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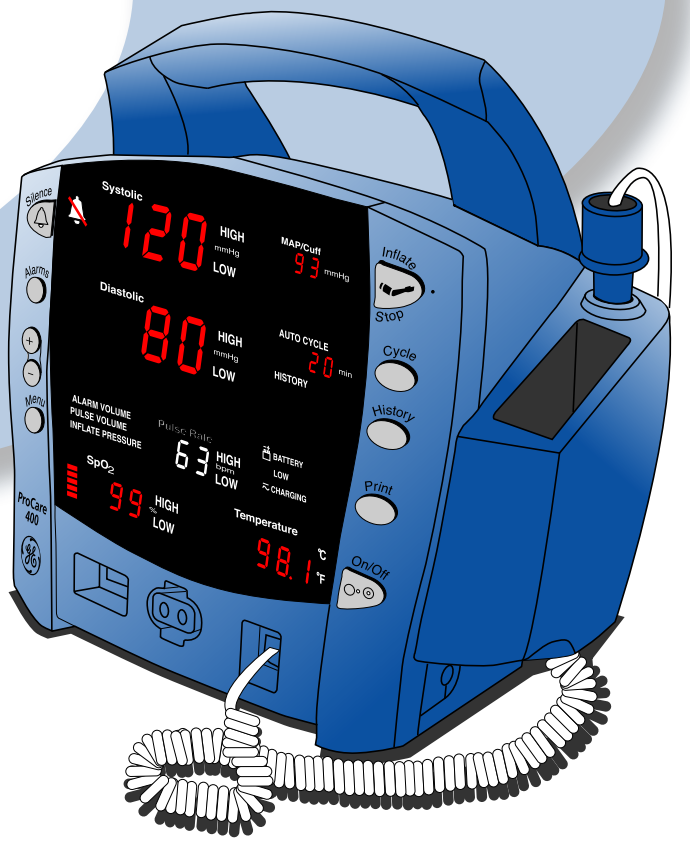
DINAMAP®
ProCare Monitor
Service Manual



DINAMAP® *ProCare* Monitor
Service Manual

This manual is for DINAMAP *ProCare* Monitors models 100, 200, 300, and 400, with or without printers.

- *ProCare* 100: BP, Pulse
- *ProCare* 200: BP, Pulse, and Temp
- *ProCare* 300: BP, Pulse, and SpO_2
- *ProCare* 400: BP, Pulse, Temp, and SpO_2

The model of the Monitor determines which parameters are in your monitor. Please refer to applicable sections.

Reissues and Updates

Changes occurring between issues are addressed through Change Information Sheets, Addendums, and replacement pages. If a Change Information Sheet does not accompany this manual, it is correct as printed.

Errors and Omissions

If errors or omissions are found in this manual, please notify:
GE Medical Systems *Information Technologies*
Technical Publications
4502 Woodland Corporate Boulevard
Tampa, FL 33614
1-877-274-8456

Part No. 2009381-001 A

Illustrations may show design models; production units may incorporate changes.

Hierarchy of Warnings and Cautions

A **general warning** is a statement that alerts the user to the possibility of injury, death, or other serious adverse reactions associated with the misuse of the device. A **warning** relates to steps in a procedure.

A **general caution** is a statement that alerts the user to the possibility of a problem with the device associated with its use or misuse. Such problems include device malfunction, device failure, damage to the device or damage to other property. A **caution** relates to steps in a procedure.

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2009381-001 Revision A

GE Medical Systems
Information Technologies

gemedical.com

NOTE: The information in this manual only applies to *ProCare* Monitor. It does not apply to earlier Monitors. Due to continuing product innovation, specifications in this manual are subject to change without notice.

1 Introduction

1.1 Scope of Manual

This Service Manual provides service and parts repair information about the DINAMAP *ProCare* Monitor. This manual is intended for use by trained service technicians who are familiar with electromechanical devices and analog circuit techniques.

WARNING

To reduce the risk of electric shock, do not remove cover or back of any component. Refer servicing to qualified service personnel.

Only qualified technicians should perform repairs to this equipment.

For information about operating the Monitor in a clinical environment, refer to the separate Operations Manual.

This Service Manual consists of the following five sections:

Section 1 describes this volume and tells you how to use it. Information is also provided about the physical and functional characteristics of the Monitor, and how to get assistance in the event the unit fails to function properly.

Section 2 provides a general overview of the *ProCare* Monitor including the user controls, external connections and product/parameter specification.

Section 3 presents principles of operation for the Monitor, including an overall system description and principles of operation at the component level.

Section 4 provides information about periodic and corrective maintenance of the Monitor and part list, replacement part lists. Procedures include module performance testing, and calibration procedures. Information is also provided to facilitate isolating faults to the subassembly level.

Section 5 provides component information about the Monitor, including assembly drawings and electrical schematics.

1.2 Manual Changes

If, in the normal course of using this manual, you notice errors, omissions, incorrect data, or if you can suggest comments that may help improve this manual, please send suggestion to:

General Electric Medical Systems *Information Technologies*
Technical Publications
4502 Woodland Corporate Boulevard
Tampa, Florida, 33614

Changes to the Service Manual, either in response to user input or to reflect continuing product improvements, are accomplished through reissue.

Changes occurring between reissues are addressed through Change Information Sheets and replacement pages. If a Change Information Sheet does not accompany your manual, the manual is correct as printed.

1.3 Service Policy

The warranty for this product is two years Parts and Labor. In the event of a monitor malfunction the monitor must be returned to General Electric Medical Systems *Information Technologies* to be covered under warranty. All repairs on products under warranty must be performed or approved by Product Service personnel. Unauthorized repairs will void the warranty. Only qualified electronics service personnel should repair products not covered by warranty.

1.3.1 Service Contracts

Service contracts may be purchased on most products. Contact your Sales Representative for details and pricing.

1.3.2 Assistance

If the product fails to function properly, or if assistance, service or spare parts are required, contact Customer Support. Before contacting Customer Support, it is helpful to attempt to duplicate the problem and to check all accessories to ensure that they are not the cause of the problem. If you are unable to resolve the problem after checking these items, contact General Electric Medical Systems *Information Technologies* at **1-877-274-8456**.

Prior to calling, please be prepared to provide:

- product name and model number
- a complete description of the problem

If repair parts or service are necessary, you will also be asked to provide:

- the product serial number
- the facility's complete name and address
- a purchase order number if the product is in need of non-warranty repair or to order spare parts
- the facility's General Electric Medical Systems *Information Technologies* account number
- the appropriate part number for spare or replacement parts

1.3.3 Return to Factory Repair Service

If your product requires warranty, extended warranty or non-warranty repair service, call Customer Support and a representative will assist you.

Estimates for non-warranty repairs are provided pre-set flat rates to facilitate prompt service. In cases where the product has external chassis or case damage, please advise the Customer Support representative when you call.

The Customer Support representative will record all necessary information and will provide you with a Return Merchandise Authorization Number (RMA). Prior to returning any product for repair, you must have a RMA number.

Contact General Electric Medical Systems *Information Technologies* at **1-877-274-8456** Monday through Friday, 8:00 a.m. to 6:00 p.m. EST, excluding holidays.

Packing Instructions
Follow these recommended packing instructions.

- Remove all hoses, cables, sensors, and power cords from the monitor before packing.
- Pack only the accessories you are requested to return; place them in a separate bag and insert the bag and the product inside the shipping carton.
- Use the original shipping carton and packing materials, if available.

If the original shipping carton is not available:

- Place the product in a plastic bag and tie or tape the bag to prevent loose particles or materials from entering openings such as hose ports.
- Use a sturdy corrugated container to ship the product.
- Pack with 4 to 6 in. of padding on all sides of the product.
- Tape securely to seal the container for shipping.

Insurance

Insurance is at the customer's discretion. The shipper must initiate claims for damage to the product incurred during shipping. Shipping damage is not covered under warranty.

1.3.4 Service Loaners

Loaner units can be provided at no charge during the warranty period if your product needs to be returned for factory service. If requested, loaner units will be shipped within 48 hours to your facility. General Electric Medical Systems *Information Technologies* will pay outgoing charges for a loaner sent for product repairs under warranty.

The customer is responsible for shipping charges to return the loaner unit to General Electric Medical Systems *Information Technologies*. All loaner units must be returned within 5 business days after receipt of your repaired unit.

Loaner and/or Rental products are available to meet your needs in non-warranty situations.

1.3.5 Repair Parts

Repair parts can be ordered from General Electric Medical Systems *Information Technologies:*

Via phone: 1-877-274-8456, or Via FAX: 1-800-421-6841

Exchange replacement assemblies such as Circuit Board Assemblies are also available; ask your Customer Support representative for details.

Most orders ship on the same day if received before 3PM Eastern Time. Overnight freight options are available to meet your critical needs.

All orders must include the following information:

- Facility's complete name, address, and phone number
- FAX number
- Your purchase order number
- Your General Electric Medical Systems *Information Technologies* account number (if available)

1.3.6 Replacement Accessories

Replacements such as hoses, sensors, etc. must be purchased from General Electric Medical Systems *Information Technologies* at 1-800-558-5102. Please have the Product Code of the item you wish to order, your purchase order and account number available.

1.4 Product Description

The Monitor is described below. Refer to Table 1-1 for specifications.

1.4.1 General Description

The *ProCare* Monitor provides a small, portable, easy-to-use monitoring alternative for sub-acute hospital and non-hospital settings. The DC-operated Monitor offers noninvasive determination of systolic blood pressure, diastolic blood pressure, mean arterial pressure, pulse rate, oxygen saturation, and temperature. Monitors are available with or without integrated printers. *ProCare* Monitors are intended for use in various markets, from the physician's office to sub-acute triage and medical/surgical units.

Indicators for external DC operation (from AC mains), battery operation, and battery charging are at the front of the unit.

At the time of publication, the available functioning parameters included the following:

- NIBP
- Nellcor™ Pulse oximetry (SpO2)
- Masimo Pulse oximetry (SpO2)
- Alaris™ Oral and Rectal thermometry
- thermal recorder/printer

Other DINAMAP *ProCare* features include:

- The ability to uses industry standard accessories
- Remote alarm capability
- Function keys for quick access to Alarm Silence, Monitor Menus, Print and NIBP Inflate/Stop

The *ProCare* Monitor operates from either an external DC power supply, or from the internal lead-acid storage battery. When external DC power becomes available, the system rapidly switches from battery power to external power.

2 Product Description

For your notes

2.1 Introduction

DINAMAP *ProCare* Monitors provide non-invasive determination of systolic blood pressure, diastolic blood pressure, mean arterial pressure, pulse rate, temperature, and oxygen saturation.

2.2. Product Configurations

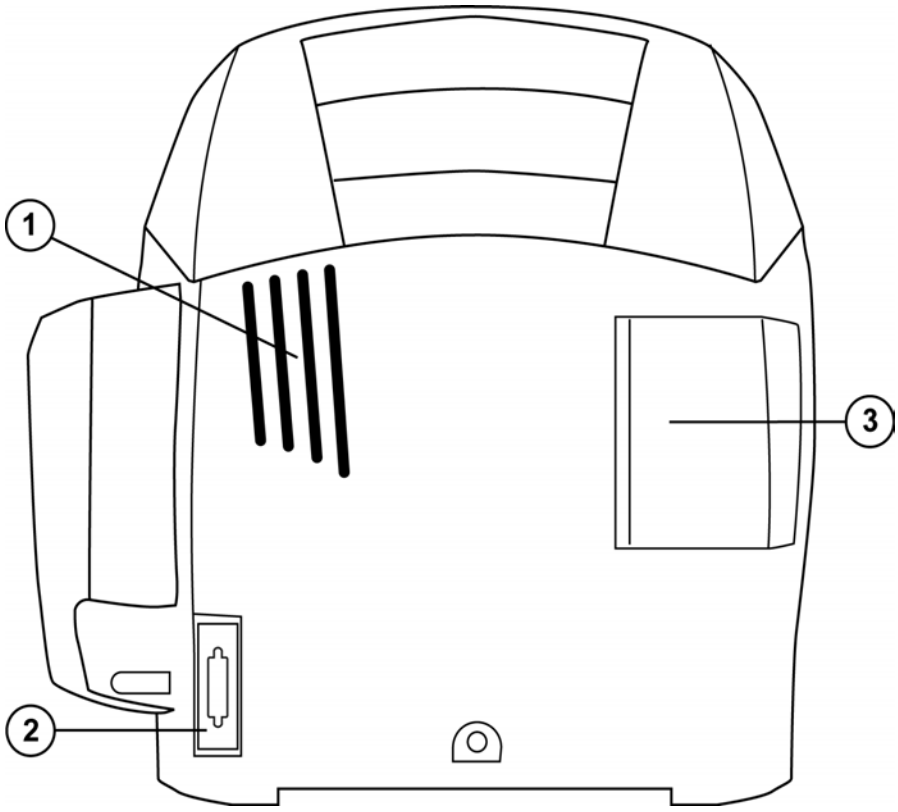
Each *ProCare* Monitor is supplied with an accessory pack. The contents of the pack vary according to model. Unpack the items carefully, and check them against the checklists enclosed within the accessory boxes. If an accessory is missing or if an item is in a nonworking condition, contact General Electric Medical Systems *Information Technologies* Customer Service immediately.

It is recommended that all the packaging be retained, in case the ProCare Monitor must be returned for service in the future.

2.3. Controls, Indicators, and Connectors

Descriptions of the items shown are listed on the pages that follow. For symbol definitions, refer to page 2-8 of this section.

2.3.1. *ProCare* Monitor Rear Panel Connections

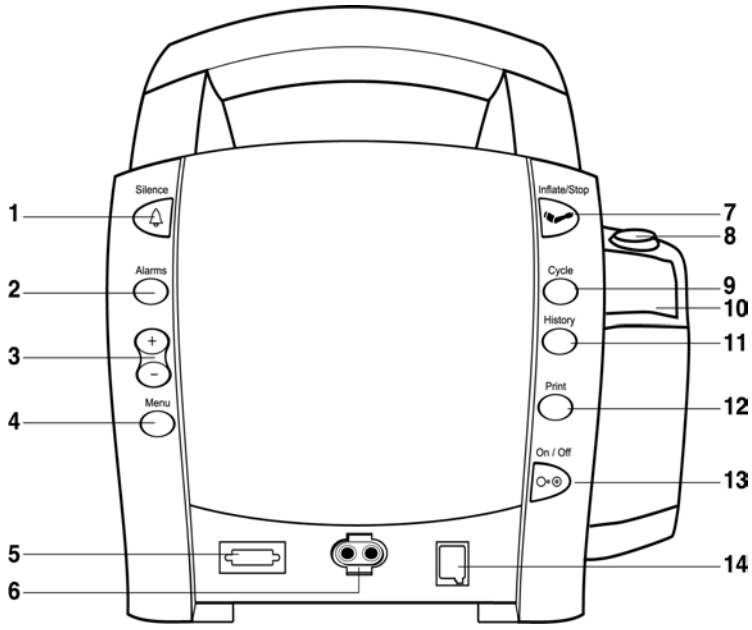


1 Speaker Grille.

2 Data interface connector: Host communications port (15 pin D-type RS-232 serial port) for use only with equipment conforming to IEC 601-1, configured to comply with IEC 601-1.

3 Printer Door (optional.)

2.3.2. Front Panel Controls and Indicators



Buttons

1 Silence button: Press to mute audible alarms. Any alarm active that is acknowledgeable is also removed whenever this key is pressed. When pressed after alarm sounds (silence active), the silence icon (bell) lights to indicate that audible alarms have been silenced for 2 minutes.

2 Alarms button: Press to view or adjust parameter alarm settings

3 +/- button (Plus/Minus): Press the + button to increment an adjustable setting and the - button to decrement an adjustable setting. This button is active only when a user-setting mode (limit or menu) is active.

4 Menu button: Press to access menu settings that can be adjusted while in clinical mode (i.e., **ALARM VOLUME, PULSE VOLUME, INFLATE PRESSURE;** refer to *Operating Modes* in this section for a description of clinical mode.)

5 SpO_2 sensor connector: SpO_2 sensor cable attaches here .

6 BP connector: BP cuff hose attaches here.

7 Inflate/Stop button: Press to start a manual BP determination or stop any BP determination.

8 Temperature probe holster: Temperature probe is stored here.

9 Cycle button: Press to start Auto Cycle or STAT mode.

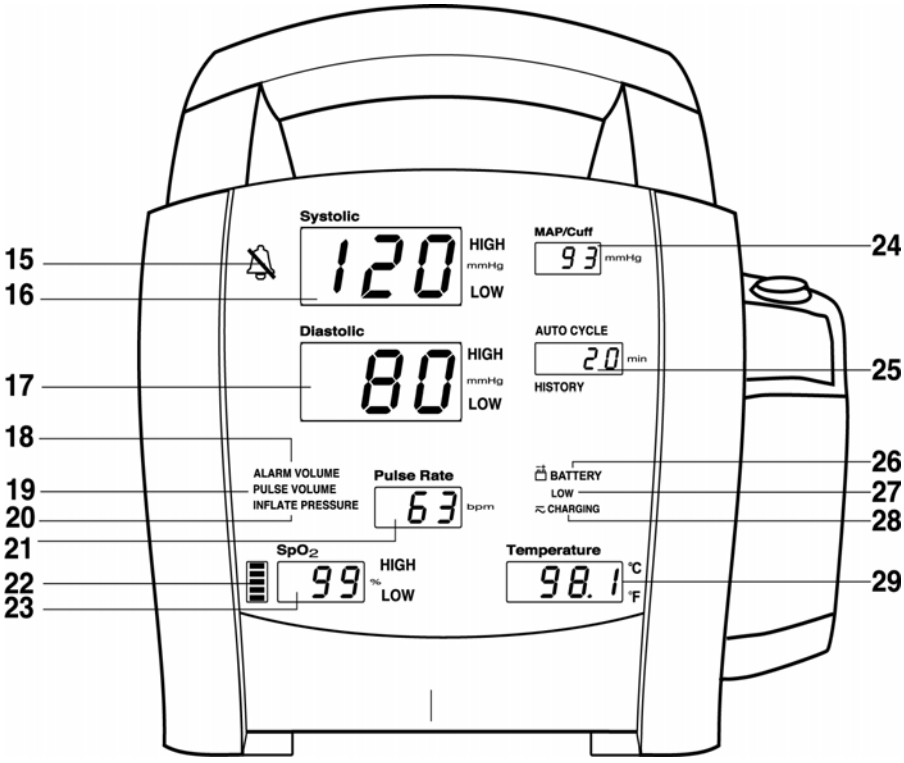
10 Temperature probe cover storage: Box of probe covers is stored here

11 History button: Press to activate the history mode. When activated, it displays the most recent entries stored. Press and hold the button for 2 seconds to clear all entries stored.

