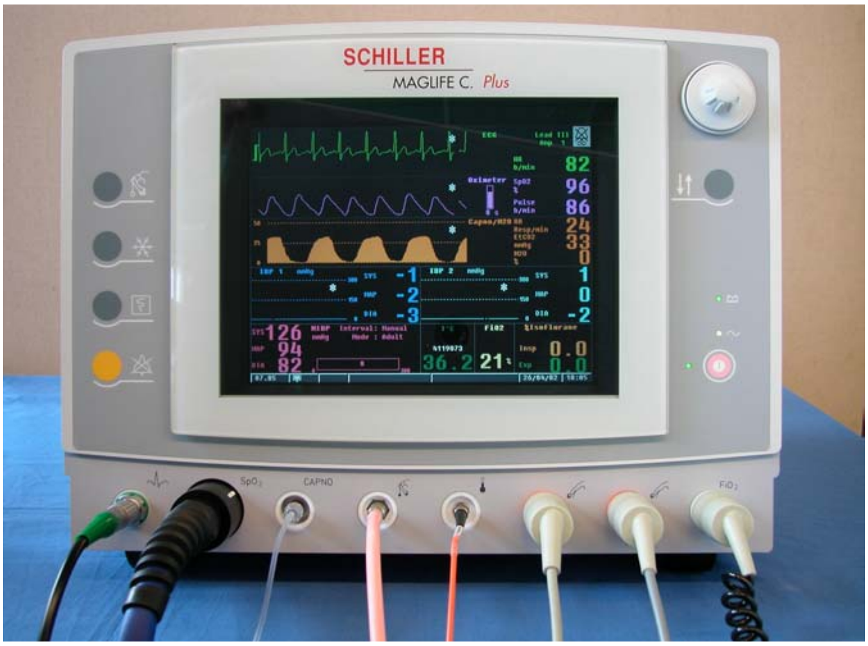
SCHILLER

MEDICAL S.A.S.

MAGLIFE C Plus

Technical manual

Version 01.00



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THE ART OF DIAGNOSTICS

Part No. 0-48-0051

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WARNING

The maker considers himself responsible for the safety, reliability and characteristics of the unit only provided:

- **the installation, extensions, adjustements, modifications or repairs are carried out by the maker or by persons authorized by the maker.**
- **the electrical installation of the room containing it complies with the applicable regulations.**
- **the unit is used in accordance with the operating instructions.**

This manual relates to the unit at the time of going to press.

The maker undertakes to supply all separated pieces for ten years.

All rights are reserved for units, circuits, procedures and registered names mentioned in this manual.

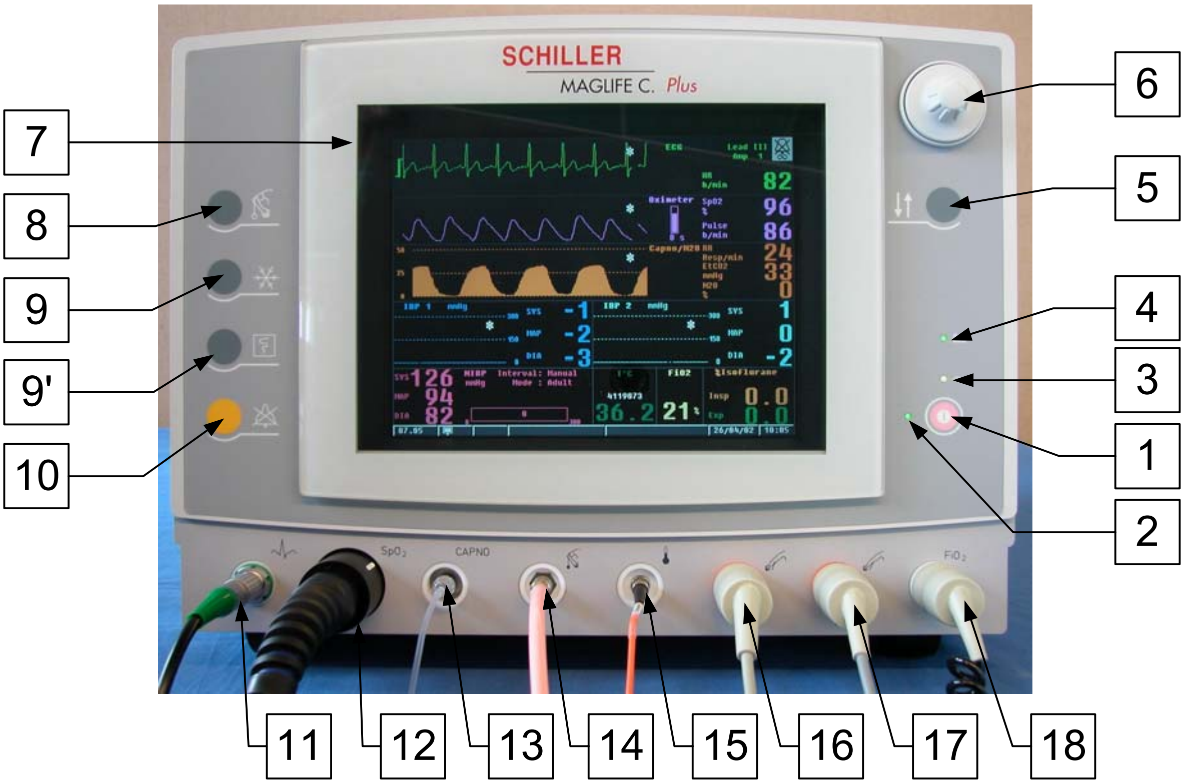
The unit has not been designed for uses other than those specifically described in this manual, which may be hazardous.

1. OPERATION

1.1. Display and controls

This chapter labels and describes each dysplay and control of **MAGLIFE C PLUS.**.

1.1.1. Front



(1) Main unit on/off switch.

(2) Unit on indicator.

(3) Indicator showing that the unit is connected to the mains.

(4) Indicator showing that the battery is being charged.

(5) Key for displaying and accessing the main menu or quitting a menu from any location.

(6) Control knob for menu selection.

(7) Waveform, parameter, menu and message display screen.

(8) Key for starting and stopping blood pressure measurement via a cuff.

(9) Key for starting and stopping the freeze function for all physiological waveforms.

(9') Key for starting a recorder sequence.

(10) Key for disabling and enabling audible alarms for 2 minutes (physiological and technical alarms).

(11) Connector for the fiber optic ECG sensor.

(12) Connector for the fiber optic SpO2 sensor.

(13) Connector for the aspiration tube for CO2/N2O and anaesthetic agents.

<u>Warning</u> : connect a filter supplied with device between connector and aspiration tube.

(14) Connector for the NIBP cuff.

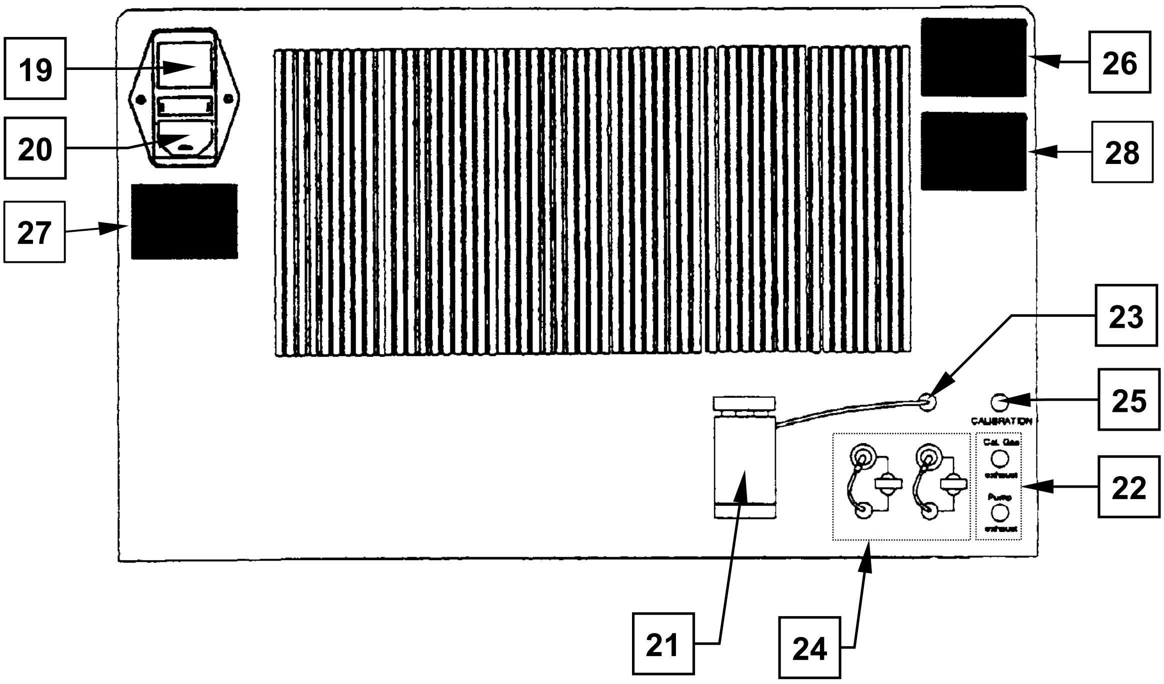
(15) Connector designed for a fiber optic temperature probe.

(16) Connector for the 1st invasive blood pressure sensor.

(17) Connector for the 2nd invasive blood pressure sensor.

(18) Connector for the inspired oxygen fraction (FiO2) sensor.

1.1.2. Rear



(19) Mains switch.

(20) Mains socket.

(21) Location of water trap for CO2/N2O and Agents functions.

(22) Exhaust for CO2/N2O and Anesthetic Agents. Exhaust 1 is used during calibration mode and Exhaust 2 is used during monotoring mode, and are used for the purpose of recovering gases from the CO2/N2O and Anesthetic Agent monitoring system.

Warning : The two exhaust ports must never be linked together using a « T ». This can bring erroneous indications for halogen agents calibration.

(23) CO2/N2O and Agents water trap inlet.

(24) CO2/N2O and Agents filters connection.

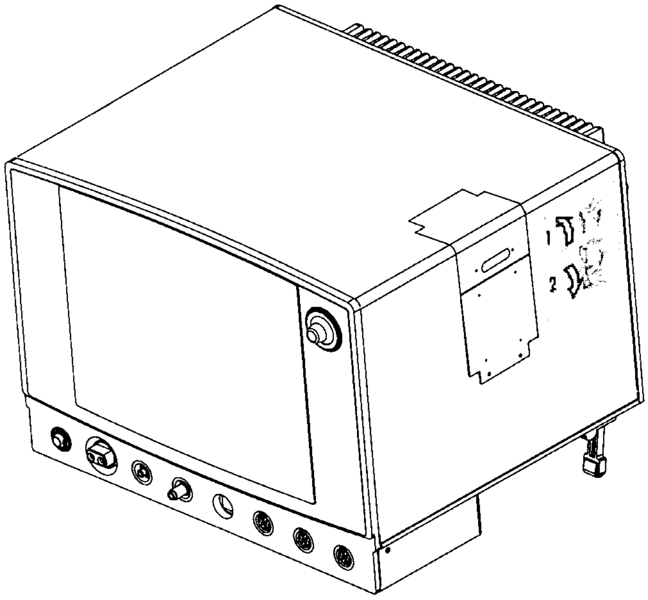
(25) Connection for the calibrating cylinder for the CO2/N2O and anaesthetic agents.

(26) Specification plate

(27) Fuse rating label

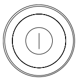
(28) CE label

1.1.3. Right side

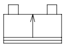


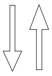
Thermal strip chart printer (optionnal) with an internal paper spool. Provides a permanent record of patient's vital signs, waveforms and trended information.

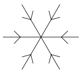
1.2. MAGLIFE C PLUS symbols

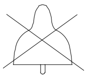
 Main unit On/Off button

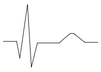
 Mains on

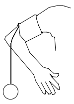
 Battery being charged

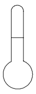
 Access to main menu or exiting any menu

 Trace freeze

 2-minutes sound alarm disabling

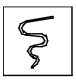
 Electrocardiogram

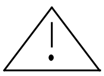
 Non Invasive Blood Pressure

 Temperature

 Invasive Blood Pressure

 CF type device protected against defibrillation shock (device designed for direct applications on heart)

 Print

 Attention ! Refer to the operating manual of this device for instructions !

1.3. Installation

MAGLIFE C PLUS is designed to operate as close to the patient as possible. It is installed in the Faraday cage, that is in the room in which the MRI magnet system is located.

Minimum distances from the entrance of the measuring tunnel must be maintained. These depend upon the magnetic field and the type of magnet. As a result, **MAGLIFE C PLUS** must necessarily be kept outside the area around the magnet demarcated by the 40 mT (400 G) line. The magnetic field detector sets off an alarm as soon as this value is reached. Beyond the 40 mT limit, the monitor may be subject to the force of attraction of the magnetic field. **Users are advised to mark this area out on the floor.**

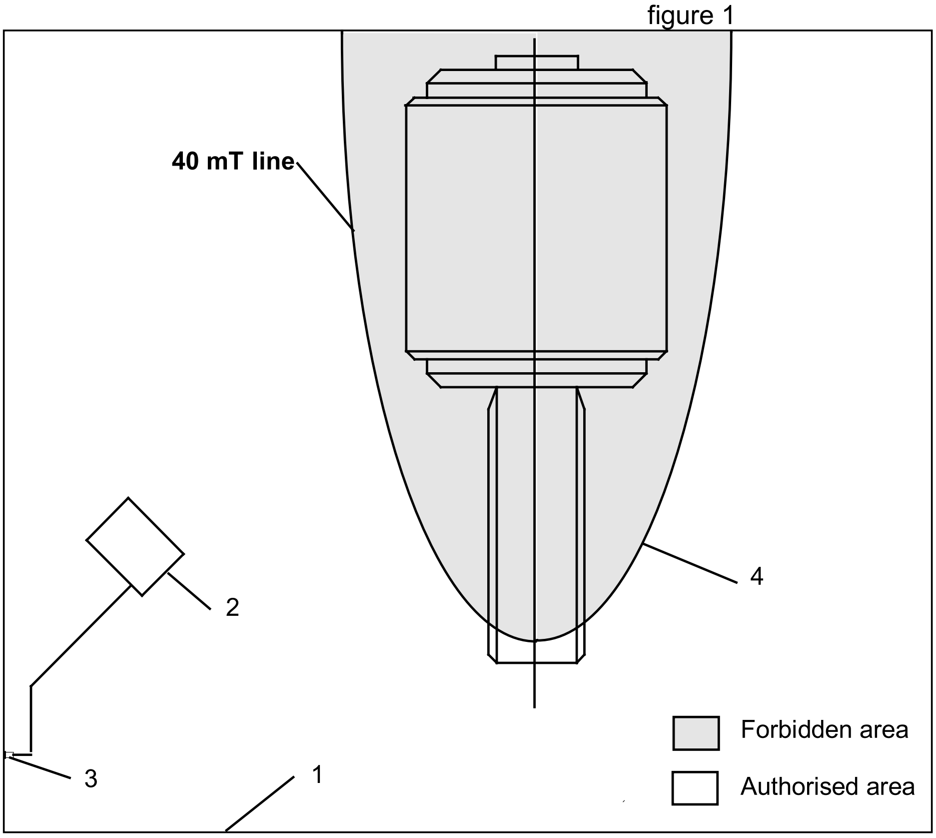
Precaution : The monitor may be installed on an optional non-magnetic cart supplied by SCHILLER SA. The cart is fitted with castors to facilitate manoeuvring. The minimum distance must be maintained if one wants to avoid any operating faults, and users are advised **not to move the monitor in the area where the magnetic field is higher than 40 mT when it is operating**.

Danger : The metal objects can become projectiles in the room of IRM. This is with the attraction of the magnet. In the event of a SAV intervention, the device must have left the room of IRM.

LAYOUT OF A TYPICAL MRI INSTALLATION WITH A MAGLIFE C PLUS MONITOR

1) Faraday cage
2) **MAGLIFE C PLUS** monitor
3) Mains socket
4) Floor marking (40 mT line)

figure 1

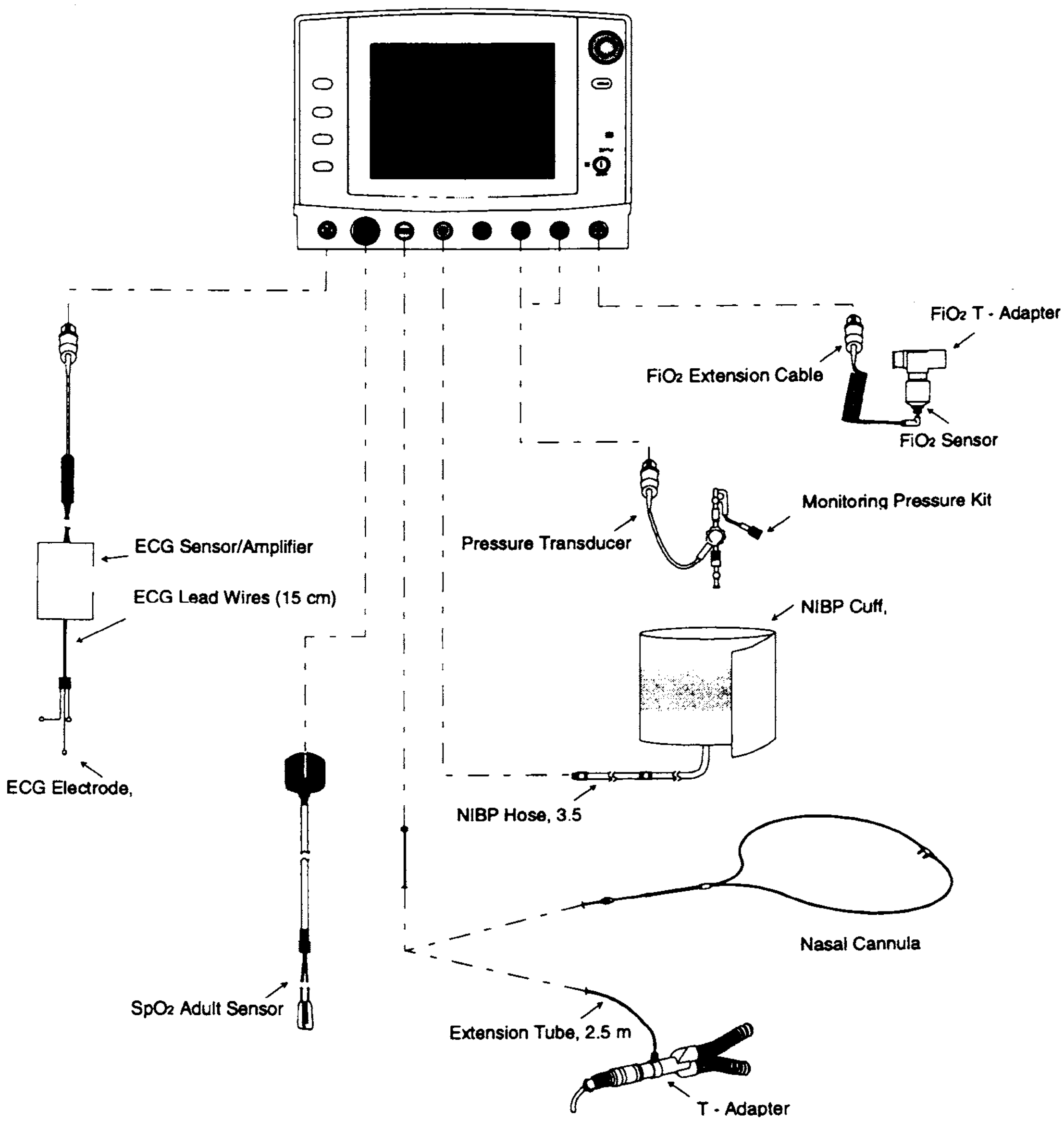


1.4. Placing the probes and controls

Warning : The recommendations below relate to the types of sensor and probe used, the positioning of the sensors and probes on the patient and the way in which the cables which connect sensors and probes from the patient to the unit are placed.

The rules given below must necessarily be followed in order to avoid the following problems:

* heating, even burns due to possible local concentration of the radio frequency energy emitted by the imager at the location of sensors and connecting cables in contact with the patient,
* interference in the medical images,
* artefacts in measurements.



1.4.1. General rules

- Cables connecting the sensors to the **MAGLIFE C PLUS** unit shall be placed parallel to each other and aligned with the main centre line of the tunnel.
- Cables and sensors must in no event touch the internal side of the tunnel or the pole parts of the magnet; keep them as far away as possible from these parts.
- Do not form loops with the cables.
- Use only SCHILLER SA supplied cables, sensors and cuffs.
- Do not put the cables in direct contact with the skin of the patient. Insert insulating material between the two (cloth, foam etc.)

1.4.2. Probes and sensors used and positioning instructions

a) ECG sensor and electrodes

Warning : The **MAGLIFE C PLUS** ECG is designed for monitoring rhythmology. The ECG signal is deformed by the static magnetic stray field. It is liable to disruption by the imaging sequences (gradients and effect of radio frequency pulses). Such ECGs may not be used for diagnostic purposes.

The ECG sensor (W1411939) is specially designed for operation with the **MAGLIFE C PLUS** monitor during MRI examinations.

Special MRI electrodes can be adapted onto the sensor. These single-use pre-gelled adhesive electrodes have SCHILLER SA validation and are available under code nos. 0-21-0001 (paediatric) and 0-21-0002 or 0-21-0007 (adult).

This sensor and the electrodes minimise the effect of the imager field gradients on the ECG signal and any heating due to imager operation (radio frequency emission), which may in extreme cases give rise to reddening of the skin or burns.

Positioning the electrodes

Note : By utilizing the following guidelines, signal quality can be maximized and interference minimized.

1. Ensure ECG function is turned « ON » and ECG parameters are set as desired.

2. Plug the ECG patient cable into the ECG connector.

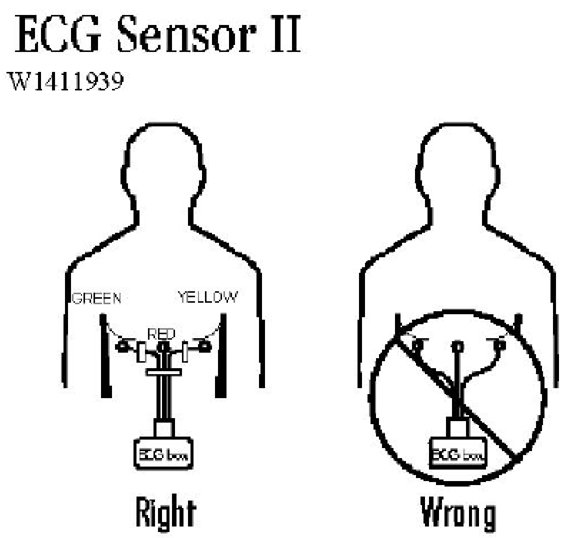
Warning : In order to avoid heating problems, the electrodes must be placed around the heart, as close to each other as possible. The distance between the electrodes must be less than 10 cm. Insure the ECG electrodes do not contact other conductive parts including earth ground.

3. In order to achieve reliable monitoring of the heart rate, it is indispensable to properly prepare the skin and look for the largest signal amplitude. Proceed as follows:
   - look for the area where the ECG signal is greatest,
   - if necessary, shave the skin in contact with the electrodes,
   - desquamate the skin (built-in scraper on the electrodes),
   - clean the skin,
   - apply the electrodes firmly onto the patient,
   - wait for at least 2 minutes before beginning to take the ECG.

4. Leads I, II or III may be selected with the help of the unit. As the electrodes have to be placed very close to each other, leads I II and III are only used for finding the maximum signal amplitude. The colour code does not have any meaning in this application.

Note : The 1 mV step which is continuously present on the screen must be used for finding the maximum amplitude.

In order to reduce interference from the imaging sequences, the cables must be placed as shown in the drawing below. In this way, the area delimited by the electrode cables is minimized:



Important :
- All three electrodes must be **aligned.**
- The alignment must be **perpendicular** to the magnet axis.
- Distance between electrodes: **9 to 10 cm** and **symmetric** to the middle one.
- Position the leadwires as shown.
- All leads must remain in **flat position** by means of tape.

MR Monitor setting:
- Lead I : ECG signal (between red and yellow).
- Lead II : processed ECG signal (noise compensated).
- Lead III : processed ECG signal (noise enhanced).

Thus, the gradient noise compensated ECG signal is lead II.

- Lead I : shows the standard case.
- Lead III : shows a gradient noise enhanced signal (for check purpose).

b) SpO2 sensor

1. Ensure the SpO2 function is turned « ON » and SpO2 parameters are set as desired.

   Use only the sensors featuring in the list of accessories supplied by SCHILLER SA.

2. Plug the SpO2 patient cable into the SpO2 connector, give the connector a quarter turn to the right to lock in place (to disconnect turn to the left and pull out).

3. Attach the sensor to the patient's index finger and route the cable down the back of the hand and secure with the velcro wristband or loosely tape the cable to the patients wrist.

Warning : Ensure proper routing of patient cable to avoid entanglement and/or strangulation .

Warning : Remove nail polish and false nails before putting the SpO2 sensor in place, as these can give rise to inaccurate SpO2 measurements. Cut long nails, because they may stop you from installing the sensor correctly.

Warning : When the sensor is put in place with the velcro wristband or loosely tape the cable to the patient wrist, do not tension or tighten the tape too much. If the tape is applied too tight, this may affect the measuring accuracy of the unit, and blisters may form on the patient's skin (due to the lack of circulation in the skin, and not because of any source of heat).

Precaution : Do not place the sensor on an extremity with an invasive catheter or blood pressure cuff in place.

Warning : Use only SCHILLER approved SpO2 sensors and patient cables. Use of other oxygen transducers may cause improper oximeter performance.

Warning : Excessive ambient light may cause inaccurate measurements. Cover the sensor site with opaque material.

Warning : Inaccurate measurements may be caused by incorrect sensor application or use ; significant levels of dysfunctional hemoglobins, (e. g. , carboxyhemoglobin or methemoglobin) ; or intra-vascular dyes such as indocyanine green methylene blue ; exposure to excessive illumination, such as surgical lamps (especially ones with a xenon light source), bilirubin lamps, fluorescent lights, infrared heating lamps, or direct sunlight ; excessive patient movement ; venous pulsations ; electro-surgical interference ; and placement of a sensor on an extremity that has a blood pressure cuff, arterial catheter, or intra-vascular line.

Warning : In certain situations in which perfusion and signal strength are low, such as in patients with thick or pigmented skin, inacccurately low SpO2 readings will result. Verification of oxygenation should be made, especially in preterm infants and patients with chronic lung disease, before instituting any therapy or intervention.

Warning : Many patients suffer from poor peripheral perfusion due to hypothermia, hypovolemia, severe vasoconstriction, reduced cardiac output, etc. These symptoms may cause a loss in SpO2 readings.

Warning : The temperature of the patient and the room must not be too low for measurement.

Precaution : do not use the SpO2 measurement alone for monitoring vital parameters.

c) *Capnogram probes*

1. Ensure CO2/N2O or Anesthetic Agents function is turned « ON » and parameters are set as desired.

2. Ensure patient filters with tubing and water trap are installed on rear of **MAGLIFE C PLUS**.

3. Plug the aspiration extension tube into the CO2/NO2 connector.

Warning : Connect a filter supplied with device between connector and aspiration tube.

4. Attach either a nasal cannula (non-intubated patients) or T-adapter (intubated patients) to the end of the aspiration extension tube.

Warning : Use only accessories supplied by SCHILLER SA.

Warning : To minimize the possibility of particles entering the sample line, ensure that the airway adapter is positioned such that the sample line is on « top ».

Warning : The maximum sampling rate at the nasal cannula is 140 ml/min. This device should not be used on patients whose breathing could be impaired by this vacuum flow rate.

Warning : Connection of the **MAGLIFE C PLUS** exhaust port (exhaust 1 in calibration mode and exhaust 2 in monitoring mode) to the hospital's waste gas scavenge system is strongly recommended to prevent exposure of hospital personnel to the patients respiratory sample. Vacuum (negative pressure) should not exceed 1 mmHg at the **MAGLIFE C PLUS** pump exhaust fitting. Excessive scavenge vacuum may result in damage to the **MAGLIFE C PLUS** internal pump.

Warning : Calibration must be performed at least every six months. Refer to section 6. for calibration procedure information.

***d) Non invasive blood pressure cuffs** (Non Invasive Blood Pressure)*

1. Ensure NIBP function is turned « ON » and NIBP parameters are set as desired.

2. Plug the NIBP hose connector into the NIBP measurement socket. Use only the cuffs listed in chapter 8.

Warning : A cuff that is too narrow for the limb will result in erroneously high readings. The correct size of the pressure cuff for a given patient has, among other considerations, a direct bearing on the accuracy of the obtained NIBP measurements. Base your selection of the cuff size on the limb circumference of the patient.

Warning : Cuffs become more supple as they age and sometimes develop permanent folds that can leave temporary marks on the limb. Any cuffs that exhibit this effect should be replaced.

Precaution : Ensure that the pressure tubes are not compressed or restricted.

3. Position the cuff slightly above the elbow, with the Velcro fastening directed upwards.

Warning : The cuff must be tight around the arm, but it must not exert any pressure on the blood vessels before the measurement begins. Wrap the cuff around the arm and fasten the Velcro strip.

Warning : Check if there is adequate blood circulation in the relevant limb (arm or leg) (except during the NIBP measurement).

Precaution : Cuff type sphygmomanometers shall not be used on the limb on which the oxygen saturation is being measured, as this could disrupt the correct determination of data.

Several models are available, such as:
- adult cuff,
- infant cuff,
- neonatal cuff.

Extension hoses are available as well.

e) FiO2 sensor

1. Ensure FiO2 function is turned « ON » and FiO2 parameters are set as desired.

2. Plug the FiO2 sensor and cable into the FiO2 connector..

Note : Do not open FiO2 sensor packaging until ready for use.

3. Attach the FiO2 T-adapter.

Precaution : This sensor and its connections must never be placed in the magnet tunnel or between its pole parts. The sensor shall be inserted with its T end piece in the inspiration tube, as high as possible and in any event **outside the tunnel or the polar parts**.

Warning : Connection of the **MAGLIFE C PLUS** exhaust port to the hospital's waste gas scavenge system is strongly recommended to prevent exposure of hospital personnel to the patients respiratory sample. Vacuum (negative pressure) should not exceed 1 mmHg at the **MAGLIFE C PLUS** pump exhaust fitting. Excessive scavenge vacuum may result in damage to the **MAGLIFE C PLUS** internal pump.

Warning : Calibration must be performed at least every six months, or if checking the system by exposing the sensor to ambient air does not yield a measurement of 21 +/-1%. Refer to section 6. for calibration procedure information.

f) Invasive blood pressure sensor

1. Ensure either IBP1 or IBP2 function is turned « ON » and IBP parameters are set as desired.

2. Plug the IBP transducer into one of the IBP connectors.

Note : a sensor which is particularly adapted for use with MRI is supplied as a standard feature. Use only SCHILLER SA supplied sensors.

3. Attach the dome pressure monitoring kit to the transducer.

4. To establish a monitoring site introduce an arterial pressure catheter into the patient's artery in accordance with standard hospital procedures. « Best practice, » as determined by the medical community, should be observed.

Note : The arterial pressure catheter should not be used on a limb that is being utilized for any other medical procedure. For example, an I.V. catheter or an SpO2 sensor.

5. Connect catheter line with flushing device to the pressure transducer.

6. Zero pressure transducer by selecting ZERO IBP on main menu.

7. Close the pressure transducer vent from atmosphere.

8. Flush arterial line at regular intervals per standard hospital procedure.

Note : Pressure transducers are protected against the effects of defibrillation and electrocautery.

1.5. Starting up

Place the electrodes and sensors on the patient (use SCHILLER SA supplied sensors and cables only). Comply with the instructions given under paragraph 4.2.

Connect the mains cord to the socket **(20)** and put the mains switch **(19)** on position 1. The lamp **(3)** will light to show that the power is on.

Precaution : For the battery option, lamp **(4)** will go on as well. The battery is charged automatically when power is on and the unit is not operating. Pressing key **(1)** will make lamp **(4)** go off.

Press the main unit on/off switch **(1)**; the associated lamp **(2)** will go on.
After a few seconds the screen will be turned on and the system will be initialised. The initialisation sequence lasts for about 20 seconds, after which the waveforms and parameters are displayed.

For use with the battery (mains cord disconnected), the position of switch **(19)** has no effect; just press key **(1)** . If the battery is charged, the associated lamp **(2)** goes on as well and the unit is turned on. When the battery is fully charged, the unit will operate on the battery for at least one hour.

Note : the main unit on/off switch **(1)** is inhibited for the first 2 s after pressing it to power up (ON) and must be pressed and held for approximately 4 seconds to turn the unit off.

1.6. Battery charging

MAGLIFE C PLUS may be powered by the internal battery. The battery is charged automatically when power is on (LED **(3)** on).

1.7. Using the menu

Apart from the functions accessible via the control keys, all the other monitor functions are selected from the menus displayed on the screen.

There are two ways of entering the main menu:
- pressing control knob **(6)** or,
- pressing key **(5)**.

Precaution : the menus displayed depend upon the parameters which have been defined as active in the option configuration.

Sub-menus are selected by rotating the control knob (6) to move up or down the main menu and pressing the control knob (6) once. Up to three sub-menus may be accessed depending upon the selection made.

If a change in a selection is desired, rotate the control knob (6) to this selection and press the control knob (6) once to either:

a. toggle the selection on or off

b. pick the desired selection (an * will appear to the left of the selection)

c. change the value of the selection by rotating the control knob (6), press control knob (6) again to save new value.

NOTE: The cursor will start blinking after the control knob (6) is pressed.

There are three ways of quitting a menu :

- pressing main menu key (5),
- selecting "Return" successively in sub-menus and then "Exit" in the main menu.
- Double clicking the control knob (6) (two clicks in rapid succession)

1.8. Description of menus

1.8.1. Main menu

The main menu is as follows:

Parameter
ECG Lead
Zero IBP
Alarm Limits
Alarms Suspend
Trends
Configuration
PC Save ON
Exit

It is used to select the sub-menus.

Note : only the installed parameters are displayed.

The main menu offers the following sub-menus :

1.8.2. ECG sub-menu

– with ECG function turned "Off" (select "ECG On" to turn on)

Parameter	ECG	ECG ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
Magfile ON	FiO2	
Exit	Temperature	
	Return	

– with ECG function turned "On" (select "ECG Off" to turn off)

Parameter	ECG	ECG Lead
ECG Lead	NIBP	Scale
Zero IBP	IBP 1	ECG OFF
Alarm Limits	IBP 2	Return
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– selecting the lead of the ECG waweform

Parameter	* I
ECG Lad	II
Zero IBP	III
Alarm Limits	Return
Alarms Suspend	
Trends	
Configuration	
PC Save ON	
Exit	

OR

Parameter	ECG	ECG Lead	* I
ECG Lead	NIBP	Scale	II
Zero IBP	IBP 1	ECG OFF	III
Alarm Limits	IBP 2	Return	Return
Alarms Suspend	SpO2		
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

– selecting the scale displayed on the screen

Parameter	ECG	ECG Lead	* 0.25
ECG Lead	NIBP	Scale	0.5
Zero IBP	IBP 1	ECG OFF	1
Alarm Limits	IBP 2	Return	2
Alarms Suspend	SpO2		Return
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

1.8.3. NIBP (Non-Invasive Blood Pressure) sub-menu

– with Non Invasive Blood Pressure function turned "Off" (select "NIBP On" to turn on)

Parameter	ECG	NIBP ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with Non Invasive Blood Pressure function turned "On" (select "NIBP Off" to turn off)

Parameter	ECG	Patient Size
ECG Lead	NIBP	Interval
Zero IBP	IBP 1	NIBP OFF
Alarm Limits	IBP 2	Return
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– selecting the patient size of the NIBP (different initial inflating pressures 180mmHg for Adult/Pediatric 120 for Neonate

<u>Note</u>: For subsequent measurements the initial inflation pressure is approximately 50 mmHg above the prior systolic measurement for Adults/Pediatrics and 30 mmHg for Neonates.

Parameter	ECG	Patient Size	Neonate
ECG Lead	NIBP	Interval	Pediatric
Zero IBP	IBP 1	NIBP OFF	Adult
Alarm Limits	IBP 2	Return	Return
Alarms Suspend	SpO2		
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

– selecting the measurement interval of the NIBP

Parameter	ECG	Patient Size	Manual
ECG Lead	NIBP	Interval	Cont.
Zero IBP	IBP 1	NIBP OFF	1 min
Alarm Limits	IBP 2	Return	2 min
Alarms Suspend	SpO2		* 5 min
Trends	CO2/N2O		10 min
Configuration	Anes. Agents		15 min
PC Save ON	FiO2		20 min
Exit	Temperature		30 min
	Return		1 hr
			2 hr
			Return

1.8.4. IBP 1 (Invasive Blood Pressure) sub-menu

– with Invasive Blood Pressure 1 function turned "Off" (select "IBP 1 On" to turn on)

Parameter	ECG	IBP 1 ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with Invasive Blood Pressure 1 function turned "On" (select "IBP 1 Off" to turn off)

Parameter	ECG	Scale
ECG Lead	NIBP	IBP 1 OFF
Zero IBP	IBP 1	Return
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– selecting the scale of the Invasive Blood Pressure 1 waveform amplitude

Parameter	ECG	Scale	15
ECG Lead	NIBP	IBP 1 OFF	30
Zero IBP	IBP 1	Return	60
Alarm Limits	IBP 2		* 150
Alarms Suspend	SpO2		225
Trends	CO2/N2O		300
Configuration	Anes. Agents		Return
PC Save ON	FiO2		
Exit	Temperature		
	Return		

– setting the zero of the Invasive Blood pressure 1 wave form, Select Zero IBP1 and press control knob to initiate the zeroing of IBP1.

Parameter	Zero IBP1
ECG Lead	Zero IBP2
Zero IBP	Return
Alarm Limits	
Alarms Suspend	
Trends	
Configuration	
PC Save ON	
Exit	

Note : Put the pressure sensor on the same level as the patient's mid-axillary before setting the zero.

1.8.5. IBP 2 (Invasive Blood Pressure) sub-menu

– with Invasive Blood Pressure 2 function turned "Off" (select "IBP 2 On" to turn on)

Parameter	ECG	IBP 2 ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with Invasive Blood Pressure 2 function turned "On" (select "IBP 2 Off" to turn off)

Parameter	ECG	Scale
ECG Lead	NIBP	IBP 2 OFF
Zero IBP	IBP 1	Return
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– selecting the scale of the Invasive Blood Pressure 2 waveform amplitude

Parameter	ECG	Scale	15
ECG Lead	NIBP	IBP 1 OFF	30
Zero IBP	IBP 1	Return	60
Alarm Limits	IBP 2		* 150
Alarms Suspend	SpO2		225
Trends	CO2/N2O		300
Configuration	Anes. Agents		Return
PC Save ON	FiO2		
Exit	Temperature		
	Return		

– setting the zero of the Invasive Blood pressure 2 wave form, Select Zero IBP2 and press control knob to initiate the zeroing of IBP2.

Parameter	Zero IBP1
ECG Lead	Zero IBP2
Zero IBP	Return
Alarm Limits	
Alarms Suspend	
Trends	
Configuration	
PC Save ON	
Exit	

Note : Put the pressure sensor on the same level as the patient's mid-axillary before setting the zero.

1.8.6. SpO2 sub-menu

– with SpO2 function turned "Off" (select "SpO2 On" to turn on)

Parameter	ECG	SpO2 ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with SpO2 function turned "On" (select "SpO2 Off" to turn off) selecting the duration used for calculating the average pulse.

Parameter	ECG	8 seconds
ECG Lead	NIBP	16 seconds
Zero IBP	IBP 1	SpO2 OFF
Alarm Limits	IBP 2	Return
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

1.8.7. CO2/N2O sub-menu

– with CO2/N2O function turned "Off" (select "CO2/N2O On" to turn on)

Parameter	ECG	CO2/N2O On
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with CO2/N2O function turned "On" (select "CO2/N2O Off" to turn off)

Parameter	ECG	Scale
ECG Lead	NIBP	Select Insp CO2/N2O
Zero IBP	IBP 1	Cal CO2/Agents
Alarm Limits	IBP 2	CO2/N2O OFF
Alarms Suspend	SpO2	Return
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– selecting the scale of Capnogram amplitude

Parameter	ECG	Scale	* 50
ECG Lead	NIBP	Select Insp CO2/N2O	75
Zero IBP	IBP 1	Cal CO2/Agents	100
Alarm Limits	IBP 2	CO2/N2O OFF	Return
Alarms Suspend	SpO2	Return	
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

– selecting N2O or Insp CO2.

Parameter	ECG	Scale	* N2O
ECG Lead	NIBP	Select Insp CO2/N2O	InspCO2
Zero IBP	IBP 1	Cal CO2/Agents	Return
Alarm Limits	IBP 2	CO2/N2O OFF	
Alarms Suspend	SpO2	Return	
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

Note : the above menus are show when both CO2 and N2O parameters are activated. Your unitv may display only CO2, NO2 or none of these parameters if not activated.

1.8.8. Anes Agents (Anesthetic Agents) sub-menu

– with anesthetics agents function turned "Off" (select "Agents On" to turn on)

Parameter	ECG	Agents ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with anesthetic agents function turned "On" (select "Agents Off" to turn off)

Parameter	ECG	Select Agent
ECG Lead	NIBP	Cal CO2/Agents
Zero IBP	IBP 1	Agents OFF
Alarm Limits	IBP 2	Return
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– selecting the displayed agent

Parameter	ECG	Select Agent	Halothane
ECG Lead	NIBP	Cal CO2/Agents	Isoflurane
Zero IBP	IBP 1	Agents OFF	* Enflurane
Alarm Limits	IBP 2	Return	Sevoflurane
Alarms Suspend	SpO2		Desflurane
Trends	CO2/N2O		Return
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

1.8.9. FiO2 sub-menu

– with FiO2 function turned "Off" (select "FiO2 On" to turn on)

Parameter	ECG	FiO2 ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with FiO2 function turned "On" (select "FiO2 Off" to turn off).

Parameter	ECG	Calibrate
ECG Lead	NIBP	FiO2 OFF
Zero IBP	IBP 1	Return
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

1.8.10. Temperature sub-menu

– with temperature function turned "Off" (select "FiO2 On" to turn on)

Parameter	ECG	Temperature ON
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

– with temperature function turned "On" (select "FiO2 Off" to turn off).

Parameter	ECG	Temperature OFF
ECG Lead	NIBP	Return
Zero IBP	IBP 1	
Alarm Limits	IBP 2	
Alarms Suspend	SpO2	
Trends	CO2/N2O	
Configuration	Anes. Agents	
PC Save ON	FiO2	
Exit	Temperature	
	Return	

1.8.11. CO2/N2O calibration procedure

Calibration is performed to ensure the accuracy of CO2, N20 and agent readings. It requires the use of a calibration gas cylinder fitted with an aspiration tube and a pressure-releasing valve. The calibration gas can contains the following gas mixture ; ISO 1.5%, CO2 10%, N2 38.5%, N2O 50%. Calibration must be performed at least once every 6 months.

WARNING: Use SCHILLER supplied gas cylinders only. They are suitable for use in high magnetic stray fields.

A 15 minute warm-up time is required before accurate calibration can be performed. Calibration shall be done away from MRI examinations of patients.

Proceed as follows:
1. Click the "Cal CO2/Agents" selection: the system will display the message "Open gas cylinder".

2. Open the gas cylinder connected at (26) and click on "Start".

Parameter	ECG	Scale	Start
ECG Lead	NIBP	Select Insp CO2/N2O	Return
Zero IBP	IBP 1	Cal CO2/Agents	
Alarm Limits	IBP 2	CO2/N2O OFF	
Alarms Suspend	SpO2	Return	
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

3. The unit will display the message "Calibrating". Wait for 2 minutes, till the message "OK" is displayed. Now you can quit the menu.

Parameter	ECG	Scale	Quit
ECG Lead	NIBP	Select Insp CO2/N2O	
Zero IBP	IBP 1	Cal CO2/Agents	
Alarm Limits	IBP 2	CO2/N2O OFF	
Alarms Suspend	SpO2	Return	
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

Note : if you do not want to calibrate, click "Return"
The 5-second messages are interrupted if any other operating message needs to be displayed.

Parameter	ECG	Scale	Start
ECG Lead	NIBP	Select Insp CO2/N2O	Return
Zero IBP	IBP 1	Cal CO2/Agents	
Alarm Limits	IBP 2	CO2/N2O OFF	
Alarms Suspend	SpO2	Return	
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

1.8.12. Anesthetic Agent calibration procedure

The agents are calibrated via the CO2/N2O (see page 38 for complete information on the calibration procedure); however, they may also be calibrated with the help of the following menus :

Parameter	ECG	Select Agent	Start
ECG Lead	NIBP	Cal CO2/Agents	Return
Zero IBP	IBP 1	Agents OFF	
Alarm Limits	IBP 2	Return	
Alarms Suspend	SpO2		
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

Parameter	ECG	Select Agent	Quit
ECG Lead	NIBP	Cal CO2/Agents	
Zero IBP	IBP 1	Agents OFF	
Alarm Limits	IBP 2	Return	
Alarms Suspend	SpO2		
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

1.8.13. FiO2 calibration procedure

Starting the FiO2 calibration sequence (perform the calibration at fresh-air).

Calibration is performed to ensure the accuracy of the FiO2 reading.

NOTE : To calibrate, make the unit run for at least 15 minutes and connect the sensor. Calibration shall be performed away from MRI examinations of patients.

NOTE : If there isn't the "- - -" indication, the system will not calibrate, but an incorrect value is displayed and calibration is required.

1. Click the "Calibrate" selection, then the "Start" selection.

Parameter	ECG	Calibrate	Start
ECG Lead	NIBP	FiO2 OFF	Return
Zero IBP	IBP 1	Return	
Alarm Limits	IBP 2		
Alarms Suspend	SpO2		
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

2. If the unit is correctly calibrated, the screen will display 21%. Click "Quit".

Parameter	ECG	Calibrate	Quit
ECG Lead	NIBP	FiO2 OFF	
Zero IBP	IBP 1	Return	
Alarm Limits	IBP 2		
Alarms Suspend	SpO2		
Trends	CO2/N2O		
Configuration	Anes. Agents		
PC Save ON	FiO2		
Exit	Temperature		
	Return		

Note : The 5-second messages are interrupted if any other operating message needs to be displayed.

1.8.14. Alarm limits menu

The Alarm Limits menu is used to set the alarm limits for setting alarms relating to the various parameters.

NOTE: The "Alarm Limits" menu only displays the parameters present in the configuration.

NOTE : If one or more of the "Alarm Limits" are set off a crossed bell icon as shown is displayed in reverse video in the upper right-hand corner of the screen.

It offers the following sub-menus :

Parameter
ECG Lead
Zero IBP
Alarm Limits
Alarms Suspend
Trends
Configuration
PC Save ON
Exit

Heart Freq.		40	120
IBP 1	SYS	80	180
mmHg	MAP	40	160
	DIA	40	120
IBP 2	SYS	80	180
mmHg	MAP	40	160
	DIA	40	120
% SpO2		40	120
SpO2 Pulse Rate		88	100
NIBP Neonate	SYS	80	160
mmHg	MAP	40	160
	DIA	40	120
Pediatric	SYS	80	180
	MAP	40	160
	DIA	40	120
Adult	SYS	80	180
	MAP	40	160
	DIA	40	120

Resp. Rate		5	70
Apnea			10
EtCO2 mmHg		5	50
InspCO2 mmHg			5
%N2O		0	70
Halothane	%Insp	0.00	2.50
	%Exp	0.00	2.50
Isoflurane	%Insp	0.00	1.80
	%Exp	0.00	1.80
Enflurane	%Insp	0.00	2.10
	%Exp	0.00	2.10
Sevoflurane	%Insp	0.00	2.10
	%Exp	0.00	2.10
Desflurane	%Insp	0.00	1.90
	%Exp	0.00	1.90
% FiO2		10	30
Temperature °C		25.0	40.0
Prior Operator Settings			
Reset to default			
Return			

When the unit is turned on, the alarm limits are set to the default values displayed on the screen above. If the control knob (6) is pressed when "Prior Operatir Settings" is selected, all alarm settings will return to the values last set prior to the monitor being turned off.

Example :

To adjust the IBP1 High Systolic alarm limit rotate the control knob (6) to highlight IBP1. Press the control knob (6) to Select IBP1 and the value for the IBP1 Low Systolic alarm ("70") will be highlighted. Rotate the control knob (6) to highlight the IBP1 High Systolic alarm value ("180"). Press the control knob (6) and the value "180" will "blink". Rotate the control knob (6) to change the value. Pressing the control knob (6) or the MENUS Key (5) will "set" the IBP1 High Systolic alarm limit at the last selected value.

Parameter
ECG Lead
Zero IBP
Alarm Limits
Alarms Suspend
Trends
Configuration
PC Save ON
Exit

Heart Freq.		40	120
IBP 1	SYS	80	180
mmHg	MAP	40	160
	DIA	40	120
IBP 2	SYS	80	180
mmHg	MAP	40	160
	DIA	40	120
% SpO2		40	120
SpO2 Pulse Rate		88	100
NIBP Neonate	SYS	80	160
mmHg	MAP	40	160
	DIA	40	120
Pediatric	SYS	80	180
	MAP	40	160
	DIA	40	120
Adult	SYS	80	180
	MAP	40	160
	DIA	40	120

Resp. Rate		5	70
Apnea			10
EtCO2 mmHg		5	50
InspCO2 mmHg			5
%N2O		0	70
Halothane	%Insp	0.00	2.50
	%Exp	0.00	2.50
Isoflurane	%Insp	0.00	1.80
	%Exp	0.00	1.80
Enflurane	%Insp	0.00	2.10
	%Exp	0.00	2.10
Sevoflurane	%Insp	0.00	2.10
	%Exp	0.00	2.10
Desflurane	%Insp	0.00	1.90
	%Exp	0.00	1.90
% FiO2		10	30
Temperature °C		25.0	40.0
Prior Operator Settings			
Reset to default			
Return			

1.8.15. Alarm Suspend menu

The Alarms Suspend menu is used to enable or disable audible alarms continuously :
.

– with Alarms Suspend "On"

Parameter	Suspend Alarms OFF
ECG Lead	Return
Zero IBP	
Alarm Limits	
Alarms Suspend	
Trends	
Configuration	
PC Save ON	
Exit	

– with Alarms Suspend "Off"

Parameter	Suspend Alarms ON
ECG Lead	Return
Zero IBP	
Alarm Limits	
Alarms Suspend	
Trends	
Configuration	
PC Save ON	
Exit	

1.8.16. Trends menu

The Trends menu is used to set-up the trend display; it offers the following sub-menus:

– no trend display or selection of the trend display

Parameter	Parameter	* No Trend
ECG Lead	Duration	Heart rate
Zero IBP	Scale	IBP 1
Alarm Limits	Print Trends	IBP 2
Alarms Suspend	Clear Trends	SpO2
Trends	Return	SpO2 Pulse Rate
Configuration		NIBP
PC Save ON		EtCO2
Exit		InspCO2
		Resp Rate
		N2O
		Anes Agent
		FiO2
		Temperature
		Return

– select duration trend

Parameter	Parameter	* 30 min
ECG Lead	Duration	1 Hour
Zero IBP	Scale	2 Hours
Alarm Limits	Print Trends	4 Hours
Alarms Suspend	Clear Trends	Return
Trends	Return	
Configuration		
PC Save ON		
Exit		

– select scale of trend

Parameter	Parameter	* Auto Scale
ECG Lead	Duration	Full Scale
Zero IBP	Scale	Return
Alarm Limits	Print Trends	
Alarms Suspend	Clear Trends	
Trends	Return	
Configuration		
PC Save ON		
Exit		

Note : Scale and Duration of selected trend are the same for recording and display. Scale and duration are trhe same for all parameters.

- Print trends

Parameter	Parameter	Heart rate	Start Printer
ECG Lead	Duration	IBP 1	Return
Zero IBP	Scale	IBP 2	
Alarm Limits	Print Trends	SpO2	
Alarms Suspend	Clear Trends	SpO2 Pulse Rate	
Trends	Return	NIBP	
Configuration		EtCO2	
PC Save ON		InspCO2	
Exit		Resp Rate	
		N2O	
		Anes Agent	
		FiO2	
		Temperature	
		Return	

Note : If aprinting is in progress while the operator selects "Print Trends", tis menu is immediately displayed.

Parameter	Parameter	Stop Printer
ECG Lead	Print Trends	Return
Zero IBP	Clear Trends	
Alarm Limits	Return	
Alarms Suspend		
Trends		
Configuration		
PC Save ON		
Exit		

- Clear trends

Parameter	Parameter	Clear
ECG Lead	Duration	Return
Zero IBP	Scale	
Alarm Limits	Print Trends	
Alarms Suspend	Clear Trends	
Trends	Return	
Configuration		
PC Save ON		
Exit		

1.8.17. Configuration menu

The Configuration menu is used to configure the unit. It offers the following sub-menus:

– selecting traces to record

Parameter	Printer	Select Traces	ECG
ECG Lead	Beep	Record on Alarm	IBP1
Zero IBP	Date/time	Return	IBP2
Alarm Limits	Language		Pleth
Alarms Suspend	Units		CO2
Trends	Return		ECG/IBP1
Configuration			ECG/IBP2
PC Save ON			ECG/Pleth
Exit			IBP1/IBP2
			Tends
			Return

– recording on appearance of alarms

Parameter	Printer	Select Traces	* On
ECG Lead	Beep	Record on Alarm	Off
Zero IBP	Date/time	Return	Return
Alarm Limits	Language		
Alarms Suspend	Units		
Trends	Return		
Configuration			
PC Save ON			
Exit			

– setting the beep parameters "On" (select one or more parameters to "Off" to turn beep on)

Parameter	Printer	QRS	* High
ECG Lead	Beep	Breath	Medium
Zero IBP	Date/time	SpO2 Pulse	Low
Alarm Limits	Language	Alarm	Off
Alarms Suspend	Units	Return	Return
Trends	Return		
Configuration			
PC Save ON			
Exit			

– setting the beep parameters "Off" (select one or more parameters to "On" to turn beep off)

Parameter	Printer	QRS	* High
ECG Lead	Beep	Breath	Medium
Zero IBP	Date/time	SpO2 Pulse	Low
Alarm Limits	Language	Alarm	Off
Alarms Suspend	Units	Return	Return
Trends	Return		
Configuration			
PC Save ON			
Exit			

Note : QRS, Breath and SPO2 pulse have the same sub-menu High, Medium, Low and Off

.

Parameter	Printer	QRS	* High

ECG Lead	Beep	Breath	Medium
Zero IBP	Date/time	SpO2 Pulse	Low
Alarm Limits	Language	Alarm	Return
Alarms Suspend	Units	Return	
Trends	Return		
Configuration			
PC Save ON			
Exit			

– setting the date and time

Parameter	Printer	Setup	11/02/97
ECG Lead	Beep	Return	19:24
Zero IBP	Date/time		Return
Alarm Limits	Language		
Alarms Suspend	Units		
Trends	Return		
Configuration			
PC Save ON			
Exit			

Note: In U.S. language, the date is displayed with the month in the first place, followed by the day.

Note: There is a restoring of the tendencies after any change of date.

– selecting the language of the text displayed on the screen

Parameter	Printer	Français
ECG Lead	Beep	English
Zero IBP	Date/time	U.S.
Alarm Limits	Language	Deutsch
Alarms Suspend	Units	Espanol
Trends	Return	Swenska
Configuration		Italiano
PC Save ON		Norsk
Exit		Return

– selecting Temperature units

Parameter	Printer	Temperature	* °C
ECG Lead	Beep	CO2	°F
Zero IBP	Date/time	IBP and NIBP	Return
Alarm Limits	Language	Return	
Alarms Suspend	Units		
Trends	Return		
Configuration			
PC Save ON			
Exit			

– selecting CO2 units

Parameter	Printer	Temperature	* mmHg
ECG Lead	Beep	CO2	kPa
Zero IBP	Date/time	IBP and NIBP	Return
Alarm Limits	Language	Return	
Alarms Suspend	Units		
Trends	Return		
Configuration			
PC Save ON			
Exit			

– selecting IBP and NIBP units

Parameter	Printer	Temperature	* mmHg
ECG Lead	Beep	CO2	kPa
Zero IBP	Date/time	IBP and NIBP	Return
Alarm Limits	Language	Return	
Alarms Suspend	Units		
Trends	Return		
Configuration			
PC Save ON			
Exit			

1.8.18. PC Save menu

- with Magfile function turned "Off" (select "PC Save On" to turn on)

Parameter
ECG Lead
Zero IBP
Alarm Limits
Alarms Suspend
Trends
Configuration
PC Save ON
Exit

- with Magfile function turned "ON" (select "PC Save OFF" to turn off)

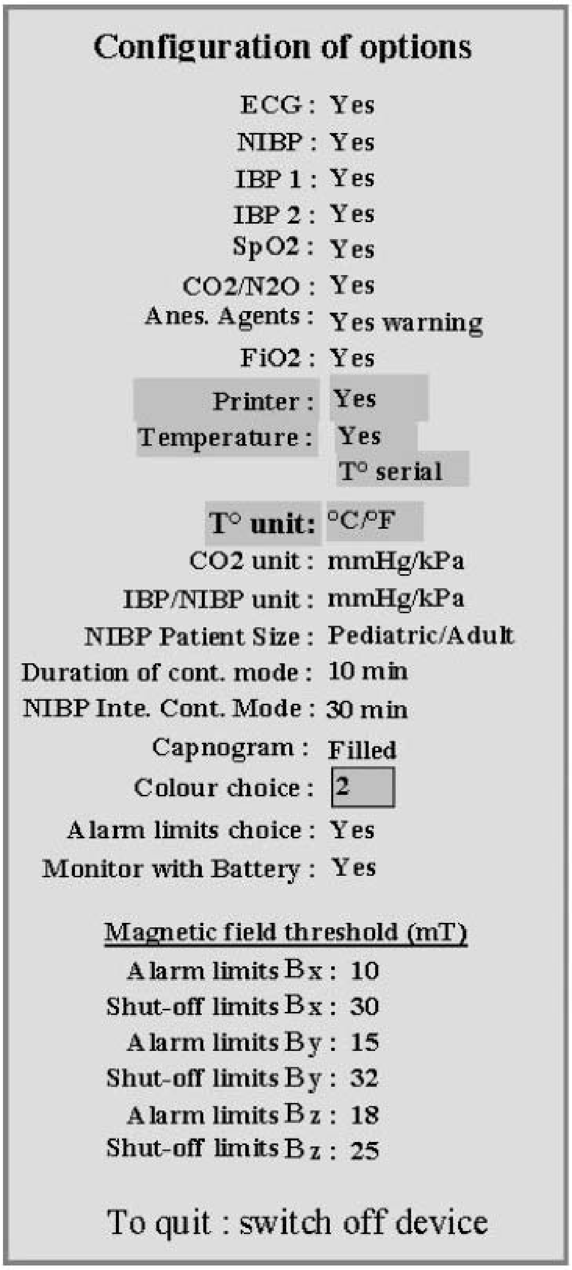
Parameter
ECG Lead
Zero IBP
Alarm Limits
Alarms Suspend
Trends
Configuration
PC Save OFF
Exit

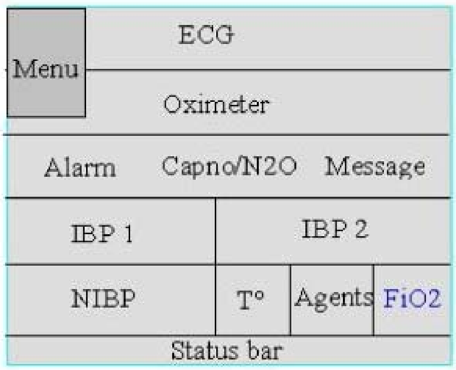
1.9. Configuration of options

The unit must be connected to the mains (mains cord connected into mains soket **(20)** and mainsswitch **(19)** on "1"), but it must not operate (lamp **(2)** off).

The following sequence is used to configure the selected monitoring parameters.

Keep main menu key **(5)** pressed down and turn the unit on by pressing the mains unit on/off switch **(1)**. Keep main menu key **(5)** pressed down till the configuration screen for the following options is displayed:





Precaution: Do not enable modules/options that are not installed in the unit. This may cause false error messages to be displayed.

The options available are as follows :

- presence or absence of modules (ECG, Respiration, Invasive Blood Pressure 1, Invasive Blood Pressure 2, Oximeter, Non Invasive Blood Pressure, CO2/N2O, Agents, FiO2, Printer)
- selection of units :
  CO2/N2O module pressure (mmHg, kPa or mmHg/kPa),
  IBP1, IBP2 and NIBP (mmHg, kPa or mmHg/kPa)
- Configuration of NIBP Patient Size (Neonatal, Ped/Adult, Neonatal/Ped/Adult)
- NIBP Continuous and Interval time periods
- selection of the representation of Capnogram (Waveform or Filled)
- selection of colors (3 pre-defined modes)
- selection of default alarm thresholds or limits (when the unit is turned on)
- Presence or absence of internal battery
- magnetic selection thresholds or limits (values programmable from 10 to 40 mT)

NOTE: The stylized screen representation takes account of the configuration of the monitor.

1.10. NIBP module test

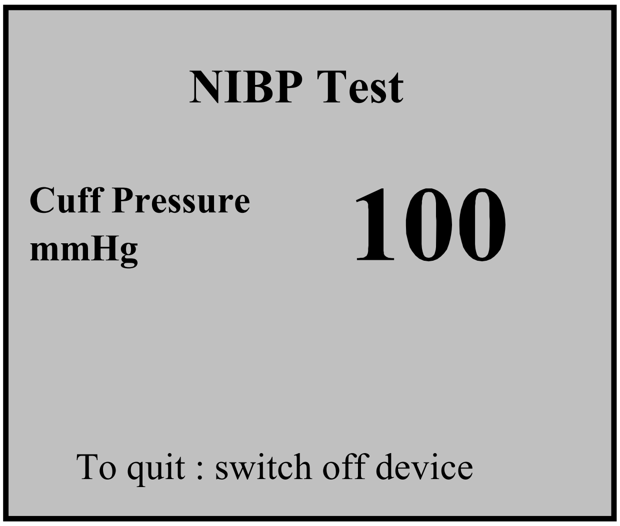
This test must be done by the technical department.

Warning : cylinder and mercury column can be metallic. This test must be done without patient. Metallic can be attracted from the magnet.

Put a cuff around a cylinder so as to have some compliance and connect it to **MAGLIFE C PLUS** and to a mercury column.

MAGLIFE C PLUS must be connected to the mains (mains cord connected to **(20)** and switch **(19)** on "1"), but must not operate (lamp **(2)** off).

Keep key **(8)** pressed down and turn the unit on by pressing key **(1)**. Keep key **(8)** pressed down till the following NIBP test screen is displayed:



The pressure in the cuff is displayed continuously on the screen and must be compared with that of the mercury column.

The management of technical alarms remains active.

1.11. Automatic test

Some functions are tested automatically by the programm.
The electronics board of the ECG, IBP, T° and Magnetic Field Measurement functions contains a microprocessor which is programmed to run a test when power is turned on.

- RAM test,
- EPROM test,
- CPU test,
- NUMERIC/ANALOGIC converter test.

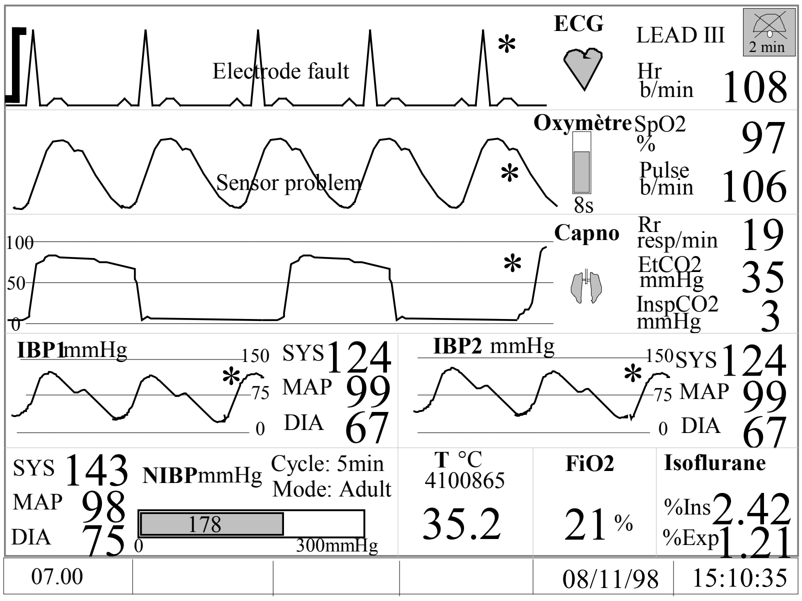
In the event of any problem, a technical alarm is displayed on the screen.

If there is any communication problem between the monitor CPU and the various electronic modules, a technical alarm message ("Time out") is displayed in the window of the affected parameter.

1.12. Waveforms and parameters diplay

The screen is divided into several parts:

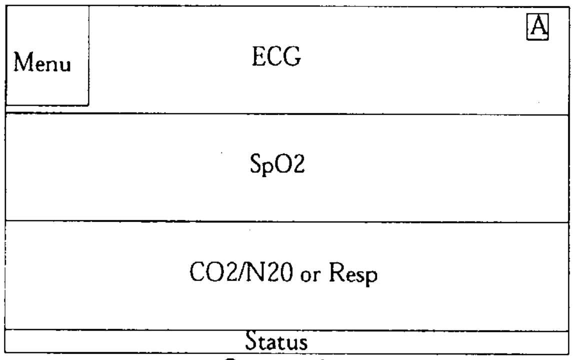
- 5 horizontal bands for the waveforms and associated parameters,
- 1 horizontal bar with general system data (software release, battery alarm, magnetic stray field alarm, condition of the connection with **MAGFILE C PLUS** and **MAGSCREEN**, date and time).



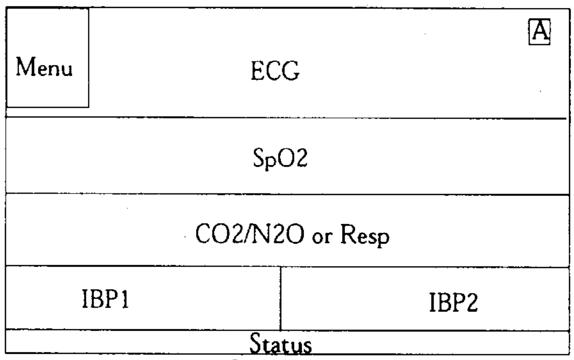
1.12.1. Distribution of waveforms and parameters on the screen

The display of waveforms and associated parameters depends upon the modules selected in the Option Configuration menu. The following table and figures on the next page show the 6 possible screens depending upon the options configured.

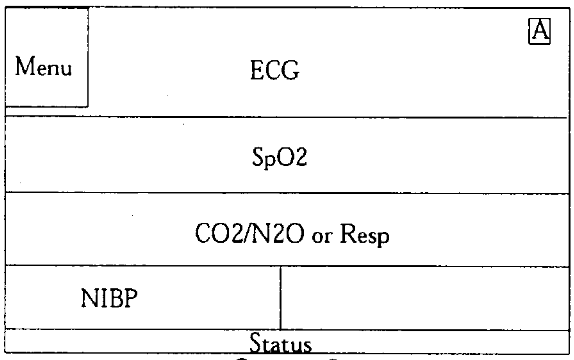
SCREEN 1	SCREEN 2	SCREEN 3	SCREEN 4	SCREEN 5	SCREEN 6
ECG	ECG	ECG	ECG	ECG	ECG
SpO_2	SpO_2	SpO_2	SpO_2	SpO_2	SpO_2
CO2/N2O / Resp	CO2/N2O / Resp	CO2/N2O / Resp	CO2/N2O / Resp	CO2/N2O / Resp	CO2/N2O / Resp
	IBP1	NIBP	IBP 1	NIBP	IBP 1
	IBP2		IBP 2	FiO_2	IBP 2
			NIBP	Agents	NIBP
					Temperature
					FiO_2
					Agents



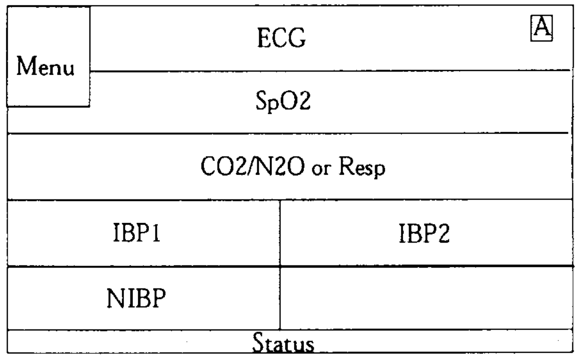
Screen 1



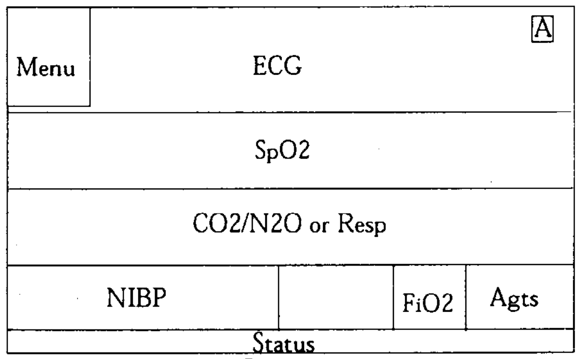
Screen 2



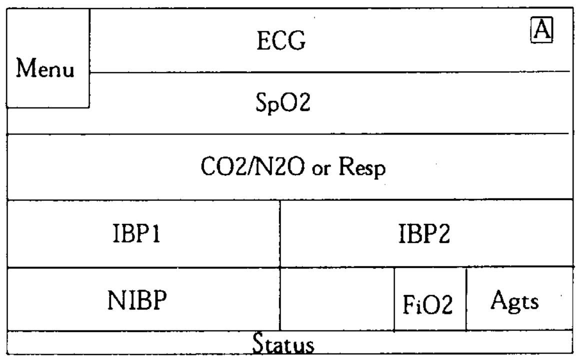
Screen 3



Screen 4



Screen 5



Screen 6

The ECG area includes :

- the ECG waveform ,
- · the mV step,
- · the heart rate in beats per minute,
- · the selected lead,
- · technical alarm messages,
- · a heart symbol which flashes along with the heart rate,
- · a trace freeze indicator.

The SpO2/Pulse oximeter area includes :
- · the plethysmograph,
- · the sensitivity bar,
- · the pulse rate in beats per minute,
- · the arterial saturation percentage value,
- · the value of the average time used for calculating the pulse rate,
- · technical alarm messages,
- · a trace freeze indicator.

The CO2/Respiration area includes :
- · the CO2 waveform,
- · the respiratory rate in Respirations (breaths) per minute,
- · the scale,
- · a lung symbol which flashes along with the respiratory rate,
- · the EtCO2 value in mmHg or kPa,
- · the InspCO2 value in mmHg or kPa, or the N2O value in %,
- · technical alarm messages.
- · a trace freeze indicator.

The IBP 1 area includes :
- · the Invasive Blood Pressure 1 waveform ,
- · the scale,
- · the systolic pressure value (SYS),
- · the mean pressure value (MAP),
- · the diastolic pressure value (DIA),
- · a trace freeze indicator,
- · technical alarm messages.

The IBP 2 area includes :
- · the Invasive Blood Pressure 2 waveform ,
- · the scale,
- · the systolic pressure value (SYS),
- · the mean pressure value (MAP),
- · the diastolic pressure value (DIA),
- · a trace freeze indicator,
- · technical alarm messages.

The NIBP area includes:
- · the systolic pressure value (SYS),
- · the mean pressure value (MAP),
- · the diastolic pressure value (DIA),
- · a pressure bar with the instant value,
- · the measurement interval,
- · the patient size,
- · technical alarm messages.

The Anesthetic Agent area includes :

- · the name of the selected agent,
- · the value of the inspired gas rate,
- · the value of the expired gas rate,
- · technical alarm messages.

The Temperature area includes :

- · the value of the temperature,
- · technical alrm messages,
- · serial number of the temperature probe.

The FiO2 area includes :

- · the FiO2 value.
- · technical alarm messages

The waveform scrolling speed is:

- · 25 mm/s for ECG, plethysmogram, IBP 1 and IBP 2 waveforms,
- · 12.5 mm/s for the CO2 waveform .

The scrolling of traces on the screen may be frozen by pressing freeze key **(9)**. The relevant symbol is displayed near each waveform. Scrolling is resumed by pressing freeze key **(9)** once again.

1.12.2. Date and Time display

The time is indicated in the " hh:mm " format"

The date and time are displayed in the system status bar in the lower right-hand corner.
The ":" character flashes along with the seconds.

1.12.3. Software release display

The software customer version is given in a 5-character code, " XX.YY ".

The release number is displayed in the system status bar, in the lower left-hand corner.

1.12.4. Trend waveform display

The following parameter trends may be displayed :

- · heart rate (HR),
- · Invasive Blood Pressure 1 (SYS, MAP and DIA),
- · Invasive Blood Pressure 2 (SYS, MAP and DIA),
- · peripheral oxygen saturation (SpO2),
- · peripheral pulse rate (Pulse),
- · Non Invasive Blood Pressure (SYS, MAP, DIA),
- · CO2 (RR) respiratory rate,
- · partial CO2 pressure at the end of expiration (EtCO2),
- · partial pressure of inspired CO2 (Insp CO2),
- · inspired nitrous oxide concentration (N2O),
- · the 5 anesthetic agents inspired and expired (Isoflurane, Halothane, Enflurane, Sevoflurane, Desflurane),
- · fraction of oxygen inspired (FiO2),

The trend display selected in the "Trends" menu is displayed in the upper band of the screen instead of the ECG. ECG and SpO2 waveforms are displayed on a single horizontal band (ECG to the left and SpO2 to the right).

Depending upon the trend display duration selected in the Configuration menu, the waveform sampling interval changes over time, but the number of points remains constant :

- · 1 point every 4 seconds for half an hour,
- · 1 point every 8 seconds for one hour,
- · 1 point every 16 seconds for two hours,
- · 1 point every 32 seconds for four hours.

The SYS, MAP and DIA physiological parameters are represented on a single waveform (bar graph).

The "Halogenated Agent" parameters are represented on a single waveform with marks and identifications when the gas is changed.

* Graphical representation of trends

The horizontal axis is graduated in keeping with the displayed time. It represents the real time of the saving of the data.

The vertical axis is graduated in keeping with the displayed parameter.

The title of the waveform indicates the displayed parameter and the measuring unit. The color of the trend is the same as the parameter selected.

The scales are either Full Scale or Auto Scale Zoom as follows:

- full scales:

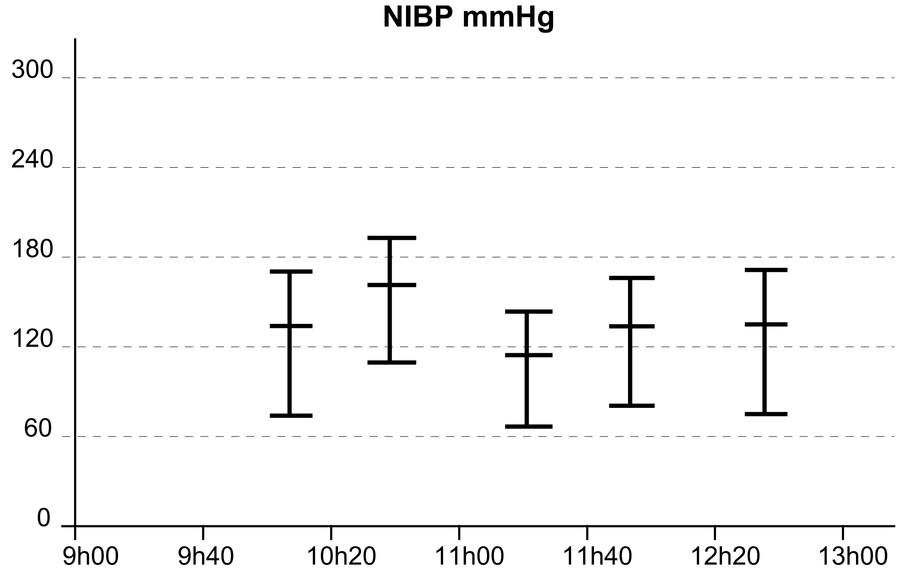
· Hr (b/min)	0 - 60 - 120 - 180 - 240 - 300
· IBP 1 (mmHg)	0 - 60 - 120 - 180 - 240 - 300
· IBP 2 (mmHg)	0 - 60 - 120 - 180 - 240 - 300
· SpO_2 (%)	50 - 60 - 70 - 80 - 90 - 100
· Pulse (b/min)	0 - 60 - 120 - 180 - 240 - 300
· NIBP (mmHg)	0 - 60 - 120 - 180 - 240 - 300
· RR (resp/min)	0 - 30 - 60 - 90 - 120 - 150
· $EtCO_2$ (mmHg)	0 - 20 - 40 - 60 - 80 - 100
· $MinCO_2$ (mmHg)	0 - 20 - 40 - 60 - 80 - 100
· N_2O (%)	0 - 20 - 40 - 60 - 80 - 100
· Agent (%Insp)	0 - 20 - 40 - 60 - 80 - 100
· Agent (%Exp)	0 - 20 - 40 - 60 - 80 - 100
· FiO_2 (%)	0 - 20 - 40 - 60 - 80 - 100

- zoom:

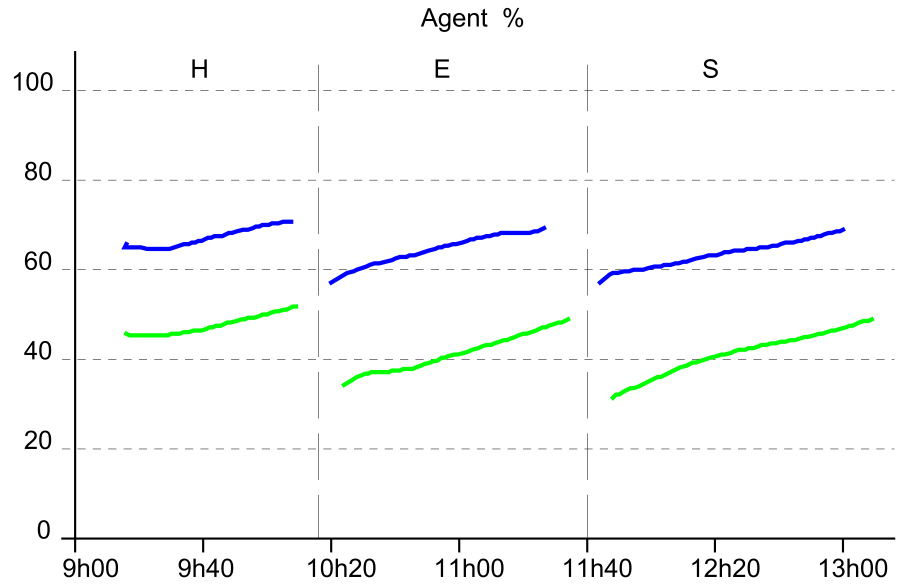
  · the scale adjusts automatically to the minimum and maximum points of the displayedscale or waveforms (agents),

  · a minimum distance of 25 is applied to all parameters.

Sample of trended physiological parameters “ SYS ”, “ MAP ” and “ DIA ”



Sample of trended physiological parameters “halogenated anesthetic agents”



The agents are represented in two colours as used in the text screen:

- Exp. colour,
- Insp. colour.

The agents are represented by a letter:

- D for Desflurane,
- E for Enflurane,
- H for Halothane,
- I for Isoflurane,
- S for Sevoflurane.

1.13. Alarm management

Configuration of options

ECG : Yes
NIBP : Yes
IBP 1 : Yes
IBP 2 : Yes
SpO2 : Yes
CO2/N2O : Yes
Anes.Agents : Yes
FiO2 : Yes

CO2 unit : mmHg/kPa
IBP/NIBP unit : mmHg/kPa
NIBP Patient Size : Pediatric/Adult
Duration Cont. Mode : 10 min
NIBP Int. Cont. Mode : 30 min
Capnogram : Filled
Colours choice: 2
Alarm limits choice : Yes
Monitor with Battery : Yes

Magnetic field threshold (mT)

Alarm thresh. B x : 20
Cut-off thresh. B x : 25
Alarm thresh. B y : 20
Cut-off thresh. B y : 25
Alarm thresh. B z : 15
Cut-off thresh. B z : 20

To quit : switch off device

Heart Rate		40	120	Resp Rate		5	70
IBP1	SYS	80	180	Apnea		10	
mmH	MAP	40	160	EtCO2 mmHg		50	50
	DIA	40	120	InspCO2 mmHg			5
IBP2	SYS	80	180	%N20		0	70
mmH	MAP	40	160	Halothane	Ins	0.00	2.50
	DIA	40	120		Exp	0.00	2.50
%SpO2		88	100	Isoflurane	Ins	0.00	1.80
SpO2 Pulse Rate		40	120		Exp	0.00	1.80
NIBP neon	SYS	50	120	Enflurane	Ins	0.00	2.10
mmH	MAP	30	100		Exp	0.00	2.10
	DIA	20	80	Sevoflurane	Ins	0.00	2.10
Pediatric	SYS	70	180		Exp	0.00	2.10
	MAP	50	160	Desflurane	Ins	0.00	1.90
	DIA	40	110		Exp	0.00	1.90
Adult	SYS	70	180	FiO2		10	30
	MAP	50	160	Prior Operator Settings			
	DIA	40	120	Reset to default			
				Return			

Physiologic alarms appear in the visual form (values are displayed in flashing red characters) and in the audio form (continuous).

The audible alarm may be interrupted for two minutes with mute key (10): a crossed bell with "2 min" displayed in reverse video in the upper right-hand corner of the screen.

The audible alarm may also be interrupted continuously with the help of the "Alarm Suspend" menu. An crossed bell icon as shown is displayed in reverse video in the upper right-hand corner of the screen and a double beep sounds every three minutes when the "Alarm Suspend" is active".

NOTE: If alarms are set off by several modules, physiological alarms are given preference. On the other hand, if several alarms are set off on the same module, preference is given to the technical alarms.

The parameter alarm values may be :

- either the default values which have been set in the system
- or the "operator" values which have been saved in the RAM.

1.14. Technical alarms

Technical alarms are displayed in the visual form (message) and/or sound form (3 beeps space out 500 ms every 1.5 s).

Visual alarms are displayed as follows:
- the physiological parameters are replaced by three flashing red dashes,
- the alarm message is displayed in red.

The audible alarm may be interrupted for 2 minutes by pressing key **(10)**. The audible alarm can be disabled permanently.

Measured parameter	Message	Problem	Action
ECG	Electrode fault	Electrodes not correctly connected to patient	Make sure the electrodes have been stuck on firmly
ECG	Battery fault	ECG sensor battery down	Replace battery
ECG	Sensor OFF	ECG parameter not active	Activate the ECG parameter via the menu
ECG	EPROM fault	Electronics problem with ECG acquisition board	Contact the technical department
ECG	CPU fault	Electronics problem with ECG acquisition board	Contact the technical department
ECG	ECG timeout	Electronics problem with ECG acquisition board	Contact the technical department
IBP 1 and 2	Module saturated	Pressure waveform saturated	Change the scale
IBP 1 and 2	Calibration failure	Measurement error while calibrating	Calibrate again. After 3 consecutive attempts, contact the technical department
IBP1 and 2	EPROM fault	Electronics problem with the IBP acquisition board	Contact the technical department
IBP 1 and 2	CPU fault	Electronics problem with the IBP acquisition board	Contact the technical department
IBP 1 and 2	IBP 1 (IBP 2) failure	Electronics problem with the IBP electronics problem	Contact the technical department
SpO2	Sensor failure	Incorrect placing of sensor detected by the unit	Check if the sensor is placed correctly
SpO2	Searching failure	No pulse detected by the unit after a certain time	Check the connection between patient and monitor. If not, call the after-sales service dept.
SpO2	Oximeter timeout	Electronics problem	Contact the technical department
Capno	Water trap full	Water trap full	Drain the water trap
Capno	CO2 occlusion	Tube blocked	Clear the tube
Capno	CO2 cell fault	Cell failure	Contact after-sales service
Capno	Calibration fails	Measuring error while calibrating	Repeat the calibration
Capno	Apnea	Patient in apnoea or tube disconnected	Check patient connection
Capno	Capno timeout	Electronics problem	Contact the technical department
Agents	Water trap full	Water trap full	Change the water trap
Agents	Occlusion	Tube blocked	Clear the tube
Agents	Cell fault	Cell failure	Contact after-sales service
Agents	Agents timeout	Electronics problem	Contact the technical department
FiO2	FiO2 sensor error	Sensor worn out	Change the sensor
FiO2	Calibration error	Faulty calibration	Try again. After 3 consecutive no succesfull attempts , contact the technical department
FiO2	Sensor?	No sensor connected	Connect the sensor
FiO2	Timeout	Electronics problem	Contact the technical department

NIBP	Inflation failure	Pressure does not rise while inflating	Check if the cuff is connected correctly
NIBP	Insufficient pressure	Cuff incorrectly connected	Check the connections
NIBP	Measurement failure	Motion artefacts	Check the neonatal/adult mode. Repeat the measurement; if the message persists, contact after-sales service
NIBP	Check cuff	Wrong cuff connected or faulty cuff	Check the cuff
NIBP	Communication failure	Wrong data given by internal checks	Inform after-sales service
NIBP	No cuff	Pressure does not rise while inflating	Check if the cuff is connected correctly
NIBP	NIBP timeout	Electronics problem	Contact the technical department
NIBP	Pump failure	Electronics problem	Contact the technical department
NIBP	NIBP failure	Electronics problem	Contact the technical department
NIBP	Hardware reset	Electronics problem. Software resetting the hardware	After 3 consecutive errors, contact the technical department
NIBP	Inflation failure	No pressure detected after 3 or 4 successive attempts	Check the tubes, connections and mode and repeat the measurement
Battery	Battery fault	Battery low	Charge the battery
Magnetic field	Limit mag. field	Magnetic field in excess of programmed limit value	Shift **MAGLIFE C PLUS** away from the source of the magnetic field.
Temperature	Timeout temperature	Electronics problem	Contact the technical department

Other messages (information, instructions)

Measured parameter	Message	Explanation
IBP 1 and 2	Calibrating	Offset cancellation (IBP zero)
SpO2	Searching for pulse	Automatic gain is being adjusted on the patient's pulse
Capno	Calibrating	Calibration in progress
Capno	Open cylinder	Connect the gas cylinder and open it
Capno	Cal OK / Close cylinder	Calibration completed; close the gas cylinder
Capno	Cal. Err/Close cylinder	Calibration faulty; close the gas cylinder
Capno	Cylinder empty	Calibration cylinder empty, replace the cylinder
Capno	Close cylinder	Close the gas cylinder
Capno	Occlusion/Close	The aspiration tube is blocked; close the gas cylinder
Capno	Calibrating zero	Automatic calibration every 30 minutes
Agents	Calibrating...	Calibration in progress
Agents	Cal OK/Close gas	Calibration completed; close the gas cylinder
Agents	Cal. fault/Close gas	Calibration faulty; close the gas cylinder
Agents	Open gas	Open the gas cylinder
Agents	Close gas	Close the gas cylinder
Agents	Block/Close gas	The aspiration tube is blocked; close the gas cylinder
FiO2	Cal...	Calibrating in relation to ambient air (21 %)
FiO2	Cal OK	Calibration completed
FiO2	Cal error	Calibration error
NIBP	1st attempt	1st blood pressure measurement
NIBP	2nd attempt	2nd NIBP measurement following the failure of the 1st attempt
NIBP	3rd attempt	3rd NIBP measurement following the failure of the 2nd attempt
NIBP	4th attempt	4th NIBP measurement following the failure of the 3rd attempt
NIBP	Last attempt	5th NIBP measurement following the failure of the 4th attempt
NIBP	Please wait...	The NIBP part is being initialised upon start-up.
NIBP	Measurement in XXX min	XXX is the number of minutes before the next measurement

1.15. Magnetic field monitoring

MAGLIFE C PLUS is designed for operating in magnetic stray field up to 40 mT (400 G).

Some functions may be affected by magnetic stray fields greater than 40 mT. The measurements may become impossible or incorrect, circuits may be damaged etc.
In order to avoid such situations, the monitor is fitted with a system which measures the magnetic stray field continuously in the three space directions (Bx, By, Bz). When the monitor is taken close to the limit area, an alarm message saying "Mag Field Limit" is displayed in the status bar and an audible alarm is set off. When the monitor enters the limit area, the power is turned off automatically. The user has to turn power on manually after removing the monitor from the limit area.

Upon installation, the limit area must be marked in the magnet room. To do this, the monitor can display the values of the magnetic stray field in its location (it acts as a Gaussmeter). To access this function, press **(9)** and **(8)** simultaneously. A window will appear on the screen, with the Bx, By and Bz values expressed in mT (display range 0 -40 mT).

Furthermore, the user can select the alarm thresholds for the three magnetic stray field values (see configuration of options) within a range between 10 and 40 mT.

1.16. Recorder operation (option)

1.16.1. Recorder

A two traces thermal strip chart recorder. The recorder uses plain white thermal paper 5 cm wide, all grid patterns and data are printed by the recorder. Selecting the Record menu provides indication of trace selection. The date format is configuration code dependent.

The recorder provides the capability to record patient parameters and waveforms, and to continuously record specified waveforms. The waveform format can further be broken down into one of two format : Single trace or Dual trace. When recording in waveform format, the recorder can operate in one of two modes : single cycle mode or continuous mode. A single cycle record consists of 16 seconds of delayed waveform, delayed in that the first data point on the waveform occurred 8 seconds in the past. Recordings resulting as a result of an alarm (physiological alarms only) are also delayed so that the pre-alarm condition is recorded; however, the alarm delay will be such as that pre-alarm data and post alarm data appear on the recorder strip (8 seconds delay) with an indication of the alarm event at alarm detection (alarm detection and not alarm display time). A continuous recording is a delayed recording (leader printout delay), and will continue until manually terminated. The chart speed is the same as on the screen.

The recorder output for a waveform record consists of a leader field, a waveform field, an upper annotation field and a trailer field (See Scheme 1).
A paper feed exist after every printing

<table>
<tr><td rowspan="3">LEADER</td><td>UPPER ANNOTATION</td><td rowspan="3">TRAILER</td></tr>
<tr><td>WAVEFORM DISPLAY</td></tr>
<tr><td>LOWER ANNOTATION</td></tr>
</table>

Scheme 1 (Recorder output for waveform record)

The recorder output for a trend record consists of a leader field, and a trend field. (See Scheme 2).

LEADER	TREND DISPLAY

Scheme 2 (Recorder output for trend record)

The Scheme 3 defines the recorder action in depending on the monitor state. The state of the recorder, the source of the record request, all affect how the recorder operates.

	Recorder State	Record Source	Recorder Action
1	Idle	Alarm	Record a single cycle of the wave(s) selected in record menu (8 s. delay).
2	Idle	KEY : Press	Record single cycle of wave(s) selected in record menu (8 s. delay).
3	Idle	KEY : Hold	Start continuous trace of wave(s) selected in record menu.
4	Idle	Trend	Record the trend selected in the trend record menu.
5	Single Cycle	Alarm	Single cycle alarm in progress : ontinue current tracing. Single cycle key in progress : op immediately currently tracing and start a new one with leader, waveform and trailer.
6	Continuous	Alarm	Continue the wave(s) printing. Mark the alarm event.
7	Single Cycle	KEY : Press/Hold	Leader printing in progress : op record immediately Waveform printing in progress : op waveform printing and start trailer printing Trailer printing in progress : o nothing
8	Continuous	KEY : Press/Hold	Leader printing in progress : op record immediately Waveform printing in progress : op waveform printing and start trailer printing Trailer printing in progress : o nothing
9	Trend	KEY : Press/Hold	Stop record.
10	Trend	Alarm	Stop immediately currently tracing and start a new one with leader, waveform and trailer.

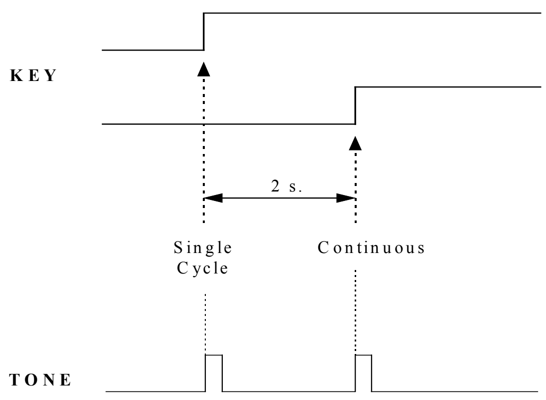
Scheme 3 (Recorder Action)

The message related to the recorder indicating a recorder error is displayed in the status bar as a system message. The message showing that the recorder is on is displayed in the same place.
If the battery is low, the recorder is not available in this case.

Remark
When the recorder is printing, all the menus changing the printing configuration are disabled (for example trace choice in the configuration menu, Date/Time selection etc..), and also the printer menus

1.16.2. Launching the recording

Key Press/Hold
At key press detection, a low (minimum Volume) tone is emitted and the recorder starts immediately a single cycle record. If during the next 2 seconds the key is all the time pressed, after this 2 seconds, a second low tone is emitted and the single cycle record changes to a continuous record.



Scheme 4 (Key Press/Hold)

Alarm
I
After selection of the menu « record on alarm » is selected, recording may occur each time an alarm arises.

1.16.3. Leader

Waveform

The leader contains the date and time of the request (the date format is configuration dependent, the time is written without the seconds), the recorder request (i.e. keypad, alarm), the wave(s) name, the delay and an area used by the operator to write the patient name.

```
MR Monitor XX.YY  MM/DD/YY HH:MM

  Start reason   : Alarm
      Printout   : ECG + IBP1
       History   : 8 seconds



  ____________________________
```

Trend

The trend leader contains the date and time of the request (the date format is configuration dependent, the time is written without the seconds), the recorder request (i.e. keypad, alarm), the trend name and an area used by the operator to write the patient name.

```
MR Monitor XX.YY  MM/DD/YY HH:MM

  Start reason   : Key
      Printout   : ECG trend



   __________________________
```

1.16.4. Annotation

Upper Annotation

The upper annotation field contains the lead (if ecg wave is output) and the trace speed. If the ecg lead or the speed changes during printing, a mark will be made at the point of change and the annotation will be printed again.

Lower Annotation

The lower annotation field contains an Alarm Event marker and will record the parameter in alarm, its value between brackets, the sign « > » or « < » and the value of the corresponding threshold.

1.16.5. Trailer

The trailer contains all the parameters value enabled during the drawing at the time of the last recorder start event. If all the parameters are present, the trailer contains :

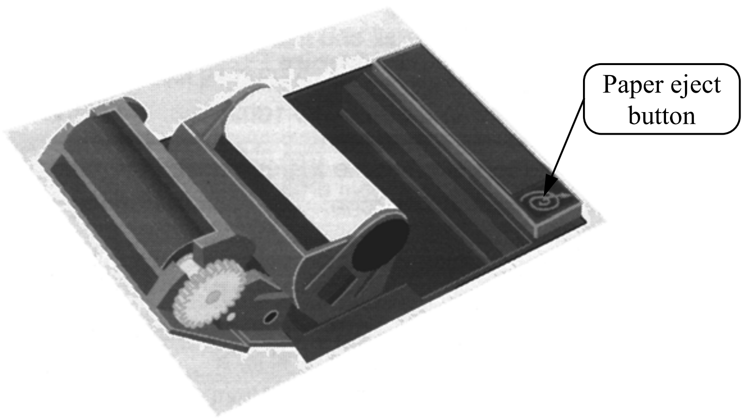
```
         HR :  XXX  bpm      Resp. Rate :  XXX  rpm
 Pulse Rate :  XXX  bpm           EtCO2 :  XXX  mmHg
       SpO2 :   XX  %            minCO2 :  XXX  mmHg
   IBP1 Sys : [XXX] mmHg            N2O :   XX  %
        Map :  XXX  mmHg           FiO2 :   XX  %
        Dia :  XXX  mmHg    Temperature :  XXX  °C
   IBP2 Sys :  XXX  mmHg          HALOTHANE
        Map :  XXX  mmHg           insp :  XX.X  %
        Dia :  XXX  mmHg            exp : [XX.X] %
   NIBP Sys :  XXX  mmHg
        Map :  XXX  mmHg          MM/DD/YY HH:MM
        Dia :  XXX  mmHg     ______________________
```

The values displayed are acquired at the last trigger (alarm or key press).
The values in alarm has square brackets around it.
The date in the trailer is the one of the last alarm, otherwise the one of the last event (« print » key pressed for ex.).
No trailer is printed for trends.

1.16.6. Printer paper replacement

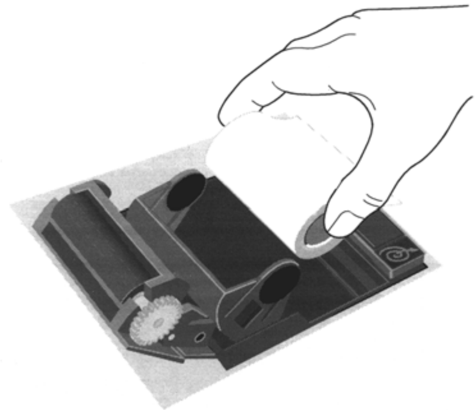
The instructions below describe the replacement of printer paper. Use only recommended printer paper, Part Number W1403406. This ensures that the print quality is acceptable and reduces print head wear.

