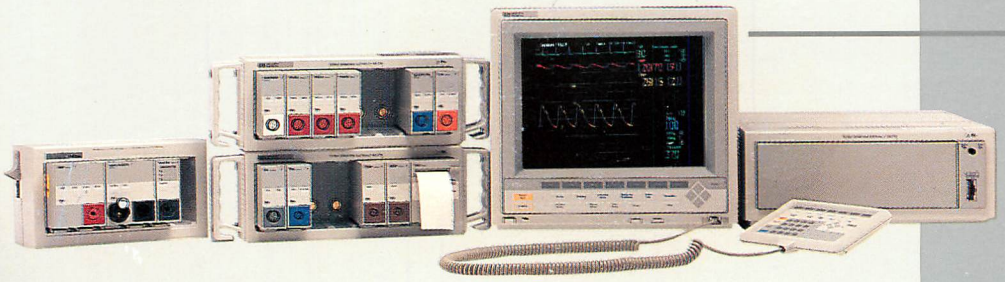
HEWLETT® PACKARD

User's Guide

HP Component Monitoring System Anesthesia/Standard/Neonatal



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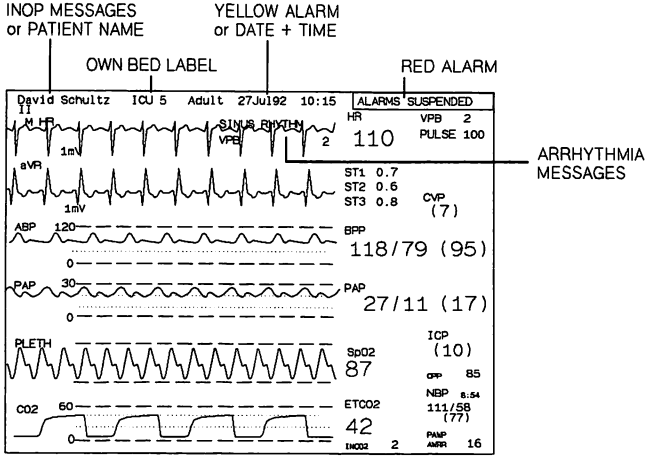
CE **Declaration**

The M1165A/66A Component Monitoring System, and the plug-in modules used in this system that carry the CE mark, comply with the requirements of the Council Directive 93/42/EEC of 14 June 1993 concerning medical devices.



To return to the main screen:

Press (Main Screen).

To stop patient monitoring, but keep all settings and patient data information:

Press (Alarms/Volume) → `Monitor Standby`.

To resume patient monitoring:

Press any control panel key, except (Suspend).

This User's Guide contains information on all the most commonly performed tasks for the Release F HP Component Monitoring System (CMS), HP Anesthesia Component Monitoring System (ACMS) and HP Neonatal Component Monitoring System (NCMS).
Please refer to the Release F User's Reference Manual, Volume I and II for full details.

Keys on the control panel are all printed on a white background, for example Procedures.
Keys on the screen are all printed on a shaded background, for example Print Calc.
Cards inside the first row of tabs contain general information about the monitor.
Cards inside the second row of tabs contain information about specific parameters.
Where relevant, troubleshooting information for these parameters is also given.

Problem	Possible Cause	Corrective Action
Wave is **not** on the screen	Transducer is not plugged in.	Plug in transducer.
	Wave is not switched on	**Switch on wave:** 1. Press (Module Setup) → `Parameter On/Off` 2. Press `Select Parameter` (to highlight the parameter). 3. Press `Parameter On/Off` . (to switch wave on)
	The monitor is not showing the display required.	**Change to the required screen display:** 1. Press (Change Screen). 2. Press `Screen A` , `Screen B` or `Screen C` .

Basic Troubleshooting (cont'd)

Problem	Possible Cause	Corrective Action
Wave is **not on the screen**	The wave has **not** been assigned to a channel.	**Assign wave to a channel:** 1. Press (Monitor Setup) → `Display 1 Setup`. 2. Press `Select Channel` (to highlight required channel). 3. Press `Assign Wave` (to highlight wave). (Change speed and # of waves on screen or wave layout as required.)
Numeric is **not** on the screen.	Parameter/Numeric is **not** switched on.	**Switch on Parameter/Numeric:** 1. Press (Module Setup) → `Parameter On/Off` 2. Press `Select Parameter` (to highlight the required parameter). 3. Press (Monitor Setup) → `Numeric 1 On/Off`.

To turn ECG, Respiration and NBP on:

1. Press (Module Setup) → `Parameter On/Off`
2. Press `Select Parameter` (to highlight the required parameter).
3. Press `Parameter On/Off` (to turn the required parameter on).

To turn all other parameters on:

Plug the transducer into the parameter module. (Parameter is turned on automatically.)

or when the transducer is unplugged

1. Press (Module Setup) → `Parameter On/Off`
2. Press `On/Off Setup` (to turn the required parameter on)

To enter a parameter setup window:

Press key on module which has parameter name (e.g. (ECG))

or

1. Press (Module Setup).
2. Press softkey with parameter name (e.g. `ECG`).

To change a setting in a Task Window:

Move the highlighting by pressing:

the softkey for the action you wish to perform (e.g. `Change Lead`)

or

the highlighted arrow keys: (▶), (◀), (▲) and (▼).

To switch Split Screen Trending on:

1. Press Change Screen
2. Press Split Screen
   (surrounded by a highlighted frame, if selected)

To switch Split Screen Trending off:

1. Press Change Screen
2. Press Split Screen
   (surrounded by a highlighted frame, if selected)

Not available on the ACMS

To display the oxyCRG:

1. Press (Change Screen)
2. Press `oxyCRG Screen` (surrounded by a highlighted frame, if selected)

To change oxygen channel (on the display and recording) and recorder speed:

1. Press (Monitor Setup) (Press `More Choices` if required)
2. Press `oxyCRG Setup`
   - Press `Change Channel` to change the oxygen channel for recording and displaying SpO_2 or $tcpO_2$.
   - Press `Change Speed` to change the recorder speed

To make an oxyCRG recording:

1. Press (Realtime Record)
2. Press `Preset Recordng` (if available)
3. Press `oxyCRG PLUG-IN` to produce the recording

To configure oxyCRG to be the alarm recording:

1. Press (Monitor Setup)
2. Press `Recordng Setup`. (Press `More Choices` if required)
3. Press `Delayed & Alarm`
4. Press `Change AlRecTyp` to highlight "oxyCRG"

Alarms/Volume - to turn *all* alarms off/on and *individual* alarms on/off, adjust alarm limits, show the alarm messages and go to standby mode.

