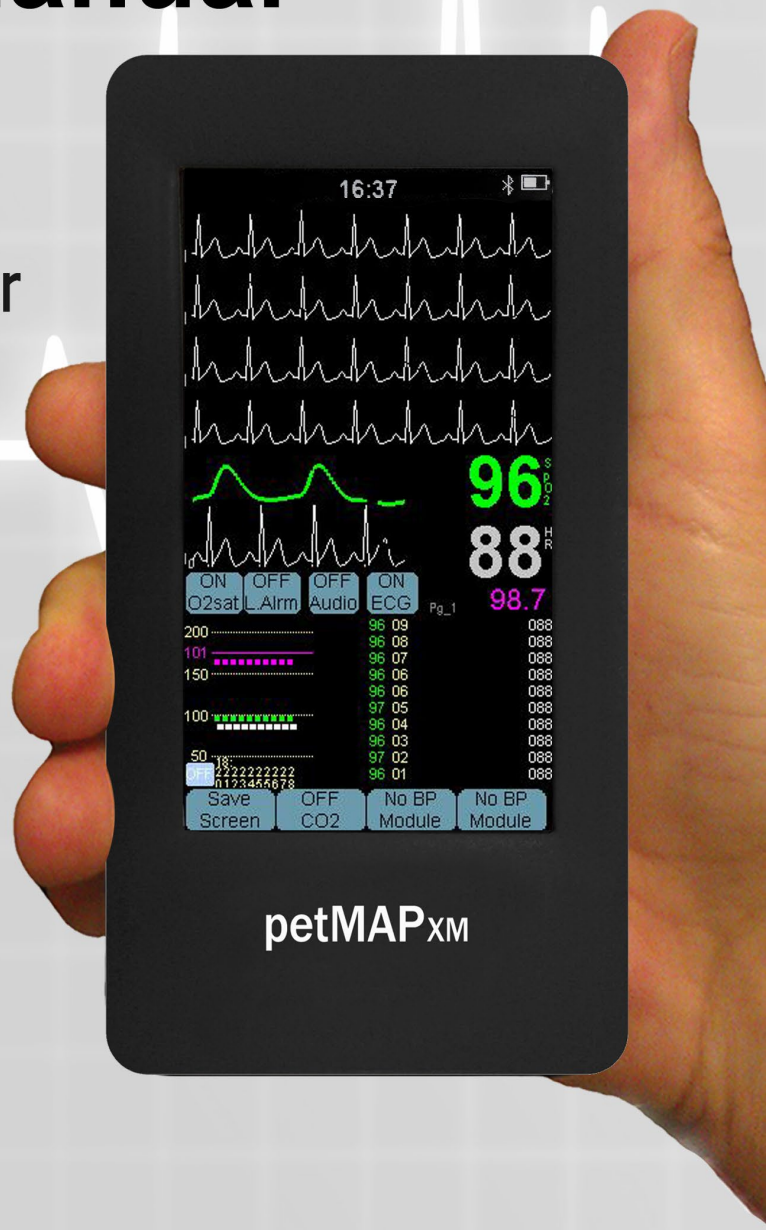
petMAP™ XM

Xpandable Monitor

Operator's Manual

Xpandable Multi-Parameter
Veterinary Monitor



ECG, SpO2,
Temperature and
More...

Manufactured,
Sold & Serviced by:
cardio COMMAND

www.petmap.com

Developed by:
RAMSEY
MEDICAL INC

petMAP™ XM Xpandable Multi-Parameter Monitor

petMAP XM Base Units

MODEL	DESCRIPTION
7500	petMAP XM, ECG and Temperature Device
7502	petMAP XM, ECG, Temperature and SpO2 Device
7504	petMAP XM, ECG, Temperature and SpO2 (Nonin) Device

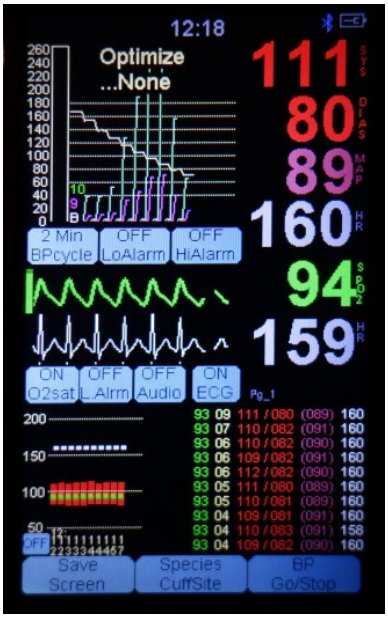
This manual applies to the above devices and their accessories. Not all devices have all of the parameters referred to in this manual. **Read this manual completely before using the equipment**.

petMAP XM Modules (priced separately)

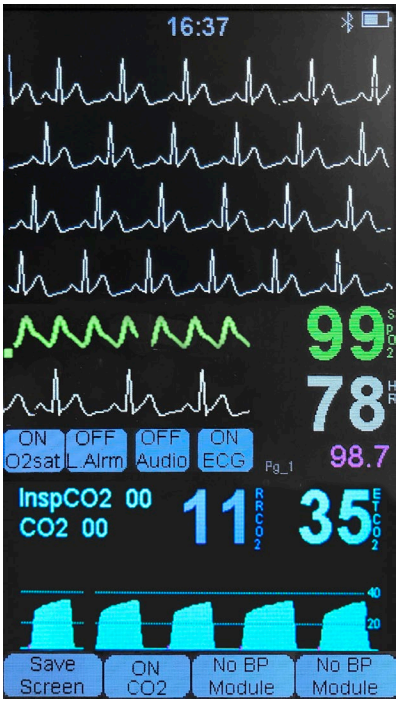
9050	petMAP BP Module
9078	petMAP CO2 Module

Note that Operator's Manuals for the BP Module and CO2 Module are included with the modules, which are packaged separately.

This is a typical screen display when petMAP XM (REF 7502 or REF 7504) is configured with a BP Module (REF 9050)



This is a typical screen display when petMAP XM (REF 7502 or REF 7504) is configured with a CO2 Module (REF 9078)



petMAP XM is to be operated by qualified personnel only. Before use, familiarize yourself with the device and read this manual, including all warnings and cautions. The user should check that petMAP XM along with its accessories, is functioning both safely and effectively prior to use.

petMAP™ XM OPERATOR'S MANUAL

TABLE OF CONTENTS

INTRODUCTION

Device Description

petMAP XM is a small, lightweight and portable battery-operated monitoring device designed for veterinary use. In its various configurations, the base unit is capable of monitoring a single lead ECG, heart rate, temperature and oxygen saturation (SpO2). The measured values are displayed and trended on the device continuously as well as transmitted via Bluetooth for a larger Remote Display presentation (optional). Modules for Blood Pressure and CO2 can also be purchased and added to the base unit. Data trended on the petMAP XM can optionally be saved on an SD memory card via the petMAP XM's integrated SD memory card slot. A user interacts with petMAP XM using its touch screen, just like most smart phones.

Intended Uses

petMAP XM is intended to be used on veterinary patients when measuring or monitoring of ECG, heart rate, temperature and/or SpO2 is desired. It can be used on a wide variety of veterinary patients, but is primarily designed for companion animals. petMAP XM can be used on both awake and anesthetized patients; its applications include use for surgical, ICU and trauma monitoring as well as use in the exam room and during procedures (imaging, dentals, etc.).

Features of petMAP XM

- Portability: petMAP XM's weight and size just may make it the most portable and versatile monitoring device in veterinary medicine. It is a single device that can be used in the OR, ICU, trauma, dentals, exam room, transport and for mobile practices! And when not in use, it can be in your pocket… ready for action… anywhere, any time.
- Modularity and upgradability: Modules for Blood Pressure and CO2 may be purchased. These modules allow the base unit (REF 7500, REF 7502, REF 7504) to be configured by the user for added functionality. In addition, the 7500 can be upgraded to either a 7502 or 7504 as a service upgrade.
- Ease of use: petMAP XM's portability, data presentation options and intuitive user interface (no menus are required for normal use) make it one of the easiest devices to use. The touch screen controls and no menus for normal use make in-service a snap, particularly since it functions much like a smart phone or tablet…touch driven and very intuitive.

Unit Configurations & Accessories

The following table describes the petMAP XM configurations currently available:

Product Code	Description
7500	petMAP XM, ECG/ Temperature
7502	petMAP XM, ECG/Temperature/SpO2
7504	petMAP XM, ECG/Temperatur/SpO2 (Nonin)

The above configurations are capable of monitoring temperature, but only when the correct temperature probe and extension cable accessories are purchased—rectal and esophageal probes are available.