12 Print button: Press to print currently displayed values or all stored entries when in history mode.

13 On/Off button: Controls on/off state of monitor; push for power on and push again for power off.

14 Temperature probe connector: Temperature probe cable attaches here.



Front Panel

15 Silence icon: when Silence button is pressed after alarm sounds (silence active), silence icon (bell) lights to indicate that audible alarms have been silenced for 2 minutes.

16 Systolic window: 3-digit red LED indicates measured systolic Blood Pressure in mmHg.

17 Diastolic window: 3-digit red LED indicates measured diastolic Blood Pressure in mmHg.

18 Alarm volume indicator: lights to indicate you are making a change to the alarm volume.

19 Pulse volume: illuminates to indicate you are making a change to the pulse volume.

20 Inflate pressure: illuminates to indicate you are making a change to the inflation pressure.

21 Pulse Rate window: 3-digit yellow LED shows the pulse rate in beats per minute.

22 SpO_2 pulse indicator: Red LED bar flashes to indicate that real-time pulse rate measurements are being derived from SpO_2 signals.

23 SpO_2 window: 3-digit red LED indicates oxygen saturation in %.

24 MAP/Cuff window: 3-digit red LED indicates measured MAP in mmHg and shows instantaneous cuff pressure during BP determination.

25 Min window: Displays the BP mode if manual or STAT is the cycle time when in Auto Cycle mode.

26 Battery power indicator: Green LED indicates the Monitor is operating on battery power.

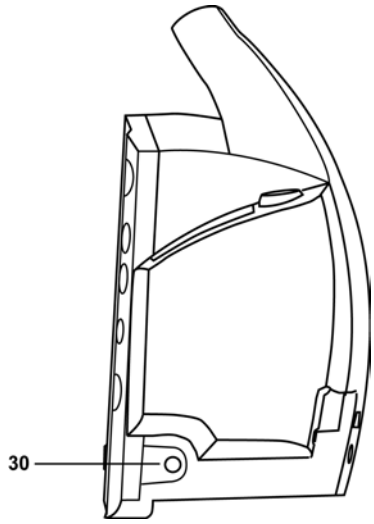
27 Low battery power indicator: Yellow LED indicates LOW charge status of internal battery.

28 Charging indicator: Green LED indicates presence of external power source and battery charging.

29 Temperature window: 4-digit red LED indicates measured temperature.

Right-Side Panel

30 External power socket: To be used with approved GE Medical Systems *Information Technologies* AC-DC power converter ONLY.



Symbols

The following symbols are associated with the *ProCare* Monitor.
Note: The model of the Monitor determines which symbols appear on it.


Attention, consult accompanying documents


Silence


Alarms


+ / -


Menu


Inflate/Stop


Cycle


History


Print


On/Off

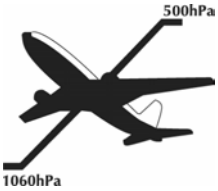

Battery Power


External Communications Port Connector


Charging


Defibrillator-proof type BF equipment


Class II equipment according to IEC 60536



Packaging label depicting the transportation and storage atmospheric pressure range of 500 to 1060 hPa.

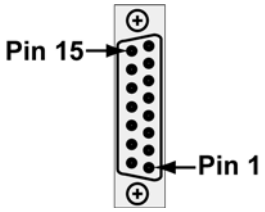
2.4. Host Communications Connector

All host port signals are NON-ISOLATED and should be connected to equipment conforming to IEC 601-1 ONLY. Where isolation of data communication is required, the isolated level converter should be used. If external alarm control is required, p/n 487208 (Isolated Remote Alarm Cable Assembly) should ALWAYS be used. Please refer to the Information Sheet included with the isolated remote alarm cable for operational details.

Note: When using remote alarm, the *ProCare* Monitor should be considered the primary alarm source. The secondary alarm is used for secondary purposes only.

2.4.1. DB15 Connector Pin Assignments

Connection Details
Host Port Connector (rear panel)



WARNING! Auxiliary equipment connected to the DINAMAP® *ProCare* Monitor will result in the formation of an electromedical system and thus must comply with the requirements of EN 60601-1-1/ IEC 601-1. All host port signals are NON-ISOLATED and should be connected to equipment conforming to IEC-601-1, configured to comply with IEC 601-1-1 ONLY. Where isolation of data communication is required, GE Medical Systems *Information Technologies* part number ILC1926 should be used. If external alarm control is required, GE Medical Systems *Information Technologies* part number 487208 (Isolated Remote Alarm Cable Assembly) should ALWAYS be used. When a high-priority condition is displayed on the Monitor, the remote alarm signal becomes active within 0.5 seconds. The active state of the alarm signal is an open circuit. In the inactive state the alarm signal is connected to ground. Please refer to the Information Sheet included with the isolated remote alarm cable for operational details.
Note: When using remote alarm, the *ProCare* Monitor should be considered the primary alarm source. The secondary alarm is used for secondary purposes only.

Pin #	Function
1	Common
2	Inverted TTL Transmit Data
3	Inverted TTL Receive Data
4	+5 volts
5	No connection
6	No connection
7	Common
8	Remote Alarm
9	No connection
10	No connection
11	RS232 Transmit Data (TxD)
12	No connection
13	RS232 Receive Data (RxD)
14	No connection
15	No connection

2.5. Compatible Parts

Reorder Codes	Product Code	ECAT
DINAMAP *ProCare* Monitor Operations Manual	2009360-001	
DINAMAP *ProCare* Monitor Service Manual	2009381-001	
Battery	633178CR	
Power Cord	316579	
Printer Paper (box of 10)	089100	E9050KP
DINAMAP Rolling Stand	003215	E9050JB
Pole Mounting Option	2009762-001	
Wall Mounting Option	2009763-001	
Hose Management Option	2009764-001	
Bed Rail Option	2009765-001	
Nurse Call	487208CR	
NIBP OPTIONS:		
Airhose 12 ft Adult/Pediatric, Screw Connector	107365	E9050LH
Airhose 24 ft Adult/Pediatric, Screw Connector	107366	E9050LJ
Airhose 12 ft Neonatal, Quick Disconnect	107368	E9050LK
Airhose 12 ft Adult/Pediatric, Quick Disconnect	88847	E9050KN
CUFF ASSORTMENT PACKS:		
CLASSIC-CUF® Assortment pack Includes 1 each: Infant, Child, Small Adult, Adult, Large Adult, Thigh Cuff	2692	E2692J
CLASSIC-CUF® Assortment Pack, Neonate Includes 2 Neo #1, 3 Neo #2, 5 Neo #3, 5 Neo #4, 5 Neo #3	2693	E2693J
SOFT-CUF® Assortment Pack Includes 1 each: Infant, Child, Small Adult, Adult, Large Adult, Thigh Cuff	2695	E2695J
SOFT-CUF® Assortment, Neonate Includes 2 Neo #1, 3 Neo #2, 5 neo #3, 5 Neo #4, 5 Neo #5	2694	E2694J
DURA-CUF® Assortment Pack Includes 1 each: Infant, Child, Small Adult, Adult, Large Adult, Thigh Cuff	2699	E2699J
DURA-CUF® Assortment Pack, Adult Includes 1 each: Infant, CHild, Small Adult, Adult, Large Adult, Thigh Cuff	2698	E2698J

Reorder Codes	Product Code	ECAT
DURA-CUF® Assortment Pack, Child Includes 2 Infant, 3 Child, and 1 Small Adult Cuff	2697	E2697J
Additional Blood Pressure Cuffs are available through http://www.gemedicalsystems.com		
TEMPERATURE		
IVAC* Turbo Temp Oral Temperature Probe, Long Cord	2008774-001	
IVAC* Turbo Temp Rectal Temperature Probe, Long Cord	2008775-001	
IVAC* Temperature Probe Covers	88015	E9050KK
SpO_2		
Nellcor**:		
Pulse Oximeter Cable DOC-10	2008773-001	
DuraSensor Adult Oxygen Sensor	DS100A	
Masimo***:		
Adult Reusable Sensor, 1/Bx (NR125)	2009745-001	
Cable (PC08)	2009743-001	
* IVAC is a trademark of Alaris Medical Systems		
** NELLCOR is a trademark of Mallinckrodt		
*** Masimo is a trademark of Masimo Corporation		

2.6. Specifications

CE 0086	This product conforms with the essential requirements of the Medical Device Directive. Accessories without the CE Mark are not guaranteed to meet the Essential requirements of the Medical Device Directive.
IPX1	The ProCare Monitor is protected against vertically falling drops of water and conforms to the IEC-529 standard at level **IPX1.** Vertically falling drops shall have no harmful effects to the monitor.
Power Requirements	
MAINS	Protection against electrical shock - Class II
AC INPUT VOLTAGE	120 VAC/60 Hz 24W
Alternate Sources	Protection against electrical shock - Class II
DC INPUT VOLTAGE	24 VDC (nominal), at 1A
	The AC Mains adapter contains a nonresettable and nonreplaceable fuse.
Battery	6 volt, 3.3 amp-hours. Protected by internal auto-resetting fuse and thermal protection.
Minimum Operation Time	2 hrs (5 min cycle with adult cuff at 25° C, SpO2 active at 60 bpm, temp in monitor mode, printout of current values every 5 minutes) from full charge.
Fuses	The Monitor contains four fuses. The fuses are auto-resettable and mounted within the Monitor. The fuses protect the low voltage DC input, the battery, the remote alarm output and the +5V output on the host port connector.
Environmental	
Operating Temperature	+5° C to + 40° C (-41 F to +104 F)
Storage Temperature	-20° C to +50° C (-4 F to +122 F)
Operating Atmospheric Pressure Range	700 to 1060 hecto Pascal
Humidity Range	0% to 95% non-condensing
Radio Frequency	Complies with IEC Publication 601-1-2 (April 1993) Medical Electrical Equipment, Electromagnetic Compatibility Requirements and Tests, and CISPR 11 (Group1, Class A) for radiated and conducted emissions.

Mechanical		
Dimensions	Height:	9.8 in (25.0 cm)
	Width:	9.8 in (24.8 cm)
	Depth:	6.9 in (17.5 cm)
Weight including battery	7.8 lb (3.5 Kg)	
Mountings	Self Supporting on rubber feet.	
Portability	Carried by built-in handle	

Mechanical	
Classification Information	Mode of Operation: Continuous degree of Protection against harmful ingress of water: Drip-Proof IPX1.

NIBP			
CUFF PRESSURE RANGE	Adult Neonate	0 mmHg to 290 mmHg 0 mmHg to 145 mmHg	
DEFAULT TARGET: CUFF INFLATION	Adult Neonate	150 ± 15 mmHg 110 ± 15 mmHg	
TARGET CUFF INFLATION ADJUSTMENT RANGE	Adult Neonate	100 - 250 mmHg (5mmHg Steps) 100 - 140 mmHg (5 mmHg Steps)	
BLOOD PRESSURE DETERMINATION TIME	Adult Neonate	120 seconds maximum 85 seconds maximum	
PULSE RATE: RANGE	Adult Neonate	30 - 200 BPM ±3% 30 - 220 BPM ±3%	
BLOOD PRESSURE: MEASUREMENT RANGES	Systolic mmHg	MAP mmHg	Diastolic mmHg
Adult Neonate	30 - 290 30 - 140	20 - 260 20 - 125	10 - 220 10 - 110
NIBP ACCURACY	Meets AAMI/ANSI standard SP-10 AAMI/ANSI standard: ±5 mmHg mean error Intra-arterial method: ± 8 mmHg standard dev.		

Temperature - Alaris Thermometry		
SCALES	Fahrenheit	Celsius
RANGE	Max Min	42.2° Celsius 108.0° Fahrenheit 31.6° Celsius 88.9° Fahrenheit
Monitor Mode Accuracy	±0.1° C	± 0.2° F (when tested in a calibrated liquid bath; meets ASTM E1112, Table 1 in range specified)
Predictive Mode Accuracy	±0.6° C	±1.0° F
Determination Time	Less then 60 seconds	

SpO_2 - Nellcor Pulse Oximetry	
SpO_2 Range and Accuracy	adult/neonate: 70-100% ±3.5 digits
Pulse Rate Range and Accuracy	30 - 250 BPM ±3 BPM
Saturation Pitch Indicator	Pitch changes with saturation
Sensor Connect/Disconnect from Patient	The Monitor detects the connection or disconnection or a sensor to the patient within 15 seconds

SpO_2 - Nellcor Pulse Oximetry	
Sensor Connect/Disconnect from Monitor	The monitor detects the attachment or disconnection of a sensor from the Monitor within 5 seconds.
Pulse Detection	The Monitor detects a pulse of enters a no-signal state within 15 seconds of being attached to a patient.
Loss of Pulse	the monitor detects loss of pulse from patient and enters a no signal state within 10 seconds.
Nellcor Sensors - SpO_2 Range 70% to 100%	
OxiMAX Sensor Models Single Patient Use	
MAX-A,* MAX-AL*	±2
MAX-N†*	±2
MAX-P*	±2
MAX-I*	±2
MAX-R‡	±3.5
OxiCliq Sensor Models Single Patient Use	
OxiCliq A	±2.5
OxiCliq P	±2.5
OxiCliq N†	±2.5
Reusable Sensor Models	
D-YS	±3
D-YS & D-YSE	±3.5
D-YS & DYSPD	±3.5
DS-100A	±3
OXI-A/N	±3
OXI-P/I	±3
* The accuracy specification under motion conditions is ±3. For a definition of motion contact GE Medical Services Technical Support. † The MAX-N and the OxiCliq N were tested on patients > 40 kg. ‡ The accuracy specification has been determined between saturations of 80-100%	

SpO_2 - Masimo Oximetry	
Saturation Range	1% - 100%
Pulse Rate and Accuracy	25-240 BPM ±3 digits
Perfusion Range	0.02 to 20%

SpO_2 - Masimo Oximetry	
Accuracy and Motion Tolerance	
Without Motion - Adult/Ped*	70 to 100% ±2 digits
Without Motion - Neonate*	70 to 100% ±3 digits
With Motion - Adult/Ped/Neo**†	70 to 100% ±3 digits
Low Perfusion‡	70 to 100% ±2 digits 0 to 69% unspecified
Pulse Rate	
Without Motion	25 to 240 beats/min ±3 digits
With Motion	normal physiologic range 25 to 240 beats/min ±5 digits

* The Masimo SET® SpO_2 parameter with LNOP-Adt sensors has been validated for no motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies in the range of 70-100% SpO_2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

**The Masimo SET® SpO_2 parameter with LNOP-Adt sensors has been validated for motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies while performing rubbing and tapping motions at 2 to 4 Hz at an amplitude of 1 to 2 cm and a nonrepetitive motion between 1 to 5 Hz at an amplitude of 2 to 3 cm in induced hypoxia studies in the range of 70-100% SpO2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

†The Masimo SET® SpO_2 parameter with LNOP-Neo Pt sensors has been validated for neonatal motion accuracy in human blood studies on neonates while moving the neonate's foot at 2 to 4 cm against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus, one standard deviation.Plus or minus one standard deviation encompasses 68% of the population.

‡The Masimo SET® SpO_2 parameter with has been validated for low perfusion accuracy in bench top testing against a Biotek Index 2 stimulator and Masimo's simulator with signal strengths of greater than 0.02% and a % transmission of greater than 5% for saturations ranging from 70 to 100%. This variation equals plus or minus, one standard deviation.Plus or minus one standard deviation encompasses 68% of the population.

3 Principles of Operation

For your notes

3.1 Introduction

This section provides overall theory of operation and functional description of the *ProCare* Monitor. The *ProCare* Monitor comes in six different configurations:

- *ProCare* 100 - Capable of monitoring Blood Pressure (BP) and Pulse
- *ProCare* 200 - Capable of monitoring Blood Pressure (BP), Pulse, and Temperature
- *ProCare* 300 Nellcor - Capable of monitoring Blood Pressure (BP), Pulse and SPO2 (Nellcor technology)
- *ProCare* 300 Masimo - Capable of monitoring Blood Pressure (BP), Pulse and SPO2 (Masimo technology)
- *ProCare* 400 Nellcor - Capable of monitoring Blood Pressure (BP), Pulse, SPO2 (Nellcor technology), and Temperature
- *ProCare* 400 Masimo - Capable of monitoring Blood Pressure (BP), Pulse, SPO2 (Masimo technology), and Temperature

The model of your monitor determines which parameters are in your monitor.

Using the ProCare monitor, a clinician can view, print and recall data that is derived from each parameter. The Monitor is also capable of alerting the clinician to changes in the patient's condition. All of the main operations of the ProCare Monitor are easy-to-use and only a button-touch away. Please review the factory default settings and, where applicable, enter settings appropriate for your use.

3.2 Overall Principles of Operation

The following paragraphs provide a general system interface relationship. The general block diagram is located in Figure 3-1.

The *ProCare* Monitor is a portable unit that receives input power from an internal rechargeable battery.

When the ON/OFF button is pressed, the Main Board is brought out of a sleep mode and turns on the power regulators. The power regulators provide conditioned power from the Lead Acid Battery. The external DC source is used only to charge the Lead Acid Battery. Once the *ProCare* Monitor is energized, a self-test is performed. The self-test automatically tests the main functions of the *ProCare* Monitor. Failure of the self-test will set the *ProCare* Monitor into a fail-safe mode with an audio alarm.

Under normal operating condition, the *ProCare* Monitor is ready to record the patient vital signs using three external attachments: the temperature probe, SPO2 sensor, and cuff. Interface with a central station or other device is accomplished through the host communication port on the back of the *ProCare* Monitor.

3.2.1 SpO_2 (Model 300 and 400)

The SpO_2 probe has a built-in sensor. When the SpO_2 sensor is attached to the SpO_2 connector and patient, the probe senses the heart rate and oxygen saturation. The analog signals are routed to the SpO_2 PWA (Nellcor or Masimo). The analog signals are analyzed on the SpO_2 PWA. The results are digitized and sent to the Main Board via opto couplers. The couplers provide patient isolation as well as serial data interface. The Main Board temporarily stores the data and routes it to the UI Board for display and/or printer.

