



The Philips 12-Lead Algorithm
Physician's Guide



PHILIPS

Notice

About This Edition

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About This Guide

This Physician Guide explains how ECG signals are analyzed by the Philips 12-Lead Algorithm.

NOTE No automated analysis is completely reliable. Computerized ECG analysis should always be reviewed by a qualified physician.

Who Should Read This Guide?

This guide is intended for physicians who overread ECGs interpreted by the Philips 12-Lead Algorithm. It also may be of interest to other health care professionals who want to know more about ECG interpretation.

NOTE This Physician Guide describes features that may not be available on all Philips Medical Systems equipment. Refer to the documentation supplied with your particular product to learn more about available features.

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Appendix B. Interpretive Statements (by Category)

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The Philips 12-Lead Algorithm

Introduction

Development of computer-assisted ECG analysis began in the 1960s. Initially used in research facilities, computer interpretation has developed into an accepted tool for physicians.

Development of the adult ECG Criteria Program began in 1971 as a combined effort between engineers and a worldwide panel of cardiologists. At the core of ECG analysis is the ECG Criteria Language (ECL). ECL is a computer programming language that was developed specifically for the definition of electrocardiographic criteria, and was first introduced in 1978. The primary objective of ECL is to provide a method for ECG criteria to be expressed in a form meaningful to both a cardiologist and to computers. ECL describes ECG criteria using consistent terminology selected from a broad base of cardiologists as well as electrocardiography texts.

The Philips 12-Lead Algorithm provides an analysis of the amplitudes, durations, and morphologies of the ECG waveforms and the associated rhythm. ECG waveform analysis is based on standard criteria for interpretation of these parameters, calculations of the electrical axis, and the relationship between leads.

The algorithm is highly age and gender specific. Patient age and gender are used throughout the program to define normal limits for heart rate, axis deviation, time intervals, and voltage values for interpretation accuracy in tachycardia, bradycardia, prolongation or shortening of PR and QT intervals, hypertrophy, early repolarization, and myocardial infarct.

Adult criteria apply if the patient age entered is 16 years old or older, or if no age is specified. Pediatric criteria apply if the patient age entered is younger than 16 years of age.

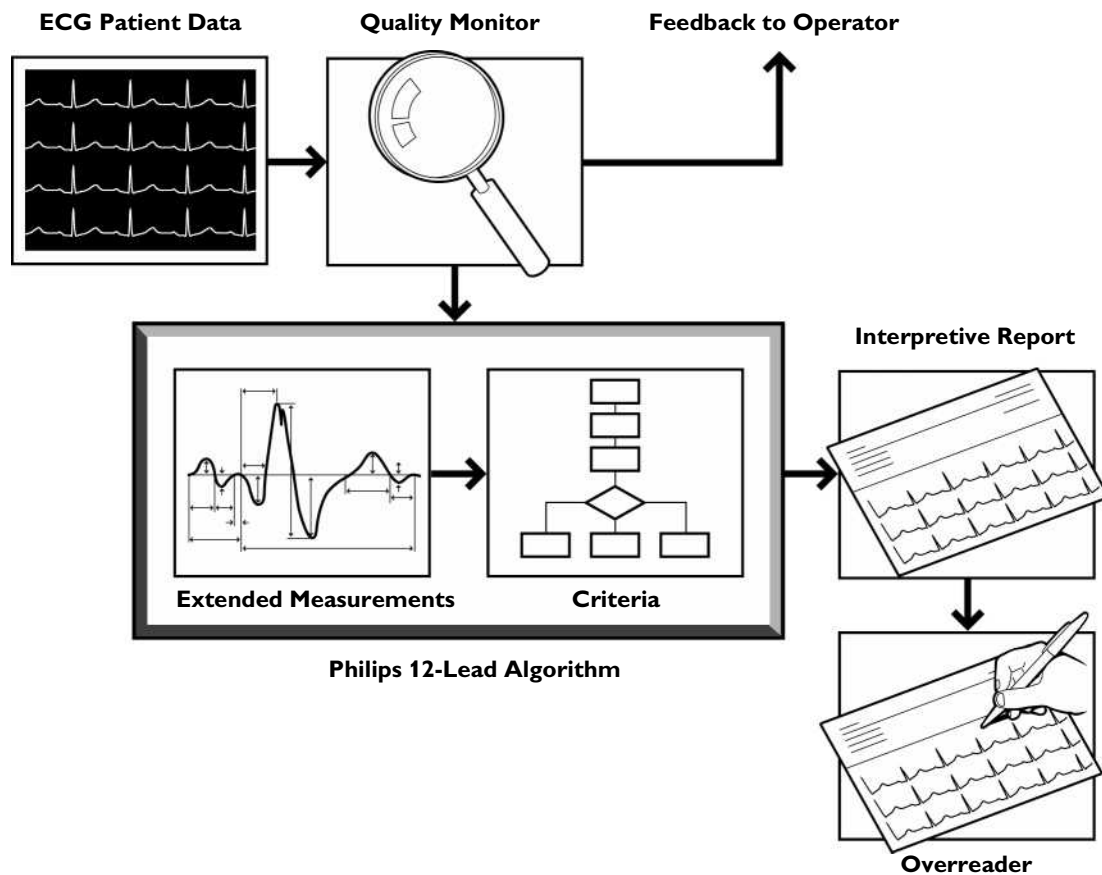
A computer-interpreted ECG report is not intended to be a substitute for interpretation by a qualified physician. The interpreted ECG is a tool to assist the physician in making a clinical diagnosis in conjunction with the physician's knowledge of the patient, the results of the physical examination, and other findings. The algorithm helps to identify problem areas for the physician and saves time for the physician or editing technician who may only need to add, delete, or modify a few statements.

The Philips 12-Lead Algorithm Process

The Philips 12-Lead Algorithm produces precise and consistent ECG measurements that are used to provide interpretive statements. The process begins with the simultaneous acquisition of the twelve conventional leads and follows four steps to produce the interpreted ECG report.

- 1 Quality Monitor** – examines the technical quality of each ECG lead
- 2 Waveform Recognition** – locates and identifies the various waveform components
- 3 Measurement** – measures each component of the waveform and performs basic rhythm analysis, producing a comprehensive set of measurements
- 4 Interpretation** – uses extended measurements and Patient ID information (age, gender) to select interpretive statements from the program

Figure 1-1 The Philips 12-Lead Algorithm Analysis Process



Quality Monitor

Computer-assisted ECG analysis begins by obtaining accurate ECG waveforms through simultaneously acquiring and analyzing 12 ECG leads. The analog ECG signal at the body surface is digitized by the Patient Module. The ECG waveform data is captured at a sample rate of 4 Mhz and reduced to 500 samples per second with 5 μ V resolution. This sampling rate will accurately detect pacemaker pulses.

Philips Medical Systems equipment monitors ECG trace quality from the time of lead attachment, to ECG acquisition, and throughout the analysis process. This ensures the highest possible quality ECG trace. This also enables the correction of problems before the ECG trace is printed.

During analysis, the trace quality is analyzed to ensure good ECG measurements. The ECG is also analyzed for muscle artifact, AC noise, baseline wander, and leads-off. Any noise problems not corrected by the operator are described in the interpretive statements on the ECG report.

If noise conditions are severe, a report may not be printed. If noise conditions are significant enough to prevent ECG analysis, the ECG may be printed without interpretation. The operator must then correct the noise problem and retake the ECG.

Modifying lead placement and improving patient preparation helps to eliminate most noise quality problems.

Reducing Artifact

Electrical interference, patient respiration, patient movement, and muscle tremors may add noise and artifact to the ECG signal. Poor quality electrodes or inadequate patient preparation may also degrade the ECG signal.

The two types of AC interference in the ECG signal are common mode and differential mode.

Common Mode

Some noise sources that interfere with the ECG signal affect all of the electrodes attached to the patient. These common noise sources are removed from the ECG by input circuitry as the signal is acquired and digitized. The amount by which these common mode signals are reduced is referred to as the *common mode rejection ratio*. The common mode rejection ratio for Philips Medical Systems input circuitry meets or exceeds current AAMI and IEC standards.

Differential Mode

The magnetic fields associated with electrical power interact with the lead wires. These fields induce electrical signals that appear as high frequency noise on the ECG. The amount of distortion differs from lead to lead, depending on the size of any loop created by the lead wire and on its orientation. A good way to prevent distortion is to align all the lead wires with the patient's body along the head-to-foot axis.

Using Filters

A variety of noise sources may degrade the reproduction of the ECG signal. A sophisticated set of digital filters may be selected by the operator (or during system configuration) to optimize the displayed or printed ECG waveform.

With the exception of the AC filter (which is highly selective) there is trade off between fidelity and clarity of the ECG trace when a filter is applied. The more filtering applied, the greater the possibility of removing ECG signal details.

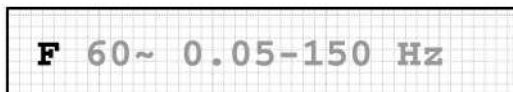
In the lower right corner of the ECG report is a box that displays information about the filtering options used on the ECG.

NOTE While all filters affect displayed and printed ECGs, the Philips 12-Lead Algorithm always receives and analyzes unfiltered data.

Figure 1-2 Example of the Filter Box on the ECG Report



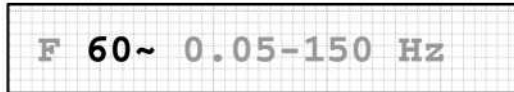
Artifact Filter



The artifact filter removes skeletal muscle artifact. This noise source is the most difficult to eliminate because it has the same frequencies as ECG signals. The artifact filter eliminates skeletal muscle artifact, but also reduces all high frequency components of the ECG.

The filter removes up to 50 μ V of signals in the 5 Hz to 150 Hz frequency range. This may affect P waves and the entire QRS-T complex. Use the artifact filter only for ECGs that would be unreadable due to significant levels of muscle artifact.

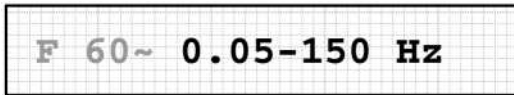
AC Filter



The AC filter removes interference created by the magnetic fields associated with electrical power interacting with the lead wires. The frequency of the AC interference is stable at 60 or 50 Hz, so the AC filter removes the AC noise and leaves the ECG signal intact. The line frequency of 60 or 50 Hz is selected during system configuration.

If the filter box does not contain the AC filter symbol, the AC filter was not used for the ECG.

Frequency Response Filters



These filters suppress frequencies at the high and low ends of the ECG signal spectrum. The available low frequency response filter settings are 40, 100, and 150 Hz. In 1989, the American Heart Association recommended that frequencies up to 125 Hz be recorded for adult ECGs and that frequencies up to 150 Hz be recorded for pediatric ECGs.¹

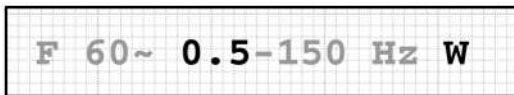
Changing the low frequency filter to 40 or 100 Hz results in a smoother-looking ECG waveform while eliminating some fine detail in the signal. Small deflections, notches, and slurs may be distorted or may disappear if one of these filters is applied.

The high frequency response filter settings are 0.05, 0.15, and 0.5 Hz.

NOTE With the baseline wander filter on, the high frequency response filter is automatically set to 0.5. It is recommended that the 0.05 high frequency response filter setting be used for all other ECGs. See "Baseline Wander Filter" below for more information.

The frequency response of the printed ECG is indicated in the ECG report filter box. The algorithm uses 0.05 to 150 Hz bandwidth for maximum fidelity.

Baseline Wander Filter



Baseline wander is the slow (typically 0.1 - 0.2 Hz) drifting of the ECG baseline up or down during ECG recording. Baseline wander may result from patient respiration or from other sources. Severe baseline wander may make it difficult to determine the true wave shapes in the ECG.

Effective baseline wander suppression techniques do not distort the ST segment. While the highest frequency response limit of 0.05 Hz (recommended for normal use) eliminates baseline wander from most ECGs, additional suppression may be required. Turning on the baseline wander filter suppresses all frequencies above 0.5.

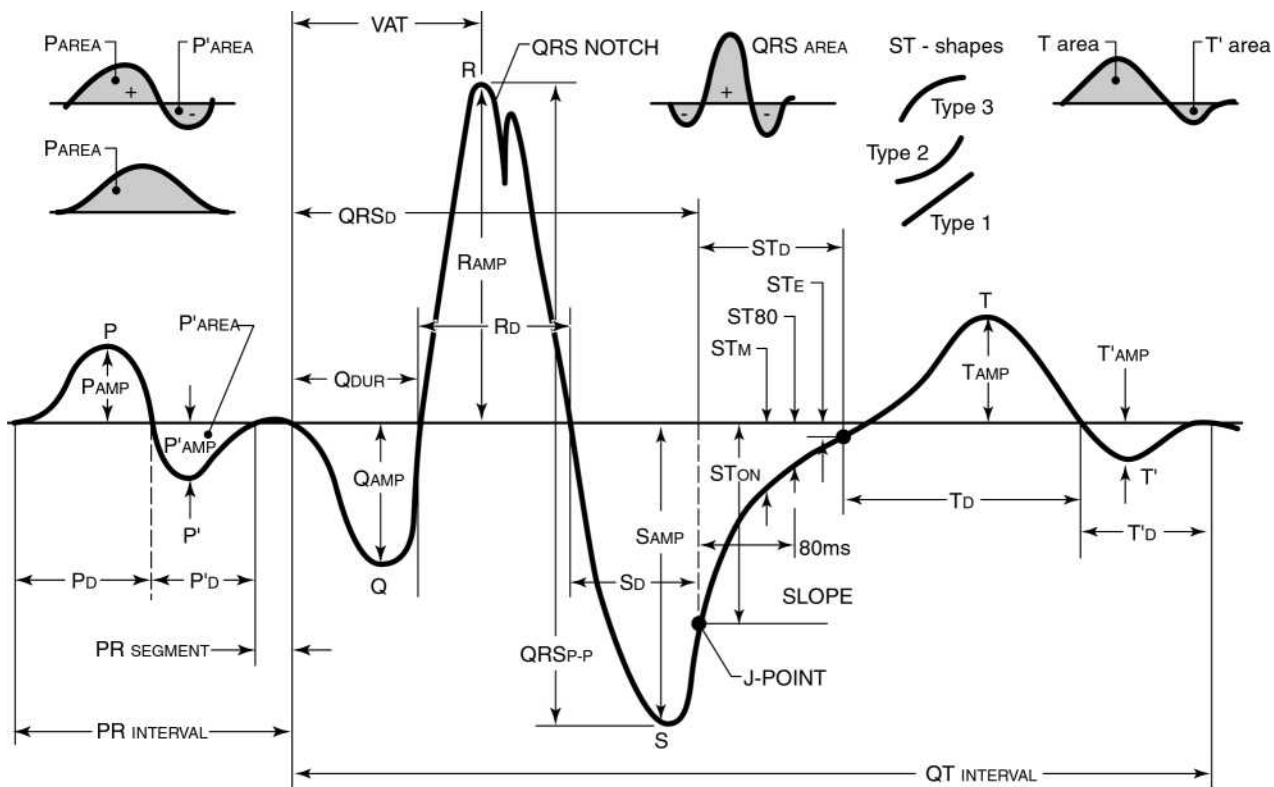
1. Bailey JJ, Berson AS, Garson A, Horan LG, Macfarlane PW, Mortara DW, Zywiec C: Recommendations for Standardization and Specifications in Automated Electrocardiography: Bandwidth and Digital Signal Processing. *Circulation*, 81:730-739 (1990).

