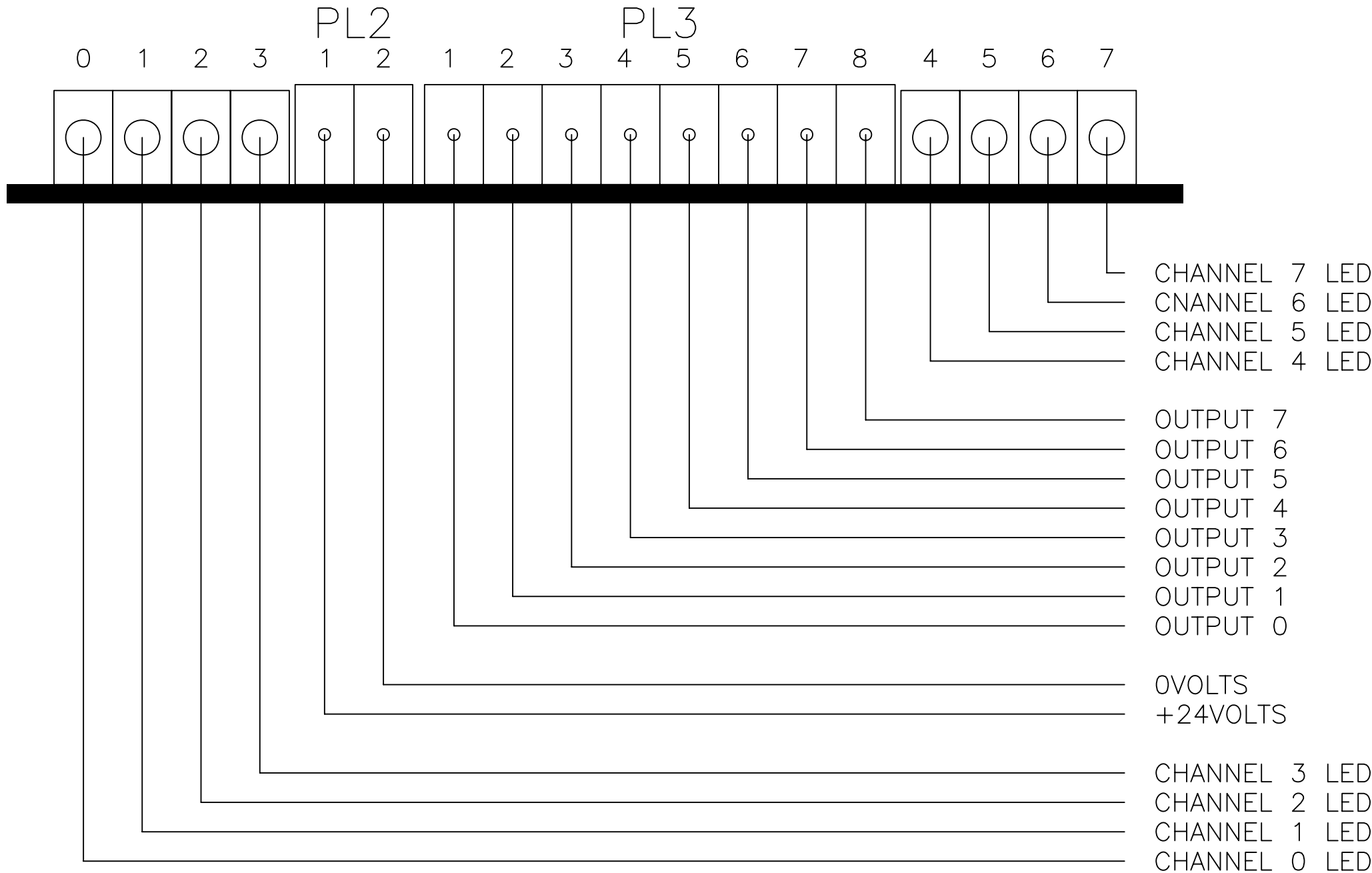
DWG.No. S0000114

| ISS | DESCRIPTION | APPD | DATE     | REF |
|-----|-------------|------|----------|-----|
| 1   | FIRST ISSUE |      | 20/09/99 |     |

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AWARD WINNERS FOR INNOVATIVE DESIGN

TITLE  
DIGITAL SYSTEM  
6055P AUX SWITCH/MANIP PCB  
COMPONENT LAYOUT  
SHEET 4 OF 5

DRAWN  
C.G.PETTIT  
APPROVED  
DATE  
20/09/99  
DWG.No. S0000114

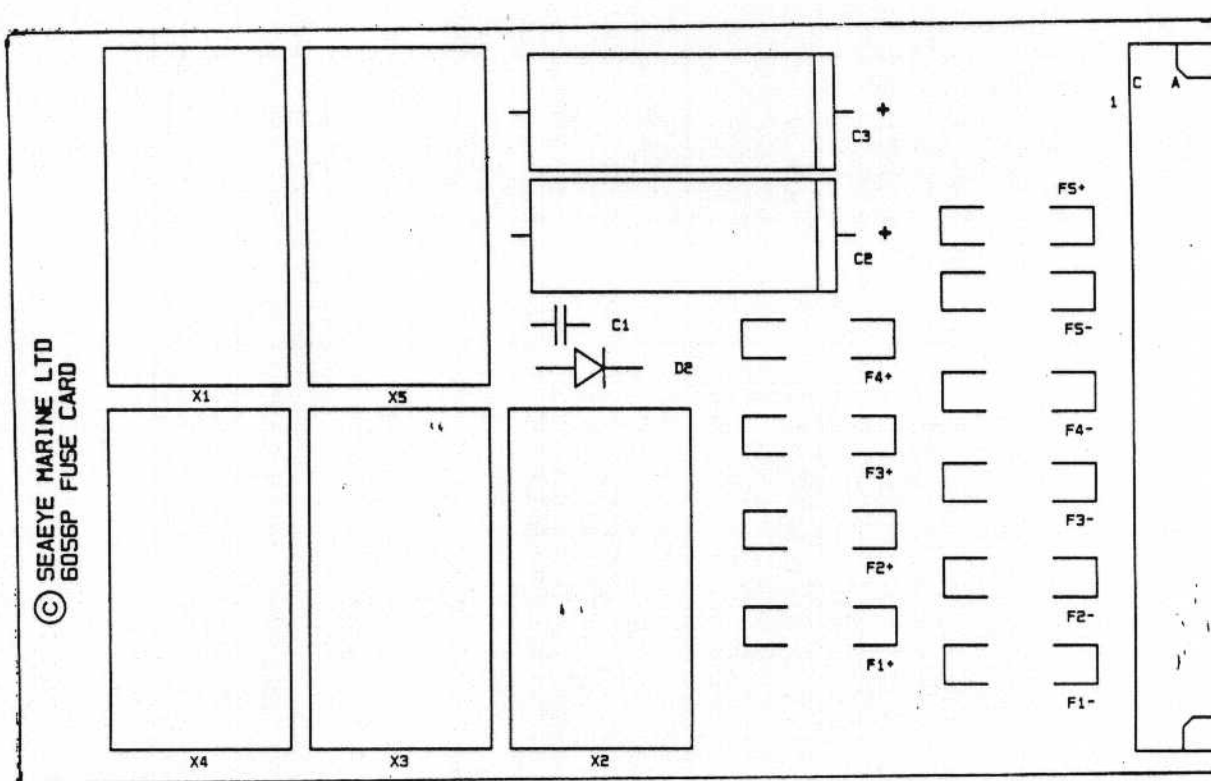


| ISS | DESCRIPTION | APPD | DATE     | REF |
|-----|-------------|------|----------|-----|
|     |             |      |          |     |
|     |             |      |          |     |
| 1   | FIRST ISSUE |      | 20/09/99 |     |

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AWARD WINNERS FOR INNOVATIVE DESIGN