A reset signal to the SpO_2 PWA is also provided so that the power up sequencing is corrected. If the SpO_2 circuit quits communicating to the Main Board, the Main Board will attempt to reset the SpO_2 PWA.

3.2.2 Cuff Blood Pressure (BP) and Pulse

When the cuff and hose are attached to the *ProCare* Monitor and a Non-Invasive Blood Pressure (NIBP) determination is initiated, the pump inflates the cuff. Pressure transducers PT1 and PT2 monitor pressure information. The pneumatic manifold has one valve, which is used to deflate the cuff. Valve control is through the Main Board. Once determinations are made for the systolic BP and diastolic BP, the Main Board calculates the pulse rate/ Mean Arterial Pressure (MAP). The results are then displayed on the UI Board and sent to the printer (if specified).

The Pneumatic Valve/Manifold (PVM) device is controlled by the secondary processor. The secondary processor monitors pressure information from PT2. If an over-inflation condition occurs, the OVERPRESSURE signal is routed to the PVM to release the air pressure. The Main Board also generates an alarm condition with the speaker sounding and error code message on the UI Board.

3.2.3 Temperature (Model 200 and 400)

The *ProCare* Monitor uses Alaris Turbo Temp technology to measure patient temperature. The Turbo Temp probe contains a heating element that pre-heats the probe to reduce determination time. The heating function is controlled by the Main Board. The Turbo Temp probe also contains a thermistor that indicates the temperature. When the probe is attached to the temperature connector and patient, the signal generated by the thermistor is routed to the Main Board. The Main Board converts the thermistor signal along with status information (i.e ORAL or RECTAL probe indicators) to a DIGITAL signal. The Main Board then processes the DIGITAL signal and displays the patient temperature on the UI Board and printer in Celsius or Fahrenheit.

3.2.4 Host Communication Port

The Host Comm Port is used to interface the *ProCare* Monitor with other electronic devices (a central nurse's station or remote alarm device.) Signals can be sent to the *ProCare* Monitor to initiate blood pressure determinations and other functions. Patient data can also be retrieved through this port. For further information, reference the Dinamap *ProCare* Series Host Communication manual.

3.3 Functional Description

The following paragraphs provide the functional interface relationship. The *ProCare* Monitor contains a number of electrical & electro-mechanical assemblies. These assemblies are:

* Main Board PWA

* User Interface (UI) Board PWA

* SPO2 PWA (optional)

* Printer (optional)

* Pneumatic Valve/Manifold (PVM)

* Optical Switch (optional)

3.3.1 Main Board PWA

The *ProCare* Main Board is based on the Motorola MMC2107 integrated microprocessor. The microprocessor integrates Flash ROM, RAM, A/D converter with input multiplexor, SPI interface, and timers into one chip. This microprocessor is the primary processor for the *ProCare* Monitor. It services and controls the Patient Parameter Interface (PPI) devices, printer, UI Board, Real Time Clock, audio circuit, and host communication. The secondary processor controls the watchdog, pneumatic safety interlock, timing check, primary processor reset, and power supply control. The secondary processor is powered at all times.

Independent software in the primary and secondary processor periodically communicate when the software systems are operating properly. When either system stops processing or detects an error, it stops communicating with the other. Either system, upon detecting a failure, can assert a safe state (herein called FAILSAFE) of the hardware.

Upon entering a FAILSAFE condition, the Main Board will perform the following tasks:

* Parameter monitoring disabled

* Alarm tone sounding from speaker

* Pneumatic FAILSAFE (deflate the cuff, pump off)

* Normal communications interface disabled

* Remote alarm control inactive

* Hard keys except ON/OFF key inactive

The ON/OFF key can reset the Monitor and end the FAILSAFE condition. The FAILSAFE condition will terminate automatically after 10 minutes to preserve battery power.

All regulated DC power, isolated and non-isolated is generated on the Main Board from Battery supply. The external DC input is used to charge the battery via charging circuitry on the Main Board.

3.3.2 User Interface (UI) Board PWA

The UI Board is used as a message center. It displays patient vital signs, alarms status, monitor set-up, limit violation, BP cycle and the time the data was received. The primary processor on the Main Board controls the UI Board. When the primary processor reads the parameter signals, it decodes the signals and routes the display information to the UI Board.

The UI assembly also provides hardkey switches for the *ProCare* Main Board. The primary processor asserts a HIGH on the 16 outputs of the 1-of-16 decoder/demultiplexer one at a time and then reads at the signal on SW_MUX. A LOW on SW_MUX indicates that the switch is asserted.

3.3.3 SPO2 PWA

The *ProCare* monitor can be configured for use with either a Nellcor or Masimo SPO2 PWA. The SPO2 PWA provides continuous readings of oxygen saturation and pulse rate. Additional circuitry on the Main Board provides power, data communications, and isolation between SPO2 PWA and primary processor.

Patient data received from the finger sensor is filtered, amplified, and analyzed on the SPO2 PWA. The information is sent to the Main Board via the optically coupled electrically isolated serial connection. The primary processor receives the data and routes it to the UI board for display. The data is also sent to the printer if specified.

3.3.4 Printer

The printer receives power from the Main Board and communicates with the primary processor. Printer presence and print head temperature is indicated by PR_TH signal to the primary processor. When a print command is sent to the printer from primary processor, the following will occur:

* PR_CLK signal - transfer the data into print head

* PR_DI signal - serial dot to be printed

* PR_LAT signal - latch the data stream into the head

* PR_ST1-6 - cause the head to print various sections

* PR_M1-4 signals - control power sequentially to the two stepper motor windings

Together these signal (CONTROL DATA) cause the printer to print a graphic hardcopy of the patient vital sign values and trend data. It also causes the printer to print a hardcopy of error logging and service record data.

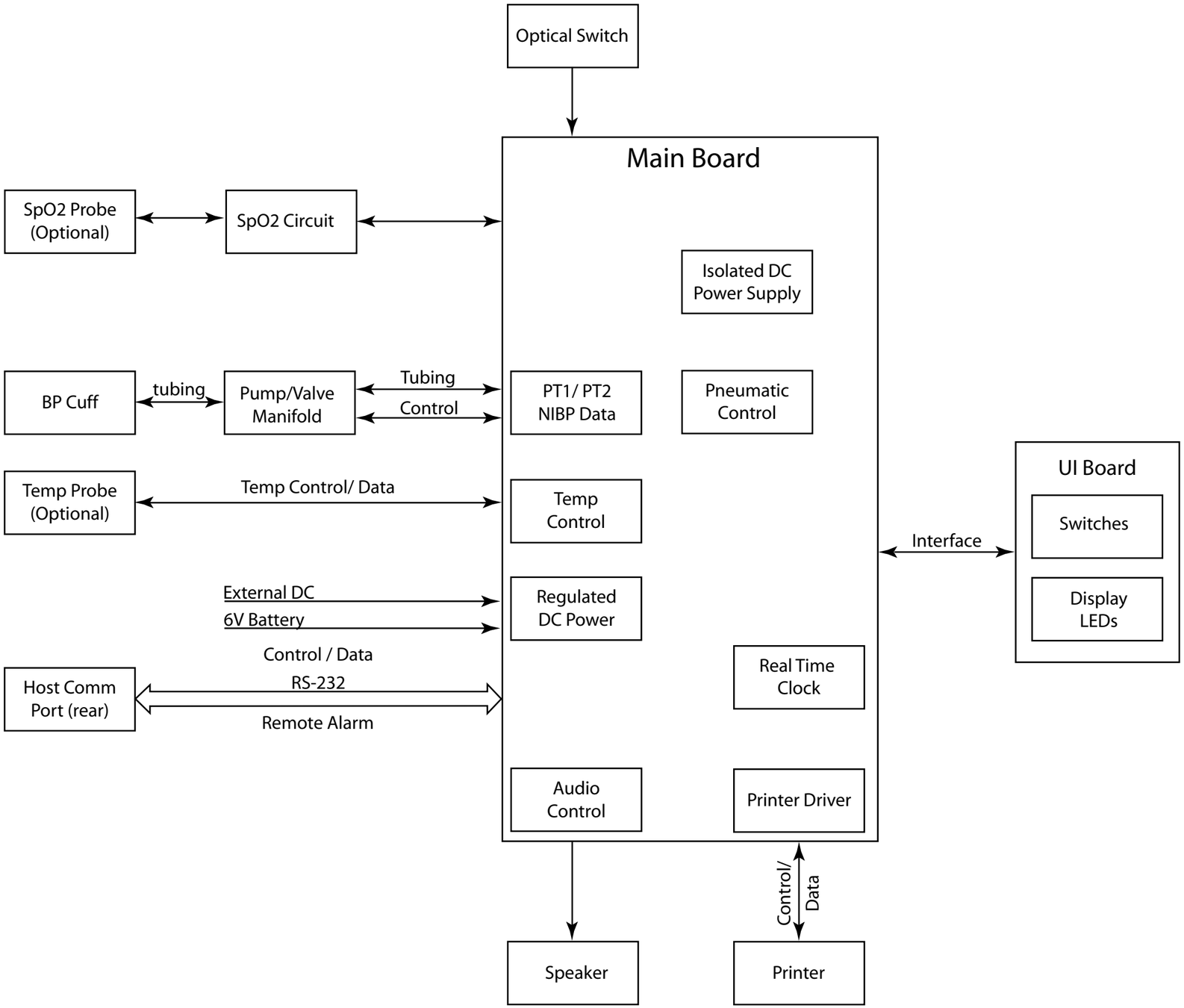
The printer has a built-in sensor to monitor the printer paper presence. When the printer is out of paper, it sends a PAPER OUT signal to the primary processor.

3.3.5 Pneumatic Valve/Manifold (PVM)

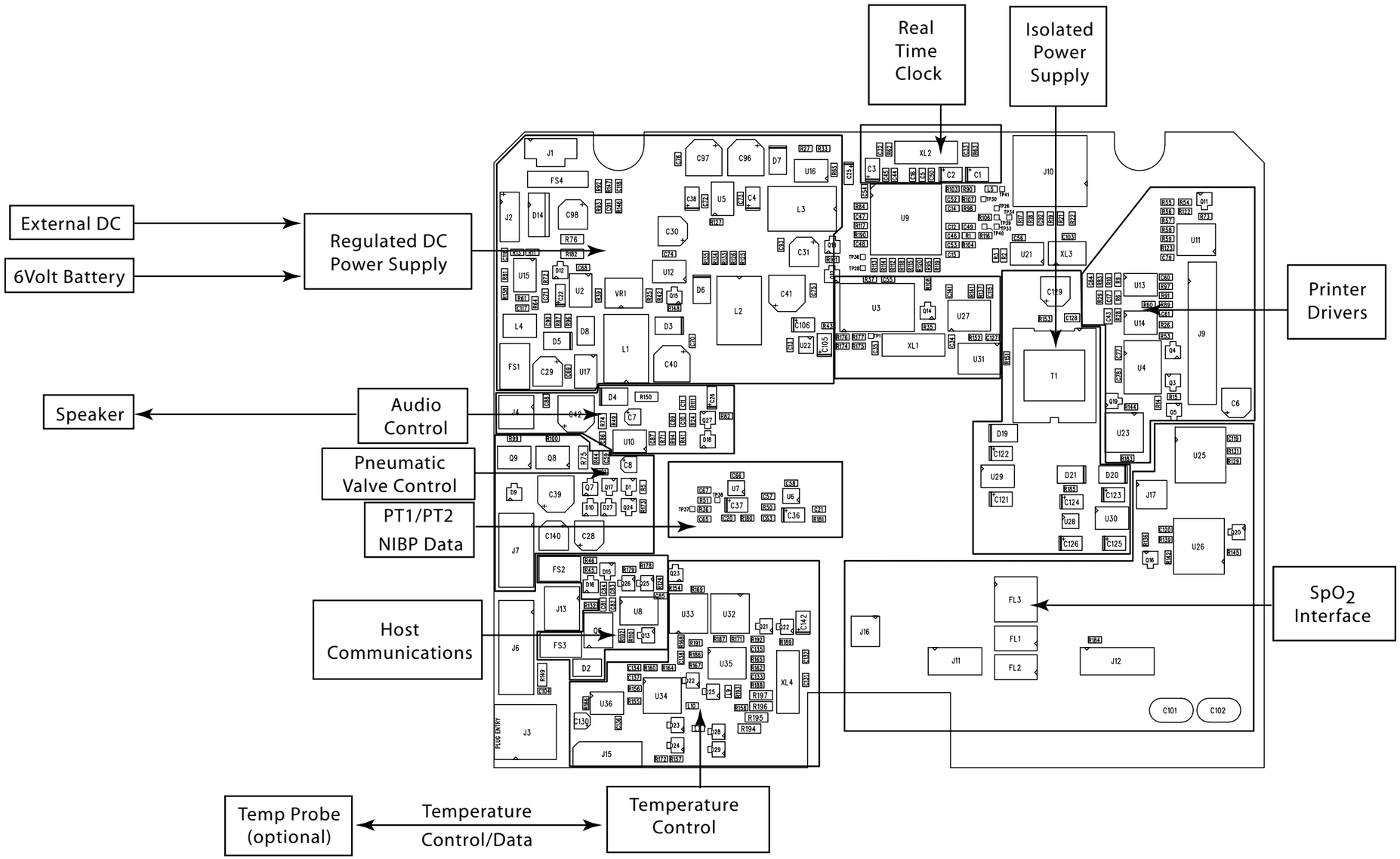
The PVM assembly consists of a pump, a deflate valve, and a dump valve. The PVM inflates/deflates the cuff during BP determinations. During normal operation the PVM is controlled by the primary processor. If a failsafe mode or overpressure condition occurs, the secondary processor provides the appropriate control signals to insure a safe condition, where the cuff vents to ambient atmosphere pressure.

3.3.6 Optical Switch

The optical switch indicates whether the temperature probe is inserted in the probe holder or not. The Main Board powers the switch.



ProCare Vital Signs Monitor - System Block Diagram (1 of 2)
page 3-9/10



(VIEWED FROM TOP COMPONENT SIDE)

ProCare Vital Signs Monitor - Main Board Diagram (2 of 2)
page 3-11/12

4 Calibration & Maintenance

For your notes

4.1 Introduction

This section contains general Monitor service procedures, including alarm code interpretation, service mode operation, and periodic maintenance and battery care. Refer to Section 5 for disassembly and reassembly procedures and related component service information.

4.2 Configuring Your *ProCare* Monitor

4.2.1 Unpacking and Preparation for Installation

1.Unpack and identify the contents of all shipping materials.

2.Remove the *ProCare* monitor.

3.Unpack the external DC Power Input.

4.Insert the external DC Power Input connector into the DC input on the lower right side of the monitor.

5.Plug the DC Power Input transformer into a Hospital Grounded AC receptacle. The word CHARGING will illuminate green on the front of the monitor indicating that an external power source is available.

Prior to usage, it is necessary to charge the monitor for 12 hours.

4.2.2 Set the Date and the Clock

Setting the Date and Time

To set the date and time on the *ProCare* Monitor, you must first access the configuration mode. The following table illustrates the menus and the corresponding LCD display graphics.

Setting	Window	Text in Window
SpO_2 Averaging	Pulse Rate and SpO_2	nOd
SpO_2		SAt
Temp Unit of Measure	Temperature	°C or °F
Year	Systolic	Yr
Month	MAP/Cuff	MtH
Day	Diastolic	dAY
Hour	min	Hr
Minute	min	Min

Procedures

1. With the Monitor off, press and hold the Menu button at the same time as pressing the On/Off button for 3 seconds.

2. The Monitor automatically switches on in configuration mode.

3. To set the date and time, press the Menu button to move from one setting to another. (You will need to press the Menu button several times until the year setting appears. Use the **+/-** buttons to increment or decrement the individual settings.) Once you are finished changing a setting, press the Menu button again to move to the next setting.

Note: For the date and time to be saved, you must advance the menu through the **min** setting.

4. To exit config mode, press the **On/Off** button.

4.2.3 Parameter Level Functional Testing

After the initial configuration is complete, perform functional testing of each of the parameters, using the accessories supplied with the *ProCare* Monitor.

Refer to the *ProCare* Operator's Manual for more detailed parameter-specific instructions.

Perform a blood pressure by connecting the supplied hose and cuff together, then attaching to the front of the *ProCare* Monitor. Press the **Inflate/Stop** on the front to begin the NIBP cycle.

Connect the supplied temperature probe to it’s corresponding connection. A predictive temperature will begin once the probe is removed from its holster. Replace the probe after completion of the Temp cycle.

·The SpO_2 sensor is an assembly consisting of two parts: the DS-100A, and the extender cable DOC-10. Connect the cables prior to attaching to the monitor. An SpO_2 reading will be displayed within moments of attaching the sensor to either a Nellcor simulator or to your finger.

4.3 Periodic Maintenance

4.3.1 As Required

Perform the following maintenance procedures as required.

4.3.1.1 Integrity of Hoses and Cuffs

When the pneumatic integrity of any NIBP cuff and hose is in doubt, replace the cuff and hose, and discard the questionable accessories.

4.3.1.2 Cleaning of Monitor

CAUTION: Do not clean Monitor with isopropyl alcohol or other solvents.

Wipe the exterior of the Monitor with a cloth slightly dampened with mild detergent or normal hospital bactericides. Use dishwashing detergents such as IVORY and JOY (registered trademarks of Procter & Gamble Corp.), or PALMOLIVE (registered trademark of Colgate-Palmolive Corp.)

Do not immerse unit.

4.3.1.3 Cleaning of Accessories

Clean the adult cuffs supplied for use with the monitor by hand washing in warm, soapy water. However, take care to avoid entry of water into the cuff and hoses at any time. If water enters the cuff, dry the cuff by passing air through it.

The neonatal cuffs are for single patient use - discard if they become soiled.

Clean cuffs and hoses with a cloth slightly dampened with mild detergent.

Do not immerse hoses.

Do not immerse cuffs without prior application of cuff hose caps.

Clean SpO2 sensor surface before and after each patient use. Clean SpO2 sensor with a cloth slightly dampened with a mild detergent. Wipe SpO2 sensor to ensure all detergent residue has been removed.

Compatible cleaning and disinfecting solutions are:

Chlorine bleach disinfectant, 5.25%, 0.75 cup per gallon of water.