The following table summarizes the standard accessories and optional accessories available for the petMAP XM:

	Product Code	Description
Standard Accessories (included with the Device)	**7500** petMAP XM ECG, Temp Device	➢ AC/DC adapter ➢ Operator's Manual ➢ Quick Reference Instructions ➢ 3 ECG lead wires (48") ➢ 5 ECG Comfort Clips
	7502 petMAP XM ECG, Temp, SpO2	➢ AC/DC adapter ➢ SpO2 Sensor Kit ➢ Operator's Manual ➢ Quick Reference Instructions ➢ 3 ECG lead wires (48") ➢ 5 ECG Comfort Clips
	7504 petMAP XM ECG, Temp, SpO2 (Nonin)	➢ AC/DC adapter ➢ Nonin SpO2 Sensor, Small Lingual Clip ➢ Operator's Manual ➢ Quick Reference Instructions ➢ 3 ECG lead wires (48") ➢ 5 ECG Comfort Clips
Optional Modules	**9050**	petMAP Blood Pressure Module (BPM)
	9078	CO2 Module
Optional Accessories	**9014**	Temperature Extension Cable
	8041	Rectal Temperature Probe
	8040	Esophageal Temperature Probe
	9008	International Adaptor Plugs
	9018	Nonin SpO2 Sensor, Transflectance (used only with 7504)
	9019	Nonin SpO2 Sensor, Small Flex (used only with 7504)
	9025	Nonin SpO2 Extension Cable (used only with 7504)
	9058-Sand	petMAP XM Cover (sand)
	9058-Teal	petMAP XM Cover (teal)
	9042	Pole Mount
	9045	Table Mount
	3205-0001	Cat Catheter (esophageal ECG electrodes and Temperature)
	3207-0001	Dog Catheter (esophageal ECG electrodes and Temperature)
	9056	Eso Extension Cable for Cat/Dog Catheter
Replacement Items	**9043**	AC/DC Adapter
	9071	SpO2 Sensor (used only with 7502)
	9017	Nonin SpO2 Sensor, Small Lingual Clip (used only with 7504)
	9044	3 ECG Lead Wire Set – 48in
	9059	ECG Comfort Clips (box of 5)

Certain configurations are also upgradeable, after purchase. For instance, if 7500 was purchased and now SpO2 capability is desired, the petMAP XM may be upgraded buy purchasing the SpO2 option. Such upgrades require the unit be returned to the service center. Contact Customer Service for more information about upgrading your petMAP XM.

Software/Firmware Update: Using an SD card (16 GB or less) and two files provided by the manufacturer, the operating firmware of the device can be updated in the field by the user when such updates are made available.

SYMBOLS

Caution Symbol

Consult Manual Symbol

CE

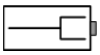
Complies with the following CE directives:

- Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)
- DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

UK CA United Kingdom Conformity Assessed - Complies with the requirements of Great Britain Legislation, The Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019.

Battery level Icon

Battery Charging Icon



Battery AC/DC adapter polarity

WARNINGS & CAUTIONS

⚠ **Do not charge batteries other than nickel-metal hydride (NiMH)**. The unit is equipped with rechargeable (NiMH) batteries, but can operate with non-rechargeable alkaline or lithium batteries. If using the unit with batteries other than NiMH rechargeables, do not use the wall AC/DC adapter since such attempt to charge non-rechargeable batteries can create an unsafe situation with the potential for injury to the device and its operator.

⚠ Only the AC/DC adapter supplied with petMAP XM should be used to charge the unit. The unit is factory equipped with 4 AA NiMH rechargeable batteries. The factory batteries can be replaced by the user with new NiMH rechargeable batteries when the charge life of the factory supplied batteries is severely degraded (this will happen over time and use), but DO NOT use the AC/DC adapter if batteries other than rechargeable NiMH batteries are installed in the unit.

⚠ Do not mix rechargeable and non-rechargeable batteries. When replacing batteries, replace all batteries with the same type. Do not mix old and new batteries.

⚠ When connecting this monitor to any equipment or accessories, verify proper operation before clinical use. Accessory equipment connected to the petMAP's USB port should be certified according to the respective IEC standards, i.e. IEC 60950 for data processing equipment.

⚠ The petMAP XM is intended for VETERINARY USE ONLY. Do not use on a human patient.

⚠ The user should be aware that the presence of an ECG waveform does not mean that the patient has a useful heartbeat. Pulseless Electrical Activity (PEA), previously called Electromechanical Dissociation (EMD), can occur under various circumstances and though the ECG appears to be normal or abnormal, there is no actual contraction of the heart and thus there is no pulse or blood pressure being generated and the animal is effectively dead unless corrected quickly. Never rely only on the ECG to judge the patient's circulatory condition. Always use the SpO2, CO2 and BP in addition to ECG to judge the condition of the patient's circulatory status. The patient can die and still have a normal looking ECG for a period of time.

⚠ When a patient's heart is being paced, the pacer current can potentially produce artifacts that appear to look like a normal or an abnormal ECG. The ECG circuit attempts to filter out the pacemaker pulses (in certain circumstances it is not possible to filter them), and the user must be able to distinguish true ECG waveforms from pace artifact induced waveforms that can look like an ECG waveform. Always judge the adequacy of the patient's circulation using other parameters in addition to the ECG, since the ECG can appear to be present even though there is no effective heartbeat contraction. SpO2, CO2, and BP are important parameters to monitor in order to judge the patient's cardio/respiratory status and should always be used in addition to the ECG.

⚠ Use of an Electrosurgical Unit (ESU) will often result in interference on the ECG trace and potentially erroneous heart rates. Never use the ECG for determining heart rate until the ECG waveform has been stable for 10 seconds or more after ESU use. The BP and SpO2 are typically not adversely affected by ESU

usage, but under certain circumstances the ESU could adversely affect them. Always assure that the ESU ground plate is well placed on the patient and placed distant from the ECG electrodes.

⚠ Inaccurate ECG heart rate readings may result when an electrosurgical unit (ESU) is used while monitoring with the petMAP XM. If this is suspected, discontinue use of the petMAP XM while the ESU is in use. When ESU is used, patient leads and wires should be away from the surgical operation site and other devices. This reduces the burning risk due to a poor connection of the ESU neutral electrode.

⚠ The scientific literature describes interference from a number of electrical devices that can produce artifacts that look like normal or abnormal ECG waveforms but are not actual ECG waveforms, and these potential ECG artifact generators include IV pumps, line isolation monitors, electrosurgical units, pacemakers and other stimulators, fluid warmers, bronchoscopes, etc. In such instances, these devices are usually malfunctioning in some way when producing ECG artifacts, but not always.

⚠ In rare patient arrhythmias there may be 1 or more peaked complexes with each actual beat that resemble the actual, true QRS complex. In such circumstances the unit can mistake the additional peaked complexes for a QRS and hence the heart rate displayed will be higher than the true heart rate. On the display where each QRS is detected there is a small indicator mark (yellow or red) below the detected QRS waveform to indicate it has been detected as a QRS. If in doubt about the ECG heart rate, confirm that only true QRS complexes are being identified as such by looking at the small marks. Even in the presence of such rare arrhythmias, the BP and the SpO2 heart rates should read properly.

⚠ Use of accessories other than those specified by Ramsey Medical may result in danger to the patient, malfunction of the monitoring unit, and additional increased electro-magnetic (EM) emissions or decreased EM immunity of the device.

⚠ Follow local governing ordinances and recycling instructions regarding disposal and recycling of device components and packaging.

⚠ Do not apply the blood pressure cuff on an extremity being used for an IV solution.

⚠ Do not place the SpO2 sensor distal to the blood pressure cuff.

⚠ Using a damaged SpO2 sensor may cause inaccurate readings. If a sensor appears damaged, do not use it. Contact CardioCommand, Inc. to purchase a replacement sensor.

⚠ Use only SpO2 sensors supplied with, or specifically intended for use with, this device.

⚠ Under certain clinical conditions the pulse oximeter may display "**?**" if unable to display SpO2 and/or pulse rate values. Under these conditions, pulse oximeters may also display erroneous values. These conditions include, but are not limited to: patient motion, low perfusion, cardiac arrhythmias, high or low pulse rates, electrical interference from electro cautery or other ESU devices, or a combination of the above conditions. It is the responsibility of the clinician to recognize the effects of these conditions on pulse

oximeter readings and proceed accordingly.

⚠ Do not immerse the device or AC/DC adapter in water or any liquid. If the unit is accidentally wetted, it should be thoroughly dried before use.

⚠ To ensure that the unit remains in calibration, verify calibration on a yearly basis or at any time there is user suspicion that proper calibration may have been lost.

⚠ If the petMAP XM has been dropped or damaged in any way, it should be checked by qualified service personnel to ensure proper operation prior to use.

⚠ The petMAP XM monitor conforms to Electromagnetic Compatibility (EMC) standard EN 61326-1:2013 and will operate accurately in conjunction with other equipment which also meets this requirement. To avoid interference problems affecting the Monitor, do not use the Monitor in the presence of equipment which does not conform to these specifications.

POTENTIAL FOR RADIO/TELEVISION INTERFERENCE

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The product generates, uses and can radiate radiofrequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the product does cause harmful interference to radio or television reception, which can be determined by turning the product on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the product and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

⚠ The petMAP XM is not intended for use on patients being imaged with an MRI device since the petMAP device contains magnetically active materials and could result in injury if used too close to an operating MRI.

