TRx4841A and TRx4851A IntelliVue Transceivers

TRx and TRx+ for the IntelliVue Telemetry System

English

PHILIPS
Introduction

About This Guided Training Manual

This training program is designed for the IntelliVue TRx/TRx+ M4841/M4851 Telemetry System. Information regarding features and functionality not discussed in this training guide are available in the IntelliVue TRx/TRx+ Transceivers Instructions for Use. Please complete the IntelliVue Information Center training guide first before you move on to this telemetry training.

In addition, the Instructions for Use contains **Warnings** that provide information about how to avoid injury to patient and personnel and **Cautions** that provide information you should know to avoid damage to your equipment.

Completing your Training

This guided tour contains chapters about specific features or functions that are included with your product such as Transceiver Setup, ECG or SpO₂. At the end of this training guide there is a test to evaluate your knowledge about the IntelliVue Telemetry System.

Resources

These items will also ship with your product:

- *IntelliVue TRx/TRx+ Transceivers Instructions for Use.*
- *IntelliVue Telemetry System Documentation CD*
Transceiver Features

About the Transceiver

The IntelliVue Transceiver is a patient-worn device for monitoring ECG and SpO₂ on adult and pediatric patients within the IntelliVue Telemetry System. The transceiver combines traditional transmitter features with communication to and from the IntelliVue Information Center.

Telemetry transmits the patient’s measurements using radio waves. The signals obtained from the patient travel from the transceiver to an access point in the ceiling or wall and then to the Information Center.

Transceiver Features

- Audio feedback for out-of-range, invalid leadset insertion and lost device.
- Battery gauge on device and at Information Center.
- Powered by two AA batteries.
- Local control of alarm suspend and resume from standby at Information Center.
- SpO₂ Spot Check measurement simply with sensor cable insertion.
- Easy for clinicians to use and comfortable for patients to wear.
- Protective covers prevent debris from accessing unused ports.

Information Center Controls

Bi-directional capability enables you to remotely control certain transceiver functions from the Information Center.

- Adjust ECG gain and select lead.
- Start a SpO₂ measurement.
- Adjust the transceiver volume, or turn it off for certain sounds.
- Change SpO₂ measurement mode, or turn SpO₂ measurement on or off.
- Change SpO₂ alarm limits (if SpO₂ is enabled).
- Enable or disable display of the pleth wave and/or pulse rate.
- Find Device feature for locating a lost transceiver within the coverage area.
## On the front of the Transceiver

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadset Insertion Guide</td>
<td>Connection for 3, 5 or 6-wire leadset</td>
</tr>
</tbody>
</table>
| Lead Indicator             | – Illuminates momentarily during leadset insertion to indicate attached leads.  
                              | – Illuminates when Check button is pressed to indicate attached leadset  
                              | – During a Leads Off condition, indicating the leads that need to be reapplied. Green indicator only on indicates all leads are off. |
| Battery Gauge              | Illuminates when the Check button is pressed, indicating the amount of power remaining in the batteries.                                                                                      |
| Monitor/Service Port       | Connection for cable to the TeleMon Companion Monitor or to the Service Tool.                                                                                                               |
| SpO₂ Sensor Port          | Connection for SpO₂ sensor.                                                                                                                                                                 |
| Telemetry Button          | Directs the Information Center to generate a * or **Nurse Call alarm.                                                                                                                         |
| Alarm Suspend/Pause Indicator | Illuminates during alarm pause initiated at transceiver, Information Center or TeleMon.                                                                                                    |
## On the back of the Transceiver

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Button</td>
<td>- Initiates a status check of the transceiver, illuminating the battery gauge and remaining power.</td>
</tr>
<tr>
<td></td>
<td>- Resumes monitoring after Standby</td>
</tr>
<tr>
<td></td>
<td>- Indicates association with the Information Center (single beep).</td>
</tr>
<tr>
<td></td>
<td>- Silences the Find Device tone. (Press and hold 6 seconds).</td>
</tr>
<tr>
<td>Battery Door</td>
<td>Two AA batteries needed. See Insertion instructions for details.</td>
</tr>
</tbody>
</table>

### Safety Symbols and other device markings are covered in detail in the Intellivue TRx/TRx+ Transceiver Instructions for Use.

### Telemetry Setup Window

In the Telemetry Setup window at the Information Center, you can change the behavior of the Telemetry Button, change the volume of the adjustable sounds and modify the SpO₂ mode. You can also turn fixed amplitude pacing on/off for patients with pacemakers whose paced status has been activated and turn the SpO₂ measurement on/off. Turning the SpO₂ measurement off while not in use will save battery life.

### Audible Tones

The transceiver emits audible tones during certain conditions. This is a description of the sounds.