**TITLE**  
DIGITAL SYSTEM  
6055P AUX SWITCH/MANIP PCB  
CONNECTOR PINOUT/IDENTIFICATION  
SHEET 5 OF 5

| DRAWN            | APPROVED | DATE     |
|------------------|----------|----------|
| C.G.PETTIT       |          | 20/09/99 |
| DWG.No. S0000115 |          |          |



SEAEYE MARINE LTD  
6056P ISSUE A  
SILKSCREEN  
MDL JOB 1812

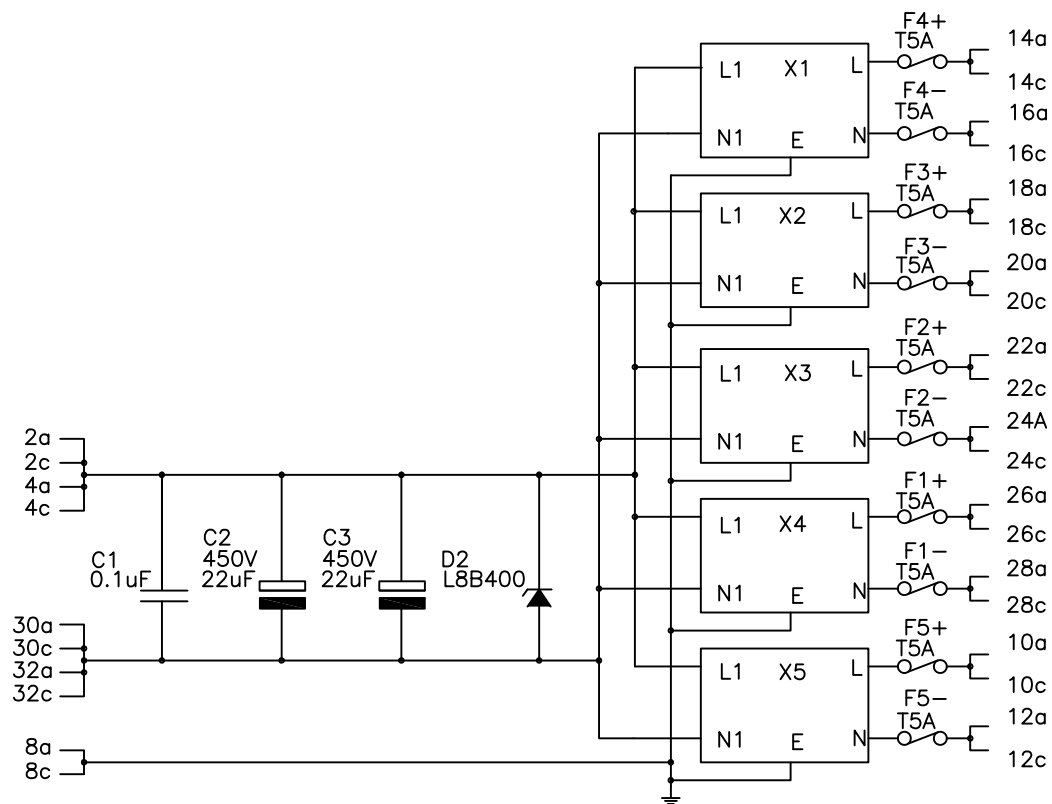
Drg. No. S0146711 6056-P Layout Diagram 5 Thruster Fuse & Filter PCB

Issue 1

31/08/99

Approved:

*A.B.*



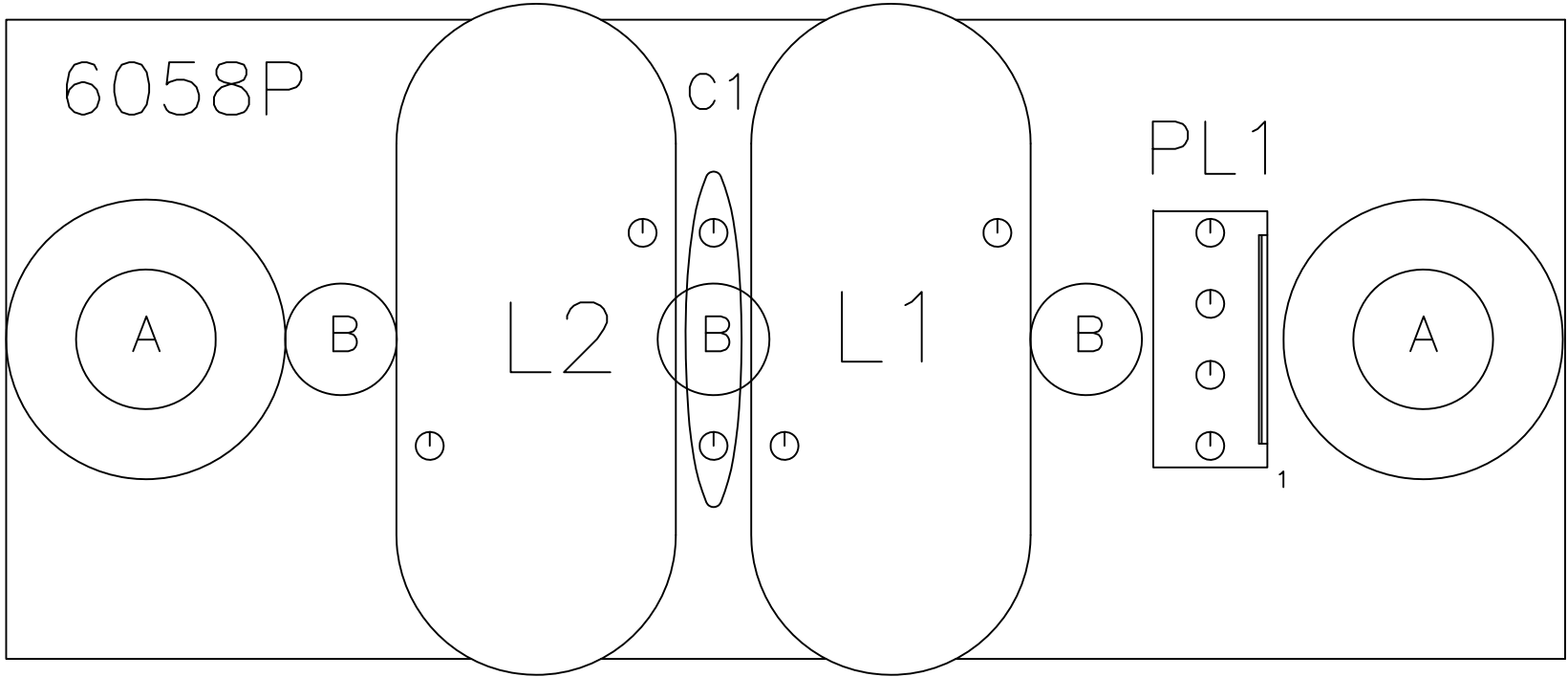
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FOR MANUFACTURE

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ON COMPLETION OF MANUFACTURE

| ISS | DESCRIPTION                             | APPD | DATE      | REF         |
|-----|-----------------------------------------|------|-----------|-------------|
| 5   | THRUSTER CARD TABLE REMOVED             |      | 6.MAR.00  | DCR0425     |
| 4   | 6 THRUSTER DETAILS ADDED                |      | 21.JAN.98 | ESS         |
| 3   | MODIFIED TO INCLUDE 10 THRUSTER VARIANT |      | 12.FEB.97 | ESS/DCR0223 |
| 2   | C2 & FUSE TYPES CHANGED C3 ADDED        |      | 13/06/95  |             |

PAD SIZE = 2mm (1.0mm HOLE)  
TRACK THICKNESS = 1.4mm  
HOLE A = 3.1mmØ  
HOLE B = 3.1mmØ  
PL1 HOLE SIZE = 1.0mmØ  
ALL OTHER HOLES = 1.0mmØ

- PL1
- 1 TILT IN B
  - 2 TILT IN A
  - 3 TILT OUT B
  - 4 TILT OUT A
- C1 = 100nF 250V CERAMIC DISC
- L1, L2 = 4mH



DRAWING APPROVED  
FOR MANUFACTURE

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ON COMPLETION OF MANUFACTURE