Monitor Setup - to change settings such as screen displays and patient type, setup OxyCRG[1] and recording and make general configuration changes.

Trends/Calcs - to view data in graphs and tables, do physiological calculations in graphs, print reports and mark events to view in graphs.

Other Patients - to view data and alarms between beds.

Procedures - to perform Cardiac Output and Wedge Pressure measurements, make ST segment monitoring adjustments, review ST wave segments, admit and discharge patients, or end a particular patient case and transfer patient data.

Module Setup - to set up and change settings for all modules that are plugged into the CMS.

1 Only available in Standard CMS.

Middle Row of Keys on the Control Panel

Silence/Reset - to silence an alarm and, if cause has been eliminated, reset it.

Suspend - to switch all alarms on/off.

Main Screen - to return to the standard monitoring screen.

Change Screen - to freeze waves on the screen. To change between screen layouts; combinations of OxyCRG[1] or the Split Screen Trending, (the selected screens are surrounded by a highlighted rectangular frame).

Realtime Record - to start a realtime preset recording or a realtime selected recording.

Delay Record - to start a delayed recording.

Airway Gases/Ventilation - to measure airway gases or show ventilator data.

Arrow Keys - ◀, ▶, ▲, ▼ - to move highlighting and make selections in Task Windows - only active when lit.

1 Only available in Standard CMS.

Bottom Row of Keys on the Control Panel

A DELAYED recording records waves that occurred 10 to 15 seconds before you requested the recording.
A REALTIME recording records waves that occur at the time you request the recording.

To make a DELAYED recording (normally ECG):

(On Plug-In recorder ONLY, press (RUN/CONT))

1. Press (Delayed Record)

To make a REALTIME (preset) recording:

1. Press (Realtime Record)
2. Press `Preset Recordng` (if available).
3. Press `Mode A/B/C PLUG-IN`[1]
4. Press `Stop Recordng` to stop (or (STOP) on recorder, if key available).

To make a REALTIME recording you select:

1. Press (Realtime Record)
2. Press `Select RecWaves` (if available)
3. Selectthe waves
4. Press `Start Recordng`
5. Press `Stop Recordng` to stop (or (STOP) on recorder, if key available).

1 The name of the actual recorder appears on the key. This can be PLUG-IN, Central, 4CH BS-1, or 4CH BS-2.

To turn alarm recordings on/off:

1. Press (Monitor Setup)
2. Press `Recordng Setup` (Press `More Choices` if required)
3. Press `AlarmRec On/Off`
4. Configure alarm recordings for each parameter.
   The availability of the following softkeys depends on the configuration of the monitor.
   - Press `Select Parametr`
   - Press `Change AlarmRec` to select sensitivity of alarm
   - Press `All Rec On` to enable red or red and yellow conditions
   - Press `All Rec Off` for no alarm recordings.

To change the recorder:

1. Press (Monitor Setup)
2. Press `Recordng Setup`. Press `More Choices` if required)
3. Press `Procedur Recordng`
4. Press `Change Recorder` to select the appropriate recorder

To make a single Vital Signs recording:

1. Press (Realtime Record).
2. Select `Preset Recordng`.
3. Select `RecVital PLUG-IN`.

To start/stop a sequence of Vital Signs recordings:

1. Press (Monitor Setup).
2. Select `Recordng Setup`, then `VitSigns Recordng`.
3. To start:
   a. Turn VitSigns recordings on with `Vitals Rec`.
   b. Press `Start Rec On` to select the trigger source (NBP or Timer). If Timer, select `Repeat Time` to choose the frequency.
4. To stop:
   a. Press `Vitals Rec` to select the Off position.

	Delayed	Realtime/Preset	Realtime/Your Selection
To Start	▶Delayed Record	▶Realtime Record ▶Preset Recordng (if available) ▶Mode X PLUG-IN [1]	▶Realtime Record ▶Select RecWaves (if available) ▶ Select the wave(s). ▶ Start Recordng
To continue indefinitely	▶RUN/CONT on recorder	▶RUN/CONT on recorder if preset to timed	Realtime/Your Selection is preset to continued
To extend	▶Delayed Record	▶Mode X PLUG-IN [1]	Realtime/Your Selection is preset to continued

1 The name of the actual recorder appears on the key. This can be PLUG- IN, Central, 4CH BS-1, or 4CH BS-2.

	Delayed	Realtime/Preset	Realtime/Your Selection
To Stop	Stops automatically or ▶STOP on recorder *or* ▶Record ▶Preset Recordng (if available) ▶Stop Recordng while highlighted. (Highlighted for local delayed recordings).	▶STOP on recorder or ▶Record ▶Preset Recordng (if available) ▶Stop Recordng while highlighted	▶STOP on recorder or ▶Record ▶Preset Recordng (if available) ▶Stop Recordng
To Change Speed while Recording is running	▶Realtime Record ▶Preset Recordng (if available) ▶Change RecSpeed	▶Realtime Record ▶Preset Recordng (if available) ▶Change RecSpeed	▶Realtime Record ▶Preset Recordng (if available) ▶Change RecSpeed

To silence and reset alarms that are sounding,

Press (Silence/Reset).

To suspend all alarms (turn alarms off):

Press (Suspend)
or
Press (Alarms/Volume) → `Suspend Alarms`
Either "Alarms Suspended" or "Alarms Suspended 1, 2 or 3Min" message, depending on how the monitor is con figured;
Large 🔕 appears on control panel.

To set/change alarm limits:

1. Press (Alarms/Volume) → `Alarm Limits`
2. Press `Select Parameter` (to highlight the required parameter)
3. Press `↓Low Limits↑` or `↓High Limits↑` (to adjust limits).

To turn individual parameter alarms on/off:
via alarm limits Task Window

1. Press (Alarms/Volume) → `Alarm Limits`.

Then either:

2. Press `Select Parameter` (to highlight required parameter).
3. Press `On/Off Alarms` (to turn alarms on or off).

or

4. Press (Confirm) to switch all alarms off
then proceed as in 2. and 3. above to switch specific alarms on.

via parameter Task Window

1. Press key on module.
2. Press `Adjust Alarms` → `On/Off Alarms` (to turn alarms on or off).

(If Off, an 🔕 appears next to the parameter numeric).