<table>
<thead>
<tr>
<th>Sound</th>
<th>How Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound 1 (beep)</td>
<td>- Indicates successful Self-Test at power on.</td>
</tr>
<tr>
<td></td>
<td>- Indicates successful SpO₂ Spot Check measurement when measurement is initiated at transceiver.</td>
</tr>
<tr>
<td></td>
<td>- If the Check Button is pressed, confirms that the transceiver is associated with the Information Center.</td>
</tr>
</tbody>
</table>
## Adjusted Sounds

Some transceiver sounds can be set to 5 different volume levels. The adjustable sounds include:

- SpO₂ Spot Check measurement success/fail
- Pulse tone

The Spot Check and pulse tone settings can be muted or changed in the Telemetry Setup window at the Information Center.

Steps to get to Telemetry Setup are:

1. Select **Patient Window**
2. Select **Telemetry Setup**

Adjust volume in the Telemetry Device Volume drop down list.

## Standby

Standby mode is used to temporarily suspend monitoring at the Information Center, for example, when a patient goes out of access point range for a test or is discharged. Standby does not power down the transceiver, so if the standby period will be prolonged, please remove the batteries.

The default time for Standby is Infinite. In the Standby window in the Information Center you may set this time to be shorter. If you set it to a shorter period of time, the transceiver will automatically resume monitoring after that specified amount of time. You can always take the transceiver out of standby at any time by using the Check Button.
**Pouch Use**

The transceiver is not intended for direct contact with the patient’s skin. During normal use, the transceiver should be worn over clothing, in a pocket or, preferably in a pouch. See pictures below for proper use of the pouch.

Do not coil the cables inside the pouch. They are part of the wireless system, and need to be freely exposed.

**WARNING** To avoid the risk of strangulation, do not tie a pouch solely around the patient’s neck.
Alignment Guides

Alignment guides are special inserts for the transceiver to allow only one leadset insertion position and to prevent debris entering any open area in the leadset block. Alignment guides can be used with 3-wire and 5-wire leadsets. The 6-wire leadset does not need an alignment guide. The transceiver will operate with or without alignment guides in place. Insert alignment guides as shown in the picture below.

Picture shown with 3-wire leadset. Insert single guide above the 5,6 slot. Insert double guide above the IntelliVue TRx+ area. Flat edges point toward the leadset.

WARNING Alignment guides may present a choking hazard. Handle with appropriate care.
Transceiver Setup

Turning Transceiver On or Off

Transceiver On

The transceiver is powered by two AA alkaline batteries. To turn the transceiver on, remove the leadset from the transceiver, insert batteries. Power-up sequence once batteries are inserted:

- All indicators illuminate briefly.
- A sequence of sounds indicates the instrument is ready for use.
  - A single beep, indicating that the self test was passed.
  - A series of double beeps, indicating the transceiver is attempting to establish contact with the Information Center.
  - Once the double beeps have stopped, you can press the Check button to verify communication with the Information Center. You should hear one beep as confirmation.
  - Do not insert the leadset in the transceiver during power-up. Once the transceiver is communicating with the Information Center you can insert the leadset.

Transceiver Off

Turn off the transceiver by removing the batteries. A “No Signal” technical alert will be in effect at the Information Center until the device is turned back on or until Standby is initiated.
3 Transceiver Setup

About Batteries

Inserting the Batteries

Insert two AA 1.5V Alkaline batteries. Matching the polarity with the +/- indication inside the compartment.

Battery Gauge Indicators

The battery gauge is also displayed in the Patient Sector at the Information Center to enable you to closely monitor battery status.

<table>
<thead>
<tr>
<th>Battery Gauge</th>
<th>Approximate Battery Life Remaining</th>
<th>Approximate Operating Time Remaining</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 green indicators</td>
<td>&gt;75%</td>
<td>&gt;34.7 hours</td>
<td>Normal</td>
</tr>
<tr>
<td>3 green indicators</td>
<td>&gt;50%</td>
<td>&gt;23.1 hours</td>
<td>Normal</td>
</tr>
<tr>
<td>2 green indicators</td>
<td>&gt;25%</td>
<td>&gt;11.6 hours</td>
<td>Normal</td>
</tr>
<tr>
<td>1 green indicator</td>
<td>25% to Battery Low level</td>
<td>&gt;15 minutes</td>
<td>Normal</td>
</tr>
<tr>
<td>1 red indicator</td>
<td>Battery Low level to Replace Battery Level</td>
<td>&lt;15 minutes</td>
<td>Normal - SpO₂ functionality is disabled in Battery Low condition</td>
</tr>
<tr>
<td>no indicator</td>
<td>Replace Battery Level</td>
<td>none</td>
<td>Transceiver shutdown</td>
</tr>
</tbody>
</table>

RF Auto Shutoff

If the ECG leads are off or there is no ECG signal or SpO₂ transducer present for 10 minutes the transceiver will stop broadcasting a radio signal. This prevents interference with the other transceivers in use. The technical alert, “Transmitter Off” INOP followed by a “No Signal” INOP will be displayed at the Information Center. Remove the batteries to conserve battery charge.