CAUTION: Do not apply isopropyl alcohol to the Monitor - some parts can become marred and cracked.

Cidex Formula 7 (registered trademark of Johnson & Johnson Medical Products, Inc.) or pHisoHex (registered trademark of Winthrop-Breon Laboratories.)

Quaternary-based germicidal detergents like VESTAL INSURANCE (registered trademark of the Vestal Corp.), HI-TOR PLUS (registered trademark of the Huntington Corp.), or VIREX (registered trademark of S.C. Johnson & Son Corp.)

For the above, follow manufacturers' recommendations for dilution rate and use. These recommendations are not an endorsement of the manufacturers or of the effectiveness of these materials for cleaning or disinfecting.

4.3.1.4 Long-Term Storage

If it becomes necessary to store the Monitor for an extended period of time, remove all attached accessories. Attach the original packing inserts, and place the monitor into the original shipping container.

Long-term storage of a discharged lead-acid battery can permanently degrade its storage capacity. Therefore, the battery should be fully charged before storage.

Batteries in storage should be charged every six months to maintain their capacity.

Elevated temperatures will shorten battery life and can lead to permanent battery damage.

4.3.2 Annual Procedures

Perform the test procedures described in section 4.6 every twelve months, or whenever the accuracy of of the monitor is in doubt.

4.4 Care of the Storage Battery

The Monitor uses one Lead-Acid storage battery. The battery can be charged at any time without reducing the charging capacity.

4.4.1 Battery Charging

The Monitor charges the Lead-Acid battery whenever the AC power supply is in use. The Monitor automatically senses if the battery needs recharging. Battery charging will continue as long as the Monitor is connected to the AC power supply, even when the Monitor is turned off.

·Batteries should be charged before first use or after long periods of storage.

·The battery should be charged for 8 hours before use, as a charged battery loses some charge when left in storage. It is possible to use the Monitor while the Monitor is charging.

·The battery should be charged at room temperature (59° F - 86° F; 16° C - 30° C).

·It is normal for the battery to become warm during charging or after use.

·Batteries can be charged or topped-off at any time. It is not necessary to wait until they are fully discharged.

·If the monitor is idle for extended periods, it should be fully charged once a month to ensure optimum performance.

4.5 Safety Testing

To adequately test the safety and integrity of the *ProCare* Monitor, the following test equipment is recommended:

- 12VDC Power Supply
- DMM (Fluke 8842 or equivalent)
- NIBP Analyzer (DNI Nevada "Cufflink" or Equivalent)
- Adult BP Cuff, Neonate BP Cuff, hose, inflation bulb, and mandrel
- Inflation bulb and associated tubing
- Calibration Kit, p/n 320246 available through GE Medical Systems
- SPO_2 Simulator (for appropriate SPO_2 type if SPO_2 is installed)
- SPO_2 Cable (for appropriate SPO_2 type, if SPO_2 is installed)
- TE 1811 Temperature Probe Simulator (if TEMP is installed.) The Temperature Simulator for the Alaris System is available from Alaris Medical Systems, Inc. (619) 458-7000
- Printer Paper (if PRINTER is installed)

CAUTION! Calibration equipment should always be kept dry and free of particulate matter. Moisture or foreign substances introduced to the pneumatic system will likely cause damage to the monitor and/or the accessories.

Complete the Test Record (Appendix A) as tests are performed.

Note: This test is written so that a knowledgeable technician who is familiar with the *ProCare* monitor and the test equipment and will be able to follow the test procedure.

Note: To enter service mode press and hold the CYCLE buttons while pressing the ON/OFF button for 3 seconds.

Notes on Electrical Safety Testing of the *ProCare* Monitor:

The DINAMAP® *ProCare* Monitor is designed and tested to meet electrical safety standard IEC 601-1. Requirements in this standard parallel requirements in NFPA99 relating to electrical safety. This product meets the requirements of NFPA99 section 7-5.1.2.2. (grounding of appliances) through the use of double insulation in the external power supply module (“Power Brick”.)

The absence of a ground connection on the power brick obviates the need for any ground resistance test, such as that described in NFPA99 section 7-5.1.3.2. (Some non-USA Power bricks are equipped with a non-conductive

pin at the ground pin location to aid mechanical retention of the Power Brick into the receptacle.)

Dielectric strength (“Hi-Pot”) testing of the double (reinforced) mains insulation (4000 V RMS, 60 Hz) may be done by disconnecting the Power Brick from the Monitor and applying the Hi-Pot tester as follows: Connect one lead to the two mains power prongs. Connect the other lead to the conductive sleeve on the DC output connector at the end of the cord.

Hi-Pot testing of the patient connections (1500 VRMS, 60 Hz) may be done by connecting one lead of the Hi-Pot tester to the outer shell of a spare DC connector plug inserted into the DC input connector on the Monitor. The other lead of the tester should be connected to the patient connection being tested.

WARNING: Don’t electrocute yourself or anyone else when performing Hi-Pot testing.

NOTE: Hi-Pot testing is done on every unit at the factory and should not be repeated unnecessarily nor performed more often than required.

4.5.1 Temp Circuit Leakage Test

1. Setup an IEC 601-1 approved leakage tester to apply 240 VAC to an isolated circuit.

2. Plug temp probe Hi Pot adapter into the temp jack.

3. Record and verify the temp circuit leakage current.

4.5.2 SpO_2 Circuit Leakage Test

1. Setup an IEC 601-1 approved leakage tester to apply 240 VAC to an isolated circuit.

2. Plug an SpO_2 cable into the SpO_2 connector on the front of the unit.

3. Plug SpO_2 probe Hi Pot adapter in to the DB9 jack at the end of the SpO_2 cable.

4. Record and verify the SpO_2 circuit leakage current.

4.6 *ProCare* Patient Monitor Parameter Tests

Complete the Test Record (Appendix A) as tests are performed.

Note: This test is written so that a technician who is familiar with the *ProCare* monitor and the test equipment will be able to successfully complete the test procedures. To enter service mode press and hold the CYCLE button while pressing the ON/OFF button for 3 seconds.

Saving Changes into Flash Memory: Modifications made to the Monitor's settings/configuration must be saved prior to placing the Monitor into service. The Monitor must be in service mode for any changes to be saved.

Events that require you to manually save to the Monitor's memory include calibration attempts and enabling/disabling the Monitor's parameters (refer to section 4.6.4.) It is not necessary to manually save following a pressure transducer calibration verification or simple calibration check.

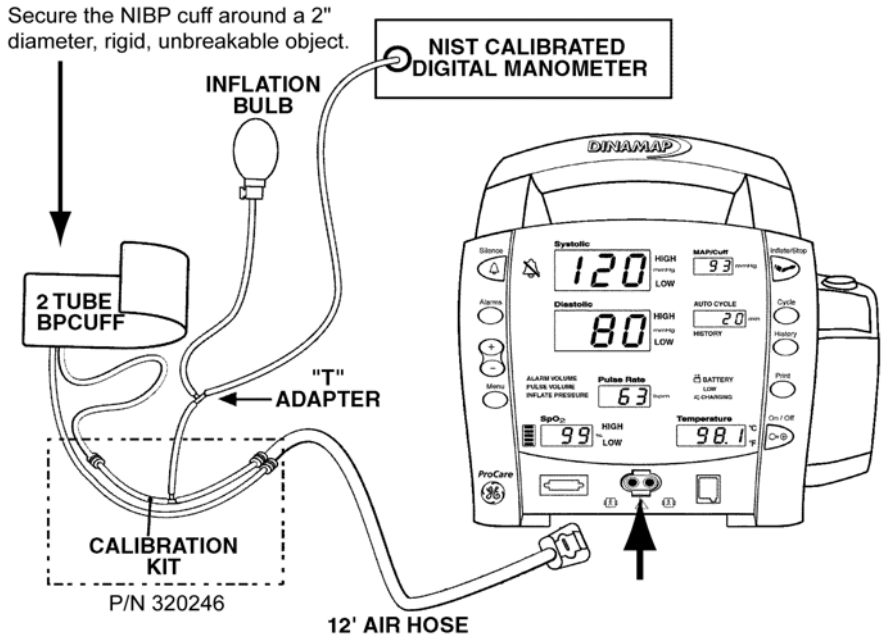
The number of times the flash memory can be saved is limited. The fatal alarm error **975** may be issued after this process is performed more than 90 times. Following issuance of this fatal alarm, the monitor must be returned to the GE Medical Systems *Information Technologies* Service Center to have the flash memory reset so that future saves can be performed.

4.6.1 SETUP

1. Connect your NIBP Analyzer to the *ProCare* Monitor.

2. 'T' an inflation bulb into the pneumatic setup

3. Consult the following diagram for pneumatic setup guidelines.



4.6.2 Leakage Testing

Note: To enter service mode press and hold the CYCLE button while pressing the ON/OFF button

1. Turn the Monitor **ON** and enter Service Mode.

2. Press **CYCLE** button and the **min** display should change to a 1

3. Close the valve on the inflation bulb

4. Set the NIBP Analyzer to "Leak test" function

5. Press the "**Pump**" button on the NIBP Analyzer

6. After the system inflates to 200mmHg, wait for the "Wait" on the NIBP analyzer message to be cleared

7. Press the "**Start**" button on the NIBP Analyzer to begin the leakage test

8. After 60 seconds the NIBP Analyzer will display the leakage rate

9. Record and verify the leakage rate.

10. Turn the *ProCare* Monitor off

4.6.3 Pressure Transducer Verification

Note: To enter service mode press and hold the CYCLE button while pressing the ON/OFF button

1. Turn the Monitor **ON** and enter Service Mode.

2. The HISTORY LED should display **0**.

3. Set NIBP Analyzer to "Manometer" function and press "Zero Pressure"

4. Press CYCLE button, HISTORY display should change to a 1.

5. Use the inflation bulb to inflate the cuff, hose and pressure indicator setup to 200mmHg

6. Record and verify the pressure reading on the top LED display (SYSTOLIC)

7. Record and verify the pressure reading on the bottom LED display (DIASTOLIC)

8. Use the valve on the bulb to reduce pressure to 150mmHg

9. Record and verify the pressure reading on the top LED display (SYSTOLIC)

10. Record and verify the pressure reading on the bottom LED display (DIASTOLIC)

11. Use the valve on the bulb to reduce pressure to 100mmHg

12. Record and verify the pressure reading on the top LED display (SYSTOLIC)

13. Record and verify the pressure reading on the bottom LED display (DIASTOLIC)

14. Use the valve on the bulb to reduce pressure to 50mmHg

15. Record and verify the pressure reading on the top LED display (SYSTOLIC)

16. Record and verify the pressure reading on the bottom LED display (DIASTOLIC)

If any of the tests fail, continue to section 4.6.4. Otherwise, continue to section 4.6.5

4.6.4 Pressure Transducer Calibration

Perform only if Pressure Transducer Verification is out of tolerance as specified in Appendix A.

Note: To enter service mode press and hold the **CYCLE** button while pressing the **ON/OFF** button.

1. Turn the *ProCare* Monitor **ON** and enter Service Mode.

2. The **min** window should display **0**.

3. Open valve on bulb to open pressure system to atmosphere

4. Set NIBP Analyzer to "Manometer" function and press "Zero Pressure"

5. Press **CYCLE** button until the **min** window shows 1.

6. Close valve on bulb and manually inflate pressure to 200 mmHg (using the CuffLink manometer as reference).

7. Press **MENU** button when pressure reads 200 mmHg to save calibration setting.

8. Two steps are necessary for burning changes into flash:
   a. Press the **CYCLE** button repeatedly until the number **6** is displayed in the **min** window.

Note: the number of remaining changes to the flash memory available are displayed in the **MAP/Cuff** window. Following each true calibration, the Monitor decrements by 1 the number of remaining calibrations available. If the MAP/Cuff window is displaying a figure of less than 10 and the accuracy of the Monitor is in doubt, contact General Electric Medical Systems *Information Technologies* Technical Support at **1-877-274-8456.**

   b. Press and hold the **MENU** button until two beeps are heard (one when

the button is pressed and another after the button has been depressed long enough for the process to complete.)

9. Turn the *ProCare* Monitor off

4.6.5 Overpressure Verification

Note: To enter service mode press and hold the **CYCLE** button while pressing the **ON/OFF** button.

1. Remain in service mode.

2. Use the inflation bulb to inflate pressure until valve opens.

3. Record and verify pressure at which valve opens.

4. Press **CYCLE** button so that the **min** window changes to a 2.

5. Use the inflation bulb to inflate pressure until valve opens.

6. Record and verify pressure at which valve opens.

7. Turn unit off.

4.6.6 Button Testing

1. Turn the Monitor on.

2. Record software revision as shown in the systolic and diastolic display.

3. Press **START/STOP** button.

4. Verify an **NIBP** determination has been initiated.

5. Block pump port and verify "**E80**" alarm.

6. Press **SILENCE** button, verify alarm has been silenced.

7. Verify flashing red indicator of Silence.

8. Press the **SILENCE** button, verify alarm condition is removed

9. Press **ALARM** button several times, verify unit cycles through all alarm settings (i.e SYS, DIA, SPO2).

10. Turn the Monitor off

4.6.7 LED Tests

1. Power on the *ProCare* Monitor.

2. During the power-up self-test verify all 7 segment LED display segments and all discrete LEDs (except CHARGING LEDs) illuminate and are the correct color.

LED COLOR MATRIX			
RED	YELLOW	GREEN	NOT LIT
Systolic	Pulse Rate	AUTO CYCLE	CHARGING
Diastolic	LOW	HISTORY	
°F		BATTERY	
°C		BATTERY ICON	
HIGH (all)		ALARM VOLUME	
LOW (all)		PULSE VOLUME	
Alarm Bell Icon		INFLATE PRESSURE	
SpO_2 Strength Meter			

3. Repeat power up cycle until all LEDs are checked.

4.6.8 External DC Verification

1. Plug the DC power cable into the monitor.

2. Verify that the CHARGING indicator is illuminated.

4.6.9 NIBP Determination

1. Set NIBP Analyzer to Adult Mode:

   SYS/DIA = 120/80
   MAP = 90
   BPM = 80

2. Press START/STOP button on the Monitor to begin determination

3. Record and verify systolic, diastolic, map and heart rate from the monitor display

4. Press **CYCLE** button to initiate a determination in "Auto BP" mode.

5. Record and verify systolic, diastolic, map and heart rate from the monitor display

6. Press **CYCLE** button until StAt is displayed on the HISTORY LED to initiate a determination in STAT mode.

7. Record and verify systolic, diastolic, map and heart rate from the monitor display

8. Press **Start/Stop** button, end STAT mode.

4.6.10 NIBP Overpressure Verification

1. Restrict airflow through cuff hose port.

2. Press "**Inflate/Stop**" to begin NIBP determination

3. Verify that E80 is displayed on the **SYSTOLIC** display and an audible alarm sounds

4. Remove the air restriction

5. Press "**Inflate/Stop**" and verify that the pump does not start

6. Press the "**Silence**" button

7. Press the "**Silence**" button again

8. Verify the alarm condition is cleared from the **SYSTOLIC** display

4.6.11 Temperature (Perform if equipped with Temp module)

The Temperature Simulator for the Alaris System is available from Alaris Medical Systems, Inc. (619) 458-7000.

1. Disconnect the temp probe from the Monitor.

2. Connect the probe simulator to the Monitor.

4. Set the probe simulator to 80.2° F.

5. Record and verify the reading in the **TEMP** display is 80.2° F ±0.2° F.

6. Set the probe simulator to 102° F.

7. Record and verify the reading in the **TEMP** display is 102° F ±0.2° F.

8. Set the probe simulator to B.P. and verify reading is 106.0° F ± 0.2° F.
Press broken probe button down and verify the Monitor displays E61.

9. Calibration verification is complete. Disconnect the probe simulator and install the temperature probe. If the Monitor does not pass the calibration verification, then the Monitor needs repair.

4.6.12 SpO_2 (Perform only if equipped with SpO_2 module)

Note for Monitors equipped with Nellcor SpO_2:

Nellcor is aware that various Nellcor oximetry platforms have some interesting behaviors when used with various pulse simulators.

On occasion when testing the integrity of the Nellcor oximetry system, abnormal results may occur when introducing large changes in the pulse rate and/or pulse amplitude. Extreme changes in rate sent to the Nellcor sensor by the SpO_2 simulator may cause the SpO_2 algorithm to completely miss in finding the pulse rate.

This is an expected result. To workaround this, incrementally step up or down the settings on your SpO_2 simulator and allow for the Monitor to detect and display the new pulse rate or saturation.

Nellcor recommends use of the SRCmax Portable Tester for use with ProCare Monitors equipped with the Nellcor SpO_2 system.

Masimo recommends BIO-TEK SpO_2 simulators.

1. Connect the appropriate SpO_2 simulator and cable to the SpO_2 connector.
2. Verify the unit displays a:

   Pulse value

   Saturation value

   Signal Strength Bar Graph
3. Disconnect the SpO_2 cable
4. Verify the unit generates a E23 alarm and speaker is sounding
5. Press the **SILENCE** button.
6. Verify the sound has stopped but the error display remains
7. Re-connect the SpO_2 sensor
8. Verify the unit displays a:

   Pulse Value

   Saturation value

   Signal Strength bar Graph

4.6.13 Printer Output Test

1. Load Thermal Paper into the print mechanism
2. Press PRINT button
3. Verify the printer outputs a record and print quality is good

4.6.14 Communication Port Test

1. Connect unit to a PC terminal emulator.
2. Turn unit on.
3. Type " NC0!E", press "Enter"
4. Verify response from unit " NC+!@"
5. Verify that within 40 seconds the pump starts.
6. Type " ND!5", press "Enter"
7. Verify response from unit " ND+!A"
8. Verify the pump stops.

4.7 Alarm Code Interpretation

If any other alarms appear that are not listed in the paragraphs that follow, record the error message and report the failure to Customer Support. Refer to the Operation Manual for information about patient alarms and general procedural alarms.

4.7.1 System Failures

When a system failure is encountered, the error code is displayed on the screen for five seconds and the system enters failsafe mode. The error code is logged in the history log.

General system error codes are listed below.

Alarm Conditions and Error Codes

When responding to a Monitor alarm, always CHECK THE PATIENT FIRST and then check the Monitor, cuff, hose and sensors. Press **SILENCE** to reset patient alarm conditions.