⚠ Do not gas sterilize or autoclave the device.

EMC Declaration and Guidance

Precautions regarding Electromagnetic Compatibility (EMC) are required when using Medical Equipment. The petMAP XM should be put into service according to the EMC information provided in this manual.

Portable and mobile RF communications equipment can affect Monitoring Equipment.

The measurement accuracy and user control functions as specified in this manual is determined to be petMAP XM essential performance.

The petMAP XM is designed to conform to Electromagnetic Compatibility (EMC) standard EN 61326-1:2013, and will operate accurately in conjunction with other equipment which also meets applicable regulatory EMC requirements.

The petMAP XM uses RF energy only for its internal function. Therefore, its RF emissions are very low and not likely to cause any interference in nearby equipment. (Bluetooth radios may affect nearby electronic equipment.)

The petMAP XM is suitable for use in all commercial, industrial and business environments.

DEVICE OVERVIEW

Power/Batteries: petMAP XM is equipped with 4 rechargeable AA NiMH batteries (factory installed) and an external wall outlet plug-in AC/DC adapter. (Note: remove the green plastic tag at the battery cover to activate the batteries before attempting first use.) The AC/DC adapter can operate the unit while charging the batteries and may be left charging continuously.

The petMAP XM may also operate on 4 AA alkaline or lithium batteries (these are non-rechargeable battery types); however, **the AC/DC adapter should never be used when using batteries other than NiMH rechargeable batteries.** (See **WARNINGS**)

The petMAP XM AC/DC adapter is equipped with standard North America/Japan blades. If purchased, accessories exist to configure the AC/DC adapter for plug compatibility to several international options. To exchange the plug, simply press the round, spring-loaded button, twist and remove the plug supplied and replace it with the appropriate one for local use. (See instructions which accompany the International Adaptor Plugs, Code 9008.)

Controls & Connections. Note the diagrams for petMAP XM controls and connections.

ECG. petMAP XM is equipped with 3 wires for ECG surface leads. The device is also capable of esophageal ECG monitoring via an optional esophageal catheter. An extension is available for the esophageal catheter.

Temperature Connector. PetMAP XM optional accessories include a temperature extension cable, an esophageal probe and a rectal probe (see **Unit Configurations & Accessories** section). While it is possible to connect the probes directly to the unit, using the extension cable allows for more placement flexibility. (Do not inadvertently plug in headsets to the temperature connector.)

SpO2 Connector. If equipped, this is the connection for the SpO2 sensor cable. Noting the pin orientation, push the connector firmly into place.

SD Card. To install an SD card, orient it with the label side up and push the card into the unit until it fully engages. To remove, push in and release to eject the SD card. See additional instructions in this manual for SD card use and utility.

AC/DC Adapter. AC/DC Adapter Connection. Only use the AC/DC adapter supplied with the device. Plug the AC/DC adapter firmly into the AC/DC adapter connection and confirm that the amber charging indicator status light is visible. It will be green when charging is complete. See **Device Overview**, Power/Batteries section, above.

Touch Screen. The touch screen is the primary method for the user to interact with petMAP XM. The display has several active areas (buttons) for the user to make selections, but some functions (alarm cancelation, trend display and selection of Fahrenheit or Celsius temperature display) are invoked by simply touching the screen in areas without buttons or by touching the temperature display directly. Generally, selections are made by using a momentary *press and release* technique. A press and hold technique on buttons will restore some controls to their OFF position. Some operators find using both their fingertip and their fingernail at the same time easier than just using the pad of their finger tip since this fingernail technique allows better visibility of the text displayed on the button. However, any technique is acceptable as long as nothing sharp is used to press the buttons on the screen.

Time of Day. Time of Day is displayed below the graphical trend in three lines where the top line is the hour of day and the next two lines are minutes.

Mounting Options.

While petMAP XM can be used in the palm of your hand, several types of mounting options may be useful.

Pole Mount

Cage Mount

Table Mount

OPERATING INSTRUCTIONS

Prior to Use — Charging the batteries.

Connect the petMAP XM AC/DC adapter cable to the bottom of the petMAP XM and plug it into a suitable power outlet; the included rechargeable NiMH batteries will charge whether the device is ON or OFF. The Battery Charge LED (viewable thru the "peephole" just above the SD Card slot on the left side of the unit) flashes AMBER when the AC/DC adapter is detected and progresses to solid AMBER while the battery is charging. It turns to steady GREEN when the batteries are fully charged. Optimally, it is best to allow the battery to fully recharge before using the monitor under battery power, but partial charge usage is acceptable if needed. It takes approximately 6 hours to recharge fully discharged batteries.

Prior to Use — Setting Date, Time and Altitude (if needed).

petMAP XM is manufactured in the US Eastern time zone and will generally arrive set for that time and date and set to 1000ft (304 M) altitude. Time is set and displayed with a 24-hour clock where noon is 12:00 hrs and midnight is 24:00 hrs. If a change in time or date is needed, the user must do it manually and the built in clock-battery will subsequently retain the proper settings of clock and calendar, even when the unit is powered OFF and even if the main batteries are discharged. The expected life of the clock-battery is approximately 4-5 years and must be replaced when needed at a petMAP service center.

If needed, setting the date, time and altitude requires that the user enter the setup mode. To enter the setup mode, switch the unit OFF, and then press your thumb or finger on the screen gently and then turn the unit ON while continuing to constantly hold slight pressure on the screen. The setup screen will then display (you must continue holding pressure on the screen while this is happening) and in the upper left corner of the display, a seconds counter will begin incrementing. See Figure 1.

Observe the seconds counter at the top left of the display, and when the count equals exactly 6, release your finger or thumb from the screen—and the date, time and altitude setting screen should appear, as in Figure 2. Touch **Set** repeatedly at the bottom of the display to scroll through the various settings fields. To change a setting, press **Inc** or **Dec**. Once everything is set properly, exit by pressing the **Ext button on the lower left of the display**. The unit will save the date, time and altitude and then power OFF automatically. Switch the unit back ON to observe proper time at the top center of the display.

Figure 1:

Figure 2:

Power ON the petMAP XM. Press and release the ON/OFF button on the right side of the unit to power the device ON. The same button is used to power the device OFF.

Monitoring ECG

The petMAP XM displays an ECG waveform and the HR derived from the ECG signal. The petMAP XM has connections for three surface ECG lead wires and an esophageal probe that has ECG electrodes on it (sold separately). Only one set of ECG electrodes can be used at one time. The user can switch between surface leads and the esophageal probe using a slide switch on the side of the petMAP XM.

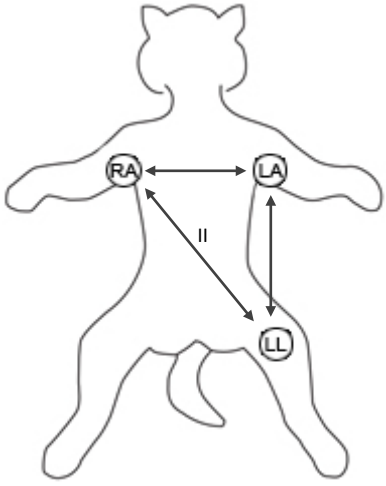
ECG applications include use for surgical, ICU and trauma monitoring as well as use during procedures (imaging, dentals, etc.).

The ECG Module is a single ECG lead (uses 3 electrodes) system, and when used with surface leads attached as directed, the ECG waveform is Lead II and is used for HR calculation. When used with the esophageal electrodes the lead is similar to a Lead II, but it is better referred to as simply the Esophageal Lead since it is not identical to a surface ECG lead II.

3205-0001
Cat Catheter

3207-0001
Dog Catheter

Patient Preparation & Lead/Catheter Placement.



RA = Right arm (white)
LA = Left arm (black)
LL = Left leg (red)

Accurate ECG lead placement is essential to obtaining a clear ECG trace and accurate HR. Proper skin preparation is necessary to achieve good results, like shaving and using plenty of electrode gel. Open the alligator clips on the distal ends of the lead wires to firmly but gently grasp the skin for good contact. Poor

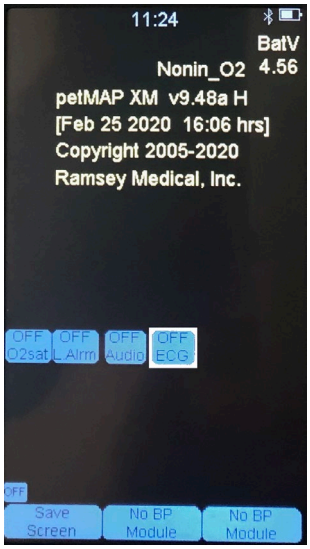
skin electrical contact is the main reason for poor ECG display quality. Alligator clips can also be connected to the Comfort Clips (provided).

Use of Esophageal Catheters vs Surface Lead Wires.