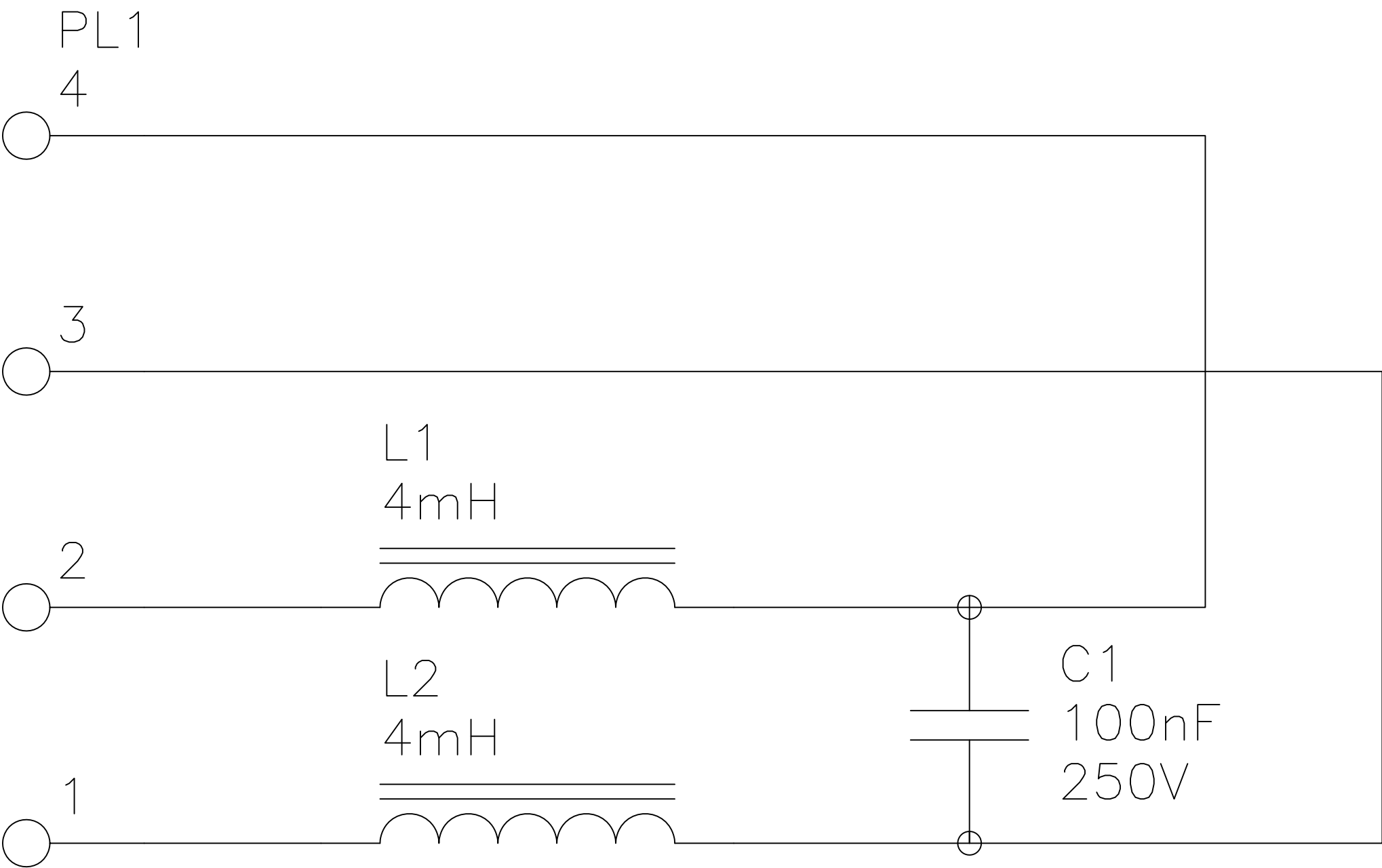
| ISS | DESCRIPTION                     | APPD | DATE     | REF    |
|-----|---------------------------------|------|----------|--------|
| 2   | HOLE SIZE REVISION + C2 WAS 50V |      | 11-05-00 | L.A.H. |
| 1   | ORIGINAL                        |      | 27/09/95 |        |

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TITLE  
SEAEYE 6058P  
TILT FILTER PCB  
LAYOUT DRAWING

SHEET 1 OF 1

| DRAWN            | APPROVED | DATE     |
|------------------|----------|----------|
| I.KING           | JMR      | 28/09/95 |
| DWG.No. S0014521 |          |          |

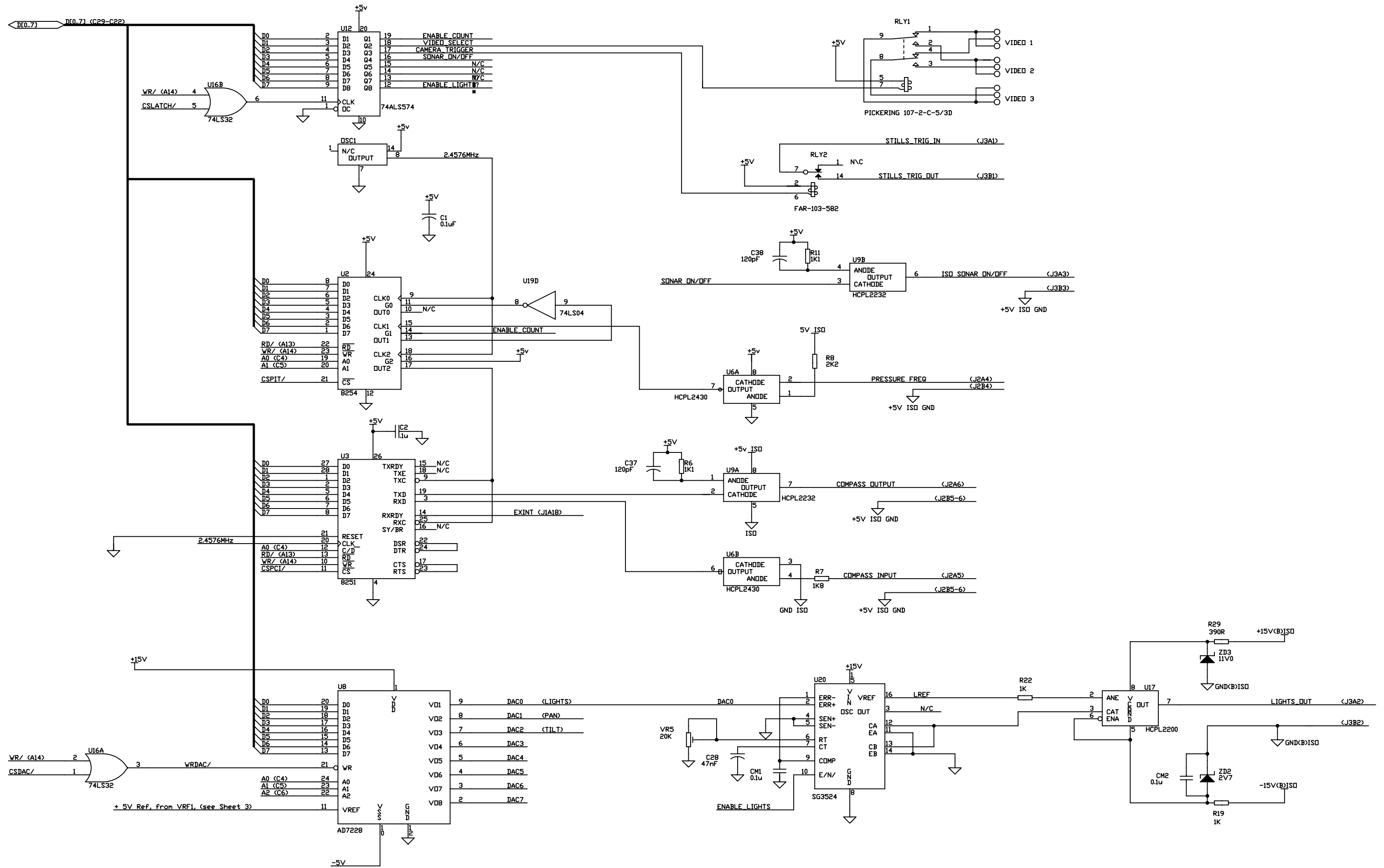


| ISS | DESCRIPTION | APPD | DATE     | REF    |
|-----|-------------|------|----------|--------|
|     |             |      |          |        |
| 2   | C2 WAS 50V  |      | 30-05-00 | L.A.H. |
| 1   | ORIGINAL    |      | 30/10/95 |        |