To restart monitoring, insert batteries (if needed), attach leads to the patient or insert the SpO₂ cable and press the Check Button to verify association with the Information Center (one beep).
Information Center Setup

Sector Setup

In order to receive transceiver information (ECG/SpO₂ signals) at the Information Center the transceiver must be assigned to a Patient Sector. The equipment label on the transceiver must match the equipment you assign at the Information Center.

Depending on your configuration, your equipment may be permanently assigned to a patient sector at the Information Center (fixed) or you may have the option of assigning the transceiver to any patient sector (flexible).

To identify which mode your Information Center is using, check Sector Setup and identify which task bar appears at the top of Sector Setup (see pictures below). This mode is set in configuration and will not change from day to day.

Assigning the Transceiver to a Sector (for flexible systems only)

You can access the Sector Setup Window by selecting the task bar button in the Patient Window or in All Controls

- In the Patient Window for the appropriate sector, select the Sector Setup button.
- On the Sector Setup Window select the Assign Bed/Equipment screen by selecting the Assign Bed/Equipment tab.
- Select the bed you want to assign to the sector by selecting a bed name from the list.
- Select the equipment you want to assign to the sector by selecting the appropriate equipment (exactly matching the equipment label that you are using for your patient) from the list.
- Select OK.
- You may now Admit a patient to this bed once there is equipment assigned to it.

NOTE If the sector already has equipment assigned to it and you have other equipment you would like to assign - use the Sector Setup Window and this time choose the Change Equipment tab, select the appropriate equipment you would like to assign and Select OK.
Telemetry Functions at the Information Center

The Patient Window at the Information Center (accessed from the Patient Window control in the Patient Sector) includes controls for a number of telemetry operations. For detailed instructions on these operations, see the *IntelliVue Information Center Instructions for Use* or the *Online Help* at the Information Center.

**To View ECG or SpO₂ Alarm Limits**

Move the cursor over the HR or SpO₂ label to display the current high and low alarm limits.

**To Change ECG or SpO₂ Alarm Limits**

Move the cursor over the High or Low numeric to display up/down arrow controls for adjusting the limit. After adjusting the limit, move the cursor away from the area to dismiss the limit controls.

**To Initiate a Spot Check SpO₂ Measurement**

Move the cursor over the picture of the finger with the sensor on it and click. This will initiate a spot check SpO₂ measurement.

**To Change ECG Waveform Size or Lead**

Move the cursor over the ECG waveform to display the ECG control box. You can change the size and the lead from this control box. Place the cursor over the Size area and select the desired size from the list. Place the cursor over the Lead area and select the desired lead from the list. Lead choices available depend on the leadset attached to the device.

**To Change the Va and Vb Default Lead Settings (6-lead only)**

Move the cursor over the ECG waveform to display the Lead Selection popup. Select the label from the label list. For Va and Vb, select Va and Vb, then select the lead to be assigned. Assignment of the same V lead to both Va and Vb is not allowed.

**Locating the Transceiver (Find Device)**

The Find Device feature enables you to generate an alternating pitch repeated tone at the transceiver to assist in locating a missing device. This function is initiated in the Telemetry Setup Window. Find Device requires that the transceiver has sufficient battery strength and is within the coverage area. To silence the Find Device sound press and hold the Check Button on the transceiver for 6 seconds.
Alarms

The Information Center is the alarm source for all physiological and technical alarms for the transceiver. You must be in monitoring distance of the Information Center in order to observe and respond to physiological and technical alarms. ECG Arrhythmia alarms will be discussed first followed by SpO2 and NBP alarms. NBP alarms will only be available if the transceiver is connected to the TeleMon Companion Monitor. If you need assistance while working at the Information Center, the Online Help system is always available in the top right corner of any window.

Arrhythmia Monitoring

The Information Center detects arrhythmia alarm conditions by comparing ECG data against a set of predefined rules/criteria for that specific condition. An alarm condition can be in the form of a rate violation (for example HR >120) or abnormal rhythm (for example VTach).

Arrhythmia analysis provides information including heart rate and Premature Ventricular Contraction (PVC) rate. The monitor uses the user-selected ECG leads for multilead arrhythmia analysis. During arrhythmia analysis the monitor continuously:

- Classifies and labels beats to aid in rhythm analysis and alarm detection.
- Examines the ECG signal for ventricular fibrillation, asystole, and noise.
- Rejects pace pulses as long as Patient Paced is checked in the Admit screen. Patient paced must be turned on for all patients with a pacemaker. Please see the lesson on Patient Management in the guided training for the Information Center.