It is often desirable to use an esophageal catheter to obtain ECG, HR and Temperature. Catheters are available for cats (or small dogs) (REF# 3205-0001, green) and dogs (REF# 3207-0001, blue). Both catheters have 4 ring ECG electrodes and an internal thermistor, which gives the catheter an added advantage of detecting temperature.

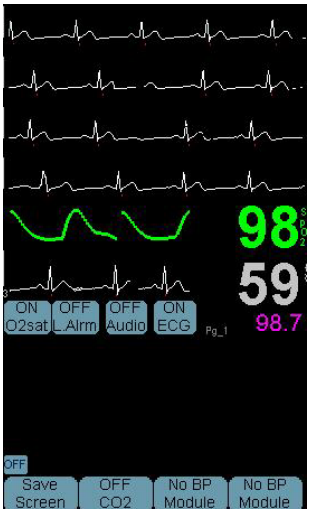
The catheter is carefully and gently inserted into the esophagus and the depth is adjusted to maximize the ECG signal. The best signal is generally achieved when the lower electrode on the catheter is below the heart and the upper electrode is above the heart. Small adjustments of a few CM can greatly improve the quality and amplitude of the ECG signal.

1) Follow the instructions above for placing lead wires or inserting the esophageal probe.



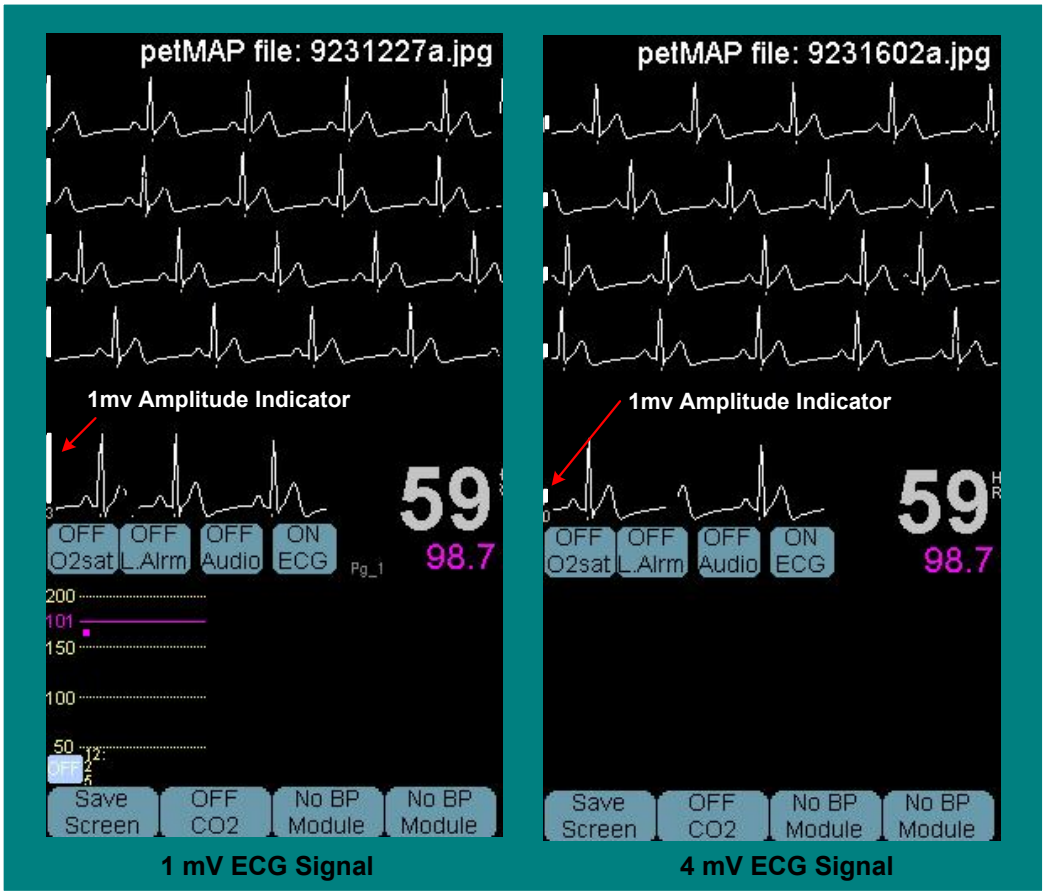
2) Turn ECG on by pressing the highlighted ECG ON/OFF button on the petMAP XM Verify the Green LED on the ECG module near the petMAP XM connector is ON, indicating the ECG module is powered.

3) This is an example of a screen display when the ECG waveform is of adequate size. A little larger is fine (better), but it should be no smaller.



ECG Signal Amplitude

The petMAP XM provides a 1mV (millivolt) amplitude reference indicator to aid the user in evaluating the amplitude of the ECG signal. The 1mV indicator is a single white line on the far left of the ECG trace--its height represents 1mv. By visually comparing the ECG signal to the reference indicator, the user can estimate the signal amplitude level. Below are screenshots showing 1 and 4 mV ECG signals. (note the 1mV reference indicator)

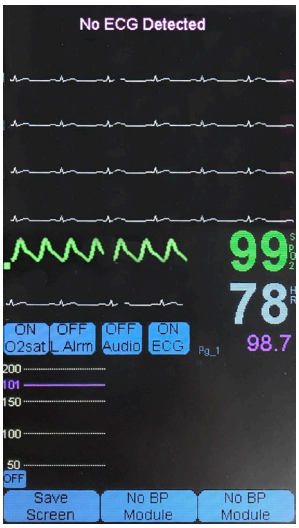


A note about HR: The ECG HR is displayed if the detected ECG HR is judged by the unit to be accurate and within expected limits. Otherwise, the SpO2 HR is displayed and a small 'o' is displayed below the HR label if the ECG is ON to indicate that the HR displayed is not from the ECG, but is from the SpO2.

ECG Alarms

The following alarms can be generated by the ECG feature and displayed on the petMAP XM:

No ECG Detected or O2 Sensor? ECG?



Situation:

- The ECG signal or waveform amplitude is insufficient to be detected.

Probable causes and/or suggestions:

- The patient has no cardiac electrical activity or rhythm.
- The amplitude or strength is inadequate. Adjust the electrodes, and/or increase the gain.

NOTE: The “No ECG detected” alarm becomes “O2 Sensor? ECG?” if at the time the no ECG detected alarm is triggered, there is already a SpO2 alarm active.

ECG Lead OFF? or ECG: Lead? Switches?

Situation:

- Either a lead is off or the ECG module has incorrect switch settings.

Probable causes and/or suggestions:

- Check the ECG leads. Reposition electrodes and add gel to surface leads if necessary.
- Check to make sure that both switches are correct:
  - Esophageal or surface
  - Gain

Other ECG Alarms

Fast ECG or Noise Displayed when HR > 260 BPM

Slow ECG Detected Displayed when HR < 40 BPM

ECG or Patient Problem. A non-specific alarm that could be caused by a potentially lethal arrhythmia or by ECG interference noise. In any event, it always requires user investigation to determine a possible cause and correction.

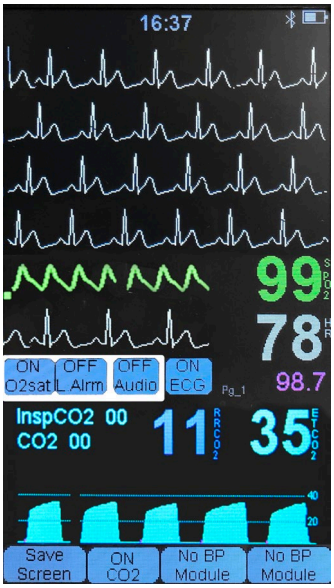
Alarms can be silenced by touching the screen.

The above alarms are self-canceling when the cause of the alarm is resolved.

Measuring SpO2

Theory of Operation

The pulse oximetry function of petMAP XM determines both pulse rate and SpO2 % (percent oxygen saturation) by passing two different wavelengths of low intensity light (one is a visible red and the other is an invisible infrared) through body tissue which has good blood flow to a photodetector. The sensor is divided into two halves: the emitter is the part of the sensor that glows red when powered on; the detector is the opposite part of the sensor and does not emit any light. SpO2 values are based on calculations of the ratios of the differences in absorbance of red and infra-red light between blood saturated with oxygen and oxygen-depleted blood at each heartbeat. The variation of the absorbance of the infrared light during each heart beat is displayed as the O2 pleth trace.



SpO2 & Related Commands

ON O2sat — Press and release to start the measurement of O2 saturation. When the SpO2 monitor is ON, the button will show ON and the plethysmographic waveform will be displayed, along with the SpO2 value and heart rate derived from the SpO2 sensor. It may take 10-15 seconds for the display to stabilize after switching O2 ON.

OFF L.Alrm — Press and release to set the low limit alarm for SpO2. The available settings are 96, 94, 92, 90, 88, 86, 84, 82 and OFF. Press and hold to turn alarm OFF.