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AWARD WINNERS FOR INNOVATIVE DESIGN

**TITLE**  
SEA EYE MARINE LTD  
TILT INTEGRATION PCB  
6058P  
CCT DIAGRAM  
SHEET 1 OF 1

| DRAWN            | APPROVED | DATE     |
|------------------|----------|----------|
| I.KING           | CGP      | 30/10/95 |
| DWG.No. S0014821 |          |          |



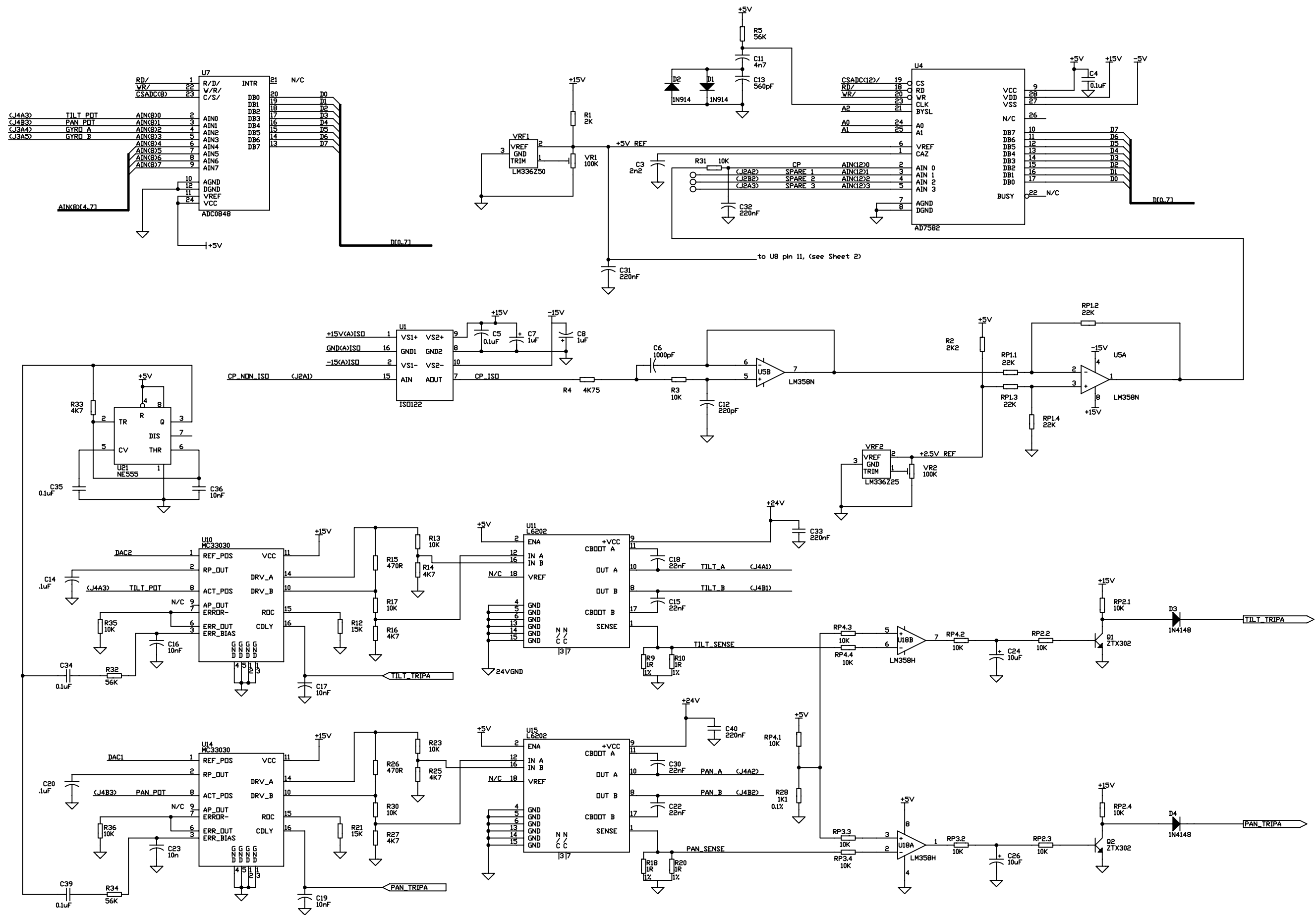
| ISS | DESCRIPTION               | CHECKED | DATE    | REF |
|-----|---------------------------|---------|---------|-----|
| 1   | First Issue as CI drawing |         | 30/1/03 | N/A |

**Seaeeye**

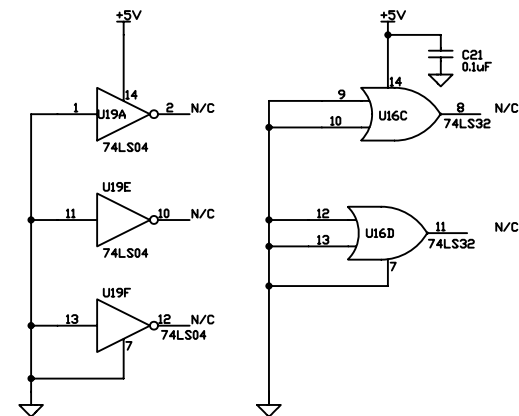
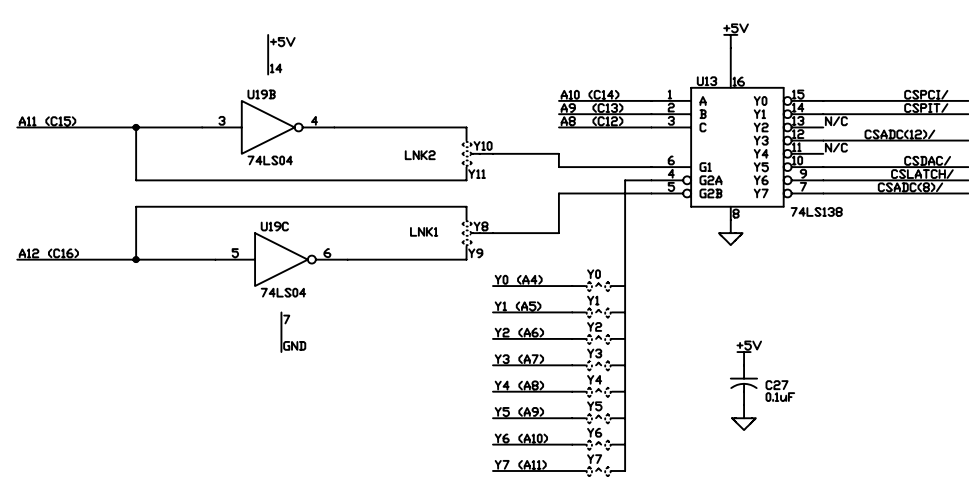
Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**  
6059P SOFT TILT MULTIFUNCTION I/O PCB  
DEPTH, COMPASS, LIGHTS, SONAR, VIDEO & STILLS  
CIRCUIT DIAGRAM  
SHEET 1 OF 4