NIBP

Alarm	Definition	Possible Cause
E89	NIBP No Determination	Unable to make an NIBP determination due to insufficient signal.
E84	Timeout	Determination time > 2 minutes. Motion Artifact.
E85	Timeout	One cuff pressure at > 1 minute. Motion artifact.
E83	Timeout: Inflation	Inflation time is > 40 seconds Possible air leak is being detected.
E82	Excess Air in Cuff	Residual air in cuff above threshold for successful auto-zero.
E80	Overpressure	Overpressure condition detected

SpO_2

Alarm	Definition	Possible Cause
E20	SpO_2 No Sensor	SpO_2 sensor not connected. No sensor code detected. Sensor failure
E21	SpO_2 Replace Sensor	SpO2 sensor or cable possibly defective. Cable not connected properly.

E23	SpO_2 Sensor off finger	No SpO_2 signal, check or reposition the sensor
E25	SpO_2 No Signal	No or very low SpO_2 signal, reposition sensor

Temperature / Printer / Miscellaneous

Alarm	Definition	Possible Cause
E63	Temp Disconnected or Wrong Probe Type	Incorrect type of temperature probe: use TurboTemp-type temperature probe
E61	Temp Probe Broken	Bad temperature probe Temp probe not properly connected
E66	Temp probe Too Hot	Bad temperature probe Verify monitor with known good accessories
E10	Printer No Paper	Printer is out of paper Printer door open Printer may be defective
E11	Printer Too Hot	
E12	Recorder cannot print	Main battery voltage is too low to operate
E00	Memory Lost	Refer Monitor to Customer Service
900-999	Internal Memory Errors	Refer Monitor to Customer Service

Appendix A - Test Results Form

Step	Description	Min	Max	Actual	Pass-Fail-N/A
4.6.2	Leakage				
	Leakage Result (mmHg)	0	6		
4.6.3	Pressure Transducer Verification				
	Pressure reading at 200mmHg, top display - Systolic	197	203		
	Pressure reading at 200mmHg, bottom display - Diastolic	197	203		
	Pressure reading at 150mmHg, top display - Systolic	147	153		
	Pressure reading at 150mmHg, bottom display - Diastolic	147	153		
	Pressure reading at 100mmHg, top display - Systolic	97	103		
	Pressure reading at 100mmHg, bottom display - Diastolic	97	103		
	Pressure reading at 50mmHg, top display - Systolic	47	53		
	Pressure reading at 50mmHg, bottom display - Diastolic	47	53		
4.6.5	Overpressure Verification				
	Overpressure threshold, Adult (mmHg)	305	325		
	Overpressure threshold, Neonate (mmHg)	155	159		
4.6.6	Buttons				
	Software revision in systolic display (top)	on	off		
	Software revision in systolic display (bottom)				
	NIBP alarm initiated				
	"E80" displayed on SYSTOLIC display				
	Audible alarm can be silenced				
	"Silenced" LEDs flash				
	Overpressure alarm can be cleared				
	Alarm button is functioning				
4.6.7	Display				
	All 7-Segment LEDs Light Correct Color				
	All Discrete LEDs Light, Correct Color				
4.6.8	4.6.8 External DC Detection				
	Charging indicator LED illuminated				
4.6.9	NIBP Determination				
	Systolic reading (mmHg)	107	133		

Step	Description	Min	Max	Actual	Pass-Fail-N/A
4.6.9	NIBP Determination (continued)				
	Diastolic reading (mmHg)	67	93		
	MAP reading (mmHg)	85	95		
	Heart rate reading (bpm)	76	84		
	Systolic reading (mmHg)	107	133		
	Diastolic reading (mmHg)	67	93		
	MAP reading (mmHg)	85	95		
	Heart rate reading (bpm)	76	84		
	Systolic reading (mmHg)	107	133		
	Diastolic reading (mmHg)	67	93		
	MAP reading (mmHg)	85	95		
	Heart rate reading (bpm)	76	84		
4.6.10	NIBP Overpressure				
	"E80" displayed on SYSTOLIC display				
	Pump will not start				
	Overpressure alarm can be cleared				
4.6.11	Temperature Test	80.0°F	80.4°F		
	Temperature reading at 80.2° F	79.9° F	80.5° F		
	Temperature reading at 102.0° F	101.8° F	102.2° F		
	Temperature reading at BP verify reads **E61**	N/A	N/A		
4.6.12	SpO_2				
	Pulse Value Displayed				
	Saturation Value Displayed				
	Signal Strength Bar Graph Displayed				
	"E23" displayed on SpO_2 display				
	Alarm is silenced, error display remains				
	Pulse Value				
	Saturation Value Displayed				
	Signal Strength Bar Graph Displayed				
4.6.13	Printer Test				
	Printout is generated cleanly				
4.6.14	Communication Port Test				
	"_NC+!@" is displayed on terminal				
	Pump stops				

Appendix B - Connectivity

CHANT

- Provides HL7 output for electronic Patient Medical Records
- Uses ILCs (Isolated Level Convertors) where required along with the CHANT software to communicate with the HIS System

Compatible Monitors: DINAMAP XL, Compact, MPS (Select and Portable), PRO 100-400 series, *ProCare* Series, and PRO 1000.

Nurse Call System

- When the DINAMAP monitor alarms, the Nurse Call System is triggered.
- Uses a Nurse Call Cable to attach to the System. P/N 487208CR.

Compatible Monitors: Compact, PRO 100-400 Series, *ProCare* Series, and PRO 1000.

Alarm View

- Wireless transmitter attached to the Monitor.
- Sends alarms and vital signs results to a pager

Compatible Monitors: Compact, MPS (Select and Portable) PRO 100-400 series, *ProCare* Series, and PRO 1000.

CIC

- Provides Central Alarm Notification & Data Management.
- Compatible with StatView for paging.

Compatible Monitors: PRO 1000 Version 2 and Dash 2000 (both hardwired)

ApexPro

- Provides Central Alarm Notification and data management.
- Transmits data wirelessly.
- Pro 100-400 Series and *ProCare* (requires P/N IPC-1931)

PatientNet

- Provides central alarm notification and data management.
- Lethal arrhythmia at the Central Station.
- WMTS frequency hopping spread spectrum.

Note: Dash 2000 is incompatible with PatientNet.

ILC-1926

- Interfaces the PRO 100-400 series or *ProCare* monitor to ANY hardwired connection.

- Requires Cables:
  -PRO 100-400, *ProCare* Series, Compact, Plus: cable p/n 683235
  -XL monitor series: p/n 682234

ILC-1927

- Interfaces the PRO 1000 monitor to any hardwire connection.
- Installs into the Communications bay at the rear of the monitor.

IPC1928

- Interfaces the PRO 1000 Monitor to the Unity network, hardwire.
- Installs into the Communications bay at the rear of the monitor.

IPC1931

Connects DINAMAP Monitors to the CIC system.

Transfers vital signs results from the Monitor to the CIC

Requirements for use:

- Plug DINAMAP into ApexPro using the DINALINK cable.

- Apex version 2

- CIC version 3

Appendix C - Display Cover: Removal, Installation

To remove the plastic display cover:

1. Place the Monitor on a stable surface.

2. Insert a flat-head screwdriver between the top of the display cover and the body of the monitor.

3. Twist the screwdriver so that the display cover is slightly separated from the body of the monitor.

4. Using two hands, grasp the top-middle edge of the display cover and pull away and down.

5. The fascia and displays are now visible.

Installing the Display Cover:

1. Place the Monitor on a flat, stable surface.

2. Insert the tabs at the base of the display cover into the slots underneath the bottom row of LEDs.

3. Using two hands, apply firm pressure to the outside edges, while flexing the upper middle-edge of the display cover away from the monitor. It is imperative that even pressure is applied as the plastic retention tabs can break free from the display cover.

4. Apply steady, even pressure to the opposite sides of the display cover until an audible click is heard.

Appendix D: Replacement Parts and Assemblies

ID numbers reference the explode drawings in Section 5.

ID	FRU Number	Description	Content/comments
1	2009910-001	Main PWA	Supplied with Arterial ref product s/w
2	2009911-001	Main PWA- Ausc	Supplied with Auscultatory version of Monitor
3	2009912-001	UI PWA	
4	2009913-001	Nellcor Module	Supplied with mounting spacers.
5	2009914-001	Masimo Module	Supplied with mounting spacers.
6	2009915-001	Plastics kit	1. Case, front & rear 2. Handle front & rear with h/w 3. Bulkheads 4 types & NIBP insert. 4. Nellcor & Masimo 'inside' labels 5. Std. labels, DC input, No temp side label. 6. Battery door & foam. 7. Help card guide and rubber feet. 8. Printer door (and blanking plate when available). 9. Cable tie hardware
	2009916-001	Screw kit	All internal hardware, screws, washers etc
7	2009918-001	Temperature	1. Housing front & rear. 2. Mounting bracket and plastic guide. 3. Sensor and cable. 4. Mounting hardware
8	2009917-001	Printer	1. Printer 2. Printer chassis and screw. 3. Printer door with roller and label.
9	2009919-001	Printer door	Door with label and roller
10	2009920-001	Pneumatics	Pump assembly
11	2009921-001	Dump valve	Dump valve and adhesive tape to apply.
12	2011645-001	Kit, Keypads	Set, left and right keypads
13	2009922-001	Speaker	Include mounting bracket
14	2009923-001	Host comms cable	With mounting h/w
	2008538-001	Power brick UK	UK plug 240V input
	2008539-001	Power brick EUR	Euro plug 230V input
	2009460-001	Power brick US	US plug 120V input
15	2010429-001 2010478-001 2010479-001 2010480-001	English 400 lbl kit English 300 lbl kit English 200 lbl kit English 100 lbl kit	1. keypad labels set (LH & RH) 2. Fascia 3. Display cover For language variants reference following pages
16		Help card guides	All 3 guides and for each language

	2010429-001	Label Kit	English 400 printer

P/N (-001)	Language	Model	Is Printer Installed?	Method of NIBP Determination (Auscultatory is labeled on left keypad)
2010429-001	English	400	Printer Installed	Traditional
2010478-001	English	300	Printer Installed	Traditional
2010479-001	English	200	Printer Installed	Traditional
2010480-001	English	100	Printer Installed	Traditional
2010481-001	English	400	Printer Installed	Auscultatory
2010482-001	English	300	Printer Installed	Auscultatory
2010483-001	English	200	Printer Installed	Auscultatory
2010484-001	English	100	Printer Installed	Auscultatory
2010485-001	English	400		Traditional
2010486-001	English	300		Traditional
2010487-001	English	200		Traditional
2010488-001	English	100		Traditional
2010489-001	English	400		Auscultatory
2010490-001	English	300		Auscultatory
2010491-001	English	200		Auscultatory
2010492-001	English	100		Auscultatory
2010493-001	French	400	Printer Installed	Traditional
2010494-001	French	300	Printer Installed	Traditional
2010495-001	French	200	Printer Installed	Traditional
2010496-001	French	100	Printer Installed	Traditional
2010497-001	French	400	Printer Installed	Auscultatory
2010498-001	French	300	Printer Installed	Auscultatory
2010499-001	French	200	Printer Installed	Auscultatory
2010500-001	French	100	Printer Installed	Auscultatory
2010501-001	French	400		Traditional
2010502-001	French	300		Traditional

2010503-001	French	200		Traditional
2010504-001	French	100		Traditional
P/N (-001)	**Language**	**Model**	**Is Printer Installed?**	**Method of NIBP Determination (Auscultatory is labeled on left keypad)**
2010505-001	French	400		Auscultatory
2010506-001	French	300		Auscultatory
2010507-001	French	200		Auscultatory
2010508-001	French	100		Auscultatory
2010509-001	German	400	Printer Installed	Traditional
2010510-001	German	300	Printer Installed	Traditional
2010511-001	German	200	Printer Installed	Traditional
2010512-001	German	100	Printer Installed	Traditional
2010513-001	German	400	Printer Installed	Auscultatory
2010514-001	German	300	Printer Installed	Auscultatory
2010515-001	German	200	Printer Installed	Auscultatory
2010516-001	German	100	Printer Installed	Auscultatory
2010517-001	German	400		Traditional
2010518-001	German	300		Traditional
2010519-001	German	200		Traditional
2010520-001	German	100		Traditional
2010521-001	German	400		Auscultatory
2010522-001	German	300		Auscultatory
2010523-001	German	200		Auscultatory
2010524-001	German	100		Auscultatory
2010525-001	Spanish	400	Printer Installed	
2010526-001	Spanish	300	Printer Installed	
2010527-001	Spanish	200	Printer Installed	
2010528-001	Spanish	100	Printer Installed	
2010529-001	Spanish	400		
2010530-001	Spanish	300		
2010531-001	Spanish	200		

2010532-001	Spanish	100		
P/N (-001)	**Language**	**Model**	**Is Printer Installed?**	**Method of NIBP Determination (Auscultatory is labeled on left keypad)**
2010534-001	Italian	400	Printer Installed	
2010535-001	Italian	300	Printer Installed	
2010536-001	Italian	200	Printer Installed	
2010537-001	Italian	100	Printer Installed	
2010538-001	Italian	400		
2010539-001	Italian	300		
2010540-001	Italian	200		
2010541-001	Italian	100		
2010542-001	Swedish	400	Printer Installed	
2010543-001	Swedish	300	Printer Installed	
2010544-001	Swedish	200	Printer Installed	
2010545-001	Swedish	100	Printer Installed	
2010546-001	Swedish	400		
2010547-001	Swedish	300		
2010552-001	Swedish	200		
2010553-001	Swedish	100		
2010554-001	Dutch	400	Printer Installed	
2010555-001	Dutch	300	Printer Installed	
2010556-001	Dutch	200	Printer Installed	
2010557-001	Dutch	100	Printer Installed	
2010588-001	Dutch	400		
2010559-001	Dutch	300		
2010560-001	Dutch	200		
2010561-001	Dutch	100		
2010578-001	Chinese	400	Printer Installed	
2010589-001	Chinese	300	Printer Installed	
2010590-001	Chinese	200	Printer Installed	
2010592-001	Chinese	100	Printer Installed	
2010593-001	Chinese	400		

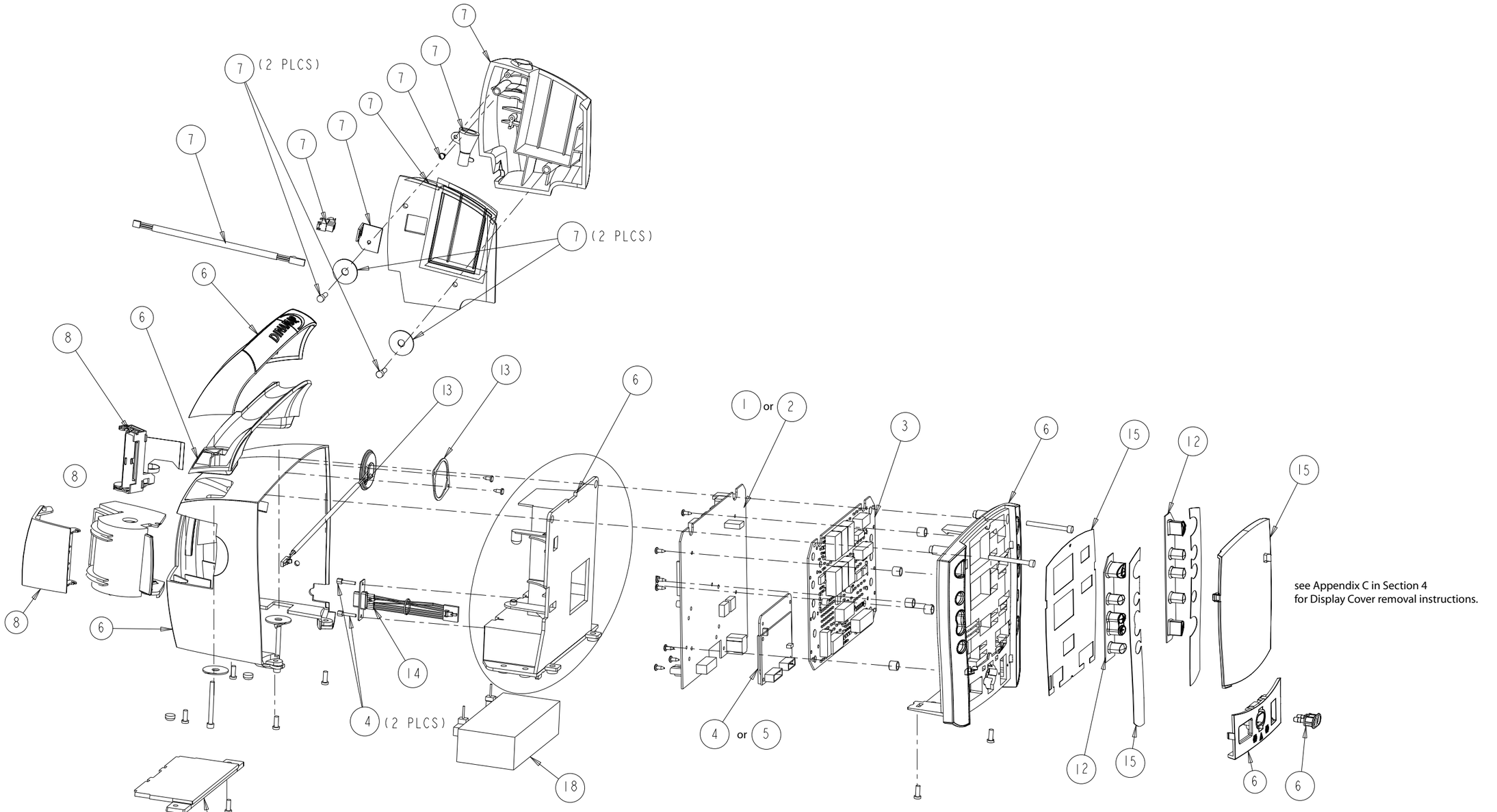
2010594-001	Chinese	300		
P/N (-001)	**Language**	**Model**	**Is Printer Installed?**	**Method of NIBP Determination (Auscultatory is labeled on left keypad)**
2010595-001	Chinese	200		
2010596-001	Chinese	100		
2010597-001	Japanese	400	Printer Installed	
2010598-001	Japanese	300	Printer Installed	
2010599-001	Japanese	200	Printer Installed	
2010600-001	Japanese	100	Printer Installed	
2010601-001	Japanese	400		
2010602-001	Japanese	300		
2010603-001	Japanese	200		
2010604-001	Japanese	100		
2010605-001	Danish	400	Printer Installed	
2010606-001	Danish	300	Printer Installed	
2010607-001	Danish	200	Printer Installed	
2010608-001	Danish	100	Printer Installed	
2010609-001	Danish	400		
2010610-001	Danish	300		
2010611-001	Danish	200		
2010612-001	Danish	100		
2010613-001	Norwegian	400	Printer Installed	
2010614-001	Norwegian	300	Printer Installed	
2010615-001	Norwegian	200	Printer Installed	
2010616-001	Norwegian	100	Printer Installed	
2010617-001	Norwegian	400		
2010618-001	Norwegian	300		
2010619-001	Norwegian	200		
2010620-001	Norwegian	100		
2010621-001	Korean	400	Printer Installed	
2010622-001	Korean	300	Printer Installed	
2010623-001	Korean	200	Printer Installed	