OFF Audio — Press and release to set the volume for the SpO2 audible heart rate cardiotachometer. The available settings are ON 1 – ON 5 (5 being the loudest) and OFF. Press and hold to turn the audio OFF.

Requirements for Obtaining Reliable SpO2 Readings

Proper Sensor Placement: The user must place the sensor clip on a relatively thin tissue that has good circulation, such as the tongue, lip, deep in the ear, paw, toe, toe webbing, arm or leg just above the paw, vulva, or Achilles tendon. The tissue being used must be of a thickness and color that allows proper light penetration of the tissue between the two halves of the sensor clip. Darkly pigmented skin or dark fur can prevent proper light penetration and thus prevent O2 measurement. Note that the sensor should NOT be placed on an extremity that has a blood pressure cuff, arterial catheter or intravascular line proximal to the O2 sensor site.

Proper Sensor clamping pressure: If needed and so equipped, the sensor's clamping pressure adjustment should be used to reduce sensor clamping pressure so that the pressure of the sensor does not compress the tissue and prevent good circulation in the tissue between the sensor's two arms. This pressure reduction adjustment is made by using the grey pressure reduction slider (details below) and is often needed when measuring on the ear and tongue of small animals. Specifically, the pressure can be relieved by moving the gray strain relieve slider towards the sensor so that clamping tension is placed on the rear

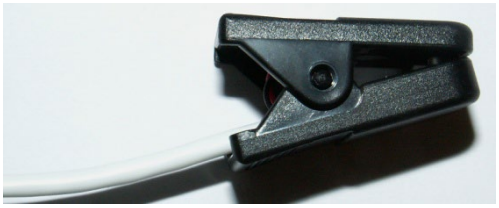
portion of the clip by the two sensor wires. This pressure on the rear portion of the sensor reduces the pressure on the sensor jaws which will prevent the sensor pressure from cutting off the circulation in the tissue between the sensor jaws. However, care should be taken to maintain just enough pressure to hold the sensor in place. (see lower left photo below which shows the slider snugged up close to the sensor to relieve pressure on the ear)

No subject motion: The animal must be motionless. Any motion will affect the stability and accuracy of the readings, and continuous motion such as shivering will prevent accurate measurement. Generally, SpO2 readings are best taken on anesthetized patients or patients that are not moving.

Reset O2 electronics: After any change in the sensor positioning, the O2sat ON/OFF button should be cycled OFF and then back to ON. This allows the O2 electronics to restart using the new sensor/tissue setup. It will typically take 15-20 seconds to get a first reading and up to 30 seconds for the readings to stabilize. During monitoring, disregard the SpO2 readings if the pleth trace is not stable and/or if the patient's heart rate is not reasonably correct. Either of these conditions requires sensor adjustment and resetting the O2 switch to OFF, then ON.

SpO2 Instructions

Some configurations of petMAP XM are capable of measuring SpO2. Currently, petMAP XM supports two technologies for SpO2 measurement as outlined in the following table:

Technology	Product Code	Sensor
Analog O2	7502	
Nonin O2	7504	

While the technologies are different, the instructions for use are the same. The unit will contain the necessary electronics and be equipped with a "clothes pin" type of SpO2 sensor. Generally, the best place to attach the O2 sensor is the tongue, but the ear, vulva or pedal area may be tried if the tongue is not available. Make sure the tongue is moist for best results.

To measure SpO2, first place the sensor on the patient as described above and then press the O2sat button to switch it ON. When activated, the button will show ON and the plethysmographic waveform and signal strength bar will be displayed, along with the SpO2 value and the heart rate value derived from the SpO2 sensor. After switching the O2 monitoring function ON, it may take 10-15 seconds for the system to become stable and display readings. Take care that the tongue (or other monitored site) is not in motion of any kind, since this will prevent acceptable monitoring accuracy.

A low alarm for SpO2 can be set by repeatedly touching the LoAlarm button next to the O2sat ON/OFF button. The available settings are 96, 94, 92, 90, 88, 86, 84, 82 and OFF. As with BP alarms, if the measured value exceeds the alarm limit set, the unit will both alarm (starting with alerting chirps and 20 seconds later continuously sounding) and display a message at the top of the display. Silencing alarms is done by simply touching the display in an area other than the buttons.

The user also has the option of setting an audible SpO2 heart rate cardiotachometer by pressing HR Audio. The available settings are ON1 – ON5 (5 being the loudest) and OFF.

Causes of Inaccurate SpO2 Measurements

Incorrect application of the sensor: move to alternate site; reduce pressure using gray slider (if equipped); make sure to place the sensor on an extremity that does not have a blood pressure cuff, arterial catheter or intravascular line proximal to the O2 sensor.

Tissue too thick or too dark (i.e., not enough signal): move to thinner site; wet fur and part to allow better light transmission; clip fur.

Tissue too thin (ie, too much signal): if the tissue is very thin like a cat's ear and tongue, move to a thicker tissue site.

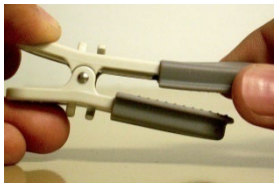
Excessive amount of ambient light: shield the sensor by covering it with a lightweight opaque material.

Subject motion: reduce motion by appropriate means.

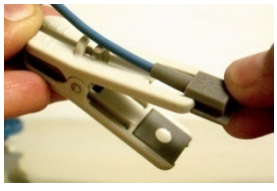
SpO2 Sensors

As previously outlined, petMAP XM has technology options for SpO2 measurement. The sensors are different, depending on the technology purchased. If petMAP XM was purchased with the Analog SpO2 option (#7502), it will include a SpO2 sensor and two clips. One of the clips is larger; the other smaller. The sensor can be removed from one of the clips and attached to the other—the user must decide which clip is best for the clinical situation. To switch clips, follow these directions:

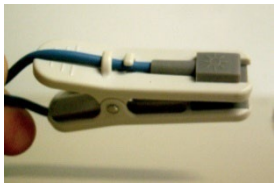
1) Remove the rubber covers by sliding them off the end of the clip.



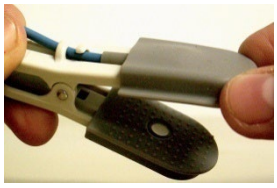
2) Carefully slide each sensing element past the end of the clip holding them in place. It may be necessary to release the cable leading up to the sensing elements from their securement points on the clip.



3) Slide the sensing elements onto the other clip, ensuring that the tabs slide into the notched areas at the end of the clips and that the sensing elements are facing inward. Secure the cable around the securement points.

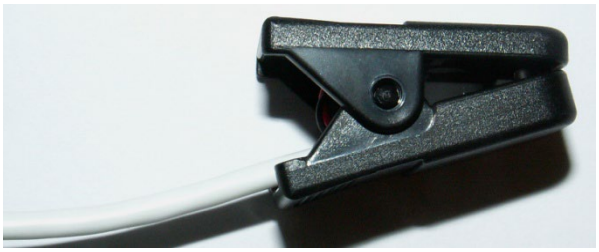


4) Install the rubber covers.

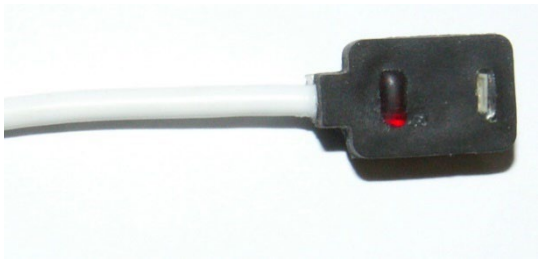


Store the removed clip in an area where others will know where to find it.

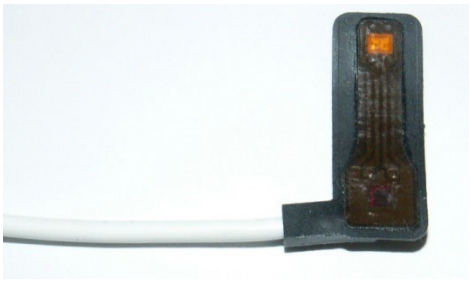
If petMAP XM was purchased with the NONIN SpO2 technology (#7504), the sensor supplied with the unit will look like this:



Additional sensor types are optionally available for purchase.



Nonin Transflectance Sensor #9018



Nonin Flex Sensor #9019

SpO2 Alarm.

When activated by the user, the petMAP XM will audibly alarm when the selected alarm settings are exceeded. When the O2 sensor alarm and/or the low SpO2 alarm conditions are resolved, the alarms will self cancel.

The alarms begin as a subtle chirping sound and progress to a louder continuous tone after about 20 seconds. All alarms are canceled by the user by touching the screen anyplace, but make sure to only touch a button when it is desired to make a change in that button's function.