To turn monitor alarms on:

Press (Suspend).

or via Alarm Task Window

Press (Alarms/Volume) → `SwitchOn Alarms`

NOTE: Any individual alarms previously turned off will still be off (⊠ next to numeric).

To view Current Alarms/INOPs:

Press (Alarms/Volume) → `Alarm Messages`.

To stop patient monitoring (but keep all settings and patient data):

Press (Alarms/Volume) → `Monitor Standby`.

To resume patient monitoring:

Press any key on the control panel, except (Suspend).

To Accept or Ignore Ohmeda Ventilator Alarms

ACMS only

To Accept Ohmeda Ventilator Alarms:

1. Press Airway Gases/Ventilation
2. Press **VENT** to bring up the Ventilator Setup Task Window.
3. If the message **Ventilator alarms ignored** is displayed, Press the **Ventiltr Alarms** softkey.

To Ignore Ohmeda Ventilator Alarms:

1. Press Airway Gases/Ventilation
2. Press **VENT** to bring up the Ventilator Setup Task Window.
3. If the message **Ventilator alarms accepted** is displayed, Press the **Ventiltr Alarms** softkey.

To view waveforms and vital signs on another patient:
Press (Other Patients) and move highlighting to line with bed or group label you want.
Press the softkey for that bed or group.
For groups, select bed, using `More Beds` if necessary.

To view other waves:
Press `Show NextWave`

To view another bed:
Press `Show Next Bed` or group label.

To send alarms to/receive alarms from another bed:

1. Press (Other Patients)
2. Press `Controls`
3. Press `Show Roster` to see which group the bed you're sending to/receiving from is in.
   If needed, Press `Select Group` and highlight the desired group. Press `Send Alarms` and/or `Receive Alarms` and highlight YES.

To assign Arrhythmia:

1. Press either Trends/Calcs or Alarms/Volume
2. Press `arrhyth functns`

   "Arrhyth assigned" on screen shows that you have been assigned arrhythmia. If arrhythmia has not been assigned to your bed and there are no channels available, you must UNASSIGN one of the other beds using the arrhythmia channel so as to assign arrhythmia to this bed. You cannot UNASSIGN the other bed from your monitor, you must do so at the Central Station or arrhythmia monitor. Assign your bed to the Central Station. (The QRS detection mode switches to "Automatic". The softkey `Auto/Man & Pacing` does not function).

To set up Arrhythmia:

1. Press `Paced Yes/No` to indicate the patient's pacer status.
2. The heartrate shown in any window is calculated by the arrhythmia computer, not the heartrate counter of the monitor.

To display the delayed Arrhythmia wave:

1. Press Module Setup
2. Press `Delayed ArrhWave`
   (This key will only work if arrhythmia is assigned)

To turn off the autmatic pop up of the Arrhythmia Validation task window:

1. Press Trends/Calcs
2. Press `Rcv Arrhyth -> No`

Press `Rcv Arrhyth -> Yes` to turn pop up back on.

To admit or edit patient information:

1. Press (Procedures)
2. Press `Admit Patient` to admit new patient or edit existing patient data
3. If necessary, press `Select Line` to select the field
4. Enter or change patient information using the keypad
5. Press (Confirm)

To print patient information:

Press `Print Admit`

To end a case :

1. If arrhythmia is assigned through an HP Arrhythmia Monitor, press Trends/Calcs → Arrhyth Functns and unassign arrhythmia.
2. Press Procedures
3. Press End Case
4. Press Confirm to:
   - print a scheduled report (if previously selected)
   - discharge the patient
   - erase the database
   - reset all settings to user defaults
   - enter Monitor Standby

   or press Main Screen to cancel.
   or press Confirm again to cancel an ongoing report and continue with End Case.
5. If the monitor is connected to an HP Component Central Monitor, discharge the patient at the Central.

To discharge a Patient:

1. If arrhythmia is assigned through an HP Arrhythmia System, press Trends\Calcs → Arrhyth Functns and unassign arrhythmia.
2. Press Monitoring Procedures
3. Press Discharg Patient
4. Press Confirm to delete previous patient's data, or Main Screen to cancel.
5. If Monitor is connected to an HP Component Central Monitor, discharge the patient at the Central.

To perform calculations:

1. Press (Trends/Calcs)
2. Press `Remo Calc`, `Ventil Calc` or `Oxygen Calc` to display the Calculations Task Window. (Displayed values may have been automatically or manually entered).
3. Optionally, press `Resample Vitals` and check that the values are representative of the patient state at the current time. If values are not representative press `Resample Vitals` again.

   Press (Confirm) to store values without calculation.
4. Press `Perform Calc` to store any resampled values and perform calculation with displayed values.

   To change or enter an input value:

   a. Press (▲) and (▼) to highlight value
   b. Enter new value using handheld keypad
   c. Press (Confirm)

   To print the displayed calculations:

   Press `Print Calc`

To view collection times of non-calculated values:

Press `On/Off DataTime`

To specify a calculation time:

1. Press `Change Time`
2. Press (◀) and (▶) to move highlighting to hours/minutes
3. Change hours/minutes if needed
4. Press (Confirm)
5. Press `Perform Calc`.

To view ranges of calculated values:

Press `On/Off Ranges`

To view previous calculations:

Press `Review Calc`.

To review calculations:

1. Press Trends/Calcs
2. Press `Hemo Review`, `Ventil Review` or `Oxygen Review` to display Calculation Review Task Window.