P/N (-001)	Language	Model	Is Printer Installed?	Method of NIBP Determination (Auscultatory is labeled on left keypad)
2010624-001	Korean	100	Printer Installed	
2010625-001	Korean	400		
2010626-001	Korean	300		
2010627-001	Korean	200		
2010628-001	Korean	100		
2010629-001	Finnish	400	Printer Installed	
2010630-001	Finnish	300	Printer Installed	
2010631-001	Finnish	200	Printer Installed	
2010632-001	Finnish	100	Printer Installed	
2010633-001	Finnish	400		
2010634-001	Finnish	300		
2010635-001	Finnish	200		
2010636-001	Finnish	100		
2010638-001	Portuguese	400	Printer Installed	
2010639-001	Portuguese	300	Printer Installed	
2010640-001	Portuguese	200	Printer Installed	
2010641-001	Portuguese	100	Printer Installed	
2010642-001	Portuguese	400		
2010643-001	Portuguese	300		
2010644-001	Portuguese	200		
2010645-001	Portuguese	100		
2010646-001	Russian	400	Printer Installed	
2010647-001	Russian	300	Printer Installed	
2010648-001	Russian	200	Printer Installed	
2010649-001	Russian	100	Printer Installed	
2010650-001	Russian	400		
2010651-001	Russian	300		
2010652-001	Russian	200		
2010653-001	Russian	100		

P/N (-001)	Language	Model	Is Printer Installed?	Method of NIBP Determination (Auscultatory is labeled on left keypad)
2010656-001	Hungarian	400	Printer Installed	
2010657-001	Hungarian	300	Printer Installed	
2010658-001	Hungarian	200	Printer Installed	
2010659-001	Hungarian	100	Printer Installed	
2010660-001	Hungarian	400		
2010661-001	Hungarian	300		
2010662-001	Hungarian	200		
2010663-001	Hungarian	100		
2010664-001	Czech	400	Printer Installed	
2010665-001	Czech	300	Printer Installed	
2010666-001	Czech	200	Printer Installed	
2010667-001	Czech	100	Printer Installed	
2010668-001	Czech	400		
2010669-001	Czech	300		
2010670-001	Czech	200		
2010671-001	Czech	100		
2010672-001	Slovak	400	Printer Installed	
2010673-001	Slovak	300	Printer Installed	
2010674-001	Slovak	200	Printer Installed	
2010675-001	Slovak	100	Printer Installed	
2010676-001	Slovak	400		
2010677-001	Slovak	300		
2010678-001	Slovak	200		
2010679-001	Slovak	100		
2010680-001	Polish	400	Printer Installed	
2010681-001	Polish	300	Printer Installed	
2010682-001	Polish	200	Printer Installed	
2010683-001	Polish	100	Printer Installed	
2010684-001	Polish	400		

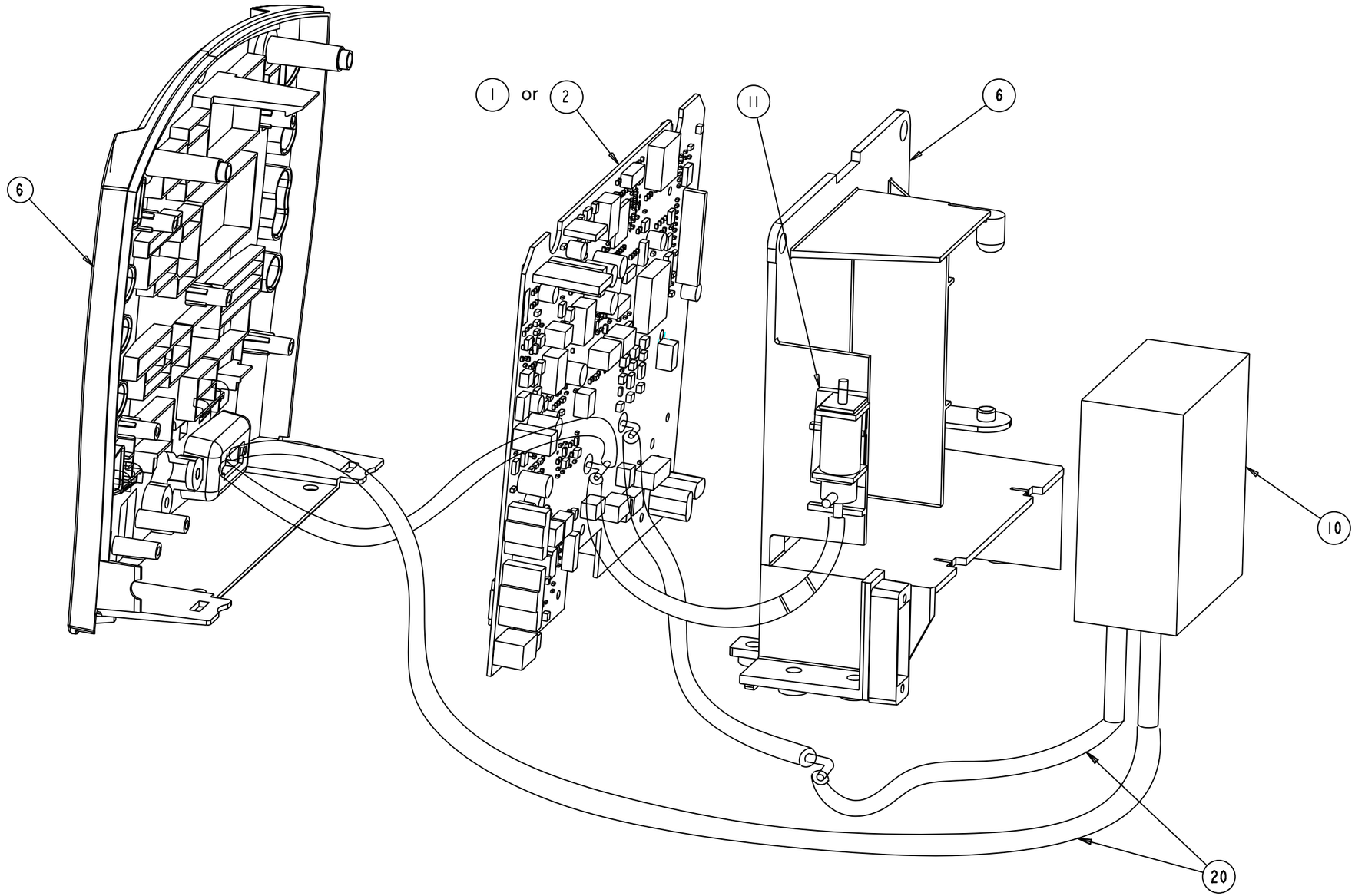
P/N (-001)	Language	Model	Is Printer Installed?	Method of NIBP Determination (Auscultatory is labeled on left keypad)
2010685-001	Polish	300		
2010686-001	Polish	200		
2010687-001	Polish	100		
2010688-001	Greek	400	Printer Installed	
2010689-001	Greek	300	Printer Installed	
2010690-001	Greek	200	Printer Installed	
2010691-001	Greek	100	Printer Installed	
2010692-001	Greek	400		
2010693-001	Greek	300		
2010694-001	Greek	200		
2010695-001	Greek	100		

5 Assembly Drawings & *ProCare* Schematics



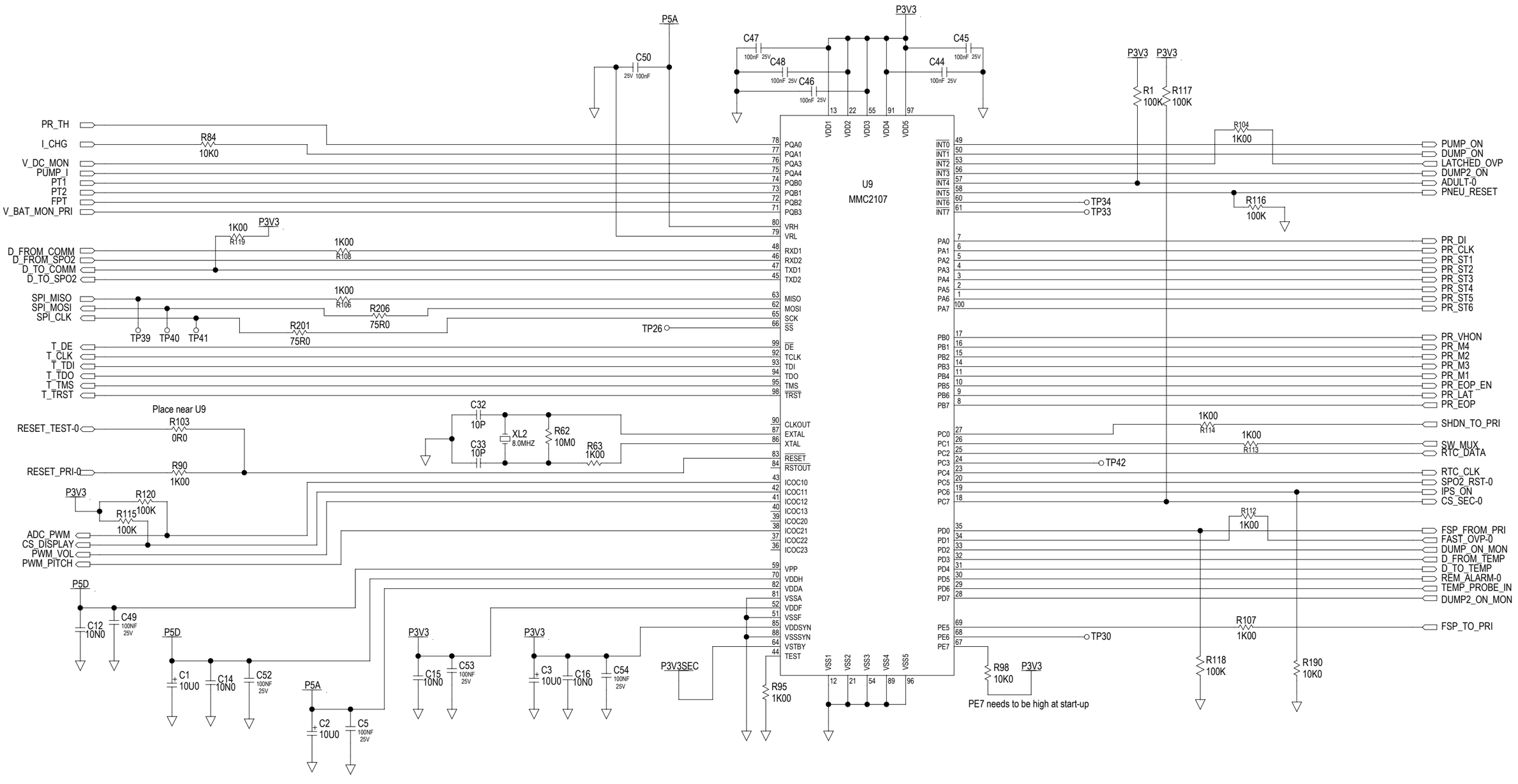
see Appendix C in Section 4
for Display Cover removal instructions.

Exploded Assembly Drawing -
ProCare Monitor (1 of 2)
page 5-1/2



PNEUMATIC TUBING ROUTING

MAIN PROCESSOR

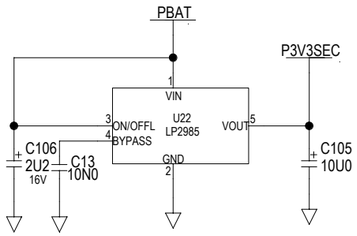


SCHEMATIC

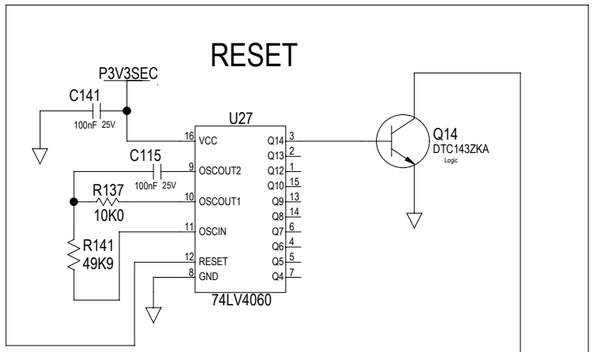
PWA, MAIN BOARD, PROCARE

Schematic - Main Board
P/N 2008855 Rev B
(1 of 10) page 5-5/6

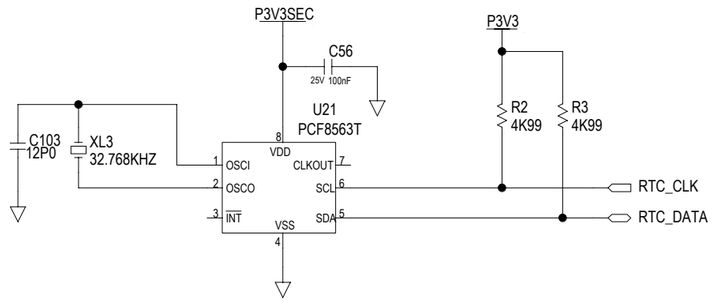
+3.3V SECONDARY POWER



RESET



REAL TIME CLOCK



SECONDARY PROCESSOR

SCHEMATIC

PWA, MAIN BOARD, PROCARE

Schematic - Main Board
P/N 2008855 Rev B
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PNEUMATICS

Pump Connector

J7
1 PBAT
2 PUMP
3 P5D
4 DUMP
5 P5D
6 DUMP2

P5D
PBAT
C39 220U0
PBAT
D9 BAS16
C140 33U0 25V
C28 33U0 25V
P5D
D1 5V1
D10 BAS16
D27 BAS16

DUMP_ON_MON R202 100K
DUMP_ON
DUMP2_ON_MON R203 100K
DUMP2_ON
R204 100K
R205 100K
R173 100K
R121 100K

Q7 SI2306DS
Q24 SI2306DS
Q17 SI2306DS
Q9 SI9410DY
Q8 SI9410DY

PNEU_OVERRIDE-0
PUMP_ON
FAST_OVP-0
PUMP_I

R5 10K0
R99 10K0
R100 10K0
R75 0R10
R44 1K00
C59 100NF 25V

P6VMIN
C66 100nF 25V
LP2980-5V
U7
VIN
ON/OFF
VOUT
GND
P5A
C37 2U2 16V

XFPM-050
PT1
VCC
VOUT
GND
CAP
C65 100nF 25V
TP37 PBACK_IN
TP38 PBACK_OUT
R36 0R0
R180 1K00
C20 680P
R51 2K0
C67 100NF 25V
PT1

Spare Parts

U14 HCT04

P5A
R9 10K0
C60 100nF 25V
TLC2272
U13
R10 10K0
C17 10N0
R6 10K0
R83 649K
C64 10N0
FPT

R29 4K99
R28 4K99
C43 470N
P5A
C61 100nF 25V
VCC
HCT04
U14
GND
ADC_PWM

P6VMIN
C58 100nF 25V
LP2980-5V
U6
VIN
ON/OFF
VOUT
GND
C36 2U2 16V
P5A2

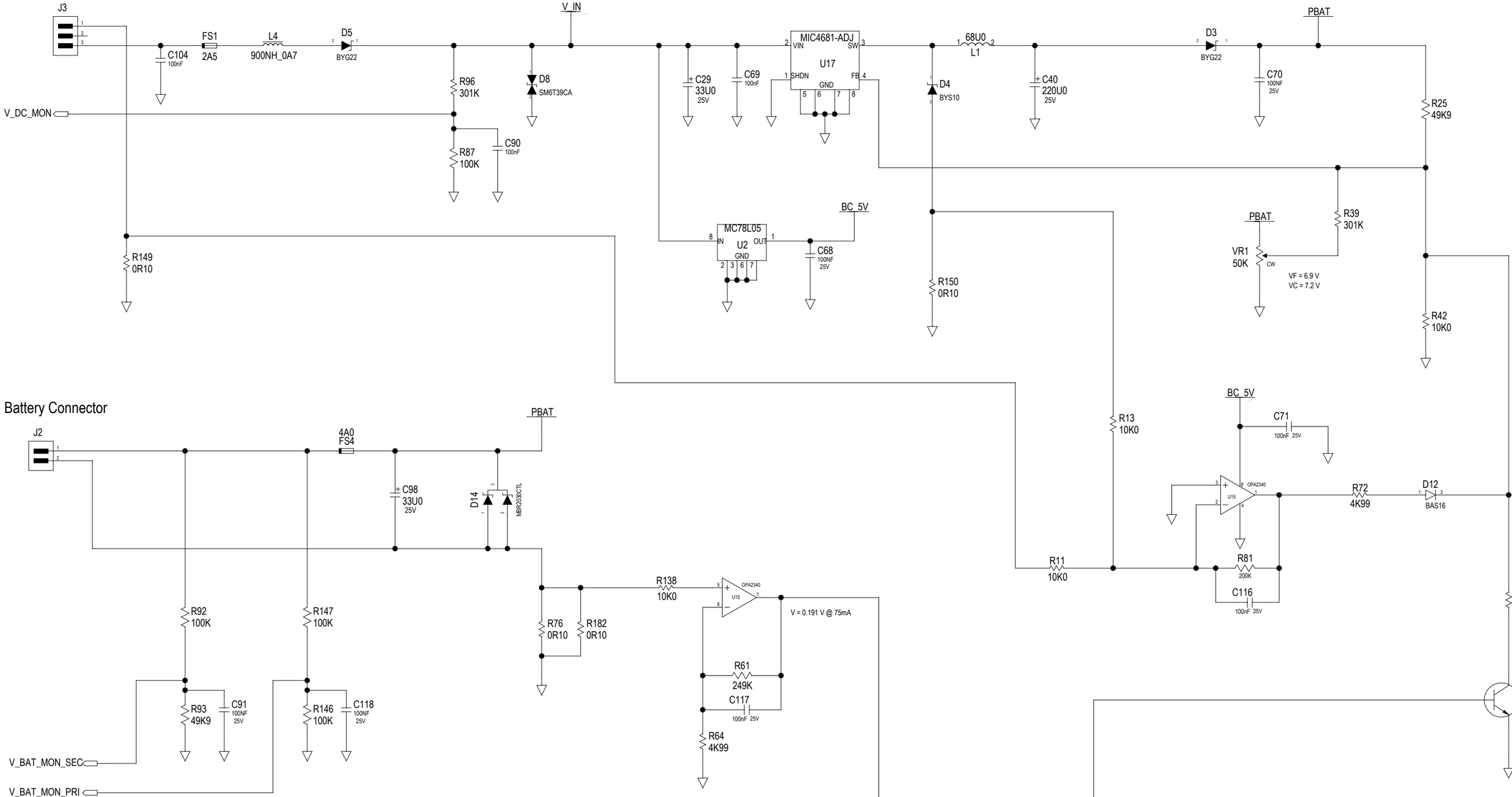
C63 100nF 25V
XFPM-050
PT2
VCC
VOUT
GND
CAP
R181 1K00
C21 680P
R50 2K0
C57 100NF 25V
PT2
PT2_SEC