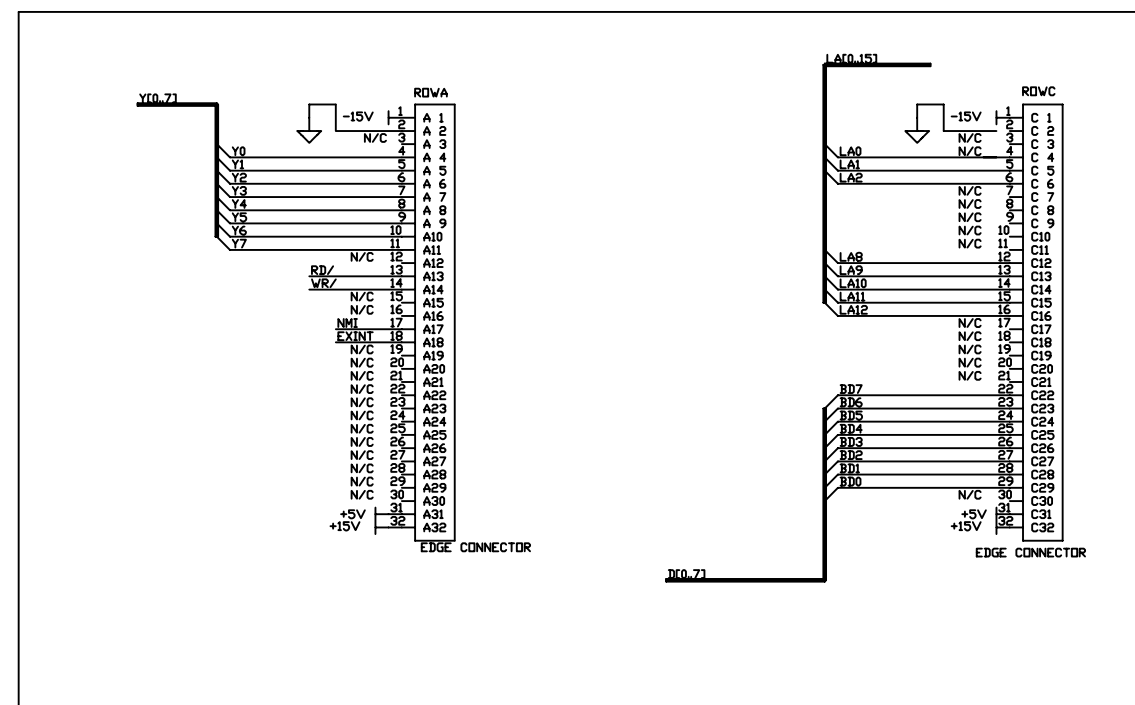
|                   |          |                 |
|-------------------|----------|-----------------|
| DRAWN<br>D. Waite | APPROVED | DATE<br>30/1/03 |
| DWG.No. S03033    |          | Rev. Sht.<br>11 |



| ISS | DESCRIPTION               | CHECKED | DATE    | REF | <div>Seaye</div> <div>Seaye Marine Ltd.<br/>Seaye House<br/>Lower Quay Road<br/>Fareham<br/>Hampshire<br/>PO16 0RQ<br/>England<br/>Tel: +44 (0)1329 289000</div> |  | TITLE                                                                                      | DRAWN    | APPROVED | DATE    | Rev. Sht.      |   |
|-----|---------------------------|---------|---------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------|----------|----------|---------|----------------|---|
|     |                           |         |         |     |                                                                                                                                                                  |  | 6059P SOFT TILT MULTIFUNCTION I/O PCB<br>PAN & TILT CONTROL, CP AND A/D<br>CIRCUIT DIAGRAM | D. Waite |          | 30/1/03 |                |   |
|     |                           |         |         |     |                                                                                                                                                                  |  | SHEET 2 OF 4                                                                               |          |          |         | DWG.No. S03033 |   |
| 1   | First Issue as CI drawing |         | 30/1/03 | N/A |                                                                                                                                                                  |  |                                                                                            |          |          |         | 1              | 2 |
|     |                           |         |         |     |                                                                                                                                                                  |  |                                                                                            |          |          |         |                |   |



CONNECTOR J1



DEPTH, LIGHTS, COMPASS

ADC, PAN, TILT

|   | A         | B         |
|---|-----------|-----------|
| 1 | CP        | CP GND    |
| 2 | ADC1      | ADC2      |
| 3 | ADC3      | ADC GND   |
| 4 | PRESS I/P | PRESS GND |
| 5 | COMP I/P  | COMP GND  |
| 6 | COMP D/P  | COMP GND  |

J2

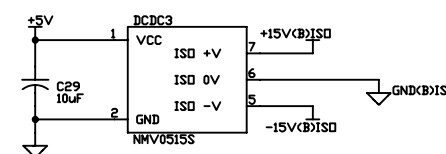
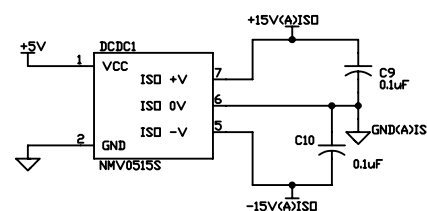
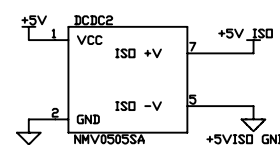
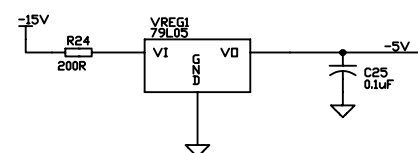
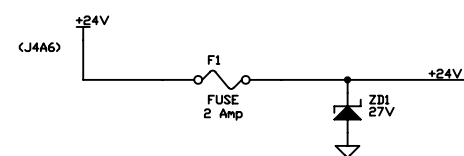
|   | A       | B          |
|---|---------|------------|
| 1 | TRIG IN | TRIG OUT   |
| 2 | LIGHTS  | LIGHTS GND |
| 3 | SONAR   | SONAR GND  |
| 4 | GYRO A  | GYRO GND   |
| 5 | GYRO B  | GYRO GND   |

J3

|   | A        | B        |
|---|----------|----------|
| 1 | TILT A   | TILT B   |
| 2 | PAN A    | PAN B    |
| 3 | TILT POT | PAN POT  |
| 4 | POT +5V  | POT GND  |
| 5 | POT +5V  | POT GND  |
| 6 | +24V     | +24V GND |

J4

| LINKS |            |
|-------|------------|
| LK1   | D--D       |
| LK2   | D--D       |
| Y0    | * LINKED * |
| Y1    | NOT LINKED |
| Y2    | NOT LINKED |
| Y3    | NOT LINKED |
| Y4    | NOT LINKED |
| Y5    | NOT LINKED |
| Y6    | NOT LINKED |
| Y7    | NOT LINKED |



| ISS | DESCRIPTION               | CHECKED | DATE    | REF |
|-----|---------------------------|---------|---------|-----|
| 1   | First Issue as CI drawing |         | 30/1/03 | N/A |