1. Open printer door by pressing the paper eject button (upper right corner with paper roll icon on it).



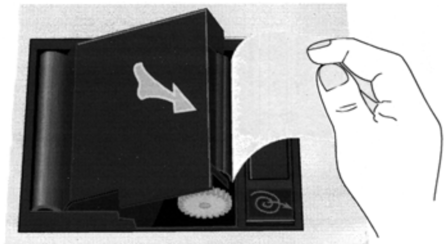
2. Remove the empty sleeve of the previous paper roll.

3. Insert the new paper roll between the two rounded tabs of the paper holder with the sensitive (shiny) side of the paper facing the print head at the top of the printer.



4. Unroll approximately 10 cm of paper.

5. Fold the beginning of the strip over the writing edge and close the door.



6. To ensure that the paper is aligned properly and has not been pinched in the door, pull the loose edge out a couple of inches. If the paper jams, open the door and return to step 5.

Note : If you store the recordings in plastic folders these should be made of polyethylene, because the traces fade in PVC covers (if in doubt, insert a sheet of paper between recording and folder

CHAPITRE 2

EXPLANATION OF OPERATION

2. EXPLANATION OF OPERATION

2.1. Overall operation

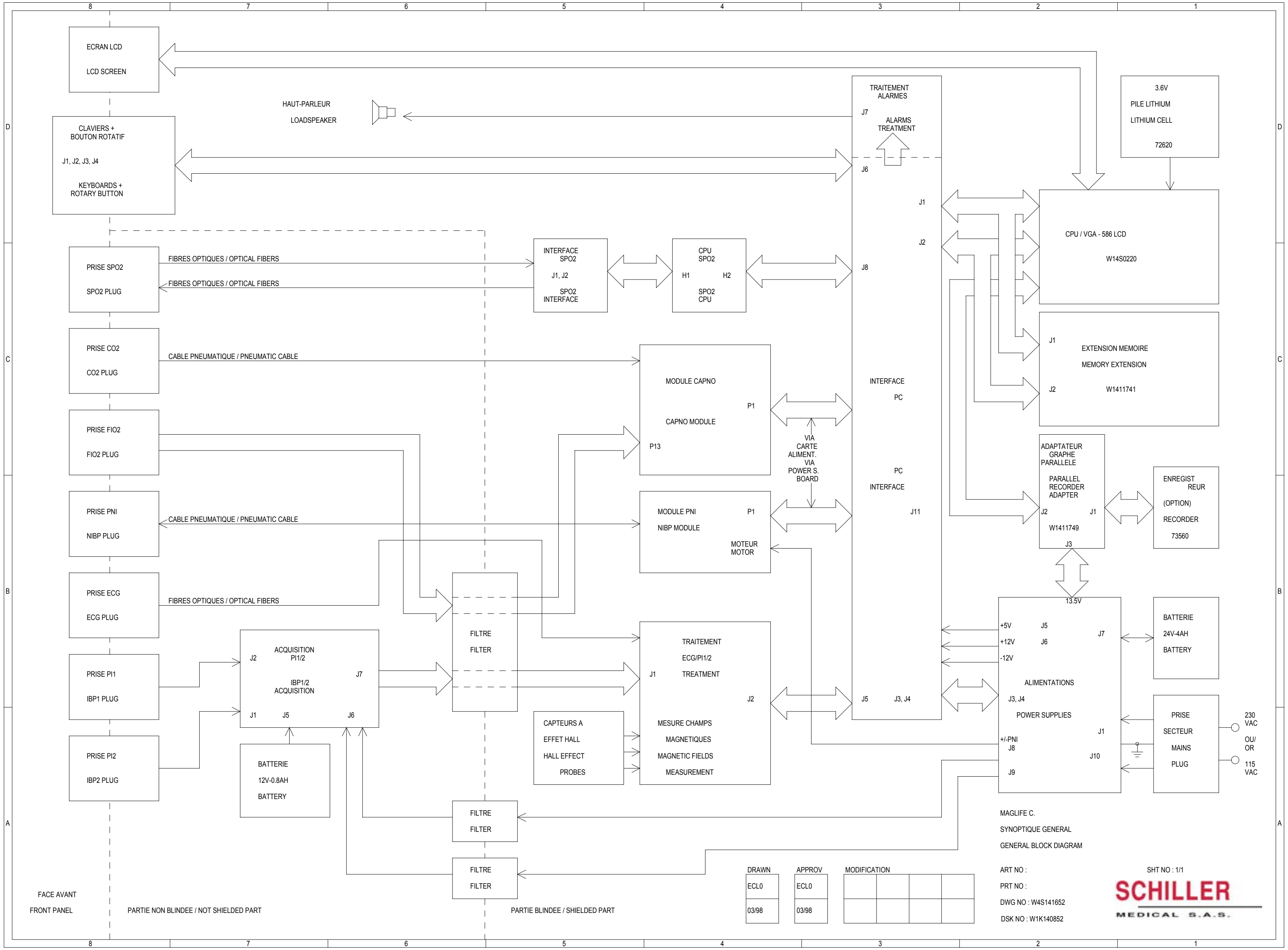
> **Remark** : indications in brackets comprising a letter and a number correspond to the Cartesian coordinates on the corresponding electronic schematic.

MAGLIFE C PLUS. is a monitor designed to operate in an MRI environment. Consequently, all the circuitry and screens (with the exception of the Invasive Blood Pressure 1/2/3/4 Acquisition board) are placed in a Faraday cage to protect the NMR images from any interference. All the signals going in and coming out of the cage are carefully filtered, and the signals present at the ECG and SpO2 plugs are transmitted by optical fibres which guarantee safe and interference-free data transmission.

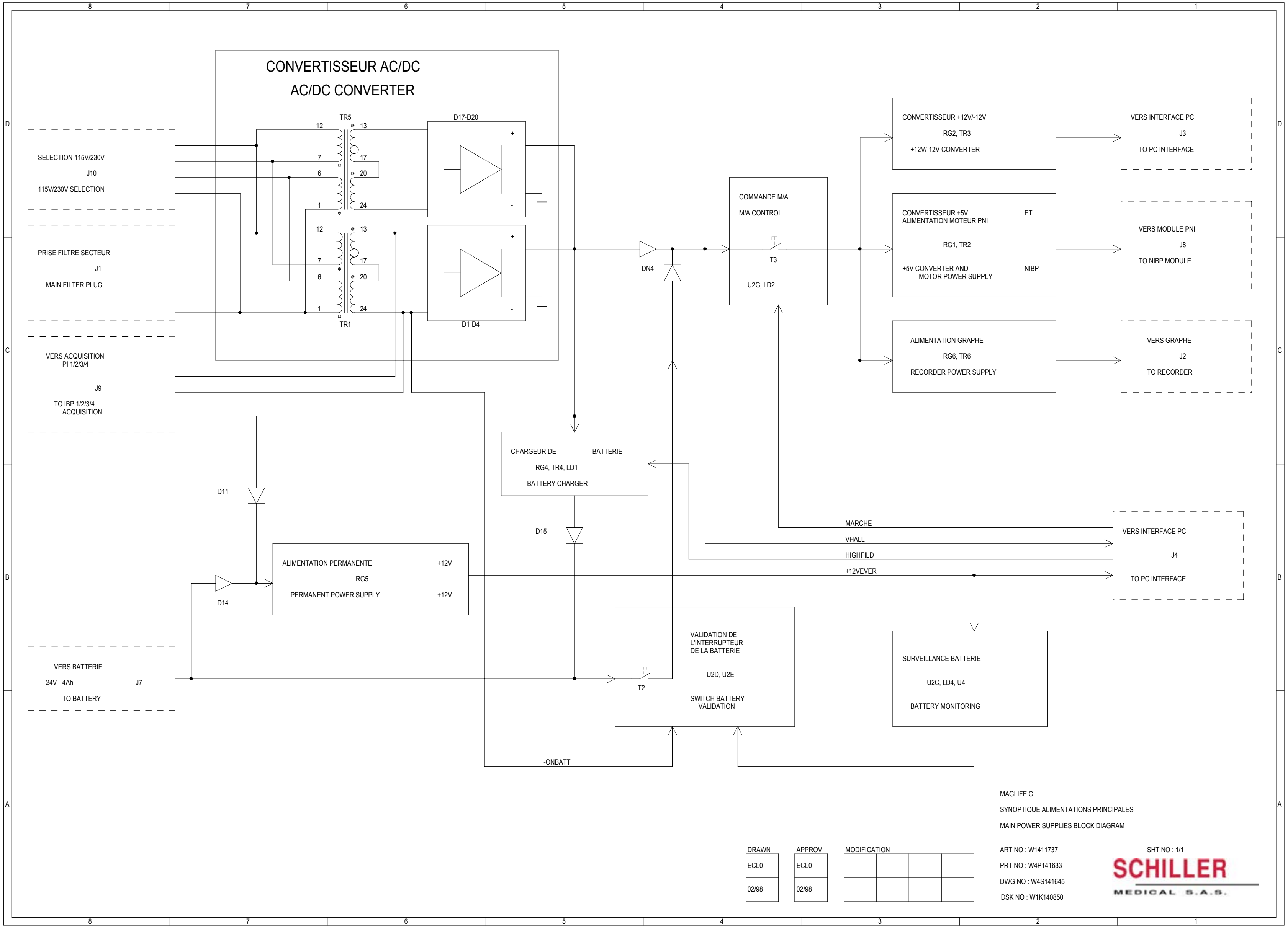
The values of the measured parameters are amplified, digitised and transmitted to a central processing unit. Each function (ECG, SpO2, respiration, invasive and non invasive blood pressure) has its own processor for the acquisition, amplification and transmission of data to the CPU via the PC interface. The CPU controls the screens and control keypads.

Power is supplied from a board which is also placed in the Faraday cage. The unit may be powered by the mains or a 24 V / 4 Ah battery.

2. EXPLANATION OF OPERATION



2. EXPLANATION OF OPERATION



2.2. Principal power supply systems

The principal power supply systems are included in a block which is mainly made up of a heat sink a printed circuit board, W4P141633.
The PCB includes the following components:
- AC/DC converter,
- battery charge control,
- battery monitoring components,
- On/Off control,
- DC/DC +/- 12 V converter
- DC/DC +/- 5 V converter and NIBP motor power supply,
- recorder power supply,
- NIBP On control and motor control.

2.2.1. AC/DC converter

When MAGLIFE C PLUS. is connected to the mains, the voltage arrives at connector J1 (D8) through the mains filter plug fixed on the rear of the casing.
The wiring of connector J10 (D8) depends upon the mains voltage:
- if the voltage is 230 V, the coils of TR1 (D7) and TR5 (D7) are wired in series by connecting tabs 3 and 5 of J10,
- if the voltage is 115 V, the primary coils are wired in parallel by connecting tabs 1 and 5 and 3 and 7 of J10.

The secondary coils of the mains transformer are protected by the 4 AT fuses F4 (D7) and F7 (D7) and the induced sinusoidal voltages are rectified by two sets of four diodes (D1 to D4, D17 to D20) (D7), cooled by the heat sink; the rectified voltages are smoothed by C10 (D6).
Lamp LD3 (D6) lights up when MAGLIFE C PLUS. is operated on the mains.
Signal LED SECT (D5) is used to supply power to the Mains Power indicator (which is duplicated on the front of the MAGLIFE C PLUS unit) and signals the presence of the mains to the PC interface board (W4P141641).

The secondary voltage obtained by single-alternation rectification system built around R14, D8 and C2 (A7) is used to disable the operation of MAGLIFE C PLUS on the battery, by keeping switch T2 (D6) open via U2D and U2E (A6). The -ONBATT signal (A5) is the signal for validating switch T2 for operating on the battery alone, when the MAGLIFE C PLUS unit is turned on.
The voltage from the rectification is also used to turn on indicator LD4 (A6) via U2C (A7) if the battery voltage is too low (less than 22 V).

☞ **Note**: Indicator LD4 can only go on when MAGLIFE C PLUS is connected to the mains.

2.2.2. Battery charge

The battery is connected to J7 (C8).
The voltage at the terminals of C10 (D6) is applied to the DC/DC converter which is mainly made up of RG4, TR4, DN1 and C20 (D6).
The battery charging indicator LD1 goes on when MAGLIFE C PLUS. is off and connected to the mains.
The LED BAT (B1) signal is used to the turn on the mains-to-battery recharging LED (indicator duplicated on the front of MAGLIFE C PLUS); when the unit does not include an optional battery, switch SW1 (B6) is open.
In the off-load condition, the converter supplies a voltage of approximately 27 V; the battery recharging current is limited by the circuit R19, R16, T4, C3 (B7) which controls the operation of the RG4 (C7) chopper (controls pin 1).
The HIGHFILD control signal (A5), which is activated when a very strong magnetic field is detected, also forces pin 1 to "0" and invalidates battery recharging.

2.2.3. Battery monitoring

Regulator RG5 (B7) is continuously supplied with power from the battery or mains via D14 and D11 (B7); RG5 therefore supplies a voltage of + 12 V (EVER12V) which is mainly used for the On/Off circuit.

The two operational amplifiers U4A (B6) and U4B (A6) are also supplied with this voltage and act as voltage comparators for the 24 V battery (C8). The connection point of R33 (B6) and R34 (A6) is at 6 V and is used as the reference by the comparators in relation to the battery voltage dividing bridge consisting of R35, R36 and R37 (B7).
If the battery voltage +BATT (C8) is less than 22 V $\pm$ 0.5 V, U4B generates a BATFAIBL (A5) signal and supplies power to indicator LD4 (A6) which lights up, providing MAGLIFE C PLUS is connected to the mains.

If MAGLIFE C PLUS. is operated on the battery alone and if the battery voltage is less than 20 V $\pm$ 0.5 V, U4A controls circuit U2E (A6) via R9 (B6) and stops the unit.
The battery voltage is sent via R10 (A8) to pin 9 of J4 (BATT) (B1) in order to be sent to the Sensor Processing board (W4P141615) (through the PC Interface board (W4P141641)) for digital conversion. When voltage VBATT is lower as 22 V, the microcontroller controls the display « battery discharged » ; when voltage VBATT is lower as 20 V at functionning without line, the microcontroller supplies a signal to stop MAGLIFE C PLUS..

2.2.4. On/Off control

The On/Off control circuit is supplied continuously with + 12 V from the linear regulator RG5 (B7) (EVER12V). The control logic is located on the PC Interface board (W4P141641) which supplies the ON signal (pin 7 of J4) (B1). This signal controls transistor T3 (D5) via U2G (A6) and R17 (D5) and transistor T2 (D6) via R28, U2E (A6) and R25 (C5) if the mains power is absent. If the mains power is present, the voltage at U2D (A6) stops U2E (A6) from conducting and therefore also T2: the battery is recharged.
If the ON signal is at the high level, T3 conducts, and so does T2 if the mains power supply is absent. The rectified mains secondary voltage or the battery voltage (if no mains) is thus applied at L3, L1 and L5 (D5) and lamp LD2 (D5) goes on.

☞ **Note**: VHALL is the voltage present before main switch T3 (D5) and is intended to supply the field detection and measuring circuitry.

2.2.5. DC/DC ±12V Converter

L3 (D5) and C11 (D4) filter the power from the DC/DC converter regulated to + 12 V and mainly made up of RG2, TR3, DN3 and C21(D3, D4).
The 2.5 AT fuse F2 (D3) protects the circuit from excess + 12 V consumption.
The - 12 V voltage is obtained by means of the associated coil 5-8 of TR3, C15, D12 and RG3 (D3,D4); it is stabilised by C16 and protected by the 0.16 AT fuse F3 (D3).

2.2.6. DC/DC +5V Converter and NIBP motor power supply

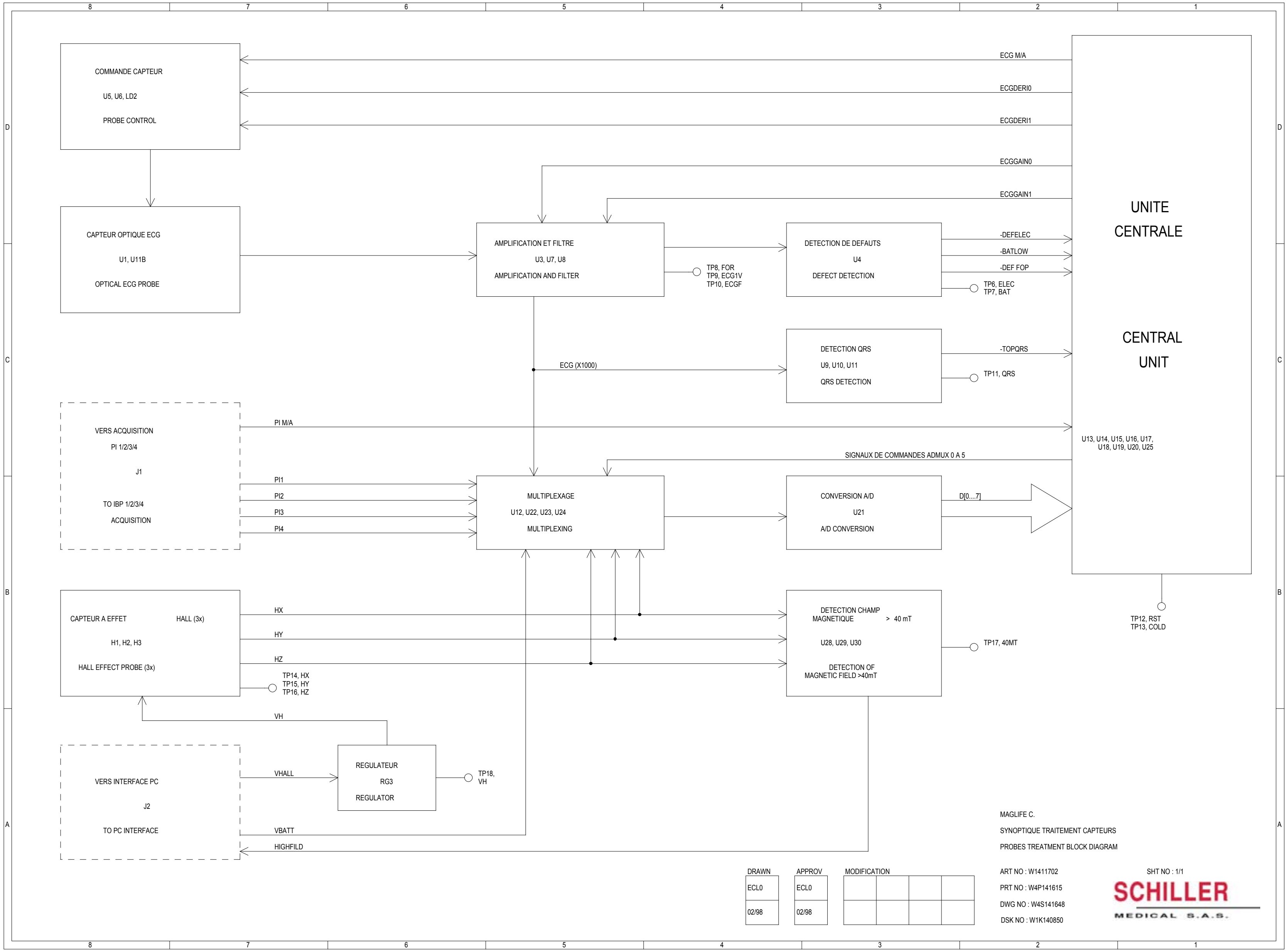
When T3 (D5) conducts, L1 (D5) lets the current required for the operation of the DC/DC converter regulated to +5 V and mainly made of RG1, TR2, DN2, C7, C8, L2, C23 (D3, D4) pass through it.
The + 5 V voltage generated in this way is protected by a 3.15 AT fuse (F1).
The auxiliary coil 8-5 of TR2, associated with D5 and C9 (D3), is only used to supply power to the NIBP module motor; these components are protected by a 1 AT fuse (F6) (D3).

2.2.7. Recorder power supply

As soon as T3 (D5) starts conducting, L5 (C5) and C25 (C4) filter the power supply voltage of the converter made up of RG6, TR6, D7, C27 and C28 (C3, C4); the output voltage is intended for the array of the recorder unit.
The 3.15 AT fuse F8 (C3) protects the system from excess consumption.
Transistor T6 (C3) is used as a switch. Its control signal GPHON comes from the PC Interface board (W4P141641) and passes through translator T5 (b3).

2.2.8. NIBP On control and NIBP motor control

When the signal to pin 1 of J4 (B1) is on "1", switches T10 (C3) and T12 (B2) supply power to the control circuits of the NIBP module. T1 (C1) also starts to conduct.
The NIBP module motor is supplied with voltages +PNI (via R40) (B5) and -PNI (C1) ; when the motor is activated, the circuit built around U3 (B4) generates a signal which is recognised by the PC interface board (W4P141641) and designed for patient safety.


COMMANDE CAPTEUR
U5, U6, LD2
PROBE CONTROL
CAPTEUR OPTIQUE ECG
U1, U11B
OPTICAL ECG PROBE
AMPLIFICATION ET FILTRE
U3, U7, U8
AMPLIFICATION AND FILTER
TP8, FOR
TP9, ECG1V
TP10, ECGF
DETECTION DE DEFAUTS
U4
DEFECT DETECTION
TP6, ELEC
TP7, BAT
DETECTION QRS
U9, U10, U11
QRS DETECTION
TP11, QRS
ECG (X1000)
ECG M/A
ECGDERI0
ECGDERI1
ECGGAIN0
ECGGAIN1
-DEFELEC
-BATLOW
-DEF FOP
-TOPQRS
UNITE CENTRALE
CENTRAL UNIT
U13, U14, U15, U16, U17,
U18, U19, U20, U25
VERS ACQUISITION
PI 1/2/3/4
J1
TO IBP 1/2/3/4
ACQUISITION
PI M/A
SIGNAUX DE COMMANDES ADMUX 0 A 5
PI1
PI2
PI3
PI4
MULTIPLEXAGE
U12, U22, U23, U24
MULTIPLEXING
CONVERSION A/D
U21
A/D CONVERSION
D[0....7]
CAPTEUR A EFFET HALL (3x)
H1, H2, H3
HALL EFFECT PROBE (3x)
HX
HY
HZ
TP14, HX
TP15, HY
TP16, HZ
DETECTION CHAMP MAGNETIQUE > 40 mT
U28, U29, U30
DETECTION OF MAGNETIC FIELD >40mT
TP17, 40MT
TP12, RST
TP13, COLD
VH
VERS INTERFACE PC
J2
TO PC INTERFACE
VHALL
REGULATEUR
RG3
REGULATOR
TP18, VH
VBATT
HIGHFILD
MAGLIFE C.
SYNOPTIQUE TRAITEMENT CAPTEURS
PROBES TREATMENT BLOCK DIAGRAM
DRAWN
ECL0
02/98
APPROV
ECL0
02/98
MODIFICATION
ART NO : W1411702
PRT NO : W4P141615
DWG NO : W4S141648
DSK NO : W1K140850
SHT NO : 1/1
SCHILLER
MEDICAL S.A.S.

2.3. Probes treatment

This PCB is used to process the following signals:
- the encoded ECG signal from the optical fibre ECG sensor,
- the signals from the three Hall effect sensors (to determine the value of ambient magnetic field),
- the electrical signals from the non shielded part, which result from the acquisition of the signals from the invasive blood pressure sensors,
- the measurement of the battery voltage which powers the MAGLIFE C PLUS. when there is no mains power.

The PCB also includes a processing unit for the analogue signals as well as the power supply required for analogue signal processing.

2.3.1. ECG function

(page 2/2)

The input signal is an optical signal from the ECG sensor.

The sensor is controlled by the light pulses emitted by LED LD2 (D5). The power supply to the LED is validated by the logical signal ECG M/A (D8) which closes switches U5C and U5D (c-). U6 produces the pulses at 3 different frequencies depending upon the encoding imposed by signals ECGDERI1 and ECGDERI2 (C8) for the ECG lead selection.

Photodiode U1 (D8) converts the light pulses into electrical pulses which control monostable trigger U11B (D7). Potentiometer P1 (D7) is set so as to obtain a voltage of 0 V at the output of U3A (D4) when the ECG test sensor is connected with the electrodes shorted.

When used with a patient, a zero-sequence component may be found at the output of U3A (D4). Depending upon the mean voltage of the zero-sequence component, the following signals are sent to the CPU:
- signal -DEFELEC (D1) relating to the detection of an electrode fault on the selected lead,
- signal -BATLOW (D1) relating to the detection of a low battery charge of the ECG sensor,
- signal -DEF FOP (D1) relating to the absence of the ECG sensor (disconnection or failure).

The ECG signal at the output of U3A (D4) goes through a filter made up of C13 (C5) and R20 (C5), and is then amplified with a gain equal to 1000 by the stage built around U7A (C4) (gain adjustment with P2 (C4)). The signal is subjected to the final gain selected by the operator by means of multiplexer U8 and control signals ECGGAIN0 and ECGGAIN1 (C1).

The ECG signal is then applied to one of the inputs of analogue multiplexers U22 (D7) and U23 (D8) in order to be digitised by A/D converter U21 (D5).

Besides, the signal with the 1000 gain goes through the QRS detector including U9, U10 and U11 (B2 to B8). For each QRS complex detected, a -TOPQRS (B1) signal is sent to the microcontroller for counting, displaying and sounding the heart rate.

2.3.2. Magnetic field measurement

(page 1/2)

This function is supplied by the VHALL voltage from the power supply PCB. The voltage is present continuously when MAGLIFE C PLUS. is connected to the mains. When the unit is powered by the battery, the VHALL voltage appears when it is turned on.
On the basis of the VHALL voltage, regulator RG3 (B6) supplies voltage VH regulated to + 5.0 V. The voltage is applied to the Hall effect sensors H1, H2 and H3 (A8) and to the comparators of U28, U29 and U30 (A7).
The comparators detect that one or more sensors is located in a magnetic field which is greater than 40 mT. A signal HIGHFILD is sent to the On/Off function of the PC Interface board (W4P141641), to turn off MAGLIFE C PLUS and the battery recharging function.

The voltages generated by sensors H1, H2 and H3 (A8) are applied at the inputs of multiplexer U23 (D8) and digitised by U21 (D5) and interpreted as magnetic field values by the CPU.

2.3.3. Central Processing Unit

(page 1/2)

The CPU is made up of microcontroller U13 (C5), memory modules U16 (C3), U17 (B3) and U18 (A3), monitoring circuit U25 (C7), control registers U19 (D2), U20 (C2) and U15 (D3), and A/D converter U21 (D5). Decoder U15 (D3) is used to select the various circuits.

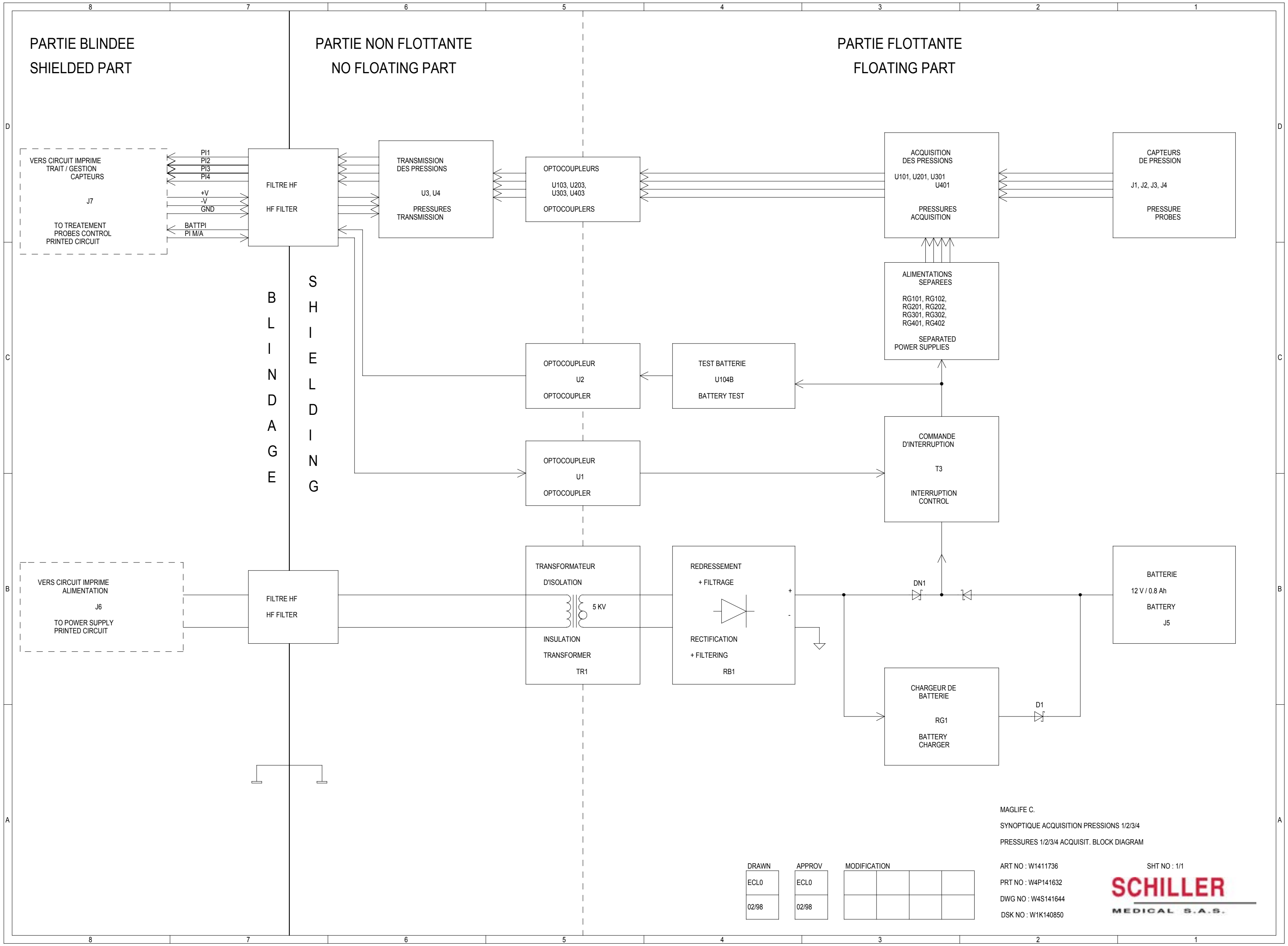
Converter U21 digitises the ECG signal, the magnetic field along three axes, the voltages relating to the invasive blood pressure values taken in the non shielded part of MAGLIFE C PLUS. and the battery voltage to assess the battery charge (the battery voltage is divided into six by means of a resistor bridge).
The various voltages are sent to pin 1 of U21 via multiplexers U23 (D8) and U22 (D7) controlled by means of register U19 (D2).

☞ **Note**: Voltages + 2.5 V and - 2.5 V are used for the auto-test of converter U21 (D5) when power is turned on.

2.3.4. Secondary power supplies

(page 2/2)

From the + 12 V and - 12 V voltages, regulators RG1 (A7) and RG2 (A6) generate voltages +V at TP3 (A7) and -V at TP5 (A5) respectively in order to supply power to the analogue parts of the ECG and invasive blood pressure (on the IBP1/2/3/4 acquisition PCB (W4P141632)) functions and the multiplexing of the voltages to be converted.


PARTIE BLINDEE
SHIELDED PART
PARTIE NON FLOTTANTE
NO FLOATING PART
PARTIE FLOTTANTE
FLOATING PART
VERS CIRCUIT IMPRIME TRAIT / GESTION CAPTEURS
J7
TO TREATEMENT PROBES CONTROL PRINTED CIRCUIT
PI1
PI2
PI3
PI4
+V
-V
GND
BATTPI
PI M/A
FILTRE HF
HF FILTER
TRANSMISSION DES PRESSIONS
U3, U4
PRESSURES TRANSMISSION
OPTOCOUPLEURS
U103, U203, U303, U403
OPTOCOUPLERS
ACQUISITION DES PRESSIONS
U101, U201, U301 U401
PRESSURES ACQUISITION
CAPTEURS DE PRESSION
J1, J2, J3, J4
PRESSURE PROBES
ALIMENTATIONS SEPAREES
RG101, RG102, RG201, RG202, RG301, RG302, RG401, RG402
SEPARATED POWER SUPPLIES
BLINDAGE
SHIELDING
OPTOCOUPLEUR
U2
OPTOCOUPLER
TEST BATTERIE
U104B
BATTERY TEST
OPTOCOUPLEUR
U1
OPTOCOUPLER
COMMANDE D'INTERRUPTION
T3
INTERRUPTION CONTROL
VERS CIRCUIT IMPRIME ALIMENTATION
J6
TO POWER SUPPLY PRINTED CIRCUIT
FILTRE HF
HF FILTER
TRANSFORMATEUR D'ISOLATION
5 KV
INSULATION TRANSFORMER
TR1
REDRESSEMENT + FILTRAGE
RECTIFICATION + FILTERING
RB1
DN1
BATTERIE
12 V / 0.8 Ah
BATTERY
J5
CHARGEUR DE BATTERIE
RG1
BATTERY CHARGER
D1
MAGLIFE C.
SYNOPTIQUE ACQUISITION PRESSIONS 1/2/3/4
PRESSURES 1/2/3/4 ACQUISIT. BLOCK DIAGRAM
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
02/98
02/98
ART NO : W1411736
PRT NO : W4P141632
DWG NO : W4S141644
DSK NO : W1K140850
SHT NO : 1/1
SCHILLER
MEDICAL S.A.S.

2.4. Acquisition of Invasive Blood Pressures 1, 2, 3 and 4

This PCB is used to acquire the analogue signals of the two invasive blood pressure values (or 4 as an optional feature), while ensuring that the patient is isolated from **MAGLIFE C PLUS.**.

2.4.1. Power supply

(page 1/2)

The power supply to the floating part of the PCB is achieved by isolating transformer TR1 (D8) or by the lead battery when there is no mains power.
The battery is recharged by voltage regulator RG1 (D5) via protection diode D1 (C7). The charge is performed as soon as MAGLIFE C PLUS is connected to the mains, at a constant voltage.

The acquisition of analogue signals PI1, PI2, PI3, PI4 is divided into four parts: pressure 1 measurement, pressure 2 measurement and pressure 3 and 4 measurement as an optional feature. Each part has its own power supply. The sensors are supplied with + 4 V (ALIM PI...) (D1, C1) and the preamplifiers are supplied with +8 V (+ F...) (D3, C3). The power is supplied by regulators RG101 (D4) and RG102 (D2) for pressure 1, RG201 (D4) and RG202 (D2) for pressure 2, RG301 (C4) and RG302 (C2) for pressure 3 and RG401 (C4) and RG402 (C2) for pressure 4.

☞ **Note**: For each pressure value, a virtual mass point is generated by dividing the floating voltages (U102A (D5), U202A (B5), U302A (D1) and U402A (B1) (page 2/2)) by two.

The power supply to the PI1/2/3/4 signal acquisition and transmission systems may be cut off by the PI M/A (C8) command and transistor T3 (C5). The system is designed to prevent battery discharging when MAGLIFE C PLUS. is off or when the IBP function is not in use.

Amplifier U104B (B3) and neighbouring components form a battery voltage monitoring system. The signal BATTPI (B1) informs the CPU of MAGLIFE C PLUS. that the battery is low. When the signal is in the high state, the battery charge is low.

The two signals (PI M/A and BATTPI) are isolated from the patient by means of optocouplers U1 (C7) and U2 (B2) respectively.

The power supply to the non floating part (+V, -V, GND) is take from the Sensor Processing circuit (W4P141615) via connector J7 (A2).

☞ **Note**: All the signals from the floating part to the non floating part (and vice versa) are filtered so as to prevent disturbing the imager.

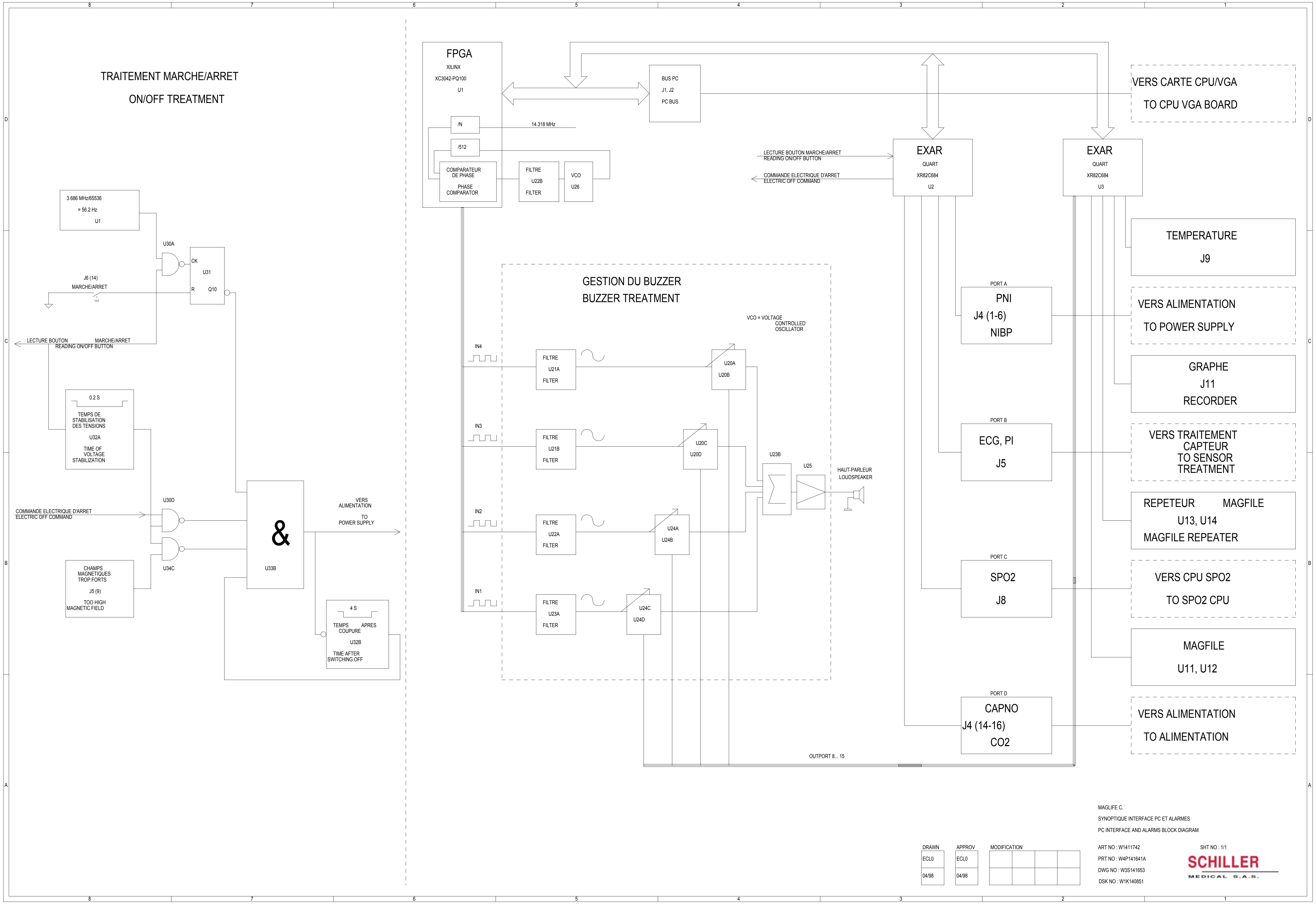
2.4.2. Acquisition and amplification of input signals
(page 2/2)

The invasive pressure sensors are connected to the orange bases on the front of the MAGLIFE C PLUS. unit. These bases are connected to connectors J1 (D8), J2 (B8), J3 (D4) and J4 (B4) of the printed circuit. The invasive pressure signals are collected on a differential basis at tabs 1 and 2 of the connectors. The sensors are supplied with power via tabs 3 and 4.

The signals are amplified by:
- U101 (D7) as regards pressure 1,
- U201 (B7) as regards pressure 2,
- U301 (D3) as regards pressure 3,
- U401 (B3) as regards pressure 4.

The signals are then transmitted to the non floating part by linear transfer optocouplers U103 (C6), U203 (B6), U303 (C2) and U403 (B2).

Circuits U3A (C5), U3B (A5), U4A (C1) and U4B (A1) and the associated components amplify the signals from the optocouplers. Potentiometers P102 (C6), P202 (A6), P302 (C2) and P402 (A2) are used to adjust the system offset when the potential difference at the sensor is zero. Potentiometers P101 (D6), P201 (B6), P301 (D2) and P401 (B2) are used to adjust the gain of the entire acquisition and amplification chain. After the adjustment, the analogue output signals PI1, PI2, PI3 and PI4 are transmitted to the shielded part of MAGLIFE C PLUS. via connector J7 (A2, page 1/2) and the HF filters.


TRAITEMENT MARCHE/ARRET
ON/OFF TREATMENT
FPGA
XILINX
XC3042-PQ100
U1
BUS PC
J1, J2
PC BUS
VERS CARTE CPU/VGA
TO CPU VGA BOARD
14.318 MHz
COMPARATEUR DE PHASE
PHASE COMPARATOR
FILTRE
U22B
FILTER
VCO
U26
LECTURE BOUTON MARCHE/ARRET
READING ON/OFF BUTTON
COMMANDE ELECTRIQUE D'ARRET
ELECTRIC OFF COMMAND
EXAR
QUART
XR82C684
U2
EXAR
QUART
XR82C684
U3
3.686 MHz/65536
= 56.2 Hz
U1
TEMPERATURE
J9
PORT A
PNI
J4 (1-6)
NIBP
VERS ALIMENTATION
TO POWER SUPPLY
GESTION DU BUZZER
BUZZER TREATMENT
VCO = VOLTAGE CONTROLLED OSCILLATOR
GRAPHE
J11
RECORDER
PORT B
ECG, PI
J5
VERS TRAITEMENT CAPTEUR
TO SENSOR TREATMENT
HAUT-PARLEUR
LOUDSPEAKER
REPETEUR MAGFILE
U13, U14
MAGFILE REPEATER
PORT C
SPO2
J8
VERS CPU SPO2
TO SPO2 CPU
MAGFILE
U11, U12
PORT D
CAPNO
J4 (14-16)
CO2
VERS ALIMENTATION
TO ALIMENTATION
OUTPORT 8... 15
J6 (14)
MARCHE/ARRET
0.2 S
TEMPS DE STABILISATION DES TENSIONS
U32A
TIME OF VOLTAGE STABILIZATION
CHAMPS MAGNETIQUES TROP FORTS
J5 (9)
TOO HIGH MAGNETIC FIELD
VERS ALIMENTATION
TO POWER SUPPLY
&
U33B
4 S
TEMPS APRES COUPURE
U32B
TIME AFTER SWITCHING OFF
MAGLIFE C.
SYNOPTIQUE INTERFACE PC ET ALARMES
PC INTERFACE AND ALARMS BLOCK DIAGRAM
ART NO : W1411742
PRT NO : W4P141641A
DWG NO : W3S141653
DSK NO : W1K140851
SHT NO : 1/1
SCHILLER
MEDICAL S.A.S.
DRAWN
APPROV
MODIFICATION
ECL0
04/98

2.5. PC Interface

This board mainly acts as a communication interface between the PC 485-686 board and the peripheral devices of **MAGLIFE C PLUS.** via series and optical links.
It controls the starting up and turning off of the main power supply, and also controls the power supply to the various modules depending upon their use, via the power supply board.

Two EXAR XR82C684 circuits act as the series connection with the modules:

- U2 (C5) communicates with the ECG, NIBP, CAPNO, SPO2 modules,
- U3 (C4) communicates with the (optional) Temperature module and the series recorder. It is also used to communicate with external devices such as MAGFILE and download data.

Two XILINX XC3042PQ100 circuits are used to reduce the surface of the printed circuit:

- U1 (C6) takes charge of decoding addresses, controlling the keypad, generating sounds and controlling the power supplies,
- U4 (C2) implements an optional system consisting of outputting, via 2 optical fibres, up to 8 analogue signals for the ECG, SPO2 and CAPNO curves and the 4 invasive pressure curves. Two optical fibres are used to connect the system to MAGSCREEN and MAGFILE; two other optical links are available for further extension.

2.5.1. Link with the NIBP module

The NIBP module requires three supply voltages (+5V, +12V, -12V) and a series link at 4800 baud with handshaking (RX, TX, RTS, CTS).

The voltages arrive through connector J8 (B1) of the power supply board when the IOP3 signal is active. The series link generated by U2 (C5) passes through XLINX U1 (C6) which puts it in high impedance when the module is not supplied with power. These signals are BTXA, 1RXA, BOP0, 1IP0 and are sent to the Power Supply board via J4 (C1).

The SENS signal from the power supply board is used to detect if power is effectively being supplied to the pump. The signal arrives at an input of U2.

2.5.2. Link with the SpO2 board

Connector J8 (B1) is used to link the SpO2 board and the PC Interface board.

The SpO2 board needs +5 V voltage and a series link without handshaking. Signals 1RXC, 1TXC and 1OP8 come from U2 (C5) and signal 1OP8 is used to switch T9 (B2) for the +5V power supply.

2.5.3. Link with the Capno module

The Capno interface requires +12V voltage and a series link without handshaking.

The +12 V voltage is directly switched on the Power Supply board by the CAPON signal from U1 (C6). The series link from U1 (1RXD and BTXD) goes through the power supply board to avoid using excessive connections.

2.5.4. Link with the Probes treatment board

The Sensor Processing board is supplied continuously with +5V, +12V and -12V.

It is used to acquire the voltages from the invasive pressure amplifiers, give the intensity of the magnetic field in the three directions and acquire the ECG signal arriving through optical fibres in the digitised form via a series link.

Data 1RXB and 1TXB pass through J5 (C8) to U2 (C5).

2.5.5. Link with the keypad

The keypad includes 5 keys, a rotating button and an On/Off button.

Signals BR0, BR1, BR2, BR4 and BR5 from the rotating button all go through a trigger gate and XILINX U1 (C6) which includes anti-rebound circuits.

The 5 signals from the keys are also reshaped by U1.

All these bits are sent to the data bus by U1, with the exception of the "Graph" key signal, which is sent through one of the U2 EXAR circuits.

Pressing the On/Off button puts the ONOF signal on "0", and the power is cut off after 4.5 seconds.

2.5.6. On/Off function

The On/Off function is used to turn the unit off in three different ways:
1. by the software, via signal E_ON from U2 (C5),
2. when the hardware senses a 40 mT magnetic field value. A HIGHFILD signal is sent by the Sensor Processing board when the magnetic field exceeds 40mT.
3. by pressing the On/Off button for more than 4.5 seconds.

* **Turning off the system**

  The signal O_SW is an input of U2 (C5) which is used by the software to detect that the On/Off button has been pressed.

  The software may turn off MAGLIFE C PLUS. by putting signal E_ON on "°0°". If E_ON is on "°0°", T10 (A5) is blocked, output 11 of U30 (A4) is on "°0°", output 13 of U33 (A4) is on "°1°", output 11 of U34 (A3) is on " 0" and the power is turned off.

  When the HIGHFILD signal switches to "1" because the magnetic field is too strong, output 11 of U34 switches to "0", the ON signal switches to "0" and the power is cut off.

  Pressing the On/Off button switches the ONOF signal to "0" and validates the counting of U31 (A3), the clock X_OFF of which comes from XILINX U1 (C6). Output 10 switches to "1" after 4.5 seconds and is inverted by U34B (A3). The "0" status at an input of the "NAND" gate U33 (A4) leads to the turning off of the power supply.

  Monostable trigger U32B (A3) is used to maintain a "0" status at an input of U33B for 4 seconds when the power supply is cut off. This gives the circuitry the time to stabilise before it is turned on again.

2. EXPLANATION OF OPERATION

* **Starting up the system**

The following states prevail in the idle condition:

- no +5V voltage, so T10 (A5) blocked,
- signal ON on "0",
- signal ONOF on "1",
- signal HIGHFILD on "0",
- output 15 of U31 (A3) on "0",
- output of U32B (A3) on "1".

A pulse on the ONOF line switches output 10 of U30 (A4) to "1" and trips monostable trigger U32A (A4) for 0.2 s (time for power supply stabilisation). A "0" status is found at the output of U32A. The output of U30D (A4) is on "1". Consequently, as per the starting states, ON is on "1".

This stage is only valid for 0.2 s maximum, because of monostable trigger U32A. In the meantime, the +5V voltage arrives and the UART circuits are initialised by a reset. The signal E_ON switches to "1" and remains there continuously. T10 (A5) is therefore saturated and output 11 of U30 (A4) remains on "1" and the other statuses of the inputs of U33B (A4) do not change. Consequently, the unit remains on.

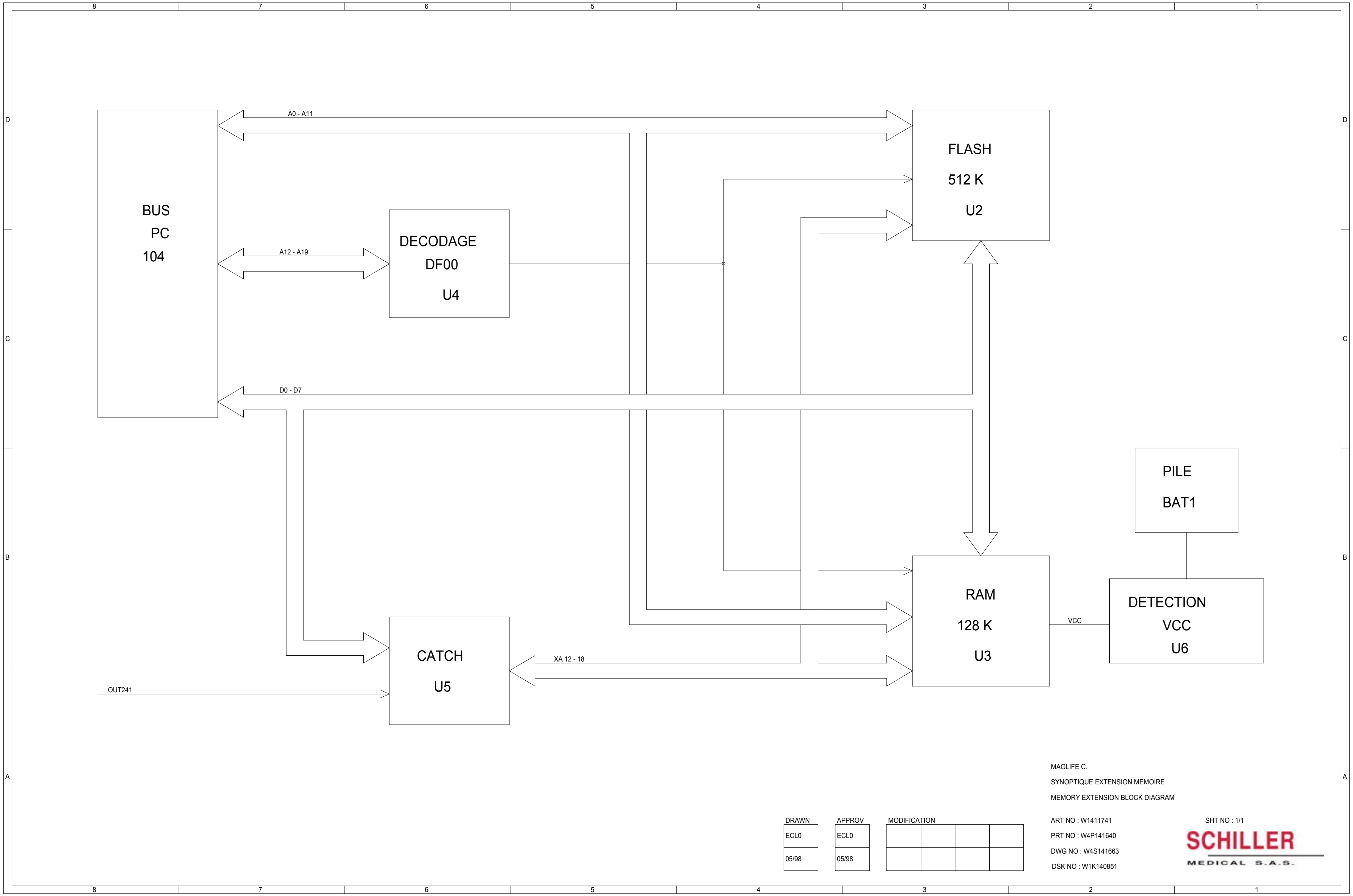
* **Sound function**

A small speaker is connected onto this board. It supplies 4 sounds:

- 3 sounds with different frequencies and amplitudes (4 levels) and of fixed duration,
- a continuous sound with a variable frequency and amplitude (4 levels).

The first three sounds are supplied by logical outputs IN1, IN2, IN3 of U1 (C6). IN4 is a variable cyclic ratio signal. Associated with U22 (A6), a variable voltage is obtained to control the VCO of U26 (A6) and obtain a variable frequency. Signals OP8 - OP15 from U3 (C4) are used to control the analogue switches and the amplitude of the sound. Signal S-ON (B8) validates the emission of a sound.

2. EXPLANATION OF OPERATION



2.6. Memory extension

For reasons relating to immediate compatibility with the previous hardware, this board has 128 Kb of 128K x 8 SRAM, accessible in blocks of 4 Kb, at the segment address 0xDF00. Block selection is done by an OUT signal at address 0x241 of a value of 0x80 - 0x9F for the 32 pages of 4 Kb.
This board is connected to the Pc104 bus of the 486 or 5x86 board (J1 (D8) and J2 (B8)). Address comparator U4 (74HC688) (C6) defines the DF00-DFFF area. U2 supplies the high address lines for the memory (A12 - A19) by means of a validation signal which is carried via J5-2 (D1) of the alarm interface board and which is the decoding of OUT 0x241. Flash memory U1 29F040 is not used and is normally not mounted. SRAM U2 628128 (B2) is saved by the 3.6V cell BAT1 (A4) through the circuitry around U6 (A4). U6 is a voltage supervisor, which monitors 5V drops to switch the power supply to the RAM to the cell.

2.7. Keypads

The Left-hand Keypad and Right-hand Keypad PCBs (W4P141637)are used to display the status of the unit and access the controls.

Displaying is done via the following LEDs:

- LD1 (C6) indicates that the unit is on,
- LD2 (C5) indicates that the mains power is present,
- LD3 (C5) indicates the battery charge.

The controls are operated by the rotating button on the front of the unit connected to J3 (D7) and by the various keys:

- PB1 (C4) is used to turn the unit on or off,
- PB2 (C4) is used to access the main menu,
- PB3 (A5) is used to disable the sound alarms for 3 minutes,
- PB4 (A5) is used to print a graph,
- PB5 (A5) is used to freeze a trace on the screen,
- PB6 (B5) is used to start and stop NIBP measurements.

The signals from tabs 7 and 9 of J2 (D2) are used by transistor T1 (D3) to control the back-lighting of the screen via J4 (D7).

2.8. SpO2 interface

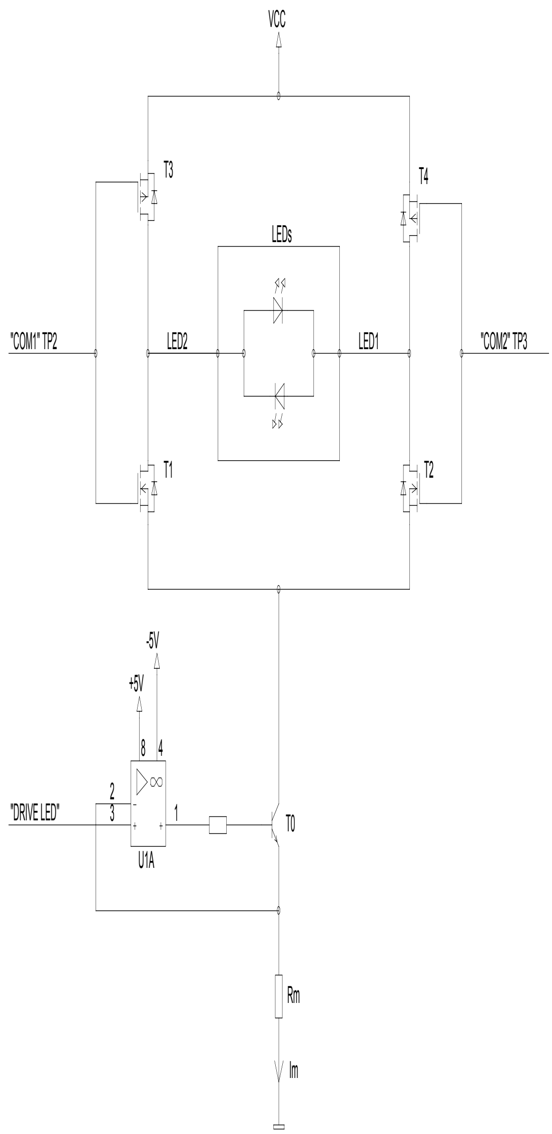
- General principle

The function of the "SPO2 Interface" printed circuit is to generate a current proportionnal to the SPO2 CPU board current. This current (between 0 and 140mA) must passed throught the LD1 and LD2 LED's in the two directions and is adjust by the SPO2 CPU board.

Therefore, the purpose is to be able to generate a current in both LED's (LD1 and LD3) in order to multiply by two quantity of light emitted compared to the electric system of origin.

To do this, take the two LEDs in series and generate therefore a equivalent current as the one request by the SPO2 CPU board.

We use this principle :



- <u>Current direction command</u> :

  ⇒ When the control signal "COM1" is at "0", the T3 transistor is saturate (T1 blocked).
  When the control signal "COM1" is at "1", the T1 transistor is saturate (T3 blocked).

  ⇒ When the control signal "COM2" is at "0", the T4 transistor is saturate (T2 blocked).
  When the control signal "COM2" is at "1", the T2 transistor is saturate (T4 blocked).

COM1	COM2	Current direction
0	0	
0	1	LD2 → LD1
1	0	LD1 → LD2
1	1	

- LED intensity command :

  The current regulation is perform by the "DRIVE LED" signal via the components U1A (B3), T0 (B2) and R26 (B2).

  The T0 (B2) transistor permits to supply the current necessary for the operationnal amplifier U1A (B3) to "equalize" this two entries. The I_{26} current is fixed by the R_{26} measurement resistor and the "DRIVE LED" control voltage.

  $$I_{26} = \text{"DRIVE LED"} / R_{26}$$

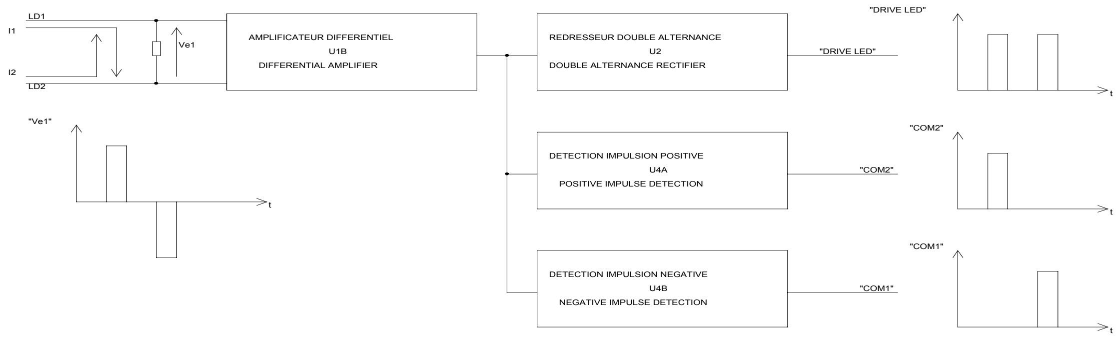
  We obtain in this way :

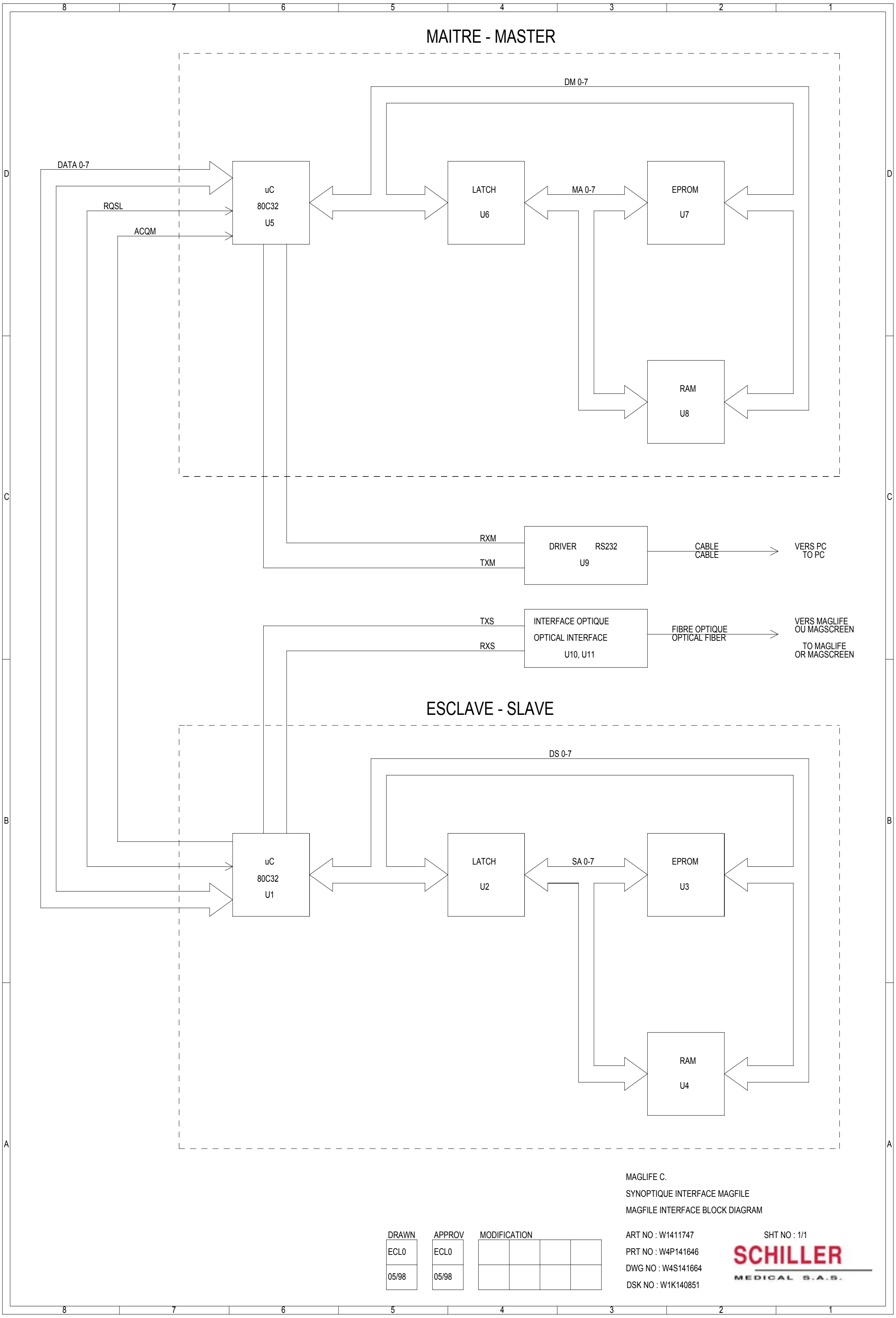
  $I_{26} \in [0 ; 140 \text{ mA}]$

- Control signal generation :

  You must generate the control signals "DRIVE LED", "COM1" and "COM2" by the current supplied by the SPO2 CPU board.

  Block diagram :




MAITRE - MASTER
DM 0-7
DATA 0-7
RQSL
ACQM
uC
80C32
U5
LATCH
U6
MA 0-7
EPROM
U7
RAM
U8
RXM
TXM
DRIVER RS232
U9
CABLE
CABLE
VERS PC
TO PC
TXS
RXS
INTERFACE OPTIQUE
OPTICAL INTERFACE
U10, U11
FIBRE OPTIQUE
OPTICAL FIBER
VERS MAGLIFE
OU MAGSCREEN
TO MAGLIFE
OR MAGSCREEN
ESCLAVE - SLAVE
DS 0-7
uC
80C32
U1
LATCH
U2
SA 0-7
EPROM
U3
RAM
U4
MAGLIFE C.
SYNOPTIQUE INTERFACE MAGFILE
MAGFILE INTERFACE BLOCK DIAGRAM
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
05/98
05/98
ART NO : W1411747
PRT NO : W4P141646
DWG NO : W4S141664
DSK NO : W1K140851
SHT NO : 1/1

2.9. Magfile interface

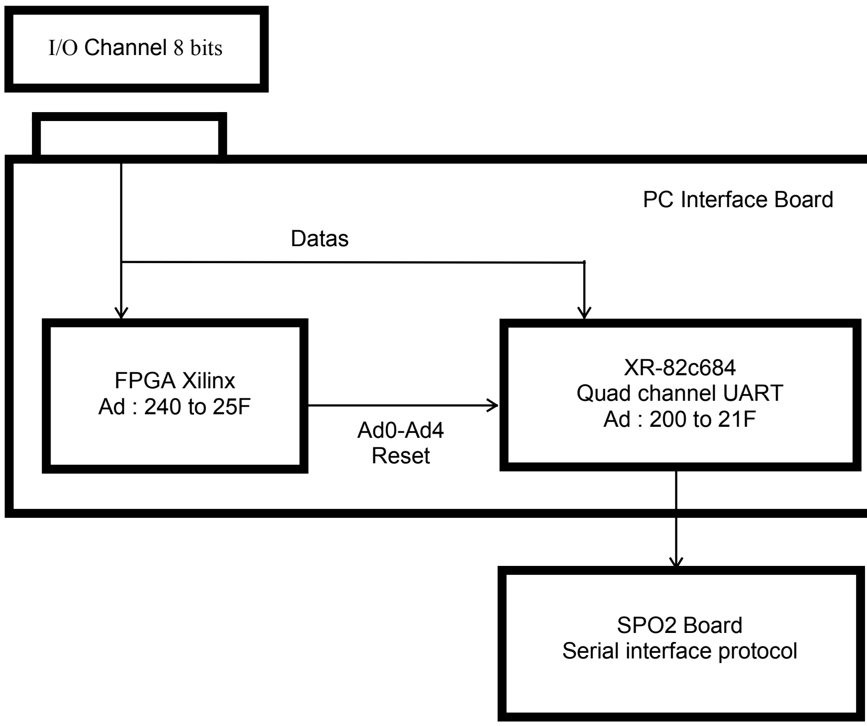
This board is the physical connection between Maglife or Magscreen and Magfile. At the same time, it converts the SCHILLER MEDICAL Maglife-Magscreen link protocol to the protocol used by Proto-Design. The system makes it possible to connect several (so-called "slave") devices to another (so-called "master") device, by relieving the master device of the task of decoding a number of different protocols.
The board is made up of two parts, with a similar architecture (microcontroller 80C32 U1 (D6), 32K EPROM and 32K RAM). The master part is connected to the COM1 output of the PC containing the Magfile software, via RS232 driver U9 (B2)(Max 232). The slave section is connected to Maglife or Magscreen through the optical interface (U10 (C5) and U11 (C8)).
The master and slave parts are connected by a parallel 8-bit bus, and two control signals (RQS request and ACK acknowledge).
The system is supplied with 5V by a chopping mains adapter.

2.10. CPU 586LCD

The CPU 586LCD board is an OEM board from Inside Technology.
For more details about this board, refer to the user's manual « 486 -586LCD/S CPU board » of Inside Technology.

2.11. SpO2 module

2.11.1. SpO2 interface block diagram



The PC interface board can be plugged in a normal PC for test purpose. In order to reduce potential I/O address conflicts, the range of I/O addresses for this board has been reduced to 96 (200 to 25F), and there are 3 IRQs used (IRQ 3,4 and 5).

Nota : there are two QUARTs on the PC interface board. NIBP, SPO2, Capno and ECG modules are connected on the first QUART. Output INTR of QUART is wired on IRQ3 (B25) from PC bus.

2.11.2. Serial communication protocol

- **Single Board SPO2 Protocol**

The serial communication may be unidirectional ; SPO2 subassembly to the processor board only. It will begin automatically after power up. Data will be transfered at 4800 BAUD with one start bit, eight data bits, odd parity bit and one stop bit. The five byte data format below is transmitted at 60 samples per second. Decoding the data is synchronized by bit 7 in the first byte (1 in this byte, 0 in all others data bytes).

Byte 1	Bit 0	Signal strength 0	Signal strength < 3 generates low perfusion (small pulse signal) alarm. Valid data : 0-8, 15 → bad data.
	Bit 1	Signal strength 1	
	Bit 2	Signal strength 2	
	Bit 3	Signal strength 3	
	Bit 4	1 → "searching too long" alarm	
	Bit 5	Cue for drop in SPO2	
	Bit 6	Pulse beep cue	
	Bit 7	Sync bit, always set to 1	
Byte 2	Bit 0	Plethysmogram 0	Plethysmogram : 0-99 127 → don't plot
	Bit 1	Plethysmogram 1	
	Bit 2	Plethysmogram 2	
	Bit 3	Plethysmogram 3	
	Bit 4	Plethysmogram 4	
	Bit 5	Plethysmogram 5	
	Bit 6	Plethysmogram 6	
	Bit 7	0	
Byte 3	Bit 0	Bargraph 0	Bargraph : 0-16
	Bit 1	Bargraph 1	
	Bit 2	Bargraph 2	
	Bit 3	Bargraph 3	
	Bit 4	1 → sensor problem	
	Bit 5	1 → searching for pulse	
	Bit 6	Rate 7	
	Bit 7	0	
Byte 4	Bit 0	Rate 0	Rate : 0-254 255 → bad data
	Bit 1	Rate 1	
	Bit 2	Rate 2	
	Bit 3	Rate 3	
	Bit 4	Rate 4	
	Bit 5	Rate 5	
	Bit 6	Rate 6	
	Bit 7	0	
Byte 5	Bit 0	SPO2 0	SPO2 : 0-100 127 → bad data
	Bit 1	SPO2 1	
	Bit 2	SPO2 2	
	Bit 3	SPO2 3	
	Bit 4	SPO2 4	
	Bit 5	SPO2 5	
	Bit 6	SPO2 6	
	Bit 7	0	

- **Commands to the SPO2 Subassembly**

"A" Synchronizes the adjustement of scale and offset for the plethysmogram (which occury every 256 samples) to the next sample. (note : subsequent offset adjustements will occur if the trace moves from the 0-99 window.)

"B" Sets SPO2 averaging to 4 beats.

"C" Resets SPO2 averaging to 8 beats and pulse rate averaging to 8 seconds (the power-up default values).

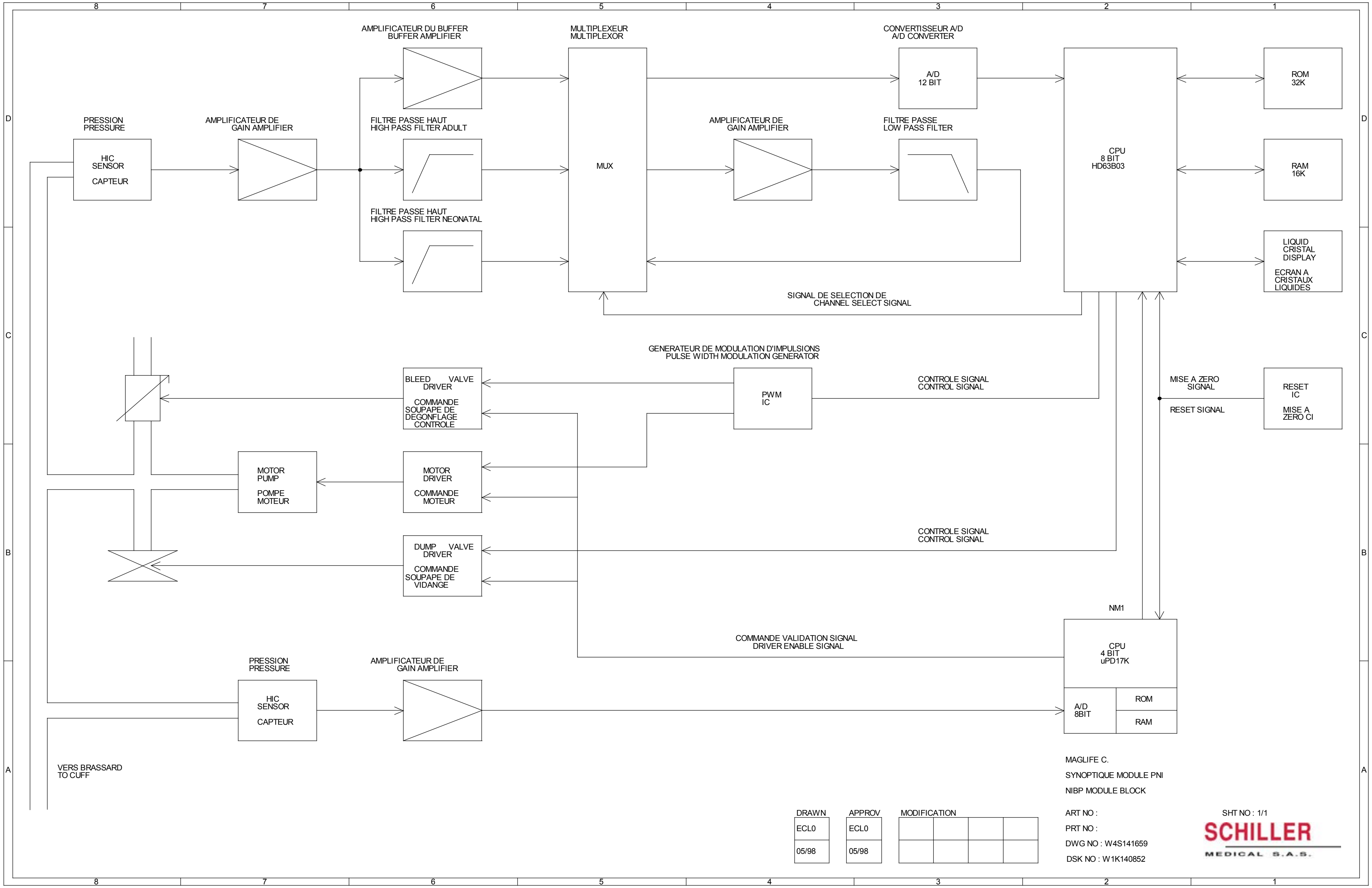
"D" Sets SPO2 averaging to 16 beats and pulse rate averaging to 16 seconds.

"E" Forces transmission of SPO2 subassembly software revision level with following format :

1st byte	80 hexadecimal
2nd byte	FF hexadecimal
3rd byte	ASCII digit - tens
4th byte	ASCII digit - units
5th byte	ASCII digit - tenths

Normal data transmission resumes automatically.

2. EXPLANATION OF OPERATION



2.12. Module PNI

The NIBP Module consists of a Main CPU for measuring blood pressure and a Sub CPU for watching the pressure and the measuring time.

The pressure signal detected by the HIC pressure sensor is calibrated to approximately 10mV/mmHg by the gain amplifier.The signal output is converted from analog signal into digital one and the Main and Sub CPUs reads it as the pressure.

The pulse wave is detected from the pressure signal and it goes through the HP filter, the gain amplifier and the LP filter, is converted from analog signal into digital one, and is read by the Main CPU. There are two HP filters ; one for the measurement of adults and the other one for neonates.

The mechanical parts consist of a motor-pump and a bleed/dump valve.

♦ **Measurement time.**

- Adult / child measurement mode.

  When a patient has no motion artifact, and his/her measurement is stable, this product measure him/her within 18 seconds. Assumes cuff inflation pressure of 180 mmHg, and does not include cuff pressurization time.

- Neonate measurement mode.

  When a patient has no motion artifact, and his/her measurement is stable, this product measures him/her within 18 seconds. Assumes cuff inflation pressure of 120 mmHg, and does not include cuff pressurization time.

♦ **Safety.**

- Quick deflation condition.

When any of the following conditions have occured, cuff pressure is automatically deflated to
0 mmHg :

- End of the measurement (unable to measure is included),
- When module receives a « reset command »,
- When a measurement error has occured,
- When the maximum pressure value exceeds 300 mmHg during measurement in adult/child mode,
- When the maximum pressure value exceeds 150 mmHg during measurement in neonatal mode,
- When the measurement time exceeds 180 seconds in Adult/child mode,
- When the measurement time exceeds 90 seconds in neonatal mode.

- Overpressure protector.

- Limiter working pressure is 320 ± 10 mmHg for adult/child mode.
- Limiter working pressure is 160 ± 5 mmHg for neonatal mode.

♦ **Automatic re-measurement.**

When any of the following condition have occured, cuff pressure is automatically deflated to 0 mmHg and a new measurement cycle starts.

a) When systolic value is higher than the previous inflation values,
b) When the blood pressure cannot be read, even throught the cuff pressure deflated down to 10 mmHg,
c) When the blood pressure value cannot be measured within 120 seconds in adult/child mode,
d) When cuff pressure cannot inflated by more than 20 mmHg in 15 seconds,
e) When the correct measurement cannot be obtained due to patient motion artifact,
f) When the measurement value exceeds 300mmHg during measurement in adult/child mode (150 mmHg in neonatal mode).

2.13. CAPNO module : operation

2.13.1. General description

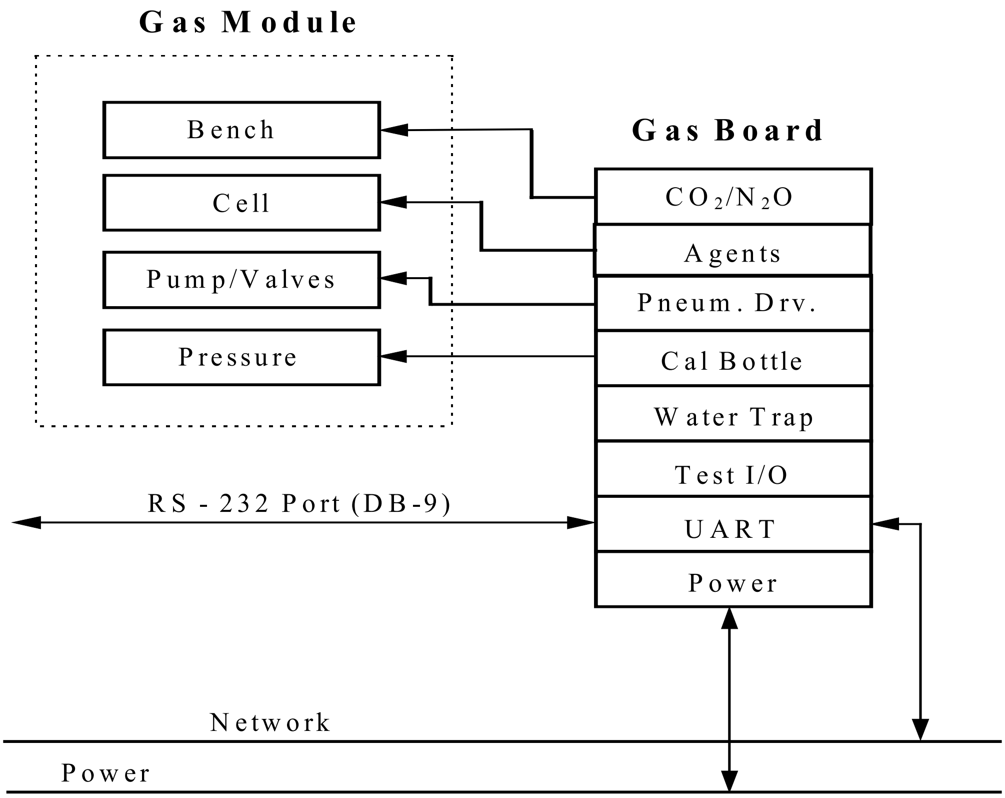
The multigaz analyser is a complete sidestream medical gas measurement system designed with the OEM in mind. The analytical bench, pneumatics, electronics and user-accessible calibration gas bottle are designed in a modular fashion that allows slide-in mounting for improved serviceability.
The multigaz analyser is microprocessor-controlled and responds to simple commands to provide waveform data, as well as important derived patient parameters.

The entire gas detection system is contained in the Gas Module. The Gas Modue is comprised of the following subsystems :

- The Gas Board (which contains the % O_2 measurement circuitry);
- The infrared (IR) CO_2/N_2O gas detector bench (IR bench);
- The crystal agent gas detector and Agent Preamplifier Board (agent bench);
- The Valve and Pneumatic Board;
- The gas sampling pump.

The gas module collects and calculates all the gas data ($ETCO_2$, minimum inspired CO_2, respiration rate, % N_2O, % O_2, CO_2 waveform, inspired and expired agents, agent waveform) and sends the data to the PC Interface Board over the high-speed serial network. The PC Interface Board displays and trends the Gas Module's data.

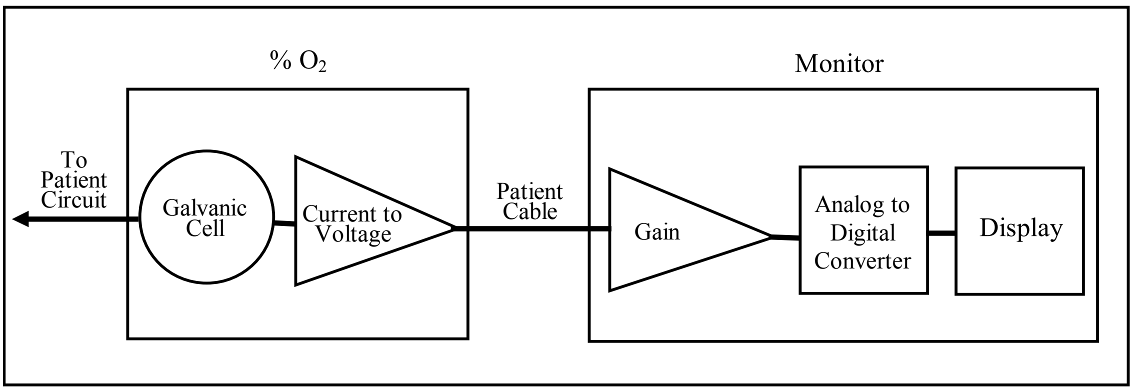
The patient's exhaled gas sample is routed from the front panel water trap to the Gas Module's rear panel. The sample is passed through the IR bench and agent bench, then exits the rear panel exhaust port. All required voltages for the Gas Module are generated on the Gas Board from the Power Module's +12VDC power supply (at the network connector 1).



2.13.2. % O_2 function

* **Theory of operation**

The % O_2 sensor behaves as a variable current source, with current output proportional to the partial pressure of oxygen. The % O_2 sensor's current output drives a resistor network to provide a temperature stable voltage. The voltage is nominally zero at zero O_2 partial pressure, but increases linearly with increasing O_2 partial pressure. The monitor amplifies the resulting voltage then converts it to a digital value.



∗ **Notes and warnings**

- Use only polyethilene or polyethilene-sleeved tubing (PE-PVC) with agent gasses. Do not use PVC sample lines with agent gasses : PVC lines may cause inacurrate agent gas measurements.

- Store the % O_2 cell as shipped in its protective wrapping, until it is ready to use. This maximize the % O_2 cell's shelf life.

- Prolong % O_2 cell life by avoiding high O_2 and CO_2 concentrations when it is not in use.

- Each % O_2 cell has different output characteristics ; changing the % O_2 cell without calibrating the monitor can result in incorrect displayed % O_2 values. The incorrect values are unpredictable in both magnitude and direction, possibly resulting in hypoxic % O_2 gas mixtures while displaying high % O_2 values. It is your responsability to properly calibrate the monitor after changing sensors.

∗ **% O_2 humidity and pressure compensation**

The % O_2 cell assumes that is being calibrated with dry gas at the same pressure for which it will be used. If this is not in case, correction factors can be calculated to take humidity (water vapor) and pressure into account.

Water vapor behaves as any diluting gas does, reducing the partial pressure oxygen in the gas sample. Since the % O_2 cell responds to this partial pressure, a gas sample diluted by water vapor will give a lower % O_2 reading than the sample before dilution. Since water vapor only dilutes the sample, and does not interfere with the chemical reaction of the % O_2 cell, the accuracy of the measurement is not affected.

Consider the following example. In a gas saturated with water vapor at 37°C, the partial pressure of the water vapor is 47 mmHg. If the gas had originally been dry 100% O_2 at 760 mmHg, then the O_2 partial pressure of the humidified gas would now be 760 - 47 = 713 mmHg. In other words, the humidified gas would now be 94% O_2 (6% H_2O).

If the % O_2 cell must be calibrated using humidified O_2 (saturation with water vapor assumed), then the following correction factor must be applied to all subsequent readings :

$$(1) \quad C_{H2O} = \frac{P_{CAL} - P_{H2O}}{P_{CAL}}$$

where P_{CAL} = pressure of calibration gas
P_{H2O} = partial pressure of water vapor at the gas temperature

In addition, if the pressure of the calibration gas is different from the pressure of the gas being measured, then a second correction factor is needed as well :

$$(2) \quad C_{CAL} = \frac{P_{CAL}}{P_{SAMPLE}}$$

where P_{SAMPLE} = pressure of the gas sample being measured

The final result is that % O_2 readings can be corrected for both humidity and pressure variations using a combination of equations (1) and (2) above :

$$\% \; O_{2ACTUAL} = \% \; O_{2READING} \times C_{H2O} \times C_{CAL}$$

2.14. Capno module : circuit description

2.14.1. Network interface

The Gas Board connects to the network at P1. The network provides :

- +12V PWR for the Gas Board's independent power supplies ;
- VBATT for the Cal Gas Canister Empty Circuit ;
- the high-speed serial communication lines ;
- the Power Module's PWRDN signal for turning on and off the Gas Module

2.14.2. Power Supply Circuitry

The +12V PWR signal from the network (P1-9) supplies power for the Gas Board's multiple-output switching power supply and linear +5 VDC regulator. Switching oscillator chip U1 turns on and off power MOSFETs Q1 and Q2 in a push-pull mode. The MOSFET's drive triple-secondary transformer T1 to provide the Gas Module's analog circuitry voltage requirements. T1's secondary ouput generates +2.5 VDC for the IR bench's thermoelectric cooler circuit, +12 VDC and -12 VDC for the Gas Module's analog circuitry, and +65 VDC and -65 VDC for the IR bench's pyroelectric IR detector.

∗ **<u>Turning On and Off the Gas Module Power Supply</u>**

Q11 turns on and off switching regulator chip U1 ; Q12 turns on and off +5 VDC regulator chip U2. When the front panel ON/OFF key is pressed, the Power Module turns on and supplies +12V PWR to q11-gate and Q12-gate trough pull-up resistor R4. This turns on Q11 and Q12, which turns on U1 and U2 respectively. When the \PWRDN signal goes low (the PC Interface is turning off the Power Module), Q11 and Q12 turn off, turning off U1 and U2.

∗ **<u>Gas Board Power Supplies</u>**

Origin	Name	Volt	Tolerance
TP2	+2.5V	+2.5 VDC	±1.0 VDC
TP4	+65V	+65 VDC	±5 VDC
TP6	-65V	-65 VDC	±5 VDC
TP1	+5V	+5 VDC	±0.20 VDC
TP3	+12V	+12 VDC	±0.60 VDC
TP9	-12V	-12 VDC	±0.60 VDC

The +2.5V supply for the IR bench's thermoelectric cooler is derived from a half bridge rectifier made up of D6 and D7. The +65V and -65V bias supplies for the IR bench's detector are regulated and filtered by D1, D2, and their associated circuitry. The +12V and -12V supplies are used for analog circuitry on the Gas Board and the IR bench and are regulated by U3 and U4.

U2 regulates the +12V PWR signal to +5 VDC for the Gas Board logic. U2 also provides an ERR output (U2-5) that goes low when U2 is no longer regulating (+IN at U2-8 is dropping) or when the SHDN signal goes high (when U2 is turned off by Q12).

The pneumatic valves on the Valve and Pneumatic Board are powered by the network's +12V PWR supply at P1-9. The Valve and Pneumatic Board draws approximately 350 mA during occlusion and 250 mA during normal operation.

2.14.3. Microprocessor Kernel

HD64180 microprocessor U9, EPROMs U17 and U22, and RAM U26 from the microcomputer that controls the Gas Module's functions. The microcomputer computes the Gas Module's parameter information ($ETCO_2$, breath rate, % N_2O, etc...) and transmits the data to the PC Interface Board through the network's high-speed serial communication lines. A17, A16, A15 and ME are gated through U7 to locate EPROM U22 at 00000h, EPROMU17 at 08000h and RAM U26 at 10000h.

The PHI at U9-64 (6.144 Mhz) is half the cristal frequency (12.288 Mhz). PHI is divised by six at U15 to generate the CLK signal for A/D converter U21.

2.14.4. Serial Ports

The microprocesor's internal serial port 0 is used to communicate with the network. Q5 and U6A interface the microprocessor's signals to network signal TRXA and TRXB. Terminating resistor selection jumper J1 (on the TRXA serial line is installed in one module on the network. If two terminating resistors are installed on the same network serial line, the network serial communications will fail. Header P3 can be jumpered to provide RS-232 voltage levels through chip U10 (for some OEM applications only).

The microprocessor's internal serial port 1 is used to communicate with the optional NIBP unit. The The RXA1 (U9-49) and TXA1 (U9-48) lines are routed to P14 for connection to the optional NIBP unit.

2.14.5. I/O Port Decoding

Six I/O strobe signals are decoded by U8. The /OUT1 select line (I/O address 0040h) loads the A/D multiplexer address, water trap LED level, pump on/off signal, and the calibration gas canister reset signal into latch U16. /OUT2 (I/O address 0042h) controls the valves and test LED's through latched driver U11. U8 pins 12 and 11 (I/O address 0046h and 0048h) are used to read the contents of the agent counters U13 and U14. /IN (I/O address 004Eh) enables the eight bit input port U25 to read the 5 test jumpers, the A/D interrupt status, the calibration gas canister state and the IR bench lock signal. /AD (I/O address 0044h) enables reads and writes at the A/D converter U21.

I/O Port Decoding Table

Signal	I/O Address	Data	Description
/OUT1	0040h	D2 - D0	MUX0 - MUX2 select for U200
	output		
		D2 D1 D0	MUX U20 SELECT
	U16	0 0 0	CO_2 (IR bench)
		0 0 1	N_2O (IR bench)
		0 1 0	BTEMP (IR bench)
		0 1 1	PRESS (IR bench)
		1 0 0	TRAP (trap full)
		1 0 1	ATEMP (agents)
		1 1 0	FiO_2 (% O_2 ctk.)
		1 1 1	unused
		D3	1 = TRAPLED on 0 = TRAPLED off
		D4	1 = PUMP off 0 = PUMP on
		D5	0 = BOTRES strobe
		D6	unused
		D7	1 = LED1 off 0 = LED1 on

/OUT2 (controls the valves and tests LED's through latched driver U11.	0042h output U11	D0 - D4 D0 D1 D2 D3 D4 D5 D6 D7	Controls valves 1 - 5 on Valve and Pneumatic Board 1 = valve on 0 = valave off VALVE 1 VALVE 2 VALVE 3 VALVE 4 VALVE 5 1 = LED2 on 0 = LED2 off 1 = LED3 on 0 = LED3 off 1 = LED4 on 0 = LED4 off

Signal	I/O Address	Data	Description
/IN	004Eh input U25	D0 - D4 D0 D1 D2 D3 D4 D5 D6 D7	Read status of test and setup jumper block P8. 1 = jumper off 0 = jumper on TEST1 TEST2 TEST3 TEST4 TEST5 Read /ADINT output (end of conversion) from A/D chip U21 1 = inactive 0 = active (end of conversion) Read NEWBOT status (cal bottle empty) 1 = cal bottle empty 0 = cal bottle not empty Read LOCK signal from IR bench. 1 = LOCK true 0 = LOCK not true
/CTRRD0	0046h input U13	D0 - D7	Read contents of agent counter latch (lower 8 bits of 16 bit counter formed by U13 and U14)
/CTRRD1	0048h input U14	D0 - D7	Read contents of agent counter latch (lower 8 bits of 16 bit counter formed by U13 and U14)
/AD	0044h input/output U21	D0 - D7	Enables reads and writes to/from A/D converter chip U21

2.14.6. IR Bench

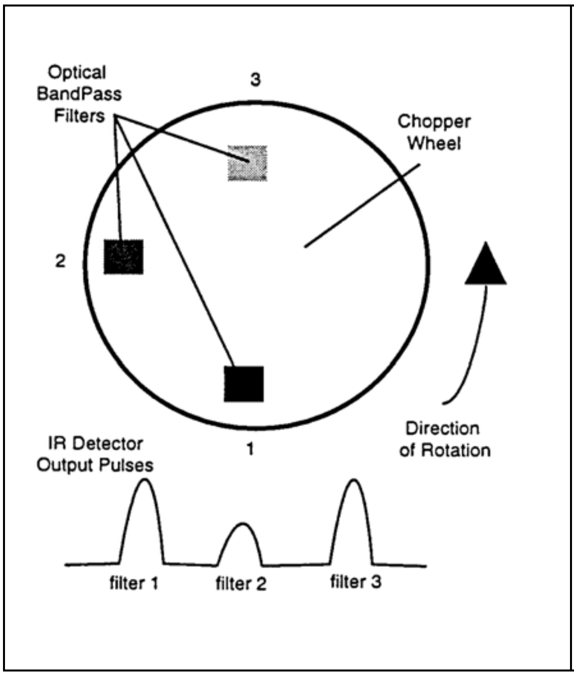
* **IR Bench Theory of Operation**

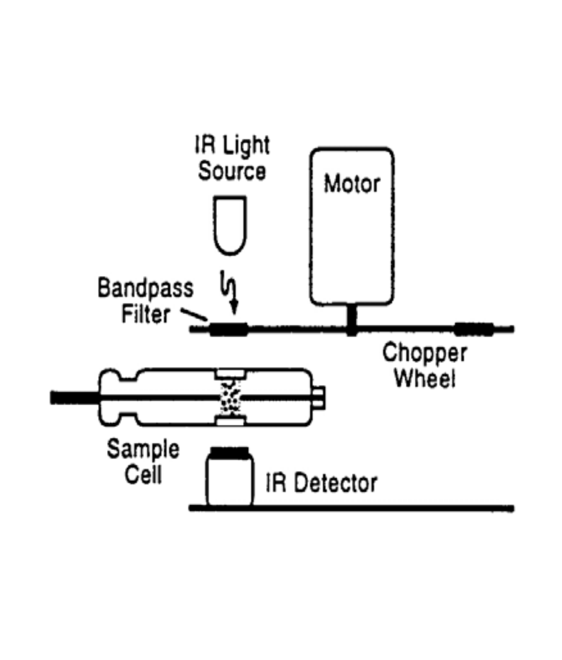
The monitor draws a sample of gas through the water trap and into the sample cell. Three optical bandpass filters (each chosen for a specific wavelenght of light) are mounted on a spinning "chopper" wheel. An infrared (IR) light source is mounted above the chopper wheel ; the sample cell and an IR detector are mounted below the chopper wheel in the IR light source's path.

As a chopper wheel spins, the IR light source is shone through each filter in succession, through the sample cell, and onto the IR detector. The action of spinning the chopper wheel while shining IR light through the bandpass filters creates pulses at the IR detector's output. Each pulse represents a specific wavelength of light ; the amplitude represents the amount of IR light absorbed by the gas in the sample cell at that wavelength of light.

Since CO_2 and N_2O absorb infrared light at specific wavelengths, the amount of light passing through the sample cell varies according to the concentration of CO_2 and N_2O in the sample cell. When there's a high concentration of CO_2 in the sample cell, the detector senses a smaller amount of the CO_2 absorption wavelength light than when there's a low concentration of CO_2. This technique works similarly for N_2O and it's absorption wavelength light.

Based on measured levels of infrared light intensity, the monitor computes the percentage of N_2O and the partial pressure of CO_2.





* **IR Bench Interface Circuitry**

A240 Hz signal is provide by the Gas Board microprocessor's interval timer output at pin 31 of U9. The IR bench uses the 240 Hz signal to synchronize the chopper wheel's phase locked loop timing circuit. An optical sensor measures the chopper wheel's speed ; when the chopper wheel speed is stable and synchronize with the 240 Hz signal, LOCK (output from the IR bench) goes (logic level) high. The Gas Board does not consider any bench output signals valid until the LOCK signal is high.

Four analog signals are output from the IR bench. CO_2, N_2O, pressure, and temperature signals are multiplexed through U20 to the single A/D input at pin 3 of U21. MUX0, MUX1 and MUX2 from latch U16 control the channel selection.

The IR bench generates CO_2 and N_2O strobes for its internal signal sampling circuitry. These signals are routed to the Gas Board and are used to initiate the Gas Board's A/D conversion. Capacitor C36 and R24 differentiate /INT1 to narrow the width of the pulse. Capacitor C37 and resistor R27 perform the same function for /INT2.

There are several adjustement potentiometers on the IR bench's circuit board. All of these are factory set and require no field adjustement.