SCHEMATIC
PWA, MAIN BOARD, PROCARE

Schematic - Main Board
P/N 2008855 Rev B
(3 of 10) page 5-9/10

BATTERY CHARGER

DC Input Power



Battery Connector

SCHEMATIC

PWA, MAIN BOARD, PROCARE

Schematic - Main Board
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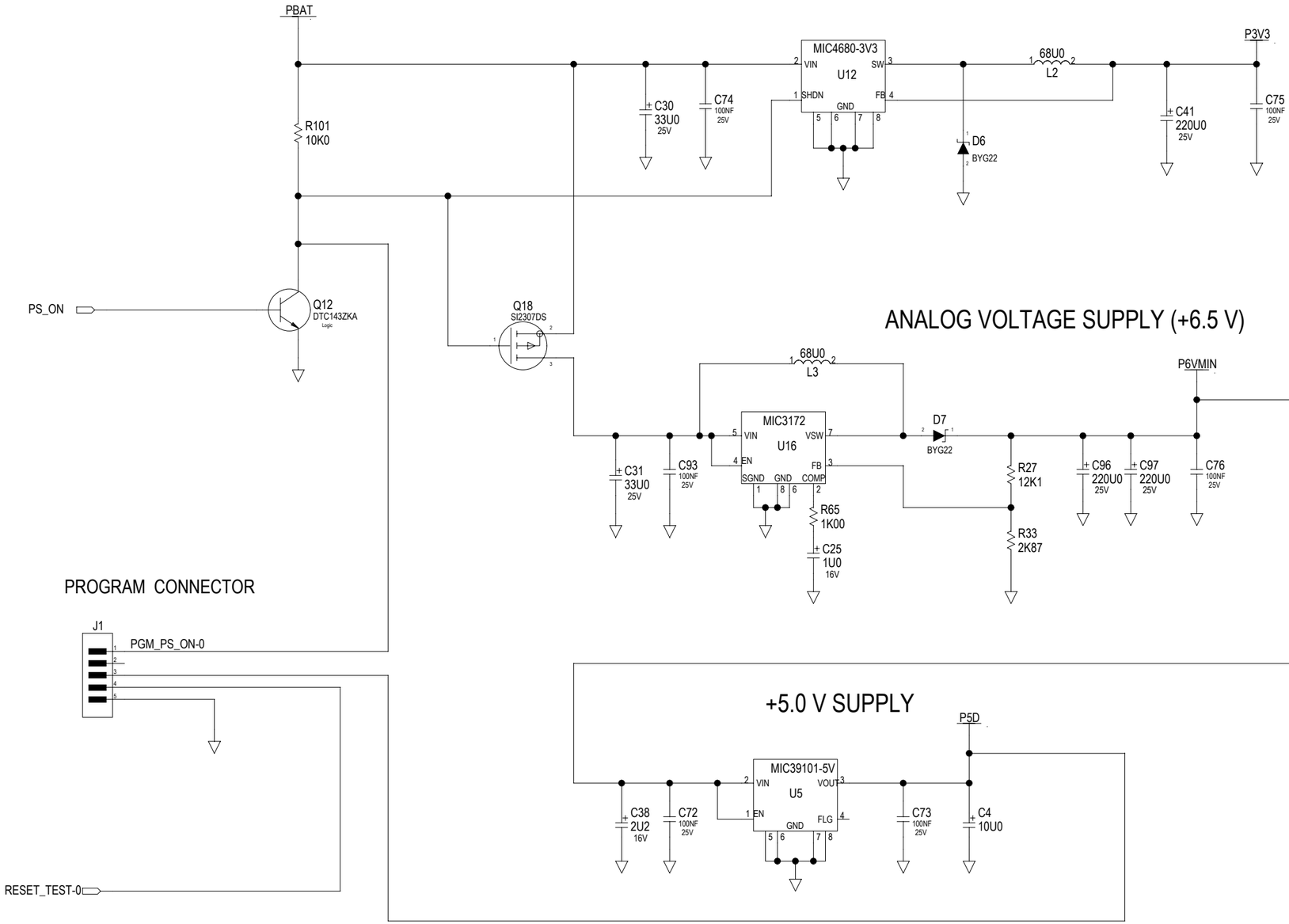
+3.3 V SUPPLY



SCHEMATIC

PWA, MAIN BOARD, PROCARE

Schematic - Main Board
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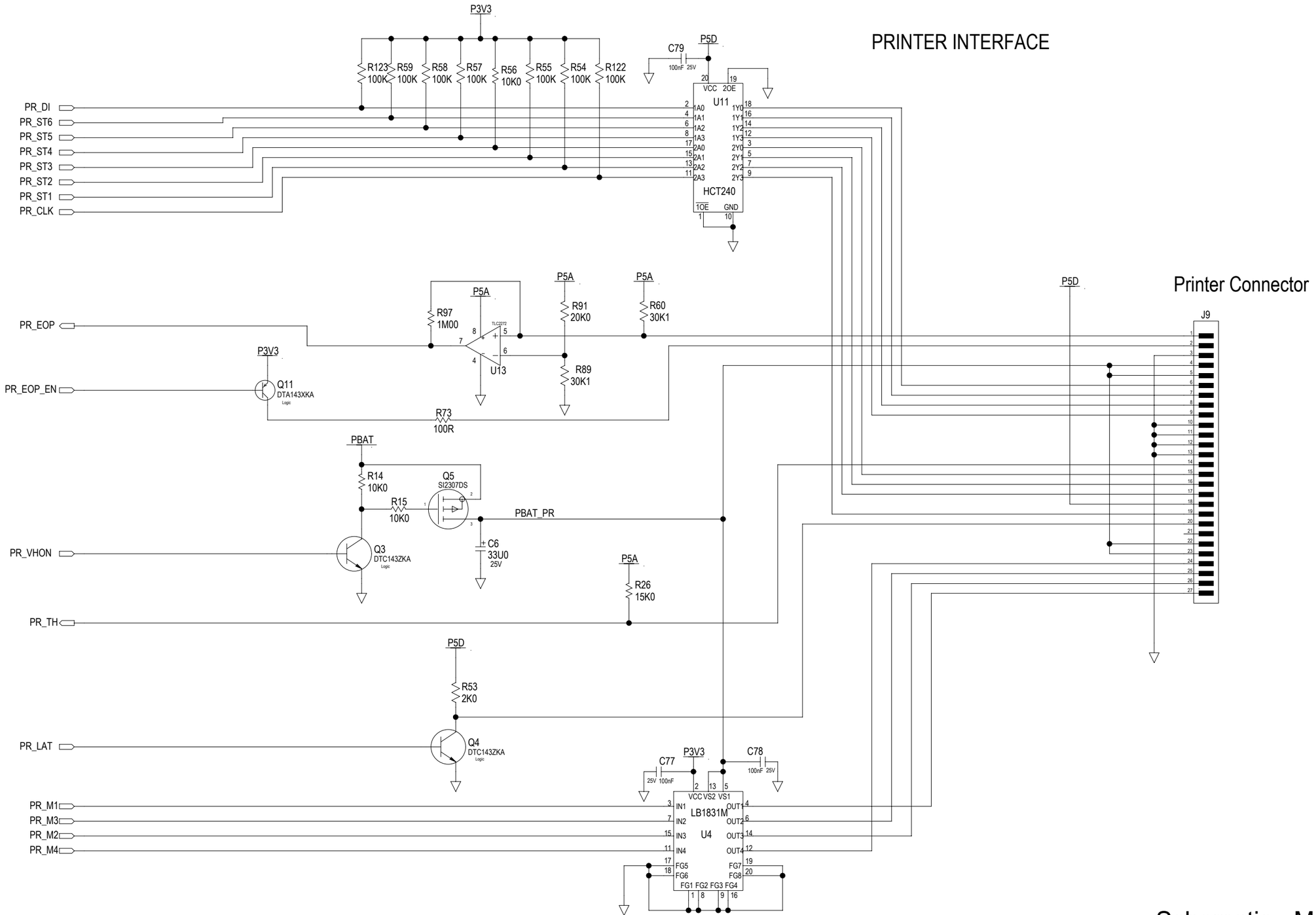
PRINTER INTERFACE



SCHEMATIC

PWA, MAIN BOARD, PROCARE

Schematic - Main Board
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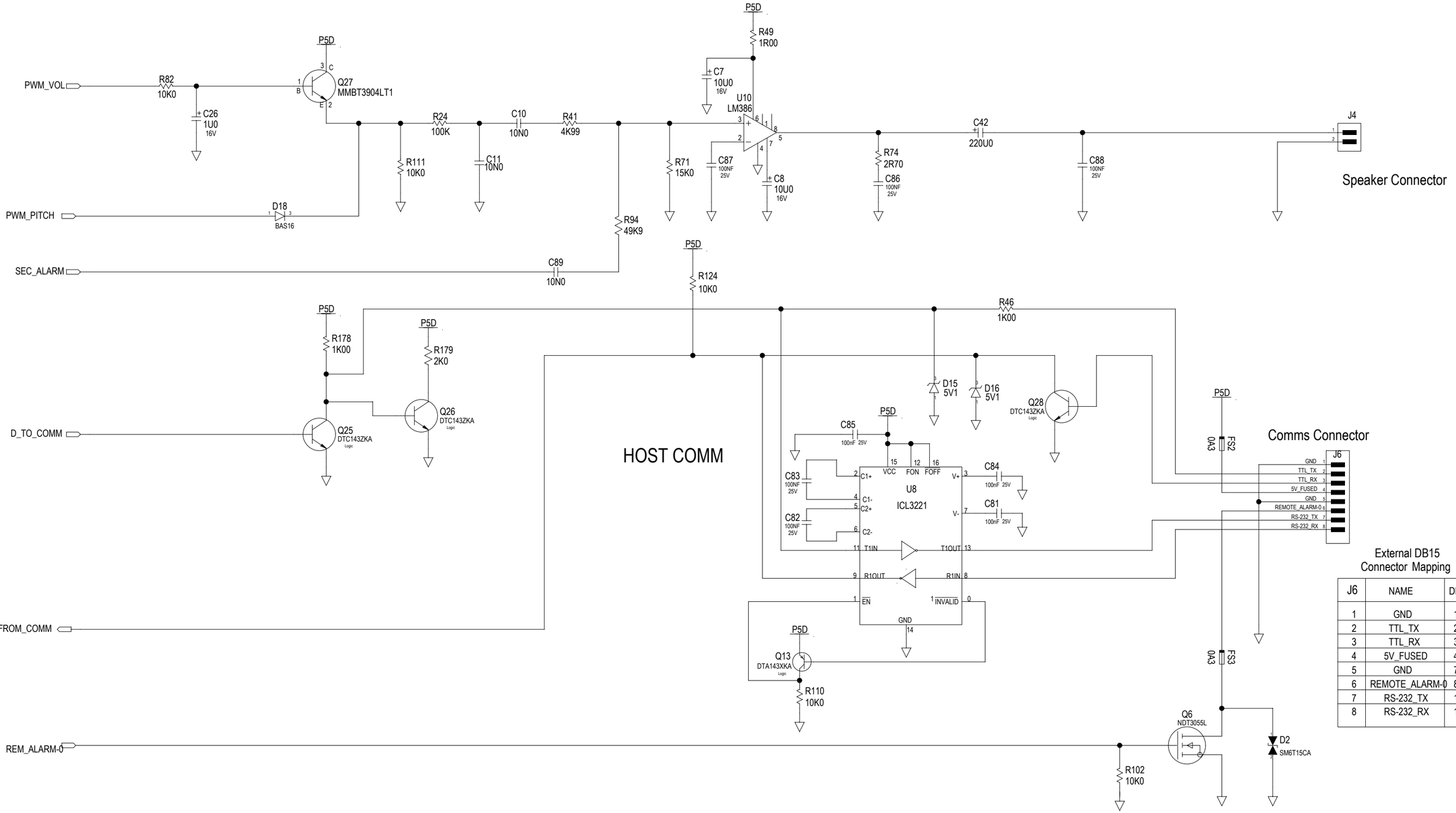
AUDIO ALARMS



External DB15
Connector Mapping

J6	NAME	DB15
1	GND	1
2	TTL_TX	2
3	TTL_RX	3
4	5V_FUSED	4
5	GND	7
6	REMOTE_ALARM-0	8
7	RS-232_TX	11
8	RS-232_RX	13

SCHEMATIC
PWA, MAIN BOARD, PROCARE

Schematic - Main Board
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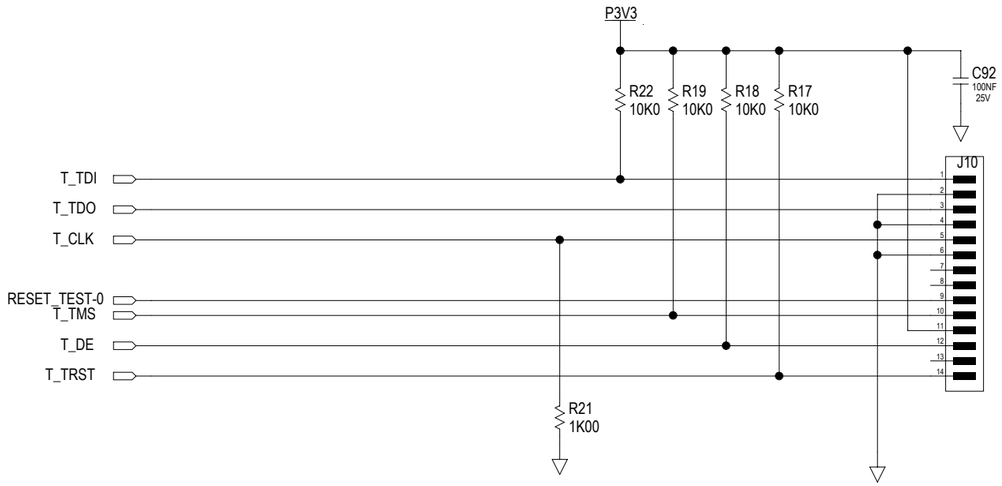
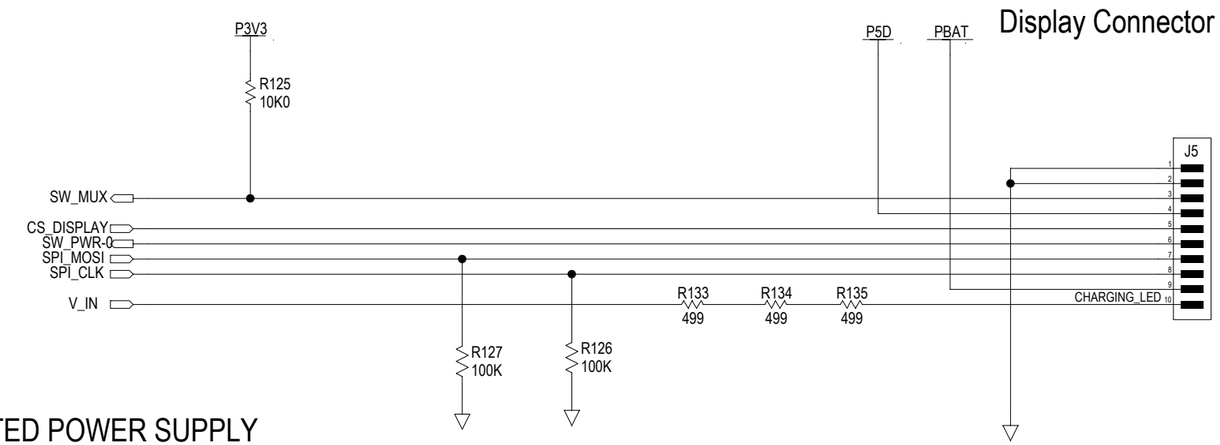
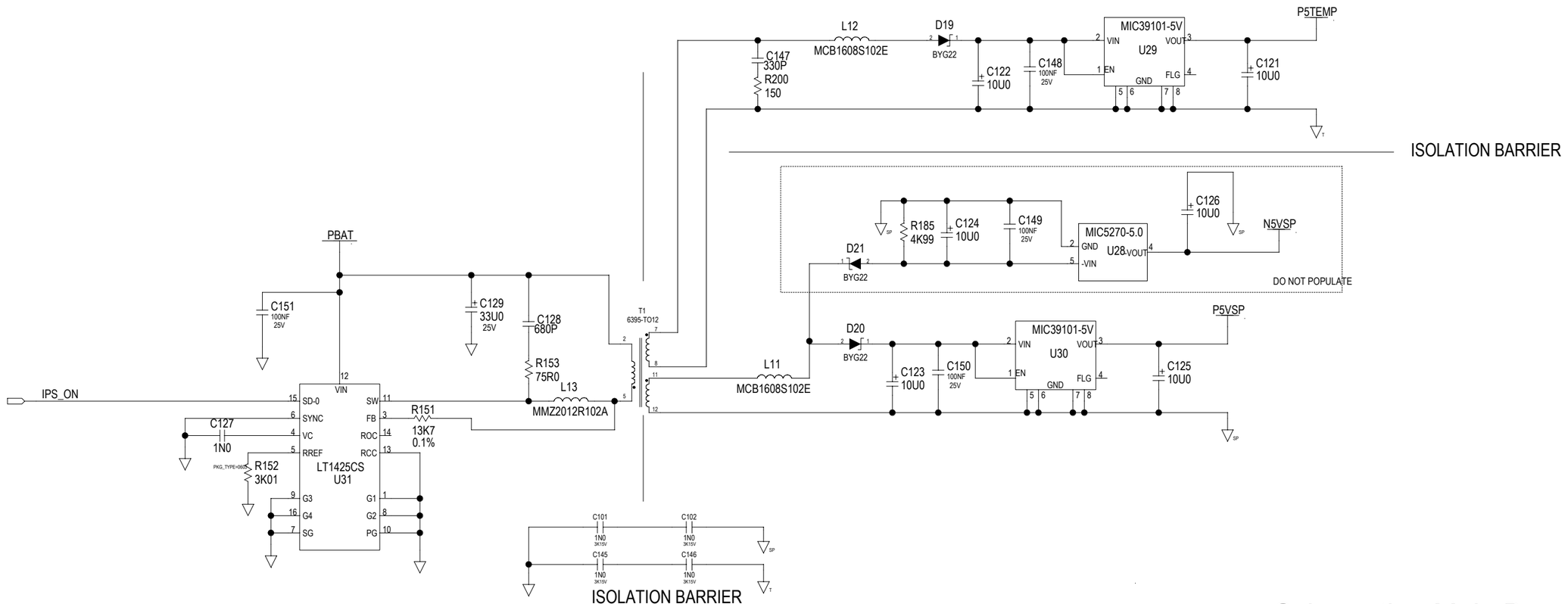
Test Connector