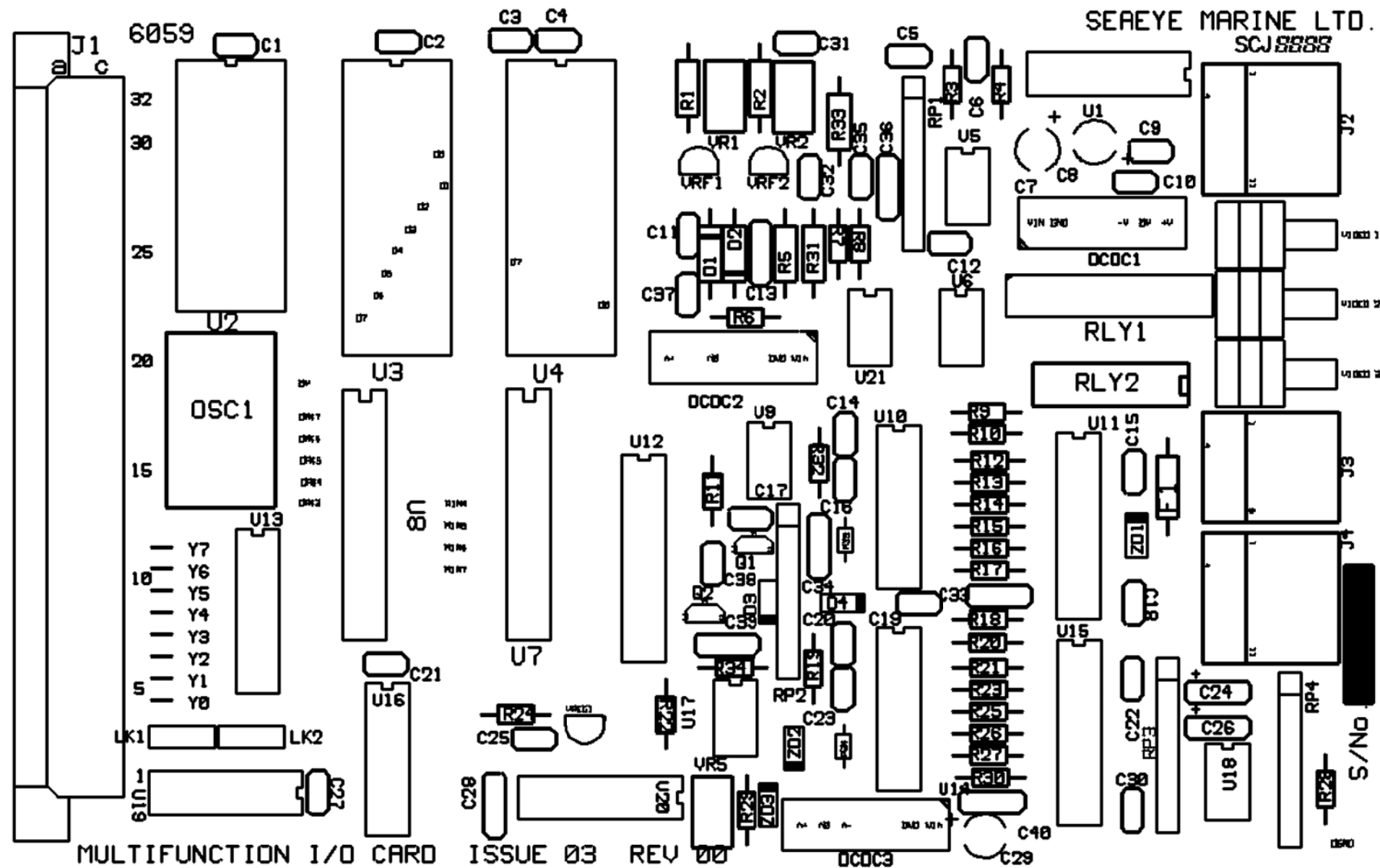
**Seaeeye**

Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**  
6059P SOFT TILT MULTIFUNCTION PCB  
CONNECTORS AND DC-DC CONVERTORS  
CIRCUIT DIAGRAM

SHEET 3 OF 4

| DRAWN          | APPROVED | DATE      |
|----------------|----------|-----------|
| D. Waite       |          | 30/1/03   |
| DWG.No. S03033 |          | Rev. Sht. |
|                |          | 13        |



MULTIFUNCTION I/O CARD

ISSUE 03 REV 00

DCDC3

| ISS | DESCRIPTION               | CHECKED | DATE    | REF |
|-----|---------------------------|---------|---------|-----|
| 1   | First Issue as CI drawing |         | 31/1/03 | N/A |

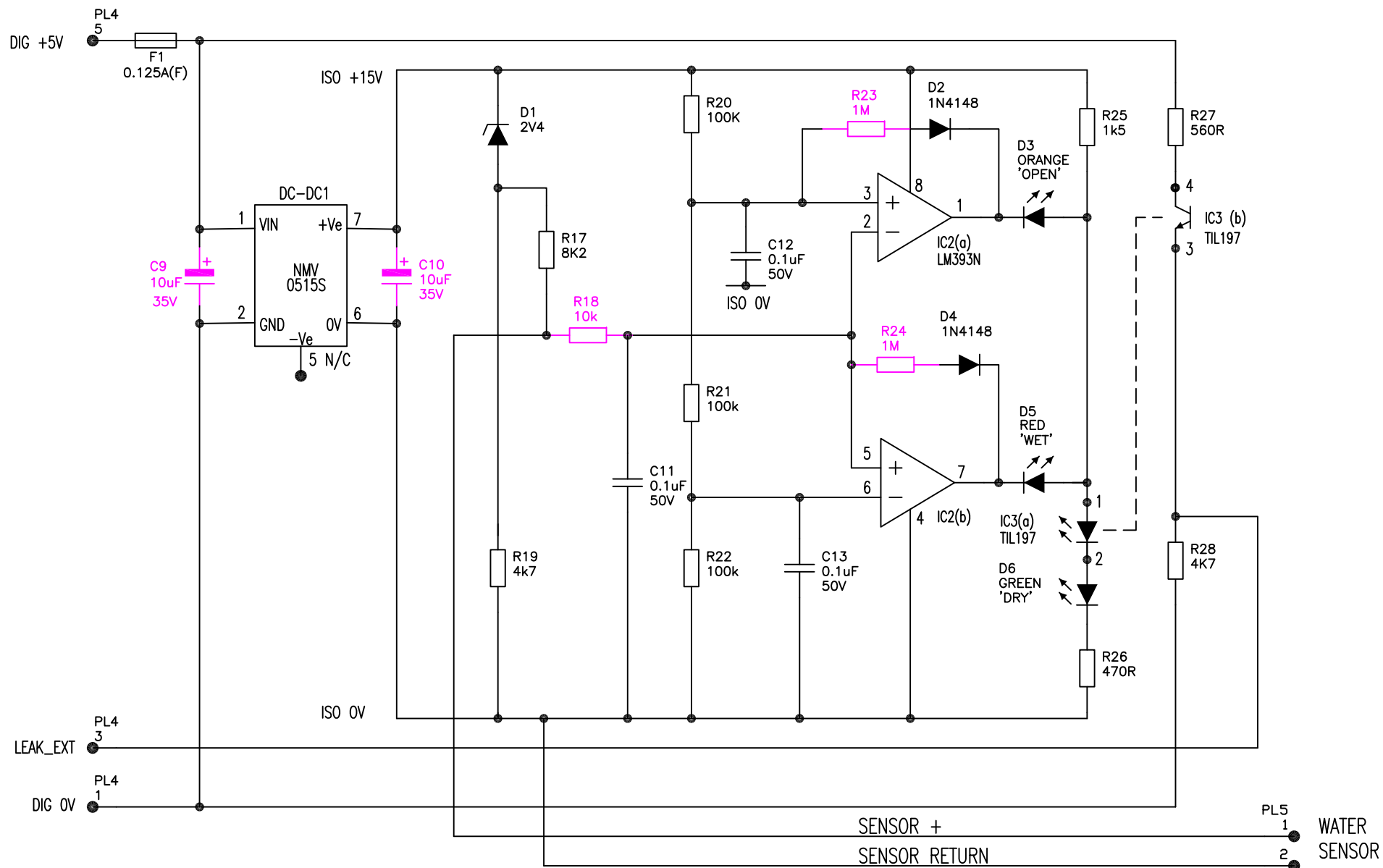
**Seaeeye**

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Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

**TITLE**  
6059P SOFT TILT MULTIFUNCTION PCB  
COMPONENT LAYOUT  
SHEET 4 OF 4

| DRAWN          | APPROVED | DATE    |
|----------------|----------|---------|
| D. Waite       |          | 31/1/03 |
| DWG.No. S03033 |          | 14      |

Rev/Shd.



| ISS | DESCRIPTION                     | APPD | DATE      | REF        |
|-----|---------------------------------|------|-----------|------------|
| 3   | COMPONENT CHANGES               |      | 22.SEP.98 | DCR321/ESS |
| 2   | COMPONENT CHANGES/RAISE TO MKII |      | 28.SEP.97 | ECR226/ESS |
| 1   | FIRST DRAUGHT                   |      | 8.AUG.97  |            |