   To view older or newer data:
   Press ◀ or ▶

   To modify input values used to perform calculations:
   a. highlight the time of the calculation to be modified using the ◀ and ▶ keys
   b. Press `Original Calc`
   c. Enter modifications, as needed, using the handheld keypad
   d. Press Confirm
   e. To recalculate, press `Perform Calc`

To show normal ranges for calculated parameters:
Press `On/Off Ranges`

To print the displayed calculations:
Press `Print Calc`

To print scheduled reports:
1. Press Trends/Calcs
2. Press `Print SchedRep`

To cancel a report:
Press `Cancel Report`

To mark an event:

1. Press Trends/Calcs
2. Press Mark Event
3. Press an event key (labelled A-D).
   The message "Mark recorded" appears.

To review an event:

1. Press Trends/Calcs
2. Press Graph Trends
3. move the time bar along the Events line by pressing ◀ and ▶ until it rests on the Events marker you want to examine
4. Press Zoom in Time

To make drug calculations:

1. Press (Trends/Calcs)
2. Press `Drug Calc`
3. Press `Select Drug` or (▲) and (▼) to highlight desired drug
4. Press `Perform Calc` to access the Drug Calculation Task Window

To modify an input field:

1. Press `Select Item`
2. Enter the value using the keypad
3. Press (Confirm) after each entry.

To assign a field to be the unknown entity in the calculation:

1. Press `Choose Unknown`
2. Press (▶) and (◀) to select the unknown field

To calculate rate, dose, amount or volume when all inputs are complete:

Press `Perform Calc`

To display the Titration Table:

1. Press `Display Table`
2. Use the `Scroll` keys to view nondisplayed parts of the table.

To print the Titration Table:

Press `Print Table`

CAUTION:

- **Be sure that the patient in the monitor matches the one in the module before performing a transfer to the monitor.** To prevent accidental overwriting of patient data or name, the module will ask you to choose a name/MRN if the monitor name and module name don't match or if there is no name/MRN.
- **Be sure to discharge the previous patient at central before performing a transfer**, or the name moved into CMS from the module will be overwritten by the name from the central monitor.

Notes:

- After insertion, the Data Transfer Module requires approximately 8 seconds to synchronize with the monitor.
- If you are transferring data to the Component Transport System, erase any existing data in the transport monitor before performing the transfer.

To transfer quickly:

1. Plug the Data Transfer module into the rack.
2. Press MODULE *or* MONITOR to select transfer direction.
3. Press Confirm.

   Remove the module when the transfer is complete.

To Transfer to the Module:

1. Plug the Data Transfer module into the rack.
2. Press MODULE
3. Select the type of transfer.
   - **All Data**:
     Press `Transfer All Data`
     Any existing data in the module will be erased. The monitor data will be transferred, followed by monitor updates once a minute.
   - **Updates**:
     Press `Collect New Data` to *send only monitor updates* once a minute starting at the current time.
     Press `Clear Yes/No`
     - *Yes* erases any data existing in the module before the transfer begins.
     - *No* appends new data to data currently existing in the module.
     If the patient name and ID do not match or if the monitor name is blank, the Combine in Module Task Window will be displayed. Select the patient name to be used in the module.
4. Press Confirm to start the transfer.

Blinking

- Rapid blinking of module light indicates a transfer in progress.
- Slow blinking indicates that the module is collecting new data.

To Stop a Transfer to the Module:

Unplug the Data Transfer module from the rack.

- or -

1. Press MODULE
2. Press Confirm.

When the module is unplugged, it retains data for at least one hour.

To Transfer to the Monitor:

1. Plug the Data Transfer module into the rack.
2. Press MONITOR
3. Select whether or not to discharge the current patient data in the monitor before starting the transfer.
   a. **If Names Match**, press Confirm to start the transfer without discharging the patient in the monitor.
   b. **If Names Don't Match** (or either is blank) **and Discharge = No**, the Combine in Monitor Task Window will be displayed.
      i. Select the patient name to be used in the monitor.
      ii. Press Confirm to start the transfer and incorporate the module data into the monitor's existing patient record.
   c. **If Discharge = Yes**, the Discharge Task Window will be displayed.
      i. Press Confirm to discharge the monitor patient first and then start the transfer of data from the module.

To Stop a Transfer to the Monitor:

Unplug the Data Transfer module from the rack.

After a transfer is completed, the data in the module is erased. If the transfer is interrupted, the module data will remain intact.

To adjust ECG measurements:

Press (ECG) on module

To select the required lead:
Press `Change Lead`

To adjust the size of the QRS complex:
Press `Adjust Size`

To select the filter setting:
Press `Filter Mon/Diag`

FILTER -use only if excessive electrical interference (can impede ECG analysis)
MONITOR - use for normal monitoring
DIAG - use when diagnostic quality required (may increase false alarms).

To view multi-lead ECG:
Press `Multi-Ld ECG/ST` → `View ECG`

To record multi-lead ECG:
Press `Multi-Ld ECG/ST` → `Record ECG`

To select the QRS detection method:
Press `Auto/Man & Pacing`

PACED or NONPACED / MANUAL or AUTO
Use AUTO except in rare cases where the monitor miscounts - if change to MANUAL, adjust detection level so only QRS complexes cross dotted threshold line.

To turn off channels 2 and 3:
1. Press `Setup Next ECG`
2. Press `On/Off ECG-CH2` to highlight **off** (Channel 3 is turned off automatically).

To Adjust Respiration Measurements:

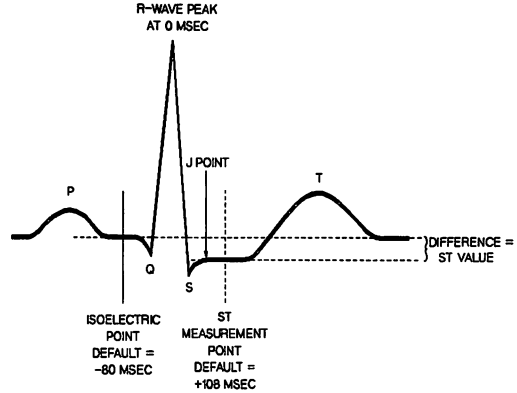
Press (RESP) on module

To adjust the size of the RESP wave:
Press `Adjust Size`

To select RESP detection method:
Press `Auto/Manual`

AUTO - monitor counts respiration and adjusts detection level automatically

MANUAL - you adjust the detection level by moving the dotted threshold line just below peak of curve) using the (▲) and (▼) keys.



The ST measurement for each beat complex is the vertical difference between the points where the wave intersects two measurement points:

- The **isoelectric point** provides the baseline for the measurement
- The **ST point** provides the other measurement point

You can adjust both measurement points. Your monitor is configured so that you set the ST Point in reference to:

- *either* the R-wave peak
- *or* the J Point, which is the transition between the QRS and the ST segment. The ST point is referenced from the j point at either +60 or +80 msec.