NOTE A 0.5 Hz baseline wander filter that may distort the ST segment is used during continuous ECG recording in Rhythm mode. Do not attempt to interpret the contour aspects of Rhythm ECGs at this setting. If contour analysis is important in Rhythm mode, use the 0.05 Hz Rhythm high-pass frequency response setting that minimizes the ST segment distortion. Rhythm characteristics of the ECG are accurately recorded regardless of the low-pass frequency setting in Rhythm mode.

Waveform Recognition and Measurements

The Philips 12-Lead Algorithm calculates measurements for all the waveforms on an ECG report. Every beat in each lead is measured individually, allowing the natural variation among beats to contribute to the representative measurements. In the algorithm, all of the representative group, lead, and global measurements are calculated from the comprehensive set of measurements for each beat. The algorithm can use any combination of these three types of measurements (group, lead, global) thereby enhancing the flexibility and power of its interpretive capabilities.

Figure 1-3 ECG Morphology Measurements



Waveform Recognition

The first step of the measurement program involves waveform recognition and beat detection. A pacing spike detector is run on all leads if the ECG pacemaker setting is On or Unknown. Pacer spikes are removed and the resulting waves are analyzed with a boundary indicator derived from all leads over the ten-second analysis period. After the approximate QRS complex and pacemaker spike locations are known, another boundary indicator waveform that

enhances P and T wave detection is derived. Approximate P wave, QRS complex, and T wave regions are then determined for each beat in the ECG.

Comprehensive Measurements

After the approximate waveform locations are known, they are further refined to determine precise onsets and offsets for each waveform. Once the onsets and offsets are determined, the amplitude, duration, area, and shape are calculated for every P wave, QRS complex, ST segment, and T wave in each lead. Waveform irregularities such as notches, slurs, delta waves, and pacemaker spikes are also noted for every beat.

Group Measurements

Each beat in the ECG is classified into one of five rhythm groups based on rate and morphology parameters. Each group has beats with similar R-R intervals, durations, and shapes. All ventricular paced beats are grouped together, regardless of other parameters.

- Group 1 measurements represent the type of beat that is predominant.
- Groups 2 through 5 represent other beat types whose measurements are averaged together.

The group into which each beat is classified is noted under the heading `RHYTHM GROUPING OF BEATS` in the Rhythm Analysis section of the Extended Measurements report. See “Extended Measurements Report” on page 5-26.

Lead Measurements

Measurements for each of the 12 leads are calculated from the Group 1 beats. Only if all beats in the ECG are ventricular paced will the measurements be for paced beats. If an ECG contains both paced and non-paced beats, only the non-paced beats will be measured.

The lead measurements are averaged representatives of the dominant waveform present in each lead and are reported in the Morphology Analysis section of the Extended Measurements Report.

Atrial Rhythm Analysis

Atrial rhythm is determined by examining leads V1, aVF, II, and III in succession until the algorithm can determine the number of P waves per QRS complex. If the determination fails, no atrial rhythm parameters are calculated.

Global Measurements

The global measurements for the ECG (including the frontal and horizontal plane axis measurements) are reported to the right of the lead measurements in the Morphology Analysis section of the Extended Measurements Report. See “Extended Measurements Report” on page 5-26 for more information.

These interval, duration, and segment measurements are the measurements of the representative beat in each lead from Group 1. The global rate reported is the mean ventricular rate over the entire ECG unless the algorithm determines that one of the group mean ventricular rates is more representative of the underlying rhythm.

Axis Measurements

Although it is convenient to use waveform amplitudes when making axis measurements manually, using the areas of the waveforms yields more accurate results. Philips Medical Systems equipment uses the waveform areas from the lead measurements in calculating the P, QRS, and T axes. The sum of the ST onset, and middle and end amplitudes are used in calculating the ST axis.

The frontal plane axis measurements use the limb leads and nine lead pairs (all at least 60° apart) to estimate the axes. The horizontal plane axis measurements are calculated from leads V1-V6 in a similar manner.

The resulting estimates are examined to ensure that they converge to a single result. They are averaged to form the representative axis measurement.

Interpretation

Within a diagnostic category, the criteria for interpretive statements become more and more restrictive from beginning to end. Criteria met for any given interpretive statement in a diagnostic category automatically suppresses any previous statement (in that category) that had been selected.

Each category may only be represented on the final report by one statement. This statement is the last one encountered whose medical criteria were true based on the measurements, earlier decisions, and Patient ID information (age, gender).

Overall Severity

Each interpretive statement selected for the ECG report has an associated severity. Severities that are more abnormal override lesser severities. The severities of all selected interpretive statements are combined to determine the overall severity of the ECG. This severity is printed on each page of the ECG report.

Table 1-1 Overall ECG Severity

| Severity | Code |
|----------------------|------|
| No Severity | NS |
| Normal ECG | NO |
| Otherwise Normal ECG | ON |
| Borderline ECG | BO |
| Abnormal ECG | AB |
| Defective ECG | DE |

Adult and Pediatric Rhythm Analysis

The interpretive statements generated by the Philips 12-Lead Algorithm are based on the full range of ECG wavelet measurements and include wavelet durations, amplitudes, areas, and other parameters.

All of the interpretive statements are grouped into diagnostic categories. In each diagnostic category, more clinically significant findings override more benign ones. For instance, in the category of Ventricular Conduction Delays, the statement Left Bundle Branch Block (LBBB) overrides Borderline Intraventricular Conduction Delay and Incomplete Left Bundle Branch Block. In addition, the presence of LBBB also suppresses a statement from a previous category such as Left Axis Deviation and bypasses tests for ventricular hypertrophy, most infarcts, ST deviations, and abnormal T waves. These suppression and bypass conditions generally are not addressed in the descriptions of the diagnostic categories.

The diagnostic categories are divided into two sections: cardiac rhythm and morphology. Each diagnostic category includes a set of interpretive statements with variations in severity and probability. Detailed cardiac rhythm criteria are described in the following section. Detailed morphology detection criteria are described in Chapter 3, “Adult Morphology Analysis” and Chapter 4, “Pediatric Morphology Analysis.”

ECG analysis begins with rhythm analysis with the first interpretive statement describing the basic rhythm of the ECG, or the paced rhythm of the ECG.

A second interpretive statement may be appended to describe additional rhythm abnormalities, including premature complexes, pauses, atrioventricular conduction abnormalities, and miscellaneous arrhythmias.

Cardiac Rhythm Categories

- Paced Rhythm (page 2-2)
- Basic Cardiac Rhythm (page 2-2)
- Ventricular Preexcitation (page 2-3)
- Premature Complexes (page 2-3)
- Pauses (page 2-4)
- Miscellaneous Arrhythmias (page 2-4)
- Atrioventricular Conduction (page 2-4)

Paced Rhythm

Paced rhythm interpretation concentrates on the apparent rhythm, not on the underlying pacemaker mode (which may not be apparent from the observed rhythm). Atrial, ventricular, dual AV sequential, and atrial-sensed ventricular-paced pacing rhythms may be described.

The term `PACED RHYTHM` is used when all beats fit a characteristic paced pattern.

Paced complexes are described when pacing is intermittent and non-paced complexes are also detected. Such complexes may include ectopic atrial or ventricular premature complexes, or episodes of sinus rhythm. Intermittently paced rhythms are not further analyzed for rhythm patterns during the non-paced periods.

Demand behavior with pulse inhibition in one or both chambers may be detected.

Noise spikes in technically poor tracings may mimic pacemaker spikes. If these are suspected, a statement of pacemaker-like artifact is generated.

When the ECG record is obtained with a magnet in place, the pacemaker spikes occur at a fixed rate and may be asynchronous with the underlying rhythm. This phenomenon is declared as a failure to sense and/or capture and the presence of a magnet is questioned.

An attempt is made to diagnose atrial fibrillation in the presence of ventricular pacing. No other atrial rhythm diagnosis is performed.

QRS complexes that are not ventricular paced (non-paced or atrial paced complexes) and that are not classified as ventricular ectopic beats will be measured and used for further morphology interpretation. No further interpretation is considered for ECGs with continuous ventricular or AV dual pacing.

Basic Cardiac Rhythm

When no pacing spikes are found, one interpretive statement describes the basic cardiac rhythm and is based on the interrelationship of the atrial rate, ventricular rate, P wave axis, QRS duration, and other measurements. Possible statements include those related to:

- Sinus, atrial, supraventricular, junctional, and ventricular rhythms
- Tachycardia, bradycardia, and varying rate
- Complete AV block
- AV dissociation
- Atrial fibrillation
- Atrial flutter

A normal P axis measurement (-30° to 120° in the frontal plane) is assumed to indicate a sinus origin of the P wave. An abnormal P axis signifies an atrial or a junctional origin.

Tachycardia is generally defined as a rate of 100 bpm or higher in adults; bradycardia is slower than 50 bpm. This is different from the value of 60 cited by many ECG texts¹. The operator may reset the default criteria from 50 bpm to 60 bpm (if available). Consult the Philips Medical Systems product documentation for more information.

1. Surawicz B, Uhley H, Borun R, Laks, M, et al. Task Force 1: Standardization of Terminology and Interpretation. *Amer J Cardio* 41:130-145 (1978).

Heart rates slower than the normal range are considered bradycardia and those higher are considered tachycardia as shown in Appendix A (pediatric values only).

An interpretive statement of complete AV block is generated when the ventricular rate is low (< 45 bpm) and the atrial rhythm is asynchronous with the ventricular rhythm. Additional categories of complete AV block include wide QRS complexes and atrial fibrillation.

AV dissociation is detected by looking for a normal ventricular rate with considerable variation of the apparent PR intervals. While describing the ECG rhythm strip, the algorithm does not define the underlying rhythm (which may be complete heart block or a junctional rhythm). An attempt is made to diagnose the underlying rhythm, complete heart block or junctional rhythm, rather than AV dissociation.

The criteria for atrial fibrillation are rather complex. Fine fibrillation is diagnosed with missing P waves in most leads and marked variation in the ventricular rate. Coarse fibrillation is diagnosed from multiple shapes of P waves with a rapid apparent atrial rate and variation in the ventricular rate.

An interpretive statement of atrial flutter is generated when the atrial rate falls between 220-340. An attempt is made to describe the degree of block with flutter.

Ventricular Preexcitation

Ventricular preexcitation is recognized based on the occurrence of delta waves in multiple leads and a mean QRS duration greater than 100 ms.

A short PR (PR segment <55 ms or PR interval <120 ms) reduces the number the leads with delta waves required to detect this condition.

Leftward or rightward initial QRS axis deviation criteria are added to determine whether a left or right accessory pathway is present. The rest of the algorithm program is bypassed if ventricular preexcitation criteria are met.

Premature Complexes

Premature complexes are recognized when the preceding R-R interval is shorter than the average R-R interval of a background ventricular rate that is basically regular. A reduction in R-R interval of 15% (typical) or greater is considered significant.

Premature complexes with normal QRS duration (QRSd) are considered to be atrial or junctional in origin, depending on the presence or absence of a P wave. Those with longer than normal QRSd are considered to be either ventricular in origin or to be aberrant supraventricular in origin.

Atrial premature complexes (APC, multiple APC) are generally recognized by their early appearance, normal QRS duration, and atypical P-wave morphology. More than one APC is diagnosed as multiple APCs.

Ventricular premature complexes (VPC, multiple VPC) are generally recognized by an early appearance, wider than normal QRS duration, a compensatory pause, and a different polarity than normal beats. Interpolated VPCs have ventricular morphologic characteristics without compensatory pauses. Multiple VPCs are diagnosed when more than one VPC is detected.

Junctional premature contractions (JPC) have the same characteristics as APCs, but without a P-wave being detected. No attempt is made to detect retrograde P waves with JPCs.

Ventricular or supraventricular bigeminy is diagnosed when ventricular (V) or supraventricular (A) premature beats alternate with normal (N) beats. There must be at least two consecutive occurrences of the pattern (NV or NA) to generate an interpretive statement of bigeminy.

Ventricular trigeminy is diagnosed when two consecutive occurrences of the pattern NNV are detected.

Two adjacent VPCs are diagnosed as a pair. The characteristics are primarily morphological since compensatory pauses are not usually seen.

A run of VPCs is diagnosed when three or more adjacent VPCs are seen.

Pauses

Long R-R intervals are significant if they are more than 140% (typical) of the average R-R in a background ventricular rate that is basically regular. They are considered to indicate either a sinus arrest or an intermittent AV block.

The presence or absence of a P wave, as well as the duration of the QRS, indicate the origin of an escape beat. Atrial and supraventricular escapes show a P wave and a normal QRS duration (QRSd). Junctional escapes show no P wave, but a normal QRSd. A prolonged QRSd indicates a ventricular origin of the escape beat, although aberration cannot be excluded.