# 606

SER  
06

○ DRY

○ OPEN

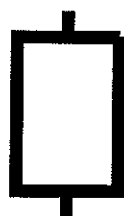
○ WET

05

PL5



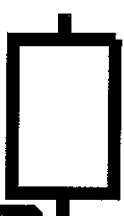
R26



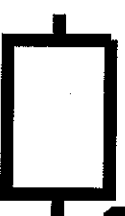
R28



R19



R17



R18



D2



C11



C12



R23



R20



DCDC

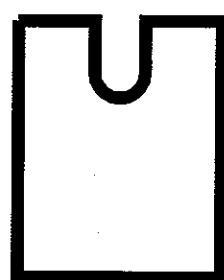
C9



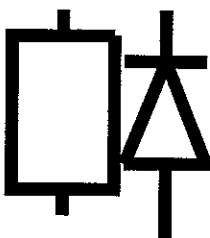
F1



PL4

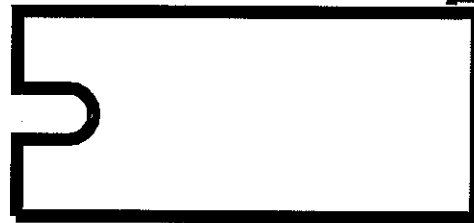


IC3



R25

D1



D4



C13



R24



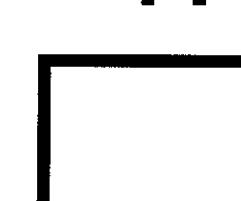
IC2



R21

R22

C10

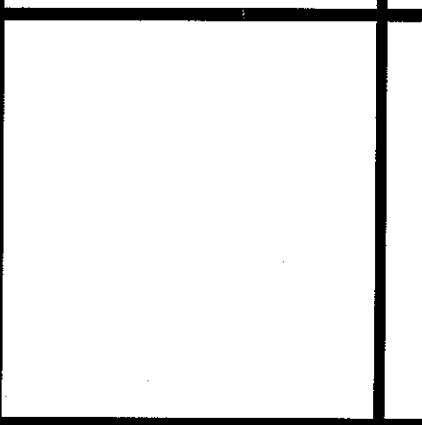


ISSUE 3



LK2

LK1



| ISS | DESCRIPTION | APPD      | DATE     | REF |
|-----|-------------|-----------|----------|-----|
| 1   | FIRST ISSUE | <i>AS</i> | 30/01/02 |     |
|     |             |           |          |     |
|     |             |           |          |     |
|     |             |           |          |     |

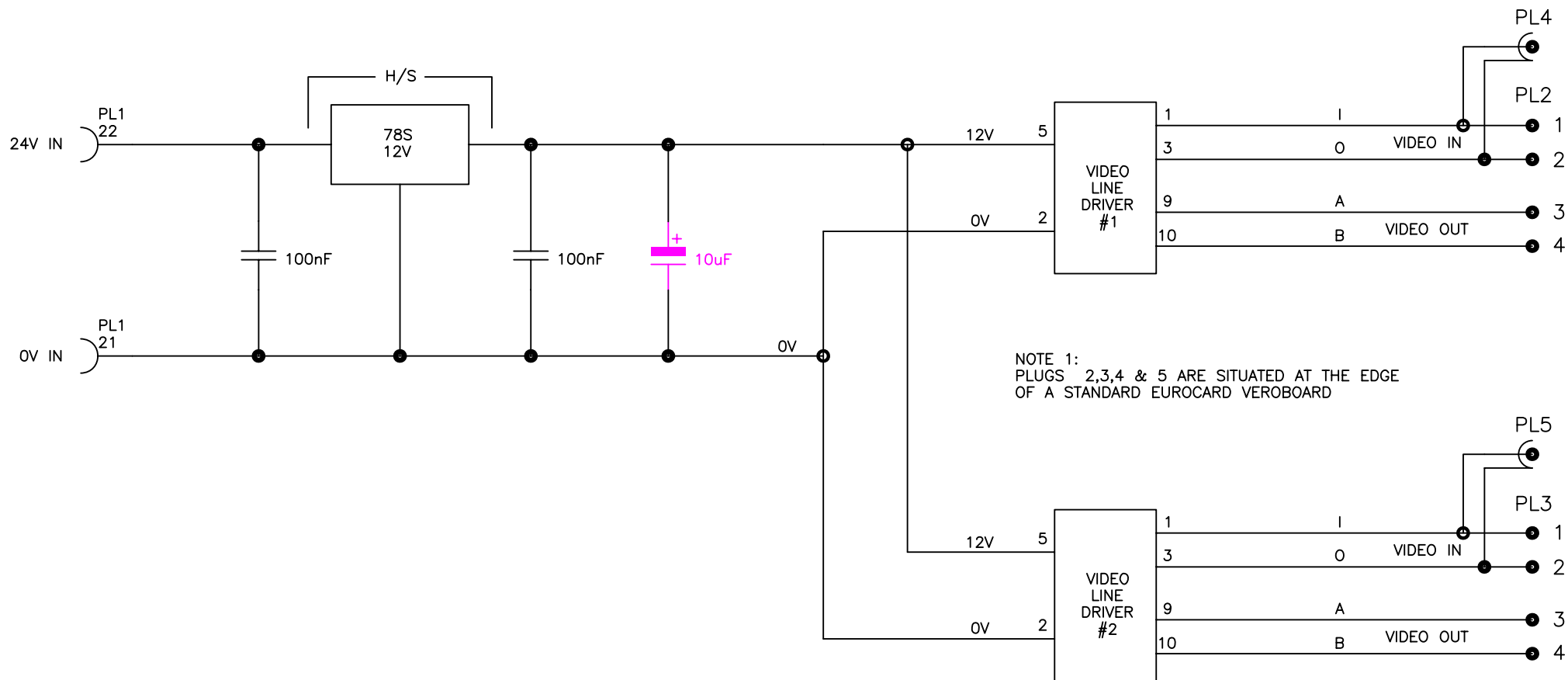
## Seaeye

Seaeye Marine Ltd.  
Seaeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

TITLE  
6068P LEAK DETECTION PCB  
(STAND ALONE)  
COMPONENT LAYOUT

SHEET 1 OF 1

| DRAWN          | APPROVED  | DATE     | Rev. Sht. |
|----------------|-----------|----------|-----------|
| C.G.PETTIT     | <i>AS</i> | 30/01/02 |           |
| DWG.No. S02530 |           |          | 11        |



NOTE 1:  
PLUGS 2,3,4 & 5 ARE SITUATED AT THE EDGE  
OF A STANDARD EUROCARD VEROBOARD

NOTE 2:  
VIDEO LINE DRIVER #2 IS NOT FITTED FOR  
6071ASP VERSION (SINGLE DRIVER ONLY)