To Adjust the ST Measurement Points

To setup for ST monitoring:

1. Ensure that the ECG channel(s) to be used for ST measurement are turned on. (Channel does not have to be displayed).
2. If necessary, turn ST on in the Parameters On/Off Task Window.
3. Press (ECG) on the module (or (Procedures)), then `ST Analysis` to display the ST Analysis Task Window.
4. If necessary, turn individual ST channels on using `On/Off ST`. Then press `ST Analysis` to return to ST Analysis Task Window.

To adjust the measurement points: *(from the ST Analysis Task Window)*

1. Press `Adjust Meas Pts`
2. Press `On/Off Freeze` to freeze the waveform
3. adjust the isoelectric point and J/ST points.
4. Press ST Analysis to return to ST Analysis Task Window.

To change the reference wave:
(from the ST Analysis Task Window)

1. Move the cursor to the point of interest in the trend. (This displays the trended beat in the cursor recall spot)
2. Press `Temp Reference` to display the beat in the reference spot.

   To make the temporary reference beat permanent,
   Press `Change Reference` → Confirm

   To redisplay the original saved reference beat,
   Press `Saved Reference`

3. Press `ST Analysis` to return to the ST Analysis Task Window.

To adjust ST alarms: *(from the ST Analysis Task Window)*

1. Press `Adjust Alarms`
2. Press `Select Channel`

   To adjust the alarm limits:
   Press `Low Limit` or `High Limit` softkeys

   To turn alarms on or off:
   Press `On/Off Alarms` .

   Press `ST Analysis` to return to ST Analysis Task Window.

Problem	Possible Cause	Corrective Action
No display of ECG	System not plugged in or switched on. ECG or ECG/RESP module is not plugged in. Brightness/contrast not adjusted. The video cable is not plugged in.	Connect and switch on system. Check ECG or ECG/RESP Module is plugged in correctly. Check that brightness and contrast controls are correctly adjusted. Check the video cable connection.
LEADS OFF message. ? instead of HR/RESP numerics. INOP tone.	ECG cable is not connected. One or more electrodes are detached. No gel on electrodes. Strong solvent used for cleaning skin. Extremely large pace pulses.	Check ECG cable is connected. Check that electrodes are not detached. Check that electrodes have enough gel. Change to a suitable skin cleaning solvent. Ensure that channels 2 and 3 are switched off if a 3-lead set is used. Reduce size or select lead with lower pacer amplitude.
ECG waveform is present but the RESP channel shows a flat line.	One of the RESP electrodes is loose. No gel on the electrodes. Patient's breathing is too shallow to be detected in auto mode.	Check that RESP electrodes are not loose. Check that electrodes have enough gel. Reposition electrodes to try and optimize signal. Change RESP detection mode from auto to manual if necessary.

Problem	Possible Cause	Corrective Action
NO PULSE SOURCE message (only if PULSE is the active alarm parameter).	The pulse source (PRESS or SpO_2/PLETH Module) is unplugged, or the transducer is not connected, or equipment malfunction.	Check that module is plugged in. Check that transducer is connected.
Lots of noise on the ECG wave signal.	Bad electrode contact, high frequency disturbance.	Remove noise source. Increase the filter on the waveform: DIAG - No filter,; all interference left in MONITOR - Small filter; usually enough to clear ECG FILTER - Stronger filter; especially good in conditions of excessive muscle movement.

To adjust pressure measurements:

Press (PRESS) on module

To change the size of the waveform:

Press `Change Scale`

(to automatically optimize the scale to suit the amplitude of the incoming wave, select "optimum" → `confirm`).

To change the pressure label:

Press `Change Label`

IMPORTANT: For information on Pressure labeling, refer to the HP Component Monitoring System User's Reference Manual Volume 2.

To adjust the alarm limit:

1. Press `Adjust Alarms`
2. change alarm parameter (sys, dia, mean), if needed.
3. Press `↓Low Limit↑` or `↓High Limit↑` (to adjust alarm limits).

To zero transducer:

from the module

1. open transducer to air (closing it to the patient)
2. Press (ZERO) on module for one second - you should see the message "Zero in Progress"

from task window

1. Press `Zero Xducer`
2. open transducer to air (closing it to the patient)
3. Press `Zero Xducer` again -
   Wait for screen message saying that procedure is complete, then close transducer to air and open it to the patient.

Remember: In order to do a Wedge measurement, the pressure label **must** be PAP.

To measure Pulmonary Artery Wedge Pressure:

Press (Procedures) → `Wedge`

To measure wedge pressure:

1. start the Wedge procedure
   Wave freezes 12 seconds after wedge detected.
2. Press `Stop Trace` to freeze trace at any time.
3. If satisfied with the trace, deflate the balloon

To adjust where the monitor is taking the reading from:

Press `Edit Wedge` and move the cursor up and down using the ↓ `Cursor` ↑ keys.

To record the curve:

Press `Record Curve`

To store in patient data:

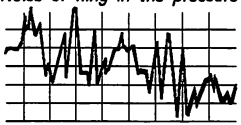
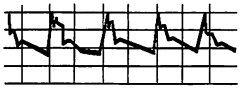
Press (Confirm)

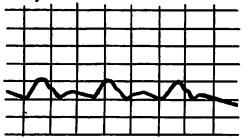
Note: ssCO_2 cannot be used as a reference waveform.

Remember: In order to measure CPP, both ICP and Mean Arterial Pressure must be monitored.

To change the pressure arterial source:

1. Press (Module Setup) → CPP
2. Press Change Source (to select arterial source).

Problem	Possible Cause	Corrective Action
No pressure wave on screen	Selected pressure scale is incorrect.	Change the size of the waveform by re-optimizing or changing pressure scale.
Noise or fling in the pressure waveform 	Movement of P.A. catheter tip. Motion of pressure tubing.	Reposition catheter (in accordance with your Hospital Procedures Policy). Make sure patient or ventilator tubing is not touching pressure tubing.
Resonating Arterial Waveform 	Small air bubbles in, or very close to the transducer.	Carefully flush the transducer and tubing when setting up system. Debubble carefully after each flush.
or Abnormally High Systolic Pressure	Tubing too long.	Shorten tubing.