Different grades of second degree AV block are indicated on the basis of more P waves than QRS complexes.

A statement indicating Mobitz I (Wenckebach) AV block depends on progressively longer PR intervals preceding the long R-R interval.

Miscellaneous Arrhythmias

This category includes arrhythmias that are not covered in the preceding sections.

Statements relating to interpolated beats depend on recognizing that consecutive R-R intervals are approximately one-half the average R-R of a background ventricular rate that is basically regular.

Aberrant complexes are recognized when the R-R interval is only slightly decreased but the QRSd is prolonged, as if it were of ventricular origin.

Atrioventricular Conduction

Statements in this category are based on the measurement of a prolonged PR interval.

The PR interval varies slightly according to age and heart rate, as shown in the following table.

Table 2-2 Borderline and Abnormally Prolonged PR Intervals (ms)

| Age (years) | Heart Rate (bpm) | | | |
|-------------|------------------|---------|---------|----------|
| | less than 50 | 51-90 | 91-120 | over 120 |
| 16-60 | 210-220 | 200-210 | 195-205 | 190-200 |
| over 60 | 200-230 | 210-220 | 205-215 | 200-210 |

Adult Morphology Analysis

The morphology interpretation starts by testing for dextrocardia. Morphology abnormalities are examined in anatomical order from right to left and from atria to ventricles. The interpretive criteria are described (by diagnostic category) in the following section.

Adult Morphology Categories

- Dextrocardia (page 3-2)
- Right Atrial Abnormality (page 3-2)
- Left Atrial Abnormality (page 3-2)
- Biatrial Abnormality (page 3-2)
- QRS Axis Deviation (page 3-2)
- Ventricular Conduction Delays (page 3-3)
- Right Ventricular Hypertrophy (page 3-3)
- Left Ventricular Hypertrophy (page 3-4)
- Low Voltage and Chronic Obstructive Pulmonary Disease Pattern (page 3-5)
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- ST Elevation, Myocardial Injury, Pericarditis, and Early Repolarization (page 3-8)
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Dextrocardia

Dextrocardia is suggested if the P wave and the QRS axes are abnormal in the frontal plane (deviated rightward), if the horizontal plane QRS is directed rightward, and if small QRS complexes are present in V5 and V6. The rest of the morphology interpretation is bypassed if dextrocardia criteria are met.

Right Atrial Abnormality

Large P waves are considered suggestive of right atrial abnormality (RAA). The minimum duration considered significant is 60 ms, the minimum voltage considered significant is 0.24 mV (typical).

Greater than normal P wave duration and amplitude in limb leads produce a statement of consider right atrial abnormality. Additional conditions such as a biphasic P wave in Lead V1 indicate probable RAA. Larger P waves lead to more definitive interpretive statements regarding the likelihood of RAA.

Left Atrial Abnormality

Left atrial abnormalities (LAA) are detected from large P waves on limb leads and a biphasic P in Lead V1, and the durations and the amplitudes of the initial and terminal portions of a biphasic P wave.

A duration greater than 110 ms combined with amplitudes over 0.10 mV in limb leads is considered significant, though not necessarily abnormal unless present in multiple leads. A notched P wave adds to the significance of the other values. Lead V1 is specifically examined for duration, amplitude, and area of the negative component of the P wave. Although duration of over 30 ms and amplitudes over 0.09 mV can be considered significant, the area of this negative component must be greater than 0.60 Ashman units to be considered LAA. An Ashman unit is the area of 1 square millimeter at normal speed (25 mm/sec) and normal sensitivity (10 mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Biatrial Abnormality

Biatrial abnormality (BAA) combines right and left atrial abnormalities. Associated LAA is diagnosed when a P amplitude greater than 0.1 mV in V1 co-exists with RAA. Associated RAA is considered when LAA statements are combined with a significant P wave greater than 10 ms in duration and greater than 0.07 mV in amplitude, and an R wave greater than 1.0 mV in Lead V6. BAA is considered if RAA and LAA statements with high severity were previously generated.

QRS Axis Deviation

Interpretive statements based on frontal QRS axis measurements describe left and right deviation as well as superior, horizontal, and vertical directions.

The mean QRS axis (mean vector of the electric force) is calculated in the frontal and horizontal planes. The normal frontal axis range varies with age and gender. The frontal QRS axis in young male patients tends to the right. The frontal QRS axis in older patients tends to the left.

A frontal QRS axis between -30° and 90° is considered normal, subject to modification by age and gender. Frontal QRS axis measurements counterclockwise from -30° are considered to be deviated to the left, and those clockwise from 90° are considered to be deviated to the right.

Ventricular Conduction Delays

A QRS duration (QRSd) greater than 100 ms is common to all of the interpretive statements in this category except for isolated left anterior fascicular block (LAFB) and left posterior fascicular block (LPFB), which do not cause a prolonged QRS.

LAFB interpretations are associated with leftward deviation of the mean frontal QRS axis between -40° and 240° counterclockwise. LPFB interpretations are associated with rightward deviation of the mean frontal QRS axis between 120° and 210° clockwise.

Other than the fascicular blocks, a definitive block interpretation requires that the QRSd exceed 120 ms. A QRSd between 110 and 120 ms is non-specific intraventricular conduction delay, and between 100 and 110ms is considered borderline intraventricular conduction delay.

Right bundle branch block (RBBB) interpretations are always associated with the terminal portion of the QRS being directed to the right (dominant negative Q, S forces in Leads I, aVL, and V6, and positive forces in Lead V1). A QRSd between 110-120 ms is considered incomplete RBBB.

Left bundle branch block (LBBB) interpretations are always associated with the terminal portion of the QRS being directed to the left dominant positive (R, R') forces in Leads I, aVL, and V6, and negative forces (Q, S) in Lead V1. A QRSd between 110-120 ms is considered incomplete LBBB.

Right Ventricular Hypertrophy

Right ventricular hypertrophy (RVH) is detected on the basis of several findings:

- Presence of a prominent R or R' in Lead V1
- Presence of a prominent Q, S, or S' in either Lead I or V6
- Right atrial abnormality
- Right axis deviation in the frontal plane
- Repolarization abnormalities typical of RVH

An R in V1 that is more than 75% the size of the Q or S is significant, and is considered to be prominent. An R' larger than 20 ms and 0.30 mV in V1 is significant. A QRS in V1 with a positive component larger than the negative component is highly significant.

Repolarization abnormalities typical of RVH are determined by an examination of Leads II, aVF, V1, V2, and V3 for the presence of depressed ST segments and inverted T waves as typical of the right ventricular strain pattern.

The statements to be printed regarding RVH are determined by combinations of the above findings. One voltage criterion generates a consider RVH statement. Two voltage criteria or one voltage plus repolarization abnormality generates a probable RVH statement. Definitive RVH statements result when multiple findings are present.

A Q, S, or S' larger than 40 ms and 0.20 mV in either Lead I or V6 is significant and is considered to be prominent. A QRS with a negative component larger than the positive component is highly significant.

Left Ventricular Hypertrophy

Left ventricular hypertrophy (LVH) is detected on the basis of several findings:

- Prominent R or R' in V5 or V6
- R in Lead I plus S in Lead III
- Sokolow-Lyon Voltage (R in V5/V6 plus S in V1)
- Cornell Voltage (R in aVL plus S in V3)
- Cornell Product (R in aVL plus S in V3) multiplied by QRSd
- Left axis deviation in the frontal plane
- Left atrial abnormality
- Prolonged QRS duration or ventricular activation time (VAT)
- Repolarization abnormality typical of LVH

Voltage values for the QRS complexes that are considered excessively high vary with patient age and gender. Because higher voltages are normal for young patients, age is considered when evaluating LVH. The younger the patient, the more stringent are the requirements for an LVH statement. Females have lower voltage values than males. Voltage limits also vary with the leads involved and whether the deflection is positive or negative.

In frontal leads the minimum value considered excessive is a positive deflection of more than 1.20 mV in Lead aVL. Precordial Leads V1 and V2 are examined for negative deflections (Q or S) and V5 and V6 are examined for positive deflections (R or R'). These values are considered individually; any value greater than 2.50 mV is considered significant.

The negative values in V1, V2 and the positive values in V5, V6 are added together. Any total for Q or S in V1 plus R or R' in V5 or V6 that exceeds 3.50 mV is significant. A total of Q or S in V2 plus R or R' in V5 or V6 must exceed 4.0 mV to be significant.

Higher voltages contribute to qualifying statements regarding LVH. Cornell Voltage criteria are used for LVH detection. This limit is an R amplitude in Lead aVL plus S amplitude in Lead V3 greater than or equal to 2.8 mV in males and 2.0 mV in females. LVH voltage criteria combine with additional features determined in previous categories such as left axis deviation, presence of LAA, QRS duration greater than 95 ms, and ventricular activation time (VAT) greater than 55 ms.

LVH with secondary repolarization abnormalities is determined separately and results in more definite statements regarding the likelihood of LVH. Secondary repolarization abnormalities are determined by examining Leads I, aVL, V4, V5, and V6 for the presence of ST depression and inverted T wave as a typical left ventricular strain pattern.

Low Voltage and Chronic Obstructive Pulmonary Disease Pattern

All leads are examined for QRS peak-to-peak voltage.

Frontal leads: if no lead has a value exceeding 0.60 mV, the ECG is considered borderline low voltage. If no value exceeds 0.50 mV, the ECG is considered definite low voltage, an abnormal finding.

Precordial leads: if no lead has a value exceeding 1.00 mV, the ECG is considered definite low voltage, an abnormal finding.

Combinations of low voltage statements, rightward deviation of the frontal P and QRS axes, and right atrial enlargement may generate statements suggesting the likelihood of chronic pulmonary disease.

Inferior Myocardial Infarction

Leads II, III, and aVF are examined for Q wave presence and size, the ratio of Q to R, the presence of T wave changes (flattened or inverted), and the presence of an elevated or depressed ST segment.

As the Q waves become larger or appear in more leads and the R waves become less prominent, the interpretive statements are more significant. For inferior Q waves to be considered significant, at least one of them must be longer than 25 ms in duration and greater than one-sixth the amplitude of the associated R. For any infarct statement to qualify, at least one Q wave must be longer than 35 ms and greater than one-fifth the amplitude of the R wave.

A leftward direction of the axis of the initial portion of the QRS adds to the likelihood of an inferior infarct statement. T wave and ST changes are used to estimate the age of the infarct. Deeper T wave inversion and larger ST segment deviations generate statements indicating more recent infarction. Gender and age influence the detection of inferior infarct. Males and younger patients are more likely to have normal Q waves in the inferior leads.

Lateral Myocardial Infarction

Leads I, aVL, V5, and V6 are examined for Q wave presence and size, the ratio of Q to R, the presence of T wave changes (flattened or inverted), and the presence of an elevated or depressed ST segment.

For lateral Q waves to be considered significant, at least one must be longer than 35 ms and greater than 0.10 mV in amplitude. It must also have an amplitude that is at least 20% as large as that of the R wave. As the Q waves become larger or show in more leads and the R waves become less prominent, the interpretive statements become more significant.

T wave and ST changes are used to estimate the age of the infarct. Deeper T wave inversion and larger ST segment deviations generate statements indicating more recent infarction.

Gender and age influence the detection of lateral infarct. Males and younger patients are more likely to have normal Q waves in the lateral leads.

Anteroseptal and Anterior Myocardial Infarction

Leads V1, V2, V3, and V4 are examined for the presence of Q wave, Q wave area, the relative and absolute sizes of the R and S waves, whether the QRS area is negative or positive, the presence of T wave changes (flattened or inverted), and the presence of elevated or depressed ST segments. Positive findings in V1 and V2 tend to be reported as anteroseptal infarcts, while abnormalities in V2, V3, and V4 tend to be reported as anterior infarcts.

For any anteroseptal or anterior Q wave to be considered significant, it must be longer than 30 ms in duration and over 0.07 mV in amplitude. As the Q waves become larger or show in more leads and the QRS progression from negative to positive becomes shifted more laterally, the interpretive statements become more definitive for infarction in the anterior region.

T wave and ST changes are used to estimate the age of the infarct. Deeper T wave inversion and greater ST elevations generate statements indicating more recent infarction.

Anterolateral and Extensive Anterior Myocardial Infarct

Leads V2, V3, V4, V5, and V6 are examined for Q wave presence and size, the relative and absolute sizes of the R and S, whether the QRS area in V3 is negative or positive, the presence of T wave changes (flattened or inverted), and the presence of elevated or depressed ST segments.

For any anterolateral Q wave to be considered significant, it must be longer than 30 ms (typical) in duration and over 0.07 mV in amplitude. As the Q waves become larger or show in more leads, the interpretive statements become more definitive for infarction.

Positive findings in all six precordial leads generate statements describing extensive anterior infarction.

Gender and age influence the detection of anterolateral infarct. Males and younger patients are more likely to have normal Q waves in the anterolateral leads.

Q, ST changes, and T wave are used to estimate the age of the infarct. Deeper T wave inversion and greater ST elevations generate statements indicating more recent infarction.

Posterior Myocardial Infarction

Leads V1, V2, and V3 are examined for the relative and absolute sizes of the R and S waves, an absent or insignificant Q wave, ST depression, and a positive T wave.

A prominent R, in the presence of an insignificant Q, and an upright T may generate a statement suggesting the likelihood of a posterior infarct (PMI). ST depression in V1-V3, and upward T or T' are detected for acute posterior infarct. Combined inferior and posterior MI is called inferoposterior MI, and combined acute inferior MI and acute posterior MI is called acute inferoposterior MI.

Indications of LVH or RVH decrease the likelihood of a PMI statement. Gender and age influence the detection of a posterior infarct. Males and younger patients are more likely to have prominent R waves in V1 and V2.

ST Depression and Myocardial Ischemia

All leads are examined for negative values in the ST segment. The values examined include the following points in the ST segment:

- The onset of the ST segment (the J point)
- The point midway between the onset and the end of the ST segment
- 80 ms past the J point
- The end of the ST segment (the beginning of the T wave)

Besides negative values in the ST segment, other features are examined:

- The slope of the ST segment in degrees
- The shape of the ST segment (straight, concave up, or concave down).