Choosing an ECG Lead for Arrhythmia Monitoring

It is important to select a suitable lead for arrhythmia monitoring. If the leads that you are monitoring do not meet the requirements below - change the lead that you are monitoring to a lead that does meet these requirements. If you still are not getting an adequate ECG signal, make sure you are using fresh, wet gel electrodes and that the lead placement is accurate.

Guidelines for non-paced patients are:

- QRS should be tall and narrow (recommended amplitude > 0.5 mV)
- R-Wave should be above or below the baseline (but not bi-phasic)
- T-wave should be smaller than 1/3 R-wave height
- the P-wave should be smaller than 1/5 R-wave height.
For paced patients, in addition to the above, the pace pulse should be:
– not wider than the normal QRS
– the QRS complexes should be at least twice the height of pace pulses
– large enough to be detected, with no re-polarization.

Viewing Arrhythmia Waves
From the Patient Window, you can click on Arrhythmia Analysis and see how the monitor is classifying each beat.

Arrhythmia beat labels tell you how the monitor is classifying beats.

N = Normal
V = Ventricular Ectopic
P = Paced
' = Pacer spike
L = Learning patient’s ECG
A = Artifact (noisy episode)
? = Insufficient information to classify beats
I = Inoperative condition (e.g., LEADS OFF)

From the Arrhythmia Analysis window you can initiate a manual relearn if you think the beat labels are incorrect.

During a learning phase:
• Alarm timeout periods are cleared
• Stored arrhythmia templates are cleared
• Asystole, VFib, and HR alarms (when there are enough beats to compute the HR) are active. No other alarms are active.

Automatic Arrhythmia Relearn
Arrhythmia relearning is initiated automatically whenever:
• ECG monitoring is switched on
• The ECG Lead or Lead Label is changed manually
• A Leads Off INOP condition (that has been active for > 60 seconds) ends.

Red Arrhythmia Alarms
Red arrhythmia alarms include:
• Asystole
• Ventricular Fibrillation
• Ventricular Tachycardia
• Extreme Tachy and Brady
Red arrhythmia alarms will sound until they are silenced. If they are silenced and the condition continues, a reminder sound will sound every 3 minutes until the condition ceases.

**Extreme Alarm Limits**

The extreme rate alarms, Extreme Tachy and Extreme Brady, are 20 bpm added to the high limit and 20 bpm subtracted from the low limit.

**Yellow Arrhythmia Alarms**

Yellow arrhythmia alarms are short yellow alarms specific to arrhythmia-related conditions.

They include:

- Irregular HR
- High/Low HR
- Missed Beat
- Multiform PVCs
- Non-Sustain VT
- Pacer Not Capture
- Pacer Not Pace
- Pair PVCs
- Pause
- PVCs > xxx/min
- R on T PVCs
- Run PVCs
- SVT
- Vent Bigeminy
- Vent Trigeminy
- Vent Rhythm

**Arrhythmia Alarm Timeout Periods**

Normally, an arrhythmia alarm is announced when an alarm condition is detected. However, there are certain situations that can inhibit the audible and visible indications of the alarm even though the alarm condition was detected. These include:

- if a more serious alarm condition is active
- if a timeout period is in effect for this alarm

**Alarm Suspend**

All alarms for a patient can be suspended/paused from the Information Center. The Alarm Suspend/Pause duration is fixed at 1, 2 or 3 minutes. The default alarm suspend time is 2 minutes. Alarms automatically resume after the configurable duration or can be manually resumed earlier.
INOP Alarms

Technical Alerts or INOPs (inoperative conditions) are sourced from the transceiver and sent to the Information Center for audible and visual alerts. The table below describes some of the INOPs you may receive when monitoring transceivers. For a complete list please see the IntelliVue TRx/TRx+ Transceivers Instructions for Use.

Soft Inops have an alarm banner and no sound, Hard Inops have an alarm banner and sound.