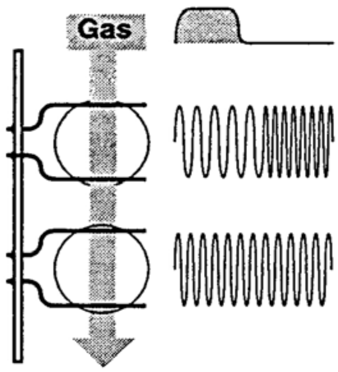
2.14.7. Agent Bench

* **Theory of operation**

Two quartz crystals, one coated with a special material and another uncoated reference crystal, are used to sense concentrations of Halothane, Isoflurane, or enflurane. Each crystal is the frequency determining element of an oscillator circuit.

The specially coated crystal selectively absorbs the anesthesic agent gas. As molecules of the gas add to the mass of the crystal, its frequency of oscillation is reduced.

The second, uncoated crystal does not absorb any of molecules of gas, and its frequency of oscillation remains unchanged. The outputs of the two oscillators are mixed and filtered to produce a signal that is the difference in frequency of the two. The difference frequency is used to calculated the concentration of the selected gas. Since the sensivity of the gas detector is different for each gas, you must select which gas is being administered.



∗ **Agent Preamplifier Board**

The agent bench is held captive between the Agent Preamplifier Board and the IR bench. This arrangement provides the pneumatic seal between the agent bench and the IR bench and provides the agent bench's electrical connection to the Agent Preamplifier Board.

Unless otherwise stated, electrical components in the next two paragraphs are contained on the Agent Preamplifier Board.

The Agent Preamplifier Board has two identical oscillator circuits, one for each of the agent bench's crystals. The output of each oscillator circuit is mixed at D1-anode. U1A and its associated discrete components form a low-pass filter to detect and pass the oscillator's difference frequency. The difference frequency (3 Khz to 8 Khz) is amplified and filtered by U1-B and its associated discrete components to produce the signal FREQ. FREQ is routed to Gas Board connector P6-3 through a ribbon cable.

The agent bench also has a thermistor mounted between the two agent detection crystals. The thermistor allows the Ga Board to compensate for temperature changes, providing accurate agent gas measerement accross a wider range of operating temperatures. The thermistor is connected from Agent Preamplifier Board P1 to Gas Board P6 through a ribbon cable.

2.14.8. Agent Detection Circuit

FREQ from Agent Preamplifier Board P1 is connected to Gas Board P6 through a ribbon cable. FREQ is fed through Q8 on the Gas Board to a phase locked loop circuit formed by U19 and U12. The output (DELTA F) of this circuit is 32 times the original frequency. This higher frequency maximizes the microprocessor's measurement resolution. DELTA F is counted by the sixteen bit counter latch configuration of U13 and U14. This counter is read by the microprocessor every 16 milliseconds to determine a relative agent concentration.

The Agent Preamplifier Board's thermistor is connected to Gas Module P6 through a ribbon cable. The thermistor along with R35, R36, and VR1 form a bridge circuit. The output of the bridge is amplified by U23A, U23B, U24A and their associated circuitry. VR1 adjusts the bridge's offset and VR2 adjusts the temperature circuit's gain. VR1 and VR2 are factory set and require no field adjustement.

2.14.9. Cal Gas Canister Empty Circuit

Gates U5A and U5B are configurated to detect an empty cal gas canister. The pressure switch on the Valve and Pneumatic Board is open when its input pressure is below 11 pounds per square inch (PSI), and closed when its pressure is above 11 PSI. One contact of the pressure switch is wired to +12V BATT ; the other contact is wired to gate U5A.

The following sequence determines if the cal gas canister is empty :

- The microprocessor strobes BOTRES low. This sets input U5-6 high.
- If the cal gas canister is empty, output U5-3 is high. This sets input U5-5 high. Since inputs U5-5 and U5-6 are both high, output U5-4 is low. This turns off Q10 ; NEWBOT at Q10-drain is pulled high to +5 VDC through R68.
- If the cal gas canister is full, U5-3 and U5-5 are low. When BOTRES is strobed low, U5-6 goes high, sending U5-4 low. This turns on Q10, sending NEWBOT low at Q10-drain.

2.14.10. Pump Speed Control Circuit

The pump's speed is controlled byoperationnal amplifier U18 and its associated discrete circuitry. Pump speed is controlled by the higher of the two reference voltages : "speed" voltage (set by VR4) which is a constant, and "load" voltage (set by VR3) which is a voltage proportional to the AC component of the motor current. During normal operation, the "load" voltage is less than the "speed" voltage, and the pump runs at a somewhat constant speed. When an occlusion occurs in the patient sample line, the load on the vacuum pump increases and, correspondingly, the AC component of the motor current increases. This causes the "load" voltage to increase. At any given load, the AC component of the motor current decreases with increasing motor voltage (motor speed). Thus, when the load is greater than normal, the "load" voltage provides a negative feedback control of motor voltage and speed. VR3 and VR4 are factory set and do not require field adjustement.

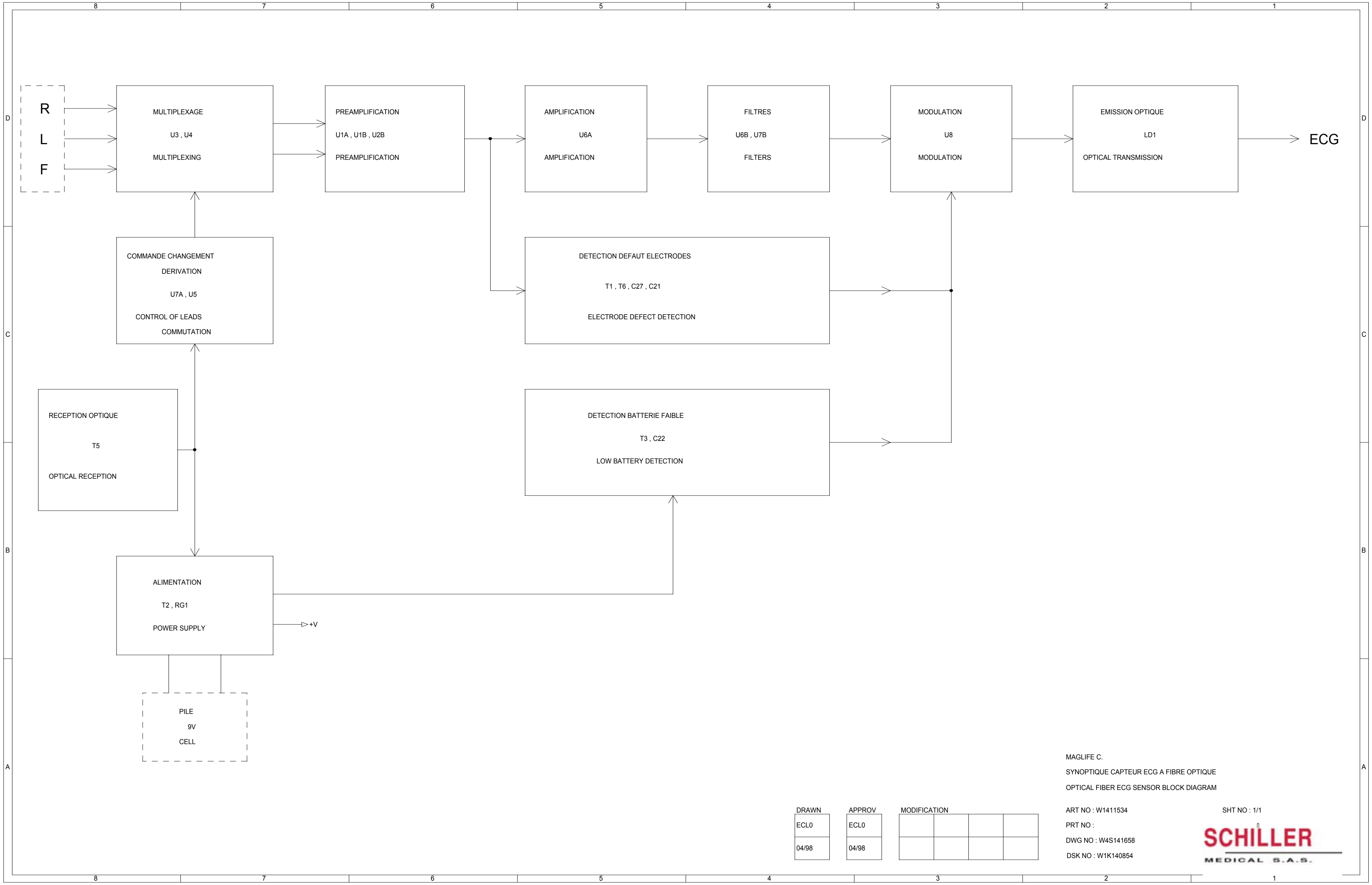
2.14.11. Valve and Pneumatic Board

The valve and Pneumatic Board is connected to the Gas Board through a ribbon cable. The Valve and Pneumatic Board performs these tasks :

- Connects the Gas Board's Pump Speed Control to the gas sampling pump ;
- Monitors the cal gas canister's pressure regulator output ;
- Routes the gas sample from the front panel water trap to the IR bench;
- Controls the gas sample flow for normal gas sampling, occlusion, and calibration cycles.

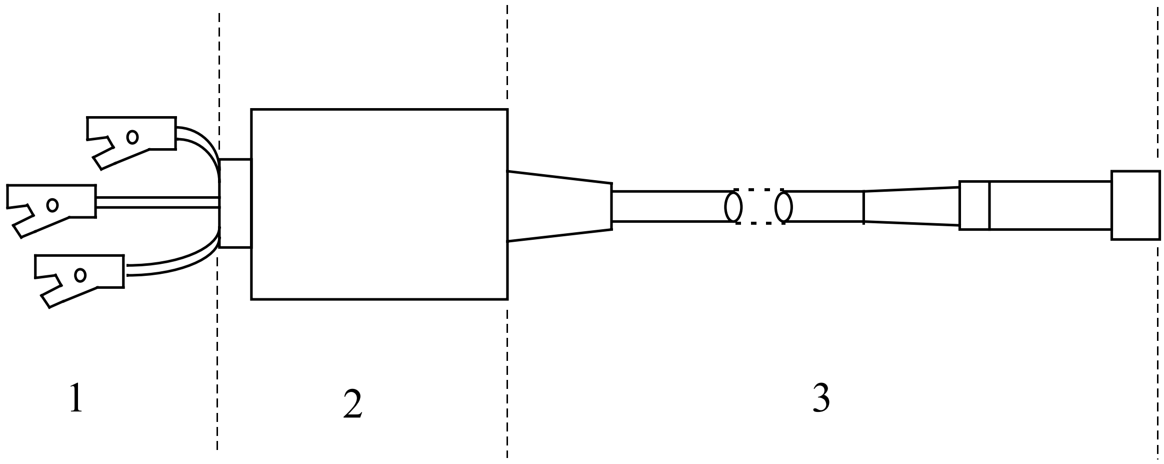
The valves are turned off and on as required by the Gas Board. Output latch U11 bits 0 through 4 control valves VALVE1 through VALVE5.

2. EXPLANATION OF OPERATION



2.15. Optical fiber ECG sensor

2.15.1. Description of the ECG sensor



The optical fiber ECG sensor is made up of the three following parts:

1. set of electrode clips,

2. sensor casing including:

   - plastic casing (outer housing),
   - sensor placed in a copper box (shielding),
   - circuitry for protection from defibrillation shocks and connector for the electrode clips

3. optical extension cord including:

   - optical cable (4.5 metres long),
   - optical connector for connecting to MAGLIFE C PLUS.

2.15.2. Explanation of the ECG sensor

The clips carry the electrical signals from the patient to the electronic board of the sensor.
The lengths of the conductors are suitable for putting the sensor assembly in place on the patient.

The protection circuitry is contained in a square assembly of two small boards. It includes the electrode connector, high-tension resistors and short wire connections soldered to the bushing filters of the shielded box.
The voltage clippers which stop any high tension from the defibrillation shocks are placed just after the bushing filters.
The shielded box contains the electronic circuits and their power supply battery. The acquisition circuitry is located on board W4P141572B.

2.15.3. Explanation of the Optical Fiber ECG Sensor Board

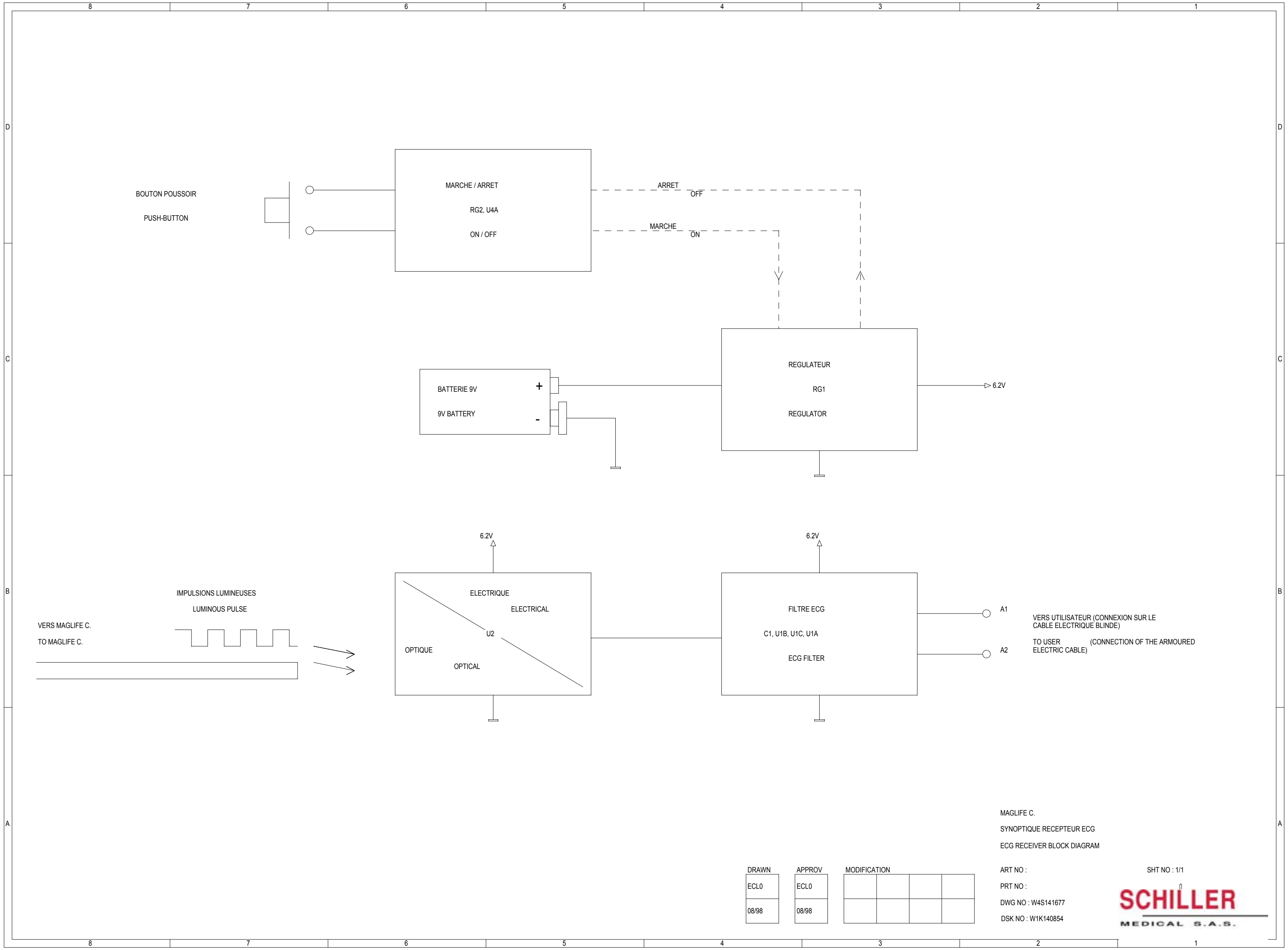
The main function of the ECG sensor is to pick up and amplify the potential difference found at the patient's heart with the help of electrodes.
The assembly around U1A (C5), U1B (D5), and U2B (D4) is the stage where the differential is pre-amplified, and is followed by an amplification system built around U6A (D3) and the filters built around U6B (D2) et U7B (D1).

The resulting ECG signal is then modulated in pulses by U8 (C1) which controls the current of optical transmitter LD1 (C1). The frequency and duration of the pulses depend upon the operation of capacitors C21 (C2), C22 (C3) and C27 (C3).

The circuitry is powered by a 9V non-magnetic cell connected between SP4 (+) (B8) and SP5 (-) (A7). When luminous transmission is received by photodetector T5 (A8), T2 (B7) starts conducting and powers regulator RG1 (A3) which produces a +V service voltage.
U2A (B5) generates a virtual ground for the ECG differential pre-amplifier by amplifying the reference voltage from U5 (B6) by 3.2.

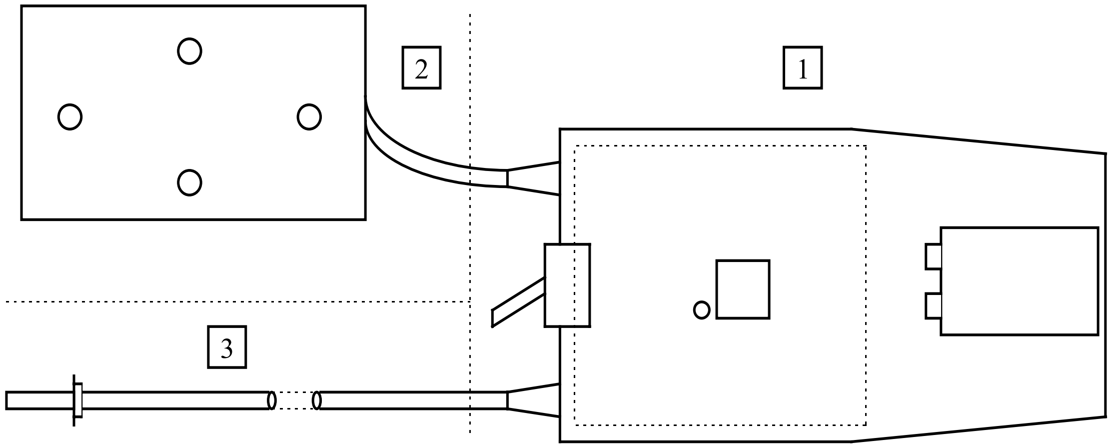
The lead is changed by modulating the luminous pulses arriving at T5 (A8) by making T4 (B8) conduct briefly. When this happens, C19 (B8) is charged and U7A (B7) produces voltage proportional to the number of pulses found at T5. Double comparator U5 (B6) is connected to voltage divider R16, R17, R18 (B6) and controls multiplexers U3 (D7) and U4 (C7) which switch the 2 pre-amplified signals and force the third electrode to the virtual ground.
If the electrode is poorly connected or disconnected, the voltage at the output of the differential stage (output 7 of U2B (D4)) is close to -P because of the high-impedance polarisation of the electrodes by the chain of resistors from R4 to R8 (D6). As a result, T1 (B4) stops conducting and T6 (C3) starts conducting. C27 (C3) is now in parallel with C21 (C2), leading to a change in the frequency of the pulses transmitted by U8 (C1). This drop in frequency is interpreted by the demodulator as an electrode error.

When the cell voltage is less than 7.9V, RG1 (A3) blocks T3 (B3). C22 (C3) is then switched off, leading to an increase in the normal frequency of the pulses produced by U8 (C1). The demodulator interprets the variation in the basic frequency to mean that the sensor cell is low.


BOUTON POUSSOIR
PUSH-BUTTON
MARCHE / ARRET
RG2, U4A
ON / OFF
ARRET
OFF
MARCHE
ON
BATTERIE 9V
9V BATTERY
+
-
REGULATEUR
RG1
REGULATOR
6.2V
6.2V
6.2V
IMPULSIONS LUMINEUSES
LUMINOUS PULSE
VERS MAGLIFE C.
TO MAGLIFE C.
ELECTRIQUE
ELECTRICAL
U2
OPTIQUE
OPTICAL
FILTRE ECG
C1, U1B, U1C, U1A
ECG FILTER
A1
A2
VERS UTILISATEUR (CONNEXION SUR LE CABLE ELECTRIQUE BLINDE)
TO USER (CONNECTION OF THE ARMOURED ELECTRIC CABLE)
MAGLIFE C.
SYNOPTIQUE RECEPTEUR ECG
ECG RECEIVER BLOCK DIAGRAM
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
08/98
08/98
ART NO :
PRT NO :
DWG NO : W4S141677
DSK NO : W1K140854
SHT NO : 1/1
SCHILLER
MEDICAL S.A.S.

2.16. ECG gating module

2.16.1. Description of the ECG Gating Module



The ECG gating module is made up of the three following parts:

1 a demodulator unit including:

- plastic casing (outer casing),
- 9V cell,
- ECG receiving circuit,
- reversing switch,
- push-button with LED.

2 an output unit including:

- plastic casing (outer casing) with 4 marks (red, yellow, green and black) and 2 resistors for a universal ECG gating module (or Amphenol connector for ECG GE gating module (W1411767)),
- electrical cable for connection with part 1.

3 an optical extension system including:

- optical cable (length = 5 m),
- optical connectors for connecting with the ECG gating module and MAGLIFE C PLUS.

2.16.2. Explanation of the ECG Gating Module and of the "ECG receiver" board

The ECG signal from MAGLIFE C PLUS arrives modulated, in the optical form.

U2 converts the optical pulses into electrical pulses and drives a bandpass filter made with C1 around U1B, U1C and U1A.

The signal at the output of U1A has gain of about 80 in relation to the signal taken from the patient.

Adjustment with P1 is used to restore the patient ECG to unit gain. The signal is supplied to the user by the electrical cable connected to A1 and A2.

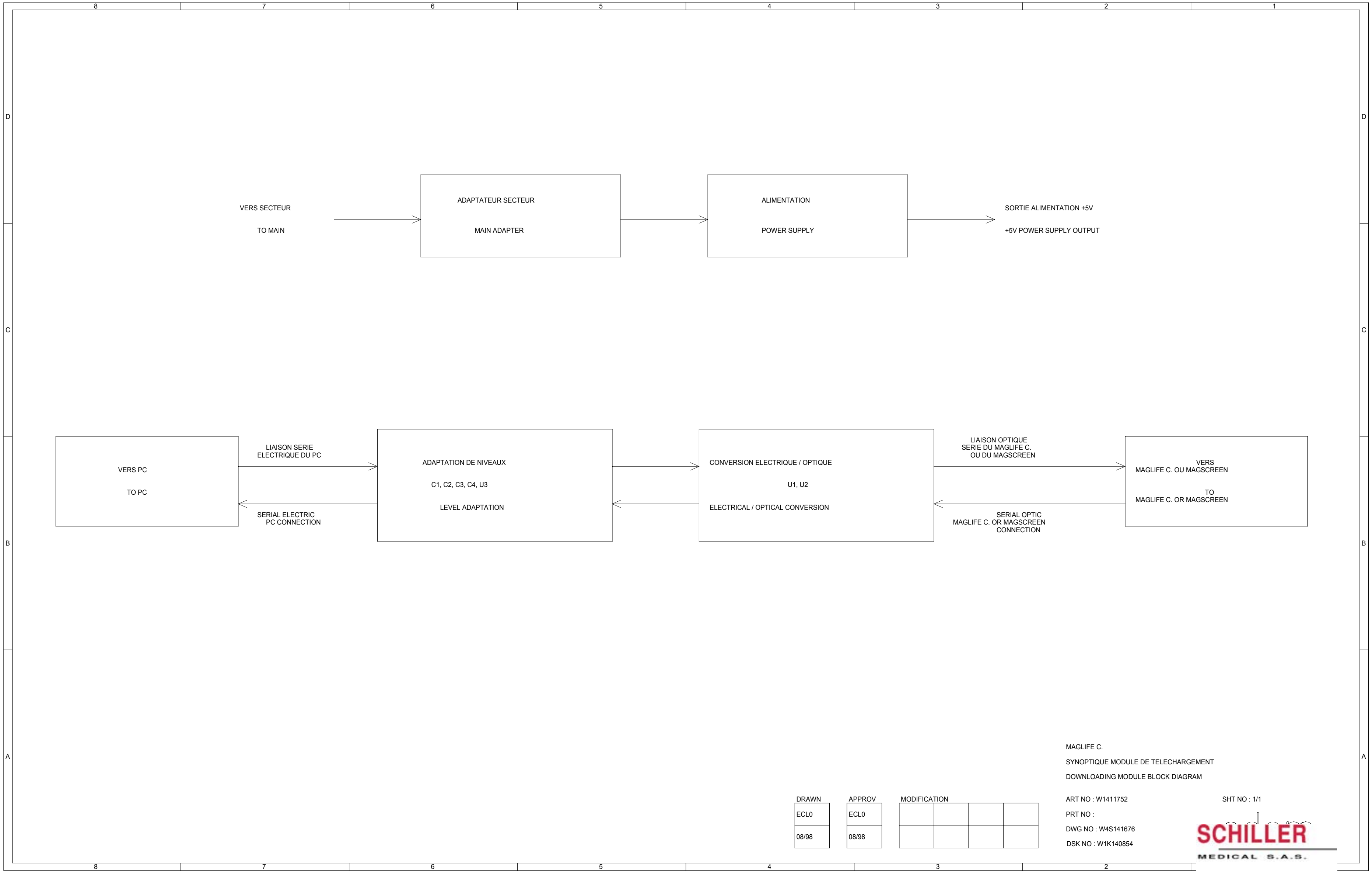
The On/Off system is made up of U3A, U3B, U4A.

U4A validates the operation of regulator RG1 which produces the power supply voltage for the ECG filter (6.2V ±0.2V).

The unit is turned on by pressing the push-button. The green LED goes on.

The unit is turned off either by pressing the button once again, or when RG2 senses that the cell is discharged and controls the resetting of U4A.

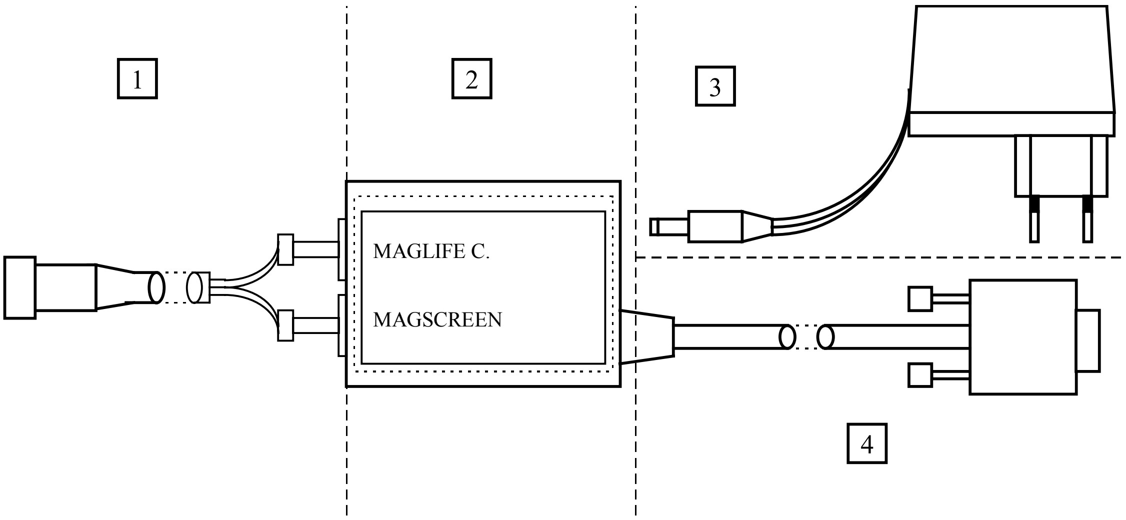
In service, the normal operating life of a 9V lithium cell is greater than 400 hours.



VERS SECTEUR
TO MAIN
ADAPTATEUR SECTEUR
MAIN ADAPTER
ALIMENTATION
POWER SUPPLY
SORTIE ALIMENTATION +5V
+5V POWER SUPPLY OUTPUT
VERS PC
TO PC
LIAISON SERIE ELECTRIQUE DU PC
SERIAL ELECTRIC PC CONNECTION
ADAPTATION DE NIVEAUX
C1, C2, C3, C4, U3
LEVEL ADAPTATION
CONVERSION ELECTRIQUE / OPTIQUE
U1, U2
ELECTRICAL / OPTICAL CONVERSION
LIAISON OPTIQUE SERIE DU MAGLIFE C. OU DU MAGSCREEN
SERIAL OPTIC MAGLIFE C. OR MAGSCREEN CONNECTION
VERS MAGLIFE C. OU MAGSCREEN
TO MAGLIFE C. OR MAGSCREEN
MAGLIFE C.
SYNOPTIQUE MODULE DE TELECHARGEMENT
DOWNLOADING MODULE BLOCK DIAGRAM
DRAWN
ECL0
08/98
APPROV
ECL0
08/98
MODIFICATION
ART NO : W1411752
SHT NO : 1/1
PRT NO :
DWG NO : W4S141676
DSK NO : W1K140854
SCHILLER
MEDICAL S.A.S.

2.17. Module de téléchargement

2.17.1. Description of the Downloading Module



The file transfer module is made up of the four following parts:

1 an optical extension system including:

- optical cable (72719)(length = 3 m)
- LEMO optical connector (72835)
- optical fibre connectors (39569)

2 a file transfer unit including:

- plastic casing (W1404608)(outer casing),
- PCB of the transfer module (W1411752),
- jack base (56593) for connecting to the power supply.
- label permetting the visualisation of the MAGSCREEN or MAGLIFE C PLUS. output.

3 a +5V / 0.8A power supply (72863)

4 an electrical extension system including:

- Magfile connecting cable (W1403226),
- 9-pin socket (8346),
- cover (56127).

2.17.2. Explanation of the Downloading Module

The transfer module is used to download software upgrades for the MALIFE C or the MAGSCREEN from a PC.

The transfer module PCB converts the conventional serial link received from the PC via the electrical extension system into luminous signals transmitted via the optical fibre to the MAGLIFE C PLUS. or the MAGSCREEN.

For such conversion, the transfer module is powered by an external power supply.

2.17.3. Explanation of the « Downloading Module » board

The function of the transfer module board is therefore that of performing electrical-to-optical conversion in order to transmit orders from the PC to the MR monitor or the Remote display controller.

In order to enable the transmission, the transfer module board must include the following:

- 1 electrical to optical converting system:
  - LED U1 transmits serial data to an optical fibre,
  - photodiode U2 receives serial data from an optical fibre.
- 1 level adaptation system including capacitors C1, C2, C3, C4 and converter U3. This MAX 232 converter is a +5V → +12V/-12V converter which is used to drive the series input of the PC.
- 1 power supply. The currently used power supply is a mains adapter which directly supplies +5V. Incorporated resistor R4 therefore conducts all of the power supply voltage. R4 may also be replaced by regulator RG1 when the adapter supplies voltage greater than +5V.

2.18. Technical characteristics

PHYSICAL ENVIRONMENT REQUIREMENTS

Dimensions	· width: 430 mm · height: 350 mm · depth: 400 mm
Weight	approx. 31 kg
Protection degree	IP20
Extreme operating temperature	10 to + 30 °C (use in air-conditioned room adjusted to + 20 °C ± 5 °C)
Extreme storage temperature	- 10 to + 50 °C

POWER SUPPLY

Mains power supply

Unit class	I
Nominal voltage	230 / 115 VAC - 50 / 60 Hz
Power absorbed from mains	approx. 120 VA
Maximum current protection	· fuses 315 mAT / 250 V (230 V) · fuses 630 mAT / 250 V (115 V)

Battery power supply

Battery	Lead - sealed - 4 X 6 V, 4 Ah
Battery life	1 hour
Recharging	automatic when the unit is connected to the mains
Charge indication	via lamp
Low battery indication	message displayed on the screen
Charging time	8 hours

2. EXPLANATION OF OPERATION

LCD SCREENS

Screen	▪ type: VGA, TFT technology ▪ dimensions: 10.4" ▪ 256 colours ▪ 640 X 480 points
Scrolling speed	25 mm/s
Scrolling direction	left to right
Trace freeze	via key
Back lighting	cold cathode fluorescent lamp

ALARMS

Physiological alarms and technical alarms	▪ visual and sound ▪ can be disabled for 2 minutes or continuously, with a reminder every 2 minutes
Preference	· physiological alarm when the alarms appear on different modules · technical alarm if the alarms appear on the same module
Audible alarm frequency	870 Hz
Time to alarm	4 s (8 s at starting)

ECG SIGNAL

Input	▪ acquisition by fiber optic ECG sensor ▪ leads I, II, III ▪ protected from defibrillation ▪ rejection rate in common mode > 80 dB ▪ electrode disconnection recognition ▪ leakage current < 10 μA
Pass band	1 Hz to 20 Hz (-3 dB) with no filter
Heart rate range	30 - 300 beats/min
Heart rate accuracy	5 b/min for T-wave amplitude < 0,8 R-wave (measured according to AAMI EC13)
Heart rate averaging and updating	2 s + the delay for the occurs of the next QRS pulse
Heart rate meter response to irregular rythm	Result with measure conform to AAMI EC13 :

	Test waveforms			
	a	b	c	d
HR (bpm)	90	90	119	90

Response time	2,5 s for 40 to 80 bpm in a upward ant downward phase (measured according to AAMI EC13)
Time base	25 mm/s
Sensitivity range	0.5 to 4 cm/mV
Calibration	1 mV step on screen and printer
Sensitivity	0.25 - 0.5 - 1 - 2 cm/mV
QRS Indicator	sound and visual

PULSE

Input	fiber optic SpO2 sensor
Measurement method	spectrophotometry
Sensitivity	automatic gain
Duration for calculating the average	8 s or 16 s
Reading range	30 - 250 p/min
Accuracy	5 p/min

SPO2

Input	fiber optic SpO2 sensor
Measurement method	spectrophotometry
Sensitivity	automatic gain
Duration for calculating the average	8 s or 16 beats
Reading range	0 - 99 %
Accuracy	- ± 2 % from 70 to 99 % - ± 3 % from 50 to 69 %

2. EXPLANATION OF OPERATION

CO2/N2O

Input — aspiration tube

Measurement method — spectrophotometry

Sensitivity — 3 gain values: 50, 75, 100

Reading range — EtCO2: 0 - 100 mmHg (0 - 13.3 kPa)
MinCO2: 0 - 100 mmHg (0 - 13,3 kPa)
N2O: 0 - 100 %
respiratory rate: 1 - 199 resp/min

Accuracy — EtCO2: ± 2 mmHg (0.266 kPa)
MinCO2: ± 2 mmHg (0.266 kPa)
N2O: ± 3 %
respiratory rate: ± 1 resp/min

ANAESTHETIC AGENTS

Measurement method — by variation in the resonance frequency of a piezo-electric crystal

Gas selection — Isoflurane
Halothane
Enflurane
Sevoflurane
Desflurane

Reading range — 0 - 9.9 %

Accuracy — 10 % of reading or 0.2 %

Resolution — 0.01 %

FIO2

Measurement method : by measuring cell

Display range : 0 - 100 %

Resolution : 1 %

Protection : against defibrillation shocks and insulation, through measuring cell.

2. EXPLANATION OF OPERATION

NON INVASIVE BLOOD PRESSURE

Measurement method	oscillometry
Blood pressure display range	adult/infant: 10 - 300 mmHg neonatal: 5 - 150 mmHg
Pressure transducer	semiconductor pressure transducer
Pressure indication resolution	1 mmHg
Inflation speed	4.0 to7.5 seconds
Pressure leakage	Maximum leak rate : 5mmHg/3minutes
Measurement accuracy	± 3 mmHg or ± 2 %
Measurement range	<u>Adult/Infant</u>: systolic: 60 - 250 mmHg diastolic: 40 - 220 mmHg mean: 45 - 235 mmHg <u>Neonatal</u>: systolic: 40 - 130 mmHg diastolic: 20 - 90 mmHg mean: 35 - 105 mmHg In adult mode, « Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method within limits prescribed by the American National Standard, *Electronic or automated sphygmomanometers*. » In neonatal mode, « Blood pressure measurements determined with this device are equivalent to those obtained by an intraarterial blood pressure measurement device, within the limits prescribed by the American National Standard, *Electronic or automated sphygmomanometers*. » On request, data are available at SCHILLER MEDICAL SA Company.
Correspondence to IEC 601-2-30	Conform except if following conditions occur simultaneously : - pressure probe faulty, - neonatal mode, - cuff tightened on rigid element. In this case, a pressure of 180 mmHg (limit of norm is 165 mmHg) can be obtained.

2. EXPLANATION OF OPERATION

INVASIVE BLOOD PRESSURE

Reading range	0 - 300 mmHg
Zero calibration	automatic
Accuracy	2 mmHg
Sensitivity range	30 - 300 mmHg
Resolution	1 mmHg
Setting positions	30 - 60 - 150 - 300 mmHg
Pass band (+ 1 dB ; - 1.5 dB)	0 - 10 Hz with no filter

RECORDER

Type	Thermal printer with high resolution thermal printhead
Paper	Roll, width 50mm, length 45 m
Paper speed	25 mm/s - 12.5 mm/s (for CO2 waveform)
Résolution	Vertical : 8 Dots/mm Horizontal : 32 Dots/mm
Printing speed	Vertical : 150 characters/s Horizontal : 132 characters/s
Start	Manual : single record (press the printing key) or continuous record (press during 2 seconds the printing key) Automatic : recording on alarm (recording each time an alarm appears)

CHAPITRE 3

REPAIR SPECIFICATIONS

3. REPAIR SPECIFICATIONS

3.1. Installation instructions

3.1.1. General technical informations

a) MAGLIFE C PLUS.

MR monitor to be operated inside the MRI examination room (Faraday cage), in proximity of the magnet and the patient bed, but outside a given forbidden area of too high stray field.

INSTALLATIONS REQUIREMENTS

- The MRI system must be in normal operation as specified by the manufacturer and producing the specified image quality.
- At least one mains power socket is needed at proximity of the MAGLIFE C PLUS., according to the standard length of the power cord : 2,5 m (European Standard) or 2 m (US Standard).

☞ **Note**: It is not allowed to use an extension plug in case of too great distance. A special power cord of adequate length must be used. Depending on this length, a RF shielded cord might be necessary.

- The power mains socket must be filtered according to the requirements of the MRI manufacturer.
- Mains :
  Voltage : 115 V (± 10 %) or 230 V (± 10 %)
  Line frequency : 50 Hz or 60 Hz
  Power : 120 VA maximum
- Room temperature : 20°C +/- 5°C / air conditionned.

b) MAGSCREEN

Remote optional control and monitor unit operated inside the MRI control room in proximity of the MRI console.

INSTALLATIONS REQUIREMENTS

- MAGSCREEN is linked to the MAGLIFE C PLUS. by means of a bi-directional fiber-optic cable.
  This FO cable needs a passage through the Faraday cage called « wave guide » which is normally available at the filter plate of the MRI system or in the neighbourhood of the RF window.
  If not available, such a « wave guide » must be installed by the Faraday cage manufacturer in accordance with the MRI manufacturer.

Internal free access : 17 mm minimum if straight « wave guide » and 55 mm if bended by 90 °.
(FO connector has an outside diameter of maximum 16 mm).

Standard length of the FO link : 25 m

- MAGSCREEN has an external power supply to be plugged in a standard mains socket.

- Mains :
  Voltage : 115 V (± 10 %) or 230 V (± 10 %)
  Line frequency : 50 Hz or 60 Hz
  Power : 60 VA maximum

Warning: **MAGSCREEN** **<u>is not MR compatible (can be attracted by the MRI magnet stray field and produce artifacts on the MR images).</u>**

so :

MAGSCREEN IS NOT TO BE INTRODUCED IN THE MAGNET ROOM !

c) MAGFILE C.

Application software under WINDOWS 95 for saving on hard disk all monitored parameters during MRI examination and printout of full anaesthesic report.
MAGFILE C. uses a special optical link from MAGSCREEN to PC or MAGLIFE C PLUS. (through wave guide) if MAGSCREEN not installed.

INSTALLATIONS REQUIREMENTS

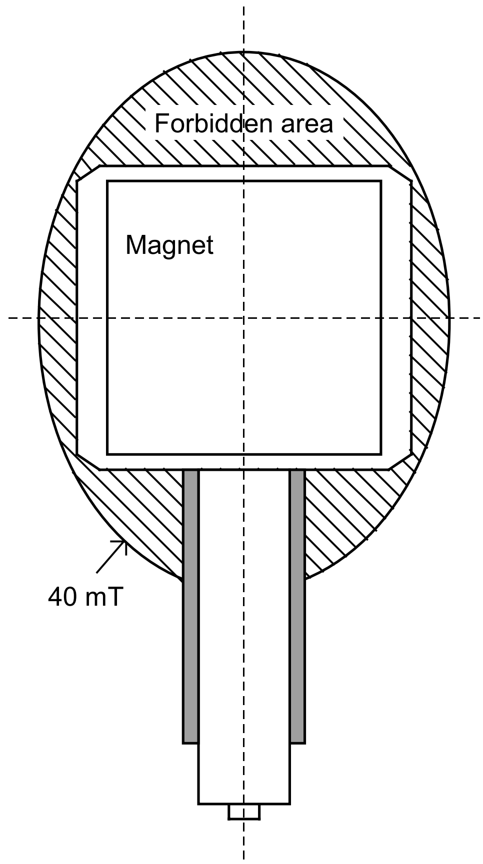
Standard mains socket for the PC, printer, etc...

3.1.2. Safety instructions

- MAGLIFE C PLUS. shall not be operated in the area around the magnet where the stray (fringe) field is equal or higher than 40 mT (400 G).

⇒ MAGLIFE C PLUS. will switch off by itself if field greater than approximately 40 mT.

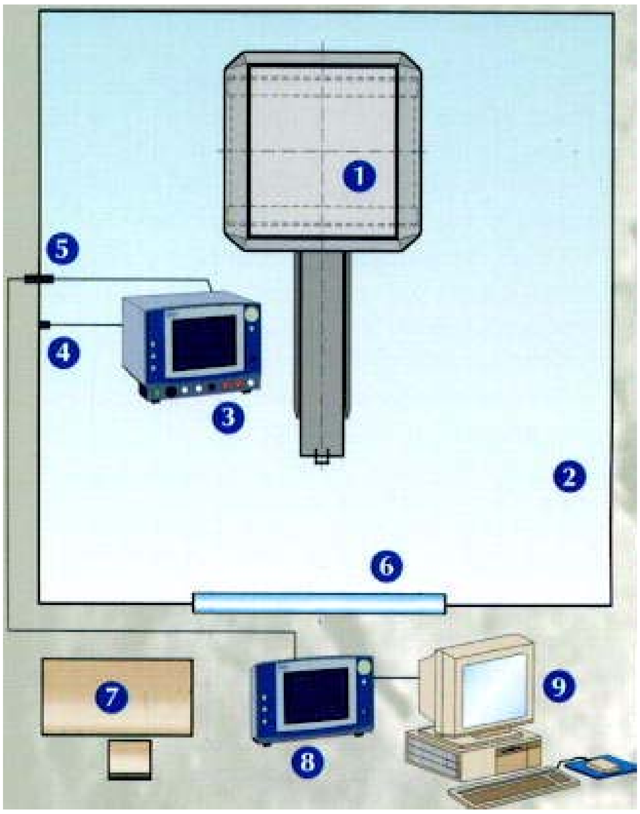
- The location of the 40 mT line must be given by the MRI manufacturer. The line has to marked on the floor by coloured stripe (red tape for example) in order to indicate the forbidden area.



- In case of operation of the MAGLIFE C PLUS. very near to the 40 mT line, it is necessary to block the wheels of the trolley in order to avoid possible slow movement toward the magnet due to attraction force applied mainly on the transformer.

3.1.3. Typical MAGLIFE C PLUS. installation in a MRI site

(see following plan).



1) Magnet
2) Faraday cage
3) MAGLIFE C PLUS.
4) Mains socket
5) RF waves guide for optical connection
6) Observation window
7) MRI operating console
8) MAGSCREEN
9) MAGFILE optional PC

3.2. Disassembly instructions

This section provides the procedure for dismantling the unit to access the various parts.

Check the following points before you dismantle the unit:

- **MAGLIFE C PLUS.** must be off, and the mains cable must be disconnected,
- all the cables on the front must be disconnected,
- dismantle the unit on an antistatic mat.

Note: the figures in brackets refer to the exploded view of the unit.

Warning:	For any intervention, leave the MAGLIFE C PLUS from the IRM room. The ferrous tools can become projectiles under the effect of the magnet.

3.2.1. Removing the top cover (76 or 77)

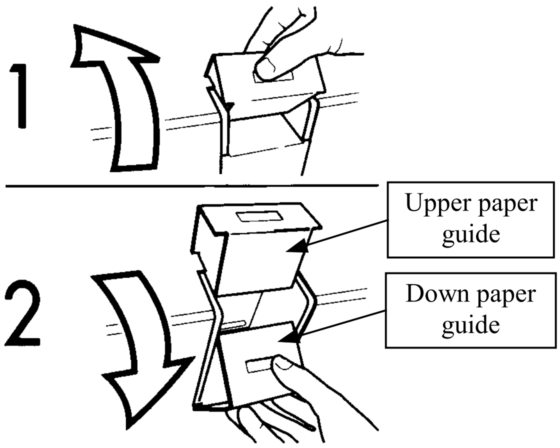
Unscrew the 22 screws around the edges of the top cover.
Also unscrew the 2 screws on the upper left-hand side.

Lift the top cover (76 or 77) with both hands.

Warning:	**Disconnect the battery power supply cable connector (93) on the Power Supply board (54) to make sure that the unit will not be supplied with power.**

Note:	For units with **recorder option**, remove also recorder cables (78 and 79) on the parallel recorder adapter board.

To remove the recorder module, open at first the upper paper guide at the high and the down paper guide at the bottom.



Press the release lever of the paper compartment door and open out the door.
Unscrew the 2 screws in the back of the recorder module (if necessary remove the paper) and remove the module out of it cage.

To remove the parallel recorder adapter board (86), remove any connectors which are still connected to boards on the plate, unscrew the 4 screws at the corner of the PCB and remove the board.

3.2.2. Removing the bottom cover (89)

☞

Note:	The bottom cover of **MR Monitor** is the non shielded part which is located underneath the unit.

Turn the **MR Monitor** unit over completely, so that the bottom cover (89) is located on top, and the screen is directed toward you.

Unscrew the 2 side screws and the 3 screws on the back of the bottom casing. Turn the casing backward.

This will make the following parts accessible:
- the Invasive Pressure 1/2/3/4 Acquisition board,
- the casing with the battery of that board,
- plugs on front panel.

a) Invasive Pressure Battery casing (94)

To remove the battery casing, unscrew the 4 nuts with which it is fastened to the bottom casing. Lift the small casing and the battery is accessible.

b) Invasive Pressure 1/2/3/4 Acquisition board (21)

To remove the board, disconnect the connectors from the circuit. Unscrew the 2 Philips head screws and the two plastic screws located at the corners of the circuit to remove the circuit.

c) Plugs on front panel

- ECG plug (13)

  Cut short the 2 optical fibers. Unscrew the 4 screws from the brace and remove this one. Unscrew the plug nut and take back the plug to the front.

- SpO2 plug (14)

  Unscrew the 4 screws on the rear of the plug. Then, to remove the optical cables, unscrew the screw placed between the 4 cables on the device bottom. Remove the printed circuit « SpO2 interface » (see § 4.2.9., attention, the top cover must be removed). Turn slightly the circuit to access at the 4 screws placed on the side of the circuit. Screw them off and remove the 4 optical cables.

- CO2 plug (91)

  Remove the cable from the plug and unscrew the nut of the CO2 plug.

- NIBP plug (27)

  Cut the cable clamp and remove the cable. Unscrew the nut of NIBP plug.

- IBP1 (26), IBP2 (25) and FiO2 plug (92)

  For IBP1, IBP2 plugs, remove the corresponding connector of « IBP1/IBP2 acquisition » board ; for FiO2 plug, cut short wires, if necessary.
  To take down one of these 3 plugs, unscrew the 4 screws placed on the rear of the plug.

3.2.3. Removing the battery (31)

Unscrew nut on the bottom of the unit.

Remove the connection from the Power Supply board if this has not been done already.

Remove the battery clamp **(38)** (unscrew the 2 screws on the rear panel).

Slide the battery horizontally towards the right (it is retained on the left-hand side by a bracket) and pull it out.

3.2.4. Removing the Capno board support plate (34)

Disconnect all the connectors from the Capno board (33).

☞ **Note**: The lower casing must be removed to remove the plate.
The unit must be positioned as stated in section 3.2.

Lift the right-hand leg (if any) and unscrew the two screws, while holding the plate, which will be released.

Then unscrew the 4 nuts located at the corners of the circuit to remove the board.

3.2.5. Removing the Capno Analyser module (35 or 36)

☞

Note:	The heat sink and the battery must be removed to remove this module.

To remove the heat sink, unscrew the 6 screws on the rear of the sink.

To remove the battery, refer to § 4.3.

When you have removed these two components, unscrew the two screws which hold the Capno analyser module.

To remove the associated PCB, remove the 3 screws with which it is fastened.

3.2.6. Removing the Power Supply board (54)

Disconnect all the board connectors.

☞

Note:	The heat sink and the battery must be removed to remove this module.

To remove the heat sink, unscrew the 6 screws on the rear of the heat sink.

To remove the battery, refer to § 4.3.

From the rear of the unit, remove the 9 screws that fasten the board support to the rear panel. In this way, the board can be removed with its support.

3.2.7. Removing the front plate (9)

Remove the NIBP connection, the optical fibers and all the connectors of front plate PCBs which are connected to other components.

Unscrew the 3 screws on the plate and the screw on the CPU heat sink unit.

Then remove the plate and place it flat. Now, you can remove the following parts:

- speaker,
- Sensor Processing board,
- Memory Extension board,
- PC Interface board,
- CPU/VGA 486/586LCD board,
- CPU SpO2 board
- NIBP module.

a) Speaker (62)

Remove the 4 nuts with which it is fastened.

b) Memory extension board (66)

Remove any connectors which are still connected to other boards on the plate.

Unscrew the 4 screws at the corners of the PCB and remove the board (the board is also held in place by connectors J1 and J2).

c) Probes treatment board (60)

Remove any connectors which are still connected to other boards on the plate.

Unscrew the 4 screws at the corners of the PCB and remove the board.

d) PC Interface board (64)

Remove any connectors which are still connected to other boards on the plate.

Unscrew the 4 braces and remove the board (the board is also held in place by connectors J1 and J2).

e) CPU/VGA - 486/586LCD board (73)

Remove any connectors which are still connected to boards on the plate.

Unscrew the 4 braces and remove the board.

f) CPU SpO2 board (61)

Remove any connectors which are still connected to boards on the plate.

Unscrew the 4 screws at the corners of the PCB and remove the board.

g) NIBP module (57)

Unscrew the 3 screws located on the side on the NIBP Module.

h) Rotary button (12)

Remove the connector on the rear of the button and unscrew the rear black part of the switch.

3.2.8. Removing the internal screen cover

Remove the 6 screws from the side and remove the internal cover.

Now you can remove the right and left-hand keypad boards and the screen.

a) Right-hand keypad board (6)

Unscrew the 4 screws on the board.

b) Left-hand keypad board (10)

Unscrew the 8 screws on the board.

c) Screen (3)

Unscrew the 4 screws on the side of the screen.

3.2.9. Removing the SpO2 Interface board (69)

Disconnect all the connectors from the board.

Unscrew the 2 screws on the board.

3.3. Replacing the cables

If any external cable (ECG, SPO2, CO2, NIBP, IBP1, IBP2, FIO2) fails to operate correctly, replace the entire cable. Use SCHILLER MEDICAL cables. Their item codes are as given below:

* W1404328 : ECG sensor
* W1404134 : Adult SpO2 sensor
* W1403955 : Child SpO2 sensor
* W1404413 : Neonate NIBP extension cord, 3.5 m
* W1404414 : Adult NIBP extension cord, 3.5 m
* W1402330 : Child patient line
* W1402331 : Adult patient line
* W1402329 : 2.5 m aspiration tube
* W1404206 : FIO2 extension cord
* W1404199 : pressure sensor
* 51644 : mains cord

3.4. Troubleshooting

3.4.1. Safety precautions

In the event that the instrument covers are removed, observe the following warnings and general guidelines.

- Do not short component leads together.

- The troubleshooting charts are not intended as a rapid course on how to repair devices of this type. Rather, they are intended as a guide for qualified technical personnel only. The instrument covers must not be removed by other than technically qualified personnel who have received supplementary instructions regarding maintenance of medical electronic equipment or have has equivalent experience in this area.

3.4.2. Troubleshooting guidelines

In an instrument as complex as this, it is virtually impossible to list each and every potential problem and appropriate action. Any given problem, however, can be effectively identified through an understanding of the instrument features and the theory of operation. These are prerequisites for repair. If necessary, read the Operating Instructions Manual and study the theory of operation presented in chapter 2 of this manual. The time spent reading and absorbing this information is generally realized by a reduction in repair time and, ultimately, in the overall experience of service personnel.

NOTE : The numbers in parentheses () refer to the isometric drawings.

General Troubleshooting Guidelines

1. IDENTIFY THE PROBLEM. Due to the wide ranges of potential symptoms, certain problems may be more subtle than others. One approach to troubleshooting is to set-up the instrument for testing as described in chapter 7 and attempt testing. If successfull, there is a reasonable assurance that there is no problem. By contrast, the fact that a particular test is not successful is generally indicative of a failure in that specific area.

   The cause of the symptom can now be further isolated by referring to chapter 2. This chapter contains a listing of specific circuits or areas in the instrument, each of which is dedicated to provide a specific function. Once the operation of that circuit is understood, trouble-shooting can be completed by making measurements in that circuit to determine which component(s) is at fault.

2. AVOID SHORTING COMPONENT LEADS. During repair procedures, it can become tempting to make a series of quick measurements. Always turn off the power bfefore connecting and disconnecting test leads and probes. The accidental shorting of component leads can easily over stress components, resulting in a second unnecessary failure (aside from creating a possible safety risk).

3. USE THE PROPER EQUIPMENT. This equipment listed in Section 4.4.3 is suggested to fulfill a wide range of troubleshooting requirements.Use a soldering iron the appropriate wattage for a given job. For example, use a pencil-type iron (25 watts max.) for repairs to printed wiring boards and a pistol-grip (75 watts) for repairs requiring this much power. Do not use the high powered iron to repair the printed wiring boards as the conductors will lift from the board under the extreme heat, thus ruining it.

4. CLEAN THE REPAIR AREA. After soldering operations, clean off the repaired area with alcohol and a stiff hair brush. This will remove residual solder flux, making the repaired area more visible for inspection and returning the instrument to its original, neat appearance. Removal of the flux will also facilitate making electrical measurements in the affected area.

3.4.3. Equipment and special tools required

Description	Specification
DVM	
Standard Mercury Column	0-300 mmHg
Test Chamber (Dummy Cuff)	0138-00-0001-01
Safety Analyzer	Dempsey Model or equivalent
Finger Sensor Probe	ACCUSAT Compatible
Oscilloscope	
Patient Simulator	
Flow meter / Siera Instruments	
(Model 822-13-001-001-01) or equivalent	0-300 cc/min

3.4.4. Technical alarms list

◊ **ECG/RESP** :

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"Check sensor"	*Electrodes defaults (ECG, RESP modules).*	Check if the electrodes are properly attached to the patient.
"Measurement failure"	*Impossible measure (RESP module).*	Not yet implemented.
"Saturation"	*Module in saturation (IBP1, IBP2 modules).*	In scale 15, 30, 60, 150, 225 the signal is out of range, to correct, switch to a higher scale, if the actual scale is already 300, the pressure is too high, there may be a problem in the sample line, or with the IBP sensor.
"Zero failure"	*Bad calibration (IBP1, IBP2 modules).*	MAGLIFE C PLUS an not perform the 0 pressure adjustment, probably because that the offset from the IBP sensor is out of specifications, check the sample line, try again, if it doesn't help, try with an other sensor.
"Check sensor"	*Sensor problem (IBP1, IBP2 modules).*	Check if the sensor is good connected, if it is connected in the right IBP entry, the MAGLIFE C PLUS sees no IBP sensor.
"Sensor OFF"	*Sensor Off (IBP1, IBP2 modules).*	
"Mag. Field Limit"	*Bx, By, Bz too important magnetic field (Magnetic field module).*	The field is close to the switch off threshold in one of the 3 directions, try to move the MAGLIFE C PLUS in a lower field area.
"High mag. Field"	*Bx, By, Bz important magnetic field (Magnetic field module).*	The field has reach the alarm threshold, in one of the 3 directions, try to move the MAGLIFE C PLUS to a lower field area.
"Check ADC"	*ADC problem (ECG, RESP, IBP1, IBP2, T°, Magnetic Field modules).*	Ecg, Ibp, Field board performs an initialisation test, by checking 3 know voltages on the converter entries, and this error is issued if the value read on the converter is not in a given range.
"Check RAM"	*RAM problem (ECG, RESP, IBP1, IBP2, T°, Magnetic Field modules).*	Ecg, Ibp, Field board performs an initialisation test, by checking writing on reading back on the boards SRAM. If this error is issued, the boards needs to be serviced.

"Check EPROM"	*EPROM problem (ECG, RESP, IBP1, IBP2, T°, Magnetic Field modules).*	Ecg, Ibp, Field board performs an initialisation test, by computing a CRC on the boards EPROM. If this error is issued, the boards needs to be serviced.
"Check CPU"	*CPU problem (ECG, RESP, IBP1, IBP2, T°, Magnetic Field modules).*	Ecg, Ibp, Field board performs an initialisation test, by making some simple arithmetical operations with the CPU registers. If this error is issued, the boards needs to be serviced
"ECG timeout", "RESP timeout", "IBP timeout"	*Time-out (ECG, RESP, IBP1, IBP2, T° modules).*	Communication problem between ECG board and Interface board : probable cause : ECG board CPU does not work, or is not able to complete its initialisation, cable between the two boards not connected or damaged. If this message is issued on all parameters, the Interface board may not be working : EXAR 82C684 in latch up, or an unsoldered pin on the IC.
"Zero transducer"	*Perform 0 calibration (IBP1,IBP2 modules).*	Each IBP channel has to be zeroed before use : No numerical value can be displayed before.

◊ **OXIMETER :**

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"*Searching failure"*	*Searching is too long.*	The SpO2 module is not able to get a valid signal, try to place the sensor in a better way, check if the fingers of the patient are not too cold.
"*Check sensor"*	*Sensor problem.*	Check if the sensor is connected to the patient.
"*Oximeter timeout"*	*Time-out.*	Communication problem between SpO2 board and Interface board : probable cause : SpO2 is not able to complete its initialisation, cable between the two boards not connected or damaged. If this message is issued on all parameters, the Interface board may not be working : EXAR 82C684 in latch up, or an unsoldered pin on the IC. This happens also if the -12v fuse is blow in the power supply.

3. REPAIR SPECIFICATIONS

◊ **MULTIGAS :**

CO2 SECTION

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"Occlusion/Close "	*Occlusion (Capno/N2O and Agents modules).*	Check if the sample line is not crimped, remove the sample line if the message doesn't disappear, check if the water trap is correctly inserted, check if the filters are clean.
"CO2 excess pressure"	*Excessive pressure (Capno/N2O and Agents modules).*	Check sample line, water trap sitting and filters.
"Check CO2 cell"	*CO2 Cell error (Capno/N2O and Agents modules).*	Hardware problem on the CO2 cell, module needs probably to be changed.
"Cal Err/Close cylinder"	*CO2 calibration failed (Capno/N2O module).*	MAGLIFE C PLUS ask the operator to close the gas cylinder, and informs that the calibration process failed. The operator can check if the cylinder was properly connected to the right gas fitting, on the rear of the MAGLIFE C PLUS, he can also check if there was enough pressure in the gas cylinder, if the MAGLIFE C PLUS was turned on at least 15min before the calibration, and if so, try a second calibration.
"Synchronising"	*Synchronizating (Capno/N2O module).*	
"Capno timeout", " Agents timeout", " Timeout"	*Time-out (Capno/N2O, Agents, FiO2 modules).*	Communication problem between Capno (agent and FiO2) module and Interface board : probable cause : Capno module was not able to complete its initialisation, cable between capno module and Interface board not connected or damaged. If this message is issued on all parameters, the Interface board may not be working : EXAR 82C684 in latch up, or an unsoldered pin on the IC.
"Check cell"	*Cell error (Agents module).*	Hardware problem on the CO2 cell, module needs probably to be changed.
"Water trap full"	*Water Trap Full (Capno/N2O and Agents modules).*	This message can normally not appear because we have no electronically survey of the level of liquid in the water trap.
"Sensor ?"	*Sensor ? (FiO2 module).*	Check if the FiO2 sensor is properly connected in the white connector from the front panel.
"Calibrate !"	*Perform calibration (Capno/N2O, agents and FiO2 modules).*	Gas module needs to be calibrated. Check if you have the right gas cylinder, there is with and without isoflurane, for gas modules with or without anaesthetic gases.
"Cal Err/Cylinder empty"		

AGENT SECTION

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"Occlusion / Close"		same as above.
"Zero Agent cal..."		
" Cal Err/Empty"		

FOI2 SECTION

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"Cal error"		

◊ **NIBP** :

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"Insufficient pressure"	*Insufficient pressure.*	Check if there is no leakage on the cuff and the tubing, check if the connection are tight and properly locked.
"Measurement failure"	*Error measurement.*	The message appears when the measurement fails due to motion artefact, or when the module is set to the right mode to be allowed to inflate enough pressure.
"Over inflation"	*Cuff over-pressure.*	To high pressure in the cuff, this can happen if the patient move his arm from the straight to the bend position, or an other mechanical reason. In this case the NIBP module aborts the current measurement.
"Check cuff"	*Wrong cuff or too tight.*	The cuff probably does not match with the selected mode, change the cuff, or select an other mode.
"Communication failure"	*Communication problem.*	The module was properly operating, and suddenly the MAGLIFE C PLUS loose contact with the module. The MAGLIFE C PLUS assumes that the module hangs, and it will try to cure the module by performing a hardware reset in a power-down power-up cycle.
"No cuff"	*No cuff.*	Check if the cuff is firmly locked, and if there is no leakage somewhere in the tubing.
"NIBP failure"	*NIBP error.*	Hardware failure detected by the module, module

		needs to be replaced.
"Reset"	*Hardware reset.*	MAGLIFE C PLUS is indicating that it is applying a power-down power-up cycle to the module.
"Measurement too long"	*Too long measurement.*	Due to motion artefact or others, if the cumulative measurement time (up to four trying) exceed the time limit (2 min), the measure is aborted, and this message displayed.
"NIBP timeout"	*NIBP Time-out.*	Communication problem between NIBP module and Interface board : probable cause : NIBP module was not able to complete its initialisation, cable between NIBP module and Interface board not connected or damaged. If this message is issued on all parameters, the Interface board may not be working : EXAR 82C684 in latch up, or an unsoldered pin on the IC. When the -12V fuse is blow on the power supply, NIBP doesn't complete its initialisation and this message results also.

◊ **TEMPERATURE :**

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
" Serial Num "	*serial number.*	The user is invited to enter the serial number of the probe, in order to match the temperature module settings to the probe.
" Timeout"	*time out.*	Communication problem between Temperature module and Interface board : probable cause : Temperature module was not able to complete its initialisation, cable between temperature module and Interface board not connected or damaged. If this message is issued on all parameters, the Interface board may not be working : EXAR 82C684 in latch up, or an unsoldered pin on the IC.
"Check sensor"	*Sensor failure.*	Optical temperature sensor not connected to the MAGLIFE C PLUS, or optical fibre damaged.

◊ **MISCELLANEOUS** :

MESSAGE DISPLAYED	EXPLANATION	CORRECTIVE ACTION
"Check battery "	*Main battery.*	Battery is low, let it recharge by keeping MAGLIFE C PLUS on mains, mains switch ON, verify that mains LED and charge LED are ON.
"Printer Error "	*Printer.*	Check if there is paper in the printer, if so, check if the printer fuse on power supply board was not blow.

CHAPITRE 4

DIAGRAMS

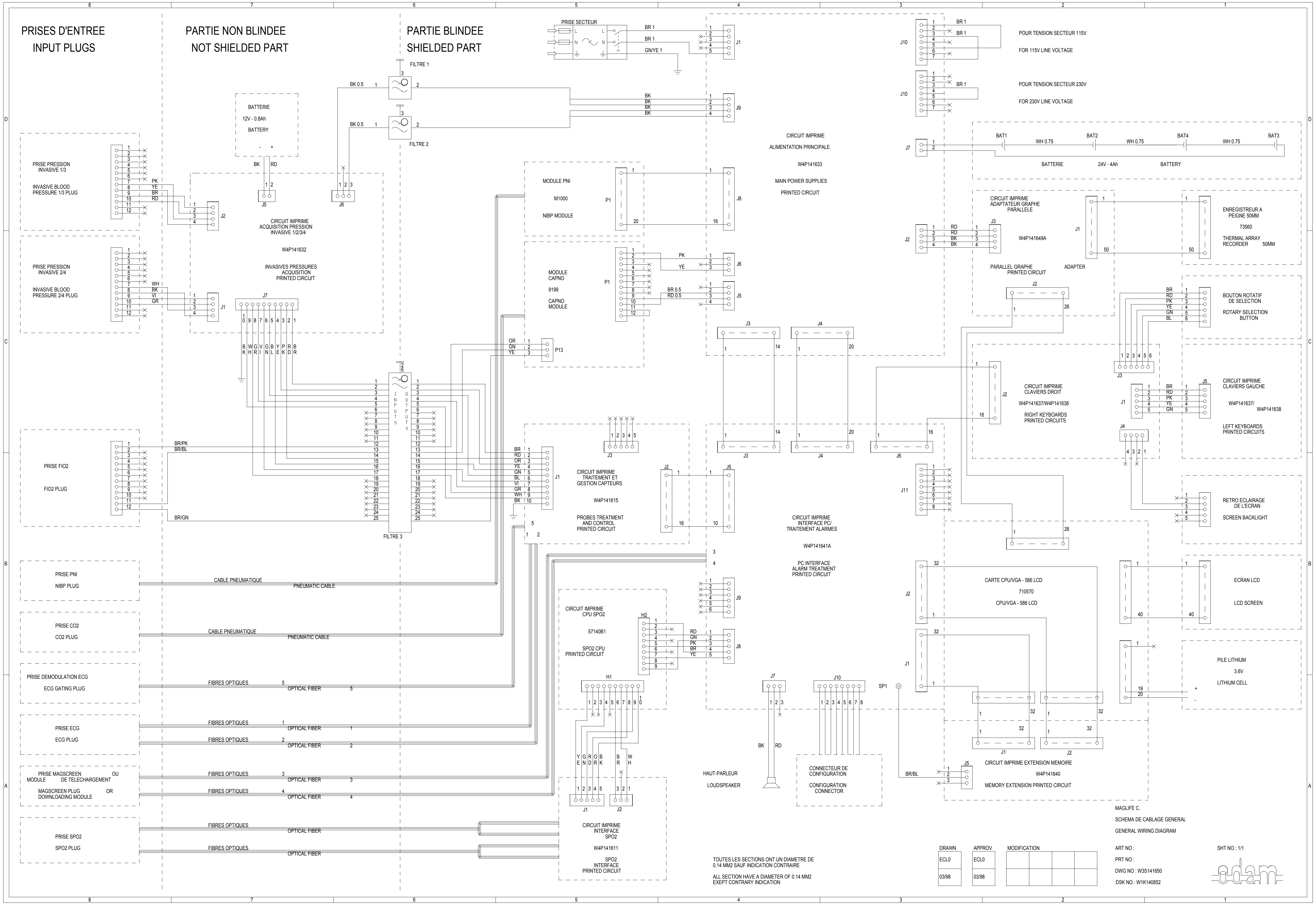
4. DIAGRAMS

4.1. Diagrams "MAGLIFE C PLUS"

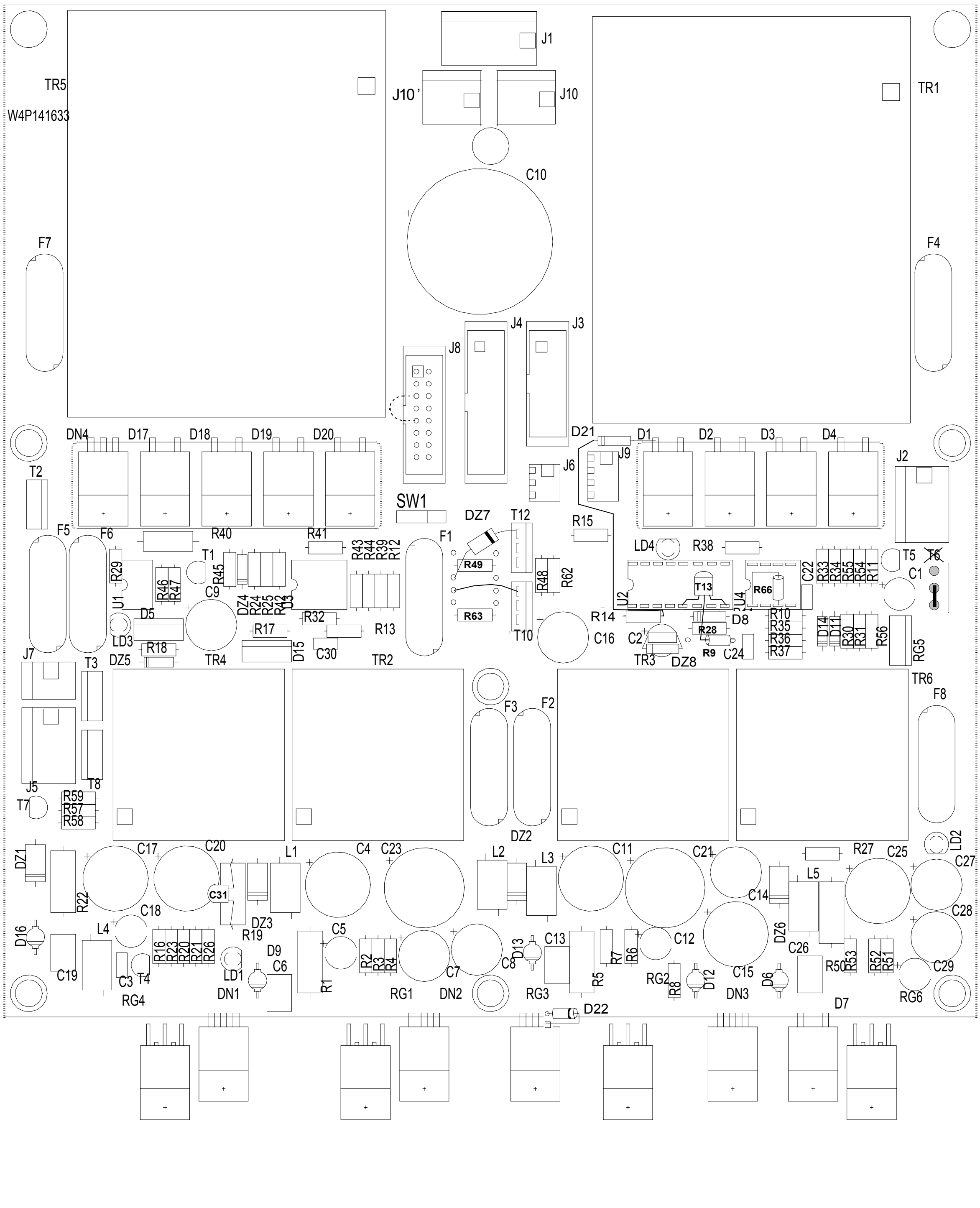
PART NUMBER	◊ DESCRIPTION	PAGE
	Device wiring diagram ◊ diagram1/1	 4-3
W7411737	**« Power supply » printed circuit - W4P141633** ◊ layout ◊ circuit diagram 1/1	 4-4 4-5
W7411702	◊ **« Probes treatment » printed circuit - W4P141615** ◊ layout ◊ circuit diagram 1/2 ◊ circuit diagram 2/2	 4-6 4-7 4-8
W7411702	**« Probes treatment » printed circuit - W4P141615A** ◊ layout ◊ circuit diagram 1/2 ◊ circuit diagram 2/2	 4-9 4-10 4-11
W7411743	**« IP1/2 acquisition » printed circuit - W4P141632** ◊ layout ◊ circuit diagram 1/1	 4-12 4-13
W7411736	**« IP1/2/3/4 acquisition » printed circuit - W4P141632** ◊ layout ◊ circuit diagram 1/2 ◊ circuit diagram 2/2	 4-14 4-15 4-16
W7412096	**« PC interface » printed circuit – W4P141730 A** ◊ layout ◊ circuit diagram 1/4 ◊ circuit diagram 2/4 ◊ circuit diagram 3/4 ◊ circuit diagram 4/4	 4-17 4-18 4-19 4-20 4-21
W1411757	**« Right and left keyboard » printed circuit W4P141637 and W4P141661** ◊ layout ◊ circuit diagram 1/1	 4-23 4-24

4. DIAGRAMS

W7412162	**« SPO2 interface » printed circuit – W4P141667A** ◊ layout ◊ circuit diagram 1/1	 4-25 4-26
W7412172	**« SPO2 BCI interface » printed circuit - W3P1737C01** ◊ layout ◊ circuit diagram 1/1	 4-28 4-29
W1411747	**« MAGFILE interface » printed circuit - W4P141646** ◊ layout ◊ circuit diagram 1/1	 4-30 4-31
W1411749	**« Parallel graph adapter » printed circuit - W4P141649A** ◊ layout ◊ circuit diagram 1/1	 4-32 4-33


PRISES D'ENTREE
INPUT PLUGS
PARTIE NON BLINDEE
NOT SHIELDED PART
PARTIE BLINDEE
SHIELDED PART
PRISE SECTEUR
FILTRE 1
FILTRE 2
FILTRE 3
BATTERIE
12V - 0.8Ah
BATTERY
PRISE PRESSION INVASIVE 1/3
INVASIVE BLOOD PRESSURE 1/3 PLUG
PRISE PRESSION INVASIVE 2/4
INVASIVE BLOOD PRESSURE 2/4 PLUG
CIRCUIT IMPRIME ACQUISITION PRESSION INVASIVE 1/2/3/4
W4P141632
INVASIVES PRESSURES ACQUISITION PRINTED CIRCUIT
MODULE PNI
M1000
NIBP MODULE
MODULE CAPNO
9199
CAPNO MODULE
CIRCUIT IMPRIME ALIMENTATION PRINCIPALE
W4P141633
MAIN POWER SUPPLIES PRINTED CIRCUIT
POUR TENSION SECTEUR 115V
FOR 115V LINE VOLTAGE
POUR TENSION SECTEUR 230V
FOR 230V LINE VOLTAGE
BATTERIE 24V - 4Ah BATTERY
CIRCUIT IMPRIME ADAPTATEUR GRAPHE PARALLELE
W4P141649A
PARALLEL GRAPHE PRINTED CIRCUIT
ADAPTER
ENREGISTREUR A PEIGNE 50MM
73560
THERMAL ARRAY RECORDER 50MM
BOUTON ROTATIF DE SELECTION
ROTARY SELECTION BUTTON
CIRCUIT IMPRIME CLAVIERS DROIT
W4P141637/W4P141638
RIGHT KEYBOARDS PRINTED CIRCUITS
CIRCUIT IMPRIME CLAVIERS GAUCHE
W4P141637/ W4P141638
LEFT KEYBOARDS PRINTED CIRCUITS
PRISE FIO2
FIO2 PLUG
CIRCUIT IMPRIME TRAITEMENT ET GESTION CAPTEURS
W4P141615
PROBES TREATMENT AND CONTROL PRINTED CIRCUIT
CIRCUIT IMPRIME INTERFACE PC/ TRAITEMENT ALARMES
W4P141641A
PC INTERFACE ALARM TREATMENT PRINTED CIRCUIT
RETRO ECLAIRAGE DE L'ECRAN
SCREEN BACKLIGHT
CARTE CPU/VGA - 586 LCD
710570
CPU/VGA - 586 LCD
ECRAN LCD
LCD SCREEN
PILE LITHIUM
3.6V
LITHIUM CELL
PRISE PNI
NIBP PLUG
CABLE PNEUMATIQUE
PNEUMATIC CABLE
PRISE CO2
CO2 PLUG
PRISE DEMODULATION ECG
ECG GATING PLUG
FIBRES OPTIQUES
OPTICAL FIBER
PRISE ECG
ECG PLUG
PRISE MAGSCREEN OU MODULE DE TELECHARGEMENT
MAGSCREEN PLUG OR DOWNLOADING MODULE
PRISE SPO2
SPO2 PLUG
CIRCUIT IMPRIME CPU SPO2
57140B1
SPO2 CPU PRINTED CIRCUIT
CIRCUIT IMPRIME INTERFACE SPO2
W4P141611
SPO2 INTERFACE PRINTED CIRCUIT
HAUT-PARLEUR
LOUDSPEAKER
CONNECTEUR DE CONFIGURATION
CONFIGURATION CONNECTOR
CIRCUIT IMPRIME EXTENSION MEMOIRE
W4P141640
MEMORY EXTENSION PRINTED CIRCUIT
TOUTES LES SECTIONS ONT UN DIAMETRE DE 0.14 MM2 SAUF INDICATION CONTRAIRE
ALL SECTION HAVE A DIAMETER OF 0.14 MM2 EXEPT CONTRARY INDICATION
DRAWN ECL0 03/98
APPROV ECL0 03/98
MODIFICATION
MAGLIFE C.
SCHEMA DE CABLAGE GENERAL
GENERAL WIRING DIAGRAM
ART NO :
PRT NO :
DWG NO : W3S141650
DSK NO : W1K140852
SHT NO : 1/1
odam

4. DIAGRAMS



MAGLIFE C.
ALIMENTATION PRINCIPALE
MAIN POWER SUPPLY

DRAWN	APPROV	MODIFICATION					
ECL0	ECL0	ECL1	ECL2	ECL3	ECL4	ECL5	ECL6
02/98	02/98	04/98	04/98	06/98	09/98	10/98	11/98

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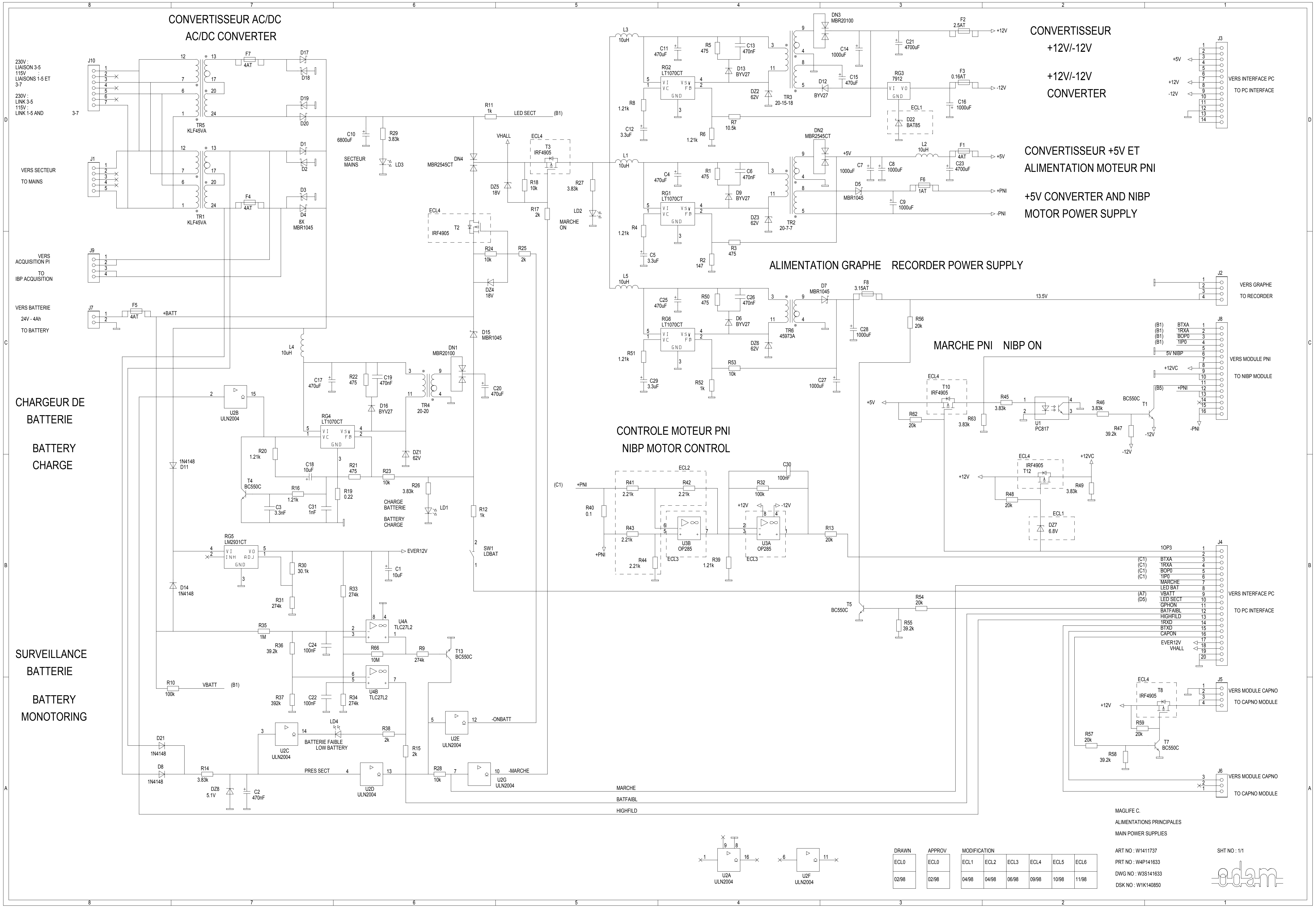
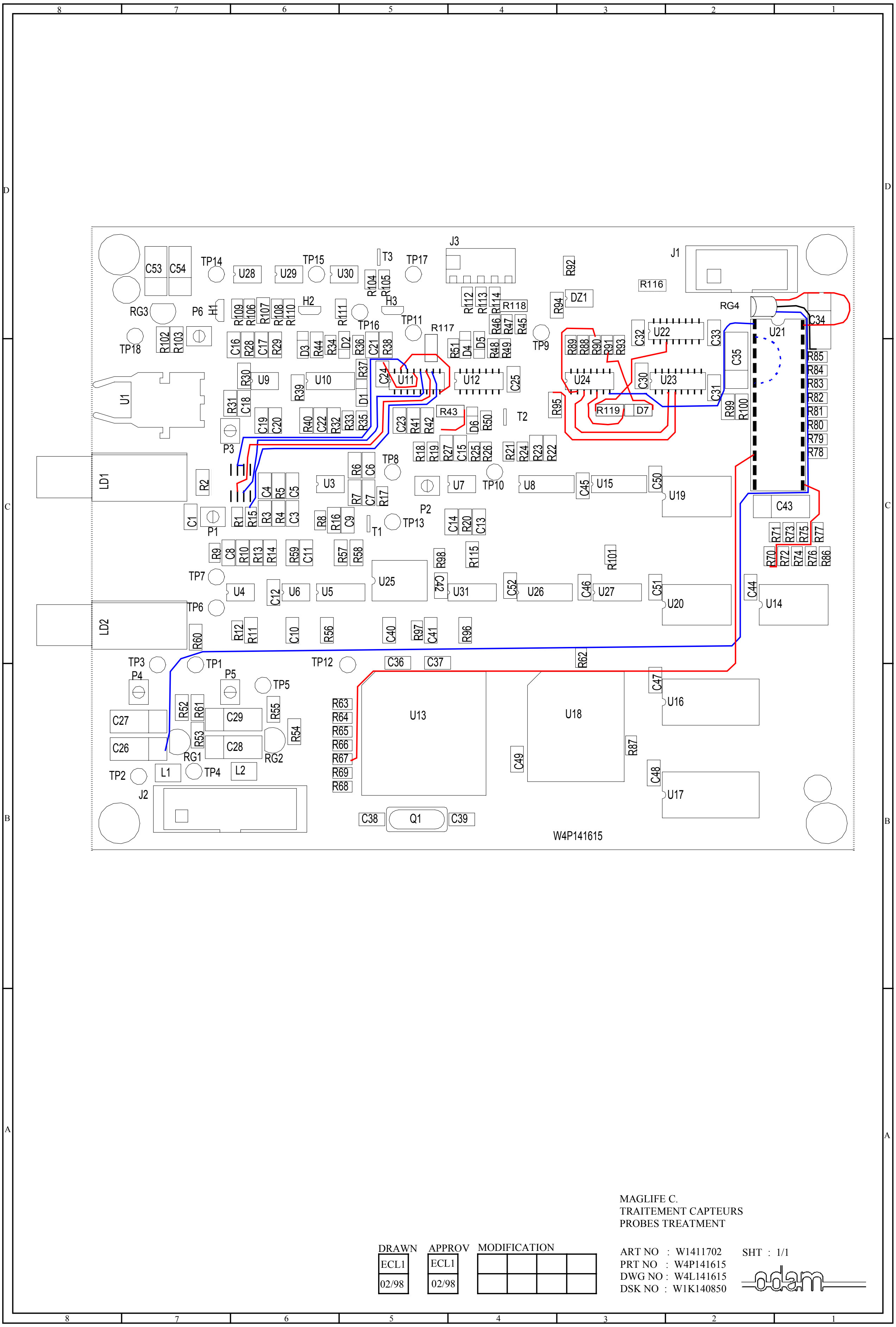
PRT NO : W4P141633
DWG NO : W4L141633
DSK NO : W1K140850



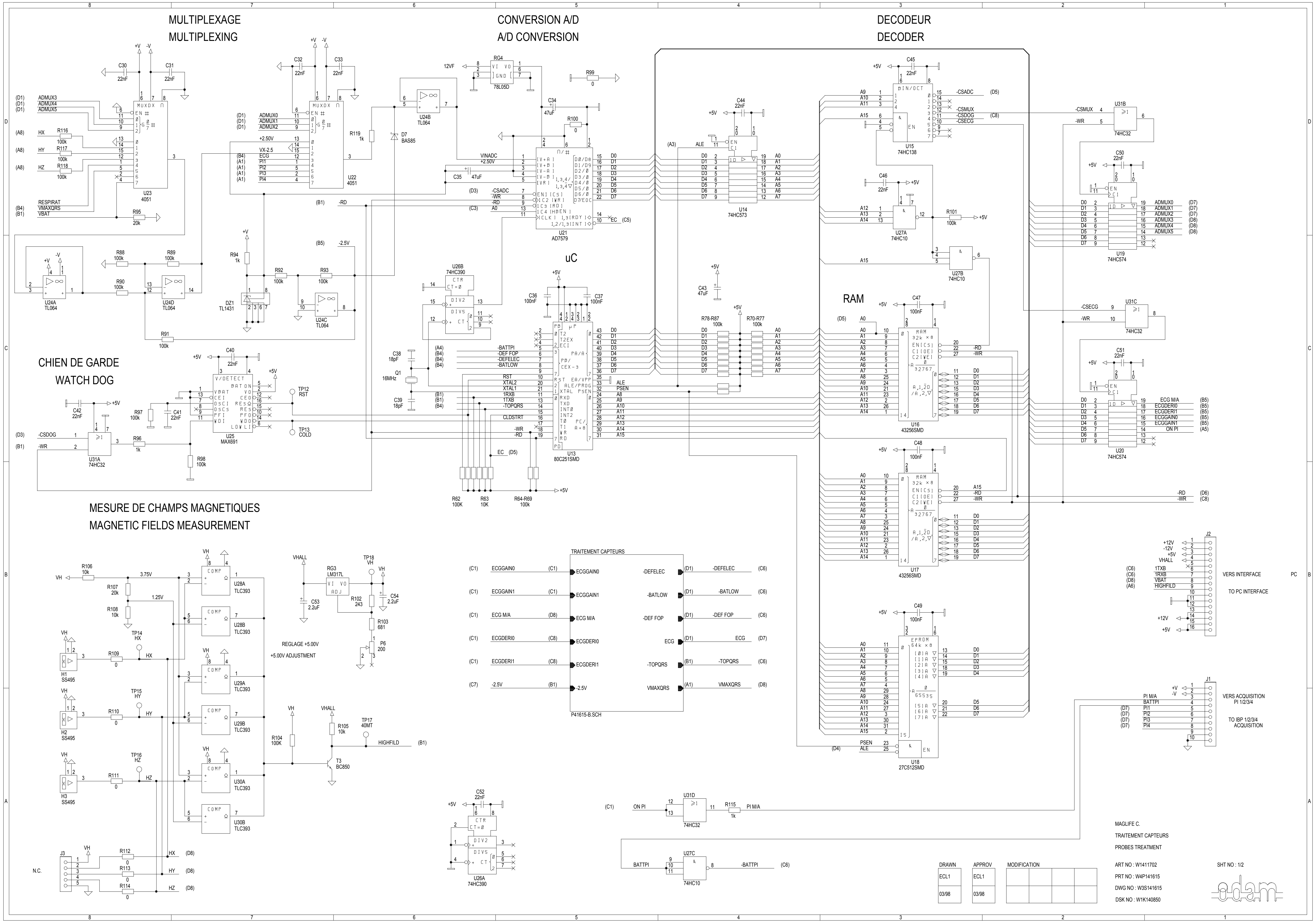
CONVERTISSEUR AC/DC
AC/DC CONVERTER
CONVERTISSEUR
+12V/-12V
+12V/-12V
CONVERTER
CONVERTISSEUR +5V ET
ALIMENTATION MOTEUR PNI
+5V CONVERTER AND NIBP
MOTOR POWER SUPPLY
ALIMENTATION GRAPHE RECORDER POWER SUPPLY
MARCHE PNI NIBP ON
CONTROLE MOTEUR PNI
NIBP MOTOR CONTROL
CHARGEUR DE
BATTERIE
BATTERY
CHARGE
SURVEILLANCE
BATTERIE
BATTERY
MONOTORING
VERS SECTEUR
TO MAINS
VERS ACQUISITION PI
TO IBP ACQUISITION
VERS BATTERIE
24V - 4Ah
TO BATTERY
VERS INTERFACE PC
TO PC INTERFACE
VERS GRAPHE
TO RECORDER
VERS MODULE PNI
TO NIBP MODULE
VERS MODULE CAPNO
TO CAPNO MODULE
MAGLIFE C.
ALIMENTATIONS PRINCIPALES
MAIN POWER SUPPLIES
ART NO : W1411737
PRT NO : W4P141633
DWG NO : W3S141633
DSK NO : W1K140850
SHT NO : 1/1
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
ECL1
ECL2
ECL3
ECL4
ECL5
ECL6
02/98
02/98
04/98
04/98
06/98
09/98
10/98
11/98

4. DIAGRAMS

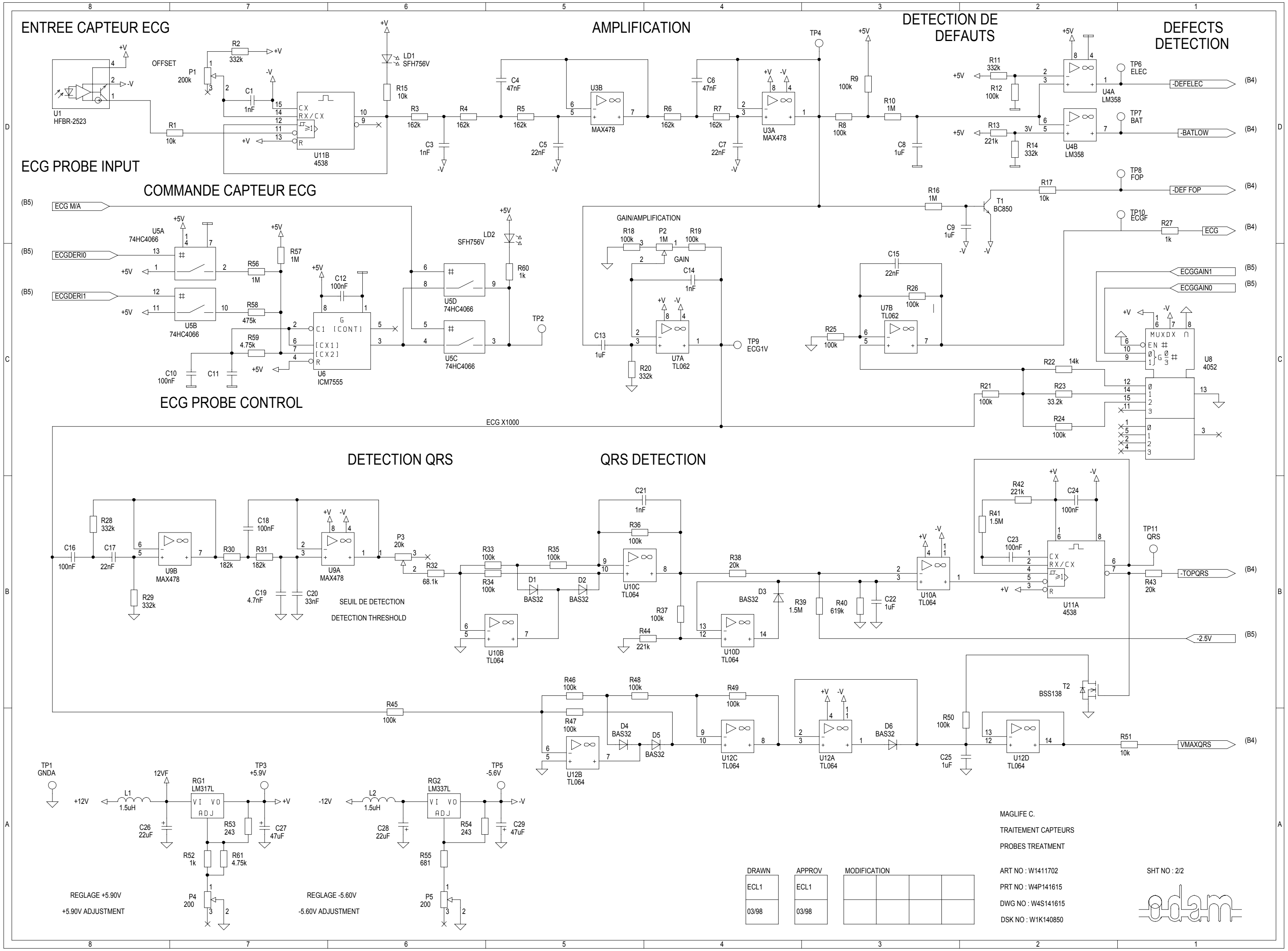


W4P141615
MAGLIFE C.
TRAITEMENT CAPTEURS
PROBES TREATMENT
DRAWN
APPROV
MODIFICATION
ECL1
ECL1
02/98
02/98
ART NO : W1411702
PRT NO : W4P141615
DWG NO : W4L141615
DSK NO : W1K140850
SHT : 1/1