The smallest negative ST deflection that is considered significant is 0.03 mV

As the negativity of the ST segment increases, more severe statements are generated. Minor depression of the segment produces statements with a severity code of OTHERWISE NORMAL (ON) or NORMAL (NO). Increasing depression produces statements progressing through from BORDERLINE to ABNORMAL.

Whenever possible, the location of ST abnormalities is indicated as part of the interpretive statement. The localization generally fits the description that follows.

Table 3-1 Location of Infarcts and Lead Group of ST-T Abnormalities

| Lead Groups (Location) | I | II | III | aVR | aVL | aVF | V1 | V2 | V3 | V4 | V5 | V6 |
|------------------------|---|----|-----|-----|-----|-----|----|----|----|----|----|----|
| Anterior | | | | | | | X | X | X | X | | |
| Anterolateral | X | | | X | X | | | X | X | X | X | X |
| Lateral | X | | | | X | | | | | | X | X |
| Inferior | | X | X | | | X | | | | | | |

ST depression is associated with rapid heart rate. A statement is generated indicating ST depression, probably rate related, if the mean heart rate is greater than 190 minus (age in years) bpm.

A concurrent statement regarding RVH, LVH, LBBB, RBBB, any new infarct, or any statement associated with drug therapy or electrolyte imbalance impacts this category by tending to suppress ST depression statements. This is more likely for the less severe ST depression statements than for the more severe ones.

T Wave Abnormalities and Myocardial Ischemia

All leads are examined for T wave amplitude, the relative amplitude of the T and the QRS, and whether the T is negative or positive. The frontal axis of the T wave and its relation to the frontal QRS axis is also measured.

Reduced T wave amplitude (both absolute and relative to the QRS), and negative T waves are considered to be abnormal findings. Minimal changes in one or a few leads produce less severe statements. As the changes become more prominent in magnitude and the number of affected leads increases, the statements become more severe.

A frontal T axis that is not between -10° and 100° or a QRS-T angle that is greater than 90° may result in a statement indicating nonspecific T wave abnormalities. Whenever possible, the lead group of T wave abnormalities is indicated as part of the interpretive statement.

A concurrent statement regarding RVH, LVH, LBBB, RBBB, any infarct, or any statement associated with drug therapy or electrolyte imbalance impacts this category by tending to suppress T wave statements. This is more likely for the less severe T wave statements than for the more severe ones.

Repolarization Abnormalities and Myocardial Ischemia

This category includes statements indicating the presence of both ST segment and T wave abnormalities. None of these statements involve any new examination of measurements.

All statements in this category are determined by the combination of statements in the T Wave Abnormalities and ST Depression categories. The severity of the statements in this category depends on the severity of the qualifying ST and T wave abnormalities.

ST Elevation, Myocardial Injury, Pericarditis, and Early Repolarization

ST segment elevation is based on examination of all lead groups for positive values of the ST onset (J point), the deflection at 80 msec after onset, and the slope of the ST segment (in degrees).

The smallest positive ST displacement considered significant is 0.05 mV (0.5 mm). When ST elevation is small (0.05 mV to approximately 0.10 mV, that is, less than 1 mm), the statements are considered to be of OTHERWISE NORMAL (ON) or BORDERLINE (BO) severity. ST elevation greater than 1 mm is generally classified as ABNORMAL (AB).

A specific lead group always follows a statement of borderline or abnormal ST elevation. Abnormal ST elevation in a specific lead group is described as consider, probable, or definite myocardial injury. If ST elevation is widespread on all anterior, lateral, and inferior lead groups, either pericarditis or probable early repolarization is suggested.

Tall T Waves

All leads are examined for the presence of positive T waves with amplitudes that exceed 1.20 mV, or for positive T waves that exceed 0.50 mV and are also more than half the size of the peak-to-peak QRS voltage.

The presence of such T waves generates statements alerting to the possibility of metabolic, electrolyte, or ischemic abnormalities.

QT Abnormalities, Electrolyte Disturbance, and Drug Effects

Measurements of QT interval, as corrected for heart rate, and measurements associated with ST segment depression and T wave changes are examined for values characteristic of the effects of digitalis and abnormal calcium and potassium levels.

A QT interval corrected for heart rate (QTc) that is shorter than 340 ms is considered to be a short QT interval with a severity code as OTHERWISE NORMAL (ON).

QTc greater than 465 ms is considered as borderline prolonged QTc. An additional 20 ms qualifies the condition as prolonged QTc. Presence of RVH, LVH, and VCD suppresses statements of a prolonged QTc.

If the QTc is shorter than 310 ms, a statement of short QTc suggesting hypercalcemia is generated.

A significantly prolonged QTc interval greater than 520 ms is considered to be due to hypocalcemia.

A significantly prolonged QTc interval (> 520 ms), combined with ST segment depression and a positive T wave in multiple leads, is considered to be due to hypokalemia.

The presence of an Rx code indicating use of digitalis favors interpretive statements that the findings are compatible with the effects of this drug. A combination of a short QTc and repolarization abnormality is considered to be due to digitalis effect.

Pediatric Morphology Analysis

The pediatric Philips 12-Lead Algorithm is intended for use on ECGs of patients from birth up to 16 years of age. Age is an important factor in the pediatric algorithm since normal limits in heart rate, axis deviation, and waveform amplitudes are highly age dependent. Specification of age is highly recommended to improve overall ECG interpretation quality. If an age is not entered or is invalid, the interpretation is based on a default adult age, and a special statement noting this assumption is printed on the report.

Specific age limits of ECG features are adopted in the pediatric algorithm.¹ For more information, see Appendix A, “Normal Measurement Values.”

The interpretive statements are described (by diagnostic category) in the following section.

Pediatric Morphology Categories

- Dextrocardia (page 4-2)
- Right Atrial Abnormality (page 4-2)
- Left Atrial Abnormality (page 4-2)
- Biatrial Abnormality (page 4-2)
- QRS Axis Deviation (page 4-3)
- Ventricular Conduction Delays (page 4-6)
- Right Ventricular Hypertrophy (page 4-7)
- Left Septal Hypertrophy (page 4-7)
- Left Ventricular Hypertrophy (page 4-7)
- Biventricular Hypertrophy (page 4-8)
- Low Voltage (page 4-8)
- Q Wave Abnormality and Myocardial Infarct (page 4-9)
- ST Depression (page 4-9)
- T Wave Abnormality (page 4-9)
- Repolarization Abnormality (page 4-9)

1. Davignon A, Rautuharju P, Boiselle E, et al.: Normal ECG Standards for Infants and Children. *Ped Cardiol* 1:123-131 (1979/80).

- ST Elevation, Pericarditis and Early Repolarization (page 4-9)
- Tall T Waves (page 4-10)
- QT Abnormality and Electrolyte Disturbance (page 4-10)
- Congenital Heart Defects (page 4-10)

Dextrocardia

Dextrocardia is suggested if:

- The frontal P axis is between 90° and 180°
- Lead I or V6 has a negative P wave
- Leads I and V6 have a large S wave (> 0.6 mV)
- The P wave amplitude in Lead III is greater than in Lead II

The remainder of the algorithm is bypassed if dextrocardia criteria are met.

Right Atrial Abnormality

Large P waves are considered suggestive of right atrial abnormality (RAA). The minimum duration considered significant is 60 ms, the minimum voltage considered significant is 0.20 mV (typical).

Greater than normal P wave duration and amplitude in limb leads produce a statement of consider right atrial abnormality. Additional conditions such as a biphasic P wave in Lead V1 indicate probable RAA. Larger P waves lead to more definitive interpretive statements regarding the likelihood of RAA.

Left Atrial Abnormality

Left atrial abnormalities (LAA) are detected from large P waves on limb leads, a biphasic P in Lead V1, and the durations and the amplitudes of the initial and terminal portions of a biphasic P wave.

A duration greater than 110 ms combined with amplitudes over 0.10 mV in limb leads is considered significant, though not necessarily abnormal unless present in multiple leads. A notched P wave adds to the significance of the other values. Lead V1 is specifically examined for duration, amplitude, and area of the negative component of the P wave. Although duration of over 30 ms and amplitudes over 0.09 mV can be considered significant, the area of this negative component must be greater than 0.60 Ashman units to be considered LAA. An Ashman unit is the area of 1 square millimeter at normal speed (25 mm/sec) and normal sensitivity (10 mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Biatrial Abnormality

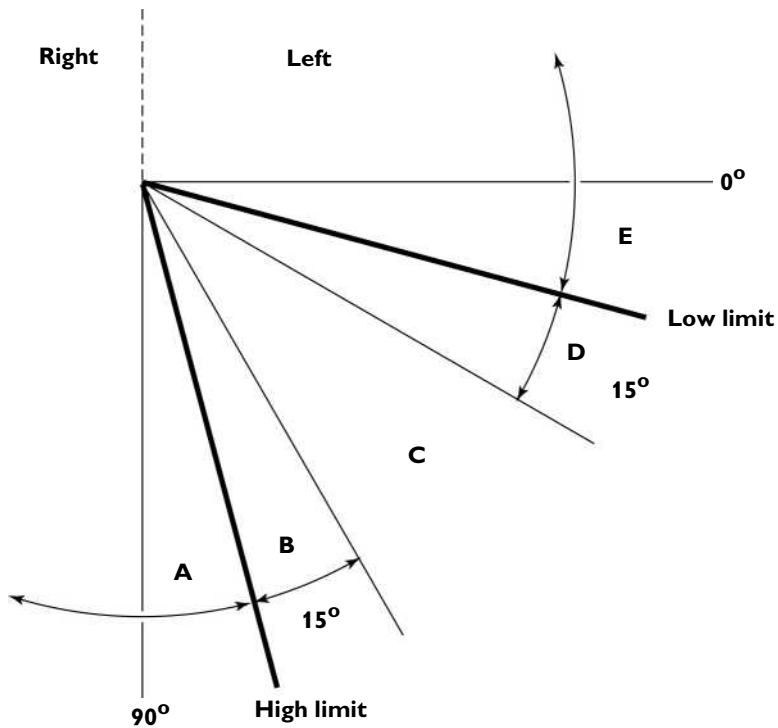
Biatrial abnormality (BAA) combines right and left atrial abnormalities. Associated LAA is considered when a P amplitude greater than 0.1 mV in V1 co-exists with RAA. Associated RAA is considered when LAA statements are combined with a high amplitude P wave. If

RAA and LAA statements with high severity are generated from previous RAA and LAA categories, a statement of biatrial hypertrophy is generated.

QRS Axis Deviation

The frontal plane axis is examined for left axis deviation and right axis deviation. The normal limits of QRS axis are adjusted for age.

Figure 4-1 Limits for QRS Axis Deviation



- | | |
|--|---|
| A Right axis deviation | D Borderline left axis deviation |
| B Borderline right axis deviation | E Left axis deviation |
| C Normal | |

The diagram above illustrates the conditions for generating QRS axis deviation statements.

Left axis deviation: a borderline left axis deviation statement is generated if the QRS axis in the frontal plane is within 15° of the low limit of normal. A left axis deviation statement is generated if the QRS axis is less than the low limit of normal.

Right axis deviation: a borderline right axis deviation statement is generated if the QRS axis in the frontal plane is within 15° of high limit of normal. A right axis deviation statement is generated if the QRS axis is greater than the high limit of normal.

Specific limits are listed in the tables that follow.

Table 4-1 Left Axis Deviation

| Age | High Limit (°) | Low Limit (°) |
|-------------|-----------------------|----------------------|
| 0-23 hours | -90 | 54 |
| 1-3 days | -90 | 54 |
| 4-6 days | -90 | 54 |
| 7-29 days | -90 | 54 |
| 1-2 months | -90 | 20 |
| 3-5 months | -90 | -6 |
| 6-11 months | -90 | -6 |
| 1-2 years | -90 | -6 |
| 3-4 years | -90 | -10 |
| 5-7 years | -90 | -10 |
| 8-11 years | -90 | -10 |
| 12-15 years | -90 | -15 |

Table 4-2 Borderline Left Axis Deviation

| Age | High Limit (°) | Low Limit (°) |
|-------------|-----------------------|----------------------|
| 0-23 hours | 55 | 65 |
| 1-3 days | 55 | 65 |
| 4-6 days | 55 | 65 |
| 7-29 days | 55 | 65 |
| 1-2 months | 21 | 30 |
| 3-5 months | -5 | 1 |
| 6-11 months | -5 | 1 |
| 1-2 years | -5 | 1 |
| 3-4 years | -9 | 1 |
| 5-7 years | -9 | 1 |
| 8-11 years | -9 | 1 |
| 12-15 years | -14 | 1 |

Table 4-3 Right Axis Deviation

| Age | High Limit (°) | Low Limit (°) |
|-------------|-----------------------|----------------------|
| 0-23 hours | 216 | 269 |
| 1-3 days | 216 | 269 |
| 4-6 days | 216 | 269 |
| 7-29 days | 216 | 269 |
| 1-2 months | 131 | 269 |
| 3-5 months | 131 | 269 |
| 6-11 months | 131 | 269 |
| 1-2 years | 131 | 269 |
| 3-4 years | 146 | 269 |
| 5-7 years | 201 | 269 |
| 8-11 years | 151 | 269 |
| 12-15 years | 161 | 269 |

Table 4-4 Borderline Right Axis Deviation

| Age | High Limit (°) | Low Limit (°) |
|-------------|-----------------------|----------------------|
| 0-23 hours | 205 | 215 |
| 1-3 days | 205 | 215 |
| 4-6 days | 205 | 215 |
| 7-29 days | 200 | 215 |
| 1-2 months | 115 | 130 |
| 3-5 months | 115 | 130 |
| 6-11 months | 115 | 130 |
| 1-2 years | 115 | 130 |
| 3-4 years | 126 | 145 |
| 5-7 years | 160 | 200 |
| 8-11 years | 135 | 150 |
| 12-15 years | 145 | 160 |

Ventricular Conduction Delays

The mean QRS duration normal limits are age dependent and listed in the following table. A mean QRS duration that exceeds 110% of the normal limit is considered borderline intraventricular conduction delay. A mean QRS duration that exceeds 120% of the normal limit generates a statement of nonspecific intraventricular conduction delay (IVCD).