Low SpO2 Alarm

Measuring Temperature

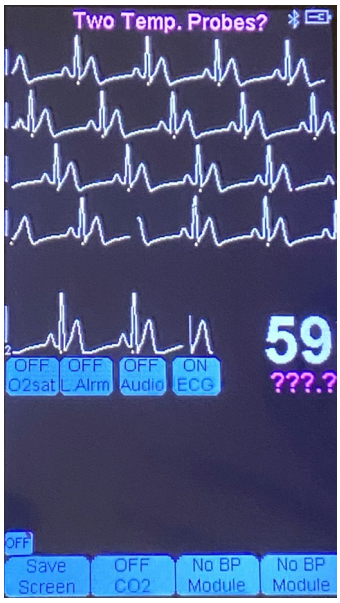
All configurations of petMAP XM are capable of monitoring temperature, provided that the proper accessories are purchased. The necessary accessories include a temperature extension cable (#9014) and either an esophageal probe (#8040) and/or a rectal probe (#8041). The temperature extension cable is 2 meters long and serves to connect the probe to the device more conveniently than using the temperature probe plugged directly into the device.

To monitor temperature, carefully insert the probe into the patient using traditional clinical procedures, and connect the probe to the extension and the extension to the top of the unit. Temperature automatically displays once the unit detects that the temperature is within the physiologic range. Temperature can be displayed in either degrees F or C but it is set initially to display degrees F. To change between degrees F and degrees C display, simply press and release directly on the currently displayed temperature value to toggle between Fahrenheit and Celsius Modes. Temperature is also trended in the data display area in purple.

Temperature may also be monitored using our ECG electrode equipped Esophageal Catheters. They are available for cats (or small dogs) (REF# 3205-0001, green) and dogs (REF# 3207-0001, blue). Both catheters have 4 ring ECG electrodes and an internal thermistor, which gives the catheter an added advantage of detecting temperature.

⚠ WARNING: Care must be taken to connect only one temperature probe, using an #8040 or #8041 connected to the temperature connection at the top of the petMAP XM or using a #3205-0001 (green) or #3207-0001 (blue) Esophageal catheter connected to the “ESO” receptacle on the side of the petMAP XM.

Attempting to measure temperature with two temperature probes attached will result in an Alarm as shown:



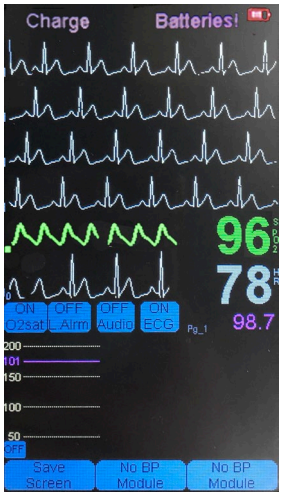
System Alarms

petMAP XM has built in System Alarms which may sound and display when the device detects conditions that need attention. System Alarms are not user selectable and are enabled by default.

The System Alarms include:

> **Low Battery Alarm** – The message “Low Batt” is displayed on the screen and the battery level indicator will turn RED. When this warning is displayed, the unit will shut off automatically after a few minutes of continued use, but BP may not be measurable even though SpO2 is still functioning. When this occurs, the AC/DC adapter should be plugged in to prevent automatic shutdown, or the unit should be taken out of service and recharged.

The system alarms may also be silenced by touching anywhere on the screen, but take care not to touch a button unintentionally when canceling an alarm condition.



Low Batt Alarm

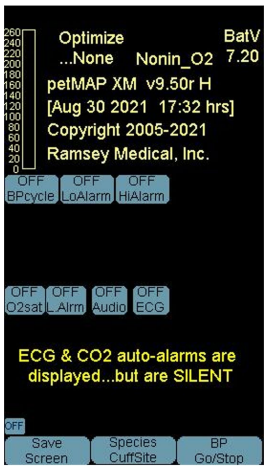
System Alarm Silencing

The audio alarms that are sounded with the detection and display of a system alarm may be silenced by selecting the “set Auto-Alarms SILENCE” option in the setup mode, option 9.

Note: To enter the setup mode, switch the unit OFF, and then press your thumb or finger on the screen gently and then turn the unit ON while continuing to constantly hold slight pressure on the screen. The setup screen will then display. Release the Touch Screen when the desired option matches the counter in the upper left of the display.

Once the System Alarms are silenced, they may be set back to Audible, by selecting the ““set Auto-Alarms AUDIBLE” option in setup mode.

The status of the audible system alarms is displayed at the bottom of the display when the petMAP XM is powered ON



SD Card Functions

The petMAP XM contains an SD card slot which can be used to automatically record all vital signs data on a user supplied SD card for archiving directly to the SD card and for optionally transferring to a PC/MAC for long term storage, display and/or printing. The SD card can also optionally record an image of the screen at any time by pressing the “Save Screen” button and/or by responding to the prompt at the time the unit is switched OFF by the user.

To use these SD card storage functions a 2, 4, 8 or 16 GB SD card must be properly inserted into the SD card slot. The card must be inserted with the card label facing up when the unit is being viewed normally and pressed firmly into the slot such that it is entirely within the slot and no portion is protruding from the side of the petMAP XM device. To remove the card, press it firmly further into the slot and then release pressure and the card will eject automatically. The mechanical function of the SD card in the petMAP XM is the same as in cameras that use SD cards for picture storage and will be familiar to most users.

It is important to note if using a 2 GB SD card, it can only accommodate 512 files on a card or errors will occur. For a 4 GB card, only 1024 files can be written on it or the same errors will be created. Should this happen, the SD card must be removed and some number of data or image files erased or a new SD card used in its place. If there is difficulty after changing the SD card, it is possible that the petMAP XM must be hard powered OFF (by holding the ON/OFF button down for 10 seconds, followed by a new power ON button press) or the unit will not function. For 8 and 16 GB cards, there are many more files available, but writing time will be longer than with the smaller SD card sizes, particularly when using a 16 GB card.

Checking the available files on the SD card is easily done at the same time as when copying data from the SD card to a PC/MAC. For many users, this restriction on the number of files with a 2 or 4 GB card will not be a problem if the SD card is replaced every year. However, if the device is used in an active clinic or very active OR setting and 2 monitoring sessions are done each week day and the screen image is saved each time… in a year of use, there would be too many files for even the 4 GB SD card to hold the data, ie: 260 days X 2 sessions/day X 2 files/session = 1040 files, and thus this number would slightly exceed the 1024 allowable file count on a 4 GB SD card.

During petMAP XM use, the data for each measurement or monitoring session is automatically captured in a .TXT file (described later in this manual) if there is an SD card in the unit. The screen image file capture (described below) is enabled by the user either by pressing the “Save Screen” button or at power OFF time. Not capturing the screen image allows a single SD card to last longer before needing replacement, but the potential usefulness of the recorded screen image will be lost. It is suggested that if recording is important to the user’s practice that SD cards be checked often and the data archived on a PC/MAC before files are erased on the SD card to create more room on the card.

Using the SD Card to update petMAP XM with new software/firmware:

To install updates of the firmware/software in the petMAP XM requires several steps, the first of which will result in the upgrade files being copied from the PC/MAC to an SD card. The SD card must be a 16 GB or less in capacity; it is OK to reuse SD cards that have been used previously in the petMAP XM and which may have old update files or old data files on them. After the SD card is loaded with the update files using a PC/MAC, the card is then used to update the software/firmware in the petMAP XM unit. This process is fully described in the steps below.

Firmware/software Update Procedure:

1) If you are updating from a new SD card that already has the new firmware files on it, skip to step 2) below. If you are updating from files sent to you attached to an e-mail (or copied from the petMAP website), please copy the two files that are attached to the update announcement e-mail to an SD card using your PC or MAC. If there are already files with the same filename on your SD card, copy over them with the new files and do not try to save the old update files with the same name. Once the files are copied and confirmed to be present on the SD card, remove the SD card from the PC/MAC and proceed to step 2.

2) Before doing the actual update, make certain that the petMAP XM unit has adequate battery charge (1/3 charge or more) or is plugged into the AC/DC adapter. Then make certain that the petMAP XM unit is switched OFF. Insert the SD card containing the upgrade files into the petMAP XM unit.

3) Once the SD card is securely in the unit, switch the power to ON with a single press and release of the ON button. Nothing audible or visual will happen after pressing and releasing the power button and the screen will remain blank for about 15 seconds while the new firmware is automatically installed.

4) After 15-20 seconds, the unit will complete the update and then automatically startup normally and display the new firmware version on the top screen. Confirm that the displayed firmware version matches that which was specified in the email you received with the two update files or in the documents you received with the preloaded update SD card you received from the company.

5) Once the unit is updated, the SD card can be left in the device and used for data storage since the update will only take place one time for each new set of update files. That is, after each new update process, the petMAP XM unit recognizes at each new power ON that it is already loaded with the same update files that are on the SD card, and consequently it does not do another update until it detects that new update files are present on the SD card.

6) If the unit fails to function after an attempted update, remove the SD card, hold the ON/OFF button depressed for 10 seconds (called a hard power OFF), and then reinsert the SD card and press the ON/OFF button once and wait for 15 seconds. If it still fails, restart at step 1) and try again. If unable to successfully install the update after repeating the process, contact the company for assistance.