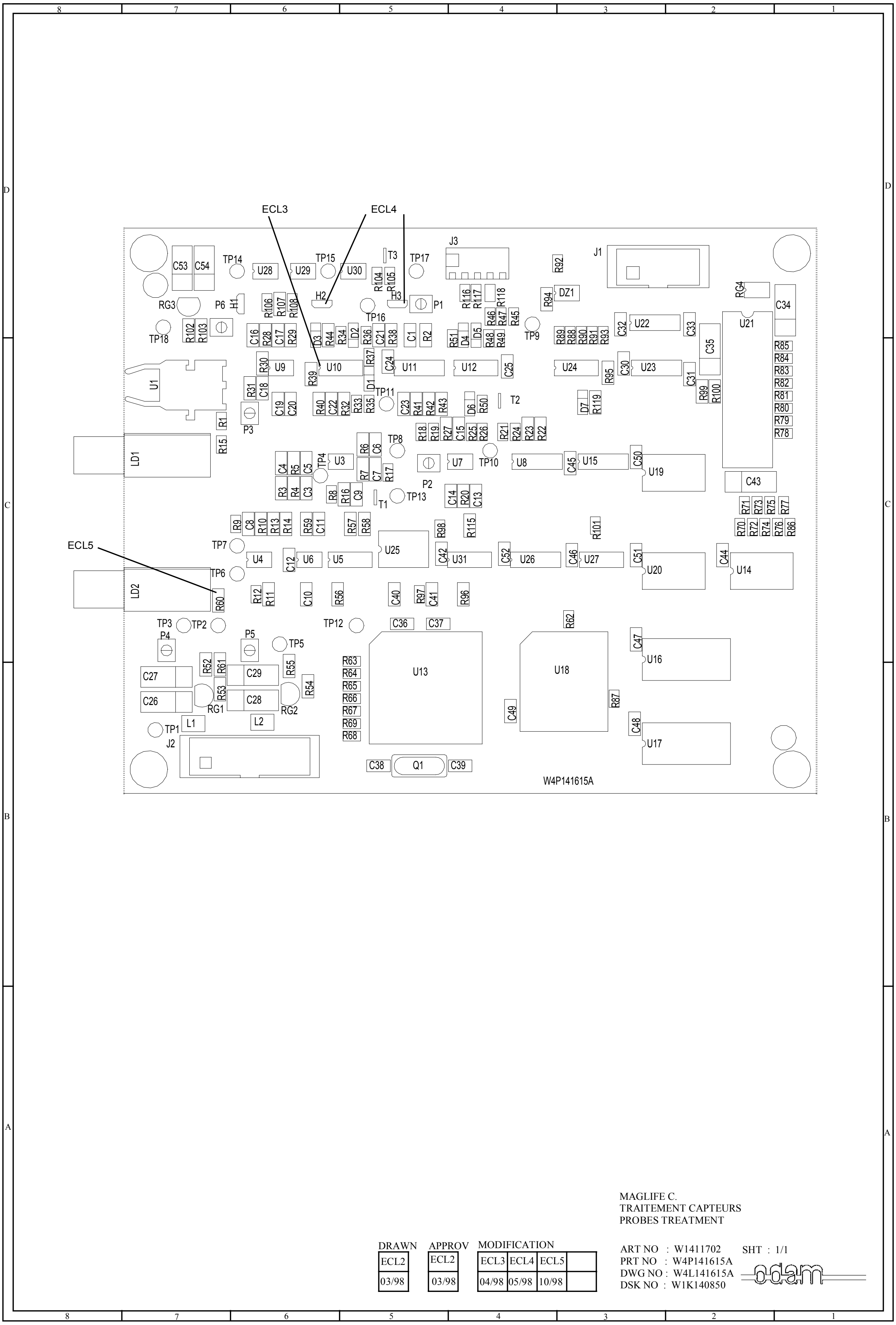
4. DIAGRAMS

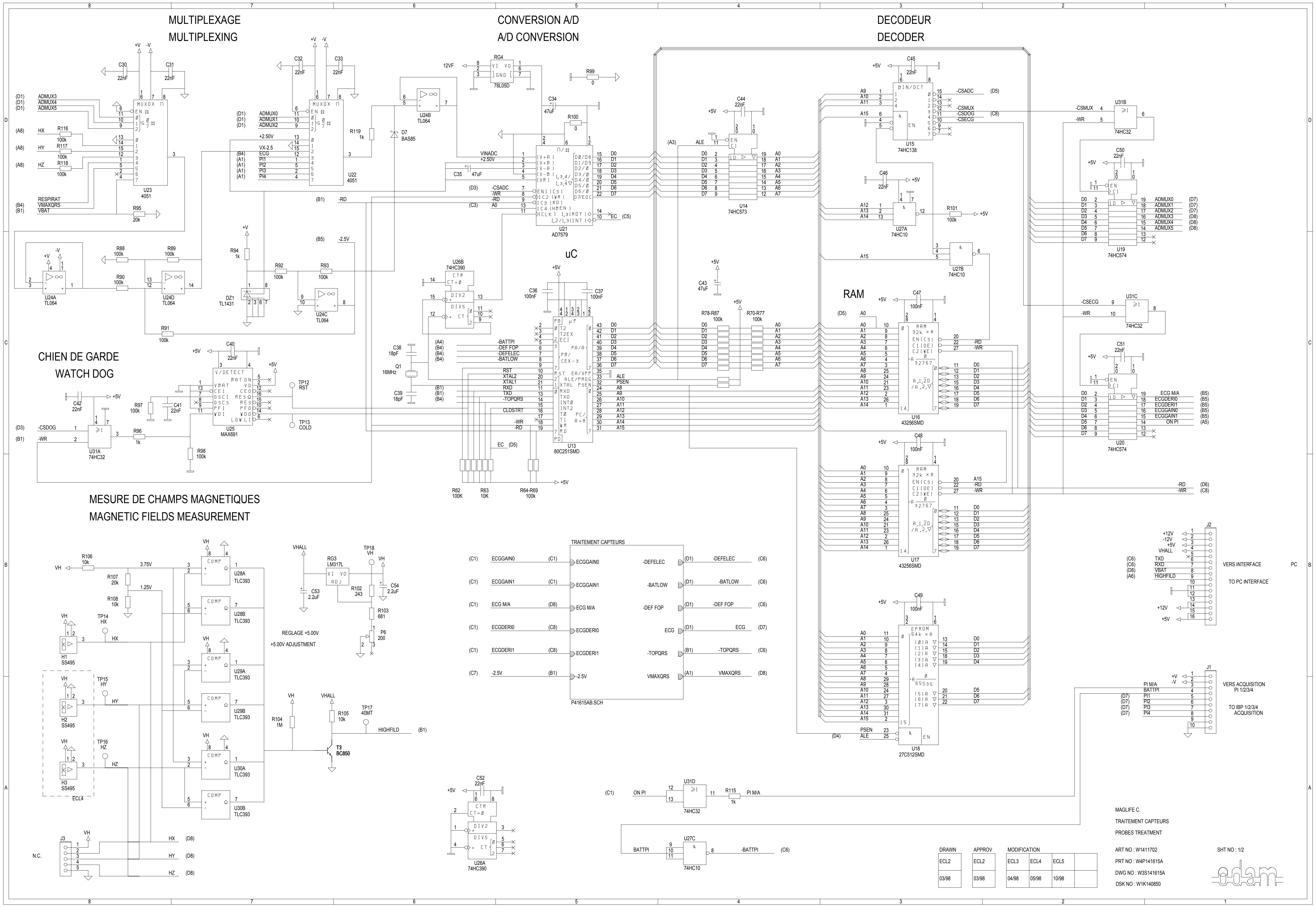

MULTIPLEXAGE
MULTIPLEXING
CONVERSION A/D
A/D CONVERSION
DECODEUR
DECODER
uC
RAM
CHIEN DE GARDE
WATCH DOG
MESURE DE CHAMPS MAGNETIQUES
MAGNETIC FIELDS MEASUREMENT
TRAITEMENT CAPTEURS
REGLAGE +5.00V
+5.00V ADJUSTMENT
VERS INTERFACE
TO PC INTERFACE
VERS ACQUISITION PI 1/2/3/4
TO IBP 1/2/3/4 ACQUISITION
MAGLIFE C.
TRAITEMENT CAPTEURS
PROBES TREATMENT
DRAWN
APPROV
MODIFICATION
ECL1
03/98
ART NO : W1411702
PRT NO : W4P141615
DWG NO : W3S141615
DSK NO : W1K140850
SHT NO : 1/2
odam

4. DIAGRAMS

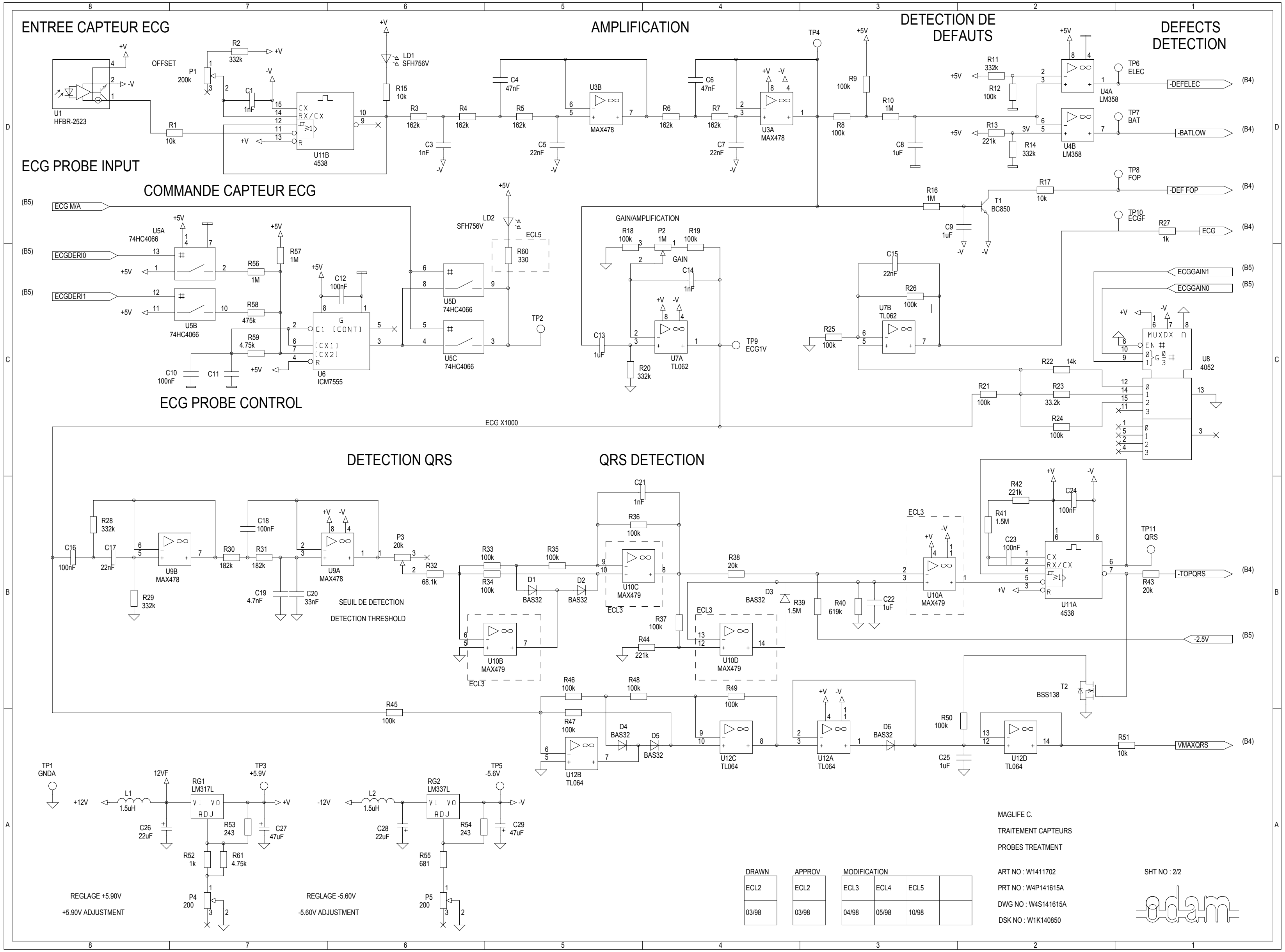

ENTREE CAPTEUR ECG
ECG PROBE INPUT
AMPLIFICATION
DETECTION DE DEFAUTS
DEFECTS DETECTION
COMMANDE CAPTEUR ECG
ECG PROBE CONTROL
DETECTION QRS
QRS DETECTION
GAIN/AMPLIFICATION
SEUIL DE DETECTION
DETECTION THRESHOLD
ECG X1000
REGLAGE +5.90V
+5.90V ADJUSTMENT
REGLAGE -5.60V
-5.60V ADJUSTMENT
MAGLIFE C.
TRAITEMENT CAPTEURS
PROBES TREATMENT
DRAWN
APPROV
MODIFICATION
ECL1
ECL1
03/98
03/98
ART NO : W1411702
PRT NO : W4P141615
DWG NO : W4S141615
DSK NO : W1K140850
SHT NO : 2/2

4. DIAGRAMS

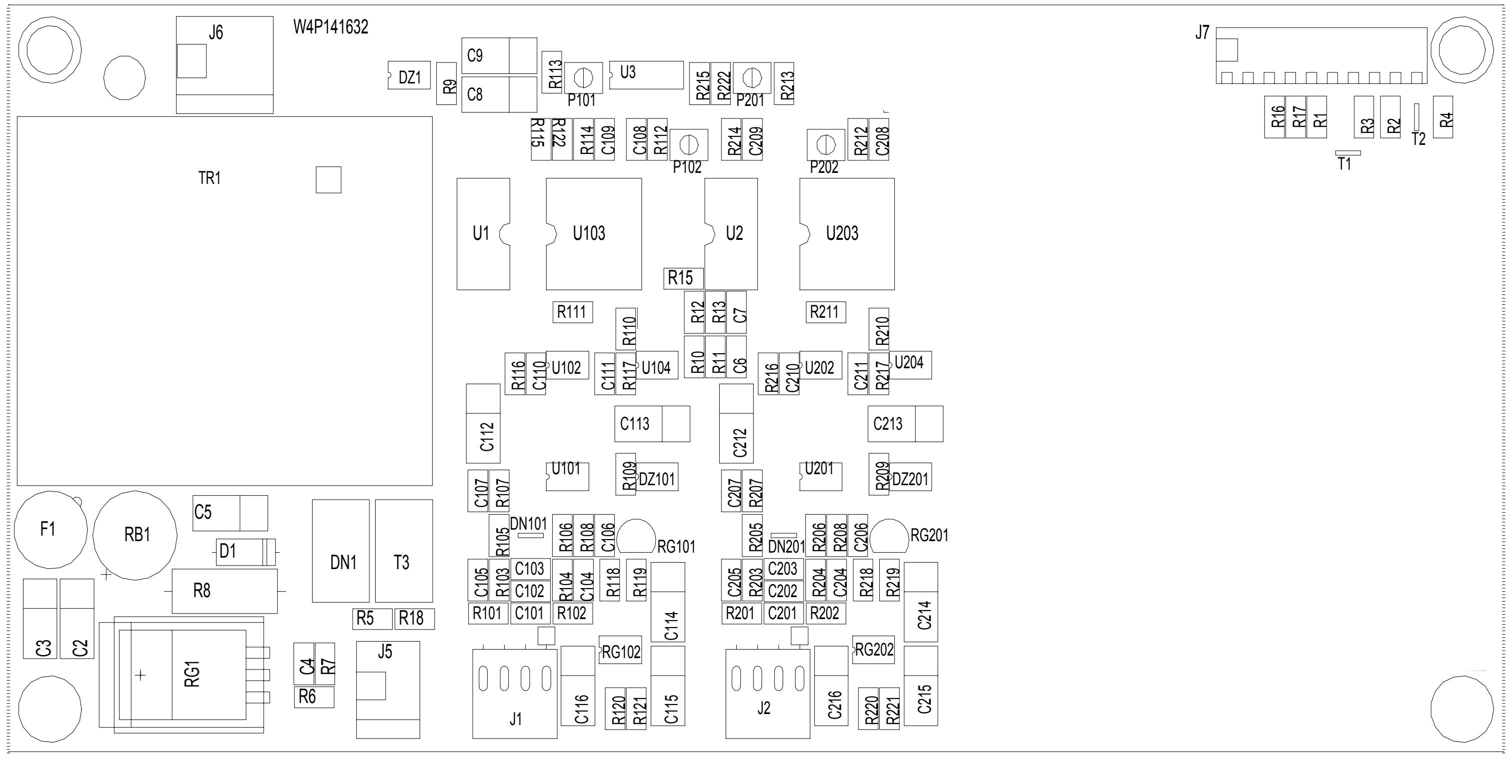

ECL3
ECL4
ECL5
W4P141615A
MAGLIFE C.
TRAITEMENT CAPTEURS
PROBES TREATMENT
DRAWN
APPROV
MODIFICATION
ECL2
03/98
ECL2
03/98
ECL3
04/98
ECL4
05/98
ECL5
10/98
ART NO : W1411702
SHT : 1/1
PRT NO : W4P141615A
DWG NO : W4L141615A
DSK NO : W1K140850
odam



MULTIPLEXAGE
MULTIPLEXING
CONVERSION A/D
A/D CONVERSION
DECODEUR
DECODER
uC
RAM
CHIEN DE GARDE
WATCH DOG
MESURE DE CHAMPS MAGNETIQUES
MAGNETIC FIELDS MEASUREMENT
TRAITEMENT CAPTEURS
VERS INTERFACE PC
TO PC INTERFACE
VERS ACQUISITION PI 1/2/3/4
TO IBP 1/2/3/4 ACQUISITION
REGLAGE +5.00V
+5.00V ADJUSTMENT
MAGLIFE C.
TRAITEMENT CAPTEURS
PROBES TREATMENT
ART NO : W1411702
PRT NO : W4P141615A
DWG NO : W3S141615A
DSK NO : W1K140850
SHT NO : 1/2



ENTREE CAPTEUR ECG
ECG PROBE INPUT
AMPLIFICATION
DETECTION DE DEFAUTS
DEFECTS DETECTION
COMMANDE CAPTEUR ECG
ECG PROBE CONTROL
DETECTION QRS
QRS DETECTION
SEUIL DE DETECTION
DETECTION THRESHOLD
REGLAGE +5.90V
+5.90V ADJUSTMENT
REGLAGE -5.60V
-5.60V ADJUSTMENT
MAGLIFE C.
TRAITEMENT CAPTEURS
PROBES TREATMENT
ART NO : W1411702
PRT NO : W4P141615A
DWG NO : W4S141615A
DSK NO : W1K140850
SHT NO : 2/2
DRAWN
APPROV
MODIFICATION
ECL2
ECL2
ECL3
ECL4
ECL5
03/98
03/98
04/98
05/98
10/98



DRAWN ECL0 02/98

APPROV ECL0 02/98

MODIFICATION ECL1 11/98

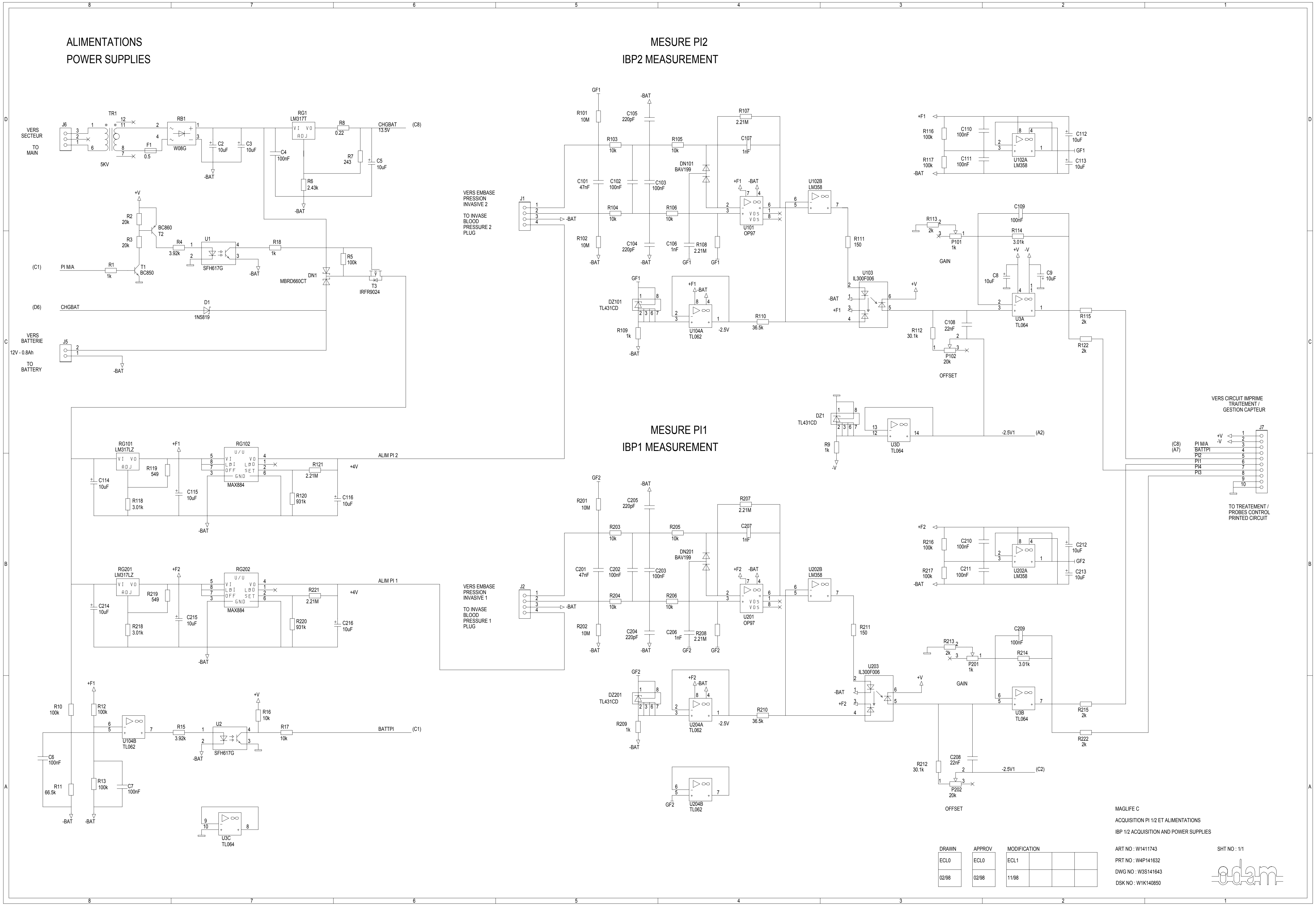
MAGLIFE C.
ACQUISITION PRESSIONS 1/2
PRESSURES 1/2 ACQUISITION

ART NO : W1411743
PRT NO : W4P141632
DWG NO : W4L141643
DSK NO : W1K140850

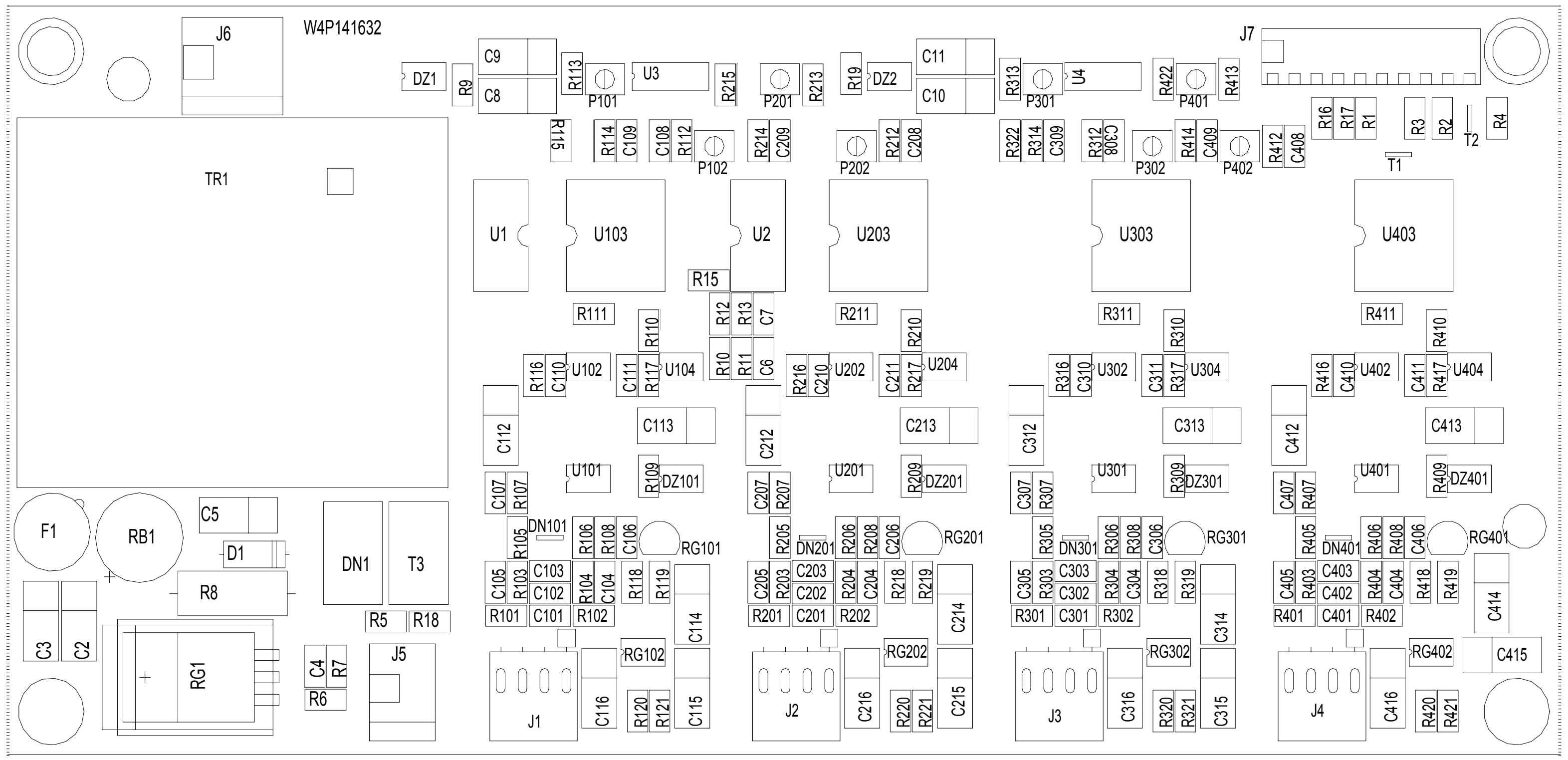
SHT : 1/1

odam

4. DIAGRAMS



ALIMENTATIONS
POWER SUPPLIES
MESURE PI2
IBP2 MEASUREMENT
MESURE PI1
IBP1 MEASUREMENT
VERS SECTEUR
TO MAIN
VERS BATTERIE
12V - 0.8Ah
TO BATTERY
VERS EMBASE PRESSION INVASIVE 2
TO INVASE BLOOD PRESSURE 2 PLUG
VERS EMBASE PRESSION INVASIVE 1
TO INVASE BLOOD PRESSURE 1 PLUG
VERS CIRCUIT IMPRIME TRAITEMENT / GESTION CAPTEUR
TO TREATEMENT / PROBES CONTROL PRINTED CIRCUIT
ALIM PI 2
ALIM PI 1
CHGBAT
BATTPI
GAIN
OFFSET
MAGLIFE C
ACQUISITION PI 1/2 ET ALIMENTATIONS
IBP 1/2 ACQUISITION AND POWER SUPPLIES
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
ECL1
02/98
02/98
11/98
ART NO : W1411743
PRT NO : W4P141632
DWG NO : W3S141643
DSK NO : W1K140850
SHT NO : 1/1

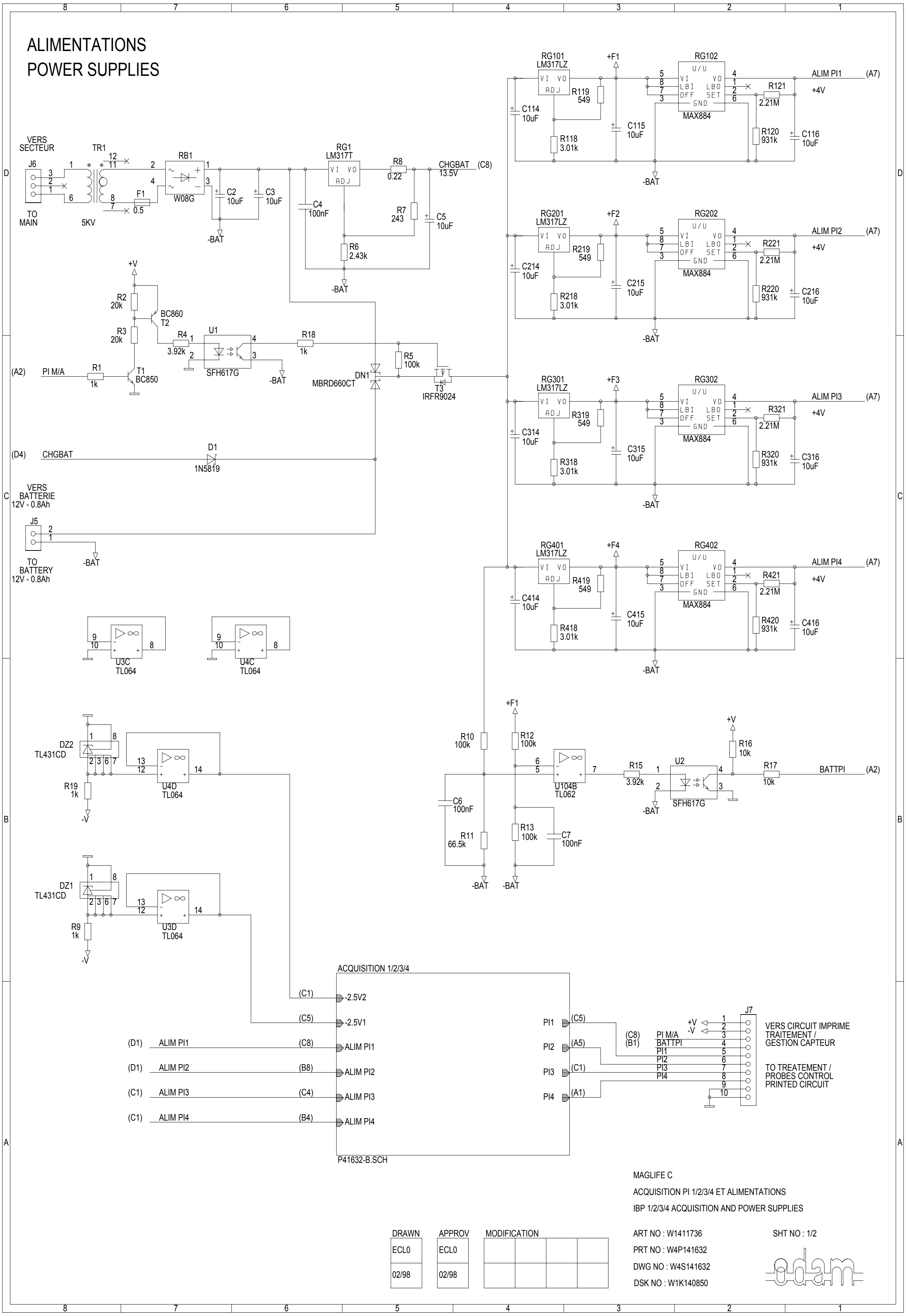


MAGLIFE C.
ACQUISITION PRESSIONS 1/2/3/4
PRESSURES 1/2/3/4 ACQUISITION

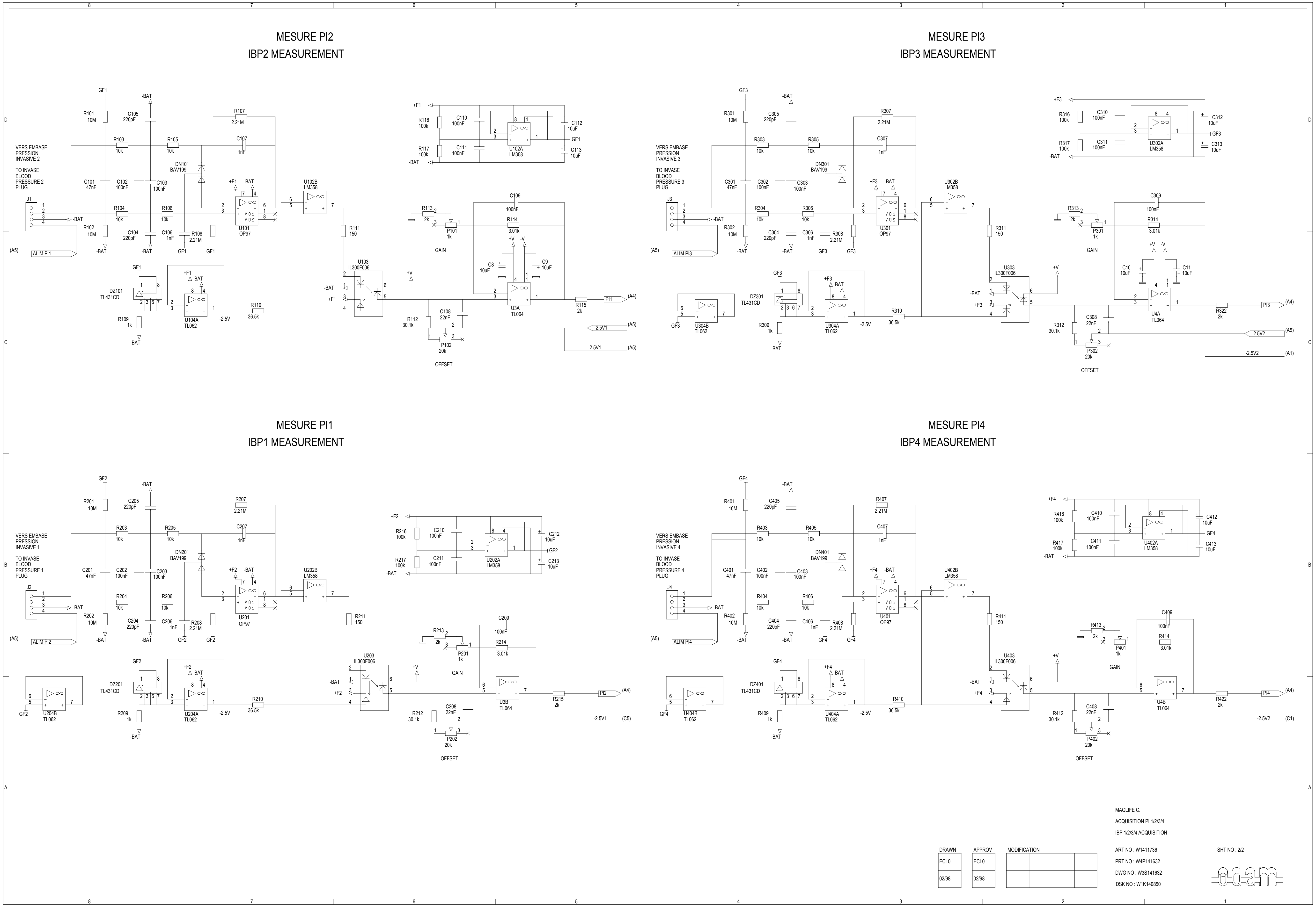
DRAWN	APPROV	MODIFICATION
ECL0	ECL0	
02/98	02/98	

ART NO : W1411736 SHT : 1/1
PRT NO : W4P141632
DWG NO : W4L141632
DSK NO : W1K140850

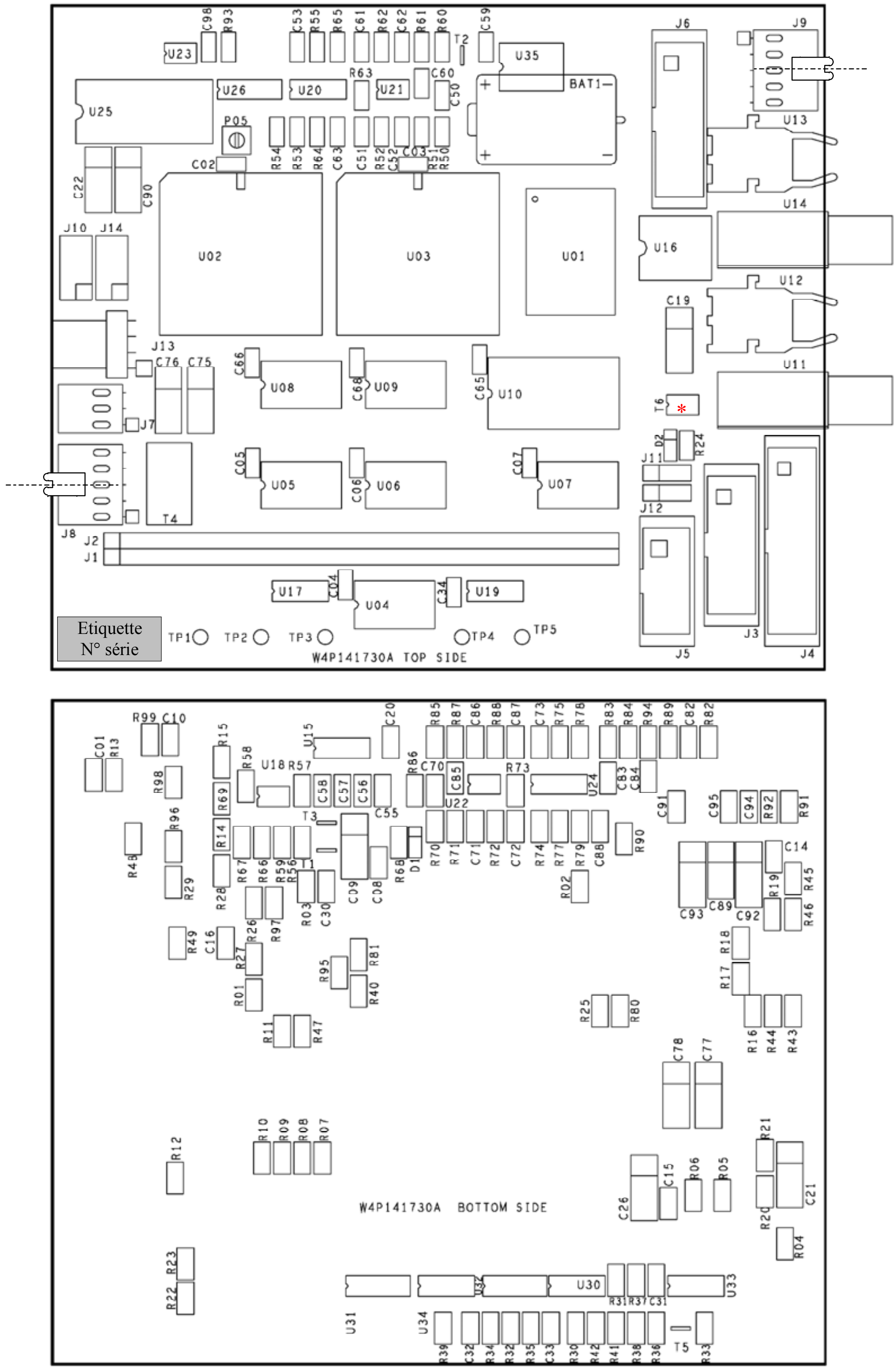
odam



ALIMENTATIONS
POWER SUPPLIES
VERS SECTEUR
TO MAIN
VERS BATTERIE 12V - 0.8Ah
TO BATTERY 12V - 0.8Ah
ACQUISITION 1/2/3/4
P41632-B.SCH
VERS CIRCUIT IMPRIME TRAITEMENT / GESTION CAPTEUR
TO TREATEMENT / PROBES CONTROL PRINTED CIRCUIT
MAGLIFE C
ACQUISITION PI 1/2/3/4 ET ALIMENTATIONS
IBP 1/2/3/4 ACQUISITION AND POWER SUPPLIES
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
02/98
02/98
ART NO : W1411736
SHT NO : 1/2
PRT NO : W4P141632
DWG NO : W4S141632
DSK NO : W1K140850


MESURE PI2
IBP2 MEASUREMENT
MESURE PI3
IBP3 MEASUREMENT
MESURE PI1
IBP1 MEASUREMENT
MESURE PI4
IBP4 MEASUREMENT
VERS EMBASE PRESSION INVASIVE 2
TO INVASE BLOOD PRESSURE 2 PLUG
VERS EMBASE PRESSION INVASIVE 3
TO INVASE BLOOD PRESSURE 3 PLUG
VERS EMBASE PRESSION INVASIVE 1
TO INVASE BLOOD PRESSURE 1 PLUG
VERS EMBASE PRESSION INVASIVE 4
TO INVASE BLOOD PRESSURE 4 PLUG
GAIN
OFFSET
MAGLIFE C.
ACQUISITION PI 1/2/3/4
IBP 1/2/3/4 ACQUISITION
DRAWN
APPROV
MODIFICATION
ECL0
02/98
ART NO : W1411736
PRT NO : W4P141632
DWG NO : W3S141632
DSK NO : W1K140850
SHT NO : 2/2
odam

4. DIAGRAMS



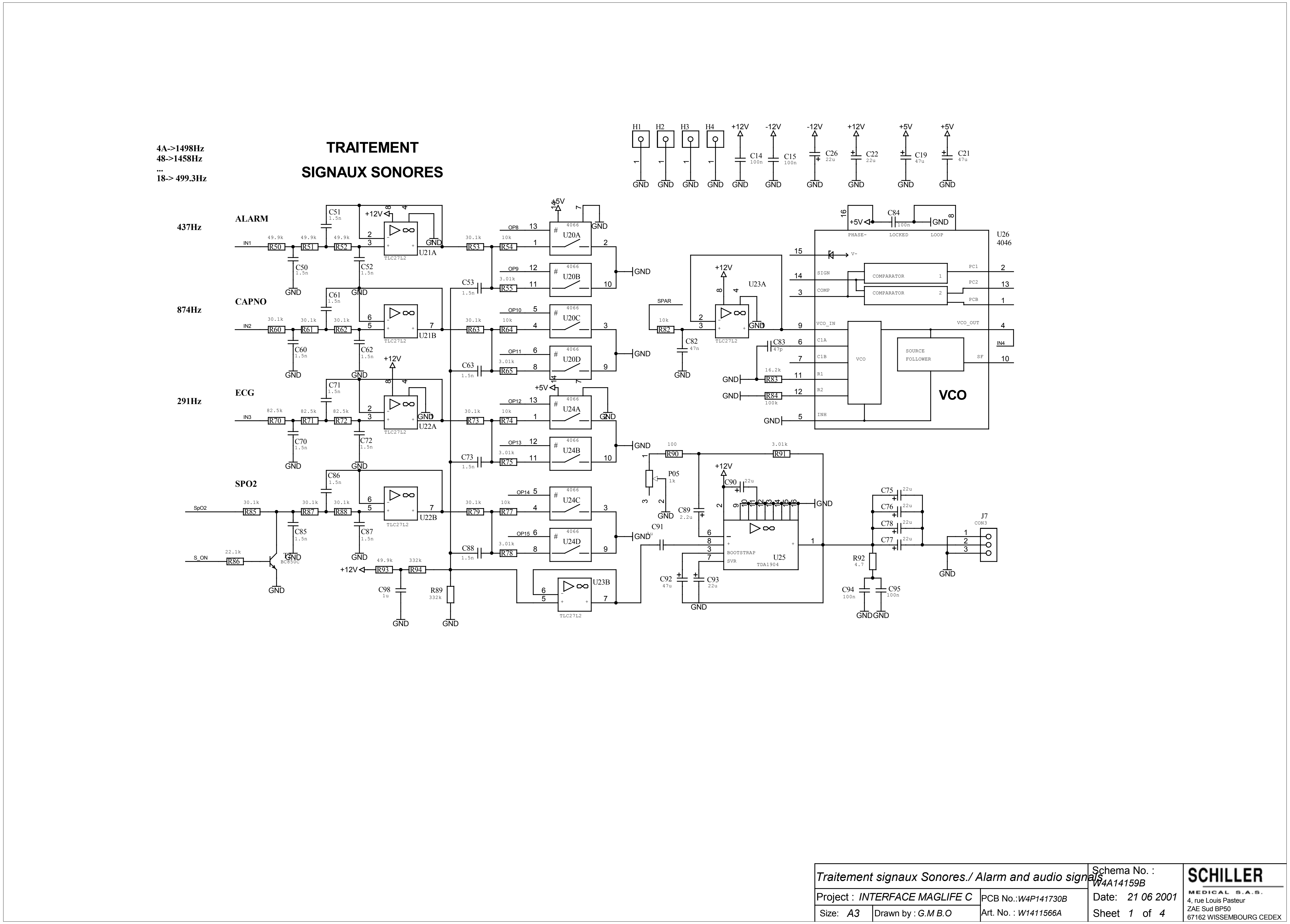
* = pas monté / *not mounted*

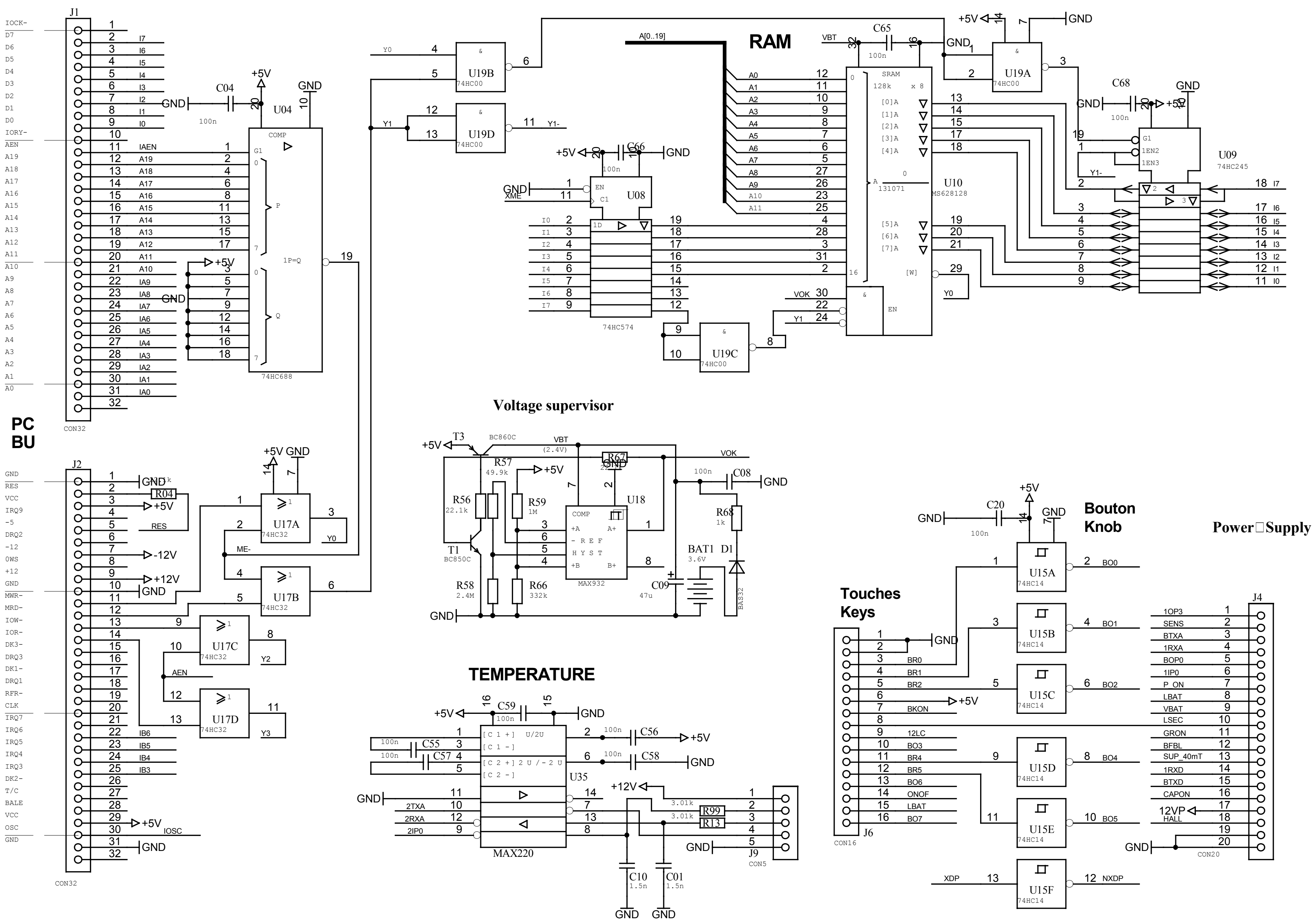
Interface PC
PC interface

DRAWN	APPROV	MODIFICATION			
CK	MK				
ECL1 06/ 01	ECL1 06/ 01				

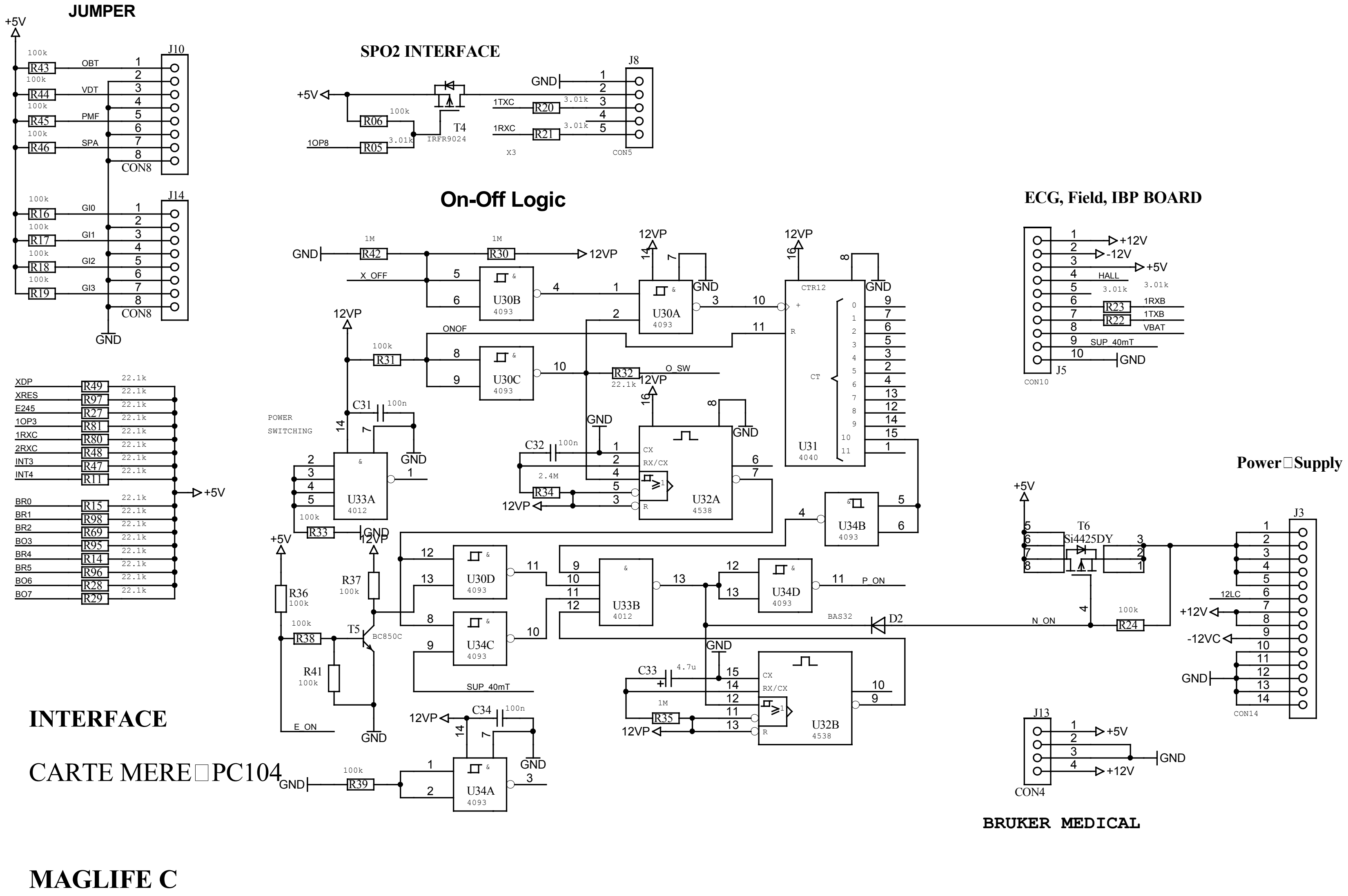
ART : W1412096
PRT : W4P141730A
DGW: W4L141730A
SHT : 1/1

SCHILLER
MEDICAL S.A.

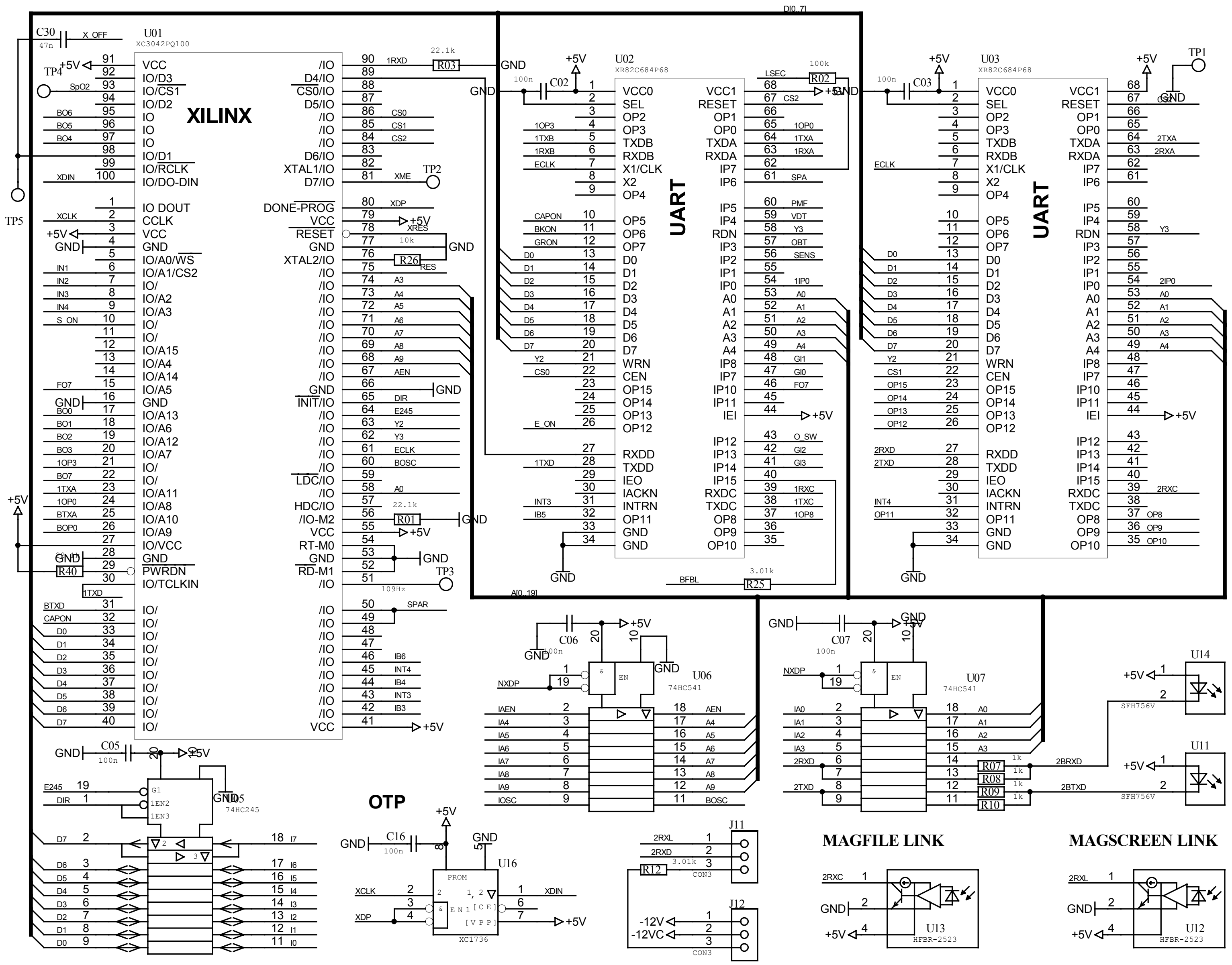

TRAITEMENT
SIGNAUX SONORES
4A->1498Hz
48->1458Hz
...
18-> 499.3Hz
437Hz
ALARM
874Hz
CAPNO
291Hz
ECG
SPO2
VCO
Traitement signaux Sonores./ Alarm and audio signals
Schema No. : W4A14159B
Project : INTERFACE MAGLIFE C
PCB No.:W4P141730B
Date: 21 06 2001
Size: A3
Drawn by : G.M B.O
Art. No. : W1411566A
Sheet 1 of 4
SCHILLER
MEDICAL S.A.S.
4, rue Louis Pasteur
ZAE Sud BP50
67162 WISSEMBOURG CEDEX



ISA BUS ,RAM memory,RS232 Interface		Schema No. : W4S14149B	SCHILLER MEDICAL S.A.S.
Project : INTERFACE MAGLIFE C	PCB No.:W4P141730B	Date: 21 06 2001	4, rue Louis Pasteur ZAE Sud BP50 67162 WISSEMBOURG CEDEX
Size: A3 / Drawn by : G.M B.O	Art. No. : W1411566A	Sheet 2 of 4	

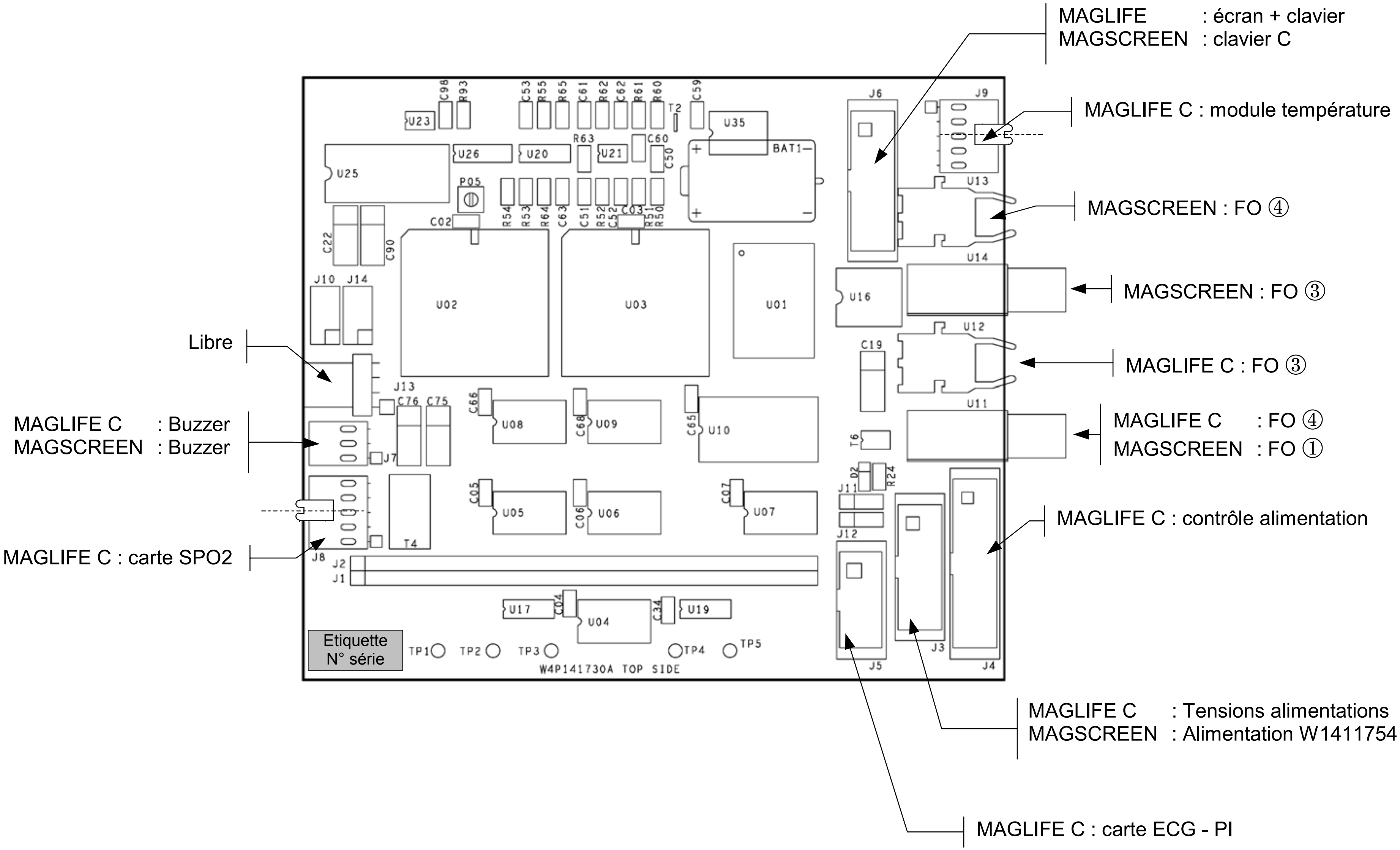


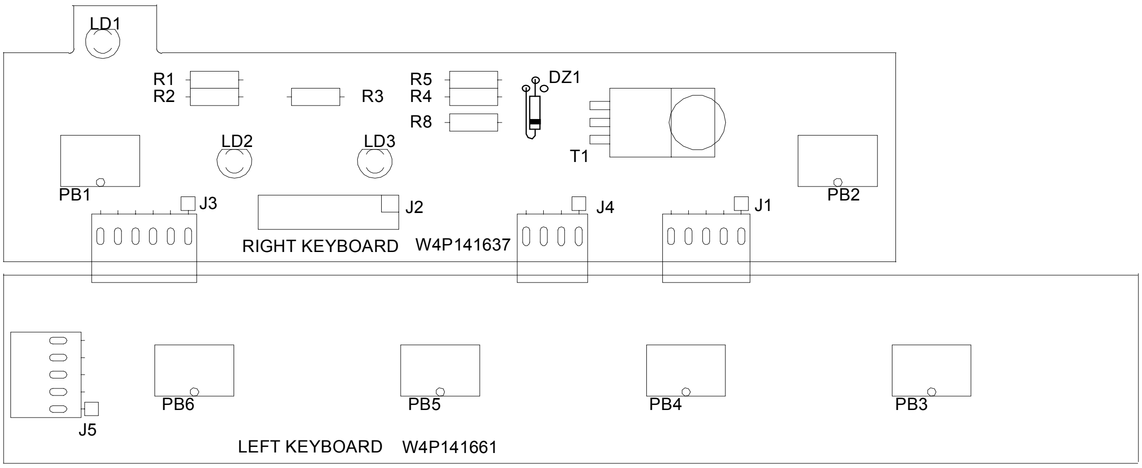
ON OFF Logic , Power supply		Schema No. : W4S141596B	SCHILLER MEDICAL S.A.S.
Project : INTERFACE MAGLIFE C	PCB No.:W4P141730B	Date: 21 06 2001	4, rue Louis Pasteur ZAE Sud BP50 67162 WISSEMBOURG CEDEX
Size: A3 — Drawn by : G.M B.O	Art. No. : W1411566A	Sheet 3 of 4	



XILINX ,UARTS, Optical Interface		Schema No. : W4S141596B	SCHILLER MEDICAL S.A.S. 4, rue Louis Pasteur ZAE Sud BP50 67162 WISSEMBOURG CEDEX
Project : INTERFACE MAGLIFE C	PCB No.:W4P141730B	Date: 21 06 2001	
Size: A3 Drawn by :G.M	Art. No. : W1411566A	Sheet 4 of 4	

W7412096 : CI INTERFACE MAGLIFE C



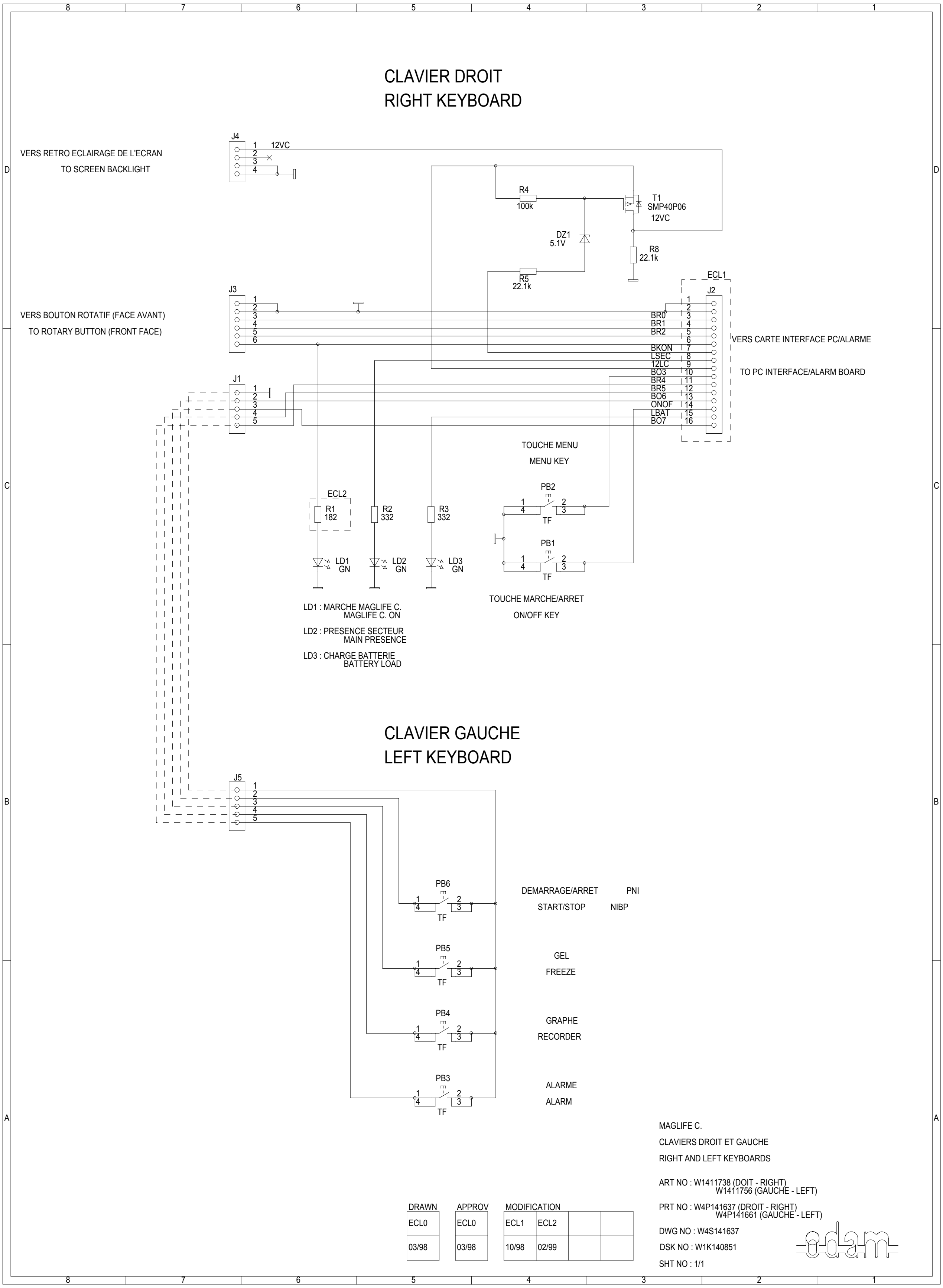


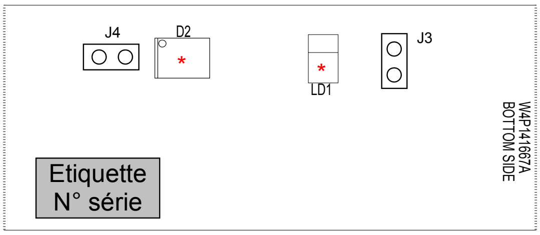
MAGLIFE C.
CLAVIERS DROIT ET GAUCHE
RIGHT AND LEFT KEYBOARDS

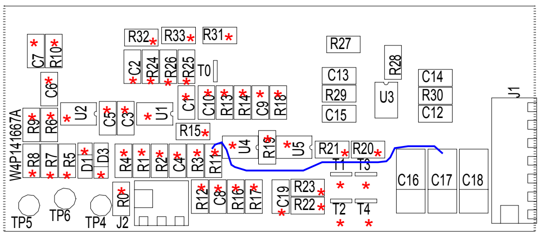
ART NO : W1411738 (droite - right)
W1411756 (gauche - left)
PRT NO : W4P141637 (droite - right)
W4P141661 (gauche - left)
DWG NO : W4L141637
DSK NO : W1K140851
SHT : 1/1

DRAWN	APPROV	MODIFICATION			
ECL0	ECL0	ECL1	ECL2		
03/98	03/98	10/98	02/99		

odam


CLAVIER DROIT
RIGHT KEYBOARD
VERS RETRO ECLAIRAGE DE L'ECRAN
TO SCREEN BACKLIGHT
J4
12VC
R4
100k
T1
SMP40P06
12VC
DZ1
5.1V
R8
22.1k
R5
22.1k
ECL1
J3
J2
VERS BOUTON ROTATIF (FACE AVANT)
TO ROTARY BUTTON (FRONT FACE)
BR0
BR1
BR2
BKON
LSEC
12LC
BO3
BR4
BR5
BO6
ONOF
LBAT
BO7
VERS CARTE INTERFACE PC/ALARME
TO PC INTERFACE/ALARM BOARD
J1
TOUCHE MENU
MENU KEY
PB2
PB1
TF
ECL2
R1
182
R2
332
R3
332
LD1 GN
LD2 GN
LD3 GN
LD1 : MARCHE MAGLIFE C.
MAGLIFE C. ON
LD2 : PRESENCE SECTEUR
MAIN PRESENCE
LD3 : CHARGE BATTERIE
BATTERY LOAD
TOUCHE MARCHE/ARRET
ON/OFF KEY
CLAVIER GAUCHE
LEFT KEYBOARD
J5
PB6
DEMARRAGE/ARRET PNI
START/STOP NIBP
PB5
GEL
FREEZE
PB4
GRAPHE
RECORDER
PB3
ALARME
ALARM
MAGLIFE C.
CLAVIERS DROIT ET GAUCHE
RIGHT AND LEFT KEYBOARDS
ART NO : W1411738 (DOIT - RIGHT)
W1411756 (GAUCHE - LEFT)
PRT NO : W4P141637 (DROIT - RIGHT)
W4P141661 (GAUCHE - LEFT)
DWG NO : W4S141637
DSK NO : W1K140851
SHT NO : 1/1
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
ECL1
ECL2
03/98
03/98
10/98
02/99
odam





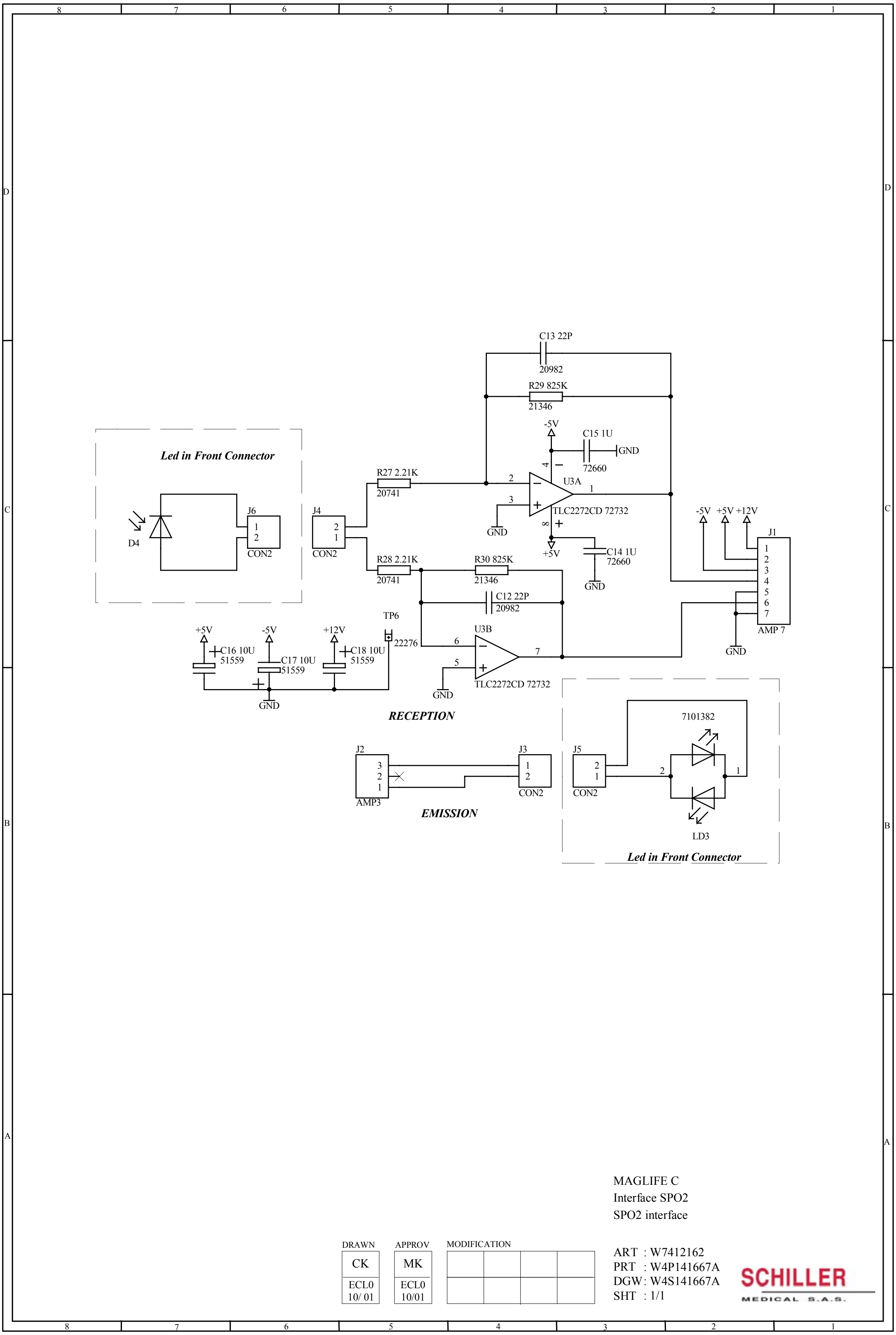
* = pas monté ou inutile / not mounted or useless

MAGLIFE C
Interface SPO2
SPO2 interface

DRAWN	APPROV	MODIFICATION
CK	MK	
ECL0 10/ 01	ECL0 10/01	

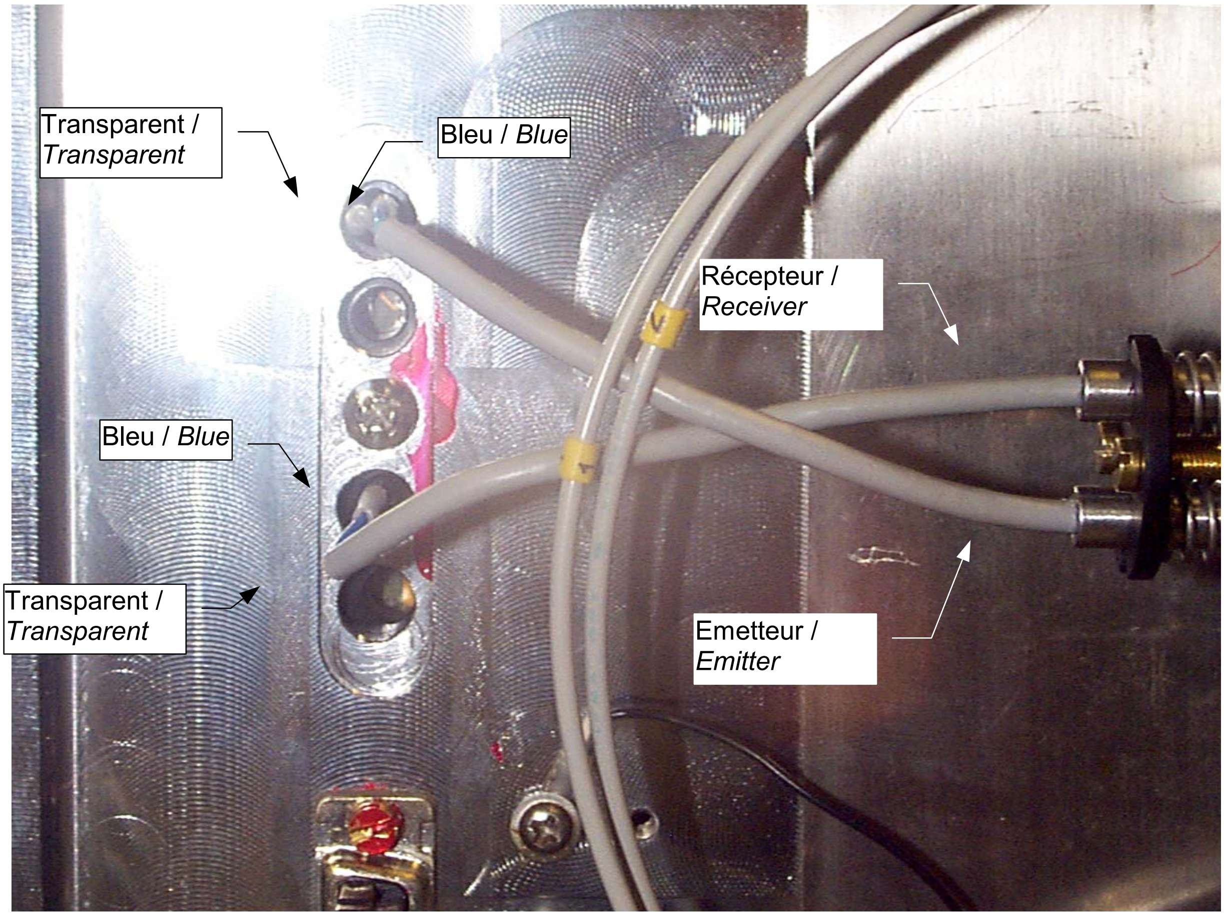
ART : W7412162
PRT : W4P141667A
DGW : W4L141667A
SHT : 1/1

SCHILLER MEDICAL S.A.S.

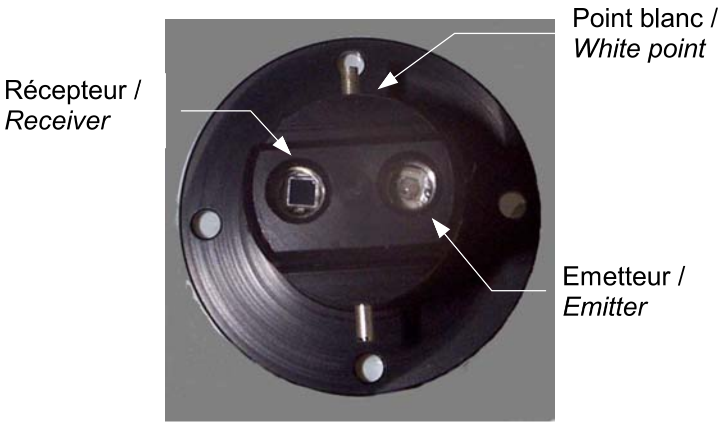


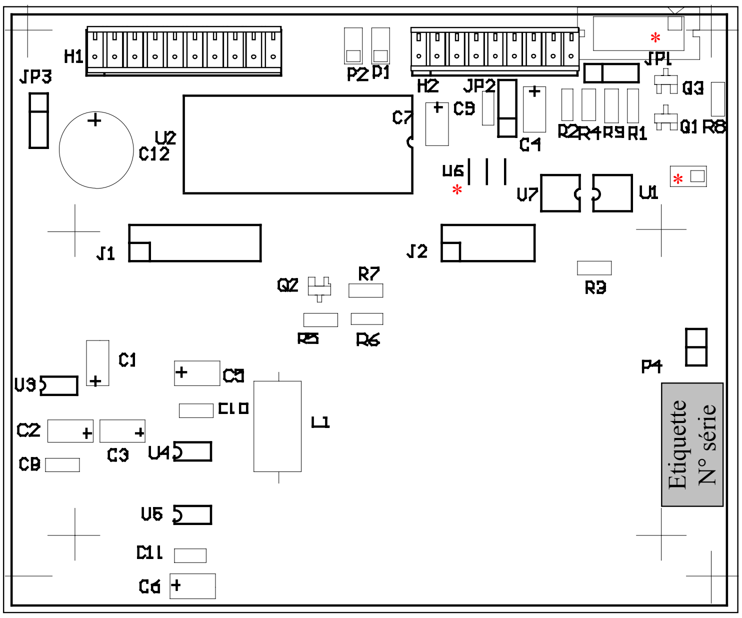
C13 22P
20982
R29 825K
21346
-5V
C15 1U
72660
GND
Led in Front Connector
R27 2.21K
20741
U3A
TLC2272CD 72732
GND
+5V
C14 1U
72660
GND
-5V +5V +12V
J1
AMP 7
GND
D4
J6
CON2
J4
CON2
R28 2.21K
20741
R30 825K
21346
C12 22P
20982
TP6
22276
U3B
TLC2272CD 72732
GND
+5V
-5V
+12V
C16 10U
51559
C17 10U
51559
C18 10U
51559
GND
RECEPTION
7101382
J2
AMP3
J3
CON2
J5
CON2
LD3
EMISSION
Led in Front Connector
MAGLIFE C
Interface SPO2
SPO2 interface
DRAWN
CK
ECL0 10/ 01
APPROV
MK
ECL0 10/01
MODIFICATION
ART : W7412162
PRT : W4P141667A
DGW: W4S141667A
SHT : 1/1
SCHILLER
MEDICAL S.A.S.

Connexion SPO2 / *SPO2 Connection*



Face avant / *Front panel*





* = pas monté / *not mounted*

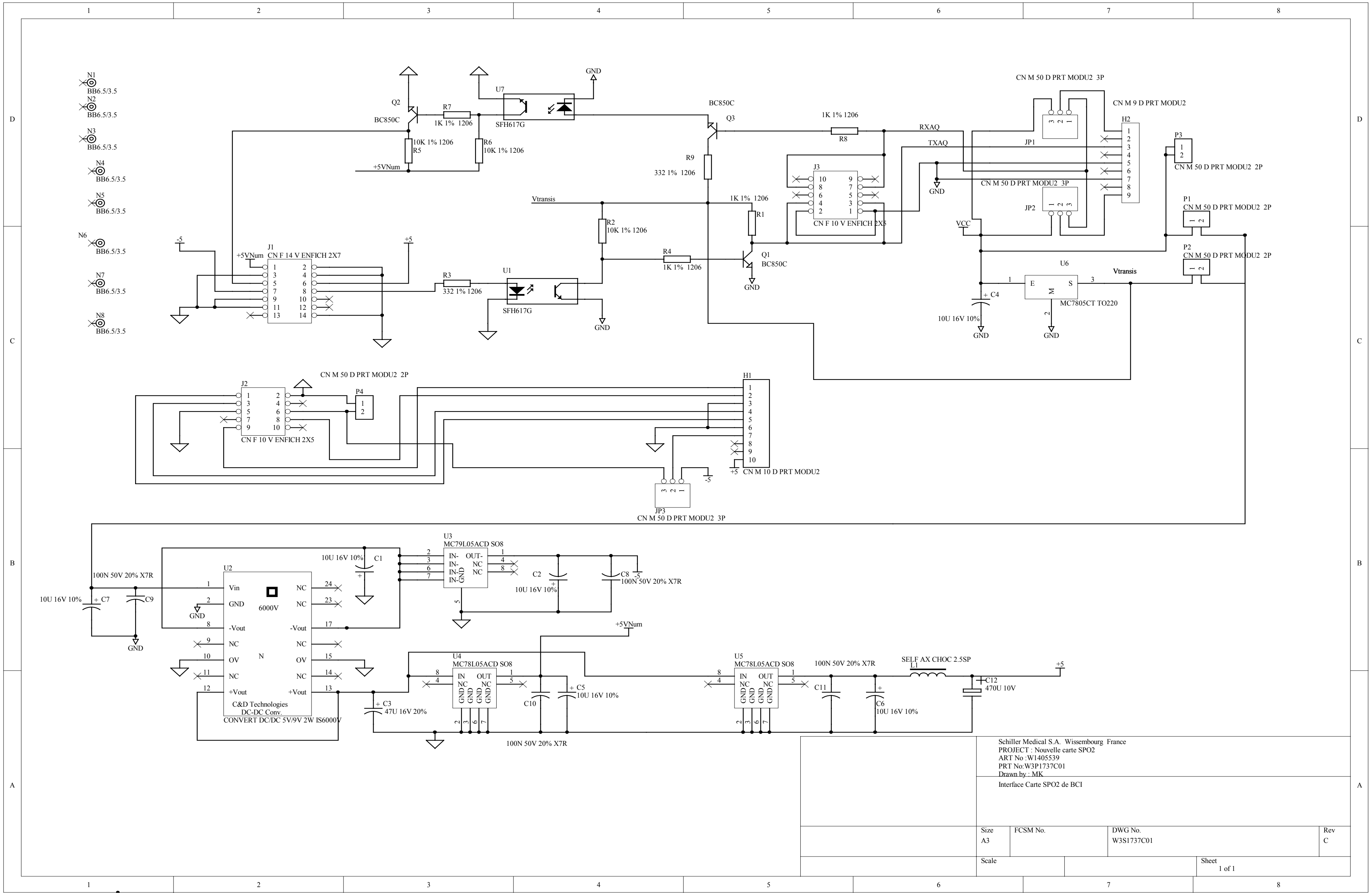
Dimensions : 84 mm x 101,5 mm

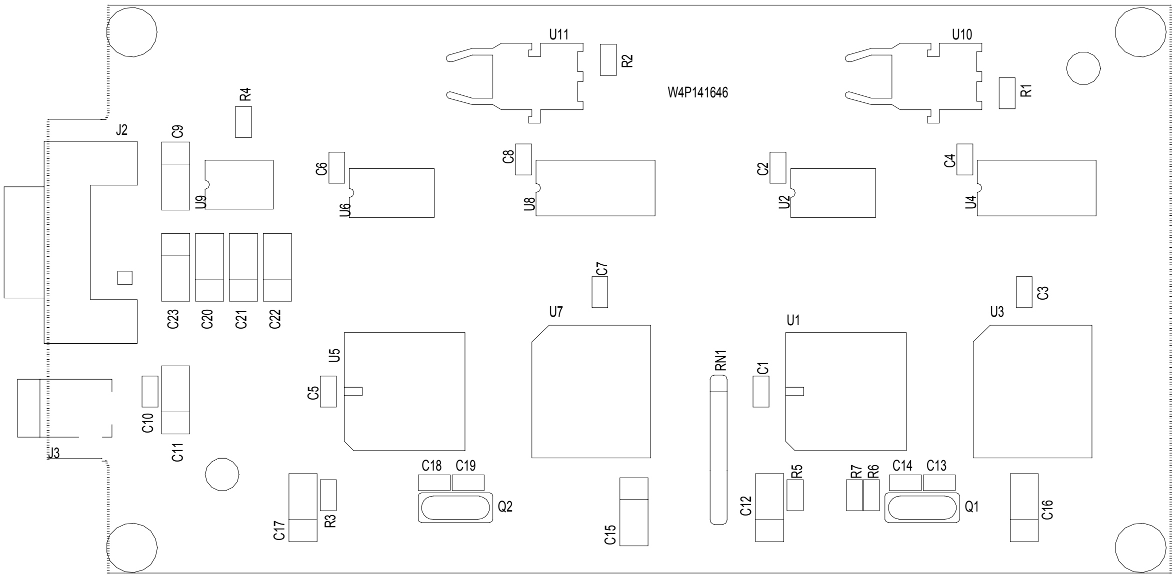
MAGLIFE C & DG1002
Interface SPO2 BCI
SPO2 BCI interface

DRAWN	APPROV	MODIFICATION
CK	MK	
ECL00 03 / 02	ECL00 03 / 02	

ART : W7412172
PRT : W3P1737C01
DGW: W3L1737C01
SHT : 1/1

SCHILLER MEDICAL S.A.