Table 4-5 Mean QRS Duration Normal Limits

| Age | Normal Limit (ms) |
|-------------|-------------------|
| 12-15 years | 100 |
| 8-11 years | 88 |
| 5-7 years | 88 |
| 3-4 years | 88 |
| 1-2 years | 78 |
| 6-11 months | 84 |
| 3-5 months | 84 |
| 1-2 months | 84 |
| 7-29 days | 70 |
| 4-6 days | 70 |
| 1-3 days | 70 |
| 0-23 hours | 70 |

The presence of a ventricular conduction delay for age and either an RSR' or no negative component at all (no Q or S) in V1 generates a right bundle branch block (RBBB) statement. In order for the RSR' to be significant, the R' must be at least 20 ms in duration and 0.15 mV in amplitude.

Incomplete right bundle branch block (IRBBB) requires a QRS complex similar to RBBB, RSR' or pure R, but with a narrower mean QRS duration, which is less than 120% of normal limit. In addition, synthesized vector measurements in the horizontal plane are applied to distinguish IRBBB from right ventricular hypertrophy.

A statement indicating left bundle branch block (LBBB) is generated in the presence of:

- Prolonged QRS duration for age
- A QRS axis for the terminal 40 ms between -90° and 90° (clockwise)
- A short (< 20 ms) or absent S in I, aVL, V5, V6, and a small or absent R wave in V1, V2, V3

In the absence of a statement regarding LBBB, a mean QRS axis between -60° and -90° generates a left anterior superior fascicular block (LAFB) statement.²

Right Ventricular Hypertrophy

This category is bypassed in the presence of RBBB. The detection of RVH is based on findings in RVH voltage, upright T, and right axis deviation (RAD).

Right ventricular hypertrophy (RVH) voltage is heavily age dependent. Six different age groups are established with appropriate voltage criteria for each group. A total of 24 different conditions form the criteria for significant RVH voltage in the varying age groups. Factors considered include:

- The absolute size of R and R' in V1 and V2
- The absolute size of S in V6
- The relative sizes of R and S in V1 and V6
- The presence of a QR pattern in V1

A statement indicating consider RVH or probable RVH is generated if the required voltage exceeds 98% of the normal distribution as listed in Appendix A.

Upward T wave criteria apply to newborns older than 48 hours and to children less than 9 years old. To qualify for RVH, an upward T in V1 without inverted T in V5 and V6 is required. Right axis deviation and borderline right axis deviation also support the determination of RVH. The terminal angle of the horizontal plane synthesized vector measurement using a 12-Lead ECG also supports identifying mild RVH versus incomplete RBBB³.

Combinations of statements relating to these conditions generate statements varying in severity from BORDERLINE (BO) to ABNORMAL (AB). The likelihood of RVH increases as the severity of the qualifying statements increases.

Left Septal Hypertrophy

A statement of left septal hypertrophy (LSH) is generated if prominent R waves in V1 and Q waves in V5 and V6 are detected (R wave amplitude $> 98\%$ of the R wave amplitude for normal distribution). Left septal hypertrophy is considered if moderate R waves in V1 and Q waves in V5 and V6 are detected.

Left Ventricular Hypertrophy

This category is bypassed in the presence of RBBB or LBBB.

The determination of left ventricular hypertrophy (LVH) is based on the presence of qualifying statements in the LVH voltage criteria, left axis deviation (LAD), and an abnormal repolarization pattern typical for LVH. Various combinations of statements from these

2. Zhou SH, Liebman J, Dubin AM, Gillette PC, et al.: Using 12-Lead ECG and Synthesized VCG in Detection of Right Ventricular Hypertrophy with Terminal Right Conduction Delay versus Partial Right Bundle Branch Block in the Pediatric Population. *Journal of Electrocardiography* 34 (supp):249-257 (2001).
3. Ibid.

abnormalities produce statements of varying severity and certainty regarding the presence of LVH.

LVH voltage criteria applied in LVH classification are:

- R amplitude in I, II, aVL, aVF, V5 or V6
- S amplitude in V1 or V2
- R amplitude in V6 plus S amplitude in V1
- Prominent Q wave in V5, V6 or II, III, aVF

The LVH voltage criteria are age dependent. A measured value in voltage is considered abnormal only if it exceeds 98% limits in the normal distribution.⁴

A left atrial abnormality reflected by P wave and left axis deviation supports determination of LVH. Leads I, aVL, V4, V5 and V6 are examined for repolarization changes typical for LVH. Two types of repolarizations are considered positive findings:

- The first is a mid ST elevation, with a large positive T wave
- The second is a slight mid ST depression that is upsloping, with a negative T wave

The pediatric LVH voltage criteria are highly age dependent. Appendix A includes the values that are considered significant for LVH voltages.

Biventricular Hypertrophy

The category of biventricular hypertrophy (BVH) combines findings of right and left ventricular hypertrophy.

Associated RVH is considered when an R amplitude greater than 1.0 mV in V1 exists with the presence of LVH. Associated LVH is considered when RVH statements are combined with a Q wave greater than 10 ms in duration, greater than 0.07 mV in amplitude, and an R wave greater than 1.0 mV in Lead V6.

BVH is also considered when the combined amplitudes of R and S exceed 6.0 mV in two of the following Leads: V2, V3, or V4. If RVH and LVH statements with high severity are generated from previous RVH and LVH categories, a statement of biventricular hypertrophy is generated. The BVH statement suppresses individual RVH and LVH statements.

Low Voltage

All leads are examined for QRS peak-to-peak voltage.

Frontal leads: if no lead has a value exceeding 0.60 mV, the ECG is considered borderline low voltage. If no value exceeds 0.50 mV, the ECG is considered definite low voltage, an abnormal finding.

Precordial leads: if no lead has a value exceeding 1.00 mV, the ECG is considered definite low voltage, an abnormal finding.

4. Op cit., Davignon A, Rautuharju P, Boiselle E, et al.

Combinations of low voltage statements, rightward deviation of the frontal P and QRS axes, and right atrial enlargement may generate statements suggesting the likelihood of chronic pulmonary disease.

Q Wave Abnormality and Myocardial Infarct

A statement of borderline Q wave abnormalities in an individual lead group is generated in the presence of large Q waves in two leads out of that group.

Q waves greater than one-fifth of the R wave amplitude generate a statement that the abnormal Q wave suggests infarct.

ST Depression

ST depression is determined in anterior, lateral, and inferior lead groups.

ST depression of more than 0.20 mV in one lead group produces a nonspecific ST depression statement.

If tachycardia is present, the statement of ST depression, probably rate related is generated.

Any type of hypertrophy or ventricular conduction delay suppresses statements from this category.

T Wave Abnormality

Inverted T waves are sought in anterior, lateral, anterolateral, and inferior lead groups.

A tall T wave abnormality statement is generated if the amplitude of the inverted T exceeds 1.0 mV in two or more leads in the particular lead group.

If RVH co-exists with inverted T waves in the anterior lead groups, the statement abnormal T, probably secondary to RVH, anterior leads is generated.

The statement abnormal T, probably due to LVH, anterolateral leads is generated if LVH co-exists with inverted waves in the anterolateral lead group.

Repolarization Abnormality

This category combines statements from the previous ST depression and inverted T wave categories to generate statements of repolarization abnormality. If ST depression and inverted T are found in the anterior lead group, a statement is generated to indicate repolarization abnormality, anterior leads.

ST Elevation, Pericarditis, and Early Repolarization

All leads are tested for ST elevation. ST elevation greater than 0.15 mV in these leads generates a statement suggesting a probable normal variation. Any hypertrophy and ventricular conduction delay suppresses statements from this category.

If ST elevation is seen on all anterior, lateral, and inferior lead groups, pericarditis is considered in children 5 to 15 years old.

For ECGs with nonspecific ST elevation and no T wave inversion, probable early repolarization is suggested in children 13 to 15 years old.

Tall T Waves

All leads are examined for the presence of T waves with amplitudes that exceed 1.20 mV, or that exceed 0.50 mV and are more than half the size of the peak-to-peak QRS voltage. The presence of such T waves may generate statements with the possibility of metabolic or electrolyte abnormalities.

QT Abnormality and Electrolyte Disturbance

A QT interval corrected for heart rate (QTc) shorter than 340 ms is considered to be borderline short QT interval with a severity of OTHERWISE NORMAL (ON).

A borderline prolonged QTc is greater than:

- 450 ms in children below 5 years
- 454 ms for children 5 to 12 years old
- 458 ms for boys 13 years and older
- 465 ms for females 13 years and older

An additional 20 ms qualifies as prolonged QT⁵.

- 470 ms in children below 5 years
- 474 ms for children 5 to 12 years old
- 478 ms for boys 13 years and older
- 485 ms for females 13 years and older

With RVH, LSH, LVH, BVH, or VCD present, the statement prolonged QTc probably secondary to wide QRS complex is generated.

Hypercalcemia is suggested if the QTc is shorter than 310 ms. Hypocalcemia is suggested by a significantly prolonged QTc interval (> 520 ms). Hypokalemia is suggested by a significantly prolonged QTc interval (> 520 ms) combined with ST segment depression and a positive T wave in multiple leads.

Congenital Heart Defects

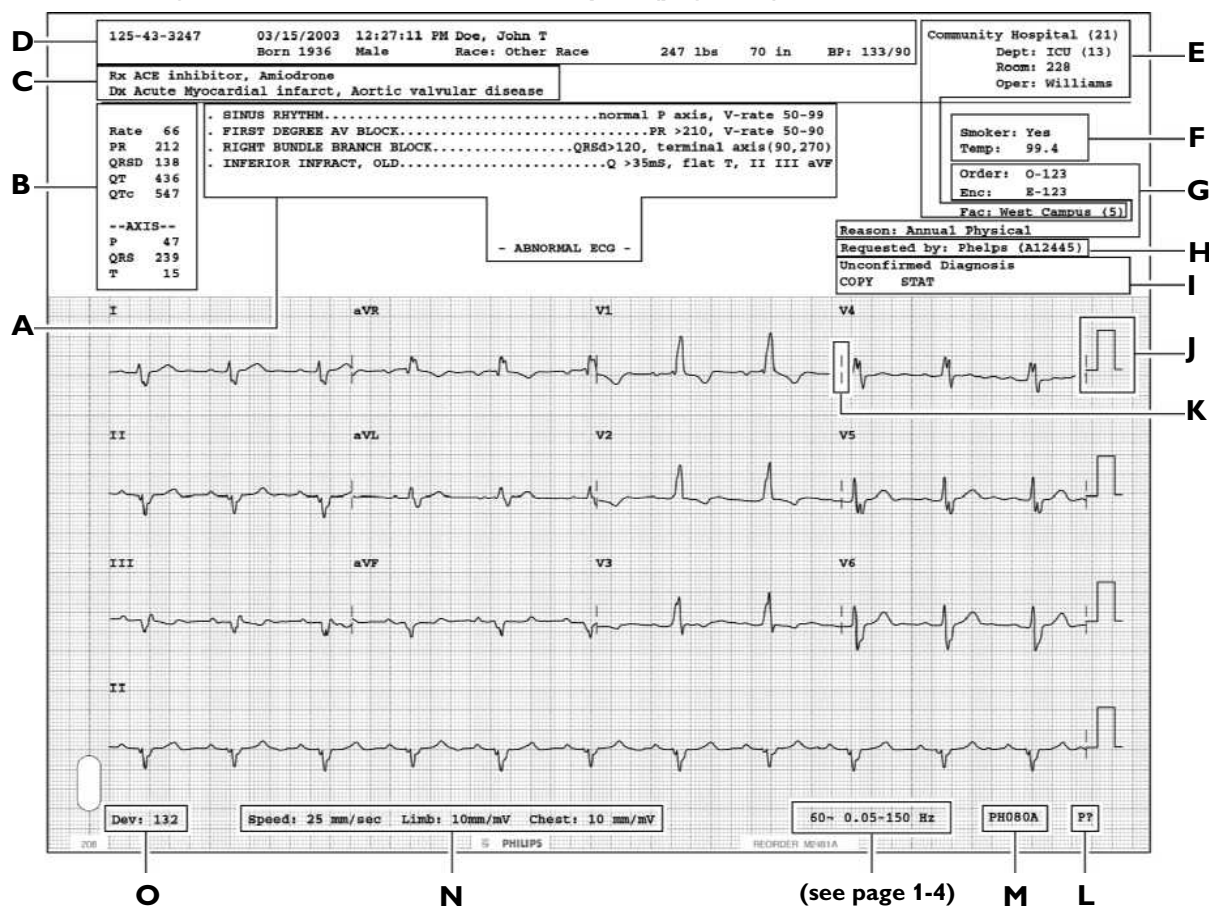
Various congenital cardiac conditions are suggested by varying combinations of atrial abnormalities, ventricular hypertrophy, ventricular conduction delays, QRS axis deviations, and QRS morphological features.

5. Rautaharju PM, Zhou SH, Wong S, et al. Sex differences in the evolution of the electrocardiographic QT interval with age. *Can J Cardio* 8(7): 690-695 (1992).

Reading the Printed ECG Report

The following ECG report types may be generated by Philips Medical Systems equipment. For more information on available printed report formats, see your product documentation.