<table>
<thead>
<tr>
<th>Alarm Text</th>
<th>Priority</th>
<th>Condition</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTERY LOW</td>
<td>Soft</td>
<td>Power is low.</td>
<td>Replace batteries promptly to avoid transceiver shutdown and cessation of monitoring.</td>
</tr>
<tr>
<td>ECG LEADS OFF</td>
<td>Hard, Can be configured to be Red or Yellow</td>
<td>Multiple leads are off.</td>
<td>Reattach ECG leads to patient.</td>
</tr>
<tr>
<td>INVALID LEADSET</td>
<td>Hard</td>
<td>– Wrong leadset.</td>
<td>– Check for appropriate leadset.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Leadset inserted incorrectly.</td>
<td>– Check for correct insertion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Bad lead selection switches in the transceiver</td>
<td>– Contact Service.</td>
</tr>
<tr>
<td>NO SIGNAL</td>
<td>Hard</td>
<td>– Patient is out of range, or</td>
<td>– Make sure that the transceiver is in range and has good batteries.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– No batteries in transceiver, or</td>
<td>– Replace the transceiver if Power On Self Test fails.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Transceiver has failed, or</td>
<td>– Put bed in Standby</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Connection to Database Server has failed.</td>
<td>– Contact Service.</td>
</tr>
<tr>
<td>REPLACE BATTERY</td>
<td>Hard, Latched, Can be configured to Red or Yellow</td>
<td>Dead battery. No monitoring is occurring.</td>
<td>Replace batteries.</td>
</tr>
<tr>
<td>TELEMETRY STANDBY</td>
<td>Soft</td>
<td>Information Center standby mode timer is active, or patient has not returned to telemetry coverage area. There is no data from bed.</td>
<td>Cancelled when patient is removed from Standby.</td>
</tr>
<tr>
<td>TRANSMITTER OFF</td>
<td>Hard</td>
<td>RF shutoff after 10 minutes of leads off or SpO₂ sensor off.</td>
<td>Reattach ECG leads and/or SpO₂ sensor to patient.</td>
</tr>
</tbody>
</table>
SpO₂ Alarms

There are three SpO₂ related alarms, one red three star alarm (desaturation) and two yellow two star alarms (high/low SpO₂) that can be generated from the Information Center. Remember, no alarms are announced at the transceiver, you must be in hearing distance of the Information Center to respond to these alarms.

Yellow level SpO₂ alarms are set at 90 and 100 as the default. Setting the high alarm to 100 is equivalent to turning the high alarm off. The red desaturation alarm activates 10 points below the low SpO₂ alarm. In this case, you would get a red desaturation alarm once the SpO₂ level reached 80%. You can change SpO₂ alarms in the Patient Window.

NBP Alarms

When the transceiver is connected to the TeleMon Companion Monitor as discussed in Chapter 9 you will be able to measure Non-invasive Blood Pressure. The alarms for NBP in TeleMon are separate and may alarm differently than the alarms at the Information Center.

The NBP alarms for the Information Center only can be set to:

- Systolic or Diastolic Alarm On
- Systolic Alarm On
- Diastolic Alarm On
- Mean Alarm On
- Off

The default alarm is set for Systolic or Diastolic Alarm On and can be adjusted in Patient Window. NBP alarms are yellow two star alarms.
ECG Monitoring

Measuring ECG

The electrocardiogram (ECG) measures the electrical activity of the heart and displays it on the Information Center as a waveform and a numeric.

Correct lead placement is always important for accurate diagnosis. QRS morphology can be greatly altered if an electrode is moved away from its correct location. Each electrode is color-coded. Use the diagrams for 5-lead standard placement located on the back of your transceiver. Additional lead placement information is available in the Online Help at the IntelliVue Information Center.

When placing electrodes on the patient, choose a flat, non-muscular site where the signal will not be impacted by either movement or bones.

Philips recommends that electrodes be changed every 24 hours.

Skin Preparation

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prepare the patient’s skin. Good electrode-to-skin contact is important for a good ECG signal, as the skin is a poor conductor of electricity.</td>
</tr>
<tr>
<td></td>
<td>• Select sites with intact skin, without impairment of any kind.</td>
</tr>
<tr>
<td></td>
<td>• Clip or shave hair from the site as necessary.</td>
</tr>
<tr>
<td></td>
<td>• Wash site with soap and water, leaving no soap residue. <em>Note--Philips does not recommend using ether or pure alcohol, because they dry the skin and increase the resistance.</em></td>
</tr>
<tr>
<td></td>
<td>• Dry thoroughly.</td>
</tr>
<tr>
<td></td>
<td>• Use ECG skin preparation paper (abrasive) to remove dead skin cells and to improve the conductivity of the electrode site.</td>
</tr>
<tr>
<td>2</td>
<td>Check electrodes for moist gel, and attach to the grabbers or snaps. If you are not using pre-gelled electrodes, apply electrode gel to the electrodes before placement. <em>Note--Gel must be moist to provide a good signal.</em></td>
</tr>
<tr>
<td>3</td>
<td>Place the electrodes on the patient according to the lead placement you have chosen (see the electrode placement diagram following). Place the edge down, then “roll down” the rest of the pad. Press firmly around the adhesive edge toward the center.</td>
</tr>
</tbody>
</table>
Connecting the ECG Cable

Match the arrow on the ECG cable with the arrow on the Lead Insertion Guide for the appropriate leadset you are using. Once inserted, make sure the colored line is no longer visible to insure proper connection.