Schiller Medical S.A. Wissembourg France
PROJECT : Nouvelle carte SPO2
ART No :W1405539
PRT No:W3P1737C01
Drawn by : MK
Interface Carte SPO2 de BCI
Size A3
FCSM No.
DWG No. W3S1737C01
Rev C
Scale
Sheet 1 of 1



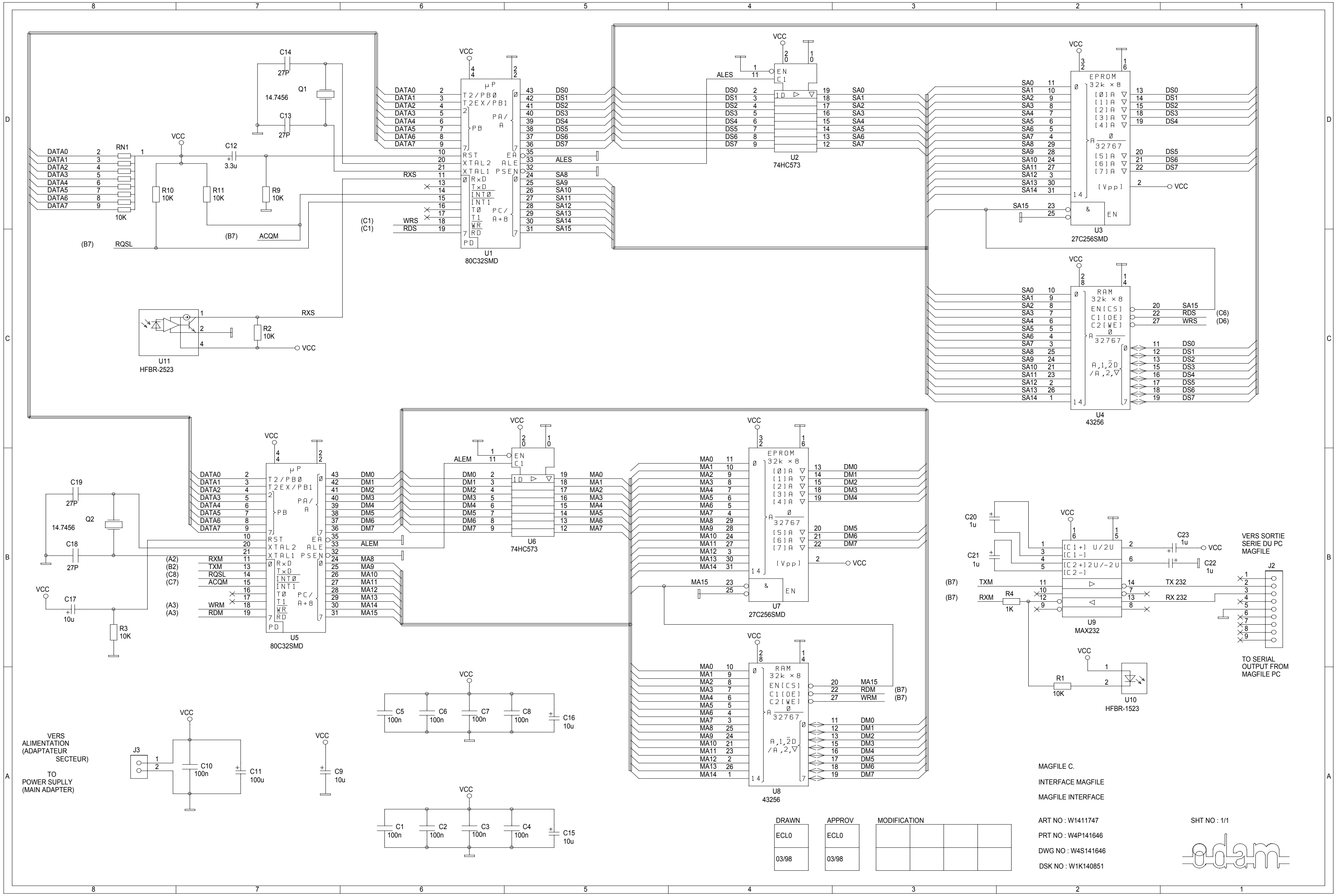
MAGLIFE C.
INTERFACE MAGFILE
MAGFILE INTERFACE

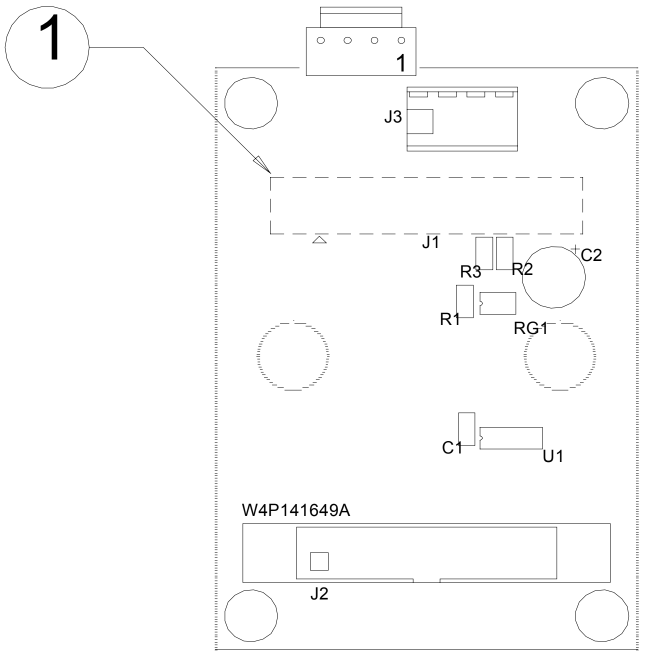
DRAWN	APPROV	MODIFICATION
ECL0	ECL0	
03/98	03/98	

ART NO : W1411747
PRT NO : W4P141646
DWG NO : W4L141646
DSK NO : W1K140851

SHT : 1/1

odam


U1
80C32SMD
U2
74HC573
U3
27C256SMD
U4
43256
U5
80C32SMD
U6
74HC573
U7
27C256SMD
U8
43256
U9
MAX232
U10
HFBR-1523
U11
HFBR-2523
Q1
14.7456
Q2
14.7456
RN1
10K
J2
J3
VERS SORTIE SERIE DU PC MAGFILE
TO SERIAL OUTPUT FROM MAGFILE PC
VERS ALIMENTATION (ADAPTATEUR SECTEUR)
TO POWER SUPPLY (MAIN ADAPTER)
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
03/98
03/98
MAGFILE C.
INTERFACE MAGFILE
MAGFILE INTERFACE
ART NO : W1411747
PRT NO : W4P141646
DWG NO : W4S141646
DSK NO : W1K140851
SHT NO : 1/1



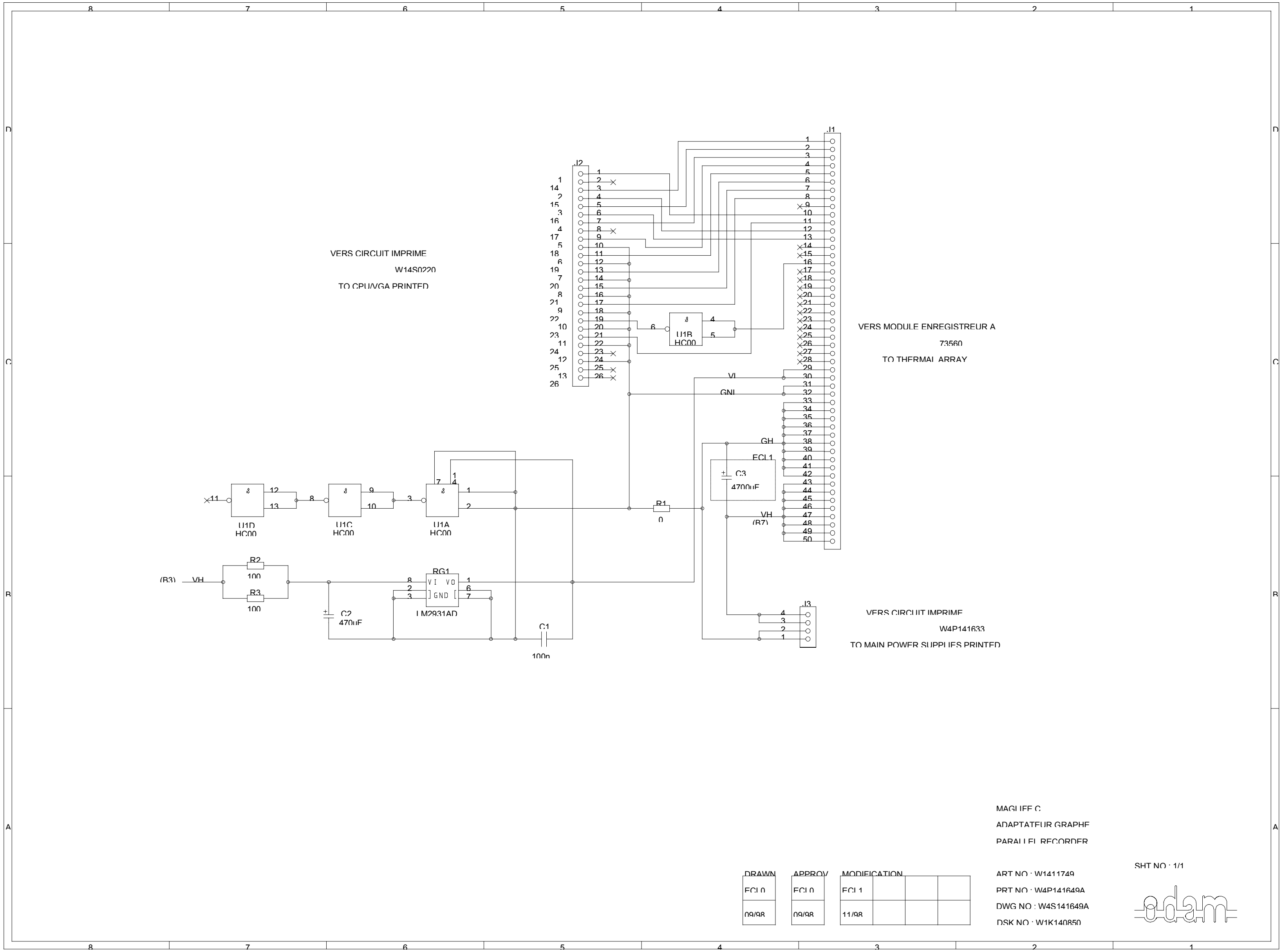
1 REMARQUE : J1 EST MONTE COTE SOUDURES

MAGLIFE C.
ADAPTATEUR GRAPHE PARALLELE
PARALLEL RECORDER ADAPTER

ART NO : W1411749
PRT NO : W4P141649A
DWG NO : W4L141649A
DSK NO : W1K140850
SHT : 1/1

DRAWN	APPROV	MODIFICATION			
ECL0	ECL0	ECL1			
09/98	09/98	11/98			

odam

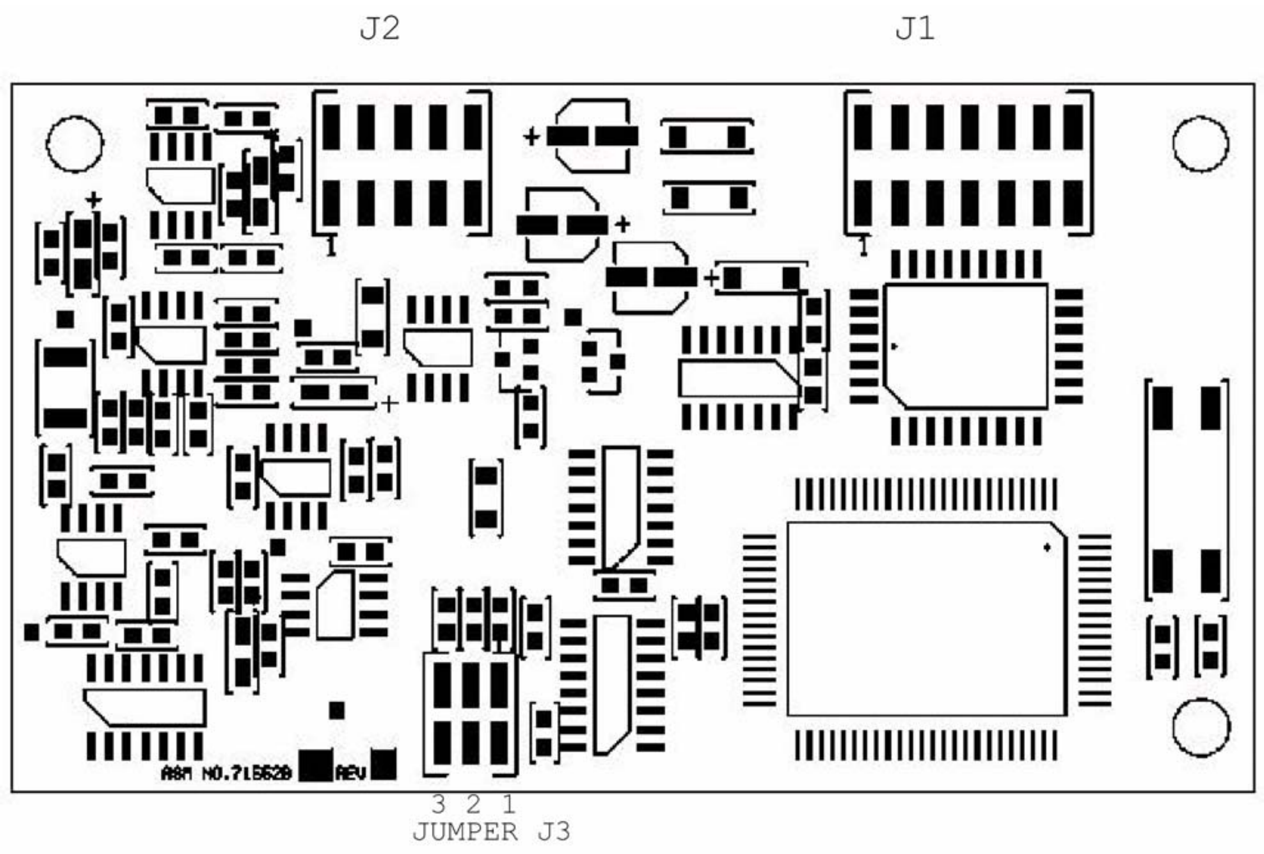


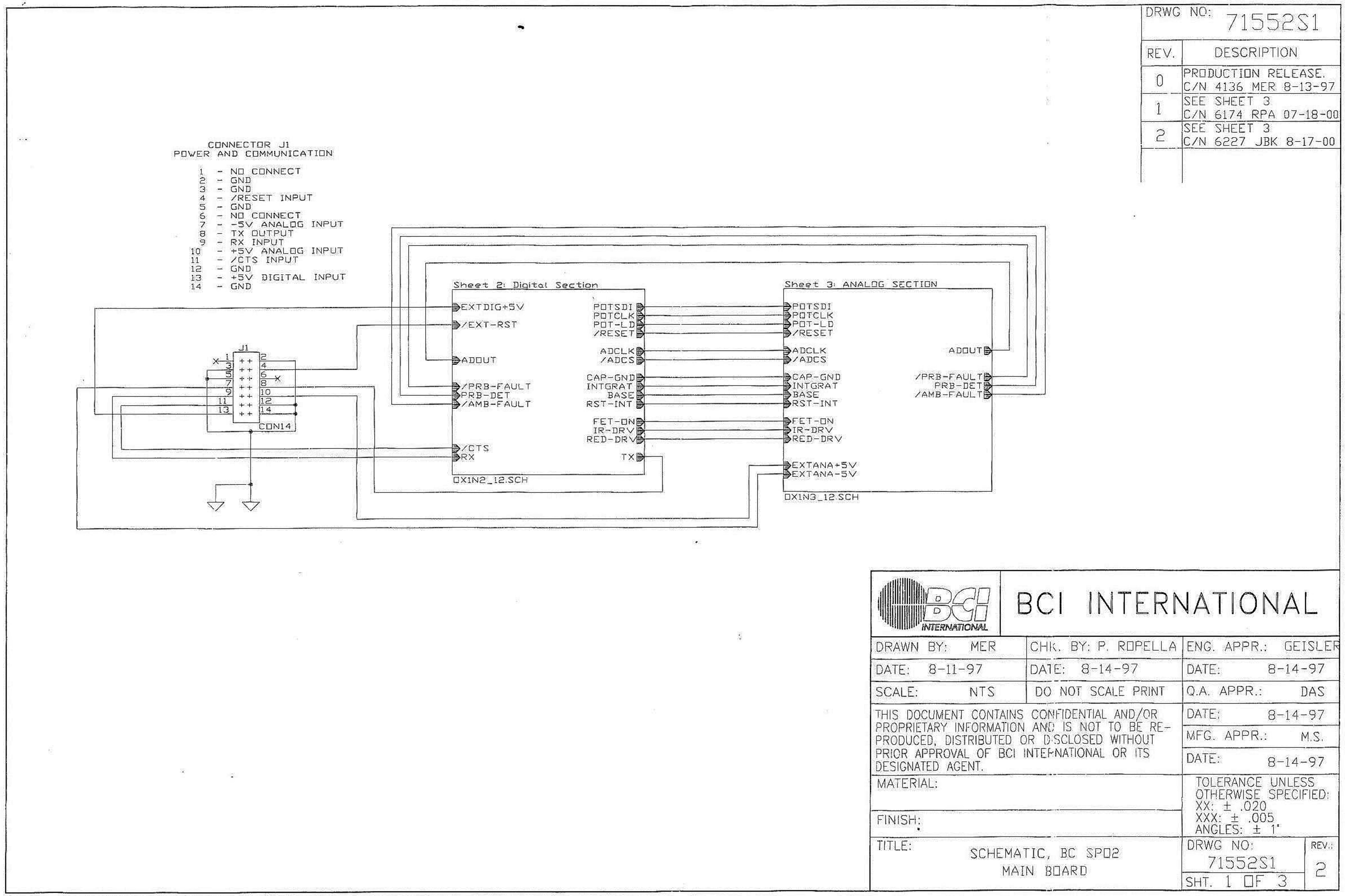
VERS CIRCUIT IMPRIME
W14S0220
TO CPU/VGA PRINTED
VERS MODULE ENREGISTREUR A
73560
TO THERMAL ARRAY
VERS CIRCUIT IMPRIME
W4P141633
TO MAIN POWER SUPPLIES PRINTED
J1
J2
J3
U1A HC00
U1B HC00
U1C HC00
U1D HC00
RG1
LM2931AD
R1 0
R2 100
R3 100
C1 100n
C2 470uF
C3 4700uF
VH
GH
ECL1
MAGUEE C
ADAPTATEUR GRAPHE
PARALLEL RECORDER
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
ECL1
09/98
09/98
11/98
ART NO : W1411749
PRT NO : W4P141649A
DWG NO : W4S141649A
DSK NO : W1K140850
SHT NO : 1/1
odam

4.2. Diagrams "SpO2 Module"

PART NUMBER	DESCRIPTION	PAGE
77193	**Printed circuit « CPU SpO2 » 71552 B1**	
	◊ layout 1/1	4-35
	◊ circuit diagram 1/3	4-36
	◊ circuit diagram 2/3	4-37
	◊ circuit diagram 3/3	4-38

4. DIAGRAMS

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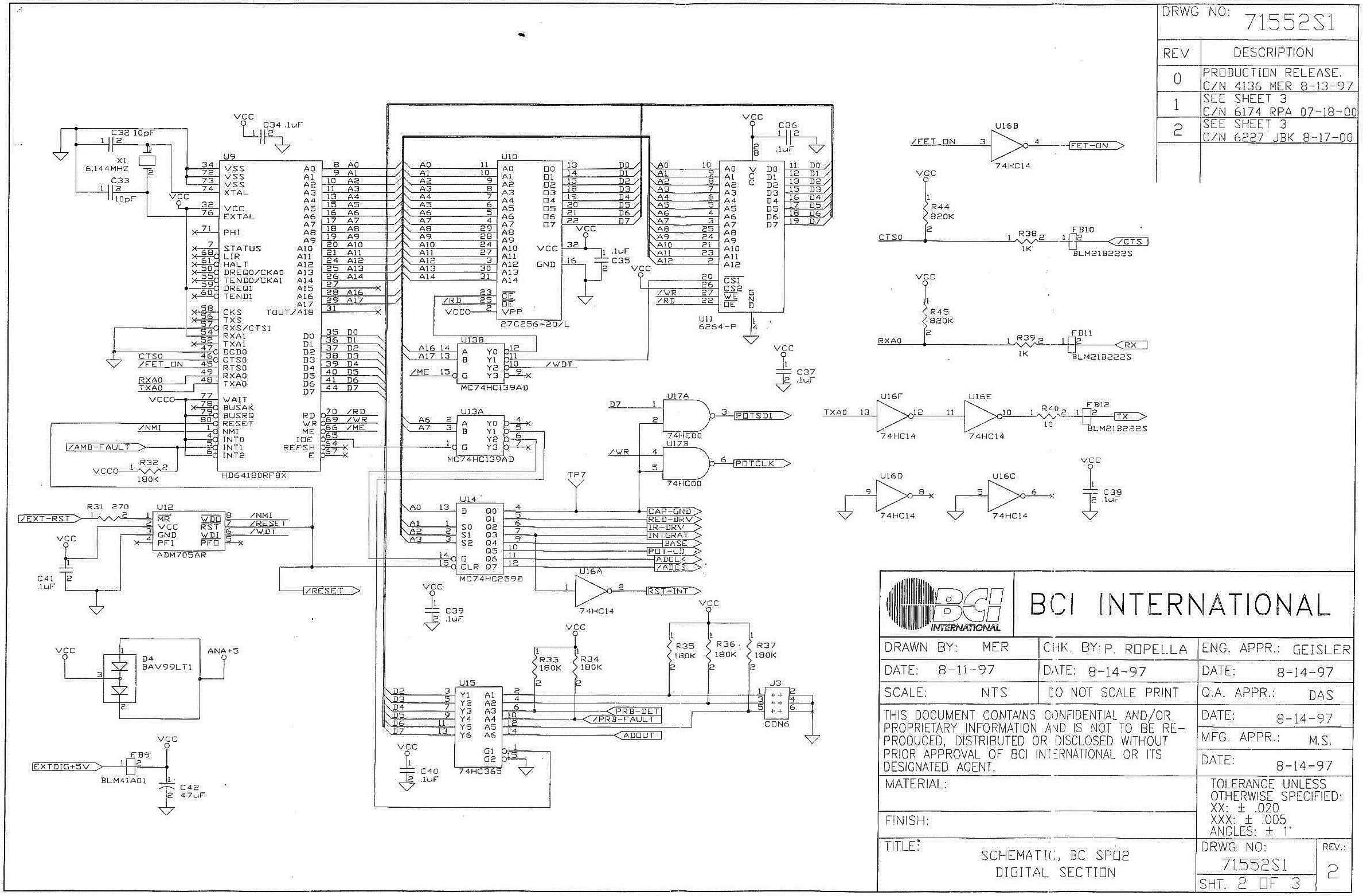
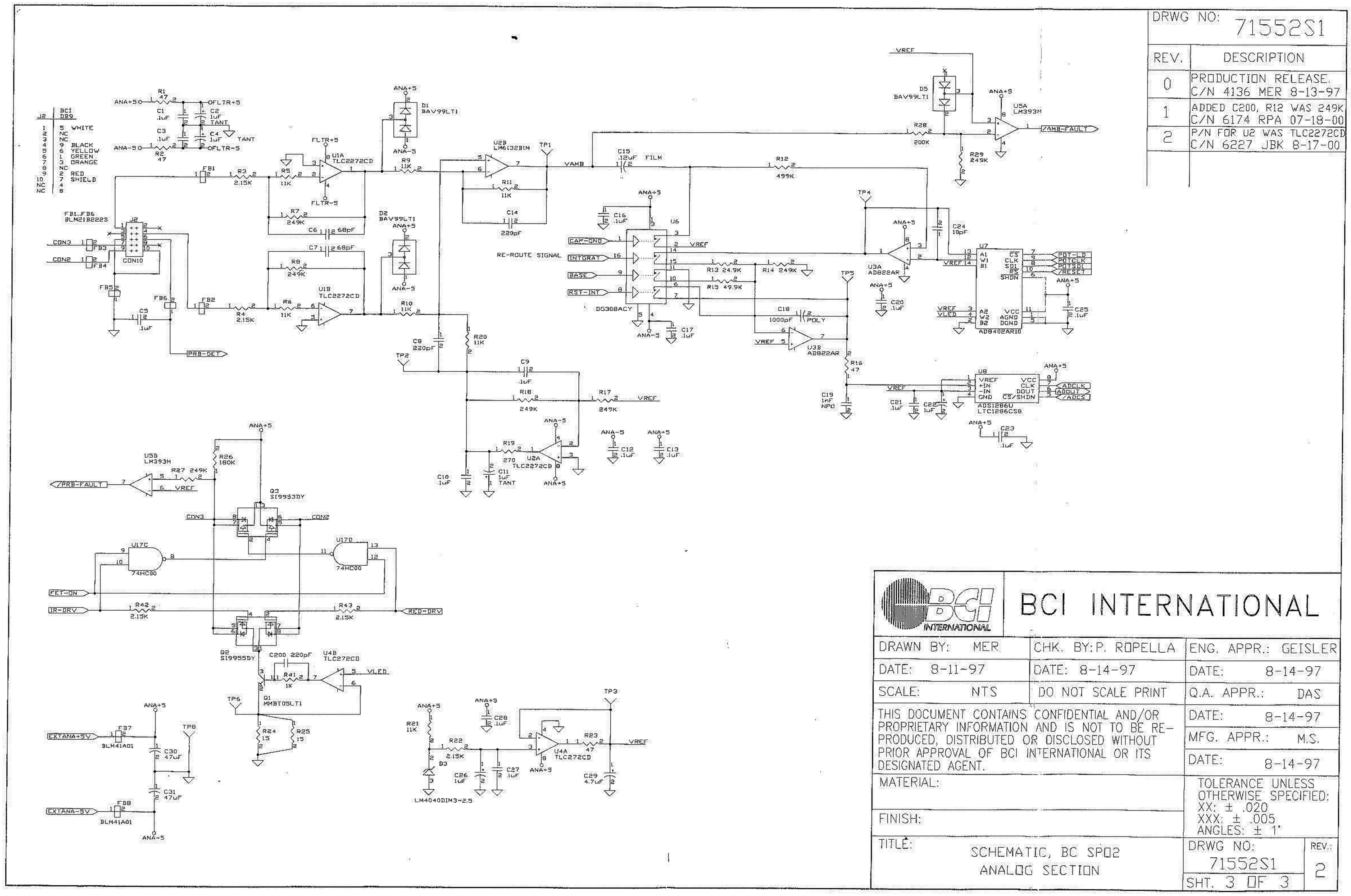
REV. DESCRIPTION
0 PRODUCTION RELEASE. C/N 4136 MER 8-13-97
1 SEE SHEET 3 C/N 6174 RPA 07-18-00
2 SEE SHEET 3 C/N 6227 JBK 8-17-00
CONNECTOR J1
POWER AND COMMUNICATION
1 - NO CONNECT
2 - GND
3 - GND
4 - /RESET INPUT
5 - GND
6 - NO CONNECT
7 - -5V ANALOG INPUT
8 - TX OUTPUT
9 - RX INPUT
10 - +5V ANALOG INPUT
11 - /CTS INPUT
12 - GND
13 - +5V DIGITAL INPUT
14 - GND
J1
CON14
Sheet 2: Digital Section
EXTDIG+5V
/EXT-RST
ADOUT
/PRB-FAULT
PRB-DET
/AMB-FAULT
/CTS
RX
POTSDI
POTCLK
POT-LD
/RESET
ADCLK
/ADCS
CAP-GND
INTGRAT
BASE
RST-INT
FET-ON
IR-DRV
RED-DRV
TX
OX1N2_12.SCH
Sheet 3: ANALOG SECTION
POTSDI
POTCLK
POT-LD
/RESET
ADCLK
/ADCS
CAP-GND
INTGRAT
BASE
RST-INT
FET-ON
IR-DRV
RED-DRV
EXTANA+5V
EXTANA-5V
ADOUT
/PRB-FAULT
PRB-DET
/AMB-FAULT
OX1N3_12.SCH
BCI INTERNATIONAL
DRAWN BY: MER
CHK. BY: P. ROPELLA
ENG. APPR.: GEISLER
DATE: 8-11-97
DATE: 8-14-97
DATE: 8-14-97
SCALE: NTS
DO NOT SCALE PRINT
Q.A. APPR.: DAS
THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND IS NOT TO BE REPRODUCED, DISTRIBUTED OR DISCLOSED WITHOUT PRIOR APPROVAL OF BCI INTERNATIONAL OR ITS DESIGNATED AGENT.
DATE: 8-14-97
MFG. APPR.: M.S.
DATE: 8-14-97
MATERIAL:
FINISH:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
TITLE: SCHEMATIC, BC SPO2 MAIN BOARD
DRWG NO: 71552S1
REV.: 2
SHT. 1 OF 3



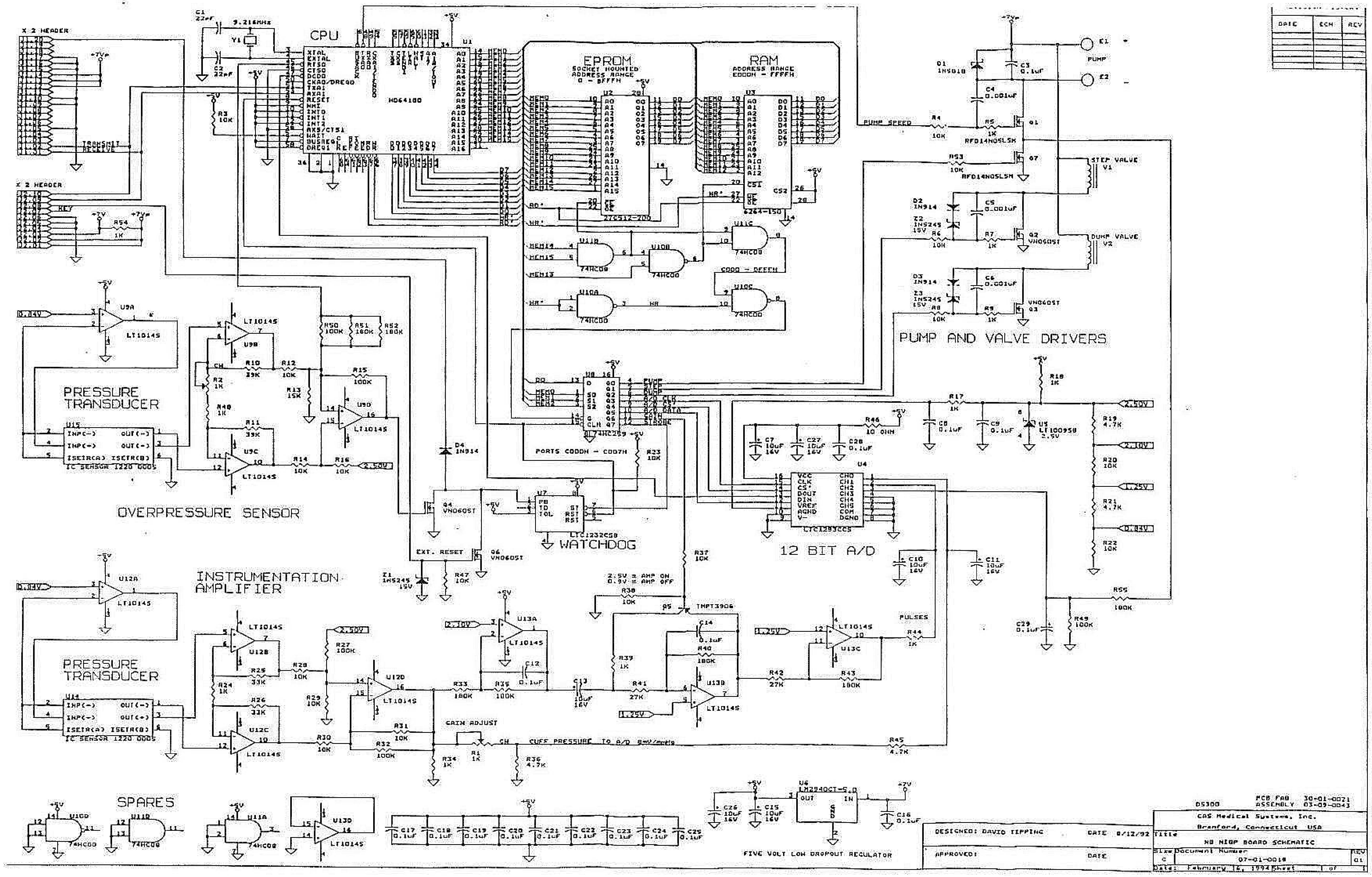
DRWG NO: 71552S1
REV | DESCRIPTION
0 PRODUCTION RELEASE. C/N 4136 MER 8-13-97
1 SEE SHEET 3 C/N 6174 RPA 07-18-00
2 SEE SHEET 3 C/N 6227 JBK 8-17-00
BCI INTERNATIONAL
DRAWN BY: MER
CHK. BY: P. ROPELLA
ENG. APPR.: GEISLER
DATE: 8-11-97
DATE: 8-14-97
DATE: 8-14-97
SCALE: NTS
DO NOT SCALE PRINT
Q.A. APPR.: DAS
THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND IS NOT TO BE REPRODUCED, DISTRIBUTED OR DISCLOSED WITHOUT PRIOR APPROVAL OF BCI INTERNATIONAL OR ITS DESIGNATED AGENT.
DATE: 8-14-97
MFG. APPR.: M.S.
DATE: 8-14-97
MATERIAL:
TOLERANCE UNLESS OTHERWISE SPECIFIED: XX: ± .020 XXX: ± .005 ANGLES: ± 1°
FINISH:
TITLE: SCHEMATIC, BC SPO2 DIGITAL SECTION
DRWG NO: 71552S1
REV.: 2
SHT. 2 OF 3
U9 HD64180RF8X
U10 27C256-20/L
U11 6264-P
U12 ADM705AR
U13B MC74HC139AD
U13A MC74HC139AD
U14 MC74HC259D
U15 74HC365
U17A 74HC00
U17B 74HC00
X1 6.144MHZ
D4 BAV99LT1


DRWG NO: 71552S1
REV.
DESCRIPTION
0
PRODUCTION RELEASE.
C/N 4136 MER 8-13-97
1
ADDED C200, R12 WAS 249K
C/N 6174 RPA 07-18-00
2
P/N FOR U2 WAS TLC2272CD
C/N 6227 JBK 8-17-00
BCI INTERNATIONAL
DRAWN BY: MER
CHK. BY: P. ROPELLA
ENG. APPR.: GEISLER
DATE: 8-11-97
DATE: 8-14-97
DATE: 8-14-97
SCALE: NTS
DO NOT SCALE PRINT
Q.A. APPR.: DAS
THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND IS NOT TO BE RE-PRODUCED, DISTRIBUTED OR DISCLOSED WITHOUT PRIOR APPROVAL OF BCI INTERNATIONAL OR ITS DESIGNATED AGENT.
DATE: 8-14-97
MFG. APPR.: M.S.
DATE: 8-14-97
MATERIAL:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
FINISH:
TITLE:
SCHEMATIC, BC SP02
ANALOG SECTION
DRWG NO: 71552S1
REV.: 2
SHT. 3 OF 3

4. DIAGRAMS

4.3. Diagrams "PNI module"

PART NUMBER	DESCRIPTION	PAGE
U44029	**Printed circuit « PNI Module »** ◊ circuit diagram 1/1	 4-40

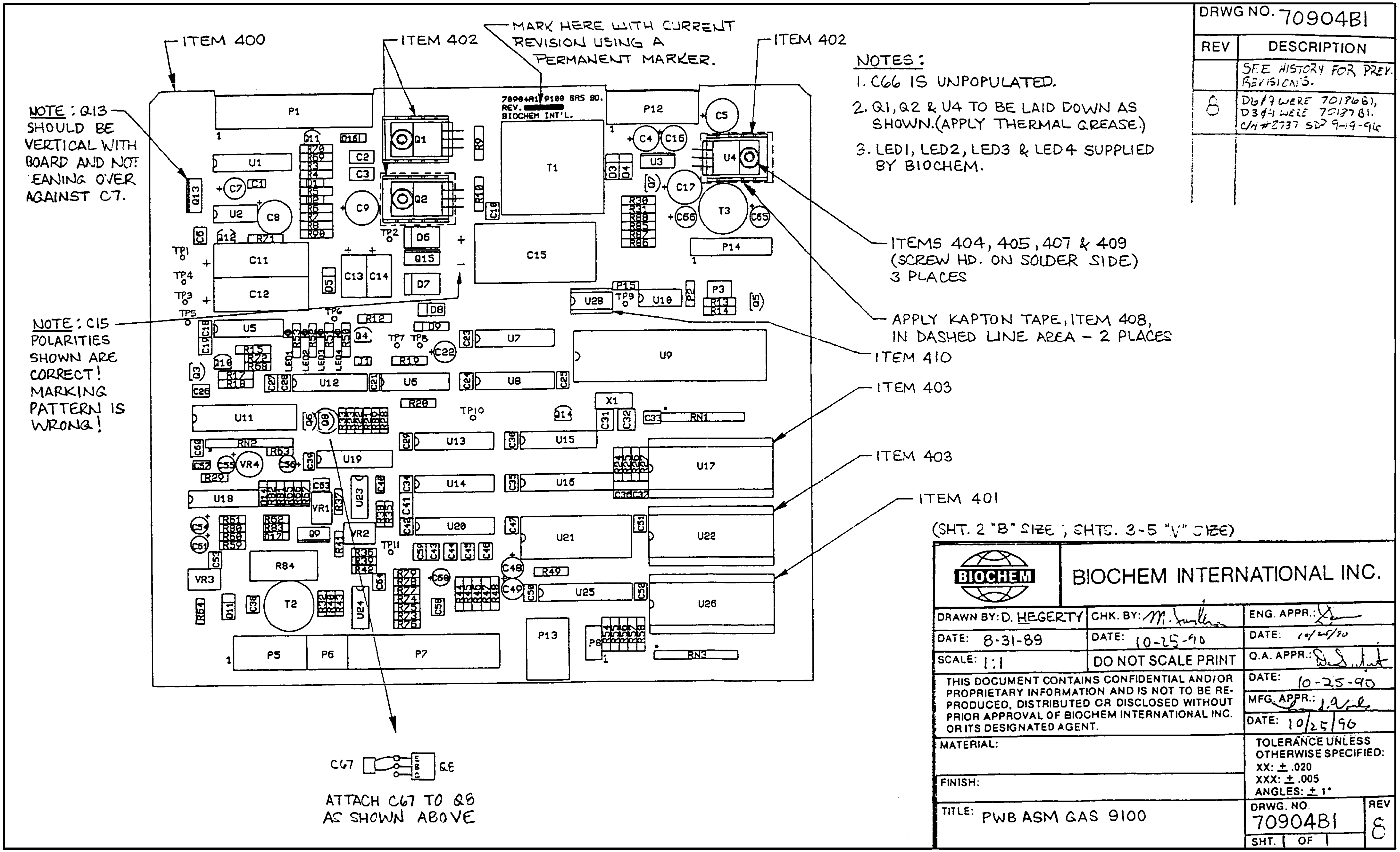


CPU
EPROM
RAM
PUMP AND VALVE DRIVERS
PRESSURE TRANSDUCER
OVERPRESSURE SENSOR
WATCHDOG
12 BIT A/D
PRESSURE TRANSDUCER
INSTRUMENTATION AMPLIFIER
SPARES
FIVE VOLT LOW DROPOUT REGULATOR
CAS Medical Systems, Inc.
Branford, Connecticut USA

4. DIAGRAMS

4.4. Diagrams "Capno module"

PART NUMBER	DESCRIPTION	PAGE
W14S0284	**Printed circuit « CPU Capno 9100 » 70904S1**	
	◊ layout (70904B1)	4-42
	◊ circuit diagram	4-43
	◊ circuit diagram (Power Supply Section)	4-44
	◊ circuit diagram (A/D Section)	4-45
	◊ circuit diagram (Agent Detector Section)	4-46
	◊ circuit diagram (Digital Section)	4-47
	◊ circuit diagram (Pump Speed Control Section)	4-48
with halogene agents : W14S0227	**Printed circuit « 9100 Optical Bench » 70226A1**	
	◊ layout	4-49
without halogene agents : W14S0228	**Printed circuit « 9100 Agent Preamplifier Board » 70464S1**	
	◊ layout	4-50
	◊ circuit diagram	4-51
W14S0229	**Printed circuit « 9100 Pneumatic Board » 70116S1**	
	◊ layout	4-52
	◊ circuit diagram	4-53



DRWG NO. 70904B1
REV DESCRIPTION
SEE HISTORY FOR PREV. REVISIONS.
8 D6/7 WERE 701768B1, D3/4 WERE 701878B1. C/N #2737 SD 9-19-96
ITEM 400
ITEM 402
MARK HERE WITH CURRENT REVISION USING A PERMANENT MARKER.
ITEM 402
NOTES:
1. C66 IS UNPOPULATED.
2. Q1, Q2 & U4 TO BE LAID DOWN AS SHOWN. (APPLY THERMAL GREASE.)
3. LED1, LED2, LED3 & LED4 SUPPLIED BY BIOCHEM.
NOTE: Q13 SHOULD BE VERTICAL WITH BOARD AND NOT LEANING OVER AGAINST C7.
70904A1 9100 GAS BD. REV. BIOCHEM INT'L.
ITEMS 404, 405, 407 & 409 (SCREW HD. ON SOLDER SIDE) 3 PLACES
NOTE: C15 POLARITIES SHOWN ARE CORRECT! MARKING PATTERN IS WRONG!
APPLY KAPTON TAPE, ITEM 408, IN DASHED LINE AREA - 2 PLACES
ITEM 410
ITEM 403
ITEM 403
ITEM 401
(SHT. 2 "B" SIZE ; SHTS. 3-5 "V" SIZE)
C67 E B C Q8
ATTACH C67 TO Q8 AS SHOWN ABOVE
BIOCHEM
BIOCHEM INTERNATIONAL INC.
DRAWN BY: D. HEGERTY
CHK. BY:
ENG. APPR.:
DATE: 8-31-89
DATE: 10-25-90
DATE: 10/25/90
SCALE: 1:1
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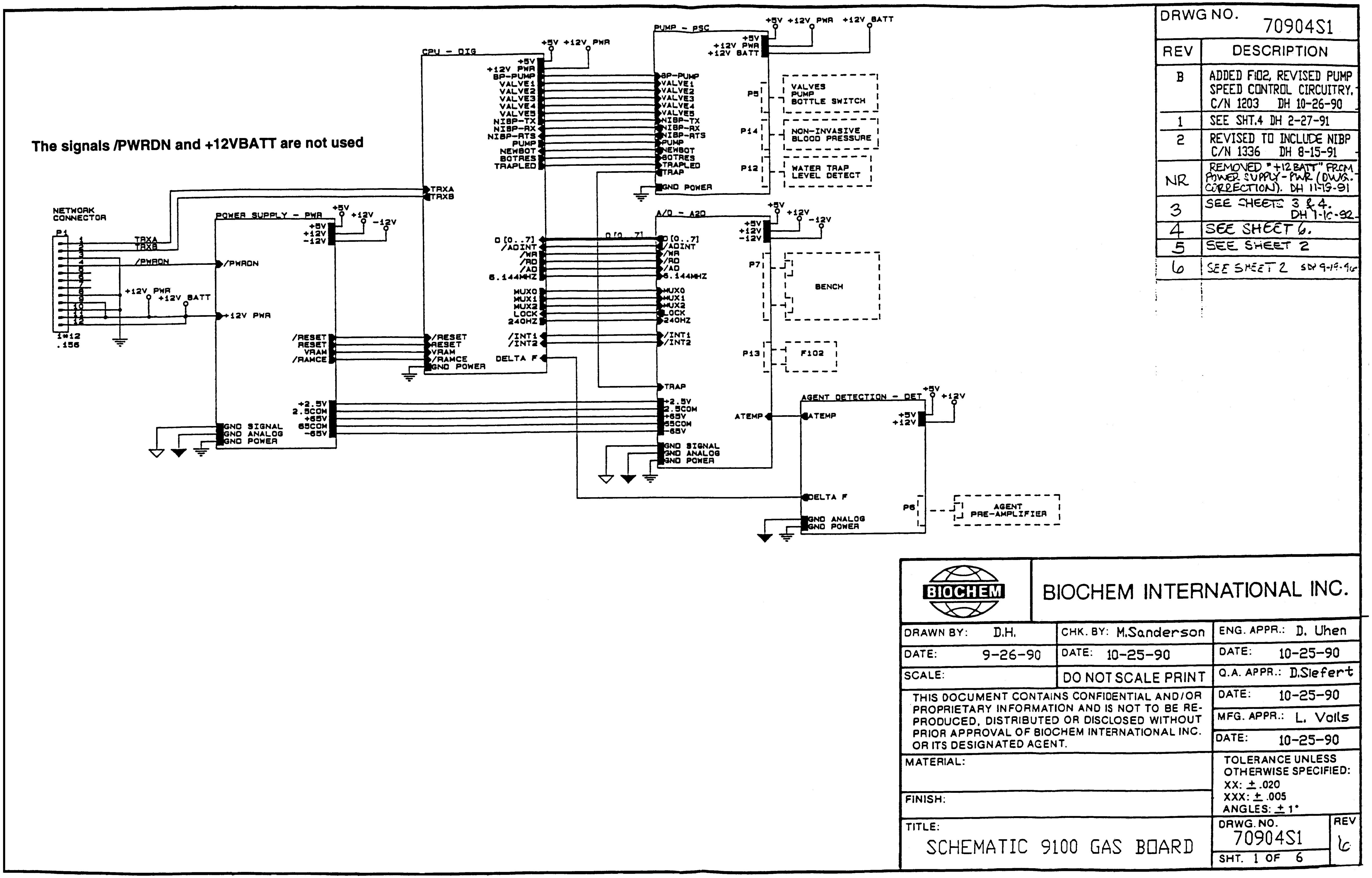
DATE: 10-25-90
MFG. APPR.:
DATE: 10/25/96
MATERIAL:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
FINISH:
TITLE: PWB ASM GAS 9100
DRWG. NO. 70904B1
REV 8
SHT. 1 OF 1


The signals /PWRDN and +12VBATT are not used
NETWORK CONNECTOR
P1
1x12 .156
TRXA
TRXB
/PWRDN
+12V PWR
+12V BATT
POWER SUPPLY - PWR
+5V
+12V
-12V
/RESET
RESET
VRAM
/RAMCE
+2.5V
2.5COM
+65V
65COM
-65V
GND SIGNAL
GND ANALOG
GND POWER
CPU - DIG
BP-PUMP
VALVE1
VALVE2
VALVE3
VALVE4
VALVE5
NIBP-TX
NIBP-RX
NIBP-RTS
PUMP
NEWBOT
BOTRES
TRAPLED
D[0..7]
/ADINT
/WR
/RD
/AD
6.144MHZ
MUX0
MUX1
MUX2
LOCK
240HZ
/INT1
/INT2
DELTA F
PUMP - PSC
P5
VALVES
PUMP
BOTTLE SWITCH
P14
NON-INVASIVE BLOOD PRESSURE
P12
WATER TRAP LEVEL DETECT
TRAP
A/D - A2D
P7
BENCH
P13
F102
ATEMP
AGENT DETECTION - DET
P6
AGENT PRE-AMPLIFIER
DRWG NO. 70904S1
REV
DESCRIPTION
B
ADDED F102, REVISED PUMP SPEED CONTROL CIRCUITRY. C/N 1203 DH 10-26-90
1
SEE SHT.4 DH 2-27-91
2
REVISED TO INCLUDE NIBP C/N 1336 DH 8-15-91
NR
REMOVED "+12 BATT" FROM POWER SUPPLY-PWR (DWG. CORRECTION). DH 11-19-91
3
SEE SHEETS 3 & 4. DH 1-16-92
4
SEE SHEET 6.
5
SEE SHEET 2
6
SEE SHEET 2
BIOCHEM
BIOCHEM INTERNATIONAL INC.
DRAWN BY: D.H.
CHK. BY: M.Sanderson
ENG. APPR.: D. Uhen
DATE: 9-26-90
DATE: 10-25-90
DATE: 10-25-90
SCALE:
DO NOT SCALE PRINT
Q.A. APPR.: D.Siefert
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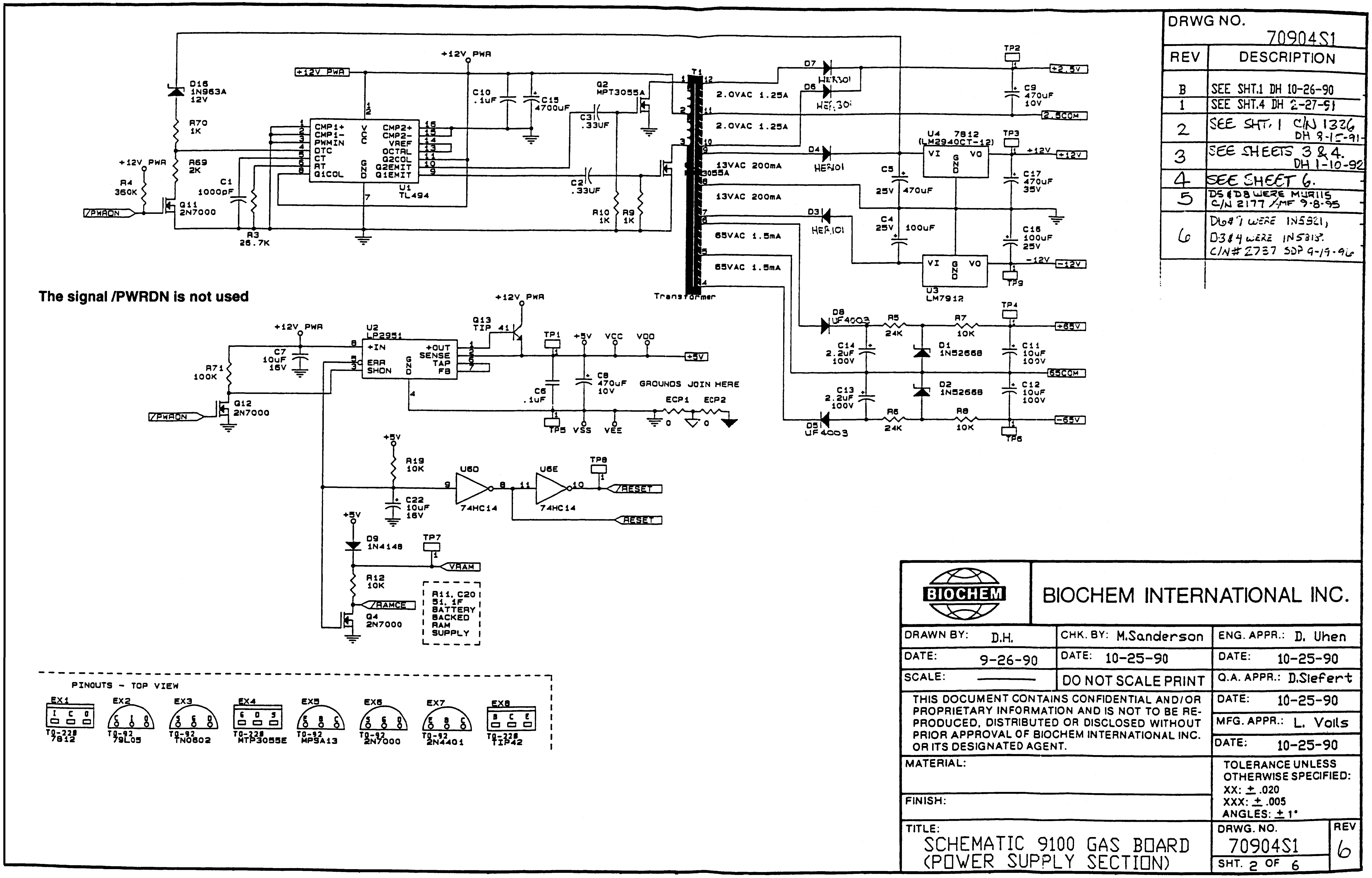
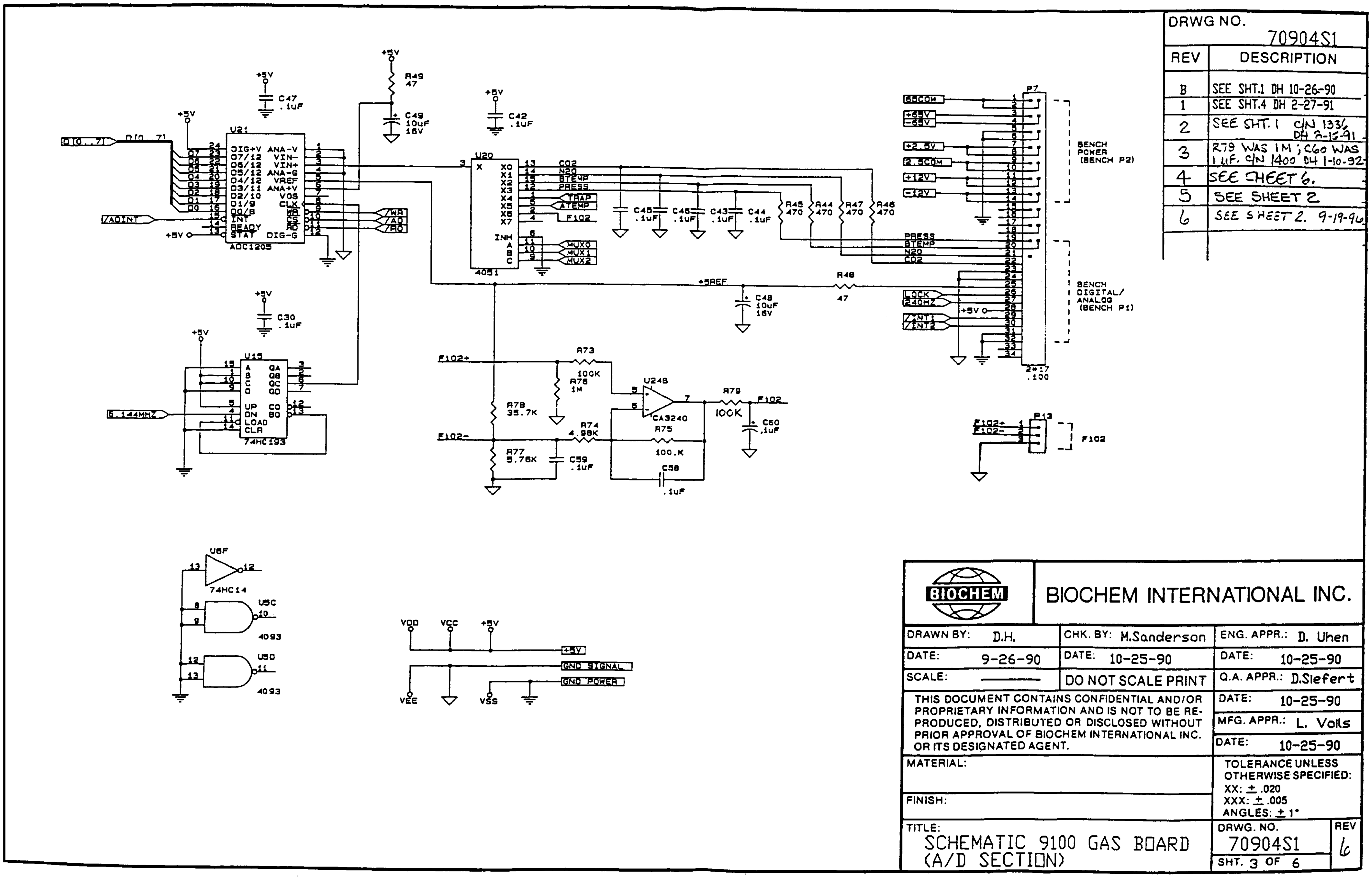
DATE: 10-25-90
MFG. APPR.: L. Volls
DATE: 10-25-90
MATERIAL:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
FINISH:
TITLE:
SCHEMATIC 9100 GAS BOARD
DRWG. NO. 70904S1
REV 6
SHT. 1 OF 6



The signal /PWRDN is not used


DRWG NO. 70904S1
REV | DESCRIPTION
B SEE SHT.1 DH 10-26-90
1 SEE SHT.4 DH 2-27-91
2 SEE SHT. 1 C/N 1336 DH 8-15-91
3 R79 WAS 1M ; C60 WAS 1uF. C/N 1400 DH 1-10-92
4 SEE SHEET 6.
5 SEE SHEET 2
6 SEE SHEET 2. 9-19-96
U21 ADC1205
U20 4051
U15 74HC193
U24B CA3240
U6F 74HC14
U5C 4093
U5D 4093
P7
BENCH POWER (BENCH P2)
BENCH DIGITAL/ ANALOG (BENCH P1)
P13 F102
BIOCHEM INTERNATIONAL INC.
DRAWN BY: D.H.
CHK. BY: M.Sanderson
ENG. APPR.: D. Uhen
DATE: 9-26-90
DATE: 10-25-90
DATE: 10-25-90
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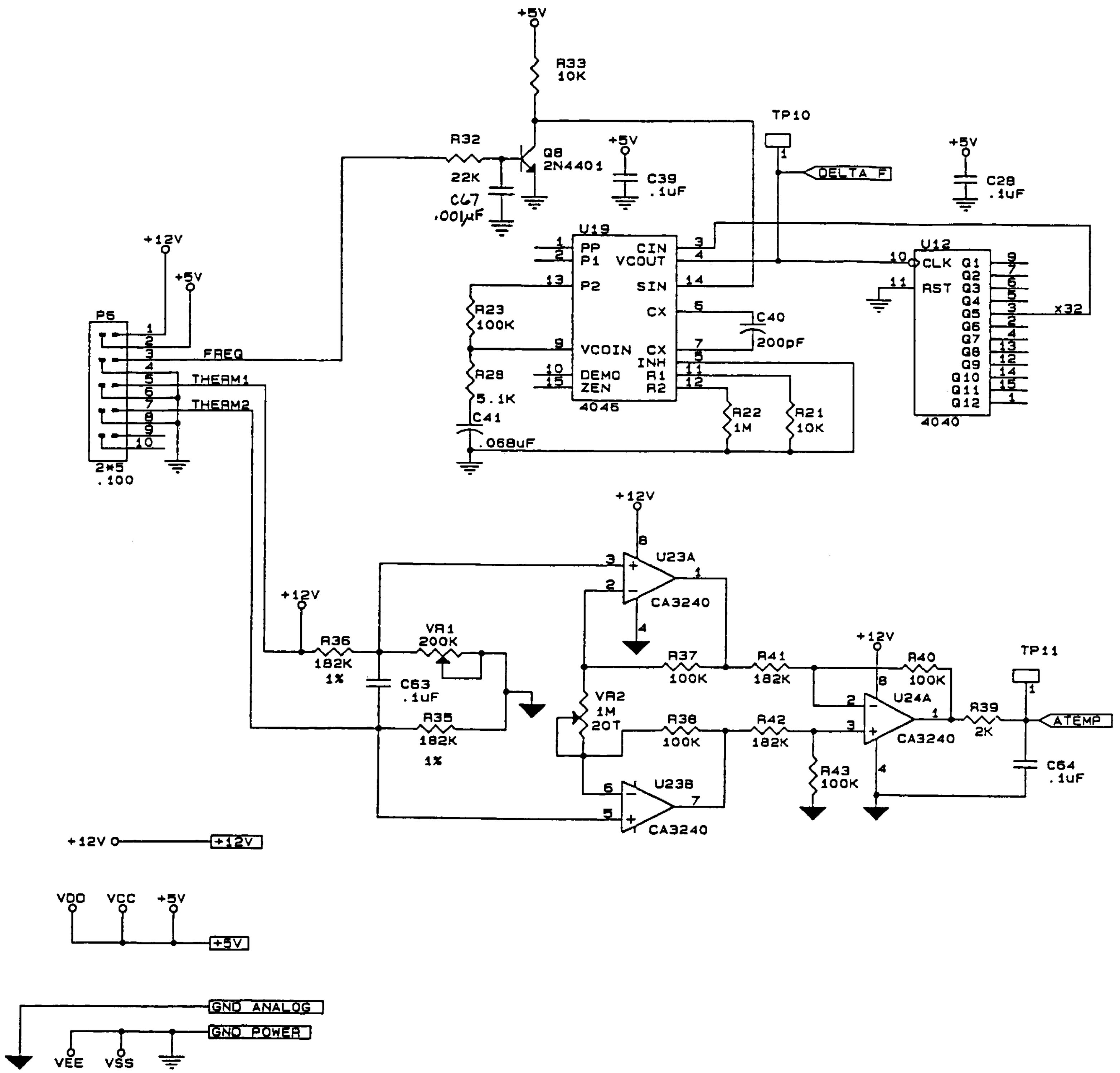
DATE: 10-25-90
MFG. APPR.: L. Volls
DATE: 10-25-90
MATERIAL:
FINISH:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
TITLE: SCHEMATIC 9100 GAS BOARD (A/D SECTION)
DRWG. NO. 70904S1
REV 6
SHT. 3 OF 6



DRWG NO.	70904S1
REV	DESCRIPTION
B	SEE SHT.1 DH 10-26-90
1	ADDED C36 & 64 C/N 1253 DH 2-27-91
2	SEE SHT. 1 C/N 1331 DH 8/15/91
3	ADDED C67. C/N 1400 DH 1-10-92
4	SEE SHEET 6.
5	SEE SHEET 2
6	SEE SHEET 2. 9-19-96

BIOCHEM INTERNATIONAL INC.

DRAWN BY: D.H.	CHK. BY: M.Sanderson	ENG. APPR.: D. Uhen
DATE: 9-26-90	DATE: 10-25-90	DATE: 10-25-90
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DATE: 10-25-90
MFG. APPR.: L. Volls
DATE: 10-25-90

MATERIAL:

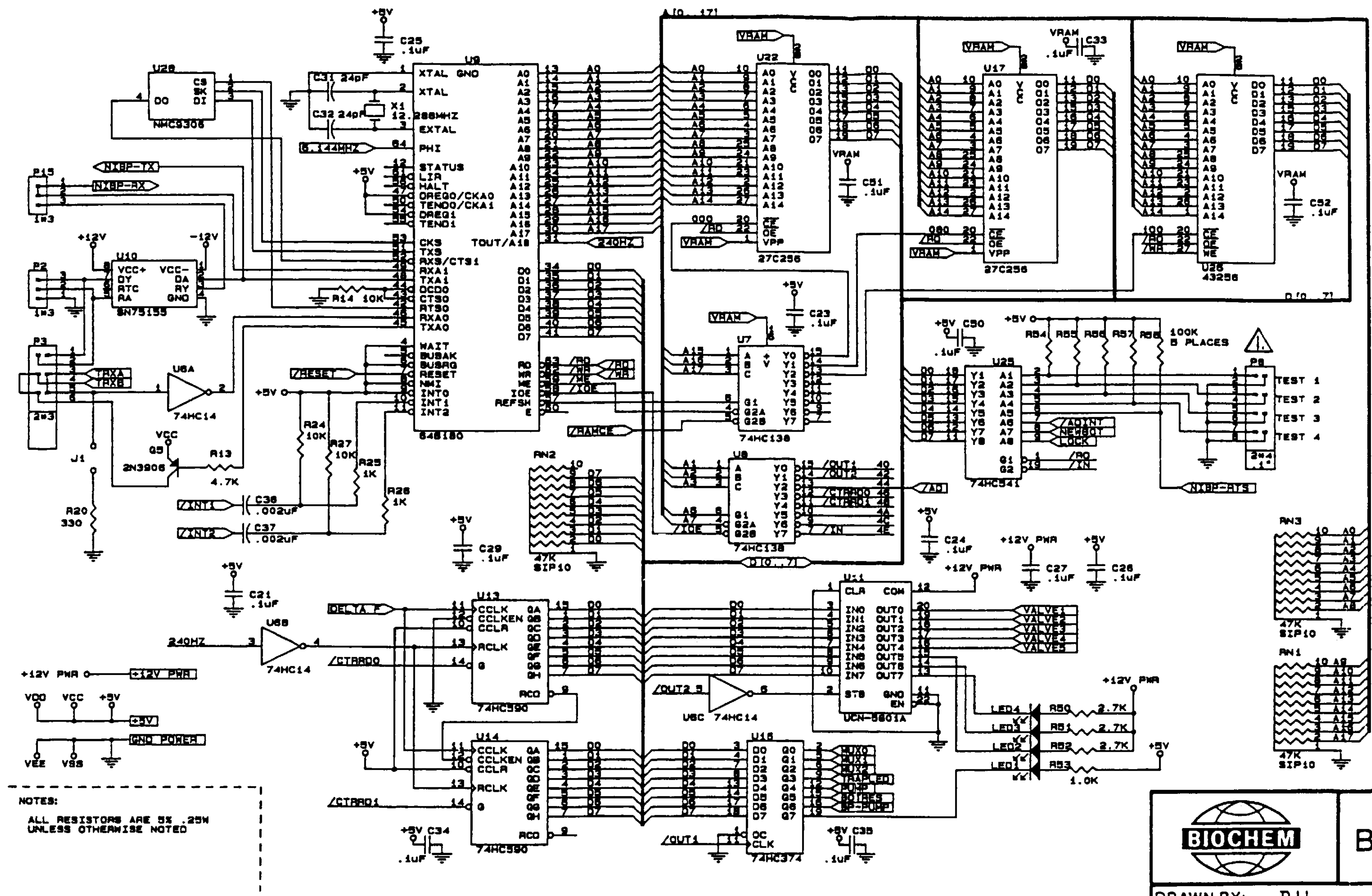
FINISH:

TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°

TITLE: SCHEMATIC 9100 GAS BOARD (AGENT DETECTOR SECTION)

DRWG. NO. 70904S1 REV 6

SHT. 4 OF 6



NOTES:
ALL RESISTORS ARE 5% .25W UNLESS OTHERWISE NOTED

DRWG NO. 70904S1

REV	DESCRIPTION
B	SEE SHT.1 DH 10-26-90
1	SEE SHT.4 DH 2-27-91
2	SEE SHT. 1 C/N 1336 DH 6/15/91
3	SEE SHEETS 3 & 4. DH 1-10-92
4	SEE SHEET 6.
NR	ADDED P8 SETTING CHART DH 11-3-92
5	SEE SHEET 2
6	SEE SHEET 2. 9-19-96

⚠ FUNCTION	P8 SETTINGS
TEST MODE	1-2 SHORTED
AGENTS INSTALLED	3-4 OPEN
FiO_2 INSTALLED	5-6 SHORTED
NIBP INSTALLED	7-8 SHORTED

BIOCHEM

BIOCHEM INTERNATIONAL INC.

DRAWN BY: D.H.	CHK. BY: M.Sanderson	ENG. APPR.: D. Uhen
DATE: 9-26-90	DATE: 10-25-90	DATE: 10-25-90
SCALE: ———	DO NOT SCALE PRINT	Q.A. APPR.: D.Siefert

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DATE: 10-25-90

MFG. APPR.: L. Voils

DATE: 10-25-90

MATERIAL:

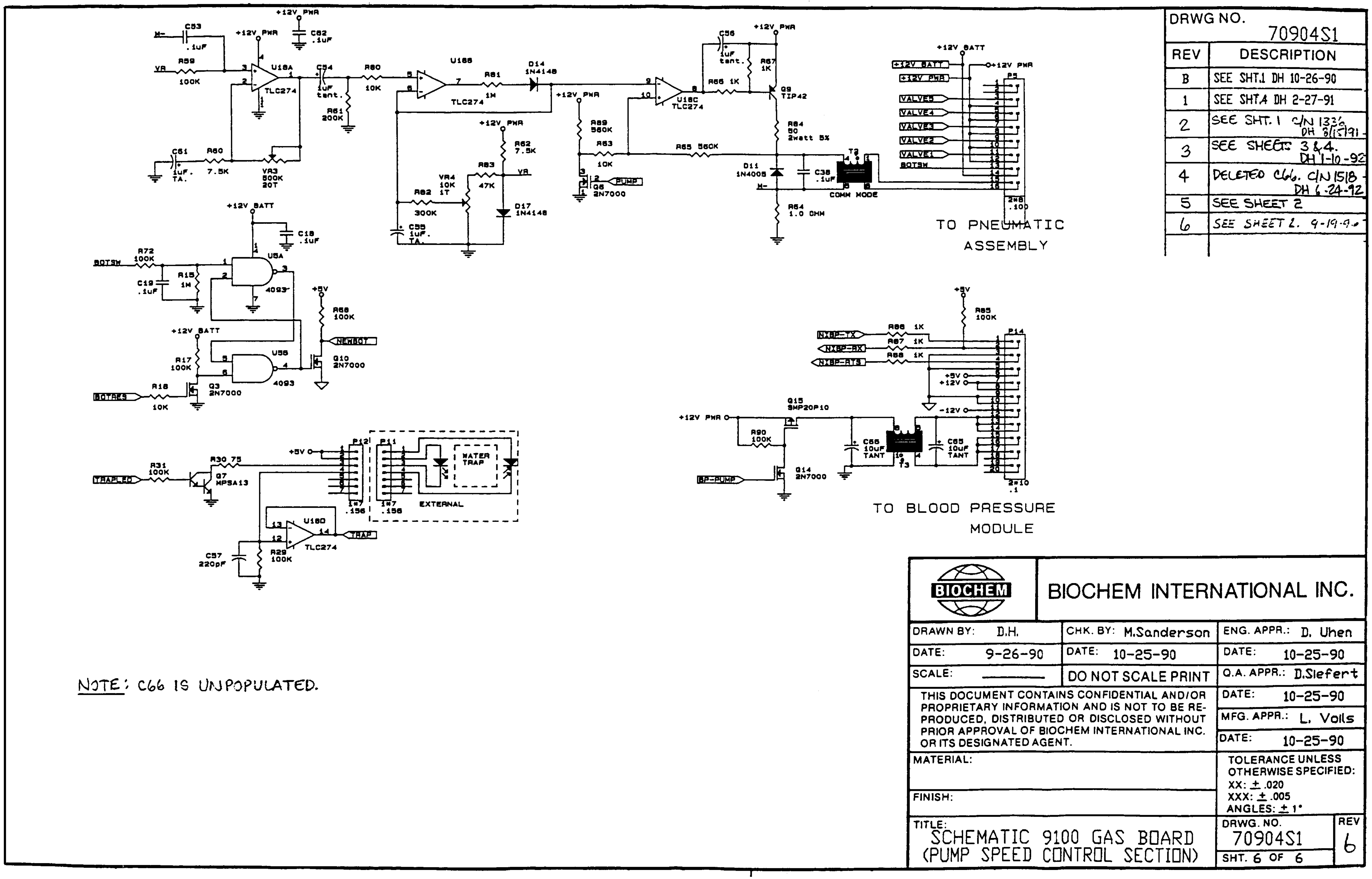
FINISH:

TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°

TITLE: SCHEMATIC 9100 GAS BOARD (DIGITAL SECTION)

DRWG. NO. 70904S1 REV 6

SHT. 5 OF 6


DRWG NO. 70904S1
REV
DESCRIPTION
B SEE SHT.1 DH 10-26-90
1 SEE SHT.4 DH 2-27-91
2 SEE SHT. 1 C/N 1336 DH 3/15/91
3 SEE SHEETS 3 & 4. DH 1-10-92
4 DELETED C66. C/N 1518 DH 6-24-92
5 SEE SHEET 2
6 SEE SHEET 2. 9-19-9
TO PNEUMATIC ASSEMBLY
TO BLOOD PRESSURE MODULE
BIOCHEM
BIOCHEM INTERNATIONAL INC.
DRAWN BY: D.H.
CHK. BY: M.Sanderson
ENG. APPR.: D. Uhen
DATE: 9-26-90
DATE: 10-25-90
DATE: 10-25-90
SCALE:
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Q.A. APPR.: D.Siefert
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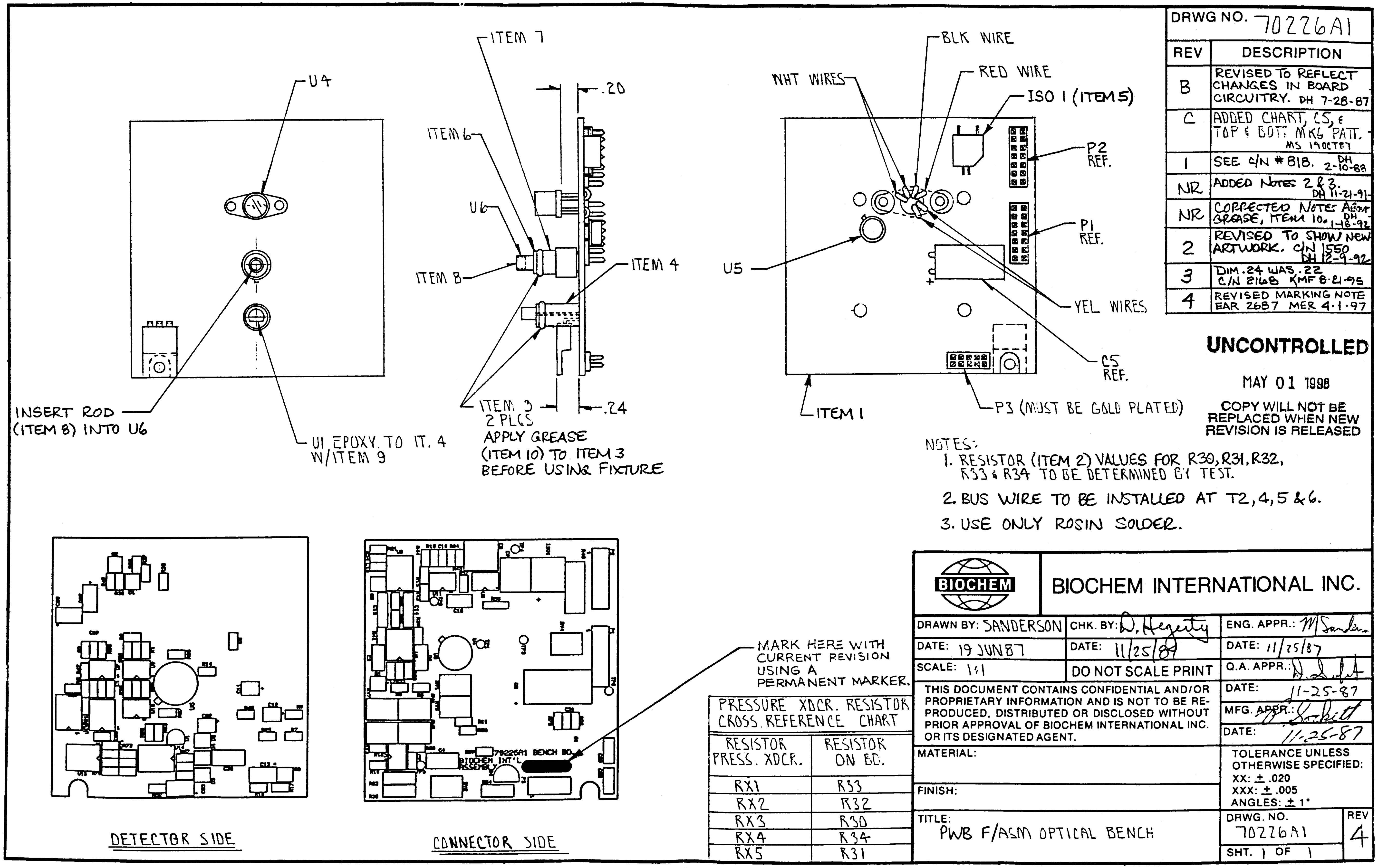
DATE: 10-25-90
MFG. APPR.: L. Voils
DATE: 10-25-90
MATERIAL:
FINISH:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
TITLE: SCHEMATIC 9100 GAS BOARD (PUMP SPEED CONTROL SECTION)
DRWG. NO. 70904S1
REV 6
SHT. 6 OF 6
NOTE: C66 IS UNPOPULATED.

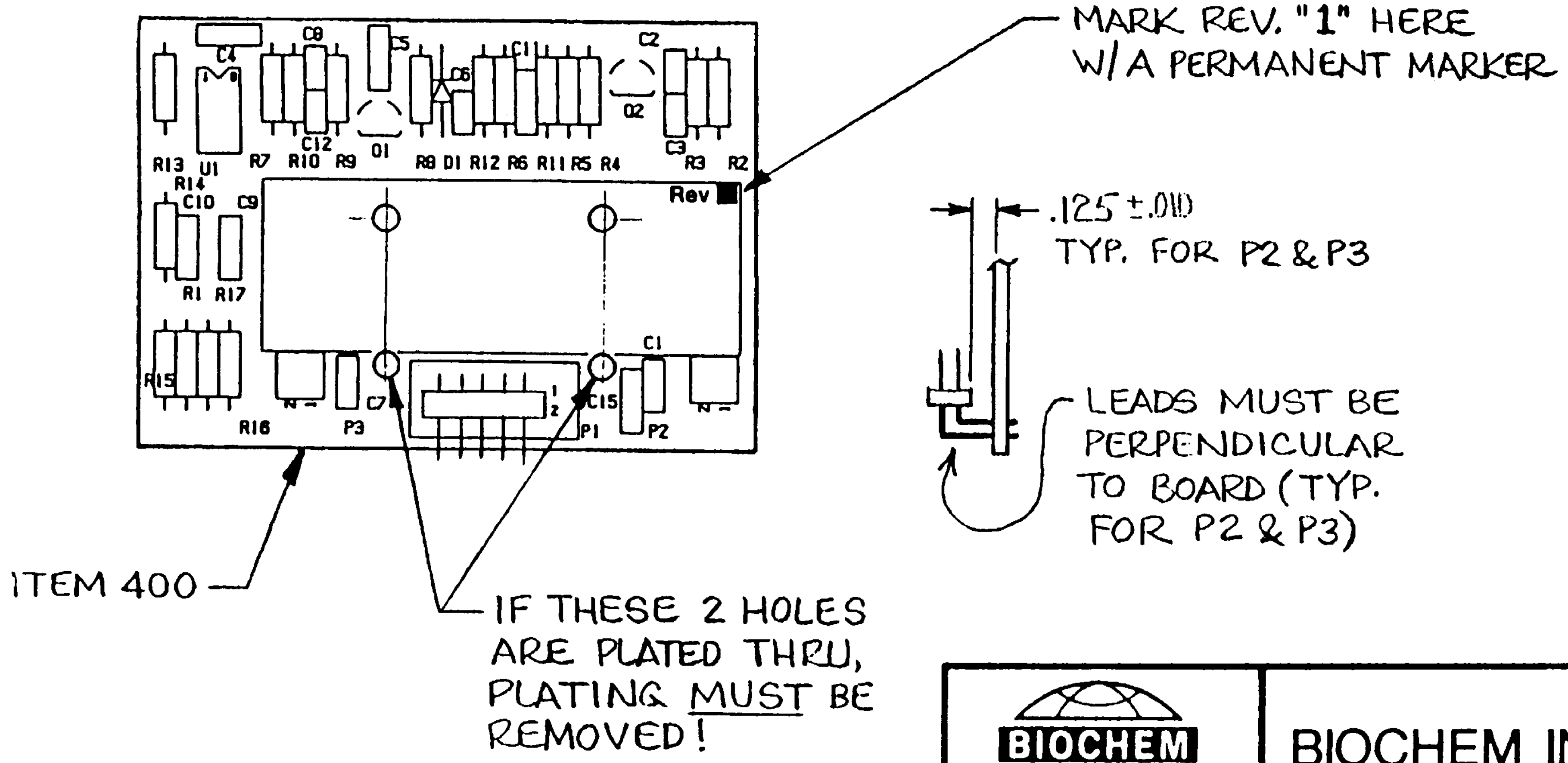


REV	DESCRIPTION
B	REVISED TO REFLECT CHANGES IN BOARD CIRCUITRY. DH 7-28-87
C	ADDED CHART, C5, & TOP & BOT. MKG. PATT. MS 19OCT87
1	SEE C/N #818. DH 2-10-89
NR	ADDED NOTES 2 & 3. DH 11-21-91
NR	CORRECTED NOTES ABOUT GREASE, ITEM 10. DH 1-16-92
2	REVISED TO SHOW NEW ARTWORK. C/N 1550 DH 12-9-92
3	DIM .24 WAS .22 C/N 2168 KMF 8-21-95
4	REVISED MARKING NOTE EAR 2687 MER 4-1-97

PRESSURE XDCR. RESISTOR CROSS REFERENCE CHART

RESISTOR PRESS. XDCR.	RESISTOR ON BD.
RX1	R33
RX2	R32
RX3	R30
RX4	R34
RX5	R31

DRWG NO. 70464B1	
REV	DESCRIPTION
B	REVISED TO REFLECT NEW ARTWORK. DH 5-24-90
C	.125 WAS .110 SHOWN P1 AS A RT. ANGLE CONN. MS20...
NR	SWAPPED LOCATIONS OF R16 & R17 TO REFLECT CURRENT ARTWORK. DH 8-14-90
NR	ADDED NOTE ABOUT PLATED THRU HOLES. DH 3-29-91
1	C1 & C7 WERE P/N 1300286. C/N #1810 DH 3-30-94



BIOCHEM

BIOCHEM INTERNATIONAL INC.

DRAWN BY: D. HEGERTY	CHK. BY: B. RAMMEL	ENG. APPR.: [illegible]
DATE: 5-3-90	DATE: 1-5-94	DATE: 1-5-94
SCALE: 1:1	DO NOT SCALE PRINT	Q.A. APPR.: [illegible]
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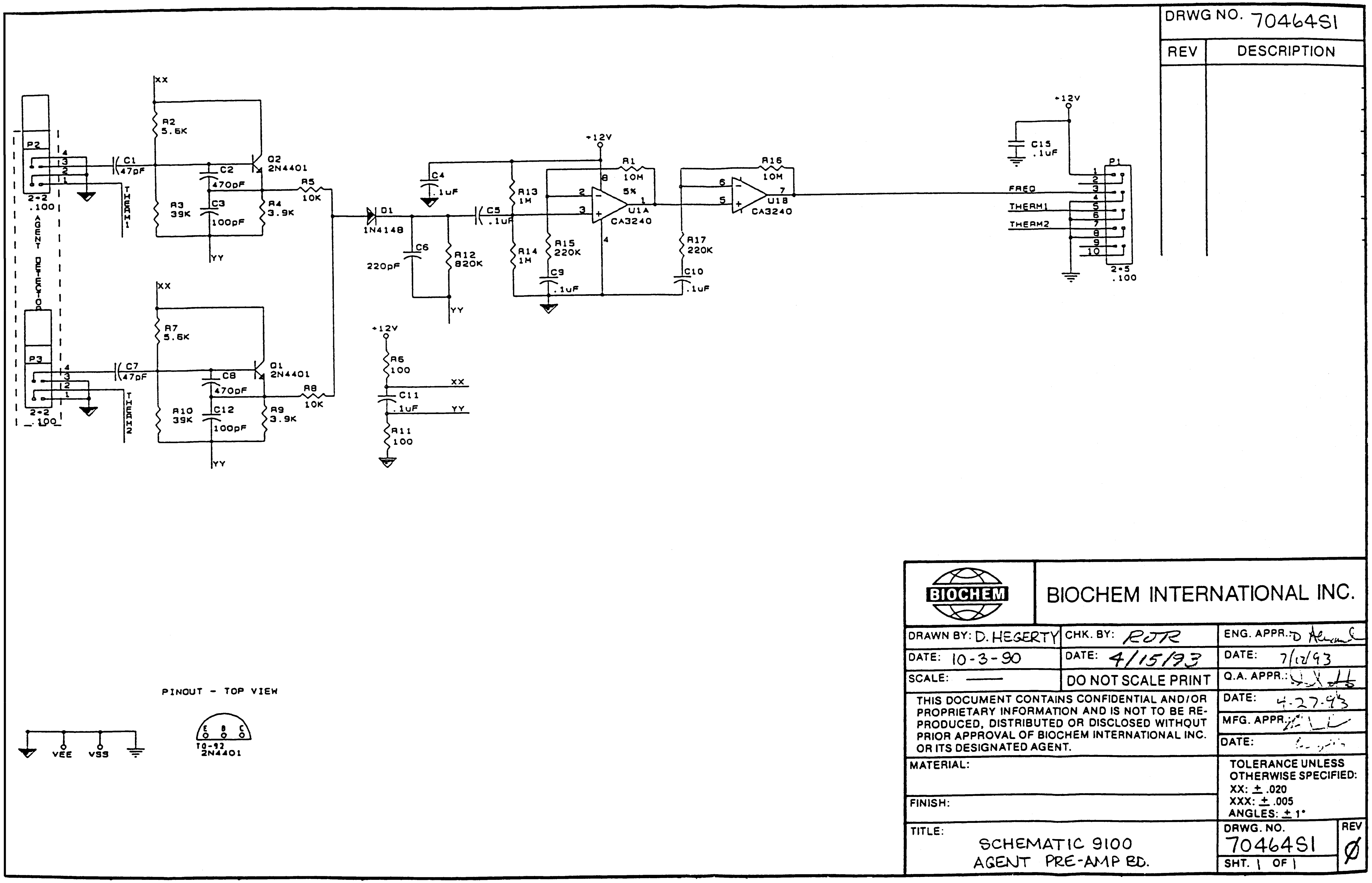
		MFG. APPR.: [illegible]
		DATE: [illegible]
MATERIAL:		TOLERANCE UNLESS OTHERWISE SPECIFIED: XX: ± .020 XXX: ± .005 ANGLES: ± 1°
FINISH:		
TITLE: PWB ASM AGENT PRE-AMP 9100		DRWG. NO. 70464B1 SHT. 1 OF 2 — REV 1



DRWG NO. 70464SI
REV
DESCRIPTION
PINOUT - TOP VIEW
TO-92
2N4401
BIOCHEM
BIOCHEM INTERNATIONAL INC.
DRAWN BY: D. HEGERTY
CHK. BY: RJR
ENG. APPR.:
DATE: 10-3-90
DATE: 4/15/93
DATE: 7/12/93
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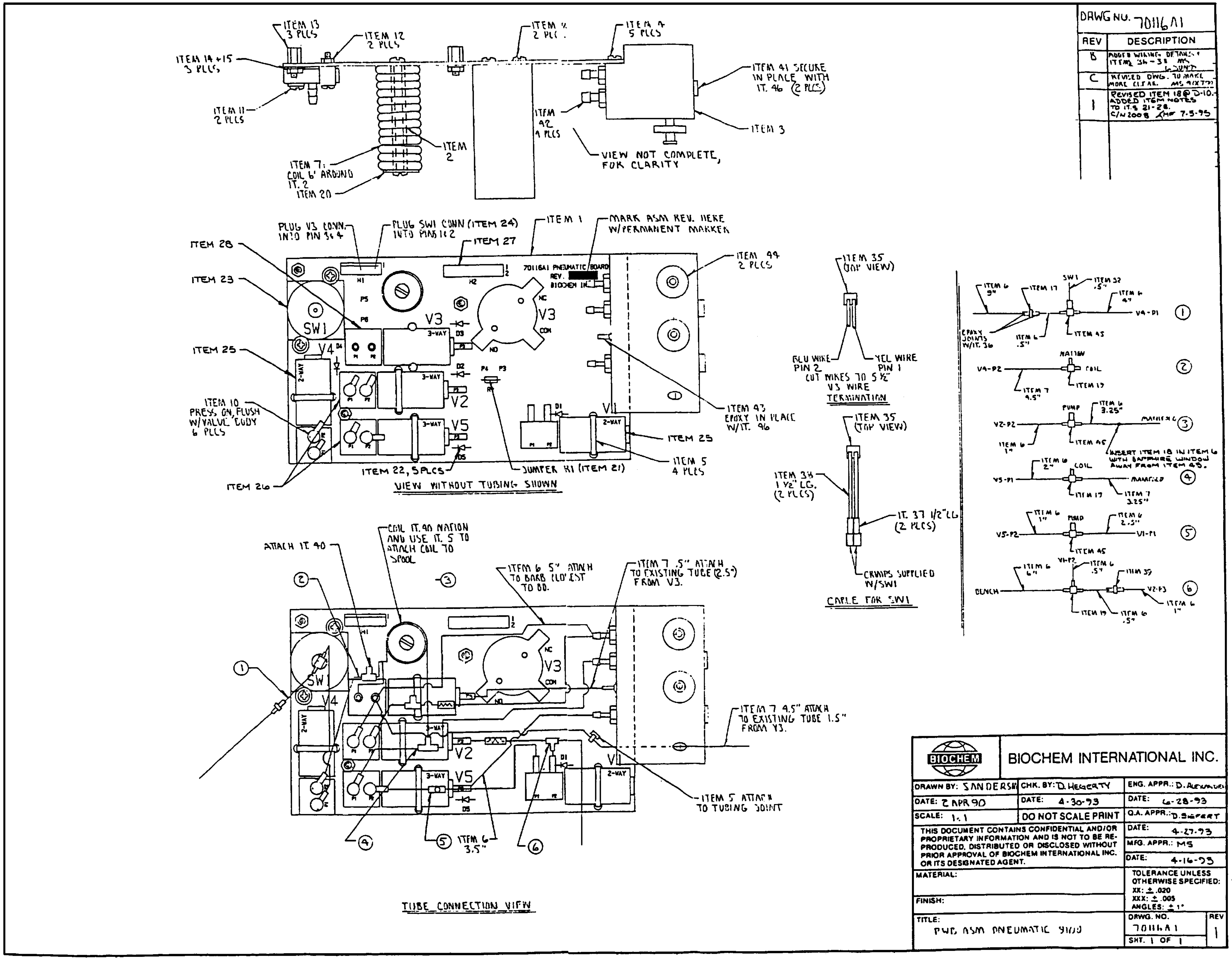
DATE: 4-27-93
MFG. APPR.:
DATE:
MATERIAL:
FINISH:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
TITLE:
SCHEMATIC 9100
AGENT PRE-AMP BD.
DRWG. NO.
70464SI
REV
Ø
SHT. 1 OF 1


DRWG NO. 70116A1
REV
DESCRIPTION
VIEW WITHOUT TUBING SHOWN
TUBE CONNECTION VIEW
CABLE FOR SW1
BIOCHEM INTERNATIONAL INC.
DRAWN BY: SANDERS
CHK. BY: D. HEGERTY
DATE: 2 APR 90
DATE: 4-30-93
SCALE: 1:1
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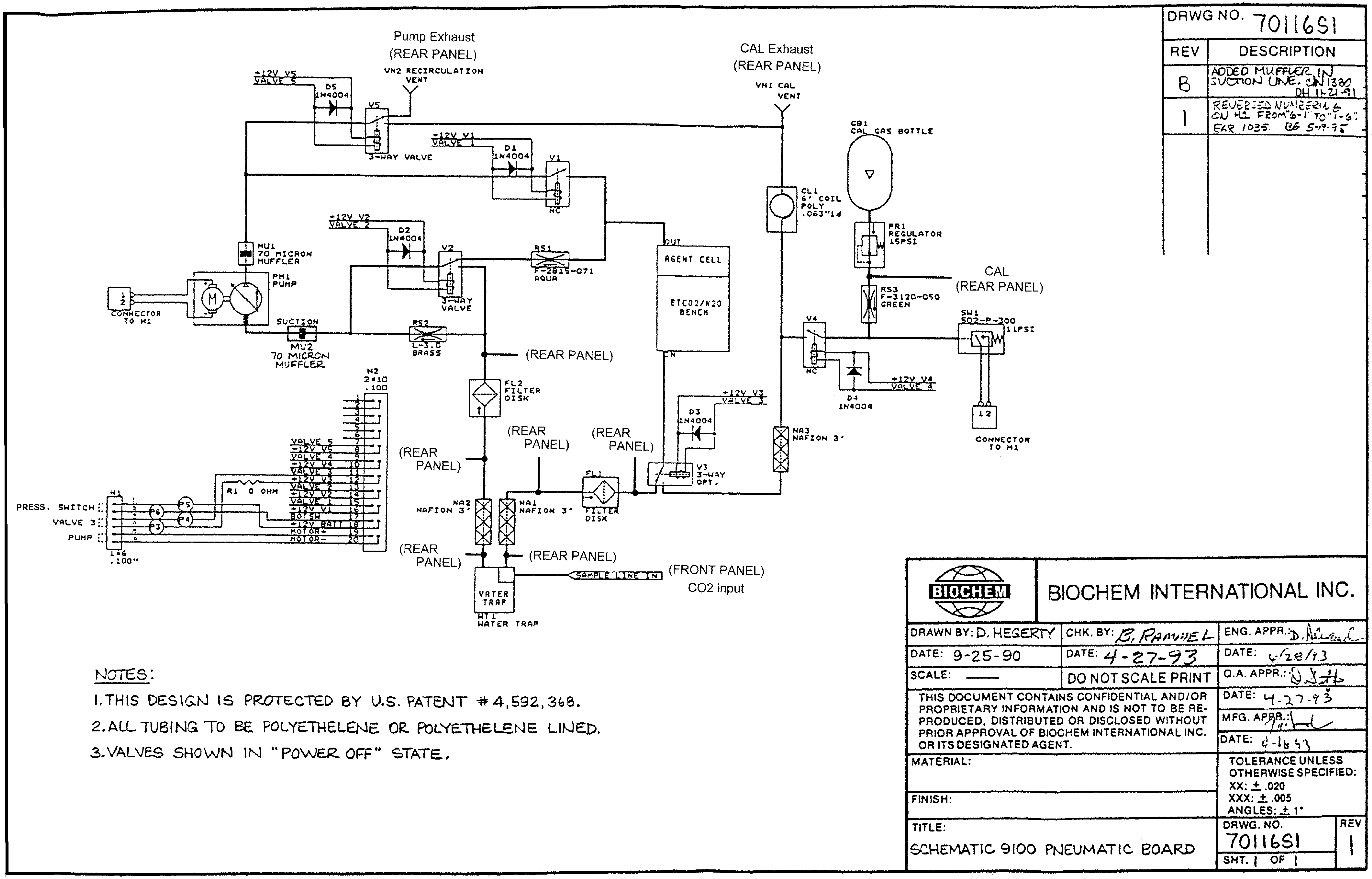
MATERIAL:
FINISH:
TITLE:
PWB ASM PNEUMATIC 9100
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
DRWG. NO. 70116A1
REV 1
SHT. 1 OF 1


DRWG NO. 70116S1
REV
DESCRIPTION
B ADDED MUFFLER IN SUCTION LINE. CN 1380 DH 11-21-91
1 REVERSED NUMBERING ON H1 FROM "6-1" TO "1-6". EAR 1035. BE 5-9-95
Pump Exhaust
(REAR PANEL)
VN2 RECIRCULATION VENT
CAL Exhaust
(REAR PANEL)
VN1 CAL VENT
+12V V5
VALVE 5
D5
1N4004
V5
3-WAY VALVE
+12V V1
VALVE 1
D1
1N4004
V1
NC
+12V V2
VALVE 2
D2
1N4004
V2
3-WAY VALVE
RS1
F-2815-071
AQUA
MU1
70 MICRON
MUFFLER
PM1
PUMP
CONNECTOR TO H1
SUCTION
MU2
70 MICRON
MUFFLER
RS2
L-3.0
BRASS
(REAR PANEL)
OUT
AGENT CELL
ETCO2/N20
BENCH
IN
CL1
6' COIL
POLY
.063"id
CB1
CAL GAS BOTTLE
PR1
REGULATOR
15PSI
CAL
(REAR PANEL)
RS3
F-3120-050
GREEN
V4
NC
SW1
SD2-P-300
11PSI
+12V V4
VALVE 4
D4
1N4004
CONNECTOR TO H1
FL2
FILTER
DISK
H2
2x10
.100
VALVE 5
+12V V5
VALVE 4
+12V V4
VALVE 3
+12V V3
VALVE 2
+12V V2
VALVE 1
+12V V1
BOTSW
+12V BATT
MOTOR+
MOTOR-
R1 0 OHM
H1
PRESS. SWITCH
VALVE 3
PUMP
1x6
.100"
P5
P6
P4
P3
(REAR PANEL)
(REAR PANEL)
(REAR PANEL)
+12V V3
VALVE 3
D3
1N4004
V3
3-WAY
OPT.
FL1
FILTER
DISK
NA3
NAFION 3'
NA2
NAFION 3'
NA1
NAFION 3'
(REAR PANEL)
(REAR PANEL)
SAMPLE LINE IN
(FRONT PANEL)
CO2 input
WATER TRAP
WT1
WATER TRAP
NOTES:
1. THIS DESIGN IS PROTECTED BY U.S. PATENT #4,592,368.
2. ALL TUBING TO BE POLYETHELENE OR POLYETHELENE LINED.
3. VALVES SHOWN IN "POWER OFF" STATE.
BIOCHEM
BIOCHEM INTERNATIONAL INC.
DRAWN BY: D. HEGERTY
CHK. BY: B. RAMMEL
ENG. APPR.:
DATE: 9-25-90
DATE: 4-27-93
DATE: 4/28/93
SCALE: ——
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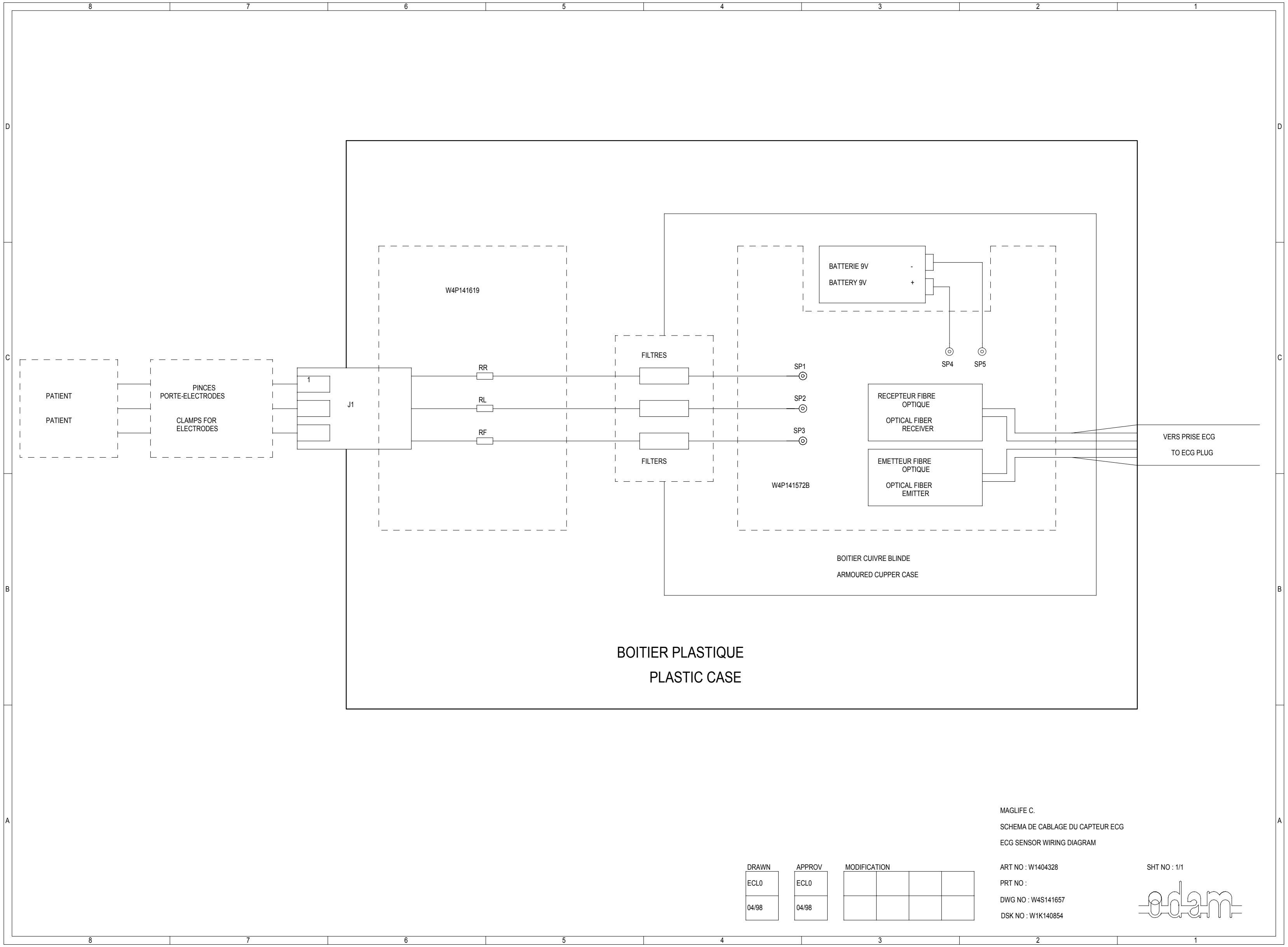
DATE: 4-27-93
MFG. APPR.:
DATE:
MATERIAL:
FINISH:
TOLERANCE UNLESS OTHERWISE SPECIFIED:
XX: ± .020
XXX: ± .005
ANGLES: ± 1°
TITLE:
SCHEMATIC 9100 PNEUMATIC BOARD
DRWG. NO. 70116S1
REV 1
SHT. 1 OF 1

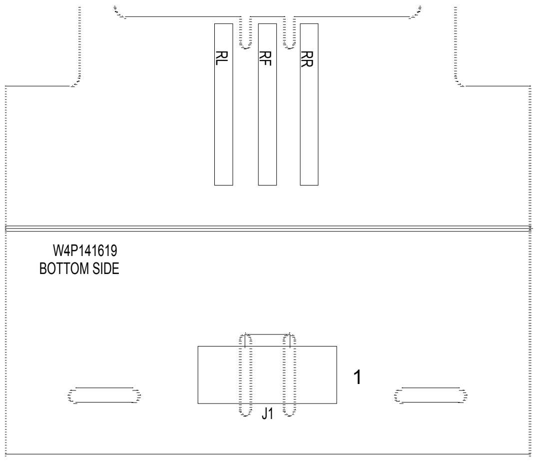
4.5. Diagrams "Optical fiber ECG sensor"

PART NUMBER	DESCRIPTION	PAGE
	Wiring diagram ◊ circuit diagram 1/1	 4-55
W1411710	**Printed circuit « ECG sensor protection » W4P141619** ◊ layout ◊ circuit diagram 1/1	 4-56 4-57
W7411924	**Printed circuit « ECG sensor type II» W4P141718** ◊ layout ◊ circuit diagram 1/1	 4-58 4-59

4. DIAGRAMS



PATIENT
PATIENT
PINCES
PORTE-ELECTRODES
CLAMPS FOR
ELECTRODES
J1
W4P141619
RR
RL
RF
FILTRES
FILTERS
SP1
SP2
SP3
SP4
SP5
BATTERIE 9V
BATTERY 9V
RECEPTEUR FIBRE
OPTIQUE
OPTICAL FIBER
RECEIVER
EMETTEUR FIBRE
OPTIQUE
OPTICAL FIBER
EMITTER
W4P141572B
VERS PRISE ECG
TO ECG PLUG
BOITIER CUIVRE BLINDE
ARMOURED CUPPER CASE
BOITIER PLASTIQUE
PLASTIC CASE
MAGLIFE C.
SCHEMA DE CABLAGE DU CAPTEUR ECG
ECG SENSOR WIRING DIAGRAM
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
04/98
04/98
ART NO : W1404328
SHT NO : 1/1
PRT NO :
DWG NO : W4S141657
DSK NO : W1K140854

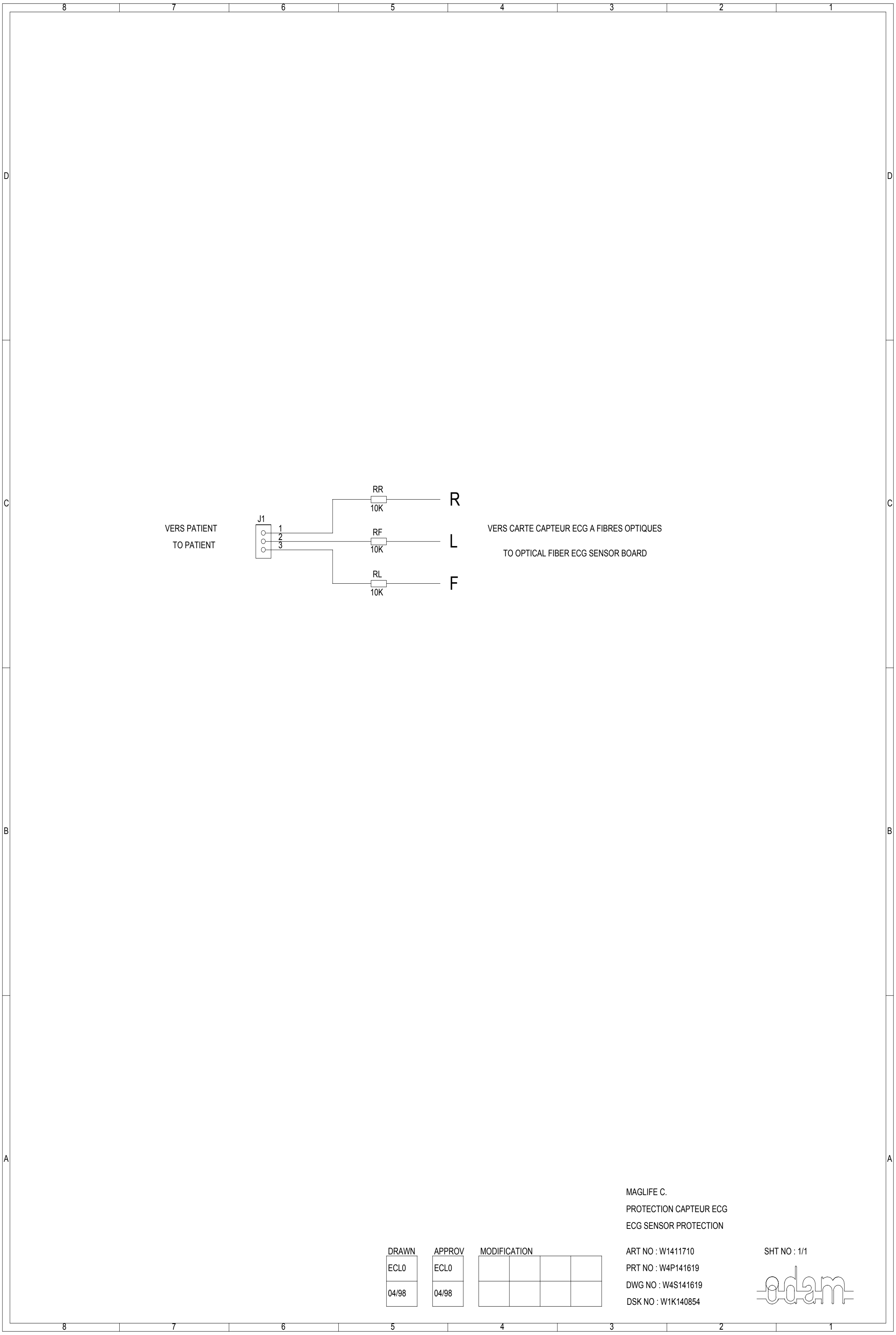


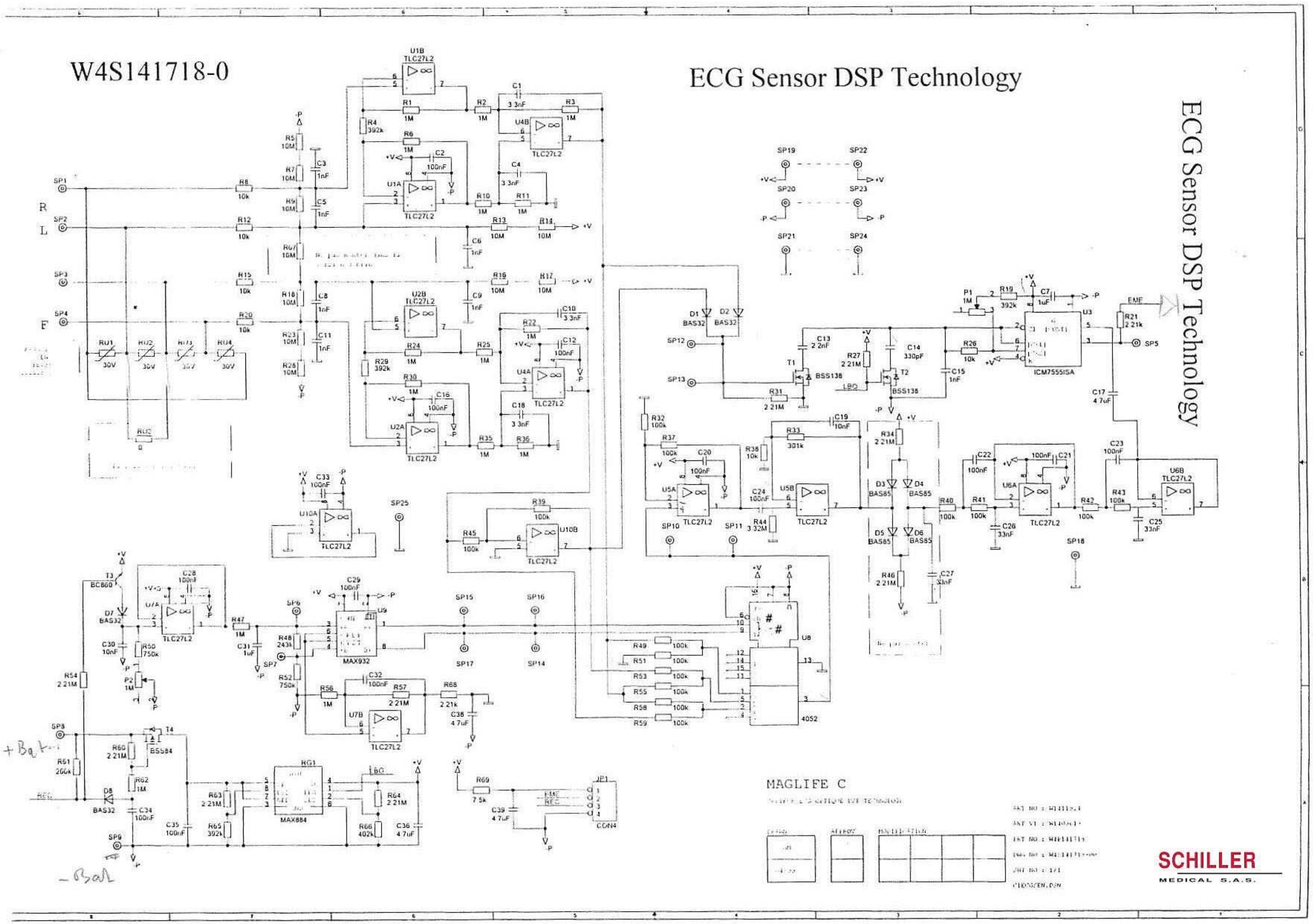
MAGLIFE C.
PROTECTION CAPTEUR ECG
ECG SENSOR PROTECTION

DRAWN	APPROV	MODIFICATION
ECL0	ECL0	
04/98	04/98	

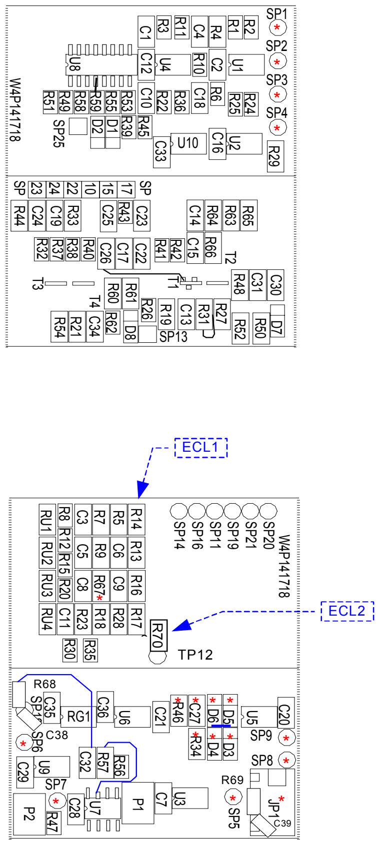
ART NO : W1411710 SHT : 1/1
PRT NO : W4P141619
DWG NO : W4L141619
DSK NO : W1K140854

odam


VERS PATIENT
TO PATIENT
J1
1
2
3
RR
10K
RF
10K
RL
10K
R
L
F
VERS CARTE CAPTEUR ECG A FIBRES OPTIQUES
TO OPTICAL FIBER ECG SENSOR BOARD
MAGLIFE C.
PROTECTION CAPTEUR ECG
ECG SENSOR PROTECTION
DRAWN
ECL0
04/98
APPROV
ECL0
04/98
MODIFICATION
ART NO : W1411710
PRT NO : W4P141619
DWG NO : W4S141619
DSK NO : W1K140854
SHT NO : 1/1



W4S141718-0
ECG Sensor DSP Technology
ECG Sensor DSP Technology
MAGLIFE C
SCHILLER
MEDICAL S.A.S.