Figure 5-1 A 12-Lead 3x4, 1R Report (page one)

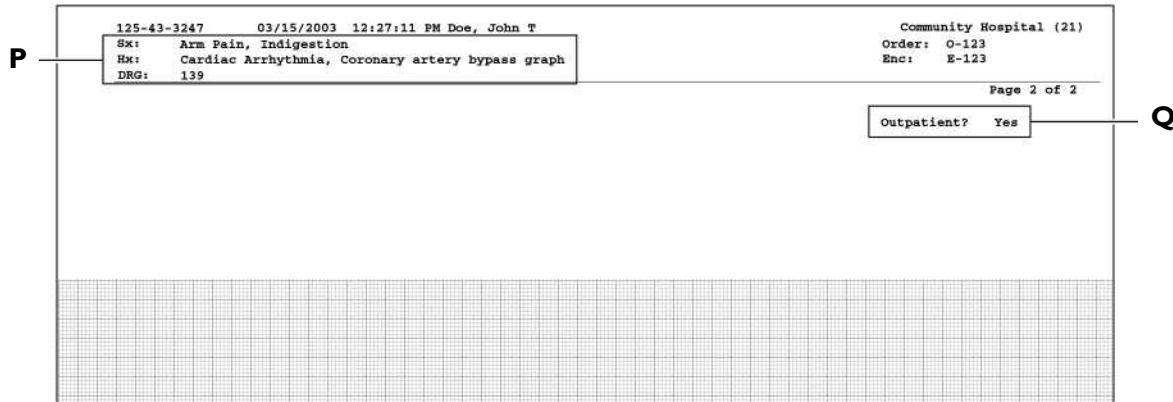


- A** Interpretive, Reason, and Severity Statements (page 5-2)
- B** Basic Measurements (page 5-3)
- C** Patient ID Clinical Information (page 5-4)
- D** Patient ID Information (page 5-7)
- E** Institution Information (page 5-9)
- F** Configurable Clinical Information (page 5-10)
- G** ECG Order Information (page 5-18)
- H** Physician Information (page 5-12)
- I** Report Information (page 5-12)
- J** Calibration Information (page 5-13)
- K** Time Separator (page 5-15)
- L** Pacing Detection Setting (page 5-15)
- M** Algorithm Version Number (page 5-17)
- N** Speed and Sensitivity Settings (page 5-18)
- O** Device Identification Number (page 5-18)

Additional Patient ID Clinical Information may appear on the top of a second page of the ECG report if more than two clinical fields (Rx, Dx, Sx, Hx) are entered with the Patient ID.

Additional Configurable Clinical Information may also appear on the top of a second page of the ECG report if more than four fields are configured.

Figure 5-2 A 12-Lead 3x4, 1R Report (page two)



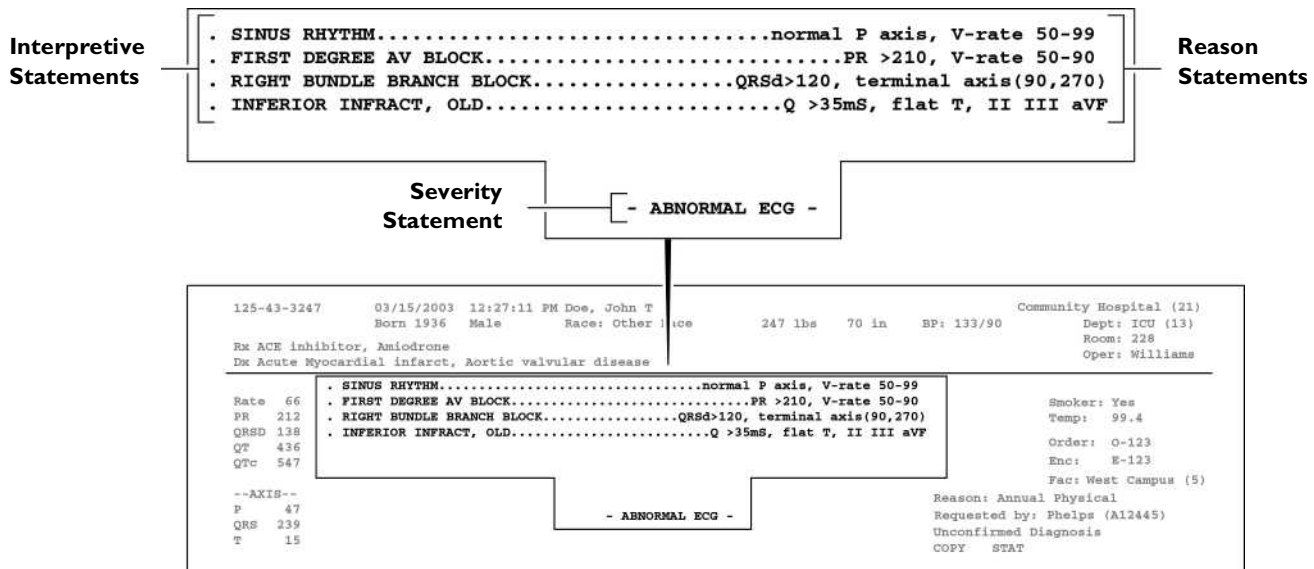
P Additional Patient ID Clinical Information (page 5-4)

Q Additional Configurable Clinical Information (page 5-10)

Interpretive, Reason, and Severity Statements

This area of the report contains the interpretive, reason, and severity statements generated by the Philips 12-Lead Algorithm.

Figure 5-3 Interpretive, Reason, and Severity Statements on the ECG Report



Complete interpretive statements may include a reason statement that summarizes the criteria that generated the interpretive statement. A listing of all of the interpretive statements included in the Philips 12-Lead Algorithm (listed in alphabetical order and by diagnostic category) are included in Appendices A and B.

NOTE The interpretive statements may include quality statements that describe a signal quality problem that occurred during recording, such as ARTIFACT IN LEAD(S) I, III, aVL.

Severity Statement

The severity statement represents the overall severity of the ECG. See “Overall Severity” on page 1-8 for more information.

Basic Measurements

These measurements provide standard interval and duration measurements in milliseconds, and limb lead axis measurements in degrees. These are the values measured from the representative beat pattern in the ECG.

Figure 5-4 Basic Measurements on the ECG Report

| | |
|-----------------|-----|
| Rate | 66 |
| PR | 212 |
| QRSD | 138 |
| QT | 436 |
| QTc | 547 |
| --AXIS-- | |
| P | 47 |
| QRS | 239 |
| T | 15 |

| | | | | | |
|-----------------|---|---|-------------|-------------------------------|--------------------------|
| 125- | 3-3247 | 03/15/2003 | 12:27:11 PM | Doe, John T | Community Hospital (21) |
| | | Born 1936 | Male | Race: Other Race | 247 lbs 70 in BP: 133/90 |
| Rx | E inhibitor, Amiodrone | | | | Dept: ICU (13) |
| Dx | ute Myocardial infarct, Aortic valvular disease | | | | Room: 228 |
| | | | | | Oper: Williams |
| Rate | 66 | . SINUS RHYTHM.....normal P axis, V-rate 50-99 | | | |
| PR | 212 | . FIRST DEGREE AV BLOCK.....PR >210, V-rate 50-90 | | Smoker: Yes | |
| QRSD | 138 | . RIGHT BUNDLE BRANCH BLOCK.....QRSd>120, terminal axis(90,270) | | Temp: 99.4 | |
| QT | 436 | . INFERIOR INFRACT, OLD.....Q >35mS, flat T, II III aVF | | Order: O-123 | |
| QTc | 547 | | | Enc: E-123 | |
| --AXIS-- | | | | Fac: West Campus (5) | |
| P | 47 | | | Reason: Annual Physical | |
| QRS | 239 | | | Requested by: Phelps (A12445) | |
| T | 15 | | | Unconfirmed Diagnosis | |
| | | | | COPY STAT | |

NOTE Some reports do not include the heart rate (RATE) in Basic Measurements, but do include a heart rate above the interpretive statements. This rate may be edited.

Table 5-1 Basic Measurements

| Label | Description | Units |
|-------|--------------------------------|------------------|
| RATE | Heart rate | beats per minute |
| PR | PR interval | milliseconds |
| QRSD | QRS duration | milliseconds |
| QT | QT interval | milliseconds |
| QTc | QT interval corrected for rate | milliseconds |
| P | Frontal P axis | degrees |

Table 5-1 Basic Measurements (continued)

| Label | Description | Units |
|-------|------------------|---------|
| QRS | Frontal QRS axis | degrees |
| T | Frontal T axis | degrees |

Patient ID Clinical Information

This area of page one or page two of the report contains clinical patient information that is entered with the Patient ID. This includes information about the patient’s Medications (Rx), Diagnoses (Dx), Symptoms (Sx), History (Hx), and a Diagnosis Related Group (DRG) code. This information is optional and configurable. The example below is for informational purposes only.

Figure 5-5 Patient ID Clinical Information on the ECG Report (page one)

Rx ACE inhibitor, Amiodrone
Dx Acute Myocardial infarct, Aortic valvular disease

| | | |
|---|--|--|
| 125-43-3247 | 03/15/2003 12:27:11 PM Doe, John T Born 1936 Male Race: Other Race 247 lbs 70 in BP: 133/90 | Community Hospital (21) Dept: ICU (13) Room: 228 Oper: Williams |
| <p>Rx ACE inhibitor, Amiodrone Dx Acute Myocardial infarct, Aortic valvular disease</p> | | |
| <p>- SINUS RHYTHM.....normal P axis, V-rate 50-99 - FIRST DEGREE AV BLOCK.....PR >210, V-rate 50-90 - RIGHT BUNDLE BRANCH BLOCK.....QRSd>120, terminal axis(90,270) - INFERIOR INFRACT, OLD.....Q >35mS, flat T, II III aVF</p> | | |
| Rate 66 | | Smoker: Yes |
| PR 212 | | Temp: 99.4 |
| QRSd 138 | | Order: 0-123 |
| QT 436 | | Enc: E-123 |
| QTc 547 | | Fac: West Campus (5) |
| <p>--AXIS-- P 47 QRS 239 T 15</p> | | |
| - ABNORMAL ECG - | | |
| <p>Reason: Annual Physical Requested by: Phelps (A12445) Unconfirmed Diagnosis COPY STAT</p> | | |

If more than two Patient ID Clinical Information fields are entered, the third and subsequent fields appear at the top of a second page of the report.

Figure 5-6 Patient ID Clinical Information on the ECG Report (page two)

| | | | |
|---|--|--|--|
| Sx: Arm Pain, Indigestion | | | |
| Hx: Cardiac Arrhythmia, Coronary artery bypass graph | | | |
| DRG: 139 | | | |

| | | | |
|---|------------|-------------------------|-------------------------|
| 125-43-3247 | 03/15/2011 | 12:27:11 PM Doe, John T | Community Hospital (21) |
| Sx: Arm Pain, Indigestion | | | Order: O-123 |
| Hx: Cardiac Arrhythmia, Coronary artery bypass graph | | | Enc: E-123 |
| DRG: 139 | | | |
| | | | Page 2 of 2 |
| | | | Outpatient: Yes |

Patient ID Clinical Codes

The following tables list the Patient ID Medications (Rx), Diagnoses (Dx), Symptoms (Sx), and History (Hx) codes that are used when editing reports with a Philips ECG Management System. The codes are used to quickly enter patient information.

Table 5-2 Patient ID Medication (Rx) Codes

| Rx Statement | Code |
|--------------------------|----------|
| ACE Inhibitor | J |
| Amiodarone | E |
| Antiarrhythmia Drug | A |
| Beta Blocker Drug | 6 |
| Calcium Blocker | C |
| Digitalis | 7 |
| Phenothiazine | V |
| Pressor Drug | O |
| Procainamide | 2 |
| Psychoactive Drug | F |
| Quinidine | 3 |
| Tricyclic Antidepressant | X |
| No Known Rx | Z |

Table 5-3 Patient ID Diagnosis (Dx) Codes

| Dx Statement | Code |
|----------------------------|-------------|
| Acute Myocardial Infarct | I |
| Aortic Valvular Disease | 8 |
| Arrhythmia | E |
| Cardiomyopathy | 3 |
| Chest Leads Right-sided | H |
| Chest Pain Chief Complaint | Y |
| Chest Pain Secondary | S |
| Congenital Heart Defect | 4 |
| Coronary Angioplasty | C |
| Coronary Artery Disease | 1 |
| Heart Transplant | G |
| Hypertension | 5 |
| Mitral Valvular Disease | 9 |
| No Chest Pain | N |
| Old Myocardial Infarct | D |
| Pacemaker | 2 |
| Post Op Cardiac Surgery | B |
| Preoperative ECG | F |
| Pulmonary Disease | 6 |
| Valvular Heart Disease | 7 |
| V3 moved to V3R | J |
| No Known Dx | Z |

Table 5-4 Patient ID Symptom (Sx) Codes

| Label | Code |
|--------------|-------------|
| Arm Pain | 6 |
| Chest Pain | 1 |
| Dizzy | 4 |
| Indigestion | 8 |
| Light Headed | 7 |
| Palpitations | 9 |

Table 5-4 Patient ID Symptom (Sx) Codes (continued)

| Label | Code |
|---------------------|------|
| Shortness of Breath | 2 |
| Shoulder Pain | 5 |
| Tight Chest | 3 |

Table 5-5 Patient ID History (Hx) Codes

| Label | Code |
|------------------------------|------|
| Cardiac Arrhythmia | 3 |
| Chest Pain | 8 |
| Coronary Artery Bypass Graft | 1 |
| Diabetes | 4 |
| Hypertension | 2 |
| Ischemic Heart Disease | 6 |
| Myocardial Infarction | 9 |
| Valvular Heart Disease | 5 |

Patient ID Information

This section contains patient identification information. This block of information is configurable. The example below is for informational purposes only.

Figure 5-7 Patient ID Information on the ECG Report

```
125-43-3247 03/15/2003 12:27:11 PM Doe, John T
          Born 1936 Male Race: Other Race 247 lbs 70 in BP: 133/90
```

```
125-43-3247 03/15/2003 12:27:11 PM Doe, John T Community Hospital (21)
          Born 1936 Male Race: Other Race 247 lbs 70 in BP: 133/90 Dept: ICU (13)
Ex ACE inhibitor, Amiodrone Room: 228
Dx Acute Myocardial infarct, Aortic valvular disease Oper: Williams

Rate 66 . SINUS RHYTHM.....normal P axis, V-rate 50-99
PR 212 . FIRST DEGREE AV BLOCK.....PR >210, V-rate 50-90 Smoker: Yes
QRSd 138 . RIGHT BUNDLE BRANCH BLOCK.....QRSd>120, terminal axis(90,270) Temp: 99.4
QT 436 . INFERIOR INFRACT, OLD.....Q >35mS, flat T, II III aVF Order: O-123
QTc 547 Fac: E-123
--AKIS-- Reason: Annual Physical
P 47 - ABNORMAL ECG - Requested by: Phelps (A12445)
QRS 239 Unconfirmed Diagnosis
T 15 COPY STAT
```

Table 5-6 Patient ID Information

| Label | Description |
|-------------|---------------------------------|
| 125-43-3247 | ■ Patient identification number |

Table 5-6 Patient ID Information (continued)

| Label | Description |
|-------------------------|--|
| 03/15/2003; 12:27:11 PM | <ul style="list-style-type: none"> ■ Date and time of ECG acquisition ■ Cannot be edited |
| Doe, John T. | <ul style="list-style-type: none"> ■ Patient name |
| Born 1936 | <ul style="list-style-type: none"> ■ Patient date of birth (may be configured to display patient age) |
| Male | <ul style="list-style-type: none"> ■ Patient gender |
| Race | <ul style="list-style-type: none"> ■ Patient ethnicity (see table below for codes) |
| 247 lbs, 70 in. | <ul style="list-style-type: none"> ■ Patient weight and height |
| BP: 133/90 | <ul style="list-style-type: none"> ■ Patient blood pressure (mmHg) |

Patient ID Ethnicity Codes

The following table lists the Patient ID ethnicity codes that are used when editing reports with a Philips ECG Management System.