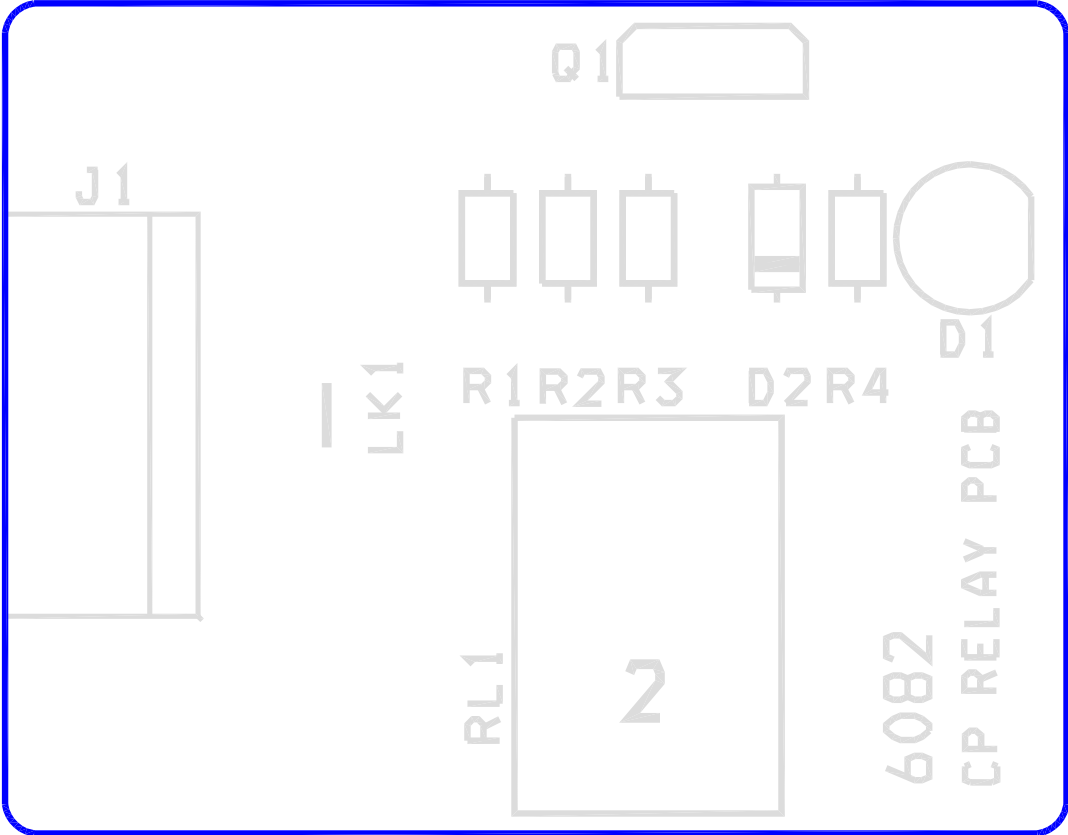
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| ISS | DESCRIPTION                   | APPD | DATE      | REF.       |  <b>SEAEYE MARINE LTD</b><br><small>AWARD WINNERS FOR INNOVATIVE DESIGN</small> | TITLE                 | DRAWN | APPROVED | DATE      |
|-----|-------------------------------|------|-----------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------|----------|-----------|
| 3   | NOTE FOR 6071ASP ADDED        |      | 19-04-01  | ECR545-LAH |                                                                                                                                                                    | DIGITAL SYSTEMS       | ESS   | JMR      | 28.OCT.97 |
| 2   | MINOR CORRECTIONS + PL4 & PL5 |      | 22-05-00  | L.A.H.     |                                                                                                                                                                    | 6071A CIRCUIT DIAGRAM |       |          |           |
| 1   | FIRST ISSUE                   |      | 28.OCT.97 |            |                                                                                                                                                                    | SHEET 1 OF 1          |       |          |           |
|     |                               |      |           |            |                                                                                                                                                                    |                       |       |          |           |

DWG.No. S00616

DWG.No. S00616



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FOR MANUFACTURE

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|-----|-------------|------|----------|-----|
|     |             |      |          |     |
|     |             |      |          |     |
|     |             |      |          |     |
| 1   | FIRST ISSUE |      | 07/01/00 |     |

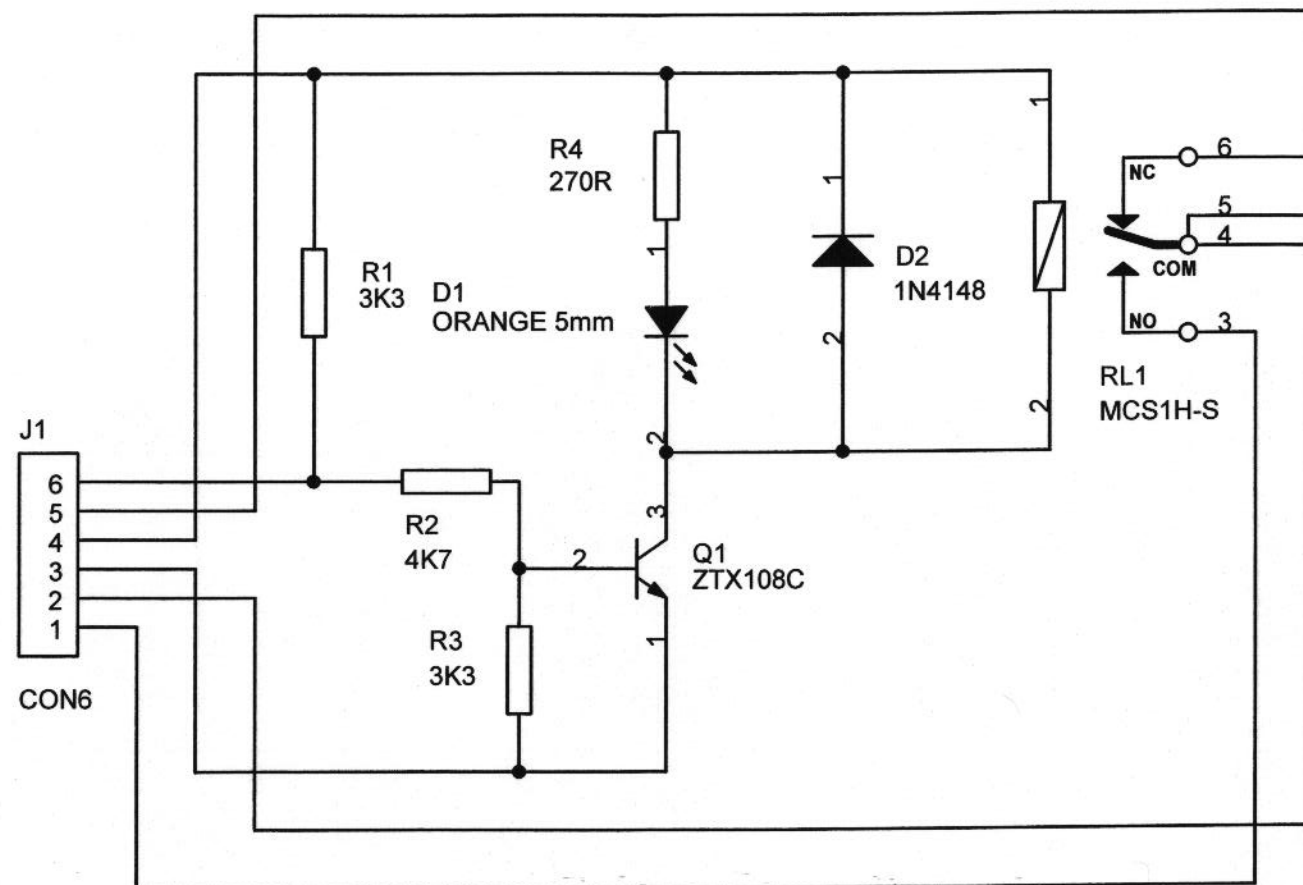


Seaeeye Marine Ltd.  
Seaeeye House  
Lower Quay Road  
Fareham  
Hampshire  
PO16 0RQ  
England  
Tel: +44 (0)1329 289000

TITLE  
DIGITAL SYSTEMS  
6082P CP RELAY PCB  
COMPONENT LAYOUT

SHEET 1 OF 1

| DRAWN            | APPROVED | DATE     |
|------------------|----------|----------|
| S.MASSIE         | JMR      | 07/01/00 |
| DWG.No. S0155311 |          |          |



| Iss | Description | APPR       | DATE     | REF |
|-----|-------------|------------|----------|-----|
| 1   | FIRST ISSUE | <i>DSP</i> | 07/01/00 |     |



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Hampshire  
England  
PO16 0RQ  
Tel: +44 (0)1329 289000

# TITLE

DIGITAL SYSTEMS  
6082P CP RELAY PCB  
CIRCUIT DIAGRAM

SHEET 1 of 1

|                   |                        |                  |
|-------------------|------------------------|------------------|
| DRAWN<br>S.MASSIE | APPROVED<br><i>DSP</i> | DATE<br>07/01/00 |
|-------------------|------------------------|------------------|

DRG No.: S0155211