* = pas implanté

DRAWN	APPROV	MODIFICATION			
ECL0	ECL0	ECL1	ECL2		
07/99	07/99	03/03	09/03		

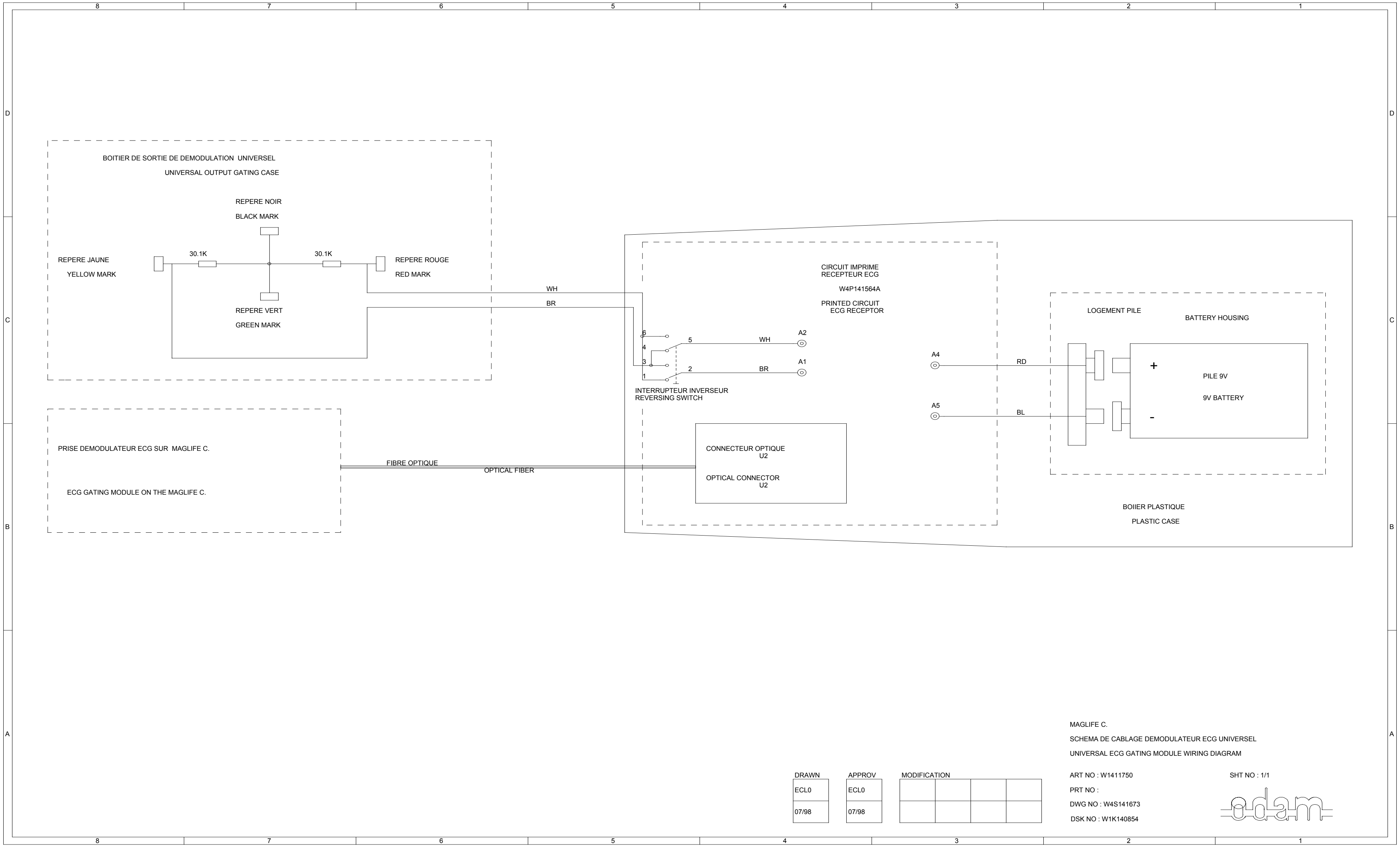
MAGLIFE C.
CAPTEUR ECG DSP TECHNOLOGIE
ECG SENSOR DSP TECHNOLOGY

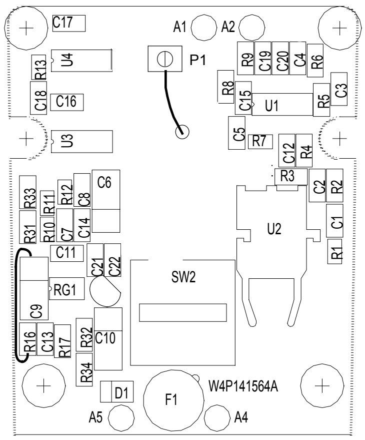
ART NO : W7411924
PRT NO : W4P141718
DWG NO : W4L141718
DSK NO :
SHT NO : 1/1

SCHILLER
MEDICAL S.A.S.

4.6. Diagrams "ECG gating module"

PART NUMBER	DESCRIPTION	PAGE
	Wiring diagram ◊ circuit diagram 1/1	 4-61
W1411520	**Printed circuit « ECG receiver » W4P141564A** ◊ layout ◊ circuit diagram 1/1	 4-62 4-63

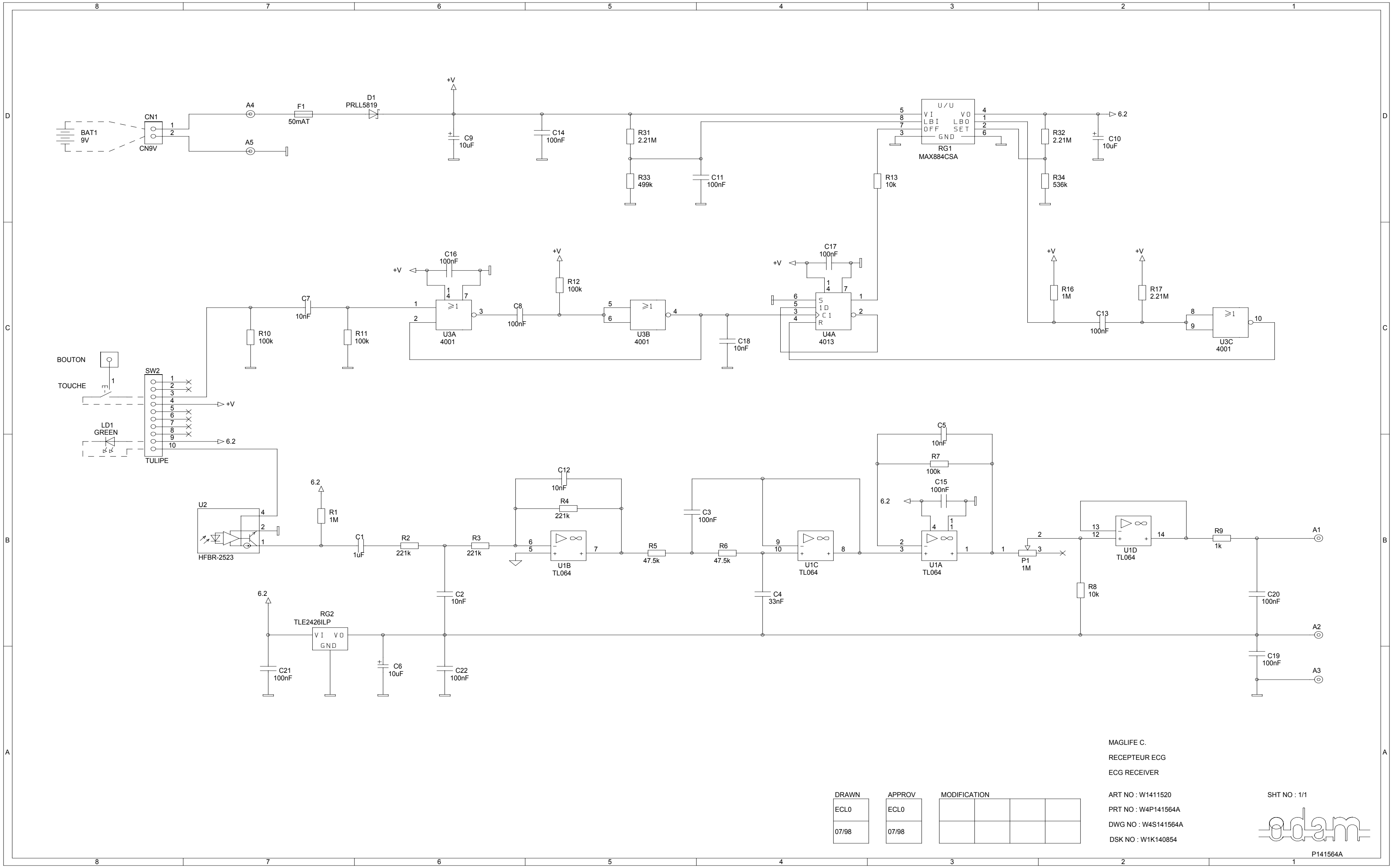

BOITIER DE SORTIE DE DEMODULATION UNIVERSEL
UNIVERSAL OUTPUT GATING CASE
REPERE NOIR
BLACK MARK
REPERE JAUNE
YELLOW MARK
30.1K
30.1K
REPERE ROUGE
RED MARK
REPERE VERT
GREEN MARK
WH
BR
CIRCUIT IMPRIME
RECEPTEUR ECG
W4P141564A
PRINTED CIRCUIT
ECG RECEPTOR
LOGEMENT PILE
BATTERY HOUSING
WH
A2
A1
BR
A4
RD
A5
BL
PILE 9V
9V BATTERY
INTERRUPTEUR INVERSEUR
REVERSING SWITCH
PRISE DEMODULATEUR ECG SUR MAGLIFE C.
ECG GATING MODULE ON THE MAGLIFE C.
FIBRE OPTIQUE
OPTICAL FIBER
CONNECTEUR OPTIQUE
U2
OPTICAL CONNECTOR
U2
BOIIER PLASTIQUE
PLASTIC CASE
MAGLIFE C.
SCHEMA DE CABLAGE DEMODULATEUR ECG UNIVERSEL
UNIVERSAL ECG GATING MODULE WIRING DIAGRAM
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
07/98
07/98
ART NO : W1411750
SHT NO : 1/1
PRT NO :
DWG NO : W4S141673
DSK NO : W1K140854



MAGLIFE C.
RECEPTEUR ECG
ECG RECEIVER

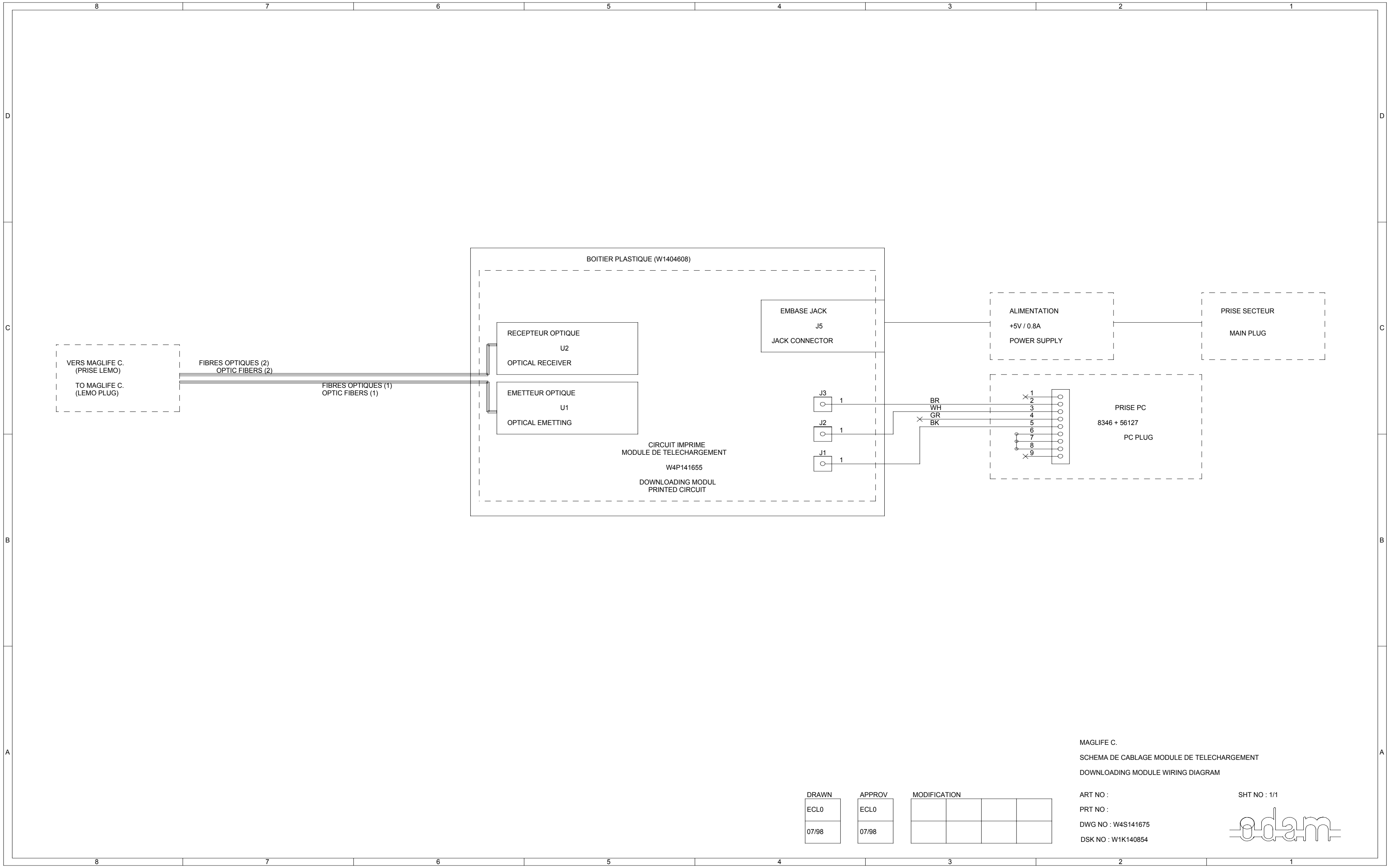
DRAWN	APPROV	MODIFICATION
ECL0	ECL0	
07/98	07/98	

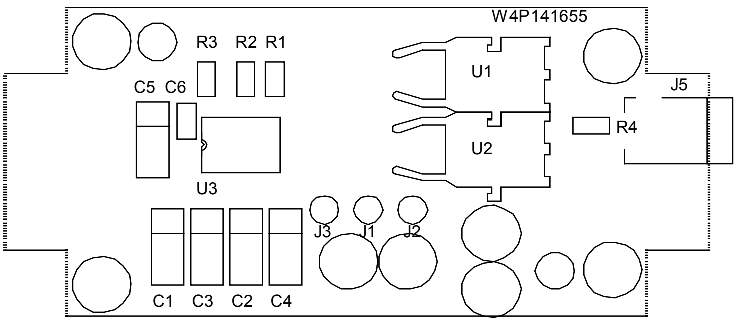
ART NO : W1411520 SHT : 1/1
PRT NO : W4P141564A
DWG NO : W4L141564A
DSK NO : W1K140854


BAT1
9V
CN1
CN9V
A4
A5
F1
50mAT
D1
PRLL5819
+V
C9
10uF
C14
100nF
R31
2.21M
R33
499k
C11
100nF
RG1
MAX884CSA
R13
10k
R32
2.21M
R34
536k
C10
10uF
6.2
C16
100nF
C7
10nF
R10
100k
R11
100k
U3A
4001
C8
100nF
R12
100k
U3B
4001
C17
100nF
C18
10nF
U4A
4013
R16
1M
R17
2.21M
C13
100nF
U3C
4001
BOUTON
TOUCHE
SW2
LD1
GREEN
TULIPE
U2
HFBR-2523
R1
1M
C1
1uF
R2
221k
R3
221k
C12
10nF
R4
221k
U1B
TL064
R5
47.5k
C3
100nF
R6
47.5k
U1C
TL064
C4
33nF
C5
10nF
R7
100k
C15
100nF
U1A
TL064
P1
1M
R8
10k
U1D
TL064
R9
1k
A1
A2
A3
C20
100nF
C19
100nF
C2
10nF
RG2
TLE2426ILP
C21
100nF
C6
10uF
C22
100nF
MAGLIFE C.
RECEPTEUR ECG
ECG RECEIVER
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
07/98
07/98
ART NO : W1411520
PRT NO : W4P141564A
DWG NO : W4S141564A
DSK NO : W1K140854
SHT NO : 1/1
P141564A

4.7. Diagrams "Downloading module"

PART NUMBER	DESCRIPTION	PAGE
	Wiring diagram ◊ circuit diagram 1/1	 4-65
W1411752	**Printed circuit « downloading module » W4P141655** ◊ layout ◊ circuit diagram 1/1	 4-66 4-67


BOITIER PLASTIQUE (W1404608)
VERS MAGLIFE C. (PRISE LEMO)
TO MAGLIFE C. (LEMO PLUG)
FIBRES OPTIQUES (2)
OPTIC FIBERS (2)
FIBRES OPTIQUES (1)
OPTIC FIBERS (1)
RECEPTEUR OPTIQUE
U2
OPTICAL RECEIVER
EMETTEUR OPTIQUE
U1
OPTICAL EMETTING
EMBASE JACK
J5
JACK CONNECTOR
J3
J2
J1
CIRCUIT IMPRIME
MODULE DE TELECHARGEMENT
W4P141655
DOWNLOADING MODUL
PRINTED CIRCUIT
ALIMENTATION
+5V / 0.8A
POWER SUPPLY
PRISE SECTEUR
MAIN PLUG
BR
WH
GR
BK
PRISE PC
8346 + 56127
PC PLUG
MAGLIFE C.
SCHEMA DE CABLAGE MODULE DE TELECHARGEMENT
DOWNLOADING MODULE WIRING DIAGRAM
DRAWN
ECL0
07/98
APPROV
ECL0
07/98
MODIFICATION
ART NO :
PRT NO :
DWG NO : W4S141675
DSK NO : W1K140854
SHT NO : 1/1

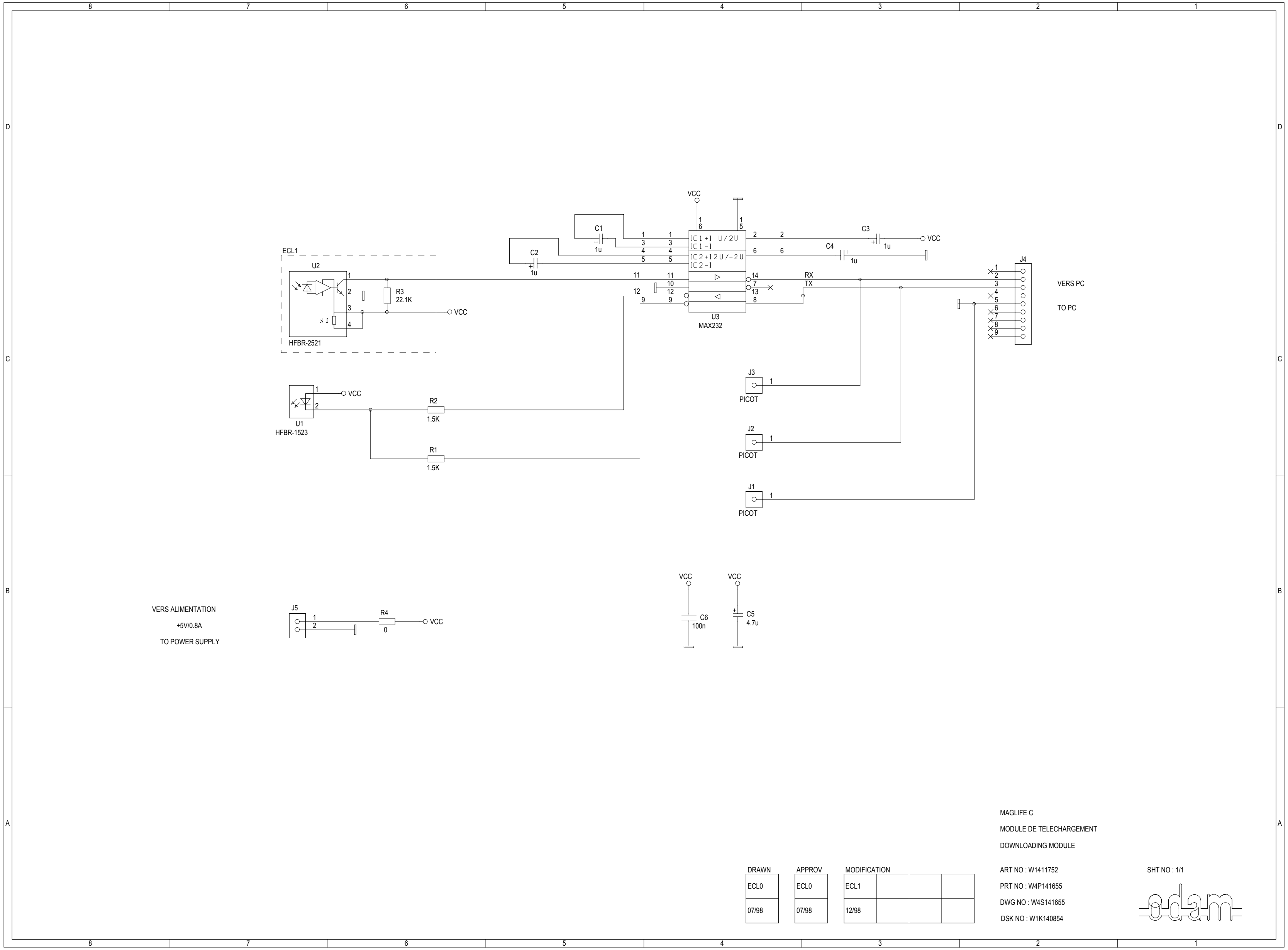


MAGLIFE C.
MODULE DE TELECHARGEMENT
DOWNLOADING MODULE

DRAWN	APPROV	MODIFICATION			
ECL0	ECL0	ECL1			
07/98	07/98	12/98			

ART NO : W1411752 SHT : 1/1
PRT NO : W4P141655
DWG NO : W4L141655
DSK NO : W1K140854

4. DIAGRAMS


ECL1
U2
HFBR-2521
R3
22.1K
VCC
U1
HFBR-1523
R2
1.5K
R1
1.5K
C1
1u
C2
1u
C3
1u
C4
1u
U3
MAX232
RX
TX
J4
VERS PC
TO PC
J3
PICOT
J2
PICOT
J1
PICOT
VERS ALIMENTATION
+5V/0.8A
TO POWER SUPPLY
J5
R4
0
C6
100n
C5
4.7u
MAGLIFE C
MODULE DE TELECHARGEMENT
DOWNLOADING MODULE
DRAWN
APPROV
MODIFICATION
ECL0
ECL0
ECL1
07/98
07/98
12/98
ART NO : W1411752
PRT NO : W4P141655
DWG NO : W4S141655
DSK NO : W1K140854
SHT NO : 1/1
odam

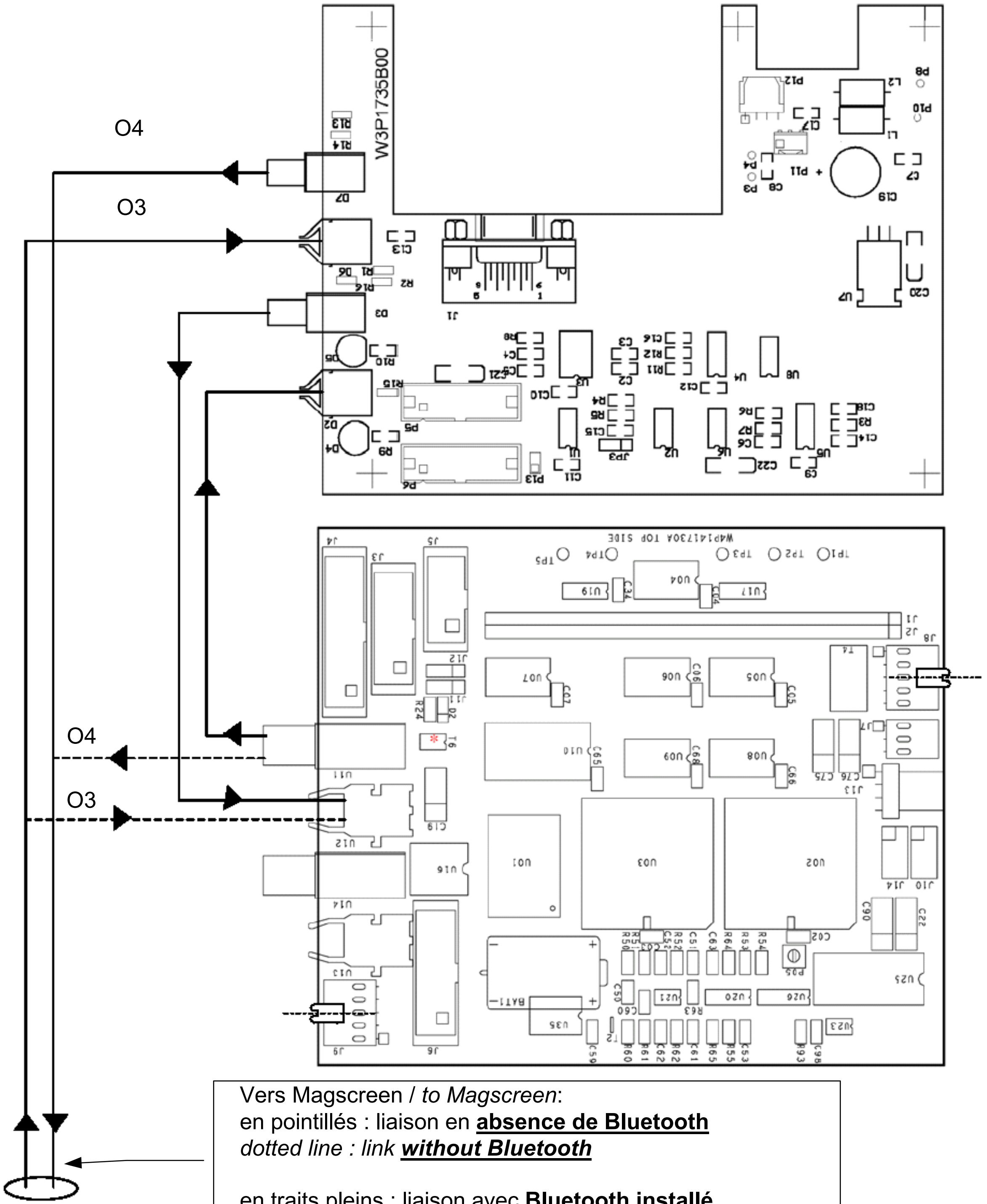
4. DIAGRAMS

4.8. Diagrams " BLUETOOTH "

PART NUMBER	DESCRIPTION	PAGE
	Wiring diagram ◊ Link with MAGSCREEN with and without BLUETOOTH	4-69
W7412166	**Printed circuit « OEM Module Adapter » W3P1735B00** ◊ layout ◊ circuit diagram 1/1	 4-70 4-71

4. DIAGRAMS

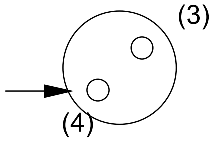
<u>Liaison MAGSCREEN avec et sans BLUETOOTH</u>.
<u>Link with MAGSCREEN with and without BLUETOOTH</u>

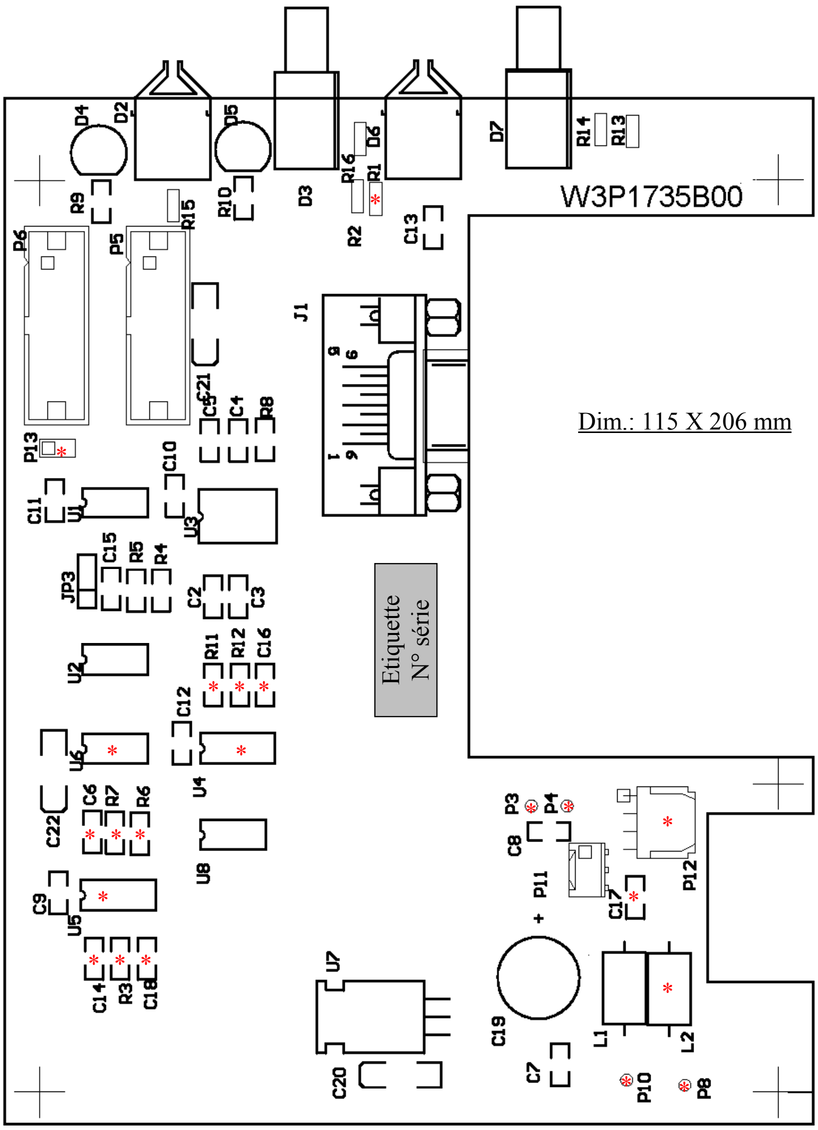


Vers Magscreen / *to Magscreen*:
en pointillés : liaison en **<u>absence de Bluetooth</u>**
*dotted line : link **<u>without Bluetooth</u>***

en traits pleins : liaison avec **<u>Bluetooth installé</u>**
*downstroke : link **<u>with Bluetooth</u>***

<u>Prise arrière pour Magscreen / *Rear pannel connector for Magscreen*</u>





** = pas monté / not mounted*

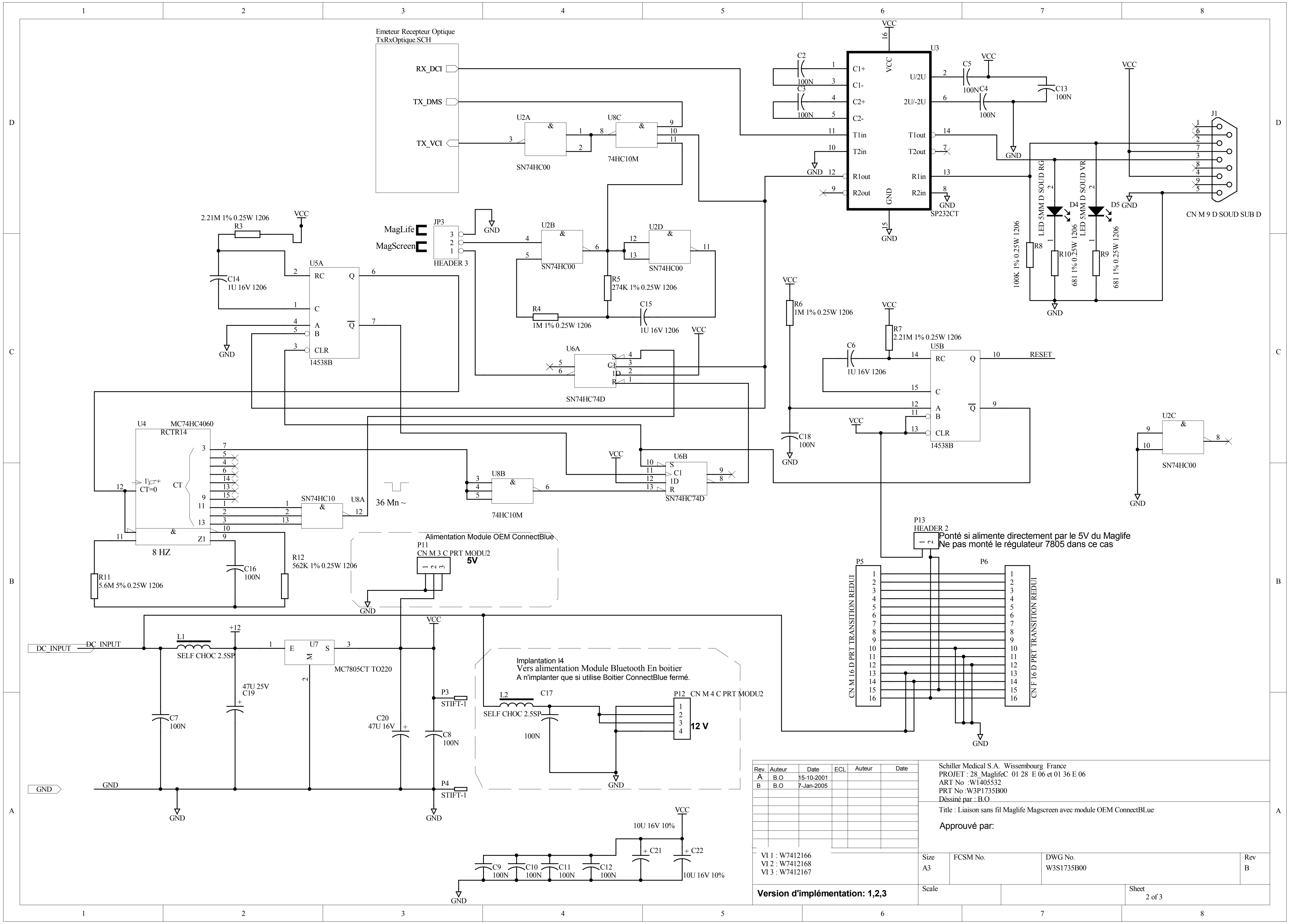
MAGLIFE C
Adaptation module OEM
OEM module adapter

DRAWN	APPROV	MODIFICATION			
CK	BO				
ECL0 12/ 01	ECL0 12/ 01				

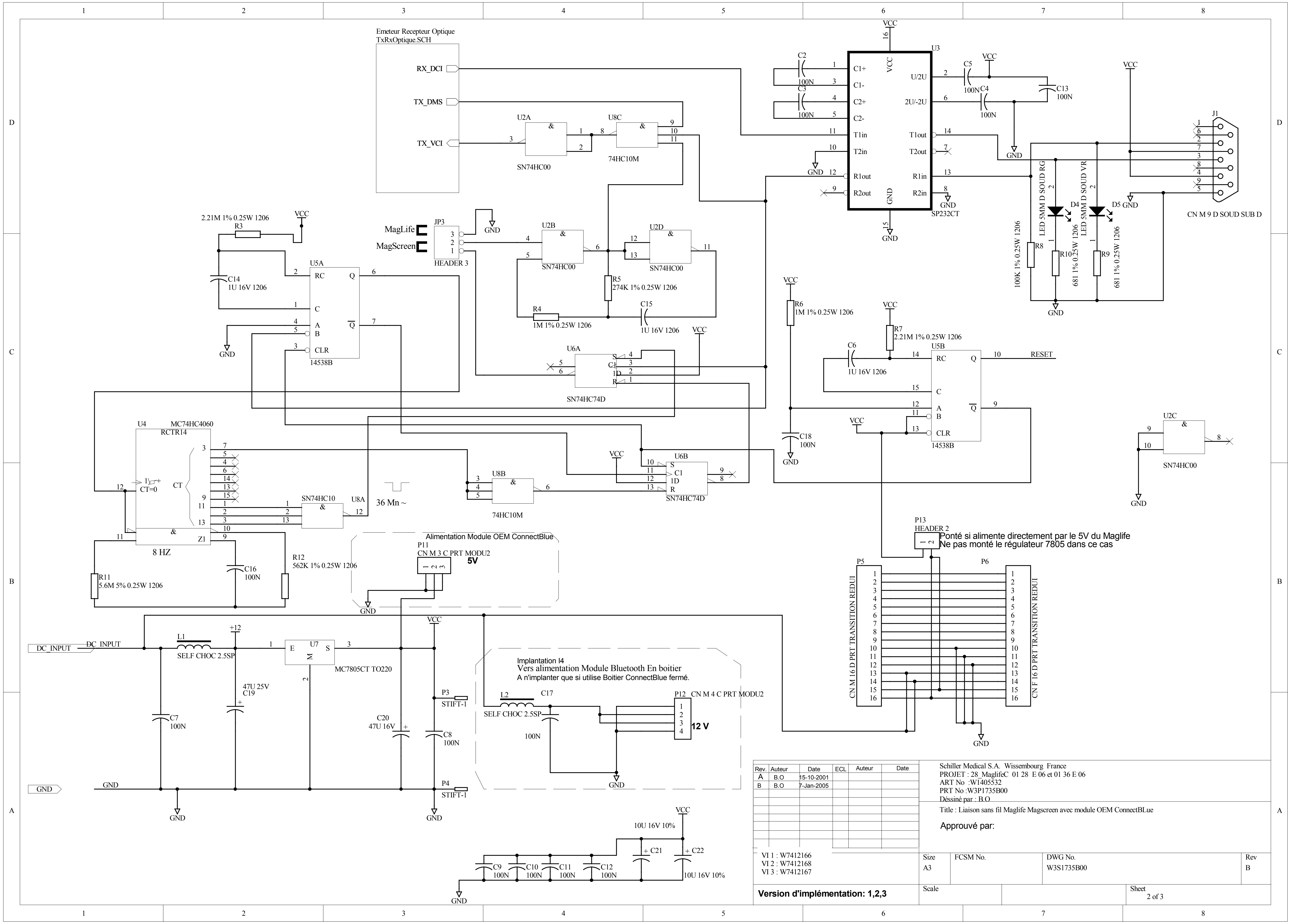
ART : W7412166
PRT : W3P1735B00
DGW: W3L1735B01
SHT : 1/1

SCHILLER
MEDICAL S.A.

4. DIAGRAMS



Emeteur Recepteur Optique
TxRxOptique.SCH
RX_DCI
TX_DMS
TX_VCI
SP232CT
CN M 9 D SOUD SUB D
MagLife
MagScreen
HEADER 3
SN74HC00
74HC10M
14538B
SN74HC74D
MC74HC4060
RCTR14
8 HZ
36 Mn ~
RESET
LED 5MM D SOUD RG
LED 5MM D SOUD VR
Alimentation Module OEM ConnectBlue
CN M 3 C PRT MODU2
5V
HEADER 2
Ponté si alimente directement par le 5V du Maglife
Ne pas monté le régulateur 7805 dans ce cas
CN M 16 D PRT TRANSITION REDUI
CN F 16 D PRT TRANSITION REDUI
DC_INPUT
SELF CHOC 2.5SP
MC7805CT TO220
STIFT-1
Implantation I4
Vers alimentation Module Bluetooth En boitier
A n'implanter que si utilise Boitier ConnectBlue fermé.
CN M 4 C PRT MODU2
12 V
GND
VCC
Schiller Medical S.A. Wissembourg France
PROJET : 28_MaglifeC 01 28 E 06 et 01 36 E 06
ART No :W1405532
PRT No :W3P1735B00
Déssiné par : B.O
Title : Liaison sans fil Maglife Magscreen avec module OEM ConnectBLue
Approuvé par:
Rev. Auteur Date ECL Auteur Date
A B.O 15-10-2001
B B.O 7-Jan-2005
VI 1 : W7412166
VI 2 : W7412168
VI 3 : W7412167
Version d'implémentation: 1,2,3
Size A3
FCSM No.
DWG No. W3S1735B00
Rev B
Scale
Sheet 2 of 3



Emeteur Recepteur Optique
TxRxOptique.SCH
RX_DCI
TX_DMS
TX_VCI
U2A
U8C
SN74HC00
74HC10M
U3
SP232CT
C1+
C1-
C2+
C2-
T1in
T2in
R1out
R2out
U/2U
2U/-2U
T1out
T2out
R1in
R2in
VCC
GND
C2 100N
C3 100N
C5 100N
C4 100N
C13 100N
J1
CN M 9 D SOUD SUB D
D4 LED 5MM D SOUD RG
D5 LED 5MM D SOUD VR
R8 100K 1% 0.25W 1206
R10 681 1% 0.25W 1206
R9 681 1% 0.25W 1206
2.21M 1% 0.25W 1206
R3
C14 1U 16V 1206
U5A
14538B
RC
Q
C
A
B
CLR
JP3
HEADER 3
MagLife
MagScreen
U2B
U2D
R5 274K 1% 0.25W 1206
R4 1M 1% 0.25W 1206
C15 1U 16V 1206
U6A
SN74HC74D
R6 1M 1% 0.25W 1206
R7 2.21M 1% 0.25W 1206
C6 1U 16V 1206
U5B
RESET
C18 100N
U2C
U4 MC74HC4060
RCTR14
CT=0
CT
8 HZ
R11 5.6M 5% 0.25W 1206
C16 100N
R12 562K 1% 0.25W 1206
SN74HC10
U8A
36 Mn ~
U8B
74HC10M
U6B
P13 HEADER 2
Ponté si alimente directement par le 5V du Maglife
Ne pas monté le régulateur 7805 dans ce cas
P5
CN M 16 D PRT TRANSITION REDUI
P6
CN F 16 D PRT TRANSITION REDUI
Alimentation Module OEM ConnectBlue
P11
CN M 3 C PRT MODU2
5V
DC_INPUT
L1
SELF CHOC 2.5SP
+12
U7
MC7805CT TO220
C7 100N
C19 47U 25V
C20 47U 16V
C8 100N
P3 STIFT-1
P4 STIFT-1
Implantation I4
Vers alimentation Module Bluetooth En boitier
A n'implanter que si utilise Boitier ConnectBlue fermé.
L2
SELF CHOC 2.5SP
C17
100N
P12 CN M 4 C PRT MODU2
12 V
10U 16V 10%
C9 100N
C10 100N
C11 100N
C12 100N
C21
C22
Rev. Auteur Date ECL Auteur Date
A B.O 15-10-2001
B B.O 7-Jan-2005
Schiller Medical S.A. Wissembourg France
PROJET : 28_MaglifeC 01 28 E 06 et 01 36 E 06
ART No :W1405532
PRT No :W3P1735B00
Déssiné par : B.O
Title : Liaison sans fil Maglife Magscreen avec module OEM ConnectBLue
Approuvé par:
VI 1 : W7412166
VI 2 : W7412168
VI 3 : W7412167
Version d'implémentation: 1,2,3
Size A3
FCSM No.
DWG No. W3S1735B00
Rev B
Scale
Sheet 2 of 3

<u>CHAPITRE 5</u>

PARTS LISTS

5. PARTS LIST

5.1. Value tables of the printed Circuits

Part Number	Assemblies	Page
	MAGLIFE C PLUS :	
W7411737	Printed Circuit « main power supply » - W4P141633	5-3
W7411702	Printed Circuit « probes treatment » - W4P141615	5-7
W7411702	Printed Circuit « probes treatment » - W4P141615A	5-14
W7411743	Printed Circuit « IBP1/2 acquisition » - W4P141632	5-15
W7411736	Printed Circuit « IBP1/2/3/4 acquisition » - W4P141632	5-18
W7412096	Printed Circuit « PC interface » - W4P141730A	5-22
W1411738	Printed Circuit « right keyboard » - W4P141637	5-26
W1411756	Printed Circuit « left keyboard » - W4P141661	5-27
W7412162	Printed Circuit « SpO2 interface » - W4P141667A	5-28
W7412172	Printed Circuit« SpO2 BCI interface »	5-29
W1411747	Printed Circuit « MAGFILE interface» - W4P141646	5-30
W1411749	Printed Circuit « parallel recorder adapter » - W4P141649A	5-31
	Capno module :	
With halogene agents : W14S0227	Printed Circuit "9100 Gas Board" - 70904S1	5-32
Without halogene agents : W14S0228	Printed Circuit "9100 Agent Preamplifier Board" - 70464S1	5-35
W14S0229	Printed Circuit "9100 Pneumatic Board" - 70116S1	5-36
W7412166	Printed Circuit « SpO2 BCI interface » W3P1735B00	5-28
	Optical fiber ECG sensor	
W1411710	Printed Circuit « ECG sensor protection » - W4P141619	5-39
W7411924	Printed Circuit « Optical fiber ECG sensor » - W4P141718	5-40

W1411750	<u>ECG gating module</u> : ECG gating module (parts list) (universal)	5-43
W1411767	ECG gating module (parts list) (GEMS)	5-44
W1411520	Printed Circuit « ECG receiver » - W4P141564A	5-45
W1404282	<u>Downloading module</u> : Downloading module (parts list)	5-46
W1411752	Printed Circuit « downloading module » - W4P141655	5-47

5. PARTS LIST

Page : **1/4**

Diagram : **W3S141633 - ECL6**
Assembly : **W1411737**
Designation : **PCB MAIN POWER SUPPLY**
Reference : **W4P141633**

Reference	Part Number	Designation
C1	3746	COND CHIMI RAD 10U 35V 5X7
C10	58252	COND CHIMI RAD 6800U 50V 30X40
C11	31705	COND CHIMI RAD 470U 50V 12X20
C12	34741	COND CHIMI RAD 3.3U 50V 4X7
C13	6909	COND MKS 470N 63V 10% R5
C14	1978	COND CHIMI RAD 1000U 16V 10X20
C15	31705	COND CHIMI RAD 470U 50V 12X20
C16	1978	COND CHIMI RAD 1000U 16V 10X20
C17	31705	COND CHIMI RAD 470U 50V 12X20
C18	3746	COND CHIMI RAD 10U 35V 5X7
C19	6909	COND MKS 470N 63V 10% R5
C2	6909	COND MKS 470N 63V 10% R5
C20	31705	COND CHIMI RAD 470U 50V 12X20
C21	34744	COND CHIMI RAD 4700U 16V 16X32
C22	3211	COND MKS 100N 50V 20% R2.5
C23	34744	COND CHIMI RAD 4700U 16V 16X32
C24	3211	COND MKS 100N 50V 20% R2.5
C25	31705	COND CHIMI RAD 470U 50V 12X20
C26	6909	COND MKS 470N 63V 10% R5
C27	1978	COND CHIMI RAD 1000U 16V 10X20
C28	1978	COND CHIMI RAD 1000U 16V 10X20
C29	34741	COND CHIMI RAD 3.3U 50V 4X7
C3	35091	COND CERM 3.3N 100V 10% X7R
C30	3211	COND MKS 100N 50V 20% R2.5
C31	1144	COND CERM 1N 100V 5% NPO R2.54
C4	31705	COND CHIMI RAD 470U 50V 12X20
C5	34741	COND CHIMI RAD 3.3U 50V 4X7
C6	6909	COND MKS 470N 63V 10% R5
C7	1978	COND CHIMI RAD 1000U 16V 10X20
C8	1978	COND CHIMI RAD 1000U 16V 10X20
C9	1978	COND CHIMI RAD 1000U 16V 10X20
D1	90011	DIODE SCHOTTKY MBR1045 TO220
D11	2967	DIODE 1N4148
D12	12713	DIODE BYV 27-200
D13	12713	DIODE BYV 27-200
D14	2967	DIODE 1N4148
D15	90011	DIODE SCHOTTKY MBR1045 TO220
D16	12713	DIODE BYV 27-200
D17	90011	DIODE SCHOTTKY MBR1045 TO220
D18	90011	DIODE SCHOTTKY MBR1045 TO220
D19	90011	DIODE SCHOTTKY MBR1045 TO220
D2	90011	DIODE SCHOTTKY MBR1045 TO220
D20	90011	DIODE SCHOTTKY MBR1045 TO220
D21	2967	DIODE 1N4148
D22	35514	DIODE BAT85
D3	90011	DIODE SCHOTTKY MBR1045 TO220
D4	90011	DIODE SCHOTTKY MBR1045 TO220
D5	90011	DIODE SCHOTTKY MBR1045 TO220
D6	12713	DIODE BYV 27-200
D7	90011	DIODE SCHOTTKY MBR1045 TO220
D8	2967	DIODE 1N4148
D9	12713	DIODE BYV 27-200
DN1	72601	DIODE S MBR20100 100V 20ATO220
DN2	72638	DIODE S MBR2545 45V 25A TO220
DN3	72601	DIODE S MBR20100 100V 20ATO220
DN4	72638	DIODE S MBR2545 45V 25A TO220
DZ1	52447	DIODE 1N6290A 62V 1.5KE
DZ2	52447	DIODE 1N6290A 62V 1.5KE
DZ3	52447	DIODE 1N6290A 62V 1.5KE
DZ4	34650	DIODE Z BZX55C 18V 500MW
DZ5	34650	DIODE Z BZX55C 18V 500MW
DZ6	52447	DIODE 1N6290A 62V 1.5KE
DZ7	34643	DIODE Z BZX55C 6.8V 500MW
DZ8	34658	DIODE Z BZX55A 5.1V 500MW

5. PARTS LIST

Page : 2/4

Diagram : W3S141633 - ECL6
Assembly : W1411737
Designation : PCB MAIN POWER SUPPLY
Reference : W4P141633

Reference	Part Number	Designation
F1	2257	FUS VERRE 5X20MM 4A T 250V
F2	2255	FUS VERRE 5X20MM 2.5A T 250V
F3	2243	FUS VERRE 5X20MM 0.16A T 250V
F4	2257	FUS VERRE 5X20MM 4A T 250V
F5	2257	FUS VERRE 5X20MM 4A T 250V
F6	2251	FUS VERRE 5X20MM 1A T 250V
F7	2257	FUS VERRE 5X20MM 4A T 250V
F8	2256	FUS VERRE 5X20MM 3.15A T 250V
J1	35460	CN M 5 D PRT 41761 R3.96MM
J10	51094	CN M 3 D PRT 41761 R3.96MM
J10'	51094	CN M 3 D PRT 41761 R3.96MM
J2	73528	CN M 4 D PRT 41761 R3.96MM
J3	15755	CN M 14 D PRT TRANSITION REDUI
J4	5676	CN M 20 D PRT 3.2 TRANSITION
J5	73528	CN M 4 D PRT 41761 R3.96MM
J6	15625	CN M 3 D PRT MODU2
J7	35461	CN M 2 D PRT 41761 R3.96MM
J8	22671	CN M 16 D PRT TRANSITION REDUI
J9	15626	CN M 4 D PRT MODU2 1-R
L1	2029	SELF AX CHOC 2.5SP GAINE THERM
L2	2029	SELF AX CHOC 2.5SP GAINE THERM
L3	2029	SELF AX CHOC 2.5SP GAINE THERM
L4	2029	SELF AX CHOC 2.5SP GAINE THERM
L5	2029	SELF AX CHOC 2.5SP GAINE THERM
LD1	365	OPTO LED 3MM D SOUD JA
LD2	367	OPTO LED 3MM D SOUD VR
LD3	367	OPTO LED 3MM D SOUD VR
LD4	365	OPTO LED 3MM D SOUD JA
P1633	W1404408	PCB ALIMENTATION PRINC MAGC
PF1	4915	FUS SUP PRT 5X20 CLIPS
PF1'	4915	FUS SUP PRT 5X20 CLIPS
PF2	4915	FUS SUP PRT 5X20 CLIPS
PF2'	4915	FUS SUP PRT 5X20 CLIPS
PF3	4915	FUS SUP PRT 5X20 CLIPS
PF3'	4915	FUS SUP PRT 5X20 CLIPS
PF4	4915	FUS SUP PRT 5X20 CLIPS
PF4'	4915	FUS SUP PRT 5X20 CLIPS
PF5	4915	FUS SUP PRT 5X20 CLIPS
PF5'	4915	FUS SUP PRT 5X20 CLIPS
PF6	4915	FUS SUP PRT 5X20 CLIPS
PF6'	4915	FUS SUP PRT 5X20 CLIPS
PF7	4915	FUS SUP PRT 5X20 CLIPS
PF7'	4915	FUS SUP PRT 5X20 CLIPS
PF8	4915	FUS SUP PRT 5X20 CLIPS
PF8'	4915	FUS SUP PRT 5X20 CLIPS
R1	35899	RES BOB 470 5% 3W
R10	1034	RES MET 100K 1% 0.6W 50PPM
R11	1010	RES MET 1K 1% 0.6W 50PPM
R12	1010	RES MET 1K 1% 0.6W 50PPM
R13	2025	RES MET 20K 1% 0.6W 50PPM
R14	2772	RES MET 3.83K 1% 0.6W 50PPM
R15	2027	RES MET 2K 1% 0.6W 50PPM
R16	1011	RES MET 1.21K 1% 0.6W 50PPM
R17	2027	RES MET 2K 1% 0.6W 50PPM
R18	1022	RES MET 10K 1% 0.6W 50PPM
R19	2868	RES BOB 0.22 5% 3W
R2	35231	RES MET 147 1% 0.6W 50PPM
R20	1011	RES MET 1.21K 1% 0.6W 50PPM
R21	1006	RES MET 475 1% 0.6W 50PPM
R22	35899	RES BOB 470 5% 3W
R23	1022	RES MET 10K 1% 0.6W 50PPM
R24	1022	RES MET 10K 1% 0.6W 50PPM
R25	2027	RES MET 2K 1% 0.6W 50PPM
R26	2772	RES MET 3.83K 1% 0.6W 50PPM

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Diagram : W3S141633 - ECL6
Assembly : W1411737
Designation : PCB MAIN POWER SUPPLY
Reference : W4P141633

Reference	Part Number	Designation
R27	2772	RES MET 3.83K 1% 0.6W 50PPM
R28	1022	RES MET 10K 1% 0.6W 50PPM
R29	2772	RES MET 3.83K 1% 0.6W 50PPM
R3	1006	RES MET 475 1% 0.6W 50PPM
R30	2795	RES MET 30.1K 1% 0.6W 50PPM
R31	1039	RES MET 274K 1% 0.6W 50PPM
R32	1034	RES MET 100K 1% 0.6W 50PPM
R33	1039	RES MET 274K 1% 0.6W 50PPM
R34	1039	RES MET 274K 1% 0.6W 50PPM
R35	1046	RES MET 1M 1% 0.6W 50PPM
R36	1029	RES MET 39.2K 1% 0.6W 50PPM
R37	1041	RES MET 392K 1% 0.6W 50PPM
R38	2027	RES MET 2K 1% 0.6W 50PPM
R39	1011	RES MET 1.21K 1% 0.6W 50PPM
R4	1011	RES MET 1.21K 1% 0.6W 50PPM
R40	2867	RES BOB 0.1 5% 3W
R41	51875	RES MET 2.21K 0.1% 0.6W 50PPM
R42	51875	RES MET 2.21K 0.1% 0.6W 50PPM
R43	51875	RES MET 2.21K 0.1% 0.6W 50PPM
R44	51875	RES MET 2.21K 0.1% 0.6W 50PPM
R45	2772	RES MET 3.83K 1% 0.6W 50PPM
R46	2772	RES MET 3.83K 1% 0.6W 50PPM
R47	1029	RES MET 39.2K 1% 0.6W 50PPM
R48	2025	RES MET 20K 1% 0.6W 50PPM
R49	2772	RES MET 3.83K 1% 0.6W 50PPM
R5	35899	RES BOB 470 5% 3W
R50	35899	RES BOB 470 5% 3W
R51	1011	RES MET 1.21K 1% 0.6W 50PPM
R52	1010	RES MET 1K 1% 0.6W 50PPM
R53	1022	RES MET 10K 1% 0.6W 50PPM
R54	2025	RES MET 20K 1% 0.6W 50PPM
R55	1029	RES MET 39.2K 1% 0.6W 50PPM
R56	2025	RES MET 20K 1% 0.6W 50PPM
R57	2025	RES MET 20K 1% 0.6W 50PPM
R58	1029	RES MET 39.2K 1% 0.6W 50PPM
R59	2025	RES MET 20K 1% 0.6W 50PPM
R6	1011	RES MET 1.21K 1% 0.6W 50PPM
R62	2025	RES MET 20K 1% 0.6W 50PPM
R63	2772	RES MET 3.83K 1% 0.6W 50PPM
R66	34987	RES MET 10M 1% 0.6W 50PPM
R7	2786	RES MET 10.5K 1% 0.6W 50PPM
R8	1011	RES MET 1.21K 1% 0.6W 50PPM
R9	1039	RES MET 274K 1% 0.6W 50PPM
RG1	72641	IC 1070/VREG LT1070CT TO220-5
RG2	72641	IC 1070/VREG LT1070CT TO220-5
RG3	2288	IC 7912/VREG MC7912CT TO220
RG4	72641	IC 1070/VREG LT1070CT TO220-5
RG5	35804	IC 2931/VREG LM2931CT TO314D
RG6	72641	IC 1070/VREG LT1070CT TO220-5
SW1	15640	SW GLISS 1XI PRT
T1	15401	TRANS BC550C NPN TO92
T10	72866	TRANS IRF4905 PMOS TO220AB
T12	72866	TRANS IRF4905 PMOS TO220AB
T13	15401	TRANS BC550C NPN TO92
T2	72866	TRANS IRF4905 PMOS TO220AB
T3	72866	TRANS IRF4905 PMOS TO220AB
T4	15401	TRANS BC550C NPN TO92
T5	15401	TRANS BC550C NPN TO92
T7	15401	TRANS BC550C NPN TO92
T8	72866	TRANS IRF4905 PMOS TO220AB

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Diagram : **W3S141633 - ECL6**
Assembly : **W1411737**
Designation : **PCB MAIN POWER SUPPLY**
Reference : **W4P141633**

Reference	Part Number	Designation
TR1	72794	TRSFO 2X110V/2X9V 45VA UL CSA
TR2	W1403824	TRSFO 2 PCB ALIMENTATIONS MAG2
TR3	W1403825	TRSFO 3 PCB ALIMENTATIONS MAG2
TR4	W1403826	TRSFO 4 PCB ALIMENTATIONS MAG2
TR5	72794	TRSFO 2X110V/2X9V 45VA UL CSA
TR6	W1403258	TRSFO ALIM GRAPHE DG3002
U1	51515	IC OPT PC817 DIP4
U2	21740	IC 2004/DRV ULN2004A DIL16
U3	75376	IC 285/OP OP285GP PDIP 8
U4	72711	IC 27/OP TLC27L2CD PDIP8

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Diagram : **W3S141615 - ECL1**
Assembly : **W1411702**
Designation : **PCB PROBES TREATMENT**
Reference : **W4P141615**

Reference	Part Number	Designation
C1	21002	COND CMS 1206 1N 50V 5% NPO
C3	21002	COND CMS 1206 1N 50V 5% NPO
C4	72548	COND CMS 1206 47N 50V 5% X7R
C5	21018	COND CMS 1206 22N 50V 20% X7R
C6	72548	COND CMS 1206 47N 50V 5% X7R
C7	21018	COND CMS 1206 22N 50V 20% X7R
C8	72660	COND CMS 1206 1U 16V +80/-20%
C9	72660	COND CMS 1206 1U 16V +80/-20%
C10	72502	COND CMS 1206 100N 50V 5% X7R
C12	8493	COND CMS 1206 100N 50V 20% X7R
C13	72660	COND CMS 1206 1U 16V +80/-20%
C14	21002	COND CMS 1206 1N 50V 5% NPO
C15	21018	COND CMS 1206 22N 50V 20% X7R
C16	72502	COND CMS 1206 100N 50V 5% X7R
C17	21018	COND CMS 1206 22N 50V 20% X7R
C18	72502	COND CMS 1206 100N 50V 5% X7R
C19	21010	COND CMS 1206 4.7N 50V 20% X7R
C20	21020	COND CMS 1206 33N 50V 20% X7R
C21	21002	COND CMS 1206 1N 50V 5% NPO
C22	72660	COND CMS 1206 1U 16V +80/-20%
C23	72502	COND CMS 1206 100N 50V 5% X7R
C24	8493	COND CMS 1206 100N 50V 20% X7R
C25	72660	COND CMS 1206 1U 16V +80/-20%
C26	51557	COND CMS TANTAL 22U 20V 20%
C27	51556	COND CMS TANTAL 47U 10V 20%
C28	51557	COND CMS TANTAL 22U 20V 20%
C29	51556	COND CMS TANTAL 47U 10V 20%
C30	21018	COND CMS 1206 22N 50V 20% X7R
C31	21018	COND CMS 1206 22N 50V 20% X7R
C32	21018	COND CMS 1206 22N 50V 20% X7R
C33	21018	COND CMS 1206 22N 50V 20% X7R
C34	51556	COND CMS TANTAL 47U 10V 20%
C35	51556	COND CMS TANTAL 47U 10V 20%
C36	8493	COND CMS 1206 100N 50V 20% X7R
C37	8493	COND CMS 1206 100N 50V 20% X7R
C38	20981	COND CMS 1206 18P 50V 5% NPO
C39	20981	COND CMS 1206 18P 50V 5% NPO
C40	21018	COND CMS 1206 22N 50V 20% X7R
C41	21018	COND CMS 1206 22N 50V 20% X7R
C42	21018	COND CMS 1206 22N 50V 20% X7R
C43	51556	COND CMS TANTAL 47U 10V 20%
C44	21018	COND CMS 1206 22N 50V 20% X7R
C45	21018	COND CMS 1206 22N 50V 20% X7R
C46	21018	COND CMS 1206 22N 50V 20% X7R
C47	8493	COND CMS 1206 100N 50V 20% X7R
C48	8493	COND CMS 1206 100N 50V 20% X7R
C49	8493	COND CMS 1206 100N 50V 20% X7R
C50	21018	COND CMS 1206 22N 50V 20% X7R
C51	21018	COND CMS 1206 22N 50V 20% X7R
C52	21018	COND CMS 1206 22N 50V 20% X7R
C53	72541	COND CMS TANTAL 2.2U 35V 20%
C54	72541	COND CMS TANTAL 2.2U 35V 20%
D1	22029	DIODE CMS BAS32L SOD80
D2	22029	DIODE CMS BAS32L SOD80
D3	22029	DIODE CMS BAS32L SOD80
D4	22029	DIODE CMS BAS32L SOD80
D5	22029	DIODE CMS BAS32L SOD80
D6	22029	DIODE CMS BAS32L SOD80
D7	51329	DIODE CMS BAS85 SOD80
DZ1	72503	IC 1431/VREF TL1431CD SO8
H1	72801	CAPTEUR EFFET HALL SS495A
H2	72801	CAPTEUR EFFET HALL SS495A
H3	72801	CAPTEUR EFFET HALL SS495A

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Diagram : **W3S141615 - ECL1**
Assembly : **W1411702**
Designation : **PCB PROBES TREATMENT**
Reference : **W4P141615**

Reference	Part Number	Designation
J1	12625	CN M 10 D PRT TRANSITION
J2	22671	CN M 16 D PRT TRANSITION REDUI
J3	72229	CN M 5 D PRT MODU2
L1	22874	SELF CMS 1008 1.5UH 10%
L2	22874	SELF CMS 1008 1.5UH 10%
LD1	72663	OPTO PHOTODIODE SFH756V
LD2	72663	OPTO PHOTODIODE SFH756V
P1615	W1404320	CI TRAITMT CAPTEURS MAGC
P1	72188	RES AJUST 200K 0.25W 1T CMS
P2	72710	RES AJUST 1M 0.25W 1T CMS
P3	51460	RES AJUST 20K 0.25W 1T CMS
P4	72828	RES AJUST 200 0.25W 1T CMS
P5	72828	RES AJUST 200 0.25W 1T CMS
P6	72828	RES AJUST 200 0.25W 1T CMS
Q1	72529	QUARTZ 16.000MHZ HC-49/U-S
R1	72678	RES CMS 10K 1% 0.16W 0805
R2	53690	RES CMS 332K 1% 0.25W 1206
R3	51729	RES CMS 162K 1% 0.25W 1206
R4	51729	RES CMS 162K 1% 0.25W 1206
R5	51729	RES CMS 162K 1% 0.25W 1206
R6	51729	RES CMS 162K 1% 0.25W 1206
R7	51729	RES CMS 162K 1% 0.25W 1206
R8	72826	RES CMS 100K 1% 0.16W 0805
R9	72826	RES CMS 100K 1% 0.16W 0805
R10	21347	RES CMS 1M 1% 0.25W 1206
R11	53690	RES CMS 332K 1% 0.25W 1206
R12	72826	RES CMS 100K 1% 0.16W 0805
R13	21339	RES CMS 221K 1% 0.25W 1206
R14	53690	RES CMS 332K 1% 0.25W 1206
R15	72678	RES CMS 10K 1% 0.16W 0805
R16	21347	RES CMS 1M 1% 0.25W 1206
R17	72678	RES CMS 10K 1% 0.16W 0805
R18	72826	RES CMS 100K 1% 0.16W 0805
R19	72826	RES CMS 100K 1% 0.16W 0805
R20	53690	RES CMS 332K 1% 0.25W 1206
R21	72826	RES CMS 100K 1% 0.16W 0805
R22	53704	RES CMS 14K 1% 0.25W 1206
R23	21329	RES CMS 33.2K 1% 0.25W 1206
R24	72826	RES CMS 100K 1% 0.16W 0805
R25	72826	RES CMS 100K 1% 0.16W 0805
R26	72826	RES CMS 100K 1% 0.16W 0805
R27	20737	RES CMS 1K 1% 0.25W 1206
R28	53690	RES CMS 332K 1% 0.25W 1206
R29	53690	RES CMS 332K 1% 0.25W 1206
R30	21338	RES CMS 182K 1% 0.25W 1206
R31	21338	RES CMS 182K 1% 0.25W 1206
R32	21333	RES CMS 68.1K 1% 0.25W 1206
R33	72826	RES CMS 100K 1% 0.16W 0805
R34	72826	RES CMS 100K 1% 0.16W 0805
R35	72826	RES CMS 100K 1% 0.16W 0805
R36	72826	RES CMS 100K 1% 0.16W 0805
R37	72826	RES CMS 100K 1% 0.16W 0805
R38	33927	RES CMS 20K 1% 0.25W 1206
R39	21349	RES CMS 1.5M 1% 0.25W 1206
R40	51758	RES CMS 619K 1% 0.25W 1206
R41	21349	RES CMS 1.5M 1% 0.25W 1206
R42	21339	RES CMS 221K 1% 0.25W 1206
R43	33927	RES CMS 20K 1% 0.25W 1206
R44	21339	RES CMS 221K 1% 0.25W 1206
R45	72826	RES CMS 100K 1% 0.16W 0805
R46	72826	RES CMS 100K 1% 0.16W 0805
R47	72826	RES CMS 100K 1% 0.16W 0805
R48	72826	RES CMS 100K 1% 0.16W 0805
R49	72826	RES CMS 100K 1% 0.16W 0805

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Diagram : **W3S141615 - ECL1**
Assembly : **W1411702**
Designation : **PCB PROBES TREATMENT**
Reference : **W4P141615**

Reference	Part Number	Designation
R50	72826	RES CMS 100K 1% 0.16W 0805
R51	72678	RES CMS 10K 1% 0.16W 0805
R52	20737	RES CMS 1K 1% 0.25W 1206
R53	51286	RES CMS 243 1% 0.25W 1206
R54	51286	RES CMS 243 1% 0.25W 1206
R55	20734	RES CMS 681 1% 0.25W 1206
R56	21347	RES CMS 1M 1% 0.25W 1206
R57	21347	RES CMS 1M 1% 0.25W 1206
R58	51748	RES CMS 475K 1% 0.25W 1206
R59	20745	RES CMS 4.7K 1% 0.25W 1206
R60	20737	RES CMS 1K 1% 0.25W 1206
R61	20745	RES CMS 4.7K 1% 0.25W 1206
R62	72826	RES CMS 100K 1% 0.16W 0805
R63	72678	RES CMS 10K 1% 0.16W 0805
R64	72826	RES CMS 100K 1% 0.16W 0805
R65	72826	RES CMS 100K 1% 0.16W 0805
R66	72826	RES CMS 100K 1% 0.16W 0805
R67	72826	RES CMS 100K 1% 0.16W 0805
R68	72826	RES CMS 100K 1% 0.16W 0805
R69	72826	RES CMS 100K 1% 0.16W 0805
R70	72826	RES CMS 100K 1% 0.16W 0805
R71	72826	RES CMS 100K 1% 0.16W 0805
R72	72826	RES CMS 100K 1% 0.16W 0805
R73	72826	RES CMS 100K 1% 0.16W 0805
R74	72826	RES CMS 100K 1% 0.16W 0805
R75	72826	RES CMS 100K 1% 0.16W 0805
R76	72826	RES CMS 100K 1% 0.16W 0805
R77	72826	RES CMS 100K 1% 0.16W 0805
R78	72826	RES CMS 100K 1% 0.16W 0805
R79	72826	RES CMS 100K 1% 0.16W 0805
R80	72826	RES CMS 100K 1% 0.16W 0805
R81	72826	RES CMS 100K 1% 0.16W 0805
R82	72826	RES CMS 100K 1% 0.16W 0805
R83	72826	RES CMS 100K 1% 0.16W 0805
R84	72826	RES CMS 100K 1% 0.16W 0805
R85	72826	RES CMS 100K 1% 0.16W 0805
R86	72826	RES CMS 100K 1% 0.16W 0805
R87	72826	RES CMS 100K 1% 0.16W 0805
R88	72826	RES CMS 100K 1% 0.16W 0805
R89	72826	RES CMS 100K 1% 0.16W 0805
R90	72826	RES CMS 100K 1% 0.16W 0805
R91	72826	RES CMS 100K 1% 0.16W 0805
R92	72826	RES CMS 100K 1% 0.16W 0805
R93	72826	RES CMS 100K 1% 0.16W 0805
R94	20737	RES CMS 1K 1% 0.25W 1206
R95	33927	RES CMS 20K 1% 0.25W 1206
R96	20737	RES CMS 1K 1% 0.25W 1206
R97	72826	RES CMS 100K 1% 0.16W 0805
R98	72826	RES CMS 100K 1% 0.16W 0805
R99	21352	RES CMS 0 1% 0.25W 1206
R100	21352	RES CMS 0 1% 0.25W 1206
R101	72826	RES CMS 100K 1% 0.16W 0805
R102	51286	RES CMS 243 1% 0.25W 1206
R103	20734	RES CMS 681 1% 0.25W 1206
R104	72826	RES CMS 100K 1% 0.16W 0805
R105	72678	RES CMS 10K 1% 0.16W 0805
R106	72678	RES CMS 10K 1% 0.16W 0805
R107	33927	RES CMS 20K 1% 0.25W 1206
R108	72678	RES CMS 10K 1% 0.16W 0805
R109	21353	RES CMS 0 1% 0.16W 0805
R110	21353	RES CMS 0 1% 0.16W 0805
R111	21353	RES CMS 0 1% 0.16W 0805
R112	21353	RES CMS 0 1% 0.16W 0805
R113	21353	RES CMS 0 1% 0.16W 0805
R114	21353	RES CMS 0 1% 0.16W 0805

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Diagram : **W3S141615 - ECL1**
Assembly : **W1411702**
Designation : **PCB PROBES TREATMENT**
Reference : **W4P141615**

Reference	Part Number	Designation
R115	20737	RES CMS 1K 1% 0.25W 1206
R116	72826	RES CMS 100K 1% 0.16W 0805
R117	72826	RES CMS 100K 1% 0.16W 0805
R118	72826	RES CMS 100K 1% 0.16W 0805
R119	20737	RES CMS 1K 1% 0.25W 1206
RG1	18812	IC 317/VREG LM317LZ TO 92
RG2	18811	IC 337/VREG LM337LZ TO 92
RG3	18812	IC 317/VREG LM317LZ TO 92
RG4	9422	IC 7805/VREG MC78L05ACP TO92
S13	15771	IC SUPPORT PLCC44
S18	51657	IC SUPPORT PLCC32
T1	51779	TRANS CMS BC850C NPN SOT23
T2	51470	TRANS CMS BSS138 SOT23
T3	51779	TRANS CMS BC850C NPN SOT23
TP1	22276	ACCBL PICOT TEST D=1.3MM
TP2	22276	ACCBL PICOT TEST D=1.3MM
TP3	22276	ACCBL PICOT TEST D=1.3MM
TP4	22276	ACCBL PICOT TEST D=1.3MM
TP5	22276	ACCBL PICOT TEST D=1.3MM
TP6	22276	ACCBL PICOT TEST D=1.3MM
TP7	22276	ACCBL PICOT TEST D=1.3MM
TP8	22276	ACCBL PICOT TEST D=1.3MM
TP9	22276	ACCBL PICOT TEST D=1.3MM
TP10	22276	ACCBL PICOT TEST D=1.3MM
TP11	22276	ACCBL PICOT TEST D=1.3MM
TP12	22276	ACCBL PICOT TEST D=1.3MM
TP13	22276	ACCBL PICOT TEST D=1.3MM
TP14	22276	ACCBL PICOT TEST D=1.3MM
TP15	22276	ACCBL PICOT TEST D=1.3MM
TP16	22276	ACCBL PICOT TEST D=1.3MM
TP17	22276	ACCBL PICOT TEST D=1.3MM
TP18	22276	ACCBL PICOT TEST D=1.3MM
U1	51807	OPTO FIBRE RECEPTEUR 2523
U3	72728	IC 478/OP MAX478CSA SO8
U4	33924	IC 358A/OP LM358AM SO8 CMS
U5	42753	IC 744066 / MM74HC4066N SO14
U6	51787	IC 555/ICM7555ISA SO8 CMS
U7	51675	IC 062/OP TL062CD SO8 CMS
U8	51684	IC 4052/MUX CD4052BCM SO16
U9	72728	IC IC478/OP MAX478CSA SO8
U10	72860	IC 064/OP TL064CD SO14 CMS
U11	51676	IC 4538/CD HEF4538BT SO16 CMS
U12	51545	IC 064/OP TL064CD SO14 CMS
U13	72598	IC 80251/MCU N80C251SB16PLCC44
U14	51498	IC 74573/74HC573D SO20L CMS
U15	51270	IC 74138/SN74HC138D SO16 CMS
U16	51531	IC 43256/SRAM SOXL28 CMS
U17	51531	IC 43256/SRAM SOXL28 CMS
U19	51902	IC 74574/SN74HC574DW SOL20CMS
U20	51902	IC 74574/SN74HC574DW SOL20CMS
U21	16132	IC 7579/ADC AD7579JN AD PDIP24
U22	51953	IC 4051/MUX HEF4051BT SO16
U23	51953	IC 4051/MUX HEF4051BT SO16
U24	51545	IC 064/OP TL064CD SO14 CMS
U25	72633	IC 691/MAX691CWE SOL16
U26	51783	IC 74390/SN74HC390D SO16 CMS
U27	51916	IC 7410/74HC10M SO14 CMS
U28	72272	IC 393/OP TLC393CD SO8
U29	72272	IC 393/OP TLC393CD SO8
U30	72272	IC 393/OP TLC393CD SO8
U31	51782	IC 7432/SN74HC32D SO14 CMS

5. PARTS LIST

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Diagram : **W3S141615A - ECL5**
Assembly : **W1411702**
Designation : **PCB PROBES TREATMENT**
Reference : **W4P141615A**

Reference	Part Number	Designation
C1	21002	COND CMS 1206 1N 50V 5% NPO
C10	72502	COND CMS 1206 100N 50V 5% X7R
C12	8493	COND CMS 1206 100N 50V 20% X7R
C13	72660	COND CMS 1206 1U 16V +80/-20%
C14	21002	COND CMS 1206 1N 50V 5% NPO
C15	21018	COND CMS 1206 22N 50V 20% X7R
C16	72502	COND CMS 1206 100N 50V 5% X7R
C17	21018	COND CMS 1206 22N 50V 20% X7R
C18	72502	COND CMS 1206 100N 50V 5% X7R
C19	21010	COND CMS 1206 4.7N 50V 20% X7R
C20	21020	COND CMS 1206 33N 50V 20% X7R
C21	21002	COND CMS 1206 1N 50V 5% NPO
C22	72660	COND CMS 1206 1U 16V +80/-20%
C23	72502	COND CMS 1206 100N 50V 5% X7R
C24	8493	COND CMS 1206 100N 50V 20% X7R
C25	72660	COND CMS 1206 1U 16V +80/-20%
C26	51557	COND CMS TANTAL 22U 20V 20%
C27	51556	COND CMS TANTAL 47U 10V 20%
C28	51557	COND CMS TANTAL 22U 20V 20%
C29	51556	COND CMS TANTAL 47U 10V 20%
C3	21002	COND CMS 1206 1N 50V 5% NPO
C30	21018	COND CMS 1206 22N 50V 20% X7R
C31	21018	COND CMS 1206 22N 50V 20% X7R
C32	21018	COND CMS 1206 22N 50V 20% X7R
C33	21018	COND CMS 1206 22N 50V 20% X7R
C34	51556	COND CMS TANTAL 47U 10V 20%
C35	51556	COND CMS TANTAL 47U 10V 20%
C36	8493	COND CMS 1206 100N 50V 20% X7R
C37	8493	COND CMS 1206 100N 50V 20% X7R
C38	20981	COND CMS 1206 18P 50V 5% NPO
C39	20981	COND CMS 1206 18P 50V 5% NPO
C4	72548	COND CMS 1206 47N 50V 5% X7R
C40	21018	COND CMS 1206 22N 50V 20% X7R
C41	21018	COND CMS 1206 22N 50V 20% X7R
C42	21018	COND CMS 1206 22N 50V 20% X7R
C43	51556	COND CMS TANTAL 47U 10V 20%
C44	21018	COND CMS 1206 22N 50V 20% X7R
C45	21018	COND CMS 1206 22N 50V 20% X7R
C46	21018	COND CMS 1206 22N 50V 20% X7R
C47	8493	COND CMS 1206 100N 50V 20% X7R
C48	8493	COND CMS 1206 100N 50V 20% X7R
C49	8493	COND CMS 1206 100N 50V 20% X7R
C5	21018	COND CMS 1206 22N 50V 20% X7R
C50	21018	COND CMS 1206 22N 50V 20% X7R
C51	21018	COND CMS 1206 22N 50V 20% X7R
C52	21018	COND CMS 1206 22N 50V 20% X7R
C53	72541	COND CMS TANTAL 2.2U 35V 20%
C54	72541	COND CMS TANTAL 2.2U 35V 20%
C6	72548	COND CMS 1206 47N 50V 5% X7R
C7	21018	COND CMS 1206 22N 50V 20% X7R
C8	72660	COND CMS 1206 1U 16V +80/-20%
C9	72660	COND CMS 1206 1U 16V +80/-20%
D1	22029	DIODE CMS BAS32L SOD80
D2	22029	DIODE CMS BAS32L SOD80
D3	22029	DIODE CMS BAS32L SOD80
D4	22029	DIODE CMS BAS32L SOD80
D5	22029	DIODE CMS BAS32L SOD80
D6	22029	DIODE CMS BAS32L SOD80
D7	51329	DIODE CMS BAS85 SOD80
DZ1	72503	IC 1431/VREF TL1431CD SO8
H1	72801	CAPTEUR EFFET HALL SS495A
H2	72801	CAPTEUR EFFET HALL SS495A
H3	72801	CAPTEUR EFFET HALL SS495A

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Diagram : W3S141615A - ECL5
Assembly : W1411702
Designation : PCB PROBES TREATMENT
Reference : W4P141615A

Reference	Part Number	Designation
J1	12625	CN M 10 D PRT TRANSITION
J2	22671	CN M 16 D PRT TRANSITION REDUI
J3	72229	CN M 5 D PRT MODU2
L1	22874	SELF CMS 1008 1.5UH 10%
L2	22874	SELF CMS 1008 1.5UH 10%
LD1	72663	OPTO PHOTODIODE SFH756V
LD2	72663	OPTO PHOTODIODE SFH756V
P1	72188	RES AJUST 200K 0.25W 1T CMS
P1615A	W1404320	CI TRAITMT CAPTEURS MAGC
P2	72710	RES AJUST 1M 0.25W 1T CMS
P3	51460	RES AJUST 20K 0.25W 1T CMS
P4	72828	RES AJUST 200 0.25W 1T CMS
P5	72828	RES AJUST 200 0.25W 1T CMS
P6	72828	RES AJUST 200 0.25W 1T CMS
Q1	72529	QUARTZ 16.000MHZ HC-49/U-S
R1	72678	RES CMS 10K 1% 0.16W 0805
R10	21347	RES CMS 1M 1% 0.25W 1206
R100	21352	RES CMS 0 1% 0.25W 1206
R101	72826	RES CMS 100K 1% 0.16W 0805
R102	51286	RES CMS 243 1% 0.25W 1206
R103	20734	RES CMS 681 1% 0.25W 1206
R104	72826	RES CMS 100K 1% 0.16W 0805
R105	72678	RES CMS 10K 1% 0.16W 0805
R106	72678	RES CMS 10K 1% 0.16W 0805
R107	33927	RES CMS 20K 1% 0.25W 1206
R108	72678	RES CMS 10K 1% 0.16W 0805
R11	53690	RES CMS 332K 1% 0.25W 1206
R115	20737	RES CMS 1K 1% 0.25W 1206
R116	72826	RES CMS 100K 1% 0.16W 0805
R117	72826	RES CMS 100K 1% 0.16W 0805
R118	72826	RES CMS 100K 1% 0.16W 0805
R119	20737	RES CMS 1K 1% 0.25W 1206
R12	72826	RES CMS 100K 1% 0.16W 0805
R13	21339	RES CMS 221K 1% 0.25W 1206
R14	53690	RES CMS 332K 1% 0.25W 1206
R15	72678	RES CMS 10K 1% 0.16W 0805
R16	21347	RES CMS 1M 1% 0.25W 1206
R17	72678	RES CMS 10K 1% 0.16W 0805
R18	72826	RES CMS 100K 1% 0.16W 0805
R19	72826	RES CMS 100K 1% 0.16W 0805
R2	53690	RES CMS 332K 1% 0.25W 1206
R20	53690	RES CMS 332K 1% 0.25W 1206
R21	72826	RES CMS 100K 1% 0.16W 0805
R22	53704	RES CMS 14K 1% 0.25W 1206
R23	21329	RES CMS 33.2K 1% 0.25W 1206
R24	72826	RES CMS 100K 1% 0.16W 0805
R25	72826	RES CMS 100K 1% 0.16W 0805
R26	72826	RES CMS 100K 1% 0.16W 0805
R27	20737	RES CMS 1K 1% 0.25W 1206
R28	53690	RES CMS 332K 1% 0.25W 1206
R29	53690	RES CMS 332K 1% 0.25W 1206
R3	51729	RES CMS 162K 1% 0.25W 1206
R30	21338	RES CMS 182K 1% 0.25W 1206
R31	21338	RES CMS 182K 1% 0.25W 1206
R32	21333	RES CMS 68.1K 1% 0.25W 1206
R33	72826	RES CMS 100K 1% 0.16W 0805
R34	72826	RES CMS 100K 1% 0.16W 0805
R35	72826	RES CMS 100K 1% 0.16W 0805
R36	72826	RES CMS 100K 1% 0.16W 0805
R37	72826	RES CMS 100K 1% 0.16W 0805
R38	33927	RES CMS 20K 1% 0.25W 1206
R39	21349	RES CMS 1.5M 1% 0.25W 1206
R4	51729	RES CMS 162K 1% 0.25W 1206
R40	51758	RES CMS 619K 1% 0.25W 1206
R41	21349	RES CMS 1.5M 1% 0.25W 1206

5. PARTS LIST

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Diagram : W3S141615A - ECL5
Assembly : W1411702
Designation : PCB PROBES TREATMENT
Reference : W4P141615A

Reference	Part Number	Designation
R42	21339	RES CMS 221K 1% 0.25W 1206
R43	33927	RES CMS 20K 1% 0.25W 1206
R44	21339	RES CMS 221K 1% 0.25W 1206
R45	72826	RES CMS 100K 1% 0.16W 0805
R46	72826	RES CMS 100K 1% 0.16W 0805
R47	72826	RES CMS 100K 1% 0.16W 0805
R48	72826	RES CMS 100K 1% 0.16W 0805
R49	72826	RES CMS 100K 1% 0.16W 0805
R5	51729	RES CMS 162K 1% 0.25W 1206
R50	72826	RES CMS 100K 1% 0.16W 0805
R51	72678	RES CMS 10K 1% 0.16W 0805
R52	20737	RES CMS 1K 1% 0.25W 1206
R53	51286	RES CMS 243 1% 0.25W 1206
R54	51286	RES CMS 243 1% 0.25W 1206
R55	20734	RES CMS 681 1% 0.25W 1206
R56	21347	RES CMS 1M 1% 0.25W 1206
R57	21347	RES CMS 1M 1% 0.25W 1206
R58	51748	RES CMS 475K 1% 0.25W 1206
R59	20745	RES CMS 4.7K 1% 0.25W 1206
R6	51729	RES CMS 162K 1% 0.25W 1206
R60	20730	RES CMS 332 1% 0.25W 1206
R61	20745	RES CMS 4.7K 1% 0.25W 1206
R62	72826	RES CMS 100K 1% 0.16W 0805
R63	72678	RES CMS 10K 1% 0.16W 0805
R64	72826	RES CMS 100K 1% 0.16W 0805
R65	72826	RES CMS 100K 1% 0.16W 0805
R66	72826	RES CMS 100K 1% 0.16W 0805
R67	72826	RES CMS 100K 1% 0.16W 0805
R68	72826	RES CMS 100K 1% 0.16W 0805
R69	72826	RES CMS 100K 1% 0.16W 0805
R7	51729	RES CMS 162K 1% 0.25W 1206
R70	72826	RES CMS 100K 1% 0.16W 0805
R71	72826	RES CMS 100K 1% 0.16W 0805
R72	72826	RES CMS 100K 1% 0.16W 0805
R73	72826	RES CMS 100K 1% 0.16W 0805
R74	72826	RES CMS 100K 1% 0.16W 0805
R75	72826	RES CMS 100K 1% 0.16W 0805
R76	72826	RES CMS 100K 1% 0.16W 0805
R77	72826	RES CMS 100K 1% 0.16W 0805
R78	72826	RES CMS 100K 1% 0.16W 0805
R79	72826	RES CMS 100K 1% 0.16W 0805
R8	72826	RES CMS 100K 1% 0.16W 0805
R80	72826	RES CMS 100K 1% 0.16W 0805
R81	72826	RES CMS 100K 1% 0.16W 0805
R82	72826	RES CMS 100K 1% 0.16W 0805
R83	72826	RES CMS 100K 1% 0.16W 0805
R84	72826	RES CMS 100K 1% 0.16W 0805
R85	72826	RES CMS 100K 1% 0.16W 0805
R86	72826	RES CMS 100K 1% 0.16W 0805
R87	72826	RES CMS 100K 1% 0.16W 0805
R88	72826	RES CMS 100K 1% 0.16W 0805
R89	72826	RES CMS 100K 1% 0.16W 0805
R9	72826	RES CMS 100K 1% 0.16W 0805
R90	72826	RES CMS 100K 1% 0.16W 0805
R91	72826	RES CMS 100K 1% 0.16W 0805
R92	72826	RES CMS 100K 1% 0.16W 0805
R93	72826	RES CMS 100K 1% 0.16W 0805
R94	20737	RES CMS 1K 1% 0.25W 1206
R95	33927	RES CMS 20K 1% 0.25W 1206
R96	20737	RES CMS 1K 1% 0.25W 1206
R97	72826	RES CMS 100K 1% 0.16W 0805
R98	72826	RES CMS 100K 1% 0.16W 0805
R99	21352	RES CMS 0 1% 0.25W 1206

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Diagram : W3S141615A - ECL5
Assembly : W1411702
Designation : PCB PROBES TREATMENT
Reference : W4P141615A

Reference	Part Number	Designation
RG1	18812	IC 317/VREG LM317LZ TO 92
RG2	18811	IC 337/VREG LM337LZ TO 92
RG3	18812	IC 317/VREG LM317LZ TO 92
RG4	22504	IC 7805/VREG MC78L05ACD SO8
S13	15771	IC SUPPORT PLCC44
S18	51657	IC SUPPORT PLCC32
T1	51779	TRANS CMS BC850C NPN SOT23
T2	51470	TRANS CMS BSS138 SOT23
T3	51779	TRANS CMS BC850C NPN SOT23
TP1	22276	ACCBL PICOT TEST D=1.3MM
TP10	22276	ACCBL PICOT TEST D=1.3MM
TP11	22276	ACCBL PICOT TEST D=1.3MM
TP12	22276	ACCBL PICOT TEST D=1.3MM
TP13	22276	ACCBL PICOT TEST D=1.3MM
TP14	22276	ACCBL PICOT TEST D=1.3MM
TP15	22276	ACCBL PICOT TEST D=1.3MM
TP16	22276	ACCBL PICOT TEST D=1.3MM
TP17	22276	ACCBL PICOT TEST D=1.3MM
TP18	22276	ACCBL PICOT TEST D=1.3MM
TP2	22276	ACCBL PICOT TEST D=1.3MM
TP3	22276	ACCBL PICOT TEST D=1.3MM
TP4	22276	ACCBL PICOT TEST D=1.3MM
TP5	22276	ACCBL PICOT TEST D=1.3MM
TP6	22276	ACCBL PICOT TEST D=1.3MM
TP7	22276	ACCBL PICOT TEST D=1.3MM
TP8	22276	ACCBL PICOT TEST D=1.3MM
TP9	22276	ACCBL PICOT TEST D=1.3MM
U1	51807	OPTO FIBRE RECEPTEUR 2523
U10	72860	IC 479/OP MAX479CSD SO14
U11	51676	IC 4538/CD HEF4538BT SO16 CMS
U12	51545	IC 064/OP TL064CD SO14 CMS
U13	72598	IC 80251/MCU N80C251SB16PLCC44
U14	51498	IC 74573/74HC573D SO20L CMS
U15	51270	IC 74138/SN74HC138D SO16 CMS
U16	51531	IC 43256/SRAM SOP 28 CMS
U17	51531	IC 43256/SRAM SOP 28 CMS
U18	W1404071	PG SCHILLER MEDICAL MAGLIFE C PLUS ECG/PI
U19	51902	IC 74574/SN74HC574DW SOL20CMS
U20	51902	IC 74574/SN74HC574DW SOL20CMS
U21	16132	IC 7579/ADC AD7579JN AD PDIP24
U22	51953	IC 4051/MUX HEF4051BT SO16
U23	51953	IC 4051/MUX HEF4051BT SO16
U24	51545	IC 064/OP TL064CD SO14 CMS
U25	72633	IC 691/MAX691CWE SOL16
U26	51783	IC 74390/CD74HC390M SO16 CMS
U27	51916	IC 7410/74HC10M SO14 CMS
U28	72272	IC 393/OP TLC393CD SO8
U29	72272	IC 393/OP TLC393CD SO8
U3	72728	IC 478/OP MAX478CSA SO8
U30	72272	IC 393/OP TLC393CD SO8
U31	51782	IC 7432/SN74HC32D SO14 CMS
U4	33924	IC 358A/OP LM358AM SO8 CMS
U5	42753	IC 744066 / MM74HC4066M SO14
U6	51787	IC 555/ICM7555ISA SO8 CMS
U7	51675	IC 062/OP TL062CD SO8 CMS
U8	51684	IC 4052/MUX CD4052BCM SO16
U9	72728	IC 478/OP MAX478CSA SO8

5. PARTS LIST

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Diagram : **W3S141643 - ECL1**
Assembly : **W1411743**
Designation : **PCB IBP1/2 ACQUISITION**
Reference : **W4P141632**