Data Recording and Transfer—SD Card

File Name Format for Data .txt Files

If an SD card is inserted into the SD card slot, files of the data measured at each measurement session will be recorded in a file on the SD card in the .txt format (that is, in a simple text format). The filename naming convention is comprised of the MonthDayHourMinute of the time when the file is actually written to the SD card. For example, if the last BP determination of a session was done August 28 at 15:36 hours; the name of the text file containing all the readings on the SD card would be named: 08281536.txt (*the naming convention for the Save Screen .jpg files is different; please refer to that section for format*). Since the year is not a part of the file name, if multiyear retention of the saved data is important, the SD card should be replaced at least once a year to prevent the possibility that a previous file would be over written by a new one saved at the exact date and time as an old one already on the SD card from a previous year.

Measurement and Monitoring Data Recorded in Text on the SD Card

During use, the information generated in each BP determination will be recorded immediately after each determination in a single line of the text file on the SD card. Care should be used when removing the SD card so that it is not being done right at the end of the determination since this could corrupt the file being updated, and potentially harm the SD card itself. (See note at the bottom of this section for more information on corrupted files or SD cards).

The format of text output recorded on the SD card is as shown in the example below. (In the top line of column labels, Dys stands for diastolic). Note that the HR obtained during the BP determination is based on the pulsations in the limb with the BP cuff.

```
HR:MN:SC  Sys Dys (MAP) HR   Temp     O2  HR    CO2 RR }If CO2
18:49:24  202 148 (168) 080  101.8    94 080     xx xx }in use
18:49:54                              94 080
18:50:18  202 147 (169) 082  101.8    93 080
18:51:07  202 147 (168) 081  101.8    94 080
18:51:56  199 149 (168) 080  101.8    94 080
18:52:50  201 147 (168) 080  101.8    94 080
18:53:38  201 149 (168) 080  101.8    94 080
18:54:27  202 147 (167) 079  101.8    93 080
18:55:00                              96 080
18:55:10                              93 080
18:55:23  200 149 (168) 081  101.8    94 080
18:56:23  201 150 (168) 081  101.8    94 080
18:57:24  202 147 (169) 078  101.8    93 080
18:58:19  152 099 (113) 079  101.8    94 080
18:59:07  147 102 (116) 080  101.8    94 080
18:59:50  153 100 (115) 081  101.8    95 080
19:00:13                              95 080
19:00:36  147 098 (113) 081  101.8    94 081
19:01:25  147 101 (114) 080  101.8    94 080
19:01:59                              93 080
19:02:12  153 099 (115) 079  101.8    94 080
19:02:46                              95 080
19:03:04  147 104 (115) 080  101.8    95 080
19:03:28                              93 081
```

```
19:03:38                                  95 080
19:03:53  149 100 (115) 081  101.8       94 080
19:04:45  152 099 (114) 080  101.8       94 080
19:05:09                                  93 080  ...
```

Importing text file into Excel

The text data file can be archived and printed directly from a PC/MAC without any changes. However, if graphics are desired, the text data file can be imported into an Excel worksheet easily by following the steps below. The steps in this example are for Excel 2007. If you have a different version of Excel, the data can also be imported, but the steps may differ a bit.

1. Insert SD card into designated slot on computer.

2. Open a blank Excel worksheet.

3. Select the Data tab in the tool bar of the Excel worksheet. In the *Get External Data* section of the tool bar (right most section) select **From Text**.

4. A window will pop up for you to select the text file you are importing. Once you have selected the file, click Open.

5. The next window that pops up will ask you to select the original data type and in what row to begin the import. Select Fixed width for the original data type, and row 1 to start the import. Click Next.

6. The following window will allow you to adjust the widths of the columns if you feel necessary. Click Next.

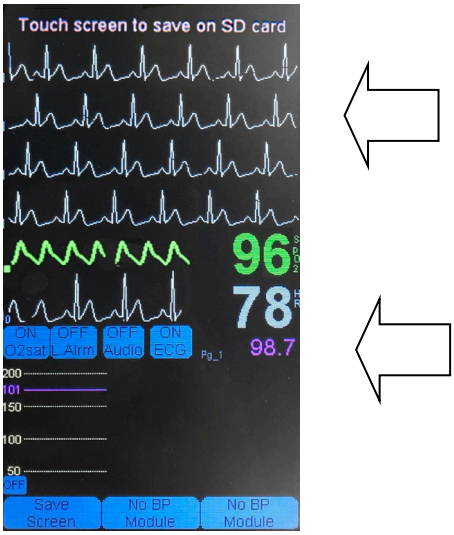
7. The last window allows you to select the data format for each column. As a default, all columns are set to General. It is recommended that you select the (MAP) column by clicking on it, and at the top right of that window selecting **Text.** This adjustment is made so the MAP values will show up in a parenthesis and not as negative numbers. Click Finish.

8. A small *Import data* window will pop up. Select okay.

Your data is now imported, should appear on the worksheet and can be graphed using normal Excel graphing commands.

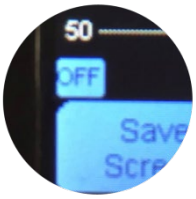
Screen Image Capture in JPG Format (.jpg) to the SD Card

If there is an SD card in the SD card slot, the user can save the screen to a .jpg file by pressing the Save Screen button at any time or by setting the automatic screen save option (described below). Also, whenever the petMAP XM unit is switched OFF using the power button on the upper right of the unit (press and release), just before actually shutting the unit OFF, the screen will display a message at both the top and bottom of the screen: "Touch screen to save to SD card". When the user sees this message, if the user then presses any place on the screen within 3 seconds, the press will signify that the user would like an image of the screen at that time to be written to the SD card. After the press, the unit will remain ON while copying the image to the SD card, a process that takes about 2-3 seconds. After creating the screen image .jpg file on the SD card, the unit will automatically switch its power OFF and the screen will go blank as the unit is now OFF. The file created on the SD card is in .jpg format which is an image format that is easily read and displayed using a PC/MAC. If the user does not want to copy the screen image to the SD card, by not touching the screen for 3 seconds, the unit will switch its power OFF, and the screen image will be lost forever. Note that the option to save the screen image onto the SD card is available to the user at any time by pressing the "Save Screen" button on the bottom left of the unit.



Automatic Screen Save

If the petMAP+II has an SD card in the card slot, there will be a very small button on the lower left of the screen, just above the "Save Screen" button (see figure 1). This button controls the automatic screen save function and is OFF at power ON. By pressing the button (since it is so small, a fingernail or the tip of a hemostat or pencil can be useful if need be), the automatic save intervals are selected.



The button will change sequentially after each press as follows:

Off Default power On condition, no automatic screen saves.

qBP Saves the screen image automatically in JPG format after every BP determination.

q3M Saves the screen image automatically in JPG format every 3 minutes.

q2M Saves the screen image automatically in JPG format every 2 minutes.

q1M Saves the screen image automatically in JPG format every 1 minute.

Wf- This selection saves waveforms displayed on petMAP to the SD card. Waveforms are saved as .wav files that can be viewed on a PC.

Wf+ This selection is identical to Wf- but, in addition, will automatically save screen after each BP determination.

File Name Format for Save Screen .jpg Files

When the screen is saved to the SD card, the file name is constructed by using the date and time that the screen was saved and the file was created and written to the SD card. The file name format is MonthDayHoursMinutes, where the months are represented by the numbers 1-9 for January-September, and 'O' for October, 'N' for November, and 'D' for December, and the hours and minutes are each 2 digits numbers. For example, a screen saved on April 14 at 2:18pm would be named: 4141418A.jpg The 'A' is appended to signify that this is the first screen saved during the date and time of 4141418. If the user saves the screen again during the time 4141418 (ie, during the very same minute), the screen image would be saved with the file name 4141418B.jpg, and then 4141418C.jpg and so forth. In this way, multiple screen images can be saved and uniquely named within the same minute if desired. As another example, if the date and time of the screen save is December 9 at 8:30 am, the file name would be D090830A.jpg. As with the .txt files, since the year is not a part of the file name, if multiyear retention of the saved data is important, the SD card should be replaced at least once a year to prevent the possibility that a previous file would be over written by a new one saved at the exact date and time as an old one already on the SD card from a previous year.

(Note regarding SD card data corruption: Should SD card data corruption inadvertently occur no matter what the cause, sometimes the data can be recovered by responding affirmatively to the operating system's question regarding "Do you want to…Scan and fix files on the SD card" when the SD card is placed into a PC/MAC. This often "fixes the SD card", but it is not always successful.