Problem	Possible Cause	Corrective Action
Dampened Arterial Waveform 	Thrombus formation or blood left in catheter following blood sampling.	Use syringe to withdraw air or particles in catheter, then flush the line with fresh solution.
	Large air bubble in tubing.	Use syringe to withdraw air in tubing, then flush line with fresh solution.
	Catheter tip against the vessel wall. Catheter kinking or arteriospasm.	Reposition the catheter to relieve the spasm.
	Tubing too long or too compliant.	Shorten the tubing (recommended length 3-4 ft. or replace with large diameter stiff tubing.
	Improper sequence of stopcock operation.	Flush line, re- zero and recalibrate.
	Defective transducer and/or amplifier.	Replace transducer and have the monitor checked.
Abnormally Low Pressure	Transducer level higher than heart.	Check patient and transducer positions.
	Loose connections.	Check and tighten connections.
No Pressure	If monitor turned on and there is no pressure. The transducer or connector wire could be broken.	Replace transducer and cable. Check stopcocks.

Pressure Troubleshooting (cont.)

To adjust NBP measurements:

Press NBP on module

To change mode:
Press `Auto/Manual`

To change repetition time (AUTO mode only):
Press `Change Rep Time`

To do a single manual measurement or initiate the AUTO cycle:
Press `Start NBP`

or

START on module

To do a STAT measurement (as many times as possible in a 5-minute period):
Press `Stat NBP`

or

STAT on module

To STOP a measurement:
Press `Stop NBP`

or

STOP on module

Note: Use appropriate cuff size for NBP measurements.

The following factors can make the NBP measurement unreliable or impossible to detect

Patient movement: Movement, shivering and convulsions may all interfere with the measurement of the arterial pressure pulses. Measurement time will also be increased.

Heart-lung machine: Measurements will not be possible if the patient is connected to a heart-lung machine.

Severe shock: Reduced blood flow to the peripheries will cause reduced pulsation to the arteries in conditions of severe shock or hypothermia. This will make measurements unreliable.

Incorrect cuff size: Using the incorrect cuff size will give erroneous readings.

Cardiac arrhythmias: An irregular heart beat will make the measurement unreliable or impossible. The measurement time will be increased.

Pressure changes: Rapid changes in blood pressure, while the arterial pressure pulses are being analyzed, may make the measurement unreliable or impossible.

Heart rate extremes: Measurements can not be made at a heart rate of less than 40 bpm or greater than 300 bpm.

Obese patients: A thick layer of fat surrounding a limb tends to dampen oscillations coming from the artery, and stops them from reaching the cuff. Accuracy may be lower than normal.

To adjust SpO_2/Pleth measurements:

Press (SpO2) on module

To select Pleth or one of the pressures as the pulse source:

1. Press (Module Setup) → HR/PULSE
2. Press Change Source (to highlight pulse source)

To switch Tone Modulation on/off:

Press On/Off Tone Mod

To adjust the QRS volume from the SpO_2 window:

Press Volume Control → QRS Tone ↑ ↓

Setting the high SpO_2 alarm limit to 100% is the equivalent to switching off the high alarm. High oxygen levels may predispose a premature infant to retrolental fibroplasia. Therefore the upper alarm limit for oxygen saturation must be carefully selected in accordance with accepted clinical practices.

The following factors can cause errors in the measurement of the SpO_2

Reduced arterial blood flow can be caused by:

- shock
- hypothermia
- use of vasoconstricting drugs
- anemia.

A "SpO_2 NON PULSATILE" message appears on the display, if the pulsations are undetectable.

High levels of ambient light

An "SpO_2 LIGHT INTERF" message will appear on the display. The measurement quality can be improved by covering the transducer with a suitable non see-through material.

Absorption of light by other chemicals in the blood for example:

- carboxyhemoglobin
- methemoglobin
- methylene blue
- indocyanine green
- indigocarmine.

Problem	Possible Cause	Corrective Action
Light interference	Surgical lamps, bilirubin lights, overhead fluorescent lights, infra-red heater/lamp, direct sunlight.	The sensor site **must** be covered with opaque, non-reflecting material.
Erratic readings, or screen messages: SpO_2 non pulsatile or Weak Signals	Using inappropriate sensor for patient or clinical condition.	Select correct sensor based on patient weight, application site, level of activity.
	Sensor applied to inappropriate site.	Apply sensor to recommended site.
	Sensor applied incorrectly.	Apply sensor to recommended site, check LED/detector are lined up, check sensor still sticks.
	Poor sensor adhesion.	Use new sensor if necessary. Do **not** use additional tape.
	Using too many adhesive dots.	Do not use more than 3 dots for each LED and detector. Do not use dots with sensors for which they were not intended.
	Tissue between LED and detector too thick.	Apply sensor to thinner tissue site.

Problem	Possible Cause	Corrective Action
Different values on different extremities	Cardiac shunts	Check with blood sample. Accuracy of value questionable, depending on shunt size.
No SpO_2 numeric, or Weak Signal message	Reduced arterial flow due to shock, hypothermia, vasoconstricting drugs.	Change transducer site. In neonates try moving sensor to thinner part of extremity, for instance, towards toes.
	Nail polish	Remove nail polish.
	Hematoma	Change transducer site
SpO_2 waveform looks flattened and monitor is questioning the reading	Poor application of probe	Check probe application
	Inappropriate waveform size	Adjust waveform size (Perfusion Mode only): Press (Pleth) on front of module → `Optimize Size`

Attaching the sensor:

After calibrating the sensor, attach it to either:

mainstream - the patient's breathing circuit

sidestream - the sidestream module

To adjust CO_2 measurements:

Press (CO2) on module

To change size of waveform,

Press `Change Scale`

To set anesthetic gas ON (if it contains N_2O) **or OFF** (if it doesn't),

Press `N2O Corr On/Off`

The following waveform represents a normal capnogram:

To adjust alarm limits,

Press `ETCO2 Alarms`, `AWRR Alarms` or `IMCO2 Alarms`, and use `↓Low Limit↑` or `↓High Limit↑` softkeys.

- $ETCO_2$: set low and high limits
- $IMCO_2$: set high limit
- AWRR: set apnea delay time, low and high limit.

For accurate measurements, allow sensor to warm up until "CO_2 Warmup" message disappears (up to 20 minutes if it has not been plugged into a module).

When to perform an accuracy check . . .

- Once a day
- If module is moved with sensor plugged in to another monitor or used with another patient.

When to calibrate . . .

- If a new (or different) sensor is attached to the module
- When the *Accuracy Check* values displayed do not coincide with the calstick value
- Once every 1-2 weeks.