3-Wire Placement

<table>
<thead>
<tr>
<th>Electrode</th>
<th>Labels</th>
<th>AAMI Color</th>
<th>IEC Color</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>R</td>
<td>White</td>
<td>Red</td>
<td>directly below the clavicle and near the right shoulder</td>
</tr>
<tr>
<td>LA</td>
<td>L</td>
<td>Black</td>
<td>Yellow</td>
<td>directly below the clavicle and near the left shoulder</td>
</tr>
<tr>
<td>LL</td>
<td>F</td>
<td>Red</td>
<td>Green</td>
<td>on the left lower abdomen</td>
</tr>
</tbody>
</table>
5-Wire Placement

<table>
<thead>
<tr>
<th>Electrode</th>
<th>Labels</th>
<th>AAMI Color</th>
<th>IEC Color</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>R</td>
<td>White</td>
<td>Red</td>
<td>directly below the clavicle and near the right shoulder</td>
</tr>
<tr>
<td>LA</td>
<td>L</td>
<td>Black</td>
<td>Yellow</td>
<td>directly below the clavicle and near the left shoulder</td>
</tr>
<tr>
<td>LL</td>
<td>F</td>
<td>Red</td>
<td>Green</td>
<td>on the left lower abdomen</td>
</tr>
<tr>
<td>RL</td>
<td>N</td>
<td>Green</td>
<td>Black</td>
<td>on the right lower abdomen</td>
</tr>
<tr>
<td>V</td>
<td>C</td>
<td>Brown</td>
<td>White</td>
<td>on the chest, the position depends on your required lead selection.</td>
</tr>
</tbody>
</table>
6-Wire Placement

<table>
<thead>
<tr>
<th>Electrode</th>
<th>Labels</th>
<th>AAMI Color</th>
<th>IEC Color</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>R</td>
<td>White</td>
<td>Red</td>
<td>directly below the clavicle and near the right shoulder</td>
</tr>
<tr>
<td>LA</td>
<td>L</td>
<td>Black</td>
<td>Yellow</td>
<td>directly below the clavicle and near the left shoulder</td>
</tr>
<tr>
<td>LL</td>
<td>F</td>
<td>Red</td>
<td>Green</td>
<td>on the left lower abdomen</td>
</tr>
<tr>
<td>RL</td>
<td>N</td>
<td>Green</td>
<td>Black</td>
<td>on the right lower abdomen</td>
</tr>
<tr>
<td>Va</td>
<td>Ca</td>
<td>Brown</td>
<td>White</td>
<td>on the chest, the position depends on your required lead selection. The default position is V2.</td>
</tr>
<tr>
<td>Vb</td>
<td>Cb</td>
<td>Brown/White</td>
<td>White/Red</td>
<td>on the chest, the position depends on your required lead selection. The default position is V5.</td>
</tr>
</tbody>
</table>
SpO₂ Monitoring

The SpO₂ parameter measures the arterial oxygen saturation, that is, the percentage of oxygenated hemoglobin in relation to the total hemoglobin. SpO₂ measurements can be made manually on an as needed basis in Spot Check mode or continuously in Continuous mode depending on the transceiver controls at the Information Center. The factory default for your system is Spot Check mode.

Initiating a Spot Check SpO₂ from the Transceiver

1. Connect the sensor cable to IntelliVue TRx+
2. Connect reusable sensors directly into the transceiver
3. Connect disposable sensors into the adapter cable, then connect the adapter cable to the transceiver.

To initiate a measurement, verify that the sensor is placed on the patient and then insert the cable into the transceiver. You can remove and reinsert the cable at any point to make another measurement.

Insert the SpO₂ cable into the port as shown and check that:

- The SpO₂ sensor light turns on.
- Place the sensor on the chosen site.
- You will hear a low-pitch tone detecting each pulsation for measurements initiated at the transceiver.
- After about 30 seconds, if the measurement is successful, you should hear a single beep. The value, with the measurement time will be displayed at the Information Center.
6 SpO2 Monitoring

- If the measurement was not successful, you will hear a double beep. Remove the sensor cable and reinsert it to retake the measurement.

**Initiating a Spot Check measurement from the Information Center**

In the Patient Window at the Information Center, move the mouse cursor over the finger with a SpO2 sensor on it and click one time. See figure below.

Note- There is no audible feedback at the transceiver (pulse tone or successful/failed measurement) when Spot Check is initiated at the Information Center.