Table 5-7 Patient ID Ethnicity Codes

| Label | Code |
|--------------------|------|
| African American | 3 |
| Aleutian or Eskimo | 1 |
| American Indian | 2 |
| Asian | 6 |
| Caucasian | 8 |
| Hawaiian | 4 |
| Hispanic | 5 |
| Other Race | 9 |
| Pacific Islander | 7 |

Institution Information

This block of identification information is optional and may be customized by an institution. For more information see the Philips Medical Systems product documentation. The example below is for informational purposes only.

Figure 5-8 Institution Information on the ECG Report

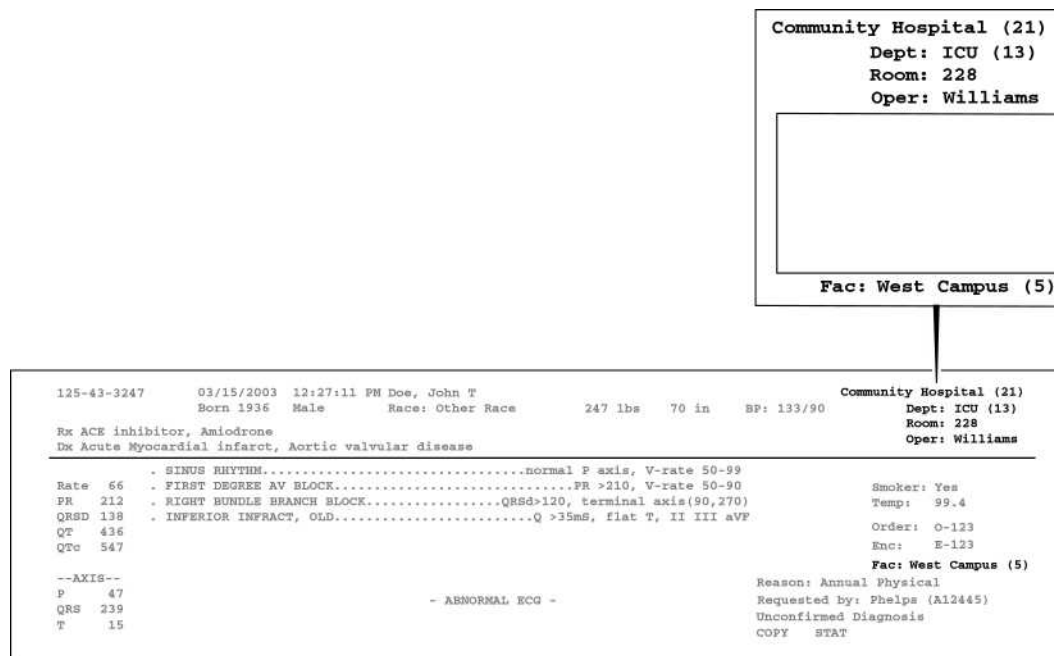


Table 5-8 Institution Information

| Label | Description |
|-------------------------|--|
| Community Hospital (21) | ■ Name and ID number of institution |
| Dept: ICU (13) | ■ Name and ID number of department |
| Room: 228 | ■ Room number of patient or room number where ECG was acquired |
| Oper: Williams | ■ Operator identification |
| Fac: West Campus (5) | ■ Name and ID number of facility or other unit within an institution |

Configurable Clinical Information

This information is configured by an institution to fit specific clinical needs. Up to eight configurable text fields are available. The text label (Smoker, Temp) is configured on the system, and the user enters the value (Yes, 99.4) before acquiring the ECG.

The first four text fields appear on page one of the ECG report. The fifth and subsequent text field appears on page two of the ECG report. The examples below are for informational purposes only.

Figure 5-9 Configurable Clinical Information on the ECG Report (page one)

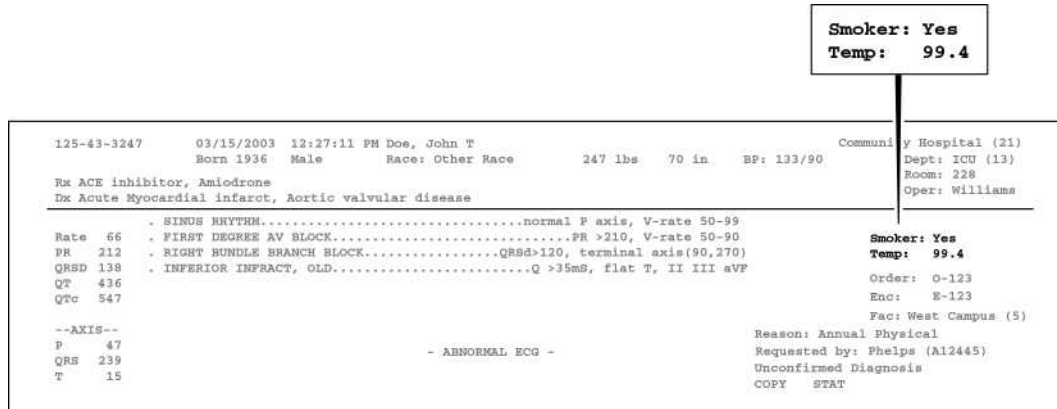
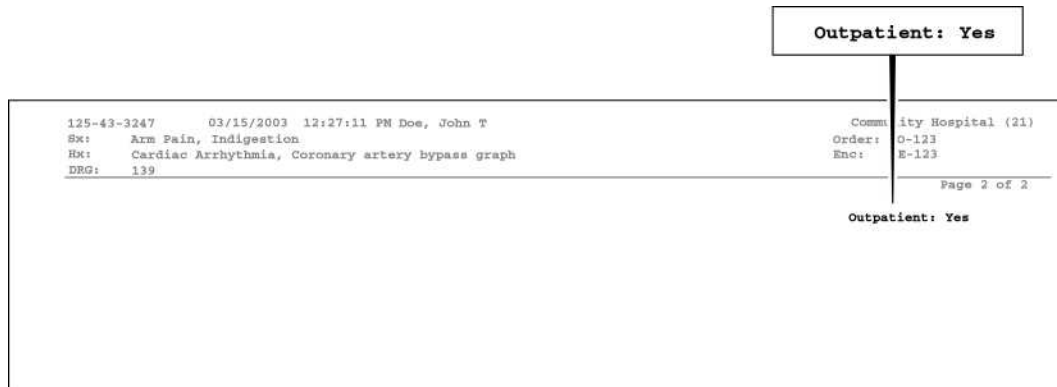


Figure 5-10 Configurable Clinical Information on the ECG Report (page two)



ECG Order Information

This area of the report may be customized to meet the requirements of an order management system.

Figure 5-11 ECG Order Information on the ECG Report

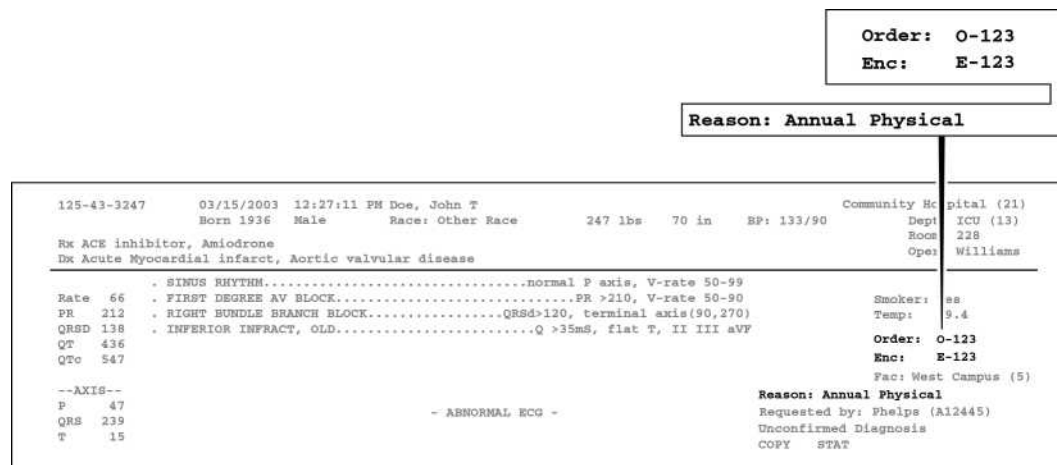


Table 5-9 ECG Order Information

| Label | Description |
|-------------------------|---|
| Order: 0-123 | <ul style="list-style-type: none"> ■ Institution-defined order number, part of order management system |
| Enc: E-123 | <ul style="list-style-type: none"> ■ Institution-defined encounter number, part of order management system |
| Reason: Annual Physical | <ul style="list-style-type: none"> ■ The reason for acquiring the ECG, may be part of an order management system |

Physician Information

This information block contains physician identification information, including the name of the ordering physician and UPIN (Universal Physician Identification Number).

Figure 5-12 Physician Information on the ECG report

Requested by: Phelps (A12445)

| | |
|---|---|
| <p>125-43-3247 03/15/2003 12:27:11 PM Doe, John T Born 1936 Male Race: Other Race 247 lbs 70 in BP: 133/90</p> <p>Rx ACE inhibitor, Amiodrone Dx Acute Myocardial infarct, Aortic valvular disease</p> <hr/> <p>Rate 66 . SINUS RHYTHM.....normal P axis, V-rate 50-99 PR 212 . FIRST DEGREE AV BLOCK.....PR >210, V-rate 50-90 QRSd 138 . RIGHT BUNDLE BRANCH BLOCK.....QRSd>120, terminal axis(90,270) QT 436 . INFERIOR INFRACT, OLD.....Q >35ms, flat T, II III aVF QTc 547</p> <p>--AXIS-- P 47 QRS 239 T 15</p> <p style="text-align: center;">- ABNORMAL ECG -</p> | <p>Community Hospital (21) Dept: ICU (13) Room: 228 Oper: Williams</p> <hr/> <p>Smoker: Yes Temp: 99.4 Order: O-123 Enc: E-123 Fac: West Campus (5)</p> <p>Reason: Annual Physical Requested by: Phelps (A12445) Unconfirmed Diagnosis COPY STAT</p> |
|---|---|

Report Information

Information about the status of the ECG report is included in this section.

Figure 5-13 Report Information on the ECG Report

**Unconfirmed Diagnosis
COPY STAT**

| | |
|---|---|
| <p>125-43-3247 03/15/2003 12:27:11 PM Doe, John T Born 1936 Male Race: Other Race 247 lbs 70 in BP: 133/90</p> <p>Rx ACE inhibitor, Amiodrone Dx Acute Myocardial infarct, Aortic valvular disease</p> <hr/> <p>Rate 66 . SINUS RHYTHM.....normal P axis, V-rate 50-99 PR 212 . FIRST DEGREE AV BLOCK.....PR >210, V-rate 50-90 QRSd 138 . RIGHT BUNDLE BRANCH BLOCK.....QRSd>120, terminal axis(90,270) QT 436 . INFERIOR INFRACT, OLD.....Q >35ms, flat T, II III aVF QTc 547</p> <p>--AXIS-- P 47 QRS 239 T 15</p> <p style="text-align: center;">- ABNORMAL ECG -</p> | <p>Community Hospital (21) Dept: ICU (13) Room: 228 Oper: Williams</p> <hr/> <p>Smoker: Yes Temp: 99.4 Order: O-123 Enc: E-123 Fac: West Campus (5)</p> <p>Reason: Annual Physical Requested by: Phelps (A12445) Unconfirmed Diagnosis COPY STAT</p> |
|---|---|

Table 5-10 Report Information

| Label | Description |
|-----------------------|--|
| Unconfirmed Diagnosis | <ul style="list-style-type: none"> ■ Indicates that the ECG report has not been overread by a qualified physician ■ This statement may be customized by an institution |
| COPY | <ul style="list-style-type: none"> ■ The ECG report is a printed copy of an original |
| STAT | <ul style="list-style-type: none"> ■ The ECG report is designated as STAT |

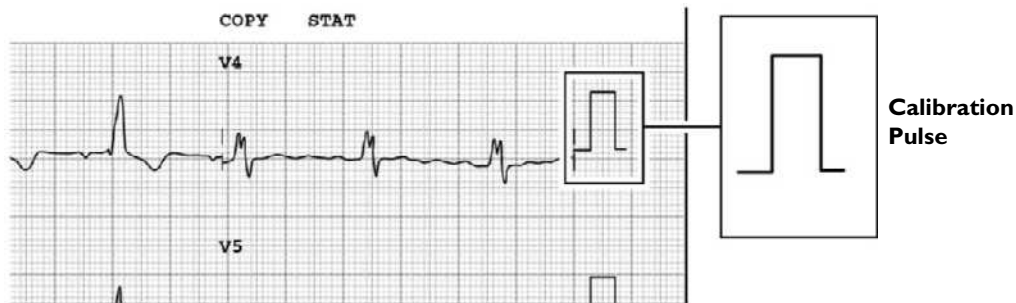
Table 5-10 Report Information (continued)

| Label | Description |
|-------------------------|--|
| Non-standard lead gains | <ul style="list-style-type: none"> The limb leads or precordial leads were recorded at a gain other than the standard 10mm/mV See "Calibration Information" on page 5-13 |

Calibration Information

The calibration pulse is the rectangular waveform shown in each line of ECG trace. It shows the hypothetical deflection of the trace in response to a 1 mV calibration pulse applied to the acquisition circuitry.