To perform an accuracy check
(this should be done once a day)

Press (CAL) on module, and check calstick value on the screen.

If calstick and screen values are the same ...

1. Place sensor on cell labelled 0.0 mmHg.
   Reading on display should be within +/- 0.3mmHg within 1 minute.
   Place sensor on other cell.
   Reading on display should be +/- 1mmHg within 1 minute.
   If the values match, you don't need to calibrate; Press (Main Screen).
2. If values don't match, you need to calibrate. Press `Start Calibr.`.
3. Go to **Perform the calibration**.

If calstick and screen values are different ...

1. Press `[Change Cal Value]` to set the correct value.
2. Press (Confirm)
3. go to **Perform the calibration**.

To calibrate CO_2:

1. Place sensor on calstick cell.
   Press `Start Calibr`.
2. Repeat process with other cell.
   (For both cells, values on screen should match values on calstick).
3. Press (Main Screen)

A more detailed version of this procedure can be found in the HP Component Monitoring System User's Reference Manual Volume 2.

To turn sidestream pump on (if pump turns off automatically):

Press CO_2 on module

Press `Restart Sidestrm` key:

ONCE if key is already highlighted,
TWICE if key is not highlighted.

Problem	Possible Cause	Corrective Action
CO_2 wave line disappears	Module not plugged in, transducer not connected, Equipment malfunction, sidestream pump off.	Check that module and accessories are plugged in. **Sidestream** - check pump switched on.
CO_2 wave set to zero, other numerics displayed as -?-	Not in monitoring mode, calibration taking place or failed, barometric pressure out of range.	Change filter (may be blocked), check sample tube (may be kinked). Check whether monitor in calibration mode. Check that transducer is placed on correct cal cell. Call service engineer to check barometric pressure.
Wave Display Clipped	Incorrect scale selected - complete wave display cannot be seen	Change wave scale size, by pressing CO_2 on module then **Change Scale** .

FiO_2 Stabilization Times:

No more than 1 min. is needed if sensor is left connected to module for more than 15 min.(power off up to 4 hr.)

15 min. is needed if disconnected from module for less than 16 hours.

When to calibrate FiO_2:

The FiO_2 transducer should be calibrated:

every 8 hours

when sensor is moved to another module

when sensor is moved to another monitor.

To perform a 21% calibration:

1. remove sensor from T-Piece and expose to room air.
2. Press CAL on module for at least one second.

(For more information on FiO_2 stabilization, the 21% or 100% calibration procedure, please refer to the User's Reference Manual Volume 2.)

Problem	Possible Cause	Corrective Action
Readings constantly drift	Transducer improperly applied. Air leaks.	Reapply fixation ring. Reattach transducer.
	Old electrolyte not fully removed during remembraning procedure.	Place transducer in cal chamber and turn on gas. Do not calibrate. If transducer does not give stable reading after 5 minutes, remembrane, taking care to clean out old electrolyte. Check groove. Calibrate.
Readings not stable 20 minutes after application.	Patient status unstable	None
	Inadequate vasodilation	Increase transducer temperature if not contra-indicated by patient's condition. (Reduce the transducer site time if appropriate).
$tcpO_2$ values too low or too high	Capilliary samples taken (Astrups, heelsticks)	Take arterial samples. Capilliary samples do not correlate well with paO_2.
	Blood taken while patient agitated (crying, feeding, suctioning, positioning).	Take another sample when patient is quiet.

Problem	Possible Cause	Corrective Action
$tcpO_2$ values too low	Patient has severe respiratory distress	No corrective action possible. $tcpO_2$ levels will underestimate paO_2.
$tcpO_2$ values too high	Incorrect handling of blood sample	Take another sample. Ensure that atmospheric oxygen does not enter sample.
	Transducer improperly applied - air leaks.	Reapply fixation ring. Reattach transducer.
$tcpCO_2$ values too high	Correction factor not ON.	*Either* ask biomed or service to configure correction ON, *or* take the rise of pCO_2 due to heating and metabolic CO_2 production into account.
	Hypoperfusion	None possible
	Shock	None possible
	Leakage in calibration tubing, or non-original tubing used	Replace tubing. Use correct tubing (M2205A).
$tcpCO_2$ values too low	Transducer improperly applied - air leaks.	Reapply fixation ring. Reattach transducer.

To adjust Cardiac Output measurements:

Press (C.O.) on module

To adjust the computation constant:

Press `Adjust Constant` or `↓ Cursor ↑` keys
(see catheter insert for comp. constant appropriate to catheter type, injectate temperature and volume)
Press (Confirm)

To measure Cardiac Output:

1. Press `Measure C.O.`
2. Press `Start C.O.` or (START) on module
3. when "Inject Now" appears, inject.
   (For accuracy start within 15 seconds - complete in 4 seconds).
4. Repeat Step 2 for each injection. Wait at least one minute (or longer, depending upon patient's clinical condition) between injections.
5. Press `Record Curve` (if you want to record the curve)
6. Press `Edit C.O.` (when enough readings have been taken).

To delete any unwanted values:

1. Press `Select Curve` and highlight curve to delete
2. Press `Delete Yes/No`

To store average in patient data:

Press (Confirm)

To perform hemodynamic calculations:

Press `Hemo Calc`

The following factors can cause errors in the measurement of the Cardiac Output

Physiological reasons:

Patient movement during the procedure
Anxious patient
Variations in cardiac rate and rhythm
Cardiac abnormalities, for example, incompetant valves
Shock.

Catheter related errors:

Balloon inflated during measurement
Catheter not positioned properly
Damaged catheter.

Injection errors:

Use of the wrong catheter injection port
Poor timing of injection
Incorrect volume of injectate
Inaccurate injectate temperature.

Instrument errors:

Incorrect computation constant
Instrument failure.