Display Connector



ISOLATED POWER SUPPLY



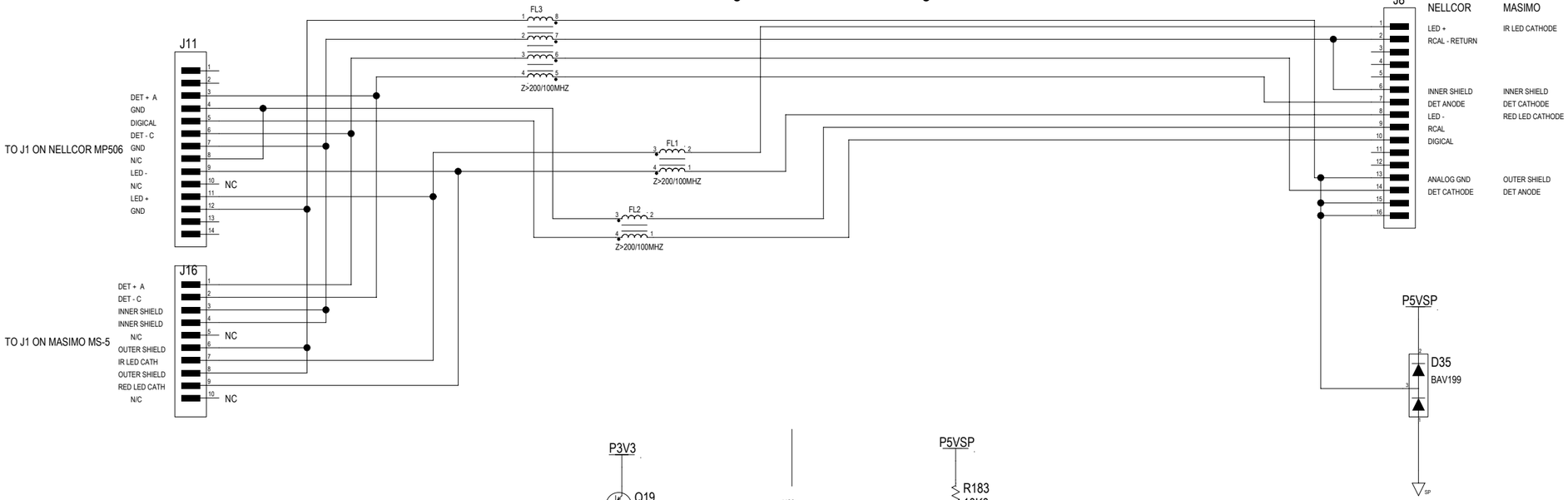
SCHEMATIC

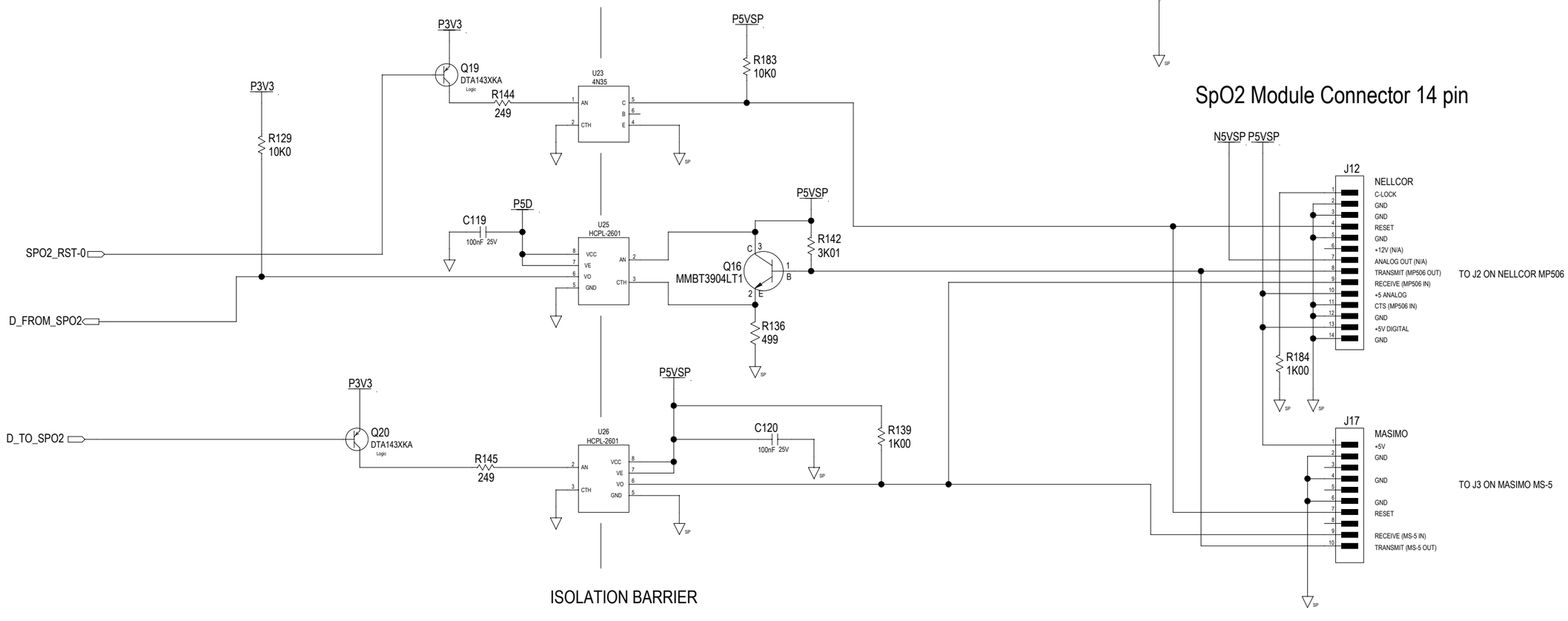
PWA, MAIN BOARD, PROCARE

SpO2 Module Connector 10 pin

Allow 4mm clearance between these signal and all other board signals

SpO2 Patient Connector





SpO2 Module Connector 14 pin

PWA, MAIN BOARD, PROCARE

SCHEMATIC

Schematic - Main Board
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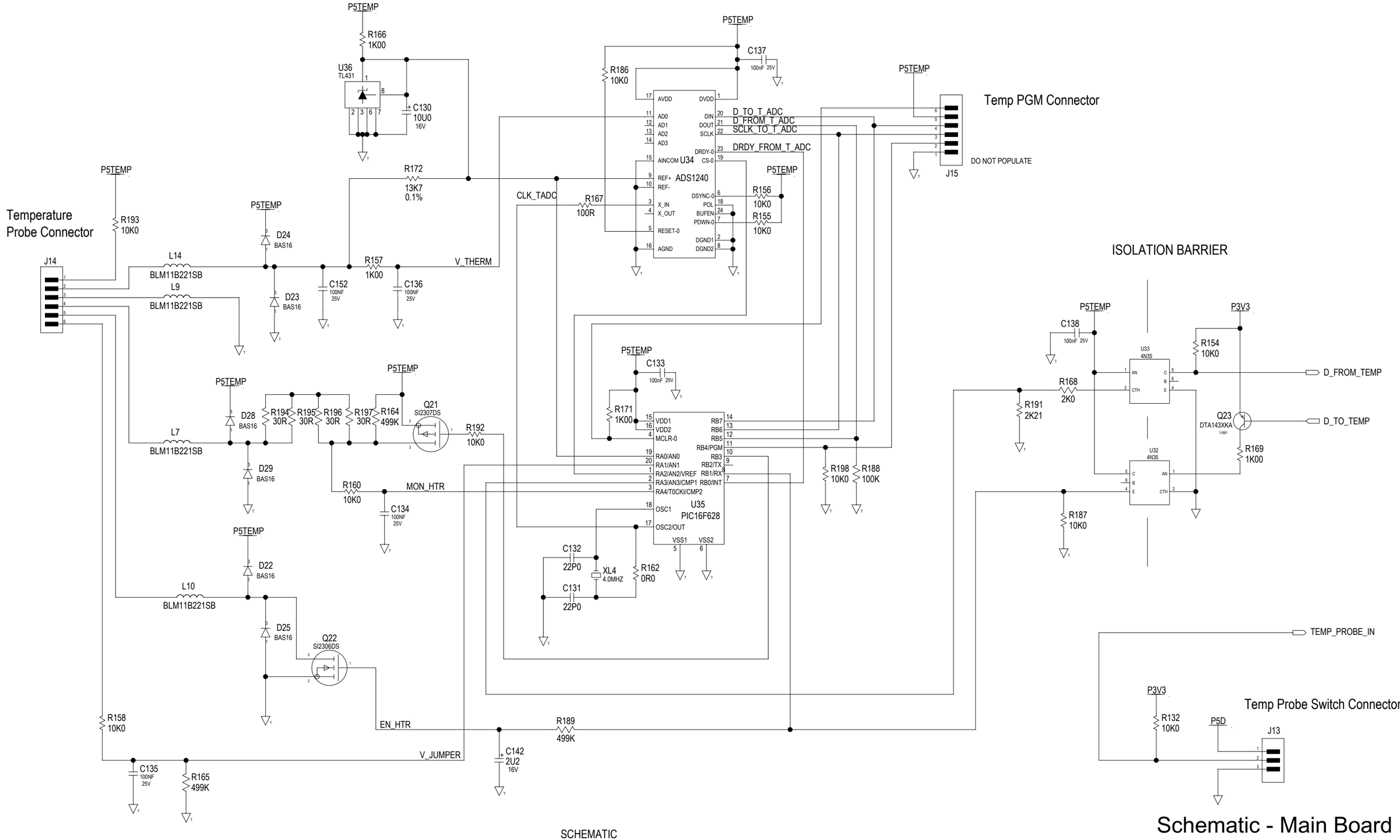

SCHEMATIC

PWA, MAIN BOARD, PROCARE

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DTC143ZKA is a digital transistor with a 4K7 base resistor and a 47K base pull-down resistor

DTD123EK is a digital transistor with a 2K2 base resistor and a 2K2 base pull-down resistor

SCHEMATIC

PROCARE USER INTERFACE BOARD

Schematic -
User Interface Board
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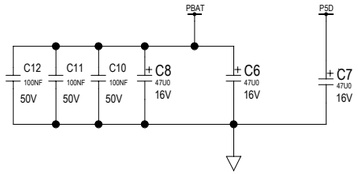
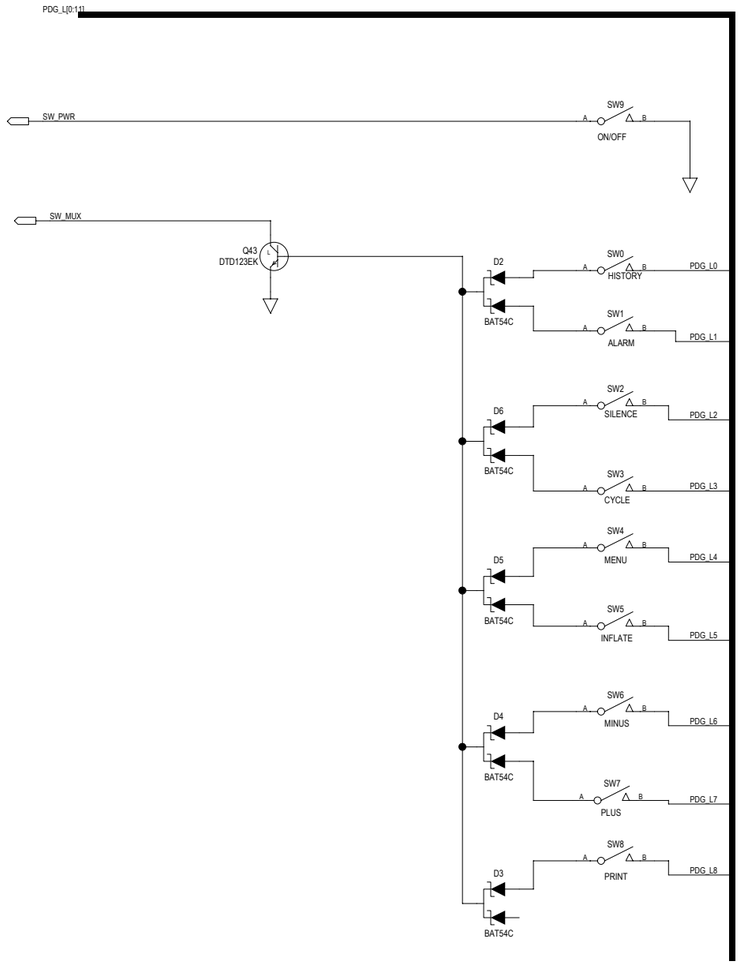
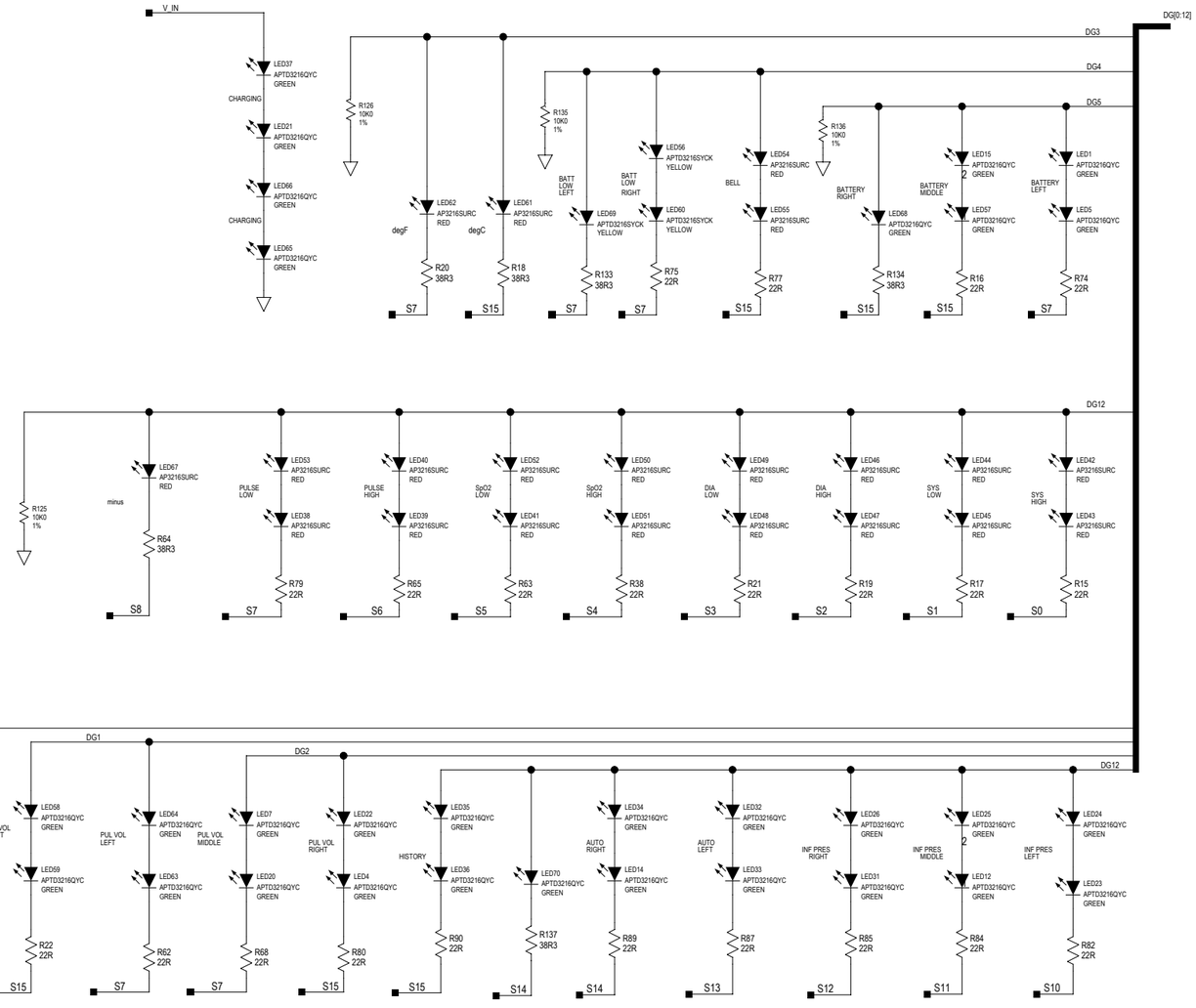


PCB BOARD SWITCH LOCATIONS

SILENCE	2	5	INFLATE
ALARM	1	3	CYCLE
+	7	0	HISTORY
-	6	8	PRINT
MENU	4	9	ON/OFF





Schematic -
User Interface Board
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CE

2009381-001 A