**Continuous Mode**

Your transceiver is capable of displaying the pulse rate and the plethysmogram waveform from the SpO2 measurement. To see these measurements, the transceiver must be changed to continuous SpO2 mode. To change the mode to Continuous SpO2 mode from the Information Center:

1. Select **Patient Window**
2. Select **Telemetry Setup**
3. Select SpO2 mode and change to **Continuous**

When your patient is discharged at the Information Center, the SpO2 mode will return to your default, Spot Check.

Note- SpO2 monitoring consumes considerable electrical energy. Continuous SpO2 monitoring consumes batteries faster than Spot Check mode. The battery power must be at least 25% full in order to make SpO2 measurements.

**Turning SpO2 Monitoring Off**

To turn SpO2 monitoring off, disconnect the sensor cable from the transceiver and silence the INOP alarm at the Information Center. SpO2 enters a power-down mode after the cable is disconnected from the transceiver, thereby conserving battery life.

You may also choose to turn off SpO2 monitoring by unchecking the box next to Enable SpO2 in Telemetry Setup. When the this box has been unchecked, as soon as the sensor is reinserted the SpO2 measurement will come back on in the mode it was in prior to turning it off.
Troubleshooting

ECG Artifact

Clinicians will tend to see more motion related artifact on the ECG of ambulatory patients than on patients that are restricted to a bed. Proper skin preparation and electrode application are very important in reducing this problem. Philips recommends changing electrodes every 24 hours.

Low Signal

The IntelliVue Telemetry System is custom designed for your site, so reliable signal reception is only possible when the transceivers are in the coverage area or range of receiving access points. When the signal is too low, the following technical alarms can occur:

- Cannot Analyze ECG
- Weak Signal
- No Signal

Corrective Action

- Make sure the patient is in range of the access point.
- If patient is out of range, place sector in standby
- If the patient is in range and is not moving, move the transceiver about 6 inches from where it is.
- Check for INOP alarms at the Information Center
- Call your Service Provider

Accidental Water Exposure

If the transceiver is accidentally immersed in liquid for up to 5 minutes, no damage to the device and no electrical safety issues for the patient will result. Remove the device from the water, dry it off and clean and or disinfect the unit as described in the IntelliVue TRx/TRx+ Telemetry System Instructions for Use.

If you have questions about using the IntelliVue Information Center, see the Instructions for Use included with the product or use the Online Help menu found in any window at the Information Center.
7 Troubleshooting
Patient Education

Skin Contact

The transceiver is not intended for direct contact with the patient’s skin. During normal use, the transceiver should be worn over clothing, in a pocket or in a pouch. Do not coil the leadset cables in the pocket or pouch. They are part of the wireless system and need to be freely exposed.

Transceiver Sounds

If you initiate the SpO₂ Spot Check monitoring from the transceiver, make sure the patient is aware that the sounds and the lights coming from the transceiver/SpO₂ sensor are not harmful.

Operational Instructions

Instruct the patient to keep the transceiver connected at all times or according to your hospital policy. Instruct the patient not to open the battery compartment during operation.
TeleMon Companion Monitor

About TeleMon

With your monitoring system you may have also received a TeleMon Companion Monitor. The TeleMon Companion Monitor provides local display of the ECG wave or a delayed/annotated arrhythmia wave and numerics for HR, %SpO₂ and NBP. The connected telemetry device simultaneously sends the ECG and %SpO₂ signal to the Information Center by way of the wireless telemetry system.

The TeleMon Instructions for Use also has further information and important Warning messages in regards to the safe use of this monitor. Please obtain the TeleMon Quick Guide and attach it to the handle of your monitor.

When the transceiver is disconnected from TeleMon, the Non-invasive Blood Pressure (NBP) measurement does not function and no additional information from TeleMon is sent to the Information Center.

TeleMon can be powered either by a rechargeable battery or AC line power. Using AC line power helps to conserve battery life.

Communication from the transceiver to the TeleMon is through the cable that connects to the Monitor/Service Port as seen on page 6.

Connecting the Transceiver to TeleMon

The transceiver must have batteries with sufficient power before connecting it to TeleMon. When you connect the transceiver to the TeleMon, SpO₂ will be in continuous mode as long as there is a sensor in the SpO₂ sensor port. Upon disconnect, SpO₂ will go back to the mode previously chosen. When the transceiver is connected to TeleMon, the battery gauge on the transceiver and at the Information Center will always indicate full power regardless of the actual battery strength.

The transceiver receives power from TeleMon when connected, however the batteries are not recharged. Once your transceiver is connected the icon at the Information Center will change to this 📡.

To connect the Transceiver:

1. Turn TeleMon On, wait for the self-test to complete
2. Connect the quick disconnect cable together
3. Insert the cable connector into the side of the transceiver
4. After about 6 seconds the Transmitter Undocked message will go away and the ECG wave and other data will appear on the screen.