Screen Message	Possible Cause	Corrective Action
1. Noisy Baseline	Mechanical Ventilation Variations in venous return (coughing, shivering, abnormal respiration)	Synchronise injections to end-expiration Maximize signal amplitude by: 1. Increasing injectate volume to 10cc (if not contra- indicated) 2. Using iced injectate (change comp constant) 3. Increasing number of measurements to be averaged (if not contra-indicated)
2. Thermal Baseline Drift	Administration of I.V. fluids; Rewarming after hypothermia, fever, shock	Try to stabilize patient temperature; Maximize signal amplitude (as above); Increase number of measurements to be averaged.
3. Unsteady Baseline	Combination of messages 1 and 2	see above
4. Multiple Peaks	Injection not smooth Cardiac shunt	Repeat smoothly and rapidly. Check with blood samples. Accuracy of values questionable, depending on shunt size.
5. Abnormal Decay Time	Low Cardiac Output	Maximize signal output

Screen Message	Possible Cause	Corrective Action
6. Very Short Curve	Injection too fast	Inject again as soon as possible after the prompt.
7. Very Long Curve	Injection too slow	Inject again as soon as possible after the prompt.
8. Irregular Curve	Combination of messages 4-7	See above.
9. Delayed injection	Low stroke volume, Low flow rate	Inject as soon as possible after prompt. Low flow rates need 15-20 seconds to pass by thermistor.
	Delayed injection	Repeat
	Kinked catheter	Check for kinks below dressing. Check chest x-rays for interior kinks.
10. Injectate temperature too high	Incorrect positioning of injectate probe	Make sure that probe is positioned in a solution identical to the one injected.
	Hypothermic patient <34°C, 93.2°F. Room temperature injectate	Use iced injectate with hypothermic patients. (Remember to change comp. constant.)
	Room temperature > 25°C (77.8°F)	Cool injectate. (Remember to change computation constant.)
11. Excessive Curve Height	Injectate too cold	Heat up injectate and start measurement again
12. Curve Below Baseline	Rewarming after hypothermia, fever, shock	Try to stabilize patient temperature and start measurement again.

To adjust temperature measurements:

Press (Temp) on module

To select temperature label:
Press `Change Label`

To measure temperature differences when monitoring more than one temperature:

1. Press (Module Setup)
2. Press `Diff`
3. Press `Select First`
   (to select the first temperature)
4. Press `Select Second`
   (to select the second temperature)

IMPORTANT: For information on the Temperature labeling, refer to the HP Component Monitoring System User's Reference Manual Volume 2.

Problem	Possible Cause	Corrective Action
SvO_2 CONFIGURATION message appears.	Computation mode was set to SaO_2 when the optical module was connected to an Abbott monitor.	Enter SvO_2 Task Window and return to SvO_2 mode, by pressing (Confirm).
SvO_2 CONNCT OPTMOD message appears.	The optical module was disconnected during storage of data.	Reconnect optical module to SvO_2 module until storage of data is complete.
SvO_2 CAL REQUIRED message appears.	No valid calibration data, usually due to connection of a new optical module.	If the catheter is still in the tray, perform a pre-insertion calibration. If the catheter is already inserted into the patient, perform an in-vivo calibration.
SvO_2 UNABL TO MEAS message appears (No SvO_2 value calculated).	Signal received is outside the normal range.	Perform an In-vivo calibration. If problems persists, contact Abbott.

Problem	Possible Cause	Corrective Action
SvO_2 LOW LIGHT message appears. (Unusually low intensity of light received from the catheter).	If the catheter is still in the tray:- Catheter is not properly connected.	Check connections and ensure that the catheter tip is fully inserted into the optical reference.
	The catheter or optical module is faulty.	Disconnect the catheter and position optical module out of direct light:- • If INOP message disappears, the catheter is faulty. Manipulate or use a new catheter. • If INOP message persists, the optical module is faulty. Check optical module by substituting with a replacement module.
	Catheter has been removed from optical reference, but not yet inserted into patient.	Insert catheter into patient.
SvO_2 LIGHT INTENS message appears (Change in light intensity).	Catheter tip against blood vessel wall.	Ensure distal lumen is patent. Reposition the catheter.
	Inadequate blood flow past the catheter tip. Damaged optical fibers.	Straighten any kinks in the catheter. Check connections at the SvO_2 and optical modules.

Only for use with the ACMS

To set up the Anesthetic Gas Module:

1. Press the power-on switch
2. Fit the bacterial filter (1) to the gas sample tube (2).
3. Connect the gas sample tube to the Anesthetic Gas Module:
   a. Move the cover (4) to reveal the inlet (3).
   b. Insert the tube into the slot
   c. In a clockwise direction, rotate the tube through 90°.
4. Wait until the Anesthetic Gas Module has finished its self test and has warmed up.
5. Connect the other end of the gas sample tube to the airway adapter (5).
6. Connect the airway adapter to the patient.

When the module is ready for use, the waveforms and numerics are shown on the Main Screen.

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When the module is ready for use, the waveforms and numerics are shown on the Main Screen.

To manually select the anesthetic agent:

1. Press the Airway Gases set-up key on the module to bring up the Overview Task Window, or the Airway Gases/Ventilation hardkey.
2. Press `Airway Agent` softkey
3. Press `Select Agent` softkey
4. Use ← or → to select agent.

The measured agents are as follows:

Anesthetic Agents	Display Abbreviation
Halothane	HAL
Isoflurane	ISO
Enflurane	ENF
Sevoflurane	SEV
Desflurane	DES

5. If no agent is to be measured select "None".
6. Press Main Screen when finished.

To adjust the alarms:

1. Press the (Airway Gases) set-up key on the module to bring up the Overview Task Window, or the (Airway Gases/Ventilation) hardkey.
2. Press the softkey corresponding to the gas to adjust (for example, `Airway CO2`)
3. Select the `et` or `in` value as required, using the arrow keys.
4. Press `CO2 Alarms`
5. Use `↓ Low Limit ↑` or `↓ High Limit ↑` softkeys to adjust alarm limits.
6. Press (Main Screen) when finished.

To Adjust Anesthetic Gas Module Alarms

To Select Automatic Agent Identification:

This feature automatically detects a set of anesthetic gases. (This feature is optional.)

1. Press the Airway Gases set-up key on the module to bring up the Overview Task Window, or the Airway Gases/Ventilation hardkey.
2. Press `Airway Agent`
3. Press `Select Agent`
4. Select `Auto` for automatic agent identification

   NOTE: `Auto` is only available for selection if you have the agent identification option
5. If no agent is to be measured, select `None`
6. Press Main Screen when finished.

Calibration

Zero Calibration:	Done automatically when the module is switched on at the following intervals: 8, 15, 30 and 90 minutes, then every 8 hours. The calibration takes 15 seconds. During zero calibration, the patient's AWRR is not measured.
Span Calibration:	The Anesthetic Gas Module should be checked at least once per year to determine if span calibration is necessary.

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