Reference	Part Number	Designation
C2	56394	COND CMS TANTAL 10U 35V 20%
C3	56394	COND CMS TANTAL 10U 35V 20%
C4	8493	COND CMS 1206 100N 50V 20% X7R
C5	56394	COND CMS TANTAL 10U 35V 20%
C6	8493	COND CMS 1206 100N 50V 20% X7R
C7	8493	COND CMS 1206 100N 50V 20% X7R
C8	51559	COND CMS TANTAL 10U 16V 20%
C9	51559	COND CMS TANTAL 10U 16V 20%
C101	72548	COND CMS 1206 47N 50V 5% X7R
C102	8493	COND CMS 1206 100N 50V 20% X7R
C103	8493	COND CMS 1206 100N 50V 20% X7R
C104	20994	COND CMS 1206 220P 50V 5% NPO
C105	20994	COND CMS 1206 220P 50V 5% NPO
C106	21002	COND CMS 1206 1N 50V 5% NPO
C107	21002	COND CMS 1206 1N 50V 5% NPO
C108	21018	COND CMS 1206 22N 50V 20% X7R
C109	8493	COND CMS 1206 100N 50V 20% X7R
C110	8493	COND CMS 1206 100N 50V 20% X7R
C111	8493	COND CMS 1206 100N 50V 20% X7R
C112	51559	COND CMS TANTAL 10U 16V 20%
C113	51559	COND CMS TANTAL 10U 16V 20%
C114	56394	COND CMS TANTAL 10U 35V 20%
C115	56394	COND CMS TANTAL 10U 35V 20%
C116	56394	COND CMS TANTAL 10U 35V 20%
C201	72548	COND CMS 1206 47N 50V 5% X7R
C202	8493	COND CMS 1206 100N 50V 20% X7R
C203	8493	COND CMS 1206 100N 50V 20% X7R
C204	20994	COND CMS 1206 220P 50V 5% NPO
C205	20994	COND CMS 1206 220P 50V 5% NPO
C206	21002	COND CMS 1206 1N 50V 5% NPO
C207	21002	COND CMS 1206 1N 50V 5% NPO
C208	21018	COND CMS 1206 22N 50V 20% X7R
C209	8493	COND CMS 1206 100N 50V 20% X7R
C210	8493	COND CMS 1206 100N 50V 20% X7R
C211	8493	COND CMS 1206 100N 50V 20% X7R
C212	51559	COND CMS TANTAL 10U 16V 20%
C213	51559	COND CMS TANTAL 10U 16V 20%
C214	56394	COND CMS TANTAL 10U 35V 20%
C215	56394	COND CMS TANTAL 10U 35V 20%
C216	56394	COND CMS TANTAL 10U 35V 20%
D1	65760	DIODE 1N5819
DN1	72735	DIODE CMS MBRD660
DN101	72501	DIODE CMS BAV199 SOT23
DN201	72501	DIODE CMS BAV199 SOT23
DZ1	51832	IC 431/VREF TL431CD SO8 CMS
DZ101	51832	IC 431/VREF TL431CD SO8 CMS
DZ201	51832	IC 431/VREF TL431CD SO8 CMS
F1	35008	FUS TR5 8X7MM 0.5A T 250V
J1	5616	CN M 4 C PRT MODU2
J2	5616	CN M 4 C PRT MODU2
J5	35461	CN M 2 D PRT 41761 R3.96MM
J6	51094	CN M 3 D PRT 41761 R3.96MM
J7	72158	CN M 10 D PRT MODU2
P1632	W1404407	CI ACQUISITION PI1/2/3/4 MAGC
P101	72771	RES AJUST 1K 0.25W 11T CMS
P102	72742	RES AJUST 20K 0.25W 11T CMS
P201	72771	RES AJUST 1K 0.25W 11T CMS
P202	72742	RES AJUST 20K 0.25W 11T CMS
PF1	35012	FUS SUP PRT TR5

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Diagram : W3S141643 - ECL1
Assembly : W1411743
Designation : PCB IBP1/2 ACQUISITION
Reference : W4P141632

Reference	Part Number	Designation
R1	20737	RES CMS 1K 1% 0.25W 1206
R2	33927	RES CMS 20K 1% 0.25W 1206
R3	33927	RES CMS 20K 1% 0.25W 1206
R4	20744	RES CMS 3.92K 1% 0.25W 1206
R5	21335	RES CMS 100K 1% 0.25W 1206
R6	56356	RES CMS 2.43K 1% 0.25W 1206
R7	51286	RES CMS 243 1% 0.25W 1206
R8	2868	RES BOB 0.22 5% 3W
R9	20737	RES CMS 1K 1% 0.25W 1206
R10	21335	RES CMS 100K 1% 0.25W 1206
R11	51761	RES CMS 66.5K 1% 0.25W 1206
R12	21335	RES CMS 100K 1% 0.25W 1206
R13	21335	RES CMS 100K 1% 0.25W 1206
R15	20744	RES CMS 3.92K 1% 0.25W 1206
R16	20750	RES CMS 10K 1% 0.25W 1206
R17	20750	RES CMS 10K 1% 0.25W 1206
R18	20737	RES CMS 1K 1% 0.25W 1206
R101	21637	RES CMS 10M 1% 0.25W 1206
R102	21637	RES CMS 10M 1% 0.25W 1206
R103	20750	RES CMS 10K 1% 0.25W 1206
R104	20750	RES CMS 10K 1% 0.25W 1206
R105	20750	RES CMS 10K 1% 0.25W 1206
R106	20750	RES CMS 10K 1% 0.25W 1206
R107	21351	RES CMS 2.21M 1% 0.25W 1206
R108	21351	RES CMS 2.21M 1% 0.25W 1206
R109	20737	RES CMS 1K 1% 0.25W 1206
R110	53701	RES CMS 36.5K 1% 0.25W 1206
R111	20726	RES CMS 150 1% 0.25W 1206
R112	53702	RES CMS 30.1K 1% 0.25W 1206
R113	51734	RES CMS 2K 1% 0.25W 1206
R114	8855	RES CMS 3.01K 1% 0.25W 1206
R115	51734	RES CMS 2K 1% 0.25W 1206
R116	21335	RES CMS 100K 1% 0.25W 1206
R117	21335	RES CMS 100K 1% 0.25W 1206
R118	8855	RES CMS 3.01K 1% 0.25W 1206
R119	56312	RES CMS 549 1% 0.25W 1206
R120	51769	RES CMS 931K 1% 0.25W 1206
R121	21351	RES CMS 2.21M 1% 0.25W 1206
R122	51734	RES CMS 2K 1% 0.25W 1206
R201	21637	RES CMS 10M 1% 0.25W 1206
R202	21637	RES CMS 10M 1% 0.25W 1206
R203	20750	RES CMS 10K 1% 0.25W 1206
R204	20750	RES CMS 10K 1% 0.25W 1206
R205	20750	RES CMS 10K 1% 0.25W 1206
R206	20750	RES CMS 10K 1% 0.25W 1206
R207	21351	RES CMS 2.21M 1% 0.25W 1206
R208	21351	RES CMS 2.21M 1% 0.25W 1206
R209	20737	RES CMS 1K 1% 0.25W 1206
R210	53701	RES CMS 36.5K 1% 0.25W 1206
R211	20726	RES CMS 150 1% 0.25W 1206
R212	53702	RES CMS 30.1K 1% 0.25W 1206
R213	51734	RES CMS 2K 1% 0.25W 1206
R214	8855	RES CMS 3.01K 1% 0.25W 1206
R215	51734	RES CMS 2K 1% 0.25W 1206
R216	21335	RES CMS 100K 1% 0.25W 1206
R217	21335	RES CMS 100K 1% 0.25W 1206
R218	8855	RES CMS 3.01K 1% 0.25W 1206
R219	56312	RES CMS 549 1% 0.25W 1206
R220	51769	RES CMS 931K 1% 0.25W 1206
R221	21351	RES CMS 2.21M 1% 0.25W 1206
R222	51734	RES CMS 2K 1% 0.25W 1206

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Diagram : W3S141643 - ECL1
Assembly : W1411743
Designation : PCB IBP1/2 ACQUISITION
Reference : W4P141632

Reference	Part Number	Designation
RB1	31726	REDR 1A/600V RND
RG1	452	IC 317/VREG LM317T TO220
RG101	18812	IC 317/VREG LM317LZ TO 92
RG102	72668	IC 884/VREG MAX884CSA SO8
RG201	18812	IC 317/VREG LM317LZ TO 92
RG202	72668	IC 884/VREG MAX884CSA SO8
T1	51779	TRANS CMS BC850C NPN SOT23
T2	51777	TRANS CMS BC860C PNP SOT23
T3	51365	TRANS CMS IRFR9024
TR1	77318	TRSFO ISOL 6.5VA 18V/13V 50HZ
U1	72546	OPTO COUP SFH617G-3
U101	22590	IC 97/OP97FS SO8 CMS
U102	33924	IC 358A/OP LM358AM SO8 CMS
U103	72553	OPTO COUP IL300 PDIP8
U104	51675	IC 062/OP TL062CD SO8 CMS
U2	72546	OPTO COUP SFH617G-3
U201	22590	IC 97/OP97FS SO8 CMS
U202	33924	IC 358A/OP LM358AM SO8 CMS
U203	72553	OPTO COUP IL300 PDIP8
U204	51675	IC 062/OP TL062CD SO8 CMS
U3	51545	IC 064/OP TL064CD SO14 CMS

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Diagram : W4S141632 - ECL0
Assembly : W1411736
Designation : PCB IBP1/2/3/4 ACQUISITION
Reference : W4P141632

Reference	Part Number	Designation
C2	56394	COND CMS TANTAL 10U 35V 20%
C3	56394	COND CMS TANTAL 10U 35V 20%
C4	8493	COND CMS 1206 100N 50V 20% X7R
C5	56394	COND CMS TANTAL 10U 35V 20%
C6	8493	COND CMS 1206 100N 50V 20% X7R
C7	8493	COND CMS 1206 100N 50V 20% X7R
C8	51559	COND CMS TANTAL 10U 16V 20%
C9	51559	COND CMS TANTAL 10U 16V 20%
C10	51559	COND CMS TANTAL 10U 16V 20%
C11	51559	COND CMS TANTAL 10U 16V 20%
C101	72548	COND CMS 1206 47N 50V 5% X7R
C102	8493	COND CMS 1206 100N 50V 20% X7R
C103	8493	COND CMS 1206 100N 50V 20% X7R
C104	20994	COND CMS 1206 220P 50V 5% NPO
C105	20994	COND CMS 1206 220P 50V 5% NPO
C106	21002	COND CMS 1206 1N 50V 5% NPO
C107	21002	COND CMS 1206 1N 50V 5% NPO
C108	21018	COND CMS 1206 22N 50V 20% X7R
C109	8493	COND CMS 1206 100N 50V 20% X7R
C110	8493	COND CMS 1206 100N 50V 20% X7R
C111	8493	COND CMS 1206 100N 50V 20% X7R
C112	51559	COND CMS TANTAL 10U 16V 20%
C113	51559	COND CMS TANTAL 10U 16V 20%
C114	56394	COND CMS TANTAL 10U 35V 20%
C115	56394	COND CMS TANTAL 10U 35V 20%
C116	56394	COND CMS TANTAL 10U 35V 20%
C201	72548	COND CMS 1206 47N 50V 5% X7R
C202	8493	COND CMS 1206 100N 50V 20% X7R
C203	8493	COND CMS 1206 100N 50V 20% X7R
C204	20994	COND CMS 1206 220P 50V 5% NPO
C205	20994	COND CMS 1206 220P 50V 5% NPO
C206	21002	COND CMS 1206 1N 50V 5% NPO
C207	21002	COND CMS 1206 1N 50V 5% NPO
C208	21018	COND CMS 1206 22N 50V 20% X7R
C209	8493	COND CMS 1206 100N 50V 20% X7R
C210	8493	COND CMS 1206 100N 50V 20% X7R
C211	8493	COND CMS 1206 100N 50V 20% X7R
C212	51559	COND CMS TANTAL 10U 16V 20%
C213	51559	COND CMS TANTAL 10U 16V 20%
C214	56394	COND CMS TANTAL 10U 35V 20%
C215	56394	COND CMS TANTAL 10U 35V 20%
C216	56394	COND CMS TANTAL 10U 35V 20%
C301	72548	COND CMS 1206 47N 50V 5% X7R
C302	8493	COND CMS 1206 100N 50V 20% X7R
C303	8493	COND CMS 1206 100N 50V 20% X7R
C304	20994	COND CMS 1206 220P 50V 5% NPO
C305	20994	COND CMS 1206 220P 50V 5% NPO
C306	21002	COND CMS 1206 1N 50V 5% NPO
C307	21002	COND CMS 1206 1N 50V 5% NPO
C308	21018	COND CMS 1206 22N 50V 20% X7R
C309	8493	COND CMS 1206 100N 50V 20% X7R
C310	8493	COND CMS 1206 100N 50V 20% X7R
C311	8493	COND CMS 1206 100N 50V 20% X7R
C312	51559	COND CMS TANTAL 10U 16V 20%
C313	51559	COND CMS TANTAL 10U 16V 20%
C314	56394	COND CMS TANTAL 10U 35V 20%
C315	56394	COND CMS TANTAL 10U 35V 20%
C316	56394	COND CMS TANTAL 10U 35V 20%
C401	72548	COND CMS 1206 47N 50V 5% X7R
C402	8493	COND CMS 1206 100N 50V 20% X7R

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Diagram : **W4S141632 - ECL0**
Assembly : **W1411736**
Designation : **PCB IBP1/2/3/4 ACQUISITION**
Reference : **W4P141632**

Reference	Part Number	Designation
C403	8493	COND CMS 1206 100N 50V 20% X7R
C404	20994	COND CMS 1206 220P 50V 5% NPO
C405	20994	COND CMS 1206 220P 50V 5% NPO
C406	21002	COND CMS 1206 1N 50V 5% NPO
C407	21002	COND CMS 1206 1N 50V 5% NPO
C408	21018	COND CMS 1206 22N 50V 20% X7R
C409	8493	COND CMS 1206 100N 50V 20% X7R
C410	8493	COND CMS 1206 100N 50V 20% X7R
C411	8493	COND CMS 1206 100N 50V 20% X7R
C412	51559	COND CMS TANTAL 10U 16V 20%
C413	51559	COND CMS TANTAL 10U 16V 20%
C414	56394	COND CMS TANTAL 10U 35V 20%
C415	56394	COND CMS TANTAL 10U 35V 20%
C416	56394	COND CMS TANTAL 10U 35V 20%
D1	65760	DIODE 1N5819
DN1	72735	DIODE CMS MBRD660
DN101	72501	DIODE CMS BAV199 SOT23
DN201	72501	DIODE CMS BAV199 SOT23
DN301	72501	DIODE CMS BAV199 SOT23
DN401	72501	DIODE CMS BAV199 SOT23
DZ1	51832	IC 431/VREF TL431CD SO8 CMS
DZ2	51832	IC 431/VREF TL431CD SO8 CMS
DZ101	51832	IC 431/VREF TL431CD SO8 CMS
DZ201	51832	IC 431/VREF TL431CD SO8 CMS
DZ301	51832	IC 431/VREF TL431CD SO8 CMS
DZ401	51832	IC 431/VREF TL431CD SO8 CMS
F1	35008	FUS TR5 8X7MM 0.5A T 250V
J1	5616	CN M 4 C PRT MODU2
J2	5616	CN M 4 C PRT MODU2
J3	5616	CN M 4 C PRT MODU2
J4	5616	CN M 4 C PRT MODU2
J5	35461	CN M 2 D PRT 41761 R3.96MM
J6	51094	CN M 3 D PRT 41761 R3.96MM
J7	72158	CN M 10 D PRT MODU2
P1632	W1404407	CI ACQUISITION PI1/2/3/4 MAGC
P101	72771	RES AJUST 1K 0.25W 11T CMS
P102	72742	RES AJUST 20K 0.25W 11T CMS
P201	72771	RES AJUST 1K 0.25W 11T CMS
P202	72742	RES AJUST 20K 0.25W 11T CMS
P301	72771	RES AJUST 1K 0.25W 11T CMS
P302	72742	RES AJUST 20K 0.25W 11T CMS
P401	72771	RES AJUST 1K 0.25W 11T CMS
P402	72742	RES AJUST 20K 0.25W 11T CMS
PF1	35012	FUS SUP PRT TR5
R1	20737	RES CMS 1K 1% 0.25W 1206
R2	33927	RES CMS 20K 1% 0.25W 1206
R3	33927	RES CMS 20K 1% 0.25W 1206
R4	20744	RES CMS 3.92K 1% 0.25W 1206
R5	21335	RES CMS 100K 1% 0.25W 1206
R6	56356	RES CMS 2.43K 1% 0.25W 1206
R7	51286	RES CMS 243 1% 0.25W 1206
R8	2868	RES BOB 0.22 5% 3W
R9	20737	RES CMS 1K 1% 0.25W 1206
R10	21335	RES CMS 100K 1% 0.25W 1206
R11	51761	RES CMS 66.5K 1% 0.25W 1206
R12	21335	RES CMS 100K 1% 0.25W 1206
R13	21335	RES CMS 100K 1% 0.25W 1206
R15	20744	RES CMS 3.92K 1% 0.25W 1206
R16	20750	RES CMS 10K 1% 0.25W 1206
R17	20750	RES CMS 10K 1% 0.25W 1206
R18	20737	RES CMS 1K 1% 0.25W 1206
R19	20737	RES CMS 1K 1% 0.25W 1206
R101	21637	RES CMS 10M 1% 0.25W 1206
R102	21637	RES CMS 10M 1% 0.25W 1206

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Diagram : W4S141632 - ECL0
Assembly : W1411736
Designation : PCB IBP1/2/3/4 ACQUISITION
Reference : W4P141632

Reference	Part Number	Designation
R103	20750	RES CMS 10K 1% 0.25W 1206
R104	20750	RES CMS 10K 1% 0.25W 1206
R105	20750	RES CMS 10K 1% 0.25W 1206
R106	20750	RES CMS 10K 1% 0.25W 1206
R107	21351	RES CMS 2.21M 1% 0.25W 1206
R108	21351	RES CMS 2.21M 1% 0.25W 1206
R109	20737	RES CMS 1K 1% 0.25W 1206
R110	53701	RES CMS 36.5K 1% 0.25W 1206
R111	20726	RES CMS 150 1% 0.25W 1206
R112	53702	RES CMS 30.1K 1% 0.25W 1206
R113	51734	RES CMS 2K 1% 0.25W 1206
R114	8855	RES CMS 3.01K 1% 0.25W 1206
R115	51734	RES CMS 2K 1% 0.25W 1206
R116	21335	RES CMS 100K 1% 0.25W 1206
R117	21335	RES CMS 100K 1% 0.25W 1206
R118	8855	RES CMS 3.01K 1% 0.25W 1206
R119	56312	RES CMS 549 1% 0.25W 1206
R120	51769	RES CMS 931K 1% 0.25W 1206
R121	21351	RES CMS 2.21M 1% 0.25W 1206
R201	21637	RES CMS 10M 1% 0.25W 1206
R202	21637	RES CMS 10M 1% 0.25W 1206
R203	20750	RES CMS 10K 1% 0.25W 1206
R204	20750	RES CMS 10K 1% 0.25W 1206
R205	20750	RES CMS 10K 1% 0.25W 1206
R206	20750	RES CMS 10K 1% 0.25W 1206
R207	21351	RES CMS 2.21M 1% 0.25W 1206
R208	21351	RES CMS 2.21M 1% 0.25W 1206
R209	20737	RES CMS 1K 1% 0.25W 1206
R210	53701	RES CMS 36.5K 1% 0.25W 1206
R211	20726	RES CMS 150 1% 0.25W 1206
R212	53702	RES CMS 30.1K 1% 0.25W 1206
R213	51734	RES CMS 2K 1% 0.25W 1206
R214	8855	RES CMS 3.01K 1% 0.25W 1206
R215	51734	RES CMS 2K 1% 0.25W 1206
R216	21335	RES CMS 100K 1% 0.25W 1206
R217	21335	RES CMS 100K 1% 0.25W 1206
R218	8855	RES CMS 3.01K 1% 0.25W 1206
R219	56312	RES CMS 549 1% 0.25W 1206
R220	51769	RES CMS 931K 1% 0.25W 1206
R221	21351	RES CMS 2.21M 1% 0.25W 1206
R301	21637	RES CMS 10M 1% 0.25W 1206
R302	21637	RES CMS 10M 1% 0.25W 1206
R303	20750	RES CMS 10K 1% 0.25W 1206
R304	20750	RES CMS 10K 1% 0.25W 1206
R305	20750	RES CMS 10K 1% 0.25W 1206
R306	20750	RES CMS 10K 1% 0.25W 1206
R307	21351	RES CMS 2.21M 1% 0.25W 1206
R308	21351	RES CMS 2.21M 1% 0.25W 1206
R309	20737	RES CMS 1K 1% 0.25W 1206
R310	53701	RES CMS 36.5K 1% 0.25W 1206
R311	20726	RES CMS 150 1% 0.25W 1206
R312	53702	RES CMS 30.1K 1% 0.25W 1206
R313	51734	RES CMS 2K 1% 0.25W 1206
R314	8855	RES CMS 3.01K 1% 0.25W 1206
R316	21335	RES CMS 100K 1% 0.25W 1206
R317	21335	RES CMS 100K 1% 0.25W 1206
R318	8855	RES CMS 3.01K 1% 0.25W 1206
R319	56312	RES CMS 549 1% 0.25W 1206
R320	51769	RES CMS 931K 1% 0.25W 1206
R321	21351	RES CMS 2.21M 1% 0.25W 1206
R322	51734	RES CMS 2K 1% 0.25W 1206
R401	21637	RES CMS 10M 1% 0.25W 1206
R402	21637	RES CMS 10M 1% 0.25W 1206
R403	20750	RES CMS 10K 1% 0.25W 1206
R404	20750	RES CMS 10K 1% 0.25W 1206

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Diagram : W4S141632 - ECL0
Assembly : W1411736
Designation : PCB IBP1/2/3/4 ACQUISITION
Reference : W4P141632

Reference	Part Number	Designation
R405	20750	RES CMS 10K 1% 0.25W 1206
R406	20750	RES CMS 10K 1% 0.25W 1206
R407	21351	RES CMS 2.21M 1% 0.25W 1206
R408	21351	RES CMS 2.21M 1% 0.25W 1206
R409	20737	RES CMS 1K 1% 0.25W 1206
R410	53701	RES CMS 36.5K 1% 0.25W 1206
R411	20726	RES CMS 150 1% 0.25W 1206
R412	53702	RES CMS 30.1K 1% 0.25W 1206
R413	51734	RES CMS 2K 1% 0.25W 1206
R414	8855	RES CMS 3.01K 1% 0.25W 1206
R416	21335	RES CMS 100K 1% 0.25W 1206
R417	21335	RES CMS 100K 1% 0.25W 1206
R418	8855	RES CMS 3.01K 1% 0.25W 1206
R419	56312	RES CMS 549 1% 0.25W 1206
R420	51769	RES CMS 931K 1% 0.25W 1206
R421	21351	RES CMS 2.21M 1% 0.25W 1206
R422	51734	RES CMS 2K 1% 0.25W 1206
RB1	31726	REDR 1A/600V RND
RG1	452	IC 317/VREG LM317T TO220
RG101	18812	IC 317/VREG LM317LZ TO 92
RG102	72668	IC 884/VREG MAX884CSA SO8
RG201	18812	IC 317/VREG LM317LZ TO 92
RG202	72668	IC 884/VREG MAX884CSA SO8
RG301	18812	IC 317/VREG LM317LZ TO 92
RG302	72668	IC 884/VREG MAX884CSA SO8
RG401	18812	IC 317/VREG LM317LZ TO 92
RG402	72668	IC 884/VREG MAX884CSA SO8
T1	51779	TRANS CMS BC850C NPN SOT23
T2	51777	TRANS CMS BC860C PNP SOT23
T3	51365	TRANS CMS IRFR9024
TR1	77318	TRSFO ISOL 6.5VA 18V/13V 50HZ
U1	72546	OPTO COUP SFH617G-3
U2	72546	OPTO COUP SFH617G-3
U3	51545	IC 064/OP TL064CD SO14 CMS
U4	51545	IC 064/OP TL064CD SO14 CMS
U101	22590	IC 97/OP97FS SO8 CMS
U102	33924	IC 358A/OP LM358AM SO8 CMS
U103	72553	OPTO COUP IL300 PDIP8
U104	51675	IC 062/OP TL062CD SO8 CMS
U201	22590	IC 97/OP97FS SO8 CMS
U202	33924	IC 358A/OP LM358AM SO8 CMS
U203	72553	OPTO COUP IL300 PDIP8
U204	51675	IC 062/OP TL062CD SO8 CMS
U301	22590	IC 97/OP97FS SO8 CMS
U302	33924	IC 358A/OP LM358AM SO8 CMS
U303	72553	OPTO COUP IL300 PDIP8
U304	51675	IC 062/OP TL062CD SO8 CMS
U401	22590	IC 97/OP97FS SO8 CMS
U402	33924	IC 358A/OP LM358AM SO8 CMS
U403	72553	OPTO COUP IL300 PDIP8
U404	51675	IC 062/OP TL062CD SO8 CMS

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Diagram : **W4S141596B**
Assembly : **W7412096**
Designation : **CI INTERFACE MAGLIFE C**
Reference : **W4P141730A**

Reference	Part Number	Designation
BAT1	72620	PILE LITH 3.6V 1/2AA
C01	21004	COND CMS 1206 1.5N 50V 5% NPO
C02	8493	COND CMS 1206 100N 50V 20% X7R
C03	8493	COND CMS 1206 100N 50V 20% X7R
C04	8493	COND CMS 1206 100N 50V 20% X7R
C05	8493	COND CMS 1206 100N 50V 20% X7R
C06	8493	COND CMS 1206 100N 50V 20% X7R
C07	8493	COND CMS 1206 100N 50V 20% X7R
C08	8493	COND CMS 1206 100N 50V 20% X7R
C09	51556	COND CMS TANTAL 47U 16V 20%
C10	21004	COND CMS 1206 1.5N 50V 5% NPO
C14	8493	COND CMS 1206 100N 50V 20% X7R
C15	8493	COND CMS 1206 100N 50V 20% X7R
C16	8493	COND CMS 1206 100N 50V 20% X7R
C19	51556	COND CMS TANTAL 47U 16V 20%
C20	8493	COND CMS 1206 100N 50V 20% X7R
C21	51556	COND CMS TANTAL 47U 16V 20%
C22	51557	COND CMS TANTAL 22U 20V 10%
C26	51557	COND CMS TANTAL 22U 20V 10%
C30	72548	COND CMS 1206 47N 50V 5% X7R
C31	8493	COND CMS 1206 100N 50V 20% X7R
C32	8493	COND CMS 1206 100N 50V 20% X7R
C33	72661	COND CMS 1206 4.7U 16V +80-20%
C34	8493	COND CMS 1206 100N 50V 20% X7R
C50	21004	COND CMS 1206 1.5N 50V 5% NPO
C51	21004	COND CMS 1206 1.5N 50V 5% NPO
C52	21004	COND CMS 1206 1.5N 50V 5% NPO
C53	21004	COND CMS 1206 1.5N 50V 5% NPO
C55	8493	COND CMS 1206 100N 50V 20% X7R
C56	8493	COND CMS 1206 100N 50V 20% X7R
C57	8493	COND CMS 1206 100N 50V 20% X7R
C58	8493	COND CMS 1206 100N 50V 20% X7R
C59	8493	COND CMS 1206 100N 50V 20% X7R
C60	21004	COND CMS 1206 1.5N 50V 5% NPO
C61	21004	COND CMS 1206 1.5N 50V 5% NPO
C62	21004	COND CMS 1206 1.5N 50V 5% NPO
C63	21004	COND CMS 1206 1.5N 50V 5% NPO
C65	8493	COND CMS 1206 100N 50V 20% X7R
C66	8493	COND CMS 1206 100N 50V 20% X7R
C68	8493	COND CMS 1206 100N 50V 20% X7R
C70	21004	COND CMS 1206 1.5N 50V 5% NPO
C71	21004	COND CMS 1206 1.5N 50V 5% NPO
C72	21004	COND CMS 1206 1.5N 50V 5% NPO
C73	21004	COND CMS 1206 1.5N 50V 5% NPO
C75	51557	COND CMS TANTAL 22U 20V 10%
C76	51557	COND CMS TANTAL 22U 20V 10%
C77	51557	COND CMS TANTAL 22U 20V 10%
C78	51557	COND CMS TANTAL 22U 20V 10%
C82	72548	COND CMS 1206 47N 50V 5% X7R
C83	20986	COND CMS 1206 47P 50V 5% NPO
C84	8493	COND CMS 1206 100N 50V 20% X7R
C85	21004	COND CMS 1206 1.5N 50V 5% NPO
C86	21004	COND CMS 1206 1.5N 50V 5% NPO
C87	21004	COND CMS 1206 1.5N 50V 5% NPO
C88	21004	COND CMS 1206 1.5N 50V 5% NPO
C89	72541	COND CMS TANTAL 2.2U 35V 20%
C90	51557	COND CMS TANTAL 22U 20V 10%
C91	72660	COND CMS 1206 1U 16V +80/-20%
C92	51556	COND CMS TANTAL 47U 16V 20%
C93	51557	COND CMS TANTAL 22U 20V 10%
C94	8493	COND CMS 1206 100N 50V 20% X7R
C95	8493	COND CMS 1206 100N 50V 20% X7R
C98	72660	COND CMS 1206 1U 16V +80/-20%

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Diagram : **W4S141596B**
Assembly : **W7412096**
Designation : **CI INTERFACE MAGLIFE C**
Reference : **W4P141730A**

Reference	Part Number	Designation
D1	22029	DIODE CMS BAS32L SOD80
D2	22029	DIODE CMS BAS32L SOD80
J1-J2	72706	CN MF 32 D PRT 2-R
J10	5770	CN M 100 D PRT MODU2 2X50
J11	5778	CN M 50 D PRT MODU2
J12	5778	CN M 50 D PRT MODU2
J13	34875	CN M 4 C PRT 7395
J14	5770	CN M 100 D PRT MODU2 2X50
J3	15755	CN M 14 D PRT TRANSITION REDUI
J4	5676	CN M 20 D PRT 3.2 TRANSITION
J5	12625	CN M 10 D PRT TRANSITION
J6	22671	CN M 16 D PRT TRANSITION REDUI
J7	5615	CN M 3 C PRT MODU2
J8	3861	CN M 5 C PRT MODU2
J9	3861	CN M 5 C PRT MODU2
P05	51457	RES AJUST 1K 0.25W 1T CMS
P1730	W1405417	CI INTERFACE MAGLIFE C
R01	21327	RES CMS 22.1K 1% 0.25W 1206
R02	21335	RES CMS 100K 1% 0.25W 1206
R03	21327	RES CMS 22.1K 1% 0.25W 1206
R04	21327	RES CMS 22.1K 1% 0.25W 1206
R05	8855	RES CMS 3.01K 1% 0.25W 1206
R06	21335	RES CMS 100K 1% 0.25W 1206
R07	20739	RES CMS 1.5K 1% 0.25W 1206
R08	20739	RES CMS 1.5K 1% 0.25W 1206
R09	20739	RES CMS 1.5K 1% 0.25W 1206
R10	20739	RES CMS 1.5K 1% 0.25W 1206
R11	21327	RES CMS 22.1K 1% 0.25W 1206
R12	8855	RES CMS 3.01K 1% 0.25W 1206
R13	8855	RES CMS 3.01K 1% 0.25W 1206
R14	21327	RES CMS 22.1K 1% 0.25W 1206
R15	21327	RES CMS 22.1K 1% 0.25W 1206
R16	21335	RES CMS 100K 1% 0.25W 1206
R17	21335	RES CMS 100K 1% 0.25W 1206
R18	21335	RES CMS 100K 1% 0.25W 1206
R19	21335	RES CMS 100K 1% 0.25W 1206
R20	8855	RES CMS 3.01K 1% 0.25W 1206
R21	8855	RES CMS 3.01K 1% 0.25W 1206
R22	8855	RES CMS 3.01K 1% 0.25W 1206
R23	8855	RES CMS 3.01K 1% 0.25W 1206
R24	21335	RES CMS 100K 1% 0.25W 1206
R25	8855	RES CMS 3.01K 1% 0.25W 1206
R26	20750	RES CMS 10K 1% 0.25W 1206
R27	21327	RES CMS 22.1K 1% 0.25W 1206
R28	21327	RES CMS 22.1K 1% 0.25W 1206
R29	21327	RES CMS 22.1K 1% 0.25W 1206
R30	21347	RES CMS 1M 1% 0.25W 1206
R31	21335	RES CMS 100K 1% 0.25W 1206
R32	21327	RES CMS 22.1K 1% 0.25W 1206
R33	21335	RES CMS 100K 1% 0.25W 1206
R34	72213	RES CMS 2.4M 1% 0.25W 1206
R35	21347	RES CMS 1M 1% 0.25W 1206
R36	21335	RES CMS 100K 1% 0.25W 1206
R37	21335	RES CMS 100K 1% 0.25W 1206
R38	21335	RES CMS 100K 1% 0.25W 1206
R39	21335	RES CMS 100K 1% 0.25W 1206
R40	21327	RES CMS 22.1K 1% 0.25W 1206
R41	21335	RES CMS 100K 1% 0.25W 1206
R42	21347	RES CMS 1M 1% 0.25W 1206
R43	21335	RES CMS 100K 1% 0.25W 1206
R44	21335	RES CMS 100K 1% 0.25W 1206
R45	21335	RES CMS 100K 1% 0.25W 1206
R46	21335	RES CMS 100K 1% 0.25W 1206
R47	21327	RES CMS 22.1K 1% 0.25W 1206
R48	21327	RES CMS 22.1K 1% 0.25W 1206
R49	21327	RES CMS 22.1K 1% 0.25W 1206

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Diagram : W4S141596B
Assembly : W7412096
Designation : CI INTERFACE MAGLIFE C
Reference : W4P141730A

Reference	Part Number	Designation
R50	51750	RES CMS 49.9K 1% 0.25W 1206
R51	51750	RES CMS 49.9K 1% 0.25W 1206
R52	51750	RES CMS 49.9K 1% 0.25W 1206
R53	53702	RES CMS 30.1K 1% 0.25W 1206
R54	20750	RES CMS 10K 1% 0.25W 1206
R55	8855	RES CMS 3.01K 1% 0.25W 1206
R56	21327	RES CMS 22.1K 1% 0.25W 1206
R57	51750	RES CMS 49.9K 1% 0.25W 1206
R58	72213	RES CMS 2.4M 1% 0.25W 1206
R59	21347	RES CMS 1M 1% 0.25W 1206
R60	53702	RES CMS 30.1K 1% 0.25W 1206
R61	53702	RES CMS 30.1K 1% 0.25W 1206
R62	53702	RES CMS 30.1K 1% 0.25W 1206
R63	53702	RES CMS 30.1K 1% 0.25W 1206
R64	20750	RES CMS 10K 1% 0.25W 1206
R65	8855	RES CMS 3.01K 1% 0.25W 1206
R66	53690	RES CMS 332K 1% 0.25W 1206
R67	21335	RES CMS 100K 1% 0.25W 1206
R68	20737	RES CMS 1K 1% 0.25W 1206
R69	21327	RES CMS 22.1K 1% 0.25W 1206
R70	21334	RES CMS 82.5K 1% 0.25W 1206
R71	21334	RES CMS 82.5K 1% 0.25W 1206
R72	21334	RES CMS 82.5K 1% 0.25W 1206
R73	53702	RES CMS 30.1K 1% 0.25W 1206
R74	20750	RES CMS 10K 1% 0.25W 1206
R75	8855	RES CMS 3.01K 1% 0.25W 1206
R77	20750	RES CMS 10K 1% 0.25W 1206
R78	8855	RES CMS 3.01K 1% 0.25W 1206
R79	53702	RES CMS 30.1K 1% 0.25W 1206
R80	21327	RES CMS 22.1K 1% 0.25W 1206
R81	21327	RES CMS 22.1K 1% 0.25W 1206
R82	20750	RES CMS 10K 1% 0.25W 1206
R83	33932	RES CMS 16.2K 1% 0.25W 1206
R84	21335	RES CMS 100K 1% 0.25W 1206
R85	21335	RES CMS 100K 1% 0.25W 1206
R86	21327	RES CMS 22.1K 1% 0.25W 1206
R87	21335	RES CMS 100K 1% 0.25W 1206
R88	21335	RES CMS 100K 1% 0.25W 1206
R89	53690	RES CMS 332K 1% 0.25W 1206
R90	20724	RES CMS 100 1% 0.25W 1206
R91	8855	RES CMS 3.01K 1% 0.25W 1206
R92	22355	RES CMS 4.7 5% 0.25W 1206
R93	51750	RES CMS 49.9K 1% 0.25W 1206
R94	53690	RES CMS 332K 1% 0.25W 1206
R95	21327	RES CMS 22.1K 1% 0.25W 1206
R96	21327	RES CMS 22.1K 1% 0.25W 1206
R97	21327	RES CMS 22.1K 1% 0.25W 1206
R98	21327	RES CMS 22.1K 1% 0.25W 1206
R99	8855	RES CMS 3.01K 1% 0.25W 1206
SU16	4285	IC SUPPORT DIL8 TULIPE
TP1	42990	ACCBL PICOT TEST CMS D=1.0MM
TP2	42990	ACCBL PICOT TEST CMS D=1.0MM
TP3	42990	ACCBL PICOT TEST CMS D=1.0MM
TP4	42990	ACCBL PICOT TEST CMS D=1.0MM
TP5	42990	ACCBL PICOT TEST CMS D=1.0MM
T1	51779	TRANS CMS BC850C NPN SOT23
T2	51779	TRANS CMS BC850C NPN SOT23
T3	51777	TRANS CMS BC860C PNP SOT23
T4	51365	TRANS CMS IRFR9024 ROULEAU
T5	51779	TRANS CMS BC850C NPN SOT23

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Diagram : W4S141596B
Assembly : W7412096
Designation : CI INTERFACE MAGLIFE C
Reference : W4P141730A

Reference	Part Number	Designation
U01	72725	IC 3142/PLD XC3142A PQFP 100
U02	51898	IC 82684/DSP XR82C684CJ PLCC68
U03	51898	IC 82684/DSP XR82C684CJ PLCC68
U04	72193	IC 74688/74HC688 SO20 CMS
U05	22323	IC 74245/SN74HC245DW SOL20 CMS
U06	22283	IC 74541/SN74HC541DW SOL20 CMS
U07	22283	IC 74541/SN74HC541DW SOL20 CMS
U08	51902	IC 74574/SN74HC574DW SOL20CMS
U09	22323	IC 74245/SN74HC245DW SOL20 CMS
U10	51375	IC 628128/SRAM AKM628128LP-70
U11	72663	OPTO PHOTODIODE SFH756V
U12	51807	OPTO FIBRE RECEPTEUR 2523
U13	51807	OPTO FIBRE RECEPTEUR 2523
U14	72663	OPTO PHOTODIODE SFH756V
U15	22320	IC 7414/SN74HC14D SO14 CMS
U16	W1403469	PG ODAM MAGLIFE XILINX
U17	51782	IC 7432/SN74HC32D SO14 CMS
U18	72669	IC 932/COMP MAX932CSA SO8
U19	22042	IC 7400/SN74HC00D SO14 CMS
U20	51794	IC 4066/SWI CD4066BM SO14
U21	72647	IC 27/OP TLC27L2CD SO8
U22	72647	IC 27/OP TLC27L2CD SO8
U23	72647	IC 27/OP TLC27L2CD SO8
U24	51794	IC 4066/SWI CD4066BM SO14
U25	72544	IC 1904/OP TDA1904 PDIP16
U26	72727	IC 4046/CD HEF4046BT SO16
U30	51791	IC 4093/CD HEF4093BT SO14 CMS
U31	51494	IC 4040/CD HEF4040BT SO16 CMS
U32	51676	IC 4538/CD HEF4538BT SO16 CMS
U33	51797	IC 4012/CD HEF4012BT SO14 CMS
U34	51791	IC 4093/CD HEF4093BT SO14 CMS
U35	22658	IC 232/DRV SP232CT SOL16

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Diagram : **W4S141637 - ECL2**
Assembly : **W1411738 (W14S0222)**
Designation : **PCB RIGHT KEYBOARD**
Reference : **W4P141637**

Reference	Part Number	Designation
DZ1	34640	DIODE Z BZX55C 5.1V 500MW
J1	3861	CN M 5 C PRT MODU2
J2	15204	CN M 16 C PRT TRANSI VER COURT
J3	72225	CN M 6 C PRT MODU2
J4	5616	CN M 4 C PRT MODU2
LD1	35534	OPTO LED 3MM TR/VR
LD2	34625	OPTO LED 3MM JA/JA
LD3	35534	OPTO LED 3MM TR/VR
P1637	W1404426	PCB RIGHT KEYBOARD ENTR35 MAGC
PB1	35221	SW POUS 1XT
PB2	35221	SW POUS 1XT
R1	1001	RES MET 182 1% 0.6W 50PPM
R2	1004	RES MET 332 1% 0.6W 50PPM
R3	1004	RES MET 332 1% 0.6W 50PPM
R4	1034	RES MET 100K 1% 0.6W 50PPM
R5	1026	RES MET 22.1K 1% 0.6W 50PPM
R8	1026	RES MET 22.1K 1% 0.6W 50PPM
T1	72866	TRANS IRF4905 PMOS TO220AB

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Diagram : **W4S141637 - ECL0**
Assembly : **W1411756 (W14S0223)**
Designation : **PCB LEFT KEYBOARD**
Reference : **W4P141661**

Reference	Part Number	Designation
J5	3861	CN M 5 C PRT MODU2
P1661	W1404585	PCB LEFT KEYBOARD ENTR35 MAGC
PB3	35221	SW POUS 1XT
PB4	35221	SW POUS 1XT
PB5	35221	SW POUS 1XT
PB6	35221	SW POUS 1XT

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Diagram : W4S141667A - ECL0
Assembly : W7412162
Designation : CI INTERF SPO2 MR MONI
Reference : W4P141667A

Reference	Part Number	Designation
C12	20989	COND CMS 1206 82P 50V 5% NPO
C13	20989	COND CMS 1206 82P 50V 5% NPO
C14	72660	COND CMS 1206 1U 16V +80/-20%
C15	72660	COND CMS 1206 1U 16V +80/-20%
C16	51559	COND CMS TANTAL 10U 16V 20%
C17	51559	COND CMS TANTAL 10U 16V 20%
C18	56394	COND CMS TANTAL 10U 35V 20%
J1	72230	CN M 7 D PRT MODU2
J2	15625	CN M 3 D PRT MODU2
P1667A	W1404641	CI INTERFACE SPO2 MAGC
R27	20741	RES CMS 2.21K 1% 0.25W 1206
R28	20741	RES CMS 2.21K 1% 0.25W 1206
R29	51736	RES CMS 200K 1% 0.25W 1206
R30	51736	RES CMS 200K 1% 0.25W 1206
U3	72732	IC 277/OP TLC277CD SO8

5. PARTS LIST

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Diagram : W3S1735B00
Assembly : W7412172
Designation : CI INTERF SPO2 MR MONI
Reference : W3P1737C01

Reference	Part Number	Designation
C1	51559	COND CMS TANTAL 10U 16V 10%
C10	8493	COND CMS 1206 100N 50V 20% X7R
C11	8493	COND CMS 1206 100N 50V 20% X7R
C12	1972	COND CHIMI RAD 470U 10V 8X11.5
C2	51559	COND CMS TANTAL 10U 16V 10%
C3	51556	COND CMS TANTAL 47U 16V 20%
C4	51559	COND CMS TANTAL 10U 16V 10%
C5	51559	COND CMS TANTAL 10U 16V 10%
C6	51559	COND CMS TANTAL 10U 16V 10%
C7	51559	COND CMS TANTAL 10U 16V 10%
C8	8493	COND CMS 1206 100N 50V 20% X7R
C9	8493	COND CMS 1206 100N 50V 20% X7R
H1	72158	CN M 10 D PRT MODU2
H2	59149	CN M 9 D PRT MODU2
J1	79343	CN F 14 V ENFICH 2X7
J2	72150	CN F 10 V ENFICH 2X5
JP1	5778	CN M 50 D PRT MODU2
JP2	5778	CN M 50 D PRT MODU2
JP3	5778	CN M 50 D PRT MODU2
L1	2029	SELF AX CHOC 2.5SP GAINE THERM
P1	5778	CN M 50 D PRT MODU2
P1737C	W1405539	CI INTERF BCI
P2	5778	CN M 50 D PRT MODU2
P4	5778	CN M 50 D PRT MODU2
Q1	51779	TRANS CMS BC850C NPN SOT23
Q2	51779	TRANS CMS BC850C NPN SOT23
Q3	51779	TRANS CMS BC850C NPN SOT23
R1	20737	RES CMS 1K 1% 0.25W 1206
R2	20750	RES CMS 10K 1% 0.25W 1206
R3	20730	RES CMS 332 1% 0.25W 1206
R4	20737	RES CMS 1K 1% 0.25W 1206
R5	20750	RES CMS 10K 1% 0.25W 1206
R6	20750	RES CMS 10K 1% 0.25W 1206
R7	20737	RES CMS 1K 1% 0.25W 1206
R8	20737	RES CMS 1K 1% 0.25W 1206
R9	20730	RES CMS 332 1% 0.25W 1206
U1	72546	OPTO COUPLER 5.5KV SFH617G
U2	79342	CONVERT DC/DC 5V/9V 2W IS6000V
U3	22993	IC 7905/VREG MC79L05ACD SO8
U4	22504	IC 7805/VREG MC78L05ACD SO8
U5	22504	IC 7805/VREG MC78L05ACD SO8
U7	72546	OPTO COUPLER 5.5KV SFH617G
	3033	ACCBL CAVALIER F 2.54MM
	3033	ACCBL CAVALIER F 2.54MM
	3033	ACCBL CAVALIER F 2.54MM
	3033	ACCBL CAVALIER F 2.54MM
	3033	ACCBL CAVALIER F 2.54MM
	3033	ACCBL CAVALIER F 2.54MM

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Diagram : **W4S141646 - ECL0**
Assembly : **W1411747**
Designation : **PCB INTERFACE MAGFILE**
Reference : **W4P141646**

Reference	Part Number	Designation
C1	8493	COND CMS 1206 100N 50V 20% X7R
C2	8493	COND CMS 1206 100N 50V 20% X7R
C3	8493	COND CMS 1206 100N 50V 20% X7R
C4	8493	COND CMS 1206 100N 50V 20% X7R
C5	8493	COND CMS 1206 100N 50V 20% X7R
C6	8493	COND CMS 1206 100N 50V 20% X7R
C7	8493	COND CMS 1206 100N 50V 20% X7R
C8	8493	COND CMS 1206 100N 50V 20% X7R
C9	19190	COND CMS TANTAL 4.7U 35V 20%
C10	8493	COND CMS 1206 100N 50V 20% X7R
C11	51556	COND CMS TANTAL 47U 10V 20%
C12	19190	COND CMS TANTAL 4.7U 35V 20%
C13	20983	COND CMS 1206 27P 50V 5% NPO
C14	20983	COND CMS 1206 27P 50V 5% NPO
C15	19190	COND CMS TANTAL 4.7U 35V 20%
C16	19190	COND CMS TANTAL 4.7U 35V 20%
C17	19190	COND CMS TANTAL 4.7U 35V 20%
C18	20983	COND CMS 1206 27P 50V 5% NPO
C19	20983	COND CMS 1206 27P 50V 5% NPO
C20	72543	COND CMS TANTAL 1U 35V 20%
C21	72543	COND CMS TANTAL 1U 35V 20%
C22	72543	COND CMS TANTAL 1U 35V 20%
C23	72543	COND CMS TANTAL 1U 35V 20%
J2	59133	CN F 9 C PRT SUB-D
J3	56593	CN M EMBASE PCB TYPE D D2.10
P1646	W1404466	PCB MAGFILE INTERFACEMAGC
Q1	72529	QUARTZ 16.000MHZ HC-49/U-S
Q2	72529	QUARTZ 16.000MHZ HC-49/U-S
R1	20739	RES CMS 1.5K 1% 0.25W 1206
R2	21327	RES CMS 22.1K 1% 0.25W 1206
R3	20750	RES CMS 10K 1% 0.25W 1206
R4	20739	RES CMS 1.5K 1% 0.25W 1206
R5	21327	RES CMS 22.1K 1% 0.25W 1206
R6	21327	RES CMS 22.1K 1% 0.25W 1206
R7	21327	RES CMS 22.1K 1% 0.25W 1206
RN1	577	RES RES 22KX8 2% SIL9
S3	51657	IC SUPPORT PLCC32
S7	51657	IC SUPPORT PLCC32
U1	51500	IC 8032/MCU S80C32-16PLCC44CMS
U2	51498	IC 74573/74HC573D SO20L CMS
U3	51525	IC 27256/EPRO PLCC32 CMS
U4	51531	IC 43256/SRAM SOP 28 CMS
U5	51500	IC 8032/MCU S80C32-16PLCC44CMS
U6	51498	IC 74573/74HC573D SO20L CMS
U7	51525	IC 27256/EPRO PLCC32 CMS
U8	51531	IC 43256/SRAM SOP 28 CMS
U9	72209	IC 220/DRV MAX220-RS232 SO16
U10	51806	OPTO FIBRE EMETTEUR 1523
U11	51807	OPTO FIBRE RECEPTEUR 2523

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Diagram **: W4S141649A - ECL1**
Assembly **: W1411749**
Designation **: PCB PARALLEL RECORDER ADAPTER**
Reference **: W4P141649A**

Reference	Part Number	Designation
C1	8493	COND CMS 1206 100N 50V 20% X7R
C2	1982	COND CHIMI RAD 470U 25V 10X16
C3	34744	COND CHIMI RAD 4700U 16V 16X32
J1	72903	CN F 50 CPL AWG28 P50
J2	9133	CN M 26 D PRT TRANSI.VER.LONG
J3	73528	CN M 4 D PRT 41761 R3.96MM
P1649A	W1404486	PCB ADAPTAT GRAPHE PARALL MAGC
R1	21352	RES CMS 0 1% 0.25W 1206
R2	20724	RES CMS 100 1% 0.25W 1206
R3	20724	RES CMS 100 1% 0.25W 1206
RG1	51830	IC 2931/VREG LM2931M-5.0 SO8
U1	22042	IC 7400/SN74HC00D SO14 CMS

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Assembly : W14S0227 or W14S0228
Designation : CI 9100 Gas Board
Reference : 70904S1

BCI INTERNATIONAL		Dwg No. 70904B1
PWB Assembly Gas 9100		Page 3 of 5
	Rev Date: 9-19-96	Rev 8

DESCRIPTION	QTY	DESIGNATION(S)	BCI PART NO.
RESISTOR 5% 1/4W 1K	11	R9,R10,R25,R26,R53,R66, R67,R70,R86,R87,R88	10001B3
RESISTOR 5% 1/4W 10K	12	R7,R8,R12,R14,R18,R19, R21,R24,R27,R33,R63,R80	10001B4
RESISTOR 5% 1/4W 100K	22	R17,R23,R29,R31,R37,R38, R40,R43,R54,R55,R56,R57, R58,R59,R68,R71,R72,R73, R75,R79,R85,R90	10001B5
RESISTOR 5% 1/4W 1M	4	R15,R22,R76,R81	10001B6
RESISTOR 5% 1/4W 2K	2	R39,R69	10001B20
RESISTOR 5% 1/4W 200K	1	R61	10001B22
RESISTOR 5% 1/4W 22K	1	R32	10001B25
RESISTOR 5% 1/4W 2.7K	3	R50,R51,R52	10001B31
RESISTOR 5% 1/4W 300K	1	R82	10001B37
RESISTOR 5% 1/4W 330	1	R20	10001B38
RESISTOR 5% 1/4W 47	2	R48,R49	10001B48
RESISTOR 5% 1/4W 470	4	R44,R45,R46,R47	10001B49
RESISTOR 5% 1/4W 4.7K	1	R13	10001B50
RESISTOR 5% 1/4W 47K	1	R83	10001B51
RESISTOR 5% 1/4W 560K	2	R65,R89	10001B61
RESISTOR 5% 1/4W 7.5K	2	R60,R62	10001B70
RESISTOR 5% 1/4W 1	1	R64	10001B90
RESISTOR 5% 1/4W 5.1K	1	R28	10001B94
RESISTOR 5% 1/4W 360K	1	R4	10001B100
RESISTOR 5% 1/4W 24K	2	R5,R6	10001B109
RESISTOR 5% 1/4W 75	1	R30	10001B120
RESISTOR 5% 2W 51	1	R84	10004B6
RESISTOR 1% 1/8W 182K	4	R35,R36,R41,R42	10006B20
RESISTOR 1% 1/8W 4.99K	1	R74	10006B71
RESISTOR 1% 1/8W 26.7K	1	R3	10006B95
RESISTOR 1% 1/8W 35.7K	1	R78	10006B98
RESISTOR 1% 1/8W 5.76K	1	R77	10006B282
IC 74HC138	2	U7,U8	11001B10
SOCKET IC 28-PIN	3	403 (FOR U17,U22,U26)	11005B5
SOCKET IC 8-PIN	1	410 (FOR U28)	11005B8
IC 4093	1	U5	11008B13
IC 4040	1	U12	11008B22
IC 4051	1	U20	11008B25
IC 4046	1	U19	11008B32
IC 74HC374	1	U16	11009B21
IC 74HC541	1	U25	11009B22
IC 74HC14	1	U6	11009B23
IC 74HC193	1	U15	11009B25
SCREW PHMS 4-40 X 5/16	3	404	12005B6
WASHER LOCK INT. TOOTH #4	3	405	12010B1
CAPAC MONO 10% 50V .1MF	34	C6,C10,C18,C19,C21,C23, C24,C25,C26,C27,C28.C29, C30,C33,C34,C35,C38,C39, C42,C43,C44,C45,C46,C47, C50,C51,C52,C53,C58,C59, C60,C62,C63,C64	13000B13

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Assembly : W14S0227 or W14S0228
Designation : CI 9100 Gas Board
Reference : 70904S1

BCI INTERNATIONAL		Dwg No. 70904B1
PWB Assembly Gas 9100		Page 4 of 5
	Rev Date: 9-19-96	Rev 8

DESCRIPTION	QTY	DESIGNATION(S)	BCI PART NO.
CAPAC MONO 10% 50V 1000PF	2	C1,C67	13000B20
CAPAC MONO 10% 50V .33MF	2	C2,C3	13000B32
CAPAC MONO 10% 50V .0022MF	2	C36,C37	13000B36
CAPAC MONO 10% 50V 220PF	2	C40,C57	13000B37
CAPAC FILM 5% 50V .068MF	1	C41	13001B17
CAPAC MICA 5% 50V 24PF	2	C31,C32	13002B5
CAPAC TANT 35V 1MF	4	C54,C56,C55,C61	13003B1
CAPAC TANT 25V 10MF	1	C65	13003B3
CAPAC AL-ELEC 35V 10MF	4	C7,C22,C48,C49	13004B2
CAPAC AL-ELEC 35V 470MF	4	C5,C8,C9,C17	13004B7
CAPAC AL-ELEC 25V 100MF	2	C4,C16	13004B12
CAPAC AL-ELEC 25V 4700MF	1	C15	13004B14
CAPAC AL-ELEC 150V 10MF	2	C11,C12	13006B8
CAPAC AL-ELEC 100V 2.2MF	2	C13,C14	13006B14
POT M-T 500K	1	VR3	15002B7
POT M-T 1M	1	VR2	15002B11
POT M-T 200K	1	VR1	15002B12
POT 3/4-T 10K	1	VR4	15003B2
IC 7912	1	U3	20239B2
IC CA3240E	2	U23,U24	30710B1
DIODE RECTIFIER 1N4148	3	D9,D14,D17	48032B
TERMINAL TEST POINT	11	TP1,TP2,TP3,TP4,TP5, TP6,TP7,IP8,TP9,TP10,TP11	48171B
NUT HEX 4-40 SMALL PATT.	3	407	49041B2
CONN HEADER 2-4 POS.	1	P8	56083B11
CONN HEADER 2-3 POS.	1	P3	56083B16
CONN HEADER 2-30 POS.	1	P5	56083B18
CONN HEADER 2-10 POS.	1	P14	56083B5
THERMAL GREASE	A/R	409	56117B1
TRANSISTOR NPN TIP41C	1	Q13	56221B1
TRANSISTOR PNP TIP42	1	Q9	56293B1
IC LP2951CN	1	U2	57119B1
TAPE KAPTON 1/2" WIDE	A/R	408	57959B1
TRANSISTOR PNP 2N3906	1	Q5	58027B1
DIODE ZENER 1N963A	1	D16	58229B1
DIODE RECTIFIER 1N4005	1	D11	68518B1
CONN HEADER SIL 2-PIN	1	J1	70026B4
CONN HEADER SIL 3-PIN	2	P2,P15	70026B5
HEAT SINK TO-220	3	402 (FOR Q1,Q2,U4)	70064B1
TRANSISTOR NPN 2N4401	1	Q8	70078B1
TRANSISTOR NPN MPSA13	1	Q7	70099B1
DIODE HI-EFF 3A HER301	2	D6,D7	31025B2
DIODE HI-EFF 1A HER101	2	D3,D4	31025B1
TRANSISTOR N-CHAN TN0602	1	Q6	70189B1
CRYSTAL 12.288MHZ	1	X1	70219B1
IC ADC1205	1	U21	70220B1
TRANSISTOR N-CHAN 2N7000	6	Q3,Q4,Q10,Q11,Q12,Q14	70238B1
IC RAM STATIC 32K X 8	1	U26	70271B1
RES NETWORK 10-PIN SIP 47K	3	RN1,RN2,RN3	70272B1

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Assembly : W14S0227 or W14S0228
Designation : CI 9100 Gas Board
Reference : 70904S1

BCI INTERNATIONAL		Dwg No. 70904B1
PWB Assembly Gas 9100		Page 5 of 5
	Rev Date: 9-19-96	Rev 8

DESCRIPTION	QTY	DESIGNATION(S)	BCI PART NO.
IC HM64180	1	U9	70307B1
IC UCN5801	1	U11	70313B1
DIODE ZENER 1N5266B	2	D1,D2	70385B1
IC TLC274CN	1	U18	70487B1
IC 7812	1	U4	70526B1
LED RED	4	LED1,LED2,LED3,LED4	70581C1 *
IC EEPROM NMC93C06	1	U28	70616B1
FILTER COMMON MODE	2	T2,T3	70649B2
TRANSISTOR FET MTP3055	2	Q1,Q2	70679B1
IC SN75155	1	U10	70815B1
PWB FAB GAS 9100	1	400	70903B1
IC 74HC590	2	U13,U14	70907B1
IC TL494	1	U1	70908B1
CONN HEADER RT-ANG 12-POS.	1	P1	70909B1
CONN HEADER RT-ANG 7-POS.	1	P12	70909B2
DIODE RECTIFIER MUR115	2	D5,D8	70910B3
TRANSFORMER	1	T1	70912B1
TRANSISTOR SMP20P10	1	Q15	70934B1
JACK PHONE RT-ANG 6 CKTS.	1	P13	70949B1

* SUPPLIED BY BIOCHEM;INSTALLED BY VENDOR

5. PARTS LIST

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Assembly : **W14S0227 or W14S0228**
Designation : **CI 9100 Agent Preamplifier Board**
Reference : **70464S1**

70464B1 - PWB ASM AGENT PRE-AMP
Rev. 1 3-30-94
Sheet 2 of 2

PART NO.	DESCRIPTION	QTY.	DESIGNATION
10001B2	RESISTOR 5% 1/4W 100	2	R6,R11
10001B4	RESISTOR 5% 1/4W 10K	2	R5,R8
10001B6	RESISTOR 5% 1/4W 1M	2	R13,R14
10001B7	RESISTOR 5% 1/4W 10M	2	R1,R16
10001B15	RESISTOR 5% 1/4W 220K	2	R15,R17
10001B45	RESISTOR 5% 1/4W 3.9K	2	R4,R9
10001B46	RESISTOR 5% 1/4W 39K	2	R3,R10
10001B59	RESISTOR 5% 1/4W 5.6K	2	R2,R7
10001B103	RESISTOR 5% 1/4W 820K	1	R12
13000B2	CAPAC MONO 10% 50V 100PF	2	C3,C12
13000B4	CAPAC MONO 10% 50V 470PF	2	C2,C8
13000B37	CAPAC MONO 10% 50V 220PF	1	C6
13001B3	CAPAC FILM 5% 50V .1MF	6	C4,C5,C9,C10,C11,C15
13025B1	CAPAC MONO 5% 100V 47PF	2	C1,C7
20124B1	CONN HDR RT-ANG 2-2 POS	2	P2,P3
20266B6	CONN HDR RT-ANG 2-5 POS	1	P1
30710B1	IC CA3240E	1	U1
48032B	DIODE 1N4148	1	D1
70078B1	TRANSISTOR NPN 2N4401	2	Q1,Q2
70463B1	PWB FAB AGENT PRE-AMP (REV. C)	1	400

5. PARTS LIST

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Assembly : W14S0229
Designation : CI 9100 Pneumatic Board
Reference : 70116S1

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SINGLE LEVEL EXPLOSION FOR:70116A1 DATE:09/13/1995 BOM REV: 1

LINE LEV	LINE/REF	PART NO/DESC	REV	QUANTITY	UM MAC
0 0		70116A1 PWB ASM PNEUMATIC 9100	1	1.000	EA M
1 _1	1	70115B1 PWB FAB PNEUMATIC 9100	0	1.000	EA B
2 _1	2	57137B1 SPACER F-F 1/4 HEX 6-32 X 1.75 NYLON		1.000	EA B
3 _1	3	70816B1 MANIFOLD BLOCK 9100	1	1.000	EA B
4 _1	4	12004B6 SCREW 6-32 X 5/16 PHMS SLOTTED	0	5.000	EA B
5 _1	5	54068B TIES CABLE MINIATURE	0	6.000	EA B
6 _1	6	68061B1 TUBING TYGON B-44-3 .125 OD X .062 ID		3.250	FT B
7 _1	7	68108B4 SAMPLE LINE 8' PE-PVC	0	1.000	EA B P
8 _1	8	12000B1 SCREW 4-40 X 1/4 BHMS SLOTTED	0	2.000	EA B
9 _1	10	70117B1 FITTING BARB RT-ANG		6.000	EA B
10 _1	11	12005B3 SCREW 4-40 X 3/4 PHMS PHILLIPS	0	2.000	EA B
11 _1	12	12008B2 NUT HEX 4-40	0	2.000	EA B
12 _1	13	12012B1 SPACER M-F 1/4 HEX #6 X 1/4	0	3.000	EA B
13 _1	14	12010B2 WASHER LOCK #6 INT	0	3.000	EA B
14 _1	15	12008B3 NUT HEX 6-32 SMALL PATTERN	0	3.000	EA B
15 _1	17	70435B1 FITTING RESTRICTOR W/ .005 DIA ORIFICE GREEN		1.000	EA B
16 _1	18	57583B1 ORIFICE BRASS	0	1.000	EA B
17 _1	19	70159B1 FITTING TEE .04/.05 ID X 1/16 OD DELRIN		3.000	EA B
18 _1	20	57862B1 WASHER FENDER FLAT 3/4 OD X .14 ID X .05		1.000	EA B
19 _1	21	56278B1 WIRE SOLID BUS BAR 22AWG	0	.000	FT B P
20 _1	22	48031B DIODE RECTIFIER 50V 1N4001/1N4004	0	5.000	EA B
21 _1	23	20132B1 SWITCH PRESSURE 11 PSI W/LEAK TEST	0	1.000	EA B
22 _1	24	20412B4 CONN HDR 6-POS LKG	1	1.000	EA B
23 _1	25	70901B1 VALVE 2-WAY PWB-MT 12V		2.000	EA B
24 _1	26	70901B2 VALVE 3-WAY PWB-MT 12V		2.000	EA B

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Assembly : W14S0229
Designation : CI 9100 Pneumatic Board
Reference : 70116S1

09/13/95 BCI International Page 2

SINGLE LEVEL EXPLOSION FOR:70116A1 DATE:09/13/1995 BOM REV: 1

LINE LEV	LINE/REF	PART NO/DESC	REV	QUANTITY	UM MAC
25 _1	27	56083B2 CONN HDR 2/10-POS	3	1.000	EA B
26 _1	28	70810B2 VALVE 3-WAY PNEUTRONIC		1.000	EA B P
27 _1	32	68064B1 TUBING TYGON 1/8 ID X 1/4 OD		.042	FT B
28 _1	35	56334B6 CONN HSG MTA 22AWG 2-POS RED	0	1.000	EA B
29 _1	36	20188B1 SOLVENT CYCLOHEXANONE	0	.000	EA B P
30 _1	37	48166B TUBING SHRINK ID .125	2	.083	FT B
31 _1	38	48151B3 WIRE STRANDED 22AWG BLACK 300V	3	.250	FT B
32 _1	39	70435B3 FITTING RESTRICTOR W/ .007 DIA ORIFICE AQUA		1.000	EA B
33 _1	40	70875B2 LINE SAMPLE ASM NAFION 3'	1	1.000	EA B
34 _1	41	20218C1 ADPTR TUBING CONN MOD	0	2.000	EA M
35 _1	42	70161B1 FITTING BARB W/O-RING 10-32		4.000	EA B
36 _1	43	68649B1 TUBE SEAMLESS SS .0395 ID X .062 OD	0	1.000	EA B
37 _1	44	70825B1 FILTER ACRODISC .45 MICRON		2.000	EA B
38 _1	45	20133B1 FITTING REDUCTION TEE 1/8-1/16	0	3.000	EA B
39 _1	46	45072B EPOXY HARDMAN QUICK-DRY	0	.000	EA B P

5. PARTS LIST

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Diagram : **W3S1735B00**
Assembly : **W7412166**
Designation : **CI ADAPT MODULE OEM MAGLC MONT**
Reference : **W3P1735B00**

Référence	Code Article	Désignation
C10	8493	COND CMS 1206 100N 50V 20% X7R
C11	8493	COND CMS 1206 100N 50V 20% X7R
C12	8493	COND CMS 1206 100N 50V 20% X7R
C13	8493	COND CMS 1206 100N 50V 20% X7R
C15	72660	COND CMS 1206 1U 16V +80/-20%
C19	1979	COND CHIMI RAD 47U 25V 7X7
C2	8493	COND CMS 1206 100N 50V 20% X7R
C20	51556	COND CMS TANTAL 47U 16V 20%
C21	51559	COND CMS TANTAL 10U 16V 10%
C22	51559	COND CMS TANTAL 10U 16V 10%
C3	8493	COND CMS 1206 100N 50V 20% X7R
C4	8493	COND CMS 1206 100N 50V 20% X7R
C5	8493	COND CMS 1206 100N 50V 20% X7R
C7	8493	COND CMS 1206 100N 50V 20% X7R
C8	8493	COND CMS 1206 100N 50V 20% X7R
C9	8493	COND CMS 1206 100N 50V 20% X7R
D2	72202	OPTO FIBRE RECEPTEUR 2521
D3	72663	OPTO PHOTODIODE SFH756V
D4	369	OPTO LED 5MM D SOUD RG
D5	375	OPTO LED 5MM D SOUD VR
D6	51807	OPTO FIBRE RECEPTEUR 2523
D7	72663	OPTO PHOTODIODE SFH756V
JP3	5778	CN M 50 D PRT MODU2
J1	79330	CN M 9 D SOUD SUB D
L1	2029	SELF AX CHOC 2.5SP GAINE THERM
P11	5615	CN M 3 C PRT MODU2
P1735B	W1405532	CI ADAPT MODULE OEM
P5	22671	CN M 16 D PRT TRANSITION REDUI
P6	79329	CN F 16 D PRT TRANSITION REDUI
R10	20734	RES CMS 681 1% 0.25W 1206
R13	20737	RES CMS 1K 1% 0.25W 1206
R14	20737	RES CMS 1K 1% 0.25W 1206
R15	20737	RES CMS 1K 1% 0.25W 1206
R16	20750	RES CMS 10K 1% 0.25W 1206
R2	51755	RES CMS 56.2K 1% 0.25W 1206
R4	21347	RES CMS 1M 1% 0.25W 1206
R5	21340	RES CMS 274K 1% 0.25W 1206
R8	21335	RES CMS 100K 1% 0.25W 1206
R9	20734	RES CMS 681 1% 0.25W 1206
SD2	4285	IC SUPPORT DIL8 TULIPE
U1	79328	IC 74125/74HCT125M SO14
U2	22042	IC 7400/SN74HC00D SO14 CMS
U3	22658	IC 232/DRV SP232ACT SOL16
U7	446	IC 7805/VREG MC7805CT TO220
U8	51916	IC 7410/74HC10M SO14 CMS
	3033	ACCBL CAVALIER F 2.54MM
	12776	EFX VIS TCB CRUCI M3X6 INX A2
	11588	EFX RONDEL EVENT M3 INX A2
	11202	EFX ECROU HU M3

5. PARTS LIST

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Diagram : **W4S141619 - ECL0**
Assembly : **W1411710**
Designation : **PCB ECG SENSOR PROTECTION**
Reference : **W4P141619**

Reference	Part Number	Designation
J1	W1404592	CONNECTEUR ECG
P1619	W1404334	PROTECTION CAPTEUR ECG MAGC
RF	72812	RES MET 10K 5% 0.7W 2000V
RL	72812	RES MET 10K 5% 0.7W 2000V
RR	72812	RES MET 10K 5% 0.7W 2000V

5. PARTS LIST

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Diagram : **W4S141718 - ECL0**
Assembly : **W7411924**
Designation : **CI CAPTEUR ECG DSP TECHNOLOGIE**
Reference : **W4P141718**

Reference	Part Number	Designation
C1	21008	COND CMS 1206 3.3N 50V 10% X7R
C10	21008	COND CMS 1206 3.3N 50V 10% X7R
C11	21002	COND CMS 1206 1N 50V 5% NPO
C12	8493	COND CMS 1206 100N 50V 20% X7R
C13	21006	COND CMS 1206 2.2N 50V 20% X7R
C14	20996	COND CMS 1206 330P 50V 5% NPO
C15	21002	COND CMS 1206 1N 50V 5% NPO
C16	8493	COND CMS 1206 100N 50V 20% X7R
C17	72661	COND CMS 1206 4.7U 16V +80-20%
C18	21008	COND CMS 1206 3.3N 50V 10% X7R
C19	21014	COND CMS 1206 10N 50V 20% X7R
C2	8493	COND CMS 1206 100N 50V 20% X7R
C20	8493	COND CMS 1206 100N 50V 20% X7R
C21	8493	COND CMS 1206 100N 50V 20% X7R
C22	8493	COND CMS 1206 100N 50V 20% X7R
C23	8493	COND CMS 1206 100N 50V 20% X7R
C24	8493	COND CMS 1206 100N 50V 20% X7R
C25	21020	COND CMS 1206 33N 50V 10% X7R
C26	21020	COND CMS 1206 33N 50V 10% X7R
C28	8493	COND CMS 1206 100N 50V 20% X7R
C29	8493	COND CMS 1206 100N 50V 20% X7R
C3	21002	COND CMS 1206 1N 50V 5% NPO
C30	21014	COND CMS 1206 10N 50V 20% X7R
C31	72660	COND CMS 1206 1U 16V +80/-20%
C32	8493	COND CMS 1206 100N 50V 20% X7R
C33	8493	COND CMS 1206 100N 50V 20% X7R
C34	8493	COND CMS 1206 100N 50V 20% X7R
C35	8493	COND CMS 1206 100N 50V 20% X7R
C36	72661	COND CMS 1206 4.7U 16V +80-20%
C38	72661	COND CMS 1206 4.7U 16V +80-20%
C39	72661	COND CMS 1206 4.7U 16V +80-20%
C4	21008	COND CMS 1206 3.3N 50V 10% X7R
C5	21002	COND CMS 1206 1N 50V 5% NPO
C6	21002	COND CMS 1206 1N 50V 5% NPO
C7	72660	COND CMS 1206 1U 16V +80/-20%
C8	21002	COND CMS 1206 1N 50V 5% NPO
C9	21002	COND CMS 1206 1N 50V 5% NPO
D1	22029	DIODE CMS BAS32L SOD80
D2	22029	DIODE CMS BAS32L SOD80
D7	22029	DIODE CMS BAS32L SOD80
D8	22029	DIODE CMS BAS32L SOD80
LD1	W1411943	CBL PHOTODIODE SFH350V
LD2	W1411944	CBL PHOTODIODE SFH756V
P1	79207	RES AJUST 1M 0.25W 1T CMS
P1718	W1404689	CI CAPTEUR ECG DSP TECHNOLOGIE
P2	79207	RES AJUST 1M 0.25W 1T CMS
R1	72827	RES CMS 1M 1% 0.16W 0805
R10	72827	RES CMS 1M 1% 0.16W 0805
R11	72827	RES CMS 1M 1% 0.16W 0805
R12	72678	RES CMS 10K 1% 0.16W 0805
R13	4-77-0214	RES CMS 20M 5% 0.25W 1206
R14	4-77-0214	RES CMS 20M 5% 0.25W 1206
R15	72678	RES CMS 10K 1% 0.16W 0805
R16	4-77-0214	RES CMS 20M 5% 0.25W 1206
R17	4-77-0214	RES CMS 20M 5% 0.25W 1206
R18	21637	RES CMS 10M 1% 0.25W 1206
R19	21342	RES CMS 392K 1% 0.25W 1206
R2	72827	RES CMS 1M 1% 0.16W 0805
R20	72678	RES CMS 10K 1% 0.16W 0805
R21	20741	RES CMS 2.21K 1% 0.25W 1206
R22	72827	RES CMS 1M 1% 0.16W 0805
R23	4-77-0214	RES CMS 20M 5% 0.25W 1206
R24	72827	RES CMS 1M 1% 0.16W 0805
R25	72827	RES CMS 1M 1% 0.16W 0805

5. PARTS LIST

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Diagram : **W4S141718 - ECL0**
Assembly : **W7411924**
Designation : **CI CAPTEUR ECG DSP TECHNOLOGIE**
Reference : **W4P141718**

Reference	Part Number	Designation
R26	72678	RES CMS 10K 1% 0.16W 0805
R27	21351	RES CMS 2.21M 1% 0.25W 1206
R28	4-77-0214	RES CMS 20M 5% 0.25W 1206
R29	21342	RES CMS 392K 1% 0.25W 1206
R3	72827	RES CMS 1M 1% 0.16W 0805
R30	72827	RES CMS 1M 1% 0.16W 0805
R31	21351	RES CMS 2.21M 1% 0.25W 1206
R32	72826	RES CMS 100K 1% 0.16W 0805
R33	53692	RES CMS 301K 1% 0.25W 1206
R35	72827	RES CMS 1M 1% 0.16W 0805
R36	72827	RES CMS 1M 1% 0.16W 0805
R37	72826	RES CMS 100K 1% 0.16W 0805
R38	72678	RES CMS 10K 1% 0.16W 0805
R39	72826	RES CMS 100K 1% 0.16W 0805
R4	21342	RES CMS 392K 1% 0.25W 1206
R40	72826	RES CMS 100K 1% 0.16W 0805
R41	72826	RES CMS 100K 1% 0.16W 0805
R42	72826	RES CMS 100K 1% 0.16W 0805
R43	72826	RES CMS 100K 1% 0.16W 0805
R44	51742	RES CMS 3.32M 1% 0.25W 1206
R45	72826	RES CMS 100K 1% 0.16W 0805
R47	72827	RES CMS 1M 1% 0.16W 0805
R48	73140	RES CMS 243K 1% 0.25W 1206
R49	72826	RES CMS 100K 1% 0.16W 0805
R5	4-77-0214	RES CMS 20M 5% 0.25W 1206
R50	33876	RES CMS 750K 1% 0.25W 1206
R51	72826	RES CMS 100K 1% 0.16W 0805
R52	33876	RES CMS 750K 1% 0.25W 1206
R53	72826	RES CMS 100K 1% 0.16W 0805
R54	21351	RES CMS 2.21M 1% 0.25W 1206
R55	72826	RES CMS 100K 1% 0.16W 0805
R56	72827	RES CMS 1M 1% 0.16W 0805
R57	21351	RES CMS 2.21M 1% 0.25W 1206
R58	72826	RES CMS 100K 1% 0.16W 0805
R59	72826	RES CMS 100K 1% 0.16W 0805
R6	72827	RES CMS 1M 1% 0.16W 0805
R60	21351	RES CMS 2.21M 1% 0.25W 1206
R61	51736	RES CMS 200K 1% 0.25W 1206
R62	72827	RES CMS 1M 1% 0.16W 0805
R63	21351	RES CMS 2.21M 1% 0.25W 1206
R64	21351	RES CMS 2.21M 1% 0.25W 1206
R65	21342	RES CMS 392K 1% 0.25W 1206
R66	51745	RES CMS 402K 1% 0.25W 1206
R68	20741	RES CMS 2.21K 1% 0.25W 1206
R69	51765	RES CMS 7.5K 1% 0.25W 1206
R70	51563	RES CMS 4.7M 1% 0.25W 1206
R7	4-77-0214	RES CMS 20M 5% 0.25W 1206
R8	72678	RES CMS 10K 1% 0.16W 0805
R9	21637	RES CMS 10M 1% 0.25W 1206
RG1	72668	IC 884/VREG MAX884CSA SO8
RU1	69667	RES VDR CN 1206 K 38V SMD
RU2	21352	RES CMS 0 1% 0.25W 1206
RU3	69667	RES VDR CN 1206 K 38V SMD
RU4	69667	RES VDR CN 1206 K 38V SMD
SP11	3351	CBL FIL SOUPLE 0.14MM2 VR
SP12	3351	CBL FIL SOUPLE 0.14MM2 VR
SP14	3351	CBL FIL SOUPLE 0.14MM2 VR
SP16	3351	CBL FIL SOUPLE 0.14MM2 VR
SP19	3351	CBL FIL SOUPLE 0.14MM2 VR
SP20	3351	CBL FIL SOUPLE 0.14MM2 VR
SP21	3351	CBL FIL SOUPLE 0.14MM2 VR
T1	51470	TRANS CMS BSS138 SOT23
T2	51470	TRANS CMS BSS138 SOT23
T3	51777	TRANS CMS BC860C PNP SOT23

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Diagram : W4S141718 - ECL0
Assembly : W7411924
Designation : CI CAPTEUR ECG DSP TECHNOLOGIE
Reference : W4P141718

Reference	Part Number	Designation
T4	51471	TRANS CMS BSS84 SOT23
U1	79028	IC 1078/OP TLC1078 SO8
U10	79028	IC 1078/OP TLC1078 SO8
U2	79028	IC 1078/OP TLC1078 SO8
U3	51787	IC 555/ICM7555ISA SO8 CMS
U4	79028	IC 1078/OP TLC1078 SO8
U5	79028	IC 1078/OP TLC1078 SO8
U6	79028	IC 1078/OP TLC1078 SO8
U7	79028	IC 1078/OP TLC1078 SO8
U8	51684	IC 4052/MUX CD4052BCM SO16
U9	72669	IC 932/COMP MAX932CSA SO8

5. PARTS LIST

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Diagram : **ECL0**
Assembly : **W1411750**
Designation : **ECG GATING MODULE UNIVERSEL**
Reference : **Parts list**

Part Number	Designation	Number
21812	ACCBL COSSE OEILLET SOUD D2X9	4
72858	ACCBL PASFIL MANCH CAOU 15-680	1
35389	ACCBL SERRE CABLE	1
W1404713	BOITIER ELECTRODE ECG MAGL C	1
W1404598	BOITIER GATING ECG	1
W1404538	CBL F OPTIQUE MAGLIFE GATING	1
3372	CBL FIL SOUPLE 0.14MM2 BC	.05
W1404537	CBL RND 2P BLINDE GATING	1
39918	CFA BOUTON UNIMEC NOIR	1
72848	CFA ENJOLIVEUR UNIMEC NOIR	1
W1411520	CI RECEPTEUR ECG MONTE	1
W1402543	COSSE STIMU DG2000EDOS	4
11201	EFX ECROU HU M2 INX A2	4
34935	EFX ENTRE D3.4X2 PA	2
11186	EFX RONDEL PLATE M2 INX A2	4
5517	EFX VIS CHC M2X4 INX A2	2
5433	EFX VIS CHC M2X8 INX A2	6
25576	EFX VIS TCB CRUCI M3X16 INX A2	4
W14E0440	ETIQU BOITIER GATING BRUKER	1
35555	PILE CN	1
72677	PILE LITHIUM 9V 1200MAH U9VL	1
2795	RES MET 30.1K 1% 0.6W 50PPM	2
30347	SW LEV 2XI	1

5. PARTS LIST

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Diagram : ECL0
Assembly : W1411767
Designation : ECG GATING MODULE GEMS
Reference : Parts list

Part Number	Designation	Number
30799	ACCBL MANCH PVC NR 14-583	1
72858	ACCBL PASFIL MANCH CAOU 15-680	1
35389	ACCBL SERRE CABLE	1
W1404598	BOITIER GATING ECG	1
3372	CBL FIL SOUPLE 0.14MM2 BC	.05
W1411801	CBL F OPTIQUE 5M MAGLC GATING	1
W1404537	CBL RND 2P BLINDE GATING	1
39918	CFA BOUTON UNIMEC NOIR	1
72848	CFA ENJOLIVEUR UNIMEC NOIR	1
W1411520	CI RECEPTEUR ECG MONTE	1
34935	EFX ENTRE D3.4X2 PA	4
72180	EFX VIS TOLE TF CRUCI M2.2X9.5	4
28314	EFX VIS TOLE TCB CRUCI 2.9X6.5	4
U30074	RUBAN ADHESIF MOUSSE 3X9MM	.04
W14E0435	ETIQU BOITIER GATING	1
35555	PILE CN	1
72677	PILE LITHIUM 9V 1200MAH U9VL	1
2795	RES MET 30.1K 1% 0.6W 50PPM	2
30347	SW LEV 2XI	1
W1404538	CBL F OPTIQUE 3M MAGLC GATING	1
10639	EFX VIS TOLE TCB CRUCI 2.2X6.5	4
34935	EFX ENTRE D3.4X2 PA	2
5433	EFX VIS CHC M2X8 INX A2	6
5517	EFX VIS CHC M2X4 INX A2	2

5. PARTS LIST

Page : **1/2**

Diagram : **W4S141619 - ECL0**
Assembly : **W1411520**
Designation : **PCB ECG RECEIVER**
Reference : **W4P141564A**

Reference	Part Number	Designation
A4	59995	ACCBL PICOT FOURCHE D1.1MM
A5	59995	ACCBL PICOT FOURCHE D1.1MM
C1	72660	COND CMS 1206 1U 16V +80/-20%
C10	51559	COND CMS TANTAL 10U 16V 20%
C11	8493	COND CMS 1206 100N 50V 20% X7R
C12	21014	COND CMS 1206 10N 50V 20% X7R
C13	8493	COND CMS 1206 100N 50V 20% X7R
C14	8493	COND CMS 1206 100N 50V 20% X7R
C15	8493	COND CMS 1206 100N 50V 20% X7R
C16	8493	COND CMS 1206 100N 50V 20% X7R
C17	8493	COND CMS 1206 100N 50V 20% X7R
C18	21014	COND CMS 1206 10N 50V 20% X7R
C19	8493	COND CMS 1206 100N 50V 20% X7R
C2	21014	COND CMS 1206 10N 50V 20% X7R
C20	8493	COND CMS 1206 100N 50V 20% X7R
C21	8493	COND CMS 1206 100N 50V 20% X7R
C22	8493	COND CMS 1206 100N 50V 20% X7R
C3	8493	COND CMS 1206 100N 50V 20% X7R
C4	21020	COND CMS 1206 33N 50V 20% X7R
C5	21014	COND CMS 1206 10N 50V 20% X7R
C6	51559	COND CMS TANTAL 10U 16V 20%
C7	21014	COND CMS 1206 10N 50V 20% X7R
C8	8493	COND CMS 1206 100N 50V 20% X7R
C9	51559	COND CMS TANTAL 10U 16V 20%
D1	51589	DIODE CMS PRLL5819 SOD87
F1	35469	FUS TR5 8X7MM 0.05A T 250V
LD1	72850	CFA OPTO LED UNIMEC VR
P1	72710	RES AJUST 1M 0.25W 1T CMS
P1564A	W1403562	CI RECEPTEUR ECG
PSW2	31748	IC SUPPORT DIL8 TULIPE MOBILE
R1	72827	RES CMS 1M 1% 0.16W 0805
R10	72826	RES CMS 100K 1% 0.16W 0805
R11	72826	RES CMS 100K 1% 0.16W 0805
R12	72826	RES CMS 100K 1% 0.16W 0805
R13	72678	RES CMS 10K 1% 0.16W 0805
R16	21347	RES CMS 1M 1% 0.25W 1206
R17	21351	RES CMS 2.21M 1% 0.25W 1206
R2	21339	RES CMS 221K 1% 0.25W 1206
R3	21339	RES CMS 221K 1% 0.25W 1206
R31	21351	RES CMS 2.21M 1% 0.25W 1206
R32	21351	RES CMS 2.21M 1% 0.25W 1206
R33	51751	RES CMS 499K 1% 0.25W 1206
R34	53695	RES CMS 536K 1% 0.25W 1206
R4	21339	RES CMS 221K 1% 0.25W 1206
R5	53699	RES CMS 47.5K 1% 0.25W 1206
R6	53699	RES CMS 47.5K 1% 0.25W 1206
R7	72826	RES CMS 100K 1% 0.16W 0805
R8	20750	RES CMS 10K 1% 0.25W 1206
R9	20737	RES CMS 1K 1% 0.25W 1206
RG1	72668	IC 884/VREG MAX884CSA SO8
RG2	72852	IC 2426/VREF TLE2426ILP TO92
SW2	39915	CFA TOUCHE UNIMEC MOMENTANE
U1	51545	IC 064/OP TL064CD SO14 CMS
U2	51807	OPTO FIBRE RECEPTEUR 2523
U3	51497	IC 4001/CD HEF4001BT SO14 CMS
U4	51802	IC 4013/CD HEF4013BT SO14 CMS

5. PARTS LIST

Page : **1/1**

Diagram : **ECL0**
Assembly : **W1404282**
Designation : **DOWNLOADING MODULE**
Reference : **Parts list**

Part Number	Designation	Number
37512	ACCBL BAGUE REPERE IMPR.1 JA	1
37513	ACCBL BAGUE REPERE IMPR.2 JA	1
39555	ACCBL BOUCHE TROU NR D25.5	2
19600	ACCBL MANCH PVC D8X53 /14-582	1
33705	ACCBL PASFIL MANCH CAOU 15-380	1
72863	ALIMENTATION 90-264V +5V/0.8A	1
W1404608	BOITIER DE TELECHARGEMENT	1
W1404548	CANON FIBRE OPTIQUE	2
W1403226	CBL LIAISON MAGFILE	1
W1411752	CI MODULE TELECHARGEMENT MONTE	1
72835	CN M 4 FICHE SOUD	1
72855	CN MANCHON GR.2B NR	1
4181	EFX VIS TC FENTE M3X25 PA	2
28314	EFX VIS TOLE TCB CRUCI 2.9X6.5	4
33893	EFX VIS TOLE TCB CRUCI M2.9X16	4
W14E0436	ETIQU POSITION DES ELECTRODES	1
W1404549	ISOLANT FIBRE OPTIQUE	1
73860	MP A COLLE ELASTIQUE 20GR	.01
35024	MP A COLLE FLACON DE 50GR	.01
39569	OPTI FIBR CN GRIS	4
72233	OPTO FIBRE KIT DE POLISSAGE	1
72719	OPTO FIBRE PLSTC 2 FIBRES	3

5. PARTS LIST

Page : **1/1**

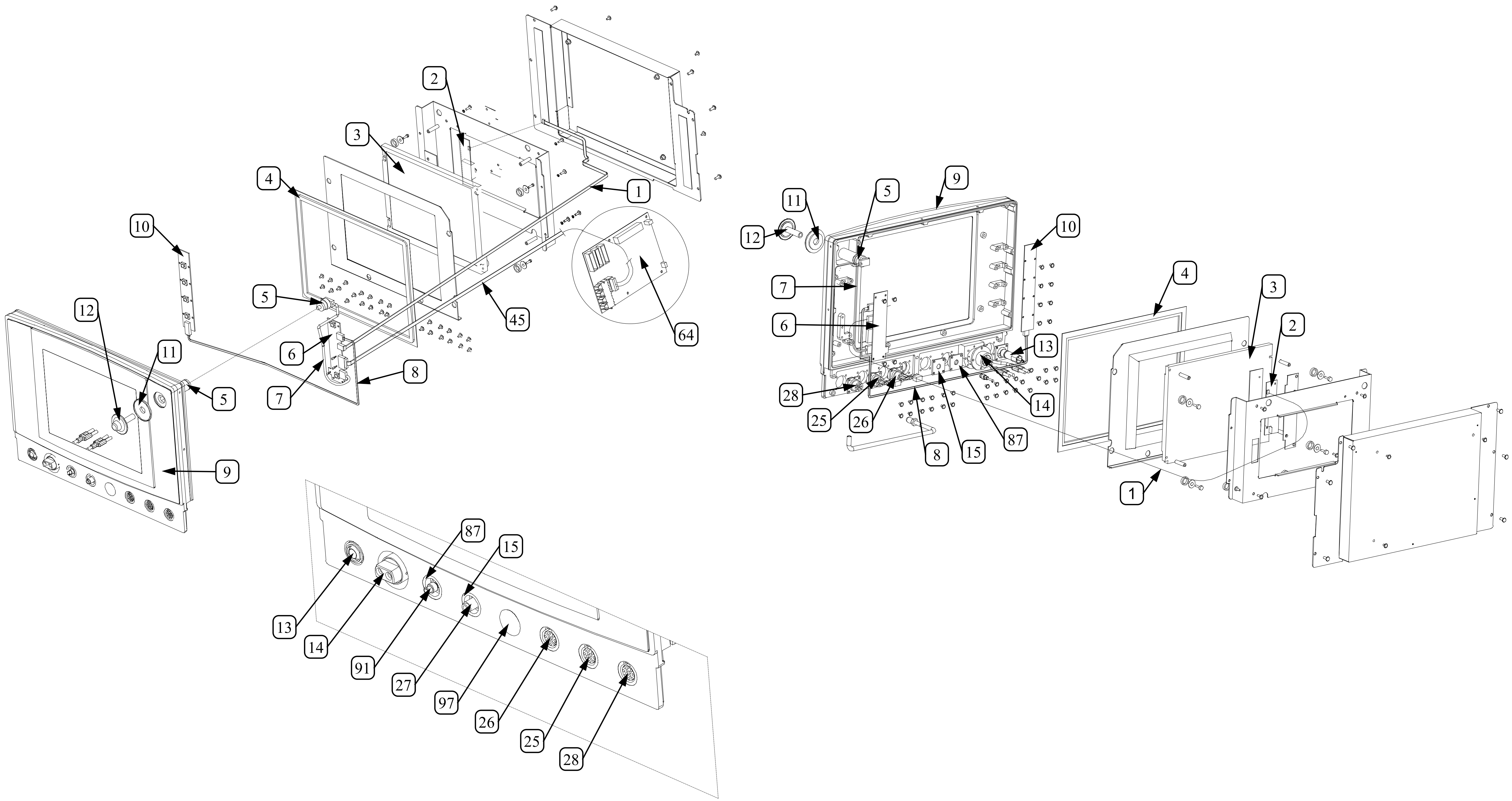
Diagram : **W4S141655 - ECL0**
Assembly : **W1411752**
Designation : **PCB DOWNLOADING MODULE**
Reference : **W4P141655**

Reference	Part Number	Designation
C1	51518	COND CMS 1812 1U 50V 20% Y4T
C2	51518	COND CMS 1812 1U 50V 20% Y4T
C3	51518	COND CMS 1812 1U 50V 20% Y4T
C4	51518	COND CMS 1812 1U 50V 20% Y4T
C5	19190	COND CMS TANTAL 4.7U 35V 20%
C6	8493	COND CMS 1206 100N 50V 20% X7R
J1	59995	ACCBL PICOT FOURCHE D1.1MM
J2	59995	ACCBL PICOT FOURCHE D1.1MM
J3	59995	ACCBL PICOT FOURCHE D1.1MM
J5	56593	CN M EMBASE PCB TYPE D D2.10
P1655	W1404547	CI MODULE TELECHARGEMENT
R1	20739	RES CMS 1.5K 1% 0.25W 1206
R2	20739	RES CMS 1.5K 1% 0.25W 1206
R3	21327	RES CMS 22.1K 1% 0.25W 1206
R4	21352	RES CMS 0 1% 0.25W 1206
U1	51806	OPTO FIBRE EMETTEUR 1523
U2	72202	OPTO FIBRE RECEPTEUR 2521
U3	22658	IC 232/DRV SP232CT SOL16