To disconnect the Transceiver:
1. Turn the TeleMon OFF
2. Disconnect the cable from the transceiver
3. SpO2 will revert to previous mode and the icon at the Information Center will be.

Alarms
TeleMon provides basic alarming capabilities for both physiological and technical conditions independent of the alarms annunciated at the Information Center. TeleMon does not get any data back from the Information Center when the transceiver is connected. If your patient has a pacemaker, you must change the TeleMon to paced mode in the Monitor Setup screen. See section on page 33 about operating your TeleMon Companion Monitor.

Physiological alarms indicate a life-threatening situation or a less urgent situation, such as heart rate beyond limits. Physiological alarms are local to TeleMon only and are not sent to the Information Center. The Information Center generates physiological and technical alarms independent of the alarms on TeleMon.

Technical alarms or INOPs (inoperative condition) indicate that TeleMon cannot measure or detect alarm conditions reliably.

Note - Alarm settings at the Information Center and TeleMon are independent of each other and must be set separately.

Please refer to the Quick Guide for TeleMon or the Instructions for Use for steps to set or change alarms for the TeleMon Companion Monitor.

To change the Information Center NBP alarms for a transceiver that is connected to TeleMon, click on the NBP alarm button in the Patient Window and adjust the limits as needed. You can also adjust the alarm source in this window, the default alarm source is Systolic or Diastolic Alarms On.

Note - These alarm limits are for the Information Center and do not get relayed back to the TeleMon Companion Monitor.
Operating the TeleMon Companion Monitor

To enter the alarm and parameter settings for your monitor:

- Use the up and down arrows to get to different elements on the screen.
- Press the check button to open the task window when you get to the desired area.
- Use the up and down arrow to make your selection.
- Press the check button to confirm your choice.

To change the paced status or patient category

- Use the Up and Down arrow to navigate to Monitor Setup
- Press the Check button
- Use arrow to highlight desired paced status
- Press the Check button
- Use arrow to highlight desired patient category
- Press the Check button
- Use arrow to highlight Main Screen
- Press the Check button

Once the monitor is powered off it returns to defaults.

Always check your alarm limits, alarm status, patient category and paced status after connecting a transceiver.
Knowledge Test

1. Where do you adjust the size of the ECG waves for your telemetry patient?
   a. All Controls Window
   b. Arrhythmia Alarms Window
   c. Patient Window

2. To connect the leadset in the telemetry device for the desired ECG configuration
   a. Push the check button to light the appropriate lead indicators
   b. Align the arrow on the leadset with the appropriate arrow on the leadset insertion guide.
   c. Push the telemetry button to light the appropriate lead indicators

3. In the patient window at the Information Center you can
   a. Make changes to ECG, heart rate and SpO₂
   b. Suspend/Unsuspend alarms
   c. Both a and b

4. How do you know when the transceiver has associated with the Information Center?
   a. The battery gauge lights up for 3 seconds
   b. The transceiver emits a single beep sound
   c. The suspend indicator on the front of the transceiver flashes three times

5. To initiate a series of high-frequency tones from the transceiver for assistance in locating a missing transceiver you would
   a. Click on the battery gauge in the patient window
   b. Select Find Device in the telemetry setup window
   c. Put the sector in standby
6. Telemetry monitoring is performed by
   a. Transmitting radio waves from the transceiver to an access point and from the access point to the Information Center
   b. Transmitting radio waves to a central receiver unit and from the central receiving unit to the Information Center
   c. Transmitting radio waves directly to the Information Center

7. With the telemetry device programmed to spot check mode, the measurement at the telemetry device is performed by
   a. Pressing the check button
   b. Connecting (or disconnecting and reconnecting) the SpO\textsubscript{2} sensor cable to the transceiver
   c. Pressing the telemetry button

8. When a spot check SpO\textsubscript{2} measurement is initiated at the telemetry device, there is an audible pulse signal.
   a. True
   b. False

9. When a transceiver with SpO\textsubscript{2} is connected to TeleMon, the SpO\textsubscript{2} is measured continuously regardless of the sample rate setting.
   a. True
   b. False

10. When the transceiver is connected to TeleMon, the alarms from TeleMon are sent to the Information Center
    a. True
    b. False

11. To power up the transceiver you must insert (2) 9 volt batteries and wait for the power up sequence to occur before connecting the leadset to the patient.
    a. True
    b. False

12. Alarms can be heard at the transceiver as well as the Information Center.
    a. True
    b. False
Knowledge Test Answers

1. c.
2. b.
3. c.
4. b.
5. b.
6. a.
7. b.
8. a.
9. a.
10. b.
11. b.
12. b.