Should the SD card be unreadable by the PC/MAC, it can usually be reformatted successfully and used again, but this permanently removes all data on the SD card and this reformatting must be done only by an experienced and knowledgeable computer operator! Anyone doing this reformatting of the SD card MUST DO IT VERY CARFULLY AND CARE MUST BE TAKEN TO RE-FORMAT SPECIFICALLY THE SD CARD…AND NOT BY MISTAKE REFORMAT ONE OF THE COMPUTER'S HARD DRIVES WHICH WILL DESTROY ALL DATA ON THE PC or MAC!!! Unfortunately this user mistake sometimes happens and it is catastrophic!
Be careful.)

petMAP XM Bluetooth

The petMAP XM has integrated Bluetooth. It may be paired with a PC, Android or IOS device which can display petMAP parameter data when running the petMAP Remote Display Application.

Contact CardioCommand Customer Service to obtain the petMAP Remote Display Application.

petMAP XM USB

The USB connector at the top of the petMAP XM unit is available for advanced users who want to monitor the data generated by the unit during a monitoring session on a local computer monitor in real time.

The data output to the USB connector is identical to the text data that is written to the SD card and described above with an example output shown in that section; however, image data is not available on the USB connector.

The USB cable must be connected to the unit and to a PC/MAC. However, to display and/or capture the data using the USB, the user must use a terminal type program, such as HyperTerminal, and the proper communications port for the connected USB client device (ie, petMAP XM) linked to the specific terminal program being used. Although such terminal programs for connecting computers to USB and serial communications devices like petMAP XM are widely available (some are free on the Internet), they all require user setup which can be very tricky, and may be beyond many good computer users skill set. It is suggested that if this USB function is desired, a computer person familiar with the specific program used (or at least the class of programs) be consulted to set up the system appropriately.

Setup parameters for a terminal program to connect to a petMAP XM are: 115.2 kBaud, 8 data bits, 1 stop bit, no parity, no flow control.

Although USB (and Bluetooth) provide capability that may be desirable in some settings, it comes at a cost in terms of complexity of setup and computer and petMAP XM coordination. Though the petMAP XM data is not displayed in realtime using the SD card for archive purposes, for most users, the SD card provides a simpler way to display and archive petMAP XM data on a computer rather than using the USB connection function.

MAINTENANCE

Device.

Cleaning petMAP XM: As needed, clean the device with a soft cloth dampened with warm water and a mild detergent solution. Gently rub the soiled area until clean. Use a soft cloth to dry the device. Do not use abrasive cleaners, alcohol or cleaning solutions which contain alcohol. Do not immerse in water or other liquids. Care should be taken to prevent water or cleaning solution from running into or onto the screen, connector openings or crevices.

Use 0.1% bleach followed by a wipe with regular water to disinfect the device. If it is necessary to remove blood or body fluid, use a more concentrated 1% bleach solution.

As needed, clean the display window using a soft, lint free cloth sprayed with an alcohol free glass cleaner. Do not use paper towels as they may scratch the surface.

SpO2 Sensors.

As needed, the sensor may be surface cleaned. Remove the cable from the unit. Use a soft cloth moistened in water and a mild soap solution and then wipe it with a 70% isopropyl alcohol pad. Allow the sensor to dry prior to placing it on a patient.

The SpO2 cable may be cleaned using a soft cloth dampened with a germicidal solution.

Temperature Probes/Extension Cable.

Clean with a soft cloth dampened with a mild soap solution and/or a germicidal solution, as needed.
Do not autoclave.

Battery Replacement.

PetMAP XM is configured with a AC/DC adapter and 4 AA NiMH rechargeable batteries. The device can operate from charged batteries (the approximate remaining battery life is displayed in an icon at the top of the display) or from line power using the AC/DC adapter. When the AC/DC adapter is plugged in, the device charges the batteries at the same time as supplying power for its operation.

To replace the batteries, follow these steps:

1) Unplug the petMAP XM AC/DC adapter.
2) With the unit powered OFF, simultaneously press the battery cover latch while pressing down on the cover near the latch. Slide the cover away from the unit.
3) Remove the batteries.
4) Noting the polarity, insert the replacement batteries.
5) Slide the cover back into place, confirming that the latch has engaged.

TROUBLESHOOTING

Unit will not turn ON, or shuts OFF, after attempting a power ON .

1. If the unit is new, make sure the battery insulator strip has been removed.
2. The batteries are likely low or defective. Plug the AC/DC adapter in and confirm that the AC/DC adapter indicator is yellow (indicating it is charging, or green, indicating that the batteries are fully charged) by looking through the "peephole" on the left side of the unit just above the SD card slot.
3. Hard power OFF reset: Hold the power switch down for 10 seconds, then release it, and then press it once again to turn the device ON. This is like rebooting a computer and should be done anytime there is a problem with the operation of the unit.
4. Test with different batteries. Use other, known good AA batteries, NiMH, Alkaline or lithium to determine if the existing batteries are possibly defective. However, do not attempt to charge any battery type except for NiMH type batteries or a dangerous condition may be created.
5. If charging the unit and then doing a hard power OFF reset does not fix problem, contact Customer Service.

Difficulty acquiring SpO2 readings.

1. SpO2 measurements may be adversely affected in the presence of high ambient light. Shield the sensor area (with a surgical towel, for example) if necessary.
2. Electrocautery, or other ESU-type device, can cause electrical interference with proper SpO2 function, the same as an ESU-type device often does to an ECG signal. If present, switch OFF the SpO2 and restart it after ESU use has been discontinued.
3. The tongue is usually the best site for sensor placement. Make sure the tongue is moist, since a dry tongue may not provide good readings.
4. Confirm that the rubber O2 sensor covers (if equipped) are securely in place. If they have slipped, they can cover the sensing elements resulting in a failure of the sensor to function. Some users remove the covers entirely to prevent any chance of the cover slipping and covering the sensing elements.

WARRANTY/SERVICE

Warranty

Ramsey Medical, Inc. warrants that the **petMAP XM** device, when new, is covered by a one year warranty against defects in materials and workmanship. All warranties begin at the date of original purchase from CardioCommand, Inc. or its authorized distributors.

PetMAP XM accessories, including blood pressure cuffs and SpO2 sensors are warranted to be free from defects in materials and workmanship for 90 days.

Our obligation under this warranty is limited to repairing or, at our option, replacing defective parts or entire units without charge, if such defects occur as a result of normal use with prompt notification.

Damage resulting from inappropriate use or physical abuse is not covered by the warranty.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THOSE EXPRESSLY LISTED ABOVE. IN ADDITION, THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Customer Service & Repairs

All units returned for service and/or repairs (warranty and non-warranty) must have a RMA obtained by calling Customer Service at CardioCommand, Inc. The RMA number obtained should be written on the outside of the shipping container and the device should be sent to:

CardioCommand, Inc.
4920 W. Cypress St., Ste. 110
Tampa, FL 33607

Phone: 800-231-6370
813-289-5555

Fax: 813-289-5454

Please include a complete description of the difficulty with all units returned for service.

SPECIFICATIONS

For Veterinary Use Only

Parameters Measured:

Heart Rate, both by ECG and SpO2 (if configured)

Sp02

Temperature. Esophageal or rectal probes are available

Heart Rate Range from ECG: 20 – 240 BPM, +/- 3% or 3 BPM, whichever is greater.

Heart Rate Range from SpO2: 40 – 240 BPM, +/- 5%

SpO2 (if equipped):

SpO2 displays a value within the range 40 – 100%, display resolution: increments of 1%

SpO2 accuracy: +/- 3% at 80-100%; <80%, undefined.

Temperature

Range: 29°C – 46°C, display resolution of .1°C (84°F - 115°F)

Accuracy: +/- .2°C when connected to a YSI compatible thermistor probe.

Power: 4 AA batteries. Supplied with Rechargeable NiMH. Capable of using alkaline or lithium (these batteries are not rechargeable and charging should not be attempted as a dangerous condition may result. See Warnings).

Battery Life: NiMH batteries typically can be full-discharge/full-charge cycled several hundred times.

Operating Environment:

Temperature: 10°C – 40°C (50°F – 104°F)

Humidity: 15% - 85%, non-condensing

Altitude: -500 feet (152 meters) below sea level to +8000 feet (2438 meters) above sea level

Storage Temperature: -20°C to 55°C (-4°F to 131°F)

Dimensions: 6.26”H x 3.61” W x 1.22”D

Weight : 1 pound (0.46 Kg, approx, with NiMH batteries)

HISTORY OF REVISIONS

Document #/ Revision	Date	Comments
R400375-A	12/07/2021	Manual Released
R400375-B	06/29/2022	Update ECG HR spec to 240bpm
R400375-C	11/08/2022	Manual updated with UKCA mark and standard. ECO 221103

petMAP XM is developed by:

RAMSEY MEDICAL INC

Tampa, FL 33607
USA

petMAP XM is manufactured, distributed and serviced by:

cardio COMMAND

4920 W. Cypress St., Ste. 110
Tampa, FL 33607

For Customer Service contact CardioCommand, Inc.

Phone:	(800) 231-6370
	(813) 289-5555
Fax:	(813) 289-5454
Website:	www.petmap.com
E-mail:	support@cardiocommand.com

UK CA CE

R400375-C
221103

Manual Revision C
11/08/22