5. PARTS LIST

5.2. Isometrics drawings and part list

5.2.1. Isometrics drawings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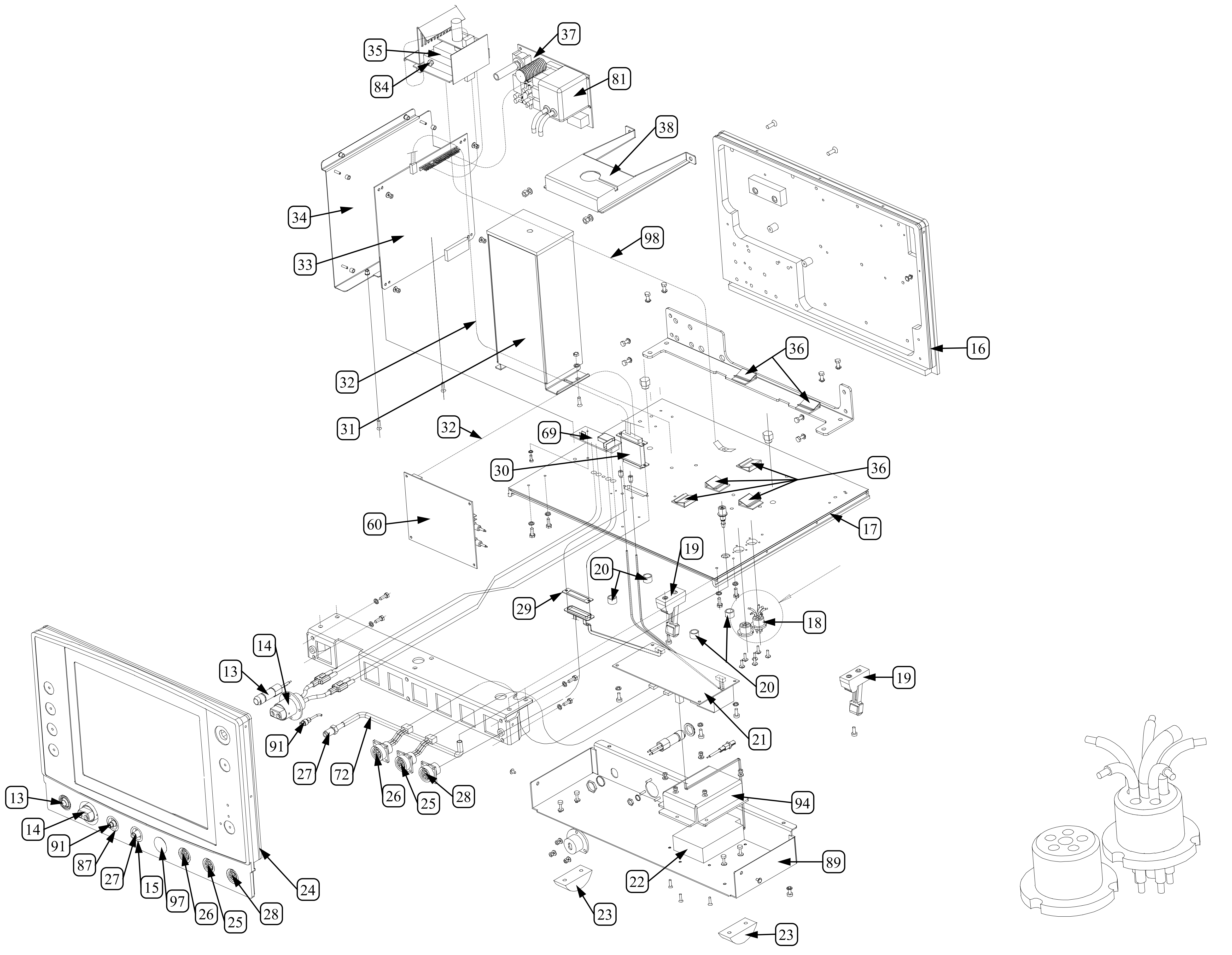
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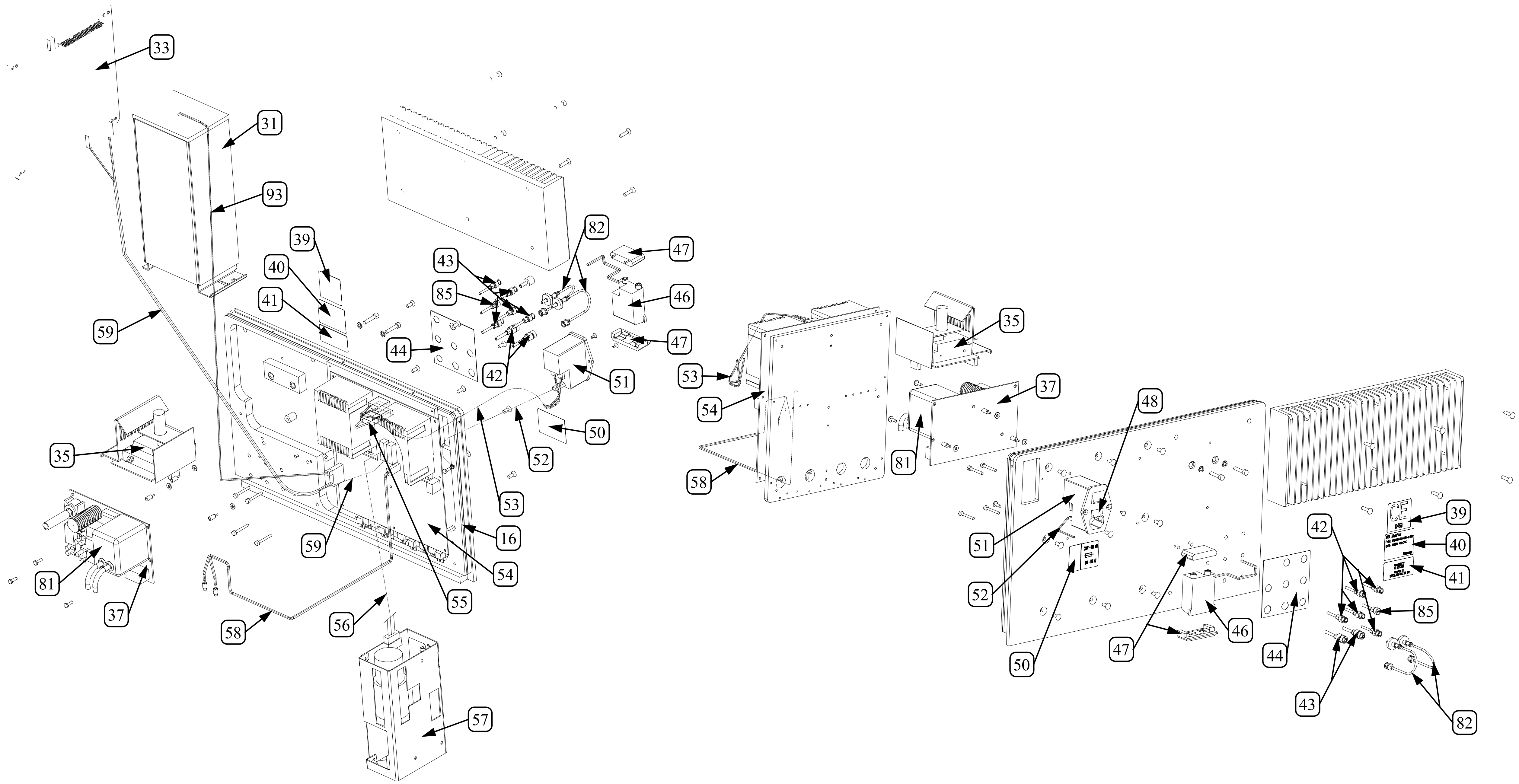
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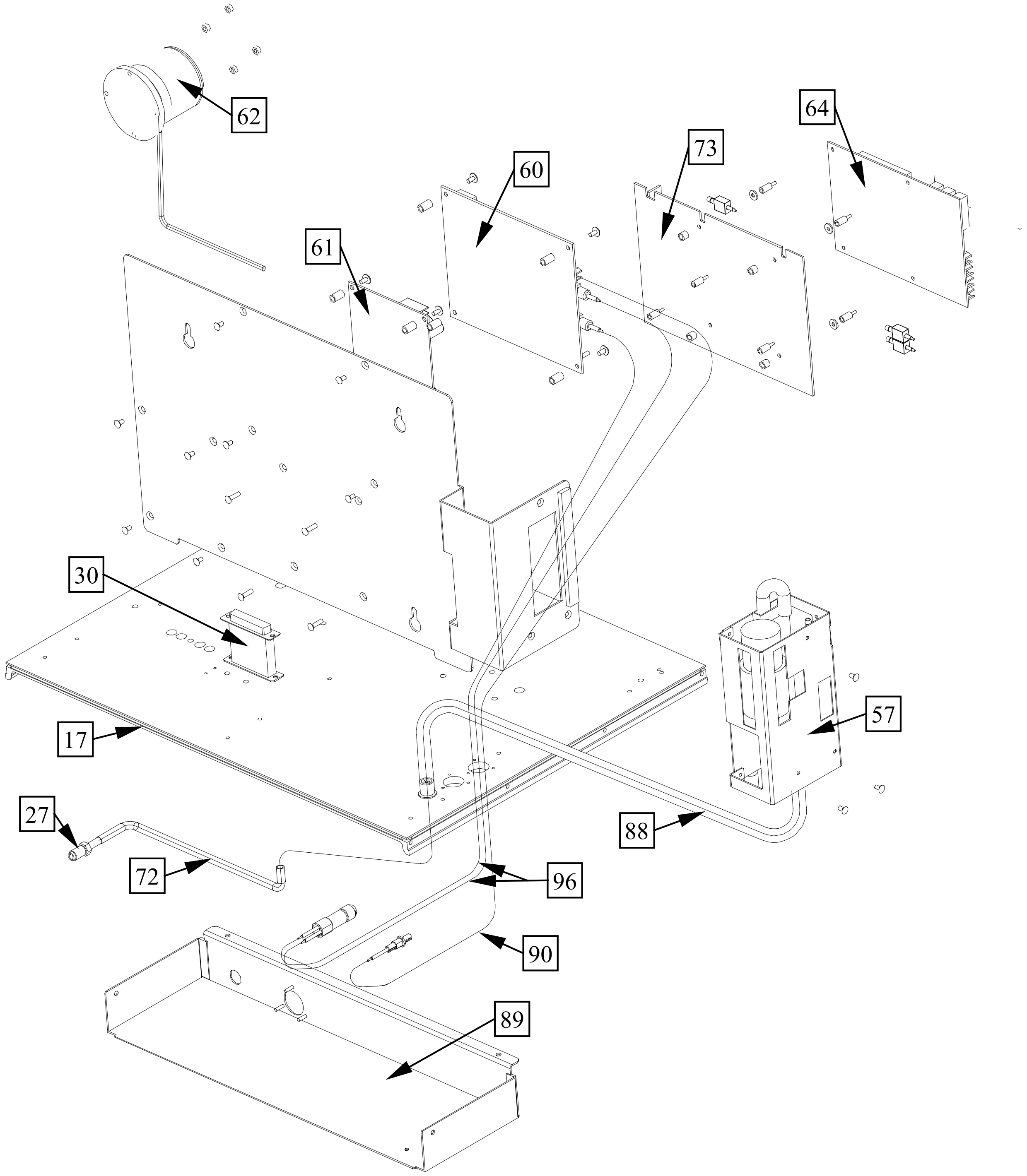
5. PARTS LIST



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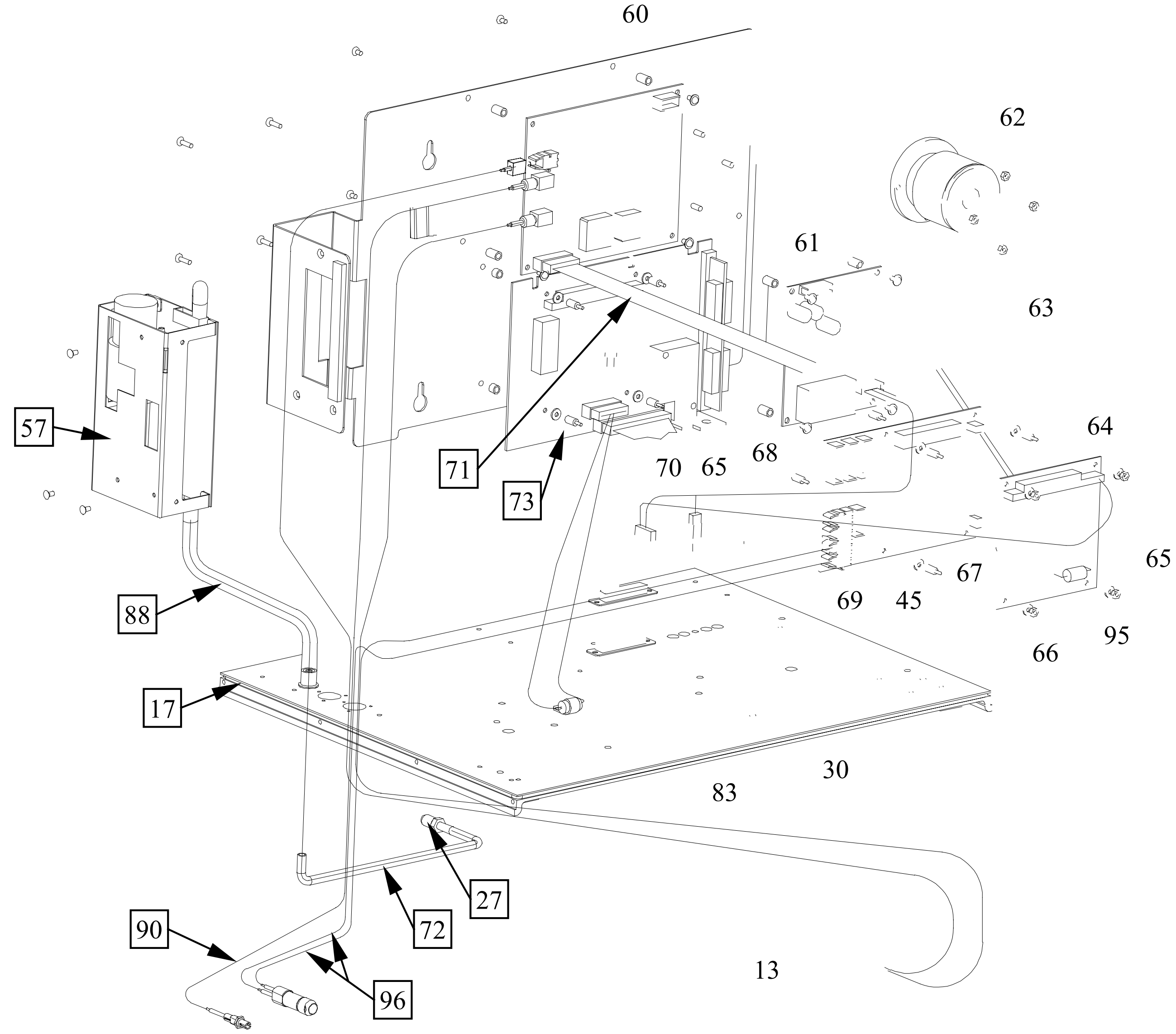

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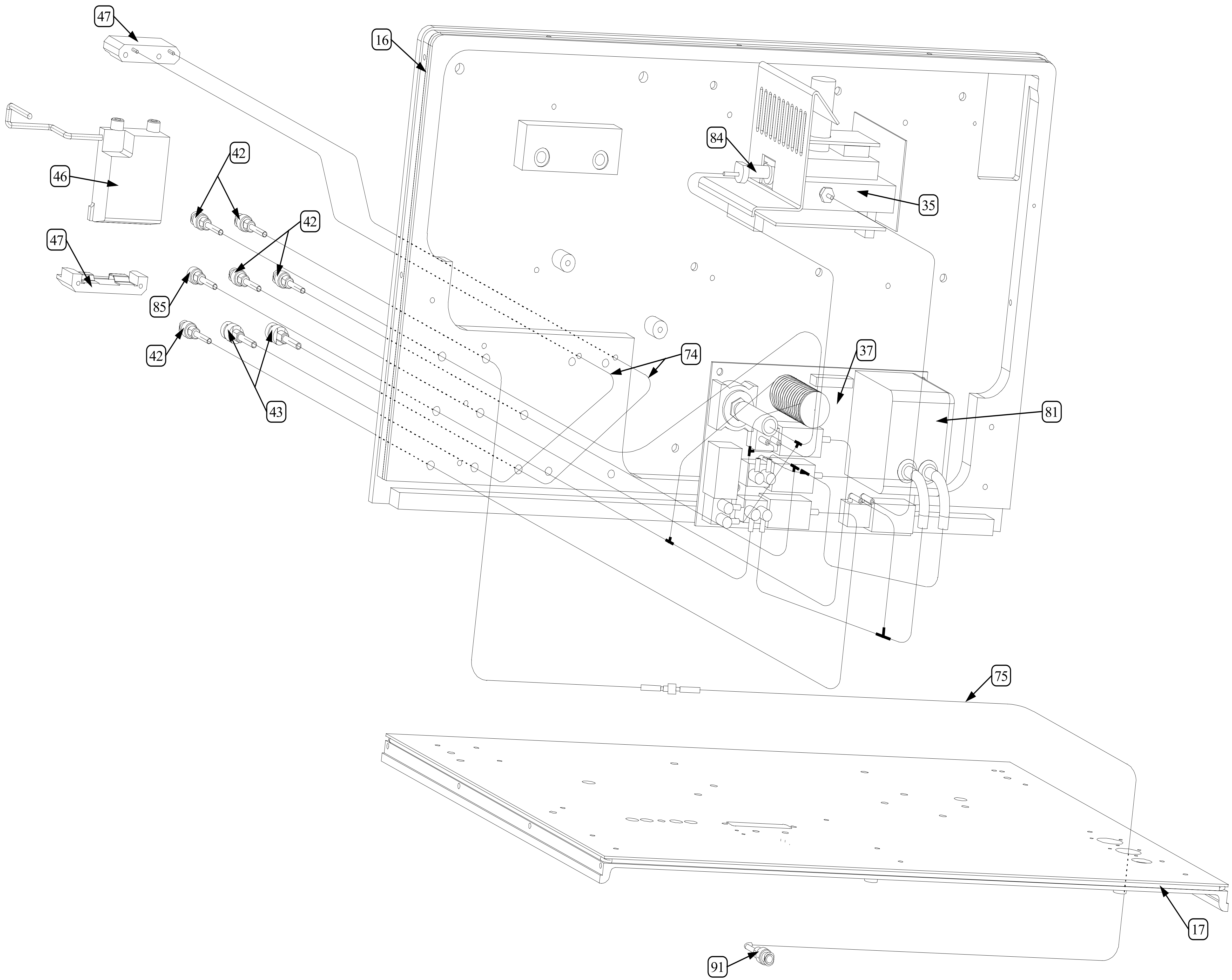
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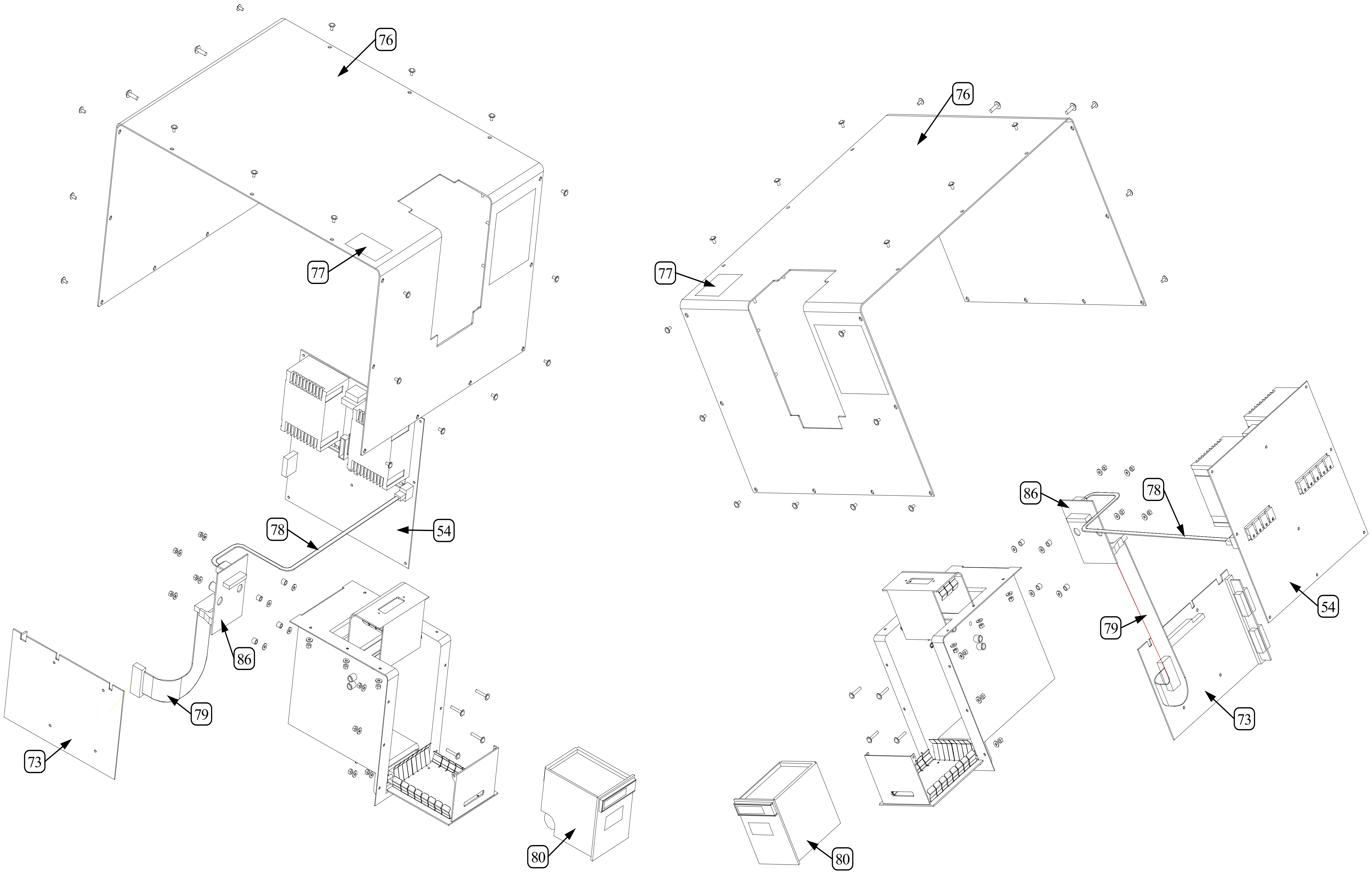
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5.2.2. Part list

Figure N°	Description	Part Number
1	Cable, Back Lighting	W1404529
2	Inverter, Display, Color, LCD	W14S0261
3	LCD, 640 x 480, Color, 10,4"	W14S0262
4	Schield, Display	W1403579
5	Switch, Rotary, Control	W14S0265
6	PCB, Right Keyboard	W14S0222
7	Cable, PCB Selector - PCB Keyboard (J3)	W1404517
8	Cable, Keyboards connection (J1 to J5)	W1404518
9	Assembly, Front Plate (35 mm)	W14S0219
10	PCB, Left Keyboard (35 mm)	W14S0223
11	Spacer, Control Knob	W1404350
12	Knob, Control w/ Schaft	W1404387
13	Connector, ECG Plug	W1404551
14	SpO2 connector (FP to SpO2 Interface PCB)	W14S0240
15	Plate, NIBP Input	W1404357
16	Gasket, RF, Rear Plate	W14S0243
17	Gasket, RF, Bottom Plate	W14S0242
18	Wave Guide, Optical Fibers	W1404286
19	Foot, Rear	72729
20	Spacer, IBP	W1403759
21	PCB, IBP Preamp	W7411743
22	Battery, IBP	W14S0263
23	Foot, Front	W1403761
24	Gasket, RF, Front Plate	W14S0241
25	Cable, IBP cable 2	W1404535
26	Cable, IBP cable 1	W1404519
27	Input, NIBP, w/ Nut	72762

28	Cable, Filter - IBP Acquisition (J7) - FiO2	W1404465
29	Gasket, Connector, sub-D	51617
30	Filter Connector	W1404464
31	Battery Assembly, Lead Sealed	W14S0236
32	Cable, Filter - Capno CPU	W1404521
33	PCB, Capno CPU	W14S0284
34	Bracket, Capno	W1404458
35	PCB, Bench w/o Agents + EPROM	W14S228
36	PCB, Bench w/ Agents + EPROM	W14S0227
37	PCB, Pneumatic	W14S0229
38	Clamp, Battery	W1404741
39	Label, CE	W14E0372
40	Label, Serial Number	W14E0417
41	Label, ETL	W1404589
42	Fitting, Pneumatic, Female Luer	72768
43	Fitting, Pneumatic, Male Luer	72767
44	Label, Pneumatic, w/ CO2	W14E0402
45	Label, Pneumatic, w/o CO2 (No graphics)	W14E0406
46	Trap, Water	W1402342
47	Holder, Water Trap, w/ Screws &Clips	W1402576
48	Fuse, 1.25 A (115V)	2252
49	Fuse, 630 mA (230V), AC Mains	2249
50	Label, Fuse Rating	W14E0426
51	Module, Input Power	72599
52	Cable, Grounding	W1404527
53	Cable, Power Supply (J1) - AC Mains Plug	W1404446
54	PCB, Power Supply	W7411737
55	Cable, Adapter, 230V AC to 115V AC	W1404447
56	Cable, Adapter, 115V AC to 230V AC	W1404448

57	NIBP Module	W14S0198
58	Cable, Filter IBP (J6) - Power Supply (J9)	W1404468
59	Cable, Capno CPU (P13) - Interface (J1)	W1404522
60	PCB, ECG Acquisition	W7411702
61	PCB, CPU SpO2	W14S0205
62	Assy, Loud Speaker, 8 Ohms, 0.2 W	W14S0235
63	Cable, SpO2 CPU (H1) - Interface (J1, J2)	W1404524
64	PCB, Interface & Alarms	W7412096
65	Cable, SpO2 CPU - SpO2 Interface	W1404528
67	Cable, Power Supply Interface PCB 1/2	W1404525
68	Cable, Power Supply Interface PCB 2/2	W1404526
69	MAGLIFE SpO2 module	3-47-0003
70	Cable, LCD Screen - CPU	W14S0224
71	Cable, Alarm - Sensor Control	W1404533
72	Hose, NIBP, w/ Female Luer (outside Faraday cage)	W14S0281
73	PCB, CPU, SBC 456 LCD	W1405408
74	Tubing, Capno Nafion	W14S0272
75	Tubing, CO2, w/ Plastic Male Luer	W1404403
76	Cover, Top, Painted	W1404388
77	Cover, Top, Recorder Option	W1404441
78	Cable, Recorder to Power Supply (J2)	W1404730
79	Cable, Recorder to CPU	W1404773
80	Recorder Module (with Labels)	W14S0279
81	Pump, Capno	W14S0276
82	Filter, Patient, 16 mm w/ Input Tube (2 per pack)	W1404416
83	Battery, CPU board	W14S0277
84	Sample Cell	W1402577
85	Luer Fitting, Gas Exhaust	W1404543
86	PCB, Parallel Recorder Adapter	W1411749

87	Plate, CO2 Fitting (Assy)	W14S0283
88	Hose, NIBP, Inside Faraday Cage	W1404402
89	Cover, Bottom	W1404624
90	Fiber, Optic, Gating Module	W14S0280
91	Plug, CO2	W1404110
92	Plug, FiO2	W1404465
93	Cable, Battery	W1404516
94	Casing, IBP Battery	W1404432
95	Battery, CPU/Mem Extension	72620
96	Fiber, Optic, Remote Display Controller	W1404552
97	Plug, Stop-Gap plastic	39554
98	Cable, Capno grounding	W1404783

CHAPITRE 6

VERIFICATIONS, TESTS AND CALIBRATIONS

6. VERIFICATIONS, TESTS AND CALIBRATIONS

6.1. Introduction

The following procedures are provided to verify the proper operation of the MAGLIFE C PLUS. Service diagnostics provide the capabilities of diagnosing problems in the MAGLIFE C PLUS hardware in the field.

6.2. Warnings and guidelines

Observe these following warnings and general guidelines:

- Perform all testing and calibration procedures outside the MR Imaging room.
- Do not short component leads together.
- Perform all steps in the exact order given.
- Use extreme care when reaching inside the opened instrument. Do not contact exposed metal parts which may become live.
- Read through each step in the procedure so it is understood prior to beginning the step.
- When disassembling the unit disconnect the AC Mains line cord and disconnect the main internal battery

6.3. Test equipment and special tools required

Description	**Specification**
Standard mercury column	0 - 300mmHg
Dummy cuff/test chamber	
Digital voltmeter (DVM)	
Oscilloscope	
Metric ruler	
Patient simulater	

6.4. Initial set-up

1. Connect the device to the mains supply using a suitable power cord plugged into socket on rear panel. Switch the mains switch at the back of the device to « 1 » : indicator « ~ » will light to show that the power is on.

> **Remarque** : the lamp will go on as well. The battery is charged automatically when the device is under power.

2. Turn on the MAGLIFE C PLUS. with ON/OFF key. After approximatively 15 seconds, a single beep will sound. After approximatively 40 seconds, the screen will be turned on and curves and parameters are displayed.

3. During the power-up sequence, some functions are tested automatically by the program. In the event of any problem, a technical alarm is displayed on the screen. If there is any communication problem between the monitor CPU and the various electronic modules, a technical alarm message ("Time out") is displayed in the window of the affected parameter.
   There is no error message displayed before the program of the MAGLIFE C PLUS is complitely charged. If the screen of MAGLIFE C PLUS does not go on after 40 seconds, there is a problem and the device must be to repair.

6.5. Initial set-up

1. Using a patient simulator, connect the ECG amplifier to the front panel. Set the ECG simulator for 60bpm, 1mv, QRS signal.
2. Setup the MAGLIFE C PLUS as follows:
   - Adult mode (NIBP option)
   - Lead II
   - ECG size to 1.0cm/mv.
   - Speed to 25mm/sec (Recorder option)
   - QRS Beep ON (Config. Option)
   - Set print to ECG Signal (Recorder option)

6.6. ECG verification

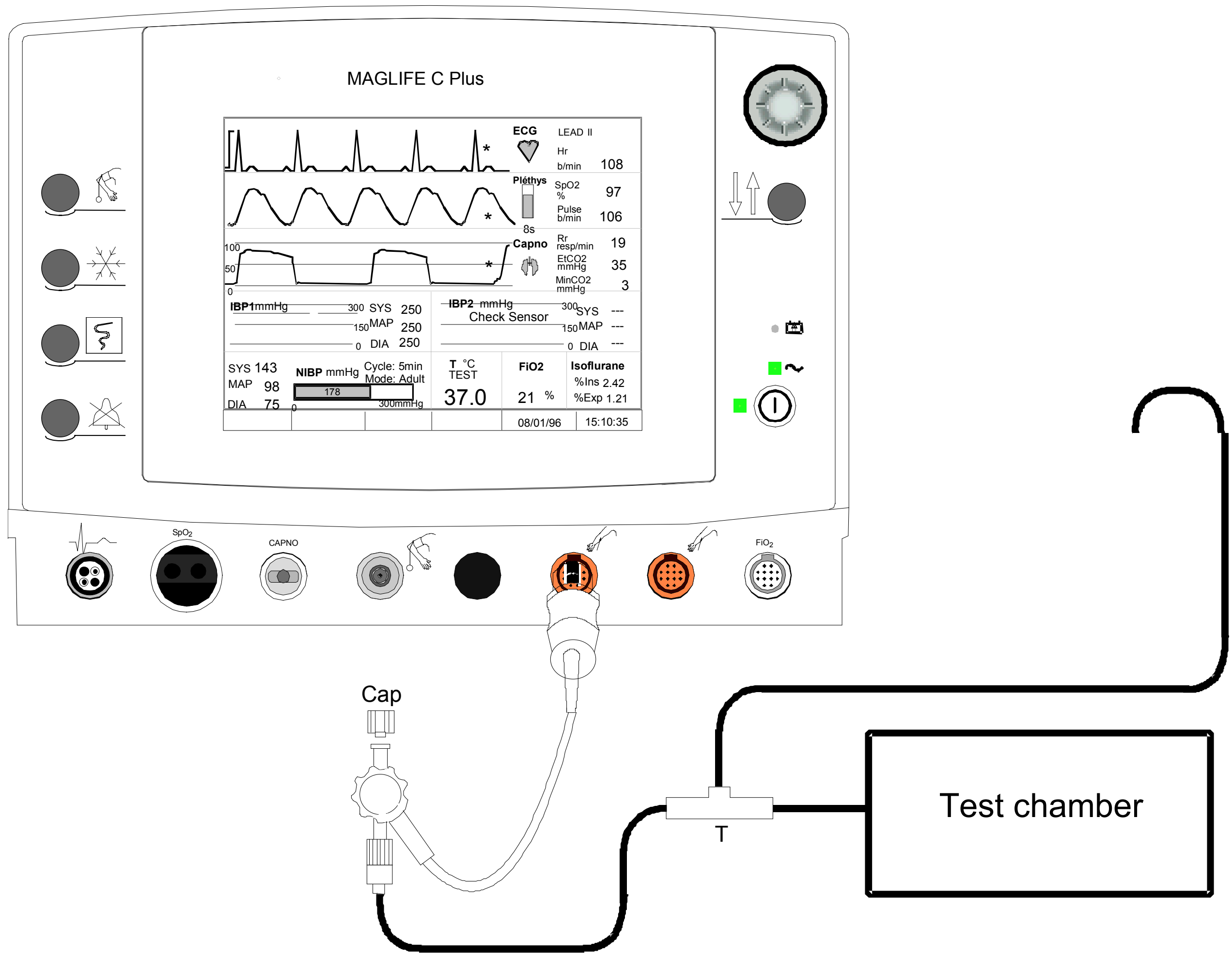
1. Observe that the ECG trace sweeps across the top display window and a HR of 60 bpm +/- 5bpm is displayed on the right side of the display. Verify that the QRS beep tone sounds and the heart icon flashes with each QRS signal. Change HR Setting on the MedSim to 250 and verify the ECG now reads 250 +/-5 bpm. Decrease the RATE to 30 bpm and allow signal to stabilize (May take 30seconds to display rate). Verify RATE display is 30 bpm +/- 5 bpm.
2. Disconnect one ECG lead at a time (RA, LL, and LA) from the simulator and observe that the ECG signal changes to a flat line and the message "Check Sensor» appears in the ECG display window.
3. Set ECG simulator to SHORT LEADS. Verify noise does not exceed two pixel resolution.
4. Press the FREEZE key **(9)** and verify that the signal displayed on the display stops scrolling.
5. Set simulator to 1mv ECG QRS signal, rate to 60 bpm.
   Set the MAGLIFE C PLUS to PRINT ON ALARM, install paper in recorder and set LO HR ALARM to 50 bpm and HI HR ALARM to 120 bpm.
   Increase ECG HR to 125 bpm and verify the following:
   The HI ALARM violates with audio tone and the HR numeric flashes.
   The recorder (if installed) prints a strip showing the ECG information.
   Measure the GRID width and verify overall width of 40 mm +/-2 mm.
   Measure the GRID length and verify overall length of 400 mm +/- 20 mm.
   Mute the alarm by pressing the MUTE key. Verify that the "ALARM MUTE" symbol is displayed next to HR display and the alarm is silent.
   Decrease the ECG HR to 45 bpm. The LO HR ALARM should sound.

6.7. IBP1 and IBP2 verification

1. Set the MAGLIFE C PLUS to display IBP 1 and IBP 2. Set the pressure scale to 300 mmHg for both IBP 1 and 2.
2. Connect an IBP transducer to IBP1 on the front panel.
3. Cap one side of the transducer dome and connect the other side to a Standard Mercury Column tee'ed off to the test chamber as shown in figure below.
4. Open the transducer to air.
5. Zero IBP 1 and verify that the systolic, diastolic, and mean display changes from "dashed lines" to zero +/- 2mmHg within 2 seconds and the "ZERO TRANSDUCER" message is removed.
6. Using the Mercury Colume's bulb, apply 50, 150 and 250mmHg and verify that the following parameters SYS/MEAN/DIA agree.

APPLIED PRESSURE	READOUT	
50 mmHg	49 - 51	(ideal ± precision of the mercury column)
150 mmHg	148 - 152	(ideal ± precision of the mercury column)
250 mmHg	247 - 253	(ideal ± precision of the mercury column)

7. Repeat steps 2 –6 for IBP2.



6.8. Temperature verification (option)

1. Set a simulator to 37° C
2. Verify that the temperature displays is 37.0 ° +/-0.3.

NOTE: If temperature exceeds 43°C or is below 25°C, the display goes to "dashed lines".

6.9. SpO2 verification

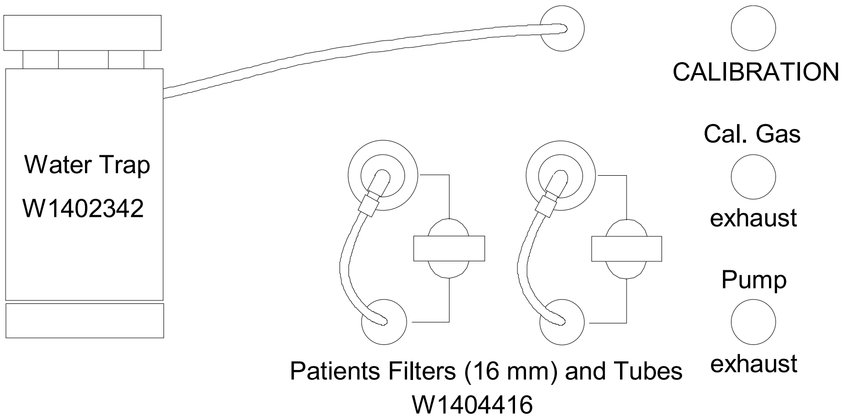
1. Set the MAGLIFE C PLUS to display the PLETH waveform. Set Spo2 pulse beep ON (Lo, Med, Hi).
2. Verify the MAGLIFE C PLUS is displaying the message "Check Sensor".
3. Connect the SpO2 sensor to the front panel connector.
4. Apply the SPO2 sensor to your finger and verify the message changes to «searching for pulse", then after the wave form settles (approx. 10 sec.) the SPO2 value for SPO2% and Pulse B/min should be displayed. Verify an SPO2 Waveform is present. And a beep tone sounds with each pulse.

6.10. NIBP verification

1. Connect the NIBP hose with adult cuff to the front panel fitting and set PATIENT SIZE to ADULT.
2. Apply cuff and press the NIBP key **(8)**.
   Verify the pump motor starts and the cuff begins to inflate.
   Verify that the MEASURING CUFF window begins to indicate a pressure increase as the cuff begins to inflate.
   Verify the pump stops when the MEASURING CUFF window reads 180mmHg +/- 10mmHg. (When initial cuff pressure is set to 180mmHg).
   The cuff should begin to deflate and in about 20 seconds should display SYS/DIA/MEAN reading in the NIBP window.

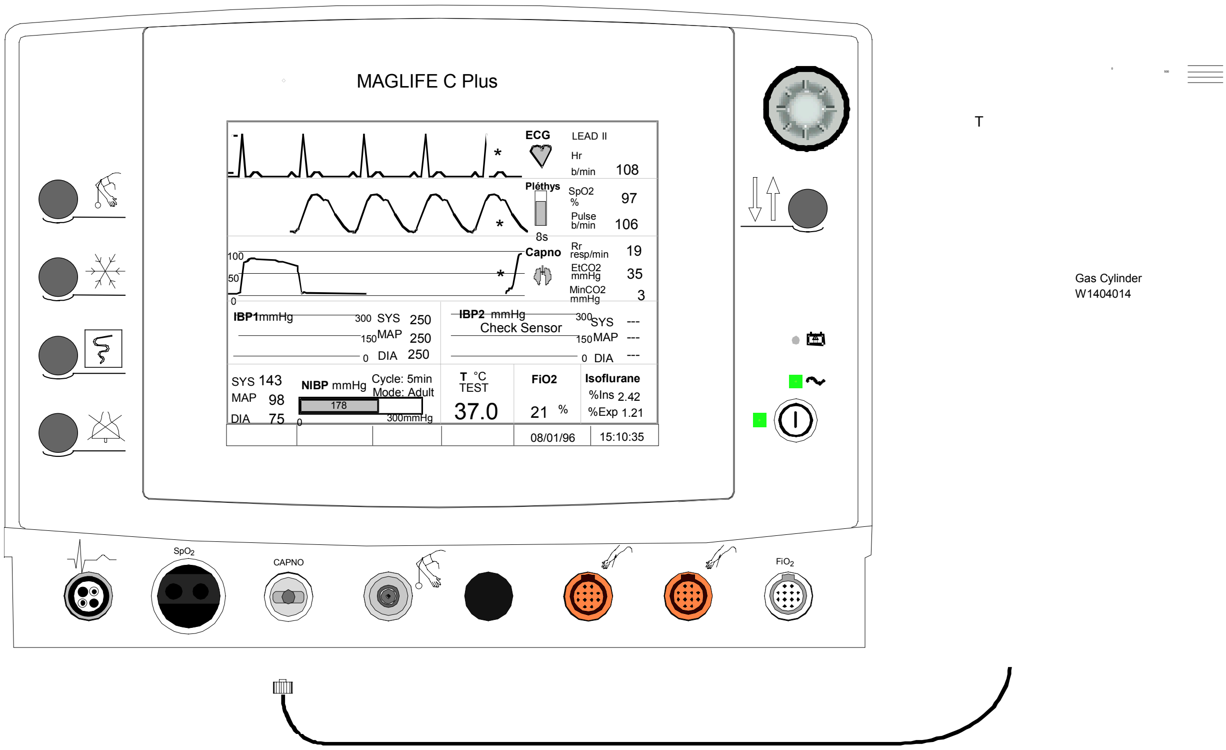
6.11. Capno/Agents verification

1. Install the filter with tubing and water trap on the rear of the unit as shown in figure below.



Warning : use only the SCHILLER gas cylinder (W1404014).

2. Plug the front panel CO2 input. Verify that in approximately 10 seconds CO2 occlusion message appears in the CO2 waveform window. If the message does not appear, check for proper connections on the rear panel.
3. Connect the test Gas **(with «T» Fitting**) to the CO2 port on the front panel of the MAGLIFE C PLUS. Set Anes Agent to Isoflurane. Set Breath Beep «On».
4. Turn on the gas and verify the N2O reads 50% +/- 5%.
5. Turn on and off the gas at approximately 4 second intervals for 20 to 30 seconds and verify that:
   a) A Respiration waveform appears in measurement window and a beep sound with each breath. (If breath beep is ON)
   b) mmHg +/-3 appears in ETCO2.
   c) % +/- 0.2 % appears in the Exp. Isoflurane window.
6. Turn off the gas.
7. If out of calibration, perform Cal CO2/Agents.



6.12. FiO2 verification

1. Connect the FiO_2 sensor and cable to the MAGLIFE C PLUS front panel.
2. Keep the sensor away from any sources of gases including the patient's breath, your own exhaled breath, and ventilator exhaust valves.
3. Verify the FiO_2 Reading is 21% +/- 2%. If out of calibration, perform Cal FiO_2 .

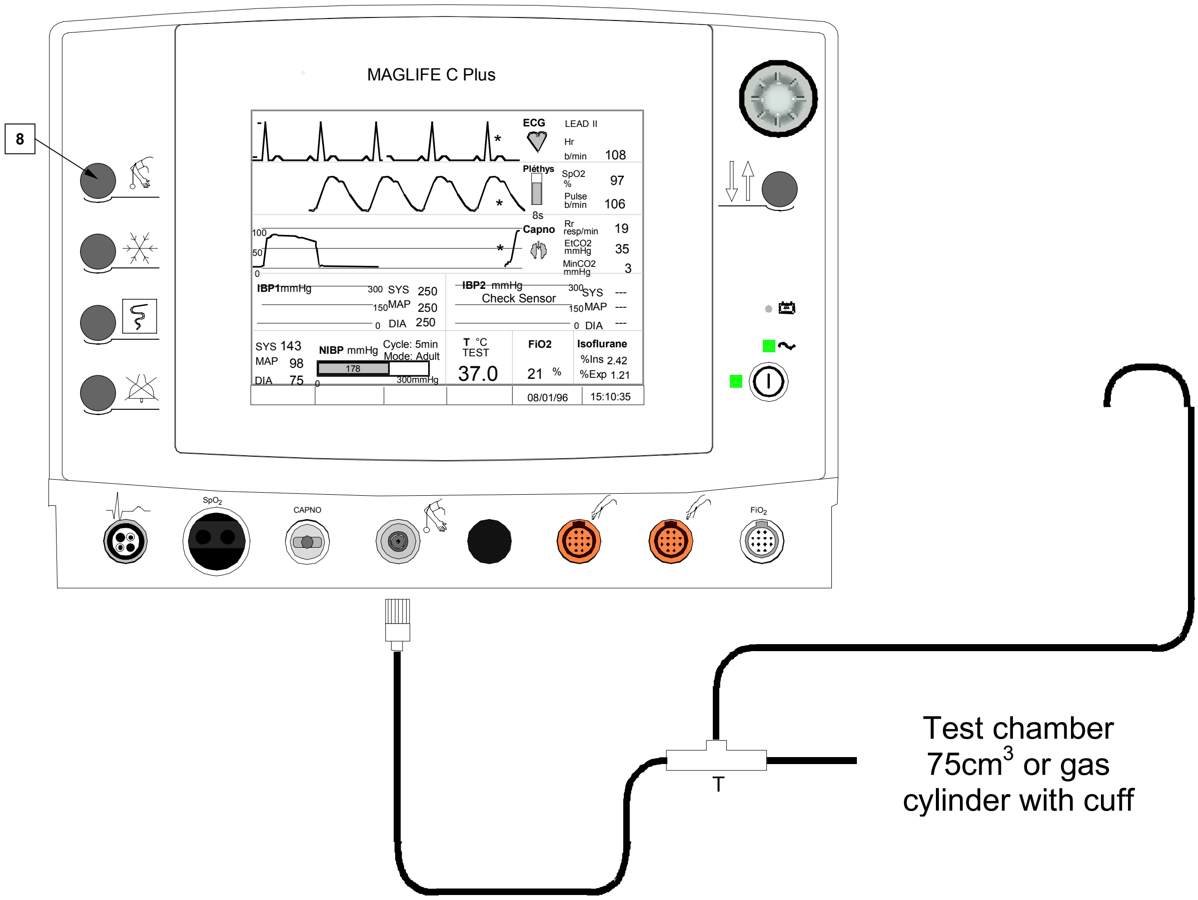
6.13. Battery test verification

1. Turn off the MAGLIFE C PLUS with the "On/Off" switch on the rear of the monitor.
2. There should be no change to the display. The unit should continue to run.
3. The front panel "AC power" LED and the "battery charge" LED should not be illuminated

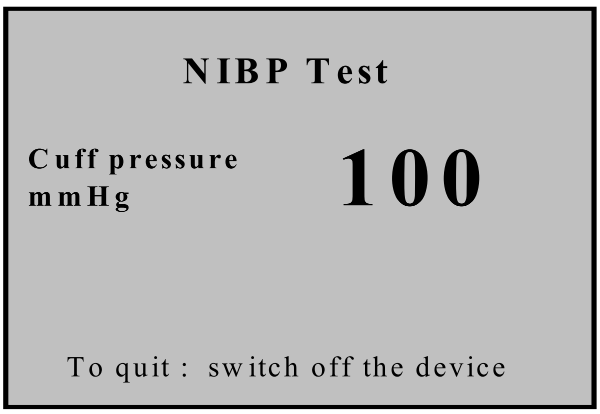
6. VERIFICATIONS, TESTS AND CALIBRATIONS

6.14. NIBP calibration

1. Connect the test chamber and manometer as shown in figure below (If a test chamber is not available, an adult cuff wrapped around a towel may be substituted to perform the pressure calibration.)



2. Set the NIBP Patient size to ADULT.
   Turn the power OFF (**MAGLIFE C PLUS.** must be connected to the mains (mains cord connected to mains socket and mains switch on "1"), but must not operate (lamp ON/OFF off).
   Press and hold the NIBP key **(8)** and turn the unit ON. Hold the NIBP key until the NIBP test screen displays then release the NIBP key.



3. The test chamber (cuff) will inflate to approx. 100mmHg. During the test the pressure will be displayed in the NIBP TEST window.
4. Compare the pressure window display with the reading on the manometer. If the reading does not match adjust VR4 in the NIBP module. The Calibration tolerance is +/- 3 mmHg.
5. Using the Mercury Column's bulb, apply 250mmHg and Repeat step 4.

6.15. "Probe treatment" board calibration

The measurement reference is always the ground (TP1).

Adjustment	Measuring instrument	Point of measure ment	Potentio meter	Target value and tolerances	Remarks
ECG signal offset	Oscilloscope	TP4	P1	0,00 V ± 0,02 V	Connect a 3-lead cable at the input with inputs short-cicuited
ECG signal gain	Oscilloscope	TP9	P2	1,00 V ± 0,05 V	Connect a 1 mV 10 Hz (peak to peak) sinusoidal signal between L and R,N of the 3 lead cable
QRS detection threshold	Oscilloscope	TP11	P3	192 ms ± 6 ms	Inject a triangular signal of 0,5 mV and 120 B/min at the input
Supply voltage +V of analog part	Multimeter	TP3	P4	+ 5,90 V ± 0,01 V	Connect the ground of multimeter on TP1
Supply voltage -V of analog part	Multimeter	TP5	P5	- 5,60 V ± 0,01 V	Connect the ground of multimeter on TP1
Supply voltage VH of Hall effect probes	Multimeter	TP18	P6	+ 5,00 V ± 0,01 V	Connect the ground of multimeter on TP1

6.16. "PC Interface " board calibration

Adjustment	Measuring instrument	Point of measure ment	Potentiom eter	Target value and tolerances	Remarks
Audio signal amplitude			P5 = MAX		
Clock	Oscilloscope	TP6			109.24 ±0.1% Hz

6.17. "IBP 1/2 acquisition" board calibration

1. Set the MAGLIFE C PLUS to display IBP1 and IBP2.
2. Connect the simulator to IBP1 connector on front panel.
3. Set the simulator to 0 mmHg.
4. Connect a DVM to J7-6, gnd to J7-9 or 10 and adjust P202 for 0.0V +/- 5 mV.
5. Set the simulator to 400 mmHg.
6. Connect DVM to J7-6, gnd to J7-9 or 10 and adjust P201 for 1.95V +/- 14 mV.
7. Repeat steps 2-5 for IBP2 :
   Connect a DVM to J7-5, gnd to J7-9 or 10.
   Offset IBP2 is P102.
   Gain IBP2 is P101.

6.18. " Capno module " calibration

Note : - Calibration must be performed at least once ecery 6 months
- Calibration requires the use of calibration gas cylinder (W1404014) fitted with an aspiration tube and a pressure release value
- Calibration can be started from two different menus selections:
  Menu, Parameter, CO2/N2O, Cal CO2/Agent or
  Menu, Parameter, Anes Agents, Cal CO2/Agents.

1. The unit should be ON and allowed to warm-up for 15 minutes prior to performing Gas calibration.
2. Setup for calibration as shown in figure below.
3. Select Menu, Parameter, Anes Agents, Cal CO2/Agents. The unit will display the message «Open cylinder».
4. Open the gas cylinder and select «START». The unit will display the message «Calibrating». In approximately 2 minutes the message «Cal OK/Close cylinder» will display. The calibration is complete, close the Gas cylinder. If the message «Cal Err/Cylinder empty» displays, use a new gas cylinder

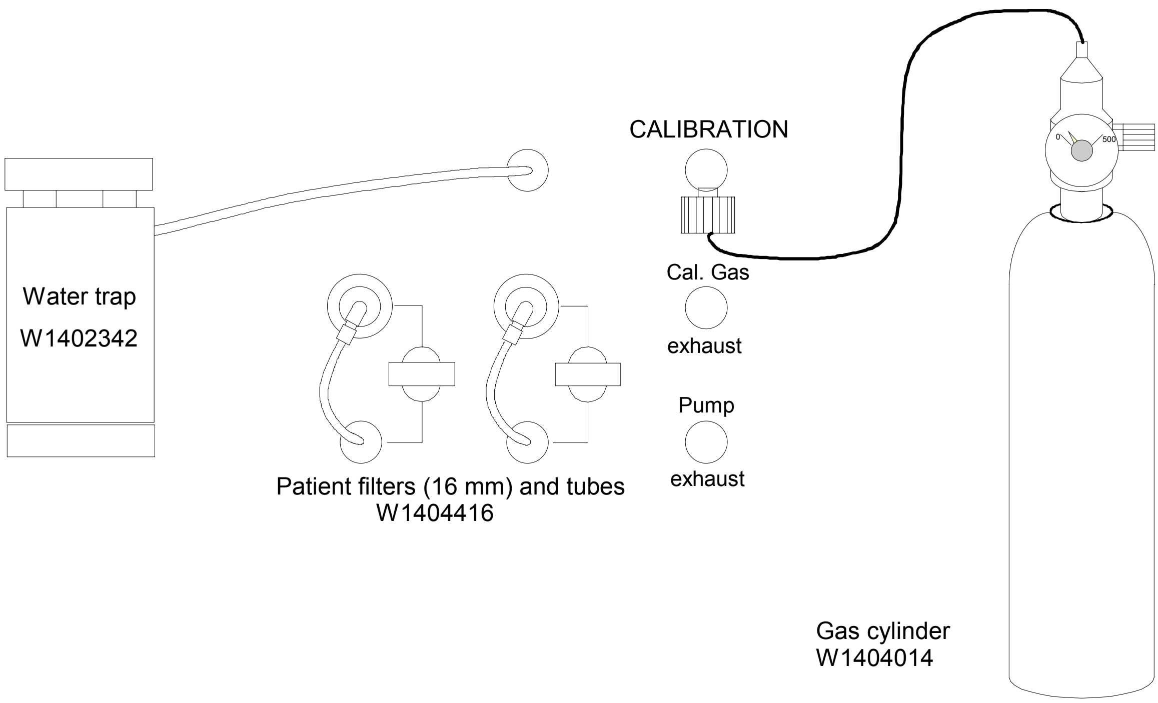
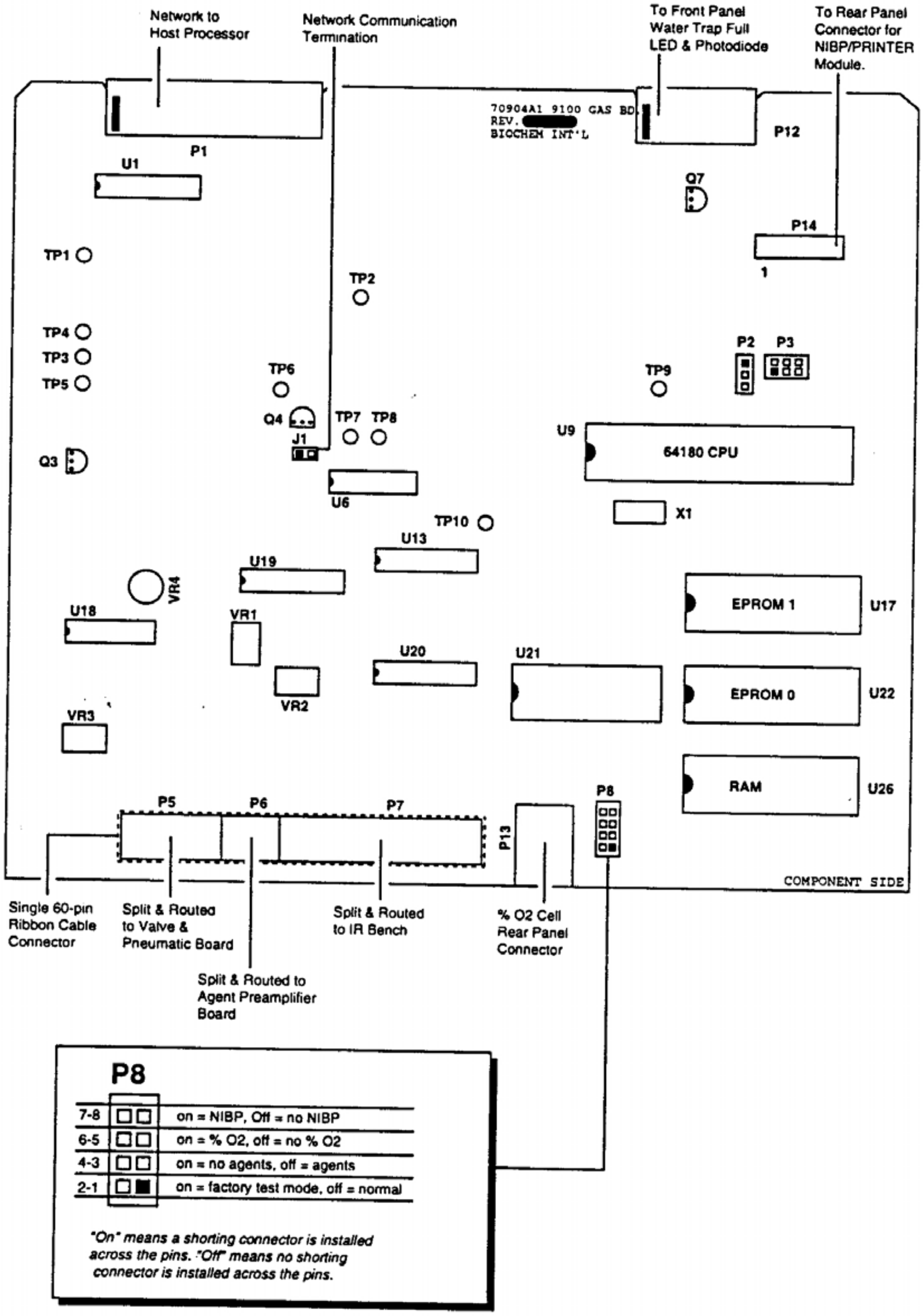


Figure N°5

6.19. "Capno module" : tests and controls

6.19.1.Representation of the "CPU Capno" board

The P.C. board outline shows all connectors, tests points, and components where typical voltages and sample waveforms are mesured.


Network to
Host Processor
Network Communication
Termination
To Front Panel
Water Trap Full
LED & Photodiode
To Rear Panel
Connector for
NIBP/PRINTER
Module.
70904A1 9100 GAS BD
REV.
BIOCHEM INT'L
P1
P12
U1
Q7
P14
1
TP1
TP2
TP4
TP3
TP5
P2
P3
TP6
TP9
Q4
TP7
TP8
J1
U9
64180 CPU
Q3
U6
X1
TP10
U13
U19
VR4
EPROM 1
U17
U18
VR1
U20
U21
EPROM 0
U22
VR2
VR3
RAM
U26
P5
P6
P7
P8
P13
COMPONENT SIDE
Single 60-pin
Ribbon Cable
Connector
Split & Routed
to Valve &
Pneumatic Board
Split & Routed
to IR Bench
% O2 Cell
Rear Panel
Connector
Split & Routed to
Agent Preamplifier
Board
P8
7-8
on = NIBP, Off = no NIBP
6-5
on = % O2, off = no % O2
4-3
on = no agents, off = agents
2-1
on = factory test mode, off = normal
"On" means a shorting connector is installed across the pins. "Off" means no shorting connector is installed across the pins.

6.19.2. Typical voltage measurement

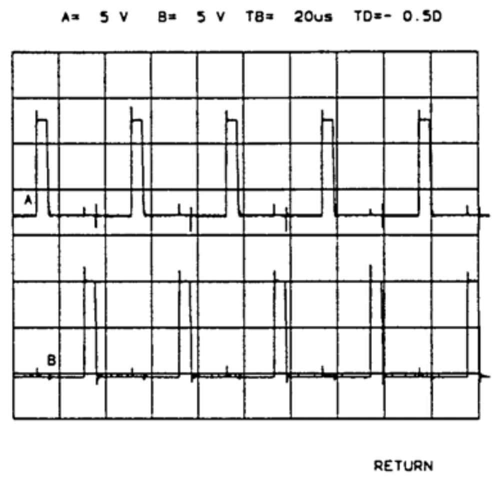
Note : Unless otherwise specified, all voltages are measured on the Gas Board, referenced to Gas Board TP5, and are taken with the EPROM installed.

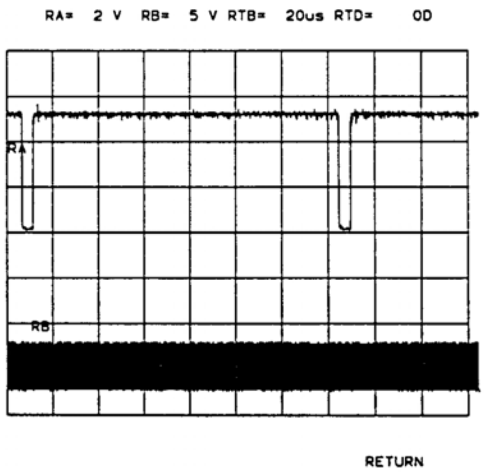
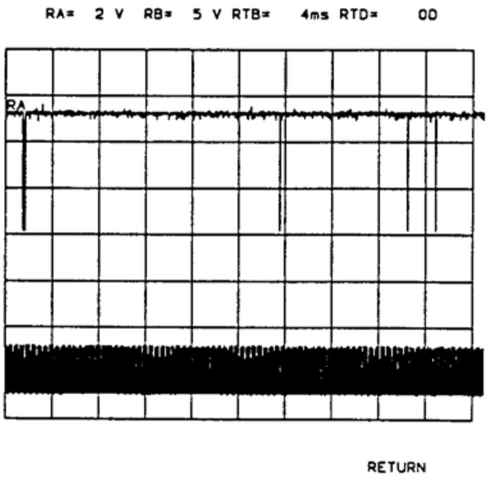
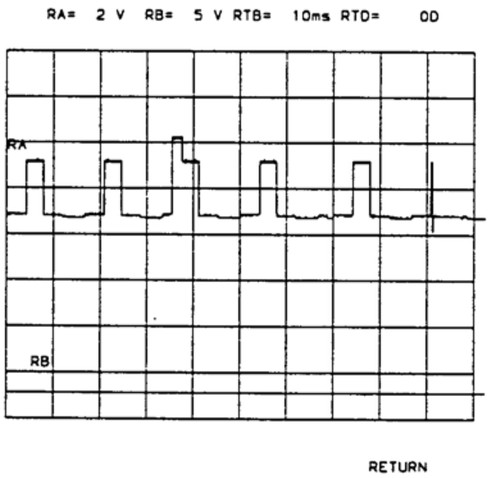
Location	Condition	Nominal and range
TP4	Gas Board ON, CO_2 bench connectors installed. If CO_2 bench connector(s) disconnected, referenced to D1-anode.	+65 VDC, ± 5 VDC
TP6	Gas Board ON, CO_2 bench connectors installed. If CO_2 bench connector(s) removed, referenced to D1-anode.	-65 VDC, ± 5 VDC
TP2	Gas Board ON, CO_2 bench connectors installed. If CO_2 bench connector(s) removed, referenced to C9 (-).	+2.5 VDC, ± 1.0 VDC
TP3	Gas Board ON.	+12.0 VDC, ± 0.60 VDC
TP9	Gas Board ON.	-12.0 VDC, ± 0.60 VDC
TP1	Gas Board ON.	+5.0 VDC, ± 0.20 VDC
TP2	Gas Board ON, CO_2 bench connectors must be installed.	Measured with an oscilloscope : +2.5 VDC, ± 1.0 VDC, ripple voltage not below +1.5 VDC.
U1-4	Gas Board ON.	+1.75 VDC, ± 1.0 VDC
TP3	Gas Board OFF but still connected to network at P1.	0 to 0.2 VDC
TP1	Gas Board OFF but still connected to network at P1.	0 to 0.2 VDC
TP7	Gas Board ON.	+5.0 VDC, ± 0.25 VDC (VRAM)
TP7	Gas Board OFF.	near o VDC (VRAM)
TP8	Gas Board ON.	Logic level high (/RESET)

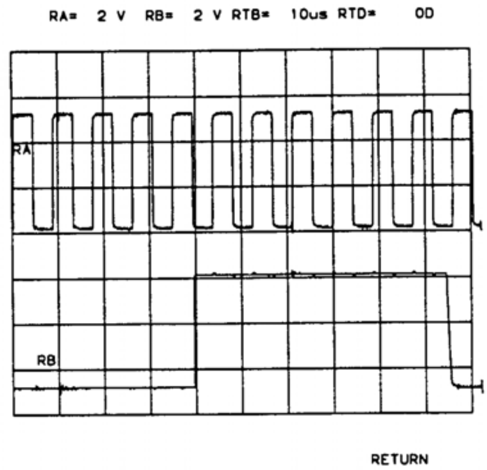
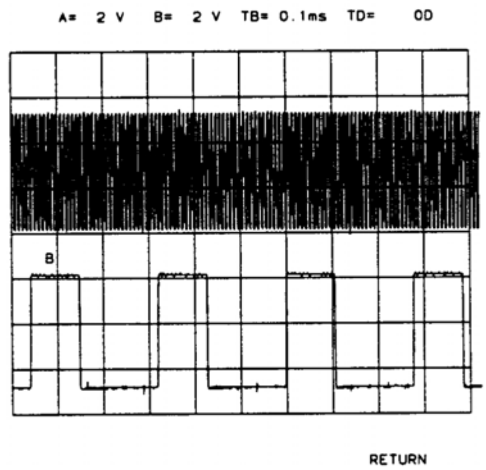
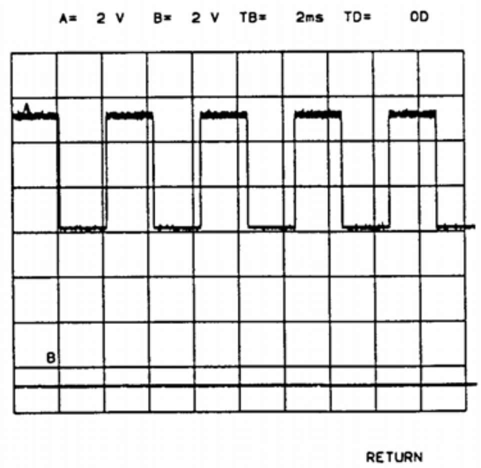
Location	Condition	Nominal and range
U6-8	Gas Board ON.	Logic level low (RESET)
Q4-drain	Gas Board ON.	Logic level low (/RAMCE enabled)
P14-6	Gas Board ON, NIBP unit connected.	+5.0 VDC, ± 0.20 VDC
P14-7 P14-8	Gas Board ON, NIBP unit connected.	+12.0 VDC, ± 0.60 VDC
P14-11	Gas Board ON, NIBP unit connected.	-12.0 VDC, ± 0.60 VDC
P14-12 P14-13 P14-14	Gas Board ON, NIBP unit connected.	+12.0 VDC, ± 0.40 VDC, -0.80 VDC

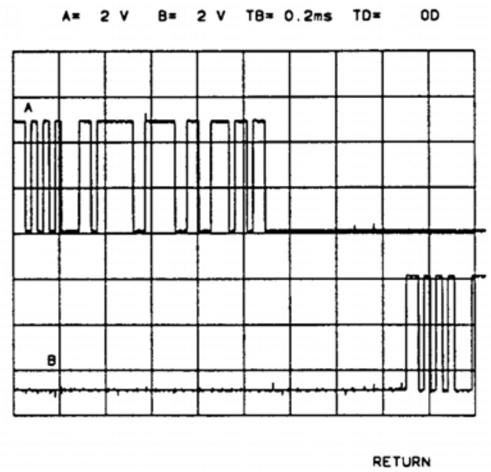
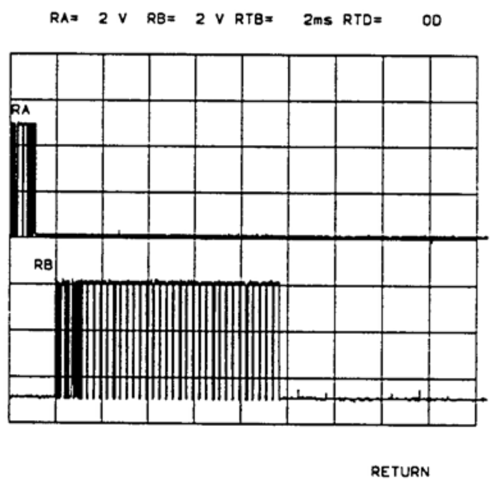
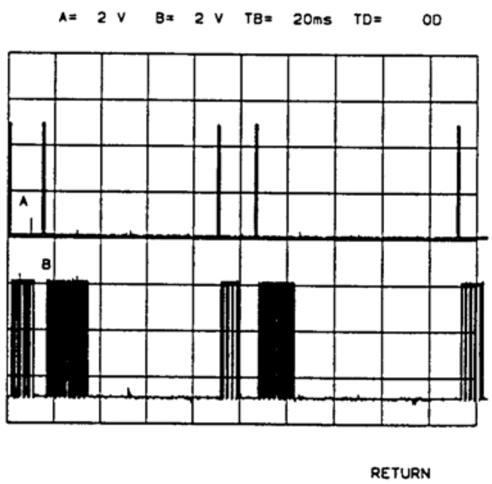
6.19.3. Sample waveform

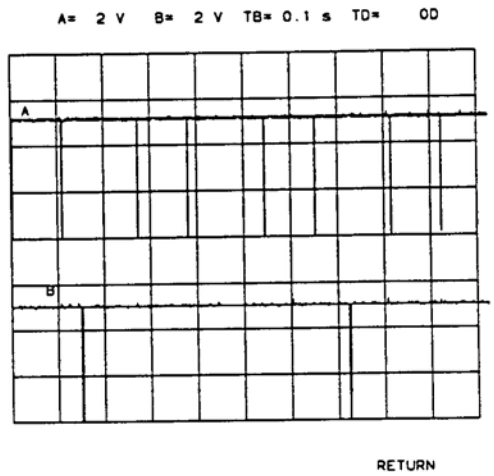
Note : Unless otherwise stated, all measurements are referenced to TP5, are taken with the monitor ON, are taken with the EPROM installed, and are taken with the Gas Board installed in the system.

Location	Signal and condition	Waveform
U9-64	microprocessor PHI signal	50% duty cycle, 6.144 MHz, ± 0.01 MHz
A : U1-10 B : U1-9	Switching power supply chip U1 push-pull outputs.	

Location	Signal and condition	Waveform
A : U21-15 B : U21-8	/ADINT output from the A/D converter and the A/D converter input clock signal.	
A : U21-15 B : U21-8	/ADINT output from the A/D converter and the A/D converter input clock signal. Same as previous waveform but at different timebase setting.	
A : U20-3 B : unused	ADC Mux output	

Location	Signal and condition	Waveform
A : U19-4 B : U19-14	DELTA F to agent crystal frequency counter latches and difference frequency output (FREQ) from Agent Preamplifier Board.	
A : U19-4 B : U19-14	DELTA F to agent crystal frequency counter latches and difference frequency output (FREQ) from Agent Preamplifier Board. Same as previous waveform but a different timebase setting.	
A : U9-31 B : unused	240 Hz signal from microprocessor timer output. Essential signal for the CO_2 bench circuit and the agent crystal frequency counter latches circuit.	

Location	Signal and condition	Waveform
A : P1-1 B : P1-2	TRXA and TRXB network serial communication lines. The gas module must be connected through the network to the PC Interface Board's network serial communication lines.	
A : P1-1 B : P1-2	TRXA and TRXB network serial communication lines. The gas module must be connected through the network to the PC Interface Board's network serial communication lines. Same as previous waveform but at different timebase.	
A : P1-1 B : P1-2	TRXA and TRXB network serial communication lines. The gas module must be connected through the network to the PC Interface Board's network serial communication lines. Same as previous weveform but at different timebase.	

Location	Signal and condition	Waveform
A : U13-9 B : unused	RCO output signals from the agent crystal frequency counter latches.	

6.20. ECG leakage currents

Test :

- Connect the main of the unit on the simulator (mains plug).
- Connect a patient cable on the monitor and on the simulator.
- Connect the ECG box to the earth.

Leakage current in normal condition (< 10 µA) :

- Currents must be < 10 µA.

Leakage current in first fault condition (< 50 µA) :

- Currents must be < 50 µA.

6.21. FiO2 leakage currents

Test :

- Connect the main of the unit on the simulator (mains plug).
- Connect a FIO2 sensor on the monitor and on the simulator with an aluminium foil for contact.

Leakage current in normal condition (< 10 µA) :

- Currents must be < 10 µA.

Leakage current in first fault condition (< 50 µA) :

- Currents must be < 50 µA.

6.22. Earth leakage currents

Test :

- Connect the main of the unit on the simulator (mains plug).
- Select the simulator on position « Patient earth » ‘3rd position on ratating button).

Leakage current in normal condition (< 500 µA) :

- Currents must be < 500 µA.

Leakage current in first fault condition (< 1 mA) :

- Currents must be < 1 µA.

6.23. Magnetic field detection test

Cut-off test in all ways :

- Check the field detection according to an axis which is shown by a shut down of the MAGLIFE C PLUS. or of the LED « Battery load » (if MAGLIFE C PLUS. is cut off).

6.24. Visual check

1. Clean the instrument enclosure with a mild soap and water solution or ammoniated window cleaner. Do not apply large amounts of liquid ; do not use abrasive cleaning agents or organic solvents.

   Check unit for any obvious signs of physical damage, (e.g., bent/cracked frames or scratches) and replace as required.

2. The front panel should be cleaned carefully in order to prevent scratches. Dust, dirt particles, finger-prints and stains may be removed by using a soft cloth. Do not wipe a dry screen. Do not use alcohol or chlorinated hydrocarbon solvents. Inspect the front panel for scratches and other physical damage, replace if required.

3. Check all panel hardware for looseness and panel clearance.

4. Check line cord for wear, damage and proper strain relief.

5. Check all graphics and labelling for wear and scratches.

CHAPITRE 7

PREVENTIVE MAINTENANCE

7. PREVENTIVE MAINTENANCE

7.1. Introduction

This section of the manual outlines routine maintenance that should be performed by service. The MAGLIFE C PLUS is designed for stable operation over long periods of time and under normal circumstances should not require technical maintenance beyond that described in this section. However, it is recommended that routine maintenance calibration and safety checks be performed at least once a year, or more often as required by local statutory or hospital administration practice.

7.2. Programme

The following is a list of activities required for periodic maintenance of the MAGLIFE C PLUS. The physical inspections, replacements of consumable items and performance checks are suggested to be performed at the recommended intervals stated below. Datascope is not responsible for component failure or loss resulting from the use of stated consumable items beyond their recommended replacement interval.

7.3. Visual/mechanical/physical/electrical inspection

This inspection must be carried out regularly with some 6 months intervals.

The following checks are suggested:

- Outer Case, Input Connectors
- AC line cord, Interface cable,
- Rolling stand,
- Clean the Water Trap bottle,
- perform the leakage current tests.

7.4. Performance verification

Verify performance for ECG, SpO2, NIBP, IBP (optional), CO2 (optional), agent (optional), FiO2 (optional) and recorder (optional) by performing verification procedure as per chapter 6.

Perform the different calibrations as per chapter 6.

7.5. Preventive maintenance kit

☞ **Note** : the figures in brackets and in bold refer to the exploded views of the unit in section 5.2.1. and 5.2.2.

Yearly maintenance kit : W14P0100 (replace at 1 year intervals)

1. Internal nafion tubing **(74)**(W14S0272)
2. Water trap **(46)**(W1402342)
3. CO2 tubing **(75)**(W1411768)
4. Capno patient filters **(82)**(W1404416)

Supplement to the one-year kit (if the button cell of the CPU board is still in place) : W14P0103

1. Replacing the CPU board cell

Two year maintenance kit : W14P0101 (replace at 2-year intervals in addition to yearly kit) :

1. Main battery **(31)** (W14S0236)
2. IBP battery **(22)** (W1404454)
3. CPU board cell **(83)**(72620)

Four year maintenance kit : W14P0102 (replace at 4 year intervals in addition to yearly kit and two year kit)

1. Battery on the "Memory extension" board **(95)**(72620)
2. Capno sample cell **(84)**(W1402577)
3. Capno pump **(81)**(W14S0276)

7.6. Maintenance kits installation procedure

7.6.1. Common part for the 1, 2 and 4 years maintenance kits

- Snap off the water trap container **(46)** from the set of container fasteners **(47)** (W1402342) and remove the patient filters **(82)**(tubes connecting 1 and 2 and 4 and 5 (W1404416)(see figure 1)) from the rear panel (W1404418).

- Remove the top cover **(76)**(W1404388). Proceed as follows :

  Unscrew the 22 screws around the edges of the top cover.
  Also unscrew the 2 screws on the upper left-hand side.

  Lift the top cover **(76)** with both hands.

Warning:	Disconnect the battery power supply cable connector **(93)** on the Power Supply board **(54)** to make sure that the unit will not be supplied with power.

- Remove the bottom cover **(89)**(preamplifier cover)(W1404624). Proceed as follows:

  Note: The bottom cover of **MAGLIFE C PLUS** is the non shielded part which is located underneath the unit.

  Turn the **MAGLIFE C PLUS** unit over completely, so that the bottom cover is located on top, and the screen is directed toward you.

  Unscrew the 2 side screws and the 3 screws on the back of the bottom casing. Turn the casing backward.

  This will make the following parts accessible:
  - the Invasive Pressure 1/2/3/4 Acquisition board **(21)**,
  - the casing **(94)** with the battery **(22)** of that board,
  - plugs on front panel.

- Remove the main battery **(31)**(W14S0236). Proceed as follows:

Unscrew nut on the bottom of the unit.

Unscrew the battery clamp **(38)**.

Remove the connection **(93)** from the Power Supply board if this has not been done already.

Slide the battery horizontally towards the right (it is retained on the left-hand side by a bracket) and pull it out.

- Unscrew the pneumatics part of the Capno **(37)** system from the rear panel.

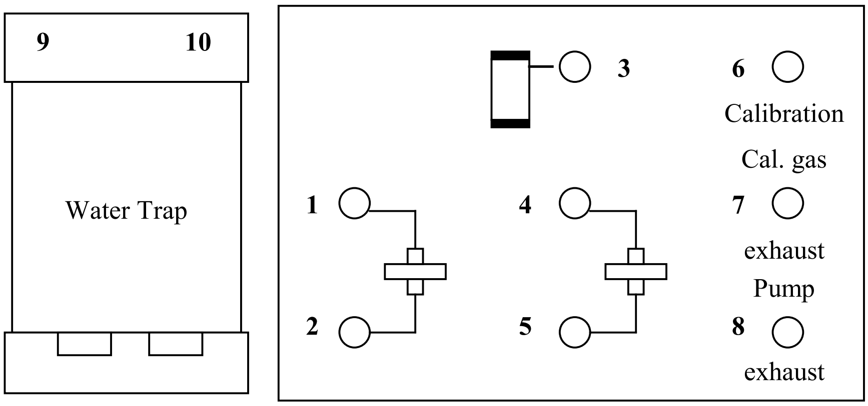
7.6.2. One-year maintenance kit installation procedure

Yearly maintenance kit : W14P0100 (replace at 1 year intervals)

1. Internal nafion tubing **(74)**(W14S0272)
2. Water trap **(46)**(W1402342)
3. CO2 tubing **(75)**(W1411768)
4. Capno patient filters **(82)**(W1404416)

Figure 1 :

External view of the rear plate



1. Replacing the internal nafion tube **(74)**(W14S0272)

   - Remove the upper part of the water trap support **(47)**(unscrew the two top screws inside the rear plate, which match ports 9 and 10: see figure 1) and disconnect the two corresponding internal nafion tube **(74)**.
   - Unscrew the lower male bases **(43)** of the patient filters (2 and 5 in figure 1)(72767) and disconnect the corresponding tubes **(74)**
   - Feed the two new internal nafion tubes **(74)**(W14S0272) through these two holes (2 and 5 in figure 1).
   - Connect the two new male bases **(43)** (72767) to the new internal nafion tubes.
   - Screw the two male bases home on the rear, at ref. 2 and 5 (figure 1).
   - Connect the tube of the male base (5) to the water trap support (10), connect the tube of the male base (2) to the water trap support (9)(see figure 1),

   Note: the internal nafion tube is coiled and maintained by a cable clamp (3632).

   - Put back the set of upper water trap fasteners **(47)**.

2. Replacing the water trap **(46)**(W1402342)

   Clip the new water trap (W1402342) into the water trap fasteners **(47)**.

3. Replacing the CO2 tubing **(75)**(W1411768)

   - Disconnect the tube **(75)** from the fitting female luer (CO2 input)**(91)** inside the front plate.
   - Also disconnect the central part of the tube **(75)**(where the two tubes are connected) which is located inside the device at the bottom of the rear plate and remove it.
   - Fasten the new tube (side without connection)(the longest part : about 1.25m) to the CO2 input **(91)** inside the front plate. Bring the tube through the intermediate plate via the hole in the middle of the fibre optic wave guide **(18)** and the various clamps (figure 3).
   - Unscrew the female base **(42)**(3 in figure 1)(72768) from the rear plate and disconnect the tube from the base. Remove the tube.
   - Fasten the new tube (side without connection)(the shortes part : about 25cm) to the female luer **(42)** and screw the luer to the rear plate (3 figure 1).
   - Connect the two new tubes forming the CO2 tubing **(75)** in their central part.
   - Put the tubes in place in the adhesive flat cable ties.

4. Replacing the patient filters (W1404416)

   These are two connections on the rear plate (exterior view) between 1 and 2 (figure 1), and 4 and 5 (figure 1). Remove the two used tubes with their filters and replace them with the new ones (W1404416). Take care to fasten the two patient filters correctly.

Re-assembling the parts:

- Check if the two and four-year maintenance kit installation procedures are required. If so, refer to the relevant procedures.
- Fix the pneumatics part of the Capno system **(37)**.
- Re-assemble the main battery **(31)**(fastened by a screw and retaining flange **(38)**(W1404741). The main battery **(31)** is connected to the power supply **(54)** board via connector J7).
- Check if all the connections and fastenings have been performed correctly.
- Make sure that no dismantled part is left in the device.
- See the test and calibration procedure.
- Put back the bottom cover **(89)**(preamplifier cover)(W1404624).
- Put back the top casing **(76)**(W1404388).

7.6.3. Supplement to the one year kit installation procedure (if the button cell of the CPU board is still in place)

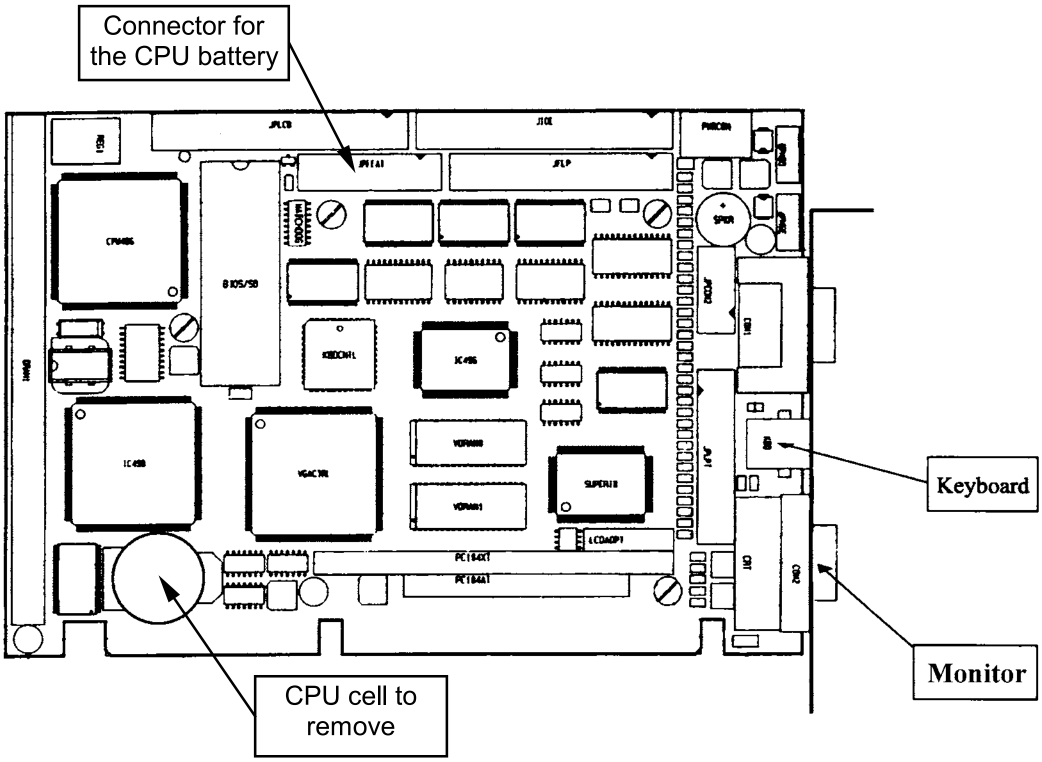
Supplement to the one-year kit (if the button cell of the CPU board is still in place) : W14P0103

1. Replacing the CPU board cell

   The button cell placed on the CPU board must be replaced with a lithium cell fixed to the plate at the bottom of the device with the help of a clip and connected to the CPU by means of a cable and a connector.

   - Remove the button cell from the CPU board (figure 2)
   - Connect the connector of the CPU lithium battery to the connector of the CPU board (figure 2)

   Figure 2: CPU board



- Fix the new lithium cell (72620) with the clip (3641) on the bottom plate (see figure 3).
- Put in place the adhesive cable tie (32512) and retain the cable with the cable tie (3632) (see figure 3).
- Refer to the two-year kit procedure for reinitialising after the CPU cell is replaced.

7.6.4. Procédure d'installation du kit de maintenance 2 ans

Two year maintenance kit : W14P0101 (replace at 2-year intervals in addition to yearly kit) :

1. Main battery **(31)** (W14S0236)
2. IBP battery **(22)** (W1404454)
3. CPU board cell **(83)**(72620)

First perform the one-year maintenance kit installation procedure. Then perform the two-year maintenance kit installation procedure.

1. Replacing the main battery **(31)**(W14S0236)

- Replace the used main battery with the new one **(31)**(W14S0236).

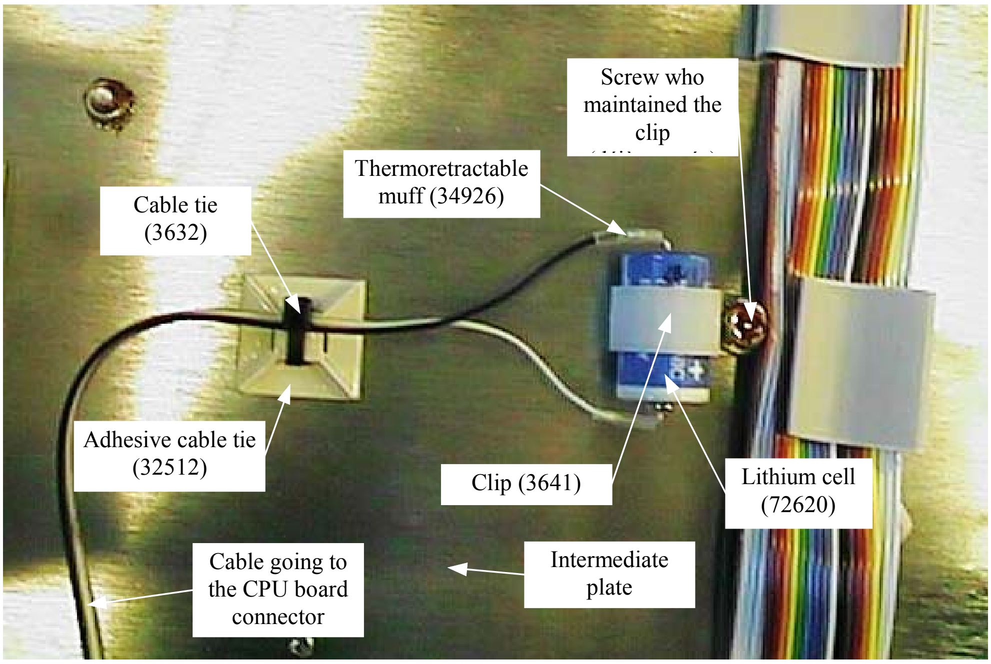
First slide the battery fastening flange in the slot of the Capno support **(34)** and then fix the battery cage to the intermediate plate.
Now screw in the battery retaining flange **(38)**.
Connect the connector **(93)** once again to the main power supply board **(54)** at J7.

2. Replacing the IBP battery **(22)**(W1404454)

- Replace the used IBP battery with the new one **(22)** (W1404454) in the preamplifier section (under the lower cover **(89)**). Proceed as follows: remove the IBP battery cage **(94)** by unscrewing the five screws and replace the used battery with the new one. Then screw the IBP battery cage to the lower cover **(89)** and connect the connector to J5 of the IBP 1/2 Acquisition board **(21)**.

3. Replacing the CPU board cell **(83)**(72620)

Figure N°3 :

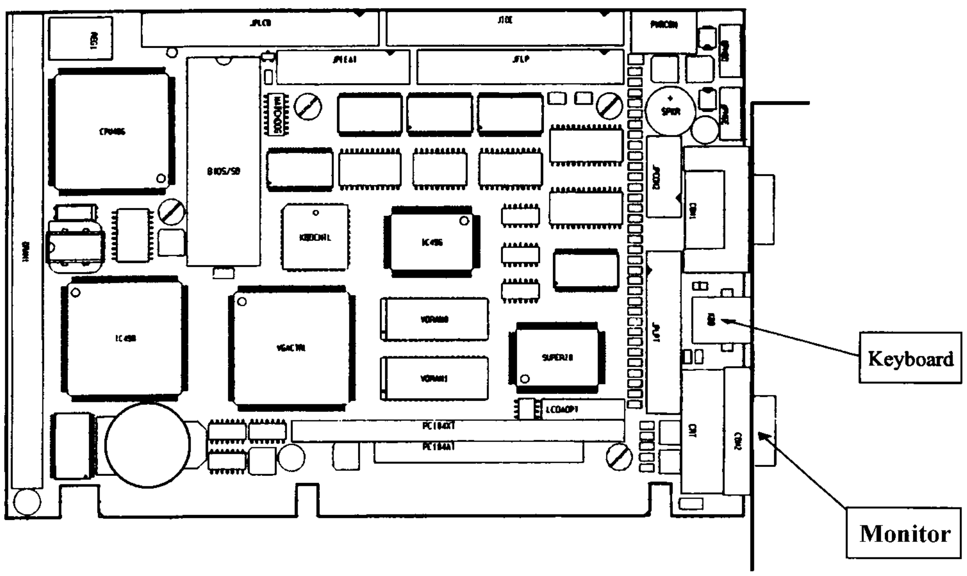


- Unsolder the wires of the lithium cell **(83)**(72620) fixed to the intermediate plate at the bottom (W1404423)(figure 3),
- Unscrew the screw on the bottom plate which retains the clip to which the cell is fixed. Remove the lithium cell from the clip (figure 3),
- Solder the new lithium cell (72620) to the wires from the CPU board: black wire to the minus (-) pole and white wire to the plus pole (+) (figure 6),
- Put the cell back into the clip and fasten the screw which holds the clip (figure 3).

> **Warning:** it is possible, during the replacement of CPU battery, that the date and the hour are lost. Is needed then to reinitialize the CPU board (see below)

<u>Reinitialization of the CPU board :</u>

- Turned the MAGLIFE C PLUS "Off".
- Connect : - a keyboard on the connector from the CPU board **(73)** (figure 4)
- a monitor on the connector from the CPU board **(73)** (figure 4)



- Turned the MAGLIFE C PLUS "On" and press the "Del" key of the keyboard during the startup sequence to enter in the BIOS system.

- The "Main screen" below is shown.

```
                AMIBIOS SETUP PROGRAM - BIOS SETUP UTILITIES
          (C) 1993 American Megatrends, Inc. All Rights Reserved

                          STANDARD CMOS SETUP
                          ADVANCED CMOS SETUP
                          ADVANCED CMOS SETUP
                  AUTO CONFIGURATION WITH POWER-ON DEFAULTS
                    AUTO CONFIGURATION WITH BIOS DEFAULTS
                            CHANGE PASSWORD
                          AUTO DETECT HARD DISK
                            INSIDE UTILITIES
                          WRITE TO CMOS AND EXIT
                       DO NOT WRITE TO CMOS AND EXIT

      INSIDE Technology Setup for Peripherals and Special Features

      ESC:Exit      ↑→↓←:Sel      F2/F3:Color     F10:Save & Exit
```

- Choose the "Standart CMOS Setup" menu (to enter in a menu press the "Enter" key). And the "Standart CMOS Setup" screen below is shown (use the ↑ and ↓ keys to scroll through the options)

```
               AMIBIOS SETUP PROGRAM - STANDARD CMOS SETUP
          (C) 1993 American Megatrends, Inc. All Rights Reserved

 Date (mn/data/year) : Tue,  Jun 20  1995       BASE Memory : 640 KB
 Time (hour/min/sec) : 15 : 16 : 21              Ext. Memory : 3072 KB
                                        Cyln Head Wpcom LZONE Sect  Size
 Hard Disk C: Type   : 47 = USER TYPE   1122   16 65535 1120  59    516 MB
 Hard Disk D: Type   : Not Installed
 Floppy Drive A:     : 1.44 MB, 3½"
 Floppy Drive B:     : Not Installed   Sun  Mon  Tue  Wed  Thu  Fri  Sat
 Primary Display     : VGA/PGA/EGA      28   29   30   31    1    2    3
 Keyboard            : Installed         4    5    6    7    8    9   10
                                        11   12   13   14   15   16   17
 Month : Jan, Feb,.....Dec              18   19   20   21   22   23   24
 Date  : 01, 02, 03,...31               25   26   27   28   29   30    1
 Year  : 1901, 1902,...2099              2    3    4    5    6    7    8
   ESC:Exit Select F2/F3:Color Pu/Pd:Modify
```

- Set the time and the date (use the "Pu" and the "Pd" keys).
- Return to the "Main screen" with the "Esc" key.
- Choose the "Inside utilities" menu. And the "Inside utilities" screen below is shown.

```
INSIDE TECHNOLOGY - SETUP PROGRAM FOR PERIPHERALS
(C) 1995 INSIDE Technology A/S, All Rights Reserved
Program Version : S4,050-201-118-05.05.01.09.18-01.03.04-00000000

CPU & CLOCK
Processor type : 486DX4 100MHz
System speed   : 33 MHz
AT bus clock   : 8.3 MHz

SOLID STATE DISK
S. State Disk: DIS  Size :   762 kB
Erase disk   : NO
CHIP 0-3 : 0064 None None None * 16kB
CHIP 4-7 : None None None None * 16kB

VGA CONTROLLER
Onb. VGA IRQ 9 : Disabled
Display type   : Standard CRT VGA
Display memory : 512 kB

BATTERY
Charging method  : Trickle
Force charging   : Inactive
Status : Trickle   Time left : 07 h

ON-BOARD PERIPHERAL
Serial port 1  : 3F8-3FFh
Serial port 2  : 2F8-2FFh
Printer port   : 278-27Fh IRQ7 ECP
Floppy disk    : 3F0-3F7h
Hard disk      : 1F0-1F7h

MISCELLANEOUS
Sign-on message  : Enabled
On-board speaker : On
Secure CMOS Setup: Disabled
INSIDE Softw Int.: Off
LBA Mode         : Enable

WATCHDOG
Watchdog  : DIS  Timeout : 100 ms

Select the system board frequency.
The CPU internal frequency is showed above
ESC:Exit   ↑→↓←:Sel   Pu/Pd:Modify   F5:Old Values
```

- Make sure that the "Secure CMOS setup" option is at "Update". If not, use the ↑ and ↓ keys to scroll through the options and go to the "Secure CMOS setup" option. Use the "Pu" and the "Pd" keys to to change the value to "Update".

- Return to the "Main screen" with the "Esc" key.

- Choose the "Write to CMOS and exit" menu, then "Y" for yes and "Enter" ⇒ you go out the BIOS system.

- Disconnect the keyboard and the monitor of the CPU board and turn "Off" the MAGLIFE C PLUS.

<u>Re-assembling the parts:</u>

- Check if the four-year kit installation procedure is required. If so, refer to the relevant procedures.
- Check if all the connections and fastenings have been performed correctly.
- Make sure that no dismantled part is left in the device.
- See the test and calibration procedure.
- Put back the bottom cover **(89)**(preamplifier cover)(W1404624).
- Put back the top casing **(76)**(W1404388).

7.6.5. Four year maintenance kit installation procedure

Four year maintenance kit : W14P0102 (replace at 4 year intervals in addition to yearly kit and two year kit)

1. Battery on the "Memory extension" board **(95)**(72620)
2. Capno sample cell **(84)**(W1402577)
3. Capno pump **(81)**(W14S0276)

First perform the one-year maintenance kit installation procedure. Then perform the two-year maintenance kit procedure and then the four-year maintenance kit procedure.

1. Replacing the battery **(95)**(72620) on the Memory extension board **(66)**(W4P141640)

- Remove the Memory extension board **(66)**(W4P141640). Proceed as follows:

  Remove the connectors which are still connected to the other plate boards.
  Unscrew the 4 nuts (x) in the corners of the PCB and remove the board (the board is also held in place by connectors J1 and J2).

- Unsolder the cell **(95)** and pull it out (figure 5).
- Solder the new cell (72620) on the Memory extension board as shown in the photograph below.

Figure 5 : Memory extension board

- Put back the Memory extension board.

2. Replacing the sample cell **(84)**(W1402577)

- Replace the sample cell **(84)** on the Capno measuring bench **(35)**.
- Remove sample cell on the left of the measuring bench.
- Remove the tube from the sample cell and connect the new sample cell (figure 10).
- Clean it and position it home in the measuring bench.

3. Replacing the Capno pump **(81)**(W14S0276)

   Replace the Capno pump **(81)** on the pneumatics board **(37)** of the Capno module.

   - Disconnect the connector from the power supply cable.
   - Disconnect the pneumatic tubes of the Capno pump from their T fittings.
   - Cut the cable clamp and remove it. Also remove the adhesive foam.
   - Remove the old Capno pump and replace it with a new one, taking care to add adhesive foam.
   - Fix the pump back onto the board with the cable clamp.
   - Connect the connector of the power supply cable of the Capno pump to H1 on the pneumatics board.
   - Fix the pneumatic tubes to the pneumatic T fittings: left-hand tube to the T fitting connecting the inputs of valves V1 and V5 and right-hand tube to the T fitting connecting the inputs of valve V2.

Re-assembling the parts:

- Check if all the connections and fastenings have been performed correctly.
- Make sure that no dismantled part is left in the device.
- See the test and calibration procedure.
- Put back the bottom cover **(89)**(preamplifier cover)(W1404624).
- Put back the top cover **(76)**(W1404388).

7.7. Cleaning the monitor

Clean the unit with common cleaning and disinfecting agents (BURATON, INCIDIN. GG. KORSOLIN or LYSO FORMIN 2000). Apply the solution on a cloth, and not directly on the device. Do not use abrasive cleaning agents or organic solvents.

Important:	**Make sure the unit is off and disconnected from the mains before cleaning.** **Do not remove the covers.** **If any liquid enters the device, have the device cleaned and verified thoroughly.**

To avoid scratching the display screen on the front of the device, clean it by blowing away dust particles or by wiping it with a sponge moistened with a cleaning agent. Do not use abrasive cleaning materials. Fingerprints and stains may be removed with lens cleaning solution and a soft cloth. Do not rub the screen with a dry cloth or use hydrochloric solvents or alcohol.

CHAPITRE 8

MODIFICATIONS OF THE DEVICE

8. MODIFICATIONS OF THE DEVICE

8.1. "Main power supplies" printed circuit

W4P141633

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7411737		0	Circuit diagram creation
W7411737		1	Addition of D22 (BAT85) Change of DZ7 (5.1V → 6.8V)
W7411737		2	Change of R41, R42, R43 et R44 value (3.83kΩ → 2.21kΩ)
W7411737		3	Change of U3 référence (TL082→OP285)
W7411737		4	Replacement of transistors SMP40P06 by transistors IRF4905
W7411737		5	Immobilization of all the vertical chemical condensators with silicone
W7411737		6	Deletion of transistor T6.

8.2. "Probes treatment" printed circuit

W4P141615

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7411702		0	Circuit diagram creation
W7411702		1	Change of R63 value (100kΩ → 10kΩ)
W7411702	A	2	The circuit goes to W4P141615A Deletion of R109 and R114 Change of RG4 value (MC78L05ACP → LM78L05ACM)
W7411702	A	3	Implantation of H2 curved at 90°
W7411702	A	4	Change of U10 value (TL064 → MAX479)
W7411702	A	5	Change of R60 value (1kΩ → 332kΩ)

8.3. "IBP1/2 acquisition" printed circuit

W4P141632

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7411743		0	Circuit diagram creation
W7411743		1	Change of TR1 fixation

8.4. "IBP1/2/3/4 acquisition" printed circuit

W4P141632

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7411736		0	Circuit diagram creation

8.5. "PC interface" printed circuit

W4P141730A

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7412096	A	0	Circuit diagram creation

8.6. "Right and left" printed circuit

W4P141637 et W4P141661

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W14S223 et W14S0222		0	Circuit diagram creation
W14S223 et W14S0222		1	Change the connector J2 on the right keyboard
W14S223 et W14S0222		2	Change the value of R1 (332Ω → 182Ω) on the right keyboard

8.7. "SpO2 interface" printed circuit

W4P141667A

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7412162	A	0	Circuit diagram creation

8.8. "Magfile interface" printed circuit

W4P141646

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W1411747		0	Circuit diagram creation

8.9. "Parallel recorder adapter" printed circuit

W4P141649A

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W1411749	A	0	Circuit diagram creation
W1411749	A	1	Addition of a condensator C3 (4700 μF)

8.10. "Optical interface" printed circuit

W4P141604

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W1411680		0	Circuit diagram creation

8.11. "ECG sensor protection" printed circuit

W4P141619

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W1411710		0	Circuit diagram creation

8.12. "Optical fibers ECG sensor" printed circuit

W4P141718

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W7411924		0	Circuit diagram creation
W7411924		1	Value change of R5, R7, R13, R14, R16, R17, R23, R28 → 20 M
W7411924		2	Addition of a resistor R70 → 4,7 M

8.13. "ECG receiver" printed circuit

W4P141564A

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W1411520	A	0	Circuit diagram creation

8.14. "Downloading module" printed circuit

W4P141655

Part number of the printed circuit	Index of the printed circuit	Number of the ECL version	Modifications
W1411752		0	Circuit diagram creation
W1411752		1	Change of U2 value (HFBR-2523 → HFBR-2521) and of R3 value (2.21kΩ → 22.1kΩ)