Figure 5-14 Calibration Pulse on the ECG Report



The shape of the calibration pulse reflects the scaling of the trace.



- If the calibration pulse is square  the precordial leads and limb leads were recorded at the same scale.
- If the calibration pulse is stepped  the precordial leads were recorded at half the scale of the limb leads.

Table 5-11 Calibration Pulse Shapes




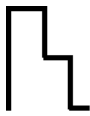
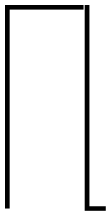
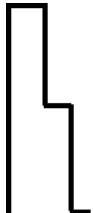
| Calibration Pulse Shape | Limb (mm/mV) | Precordial (mm/mV) |
|---|--------------|--------------------|
|  | 5 | 5 |
|  | 5 | 2.5 |
|  | 10 | 10 |

Table 5-11 Calibration Pulse Shapes (continued)

| Calibration Pulse Shape | Limb (mm/mV) | Precordial (mm/mV) |
|---|--------------|--------------------|
|  | 10 | 5 |
|  | 20 | 20 |
|  | 20 | 10 |

NOTE For ECG recordings where the precordial leads or limb leads were recorded at a gain other than 10mm/mV, the statement `Non-standard lead gains` appears in the Report Information section on the printed report.

Figure 5-15 Calibration information on the ECG report

Unconfirmed Diagnosis
COPY STAT **Non-Standard lead gains**

| | |
|---|---|
| <p>125-43-3247 03/15/2003 12:27:11 PM Doe, John T Born 1936 Male Race: Other Race 247 lbs 70 in BP: 133/90 Rx ACE inhibitor, Amlodrone Dx Acute Myocardial infarct, Aortic valvular disease</p> <hr/> <p>Rate 66 . SINUS RHYTHM.....NORMAL P axis, V-rate 50-99 PR 212 . FIRST DEGREE AV BLOCK.....PR >210, V-rate 50-90 QRSD 138 . RIGHT BUNDLE BRANCH BLOCK.....QRSD>120, terminal axis(90,270) QT 436 . INFERIOR INFRACT, OLD.....Q >35ms, flat T, II III aVF QTc 547</p> <p>--AXIS-- P 47 QRS 239 T 15</p> | <p style="text-align: right;">Community Hospital (21) Dept: U (13) Room: 8 Oper: Williams</p> <hr/> <p style="text-align: right;">Smoker: Yes Temp: 99. Order: O-1 3 Enc: E-1 3 Pac: West Campus (5)</p> <p style="text-align: right;">Reason: Annual Physical Requested by: Phelps (A12) (45) Unconfirmed Diagnosis COPY STAT Non-standard lead gains</p> |
|---|---|

Time Separator

The time separator marks indicate whether the ECG data is displayed simultaneously or time-sequentially. The data for each lead is always acquired simultaneously.

Figure 5-16 Simultaneous time separator on ECG report



The double line indicates that the ECG data for each lead is displayed simultaneously. The starting point of each lead is the same time even though they may appear to start at different times on the printed report.

Figure 5-17 Time sequential separator on ECG report



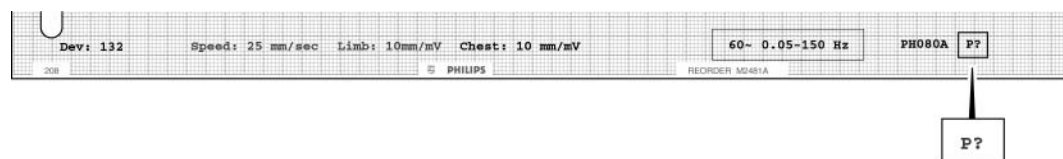
The single line indicates that the ECG data for each lead is displayed over a continuous period of time. For example, on a 3x4 grid all signals start at 0 in the first column, 2.5 seconds in the second column, 5.0 seconds in the third column, and 7.5 seconds in the fourth column.

Pacing Detection Settings

This area of the report contains information about the pacing detection settings that were selected when the ECG report was printed.

Pacemaker pulses that are detected by the recording equipment are marked on the ECG report with small vertical tick marks. These marks enable the overreader to identify false pacemaker pulse detections, or if true pulses are not being detected.

Figure 5-18 Pacing Detection Setting on the ECG report



The table below describes the available Pacing Detection Settings with the pacing detection code that appears on the printed ECG report.

Table 5-12 Pacing Detection Settings

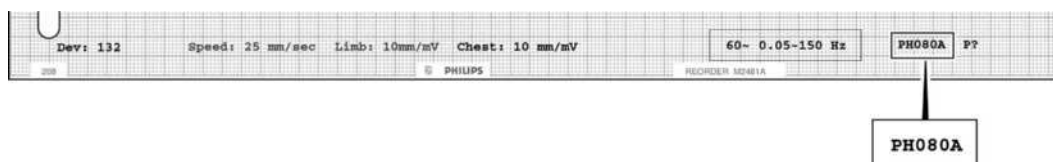
| Setting | Description | ECG Report Code |
|--------------------|--|---|
| Not known if paced | <ul style="list-style-type: none"> ■ This is the default setting and normally is used for both paced and non-paced patients. ■ Pacemaker pulse detection is on and is at normal sensitivity. ■ Occasional false pacemaker pulse detections may occur in ECGs with excessive noise. ■ False detections may result in an incorrect interpretive statement appearing on the report. ■ Small amplitude pacemaker pulses may not be detected using this setting. | P? |
| Non-paced | <ul style="list-style-type: none"> ■ Pacemaker pulse detection is off. ■ Use this setting if there are false pacemaker pulse detections from noise, or if incorrect interpretive statements or inappropriate paced ECG complexes appear on the report. | <ul style="list-style-type: none"> ■ No code appears on the ECG report if the Non-paced setting is selected. |
| Paced | <ul style="list-style-type: none"> ■ Pacemaker pulse detection is on and is set at a higher sensitivity. ■ Use this setting if small amplitude pacemaker pulses are not being detected at the default (Not Known if Paced) setting. ■ False pacemaker pulse detections may occur if the ECG is noisy. | P |

Table 5-12 Pacing Detection Settings (continued)

| Setting | Description | ECG Report Code |
|----------------|--|-----------------|
| Paced (magnet) | <ul style="list-style-type: none"> ■ Use this setting if the ECG is acquired with an active pacemaker magnet or programmer in place. ■ Pacemaker pulse detection is on and is at a higher sensitivity. ■ Magnets or programmers often put the pacemaker in a fixed-rate, non-sensing mode. ■ The statement ECG ACQUIRED WITH MAGNET IN PLACE is printed on the ECG report. This statement notifies the overreader that a magnet or programmer was used and would explain the fixed rate behavior of the pacer. | PM |

Algorithm Version Number

The version number of the Philips 12-Lead Algorithm is printed at the bottom of the ECG Report.

Figure 5-19 Algorithm Version Number on the ECG Report**Table 5-13 Algorithm Version Number**

| Label | Description |
|--------|---|
| PH080A | <ul style="list-style-type: none"> ■ PH refers to Philips ■ 08 refers to the version of the measurement program ■ 0A refers to the criteria version installed on the cardiograph |

Speed and Sensitivity Settings

This area contains information about the speed and sensitivity settings that were used for the ECG recording.

Figure 5-20 Speed and Sensitivity Settings on the ECG Report

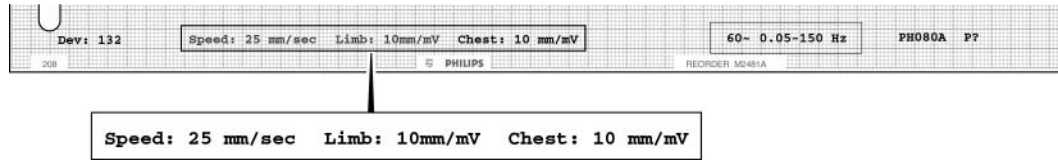


Table 5-14 Speed and Sensitivity Settings

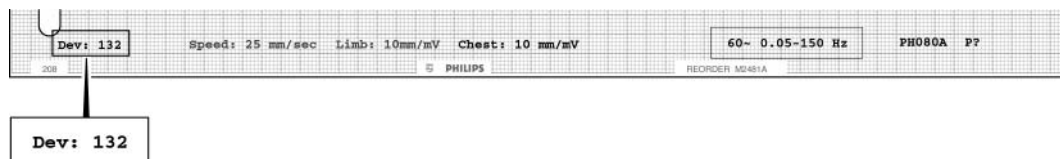
| Label | Description |
|-------|--|
| Speed | <ul style="list-style-type: none"> ■ The speed at which the ECG was printed ■ Available settings: <ul style="list-style-type: none"> – 25mm/sec – 50 mm/sec |
| Limb | <ul style="list-style-type: none"> ■ The limb lead sensitivity setting ■ Available settings: <ul style="list-style-type: none"> – 5, 10, or 20 mm/mV |
| Chest | <ul style="list-style-type: none"> ■ Precordial lead sensitivity setting ■ Available settings: <ul style="list-style-type: none"> – 2.5, 5, 10, or 20 mm/mV |

NOTE For ECG recordings where the precordial leads or limb leads were recorded at a gain other than 10mm/mV, the statement *Non-standard lead gains* appears in the Report Information section on the printed report.

Device Identification Number

This number is entered on Philips Medical Systems equipment and is used to identify an individual device that was used to acquire the ECG.

Figure 5-21 Device ID on the ECG Report



12-Lead ECG Report Examples

The following section includes examples of other 12-Lead report formats.

- 3x4, 3R report with Standard Leads
- 3x4, 1R report with Cabrera Leads
- 6x2 report (5-second waveform segments) with Cabrera Leads
- 12x1 report with Cabrera Leads. The 12x1 report shows 10 seconds of continuous waveform data for 12 leads and includes a second page with interpretive, reason, and severity statements (if configured).
- Panoramic (Pan-12) report with Cabrera Leads. The Pan-12 report shows a one-second representative complex for each Cabrera Lead and three pre-selected rhythm strips at the bottom (aVF, V2, V5).

Figure 5-22 3x4, 3R Report with Standard Leads

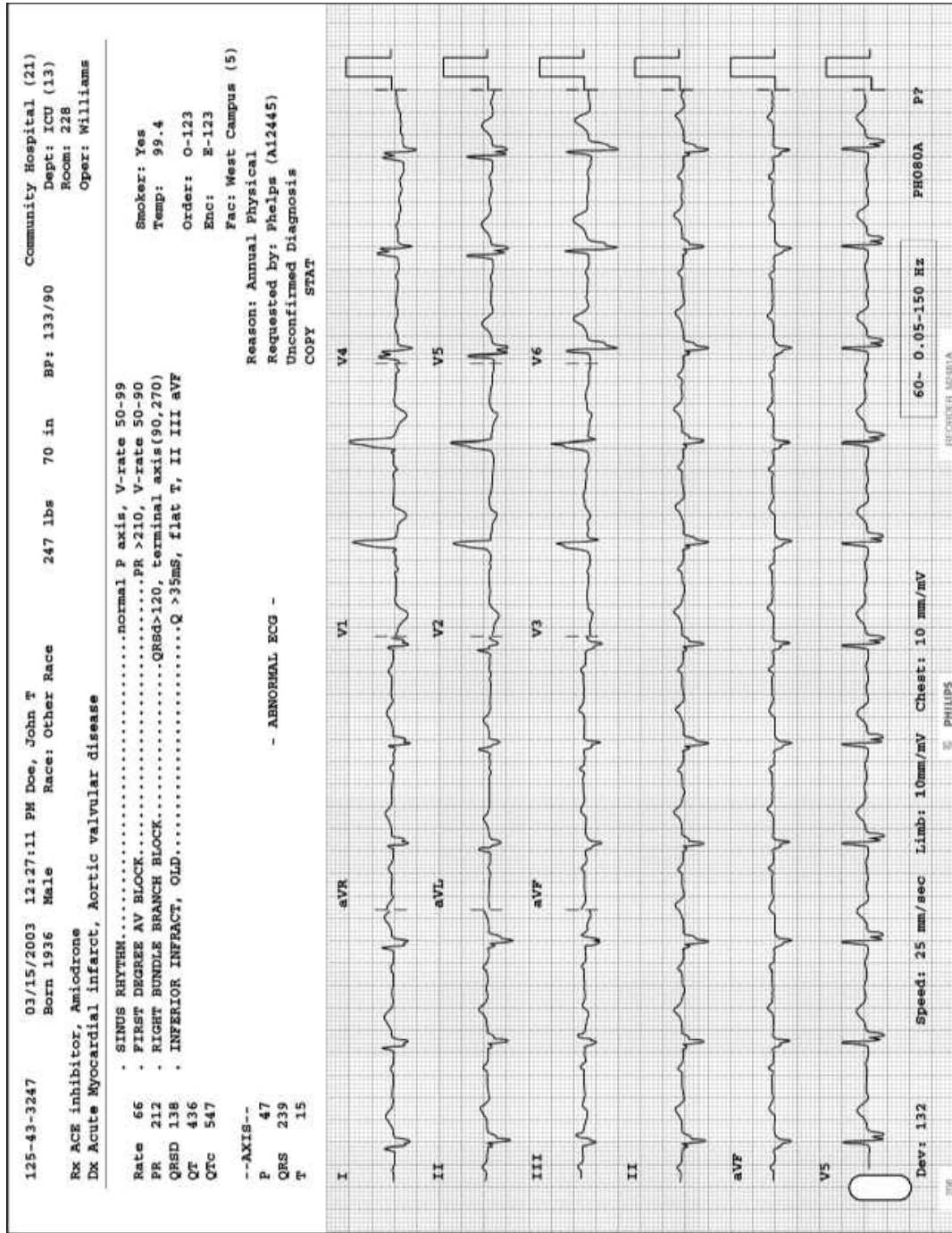


Figure 5-23 3x4, 1R Report with Cabrera Leads and Simultaneous Acquisition

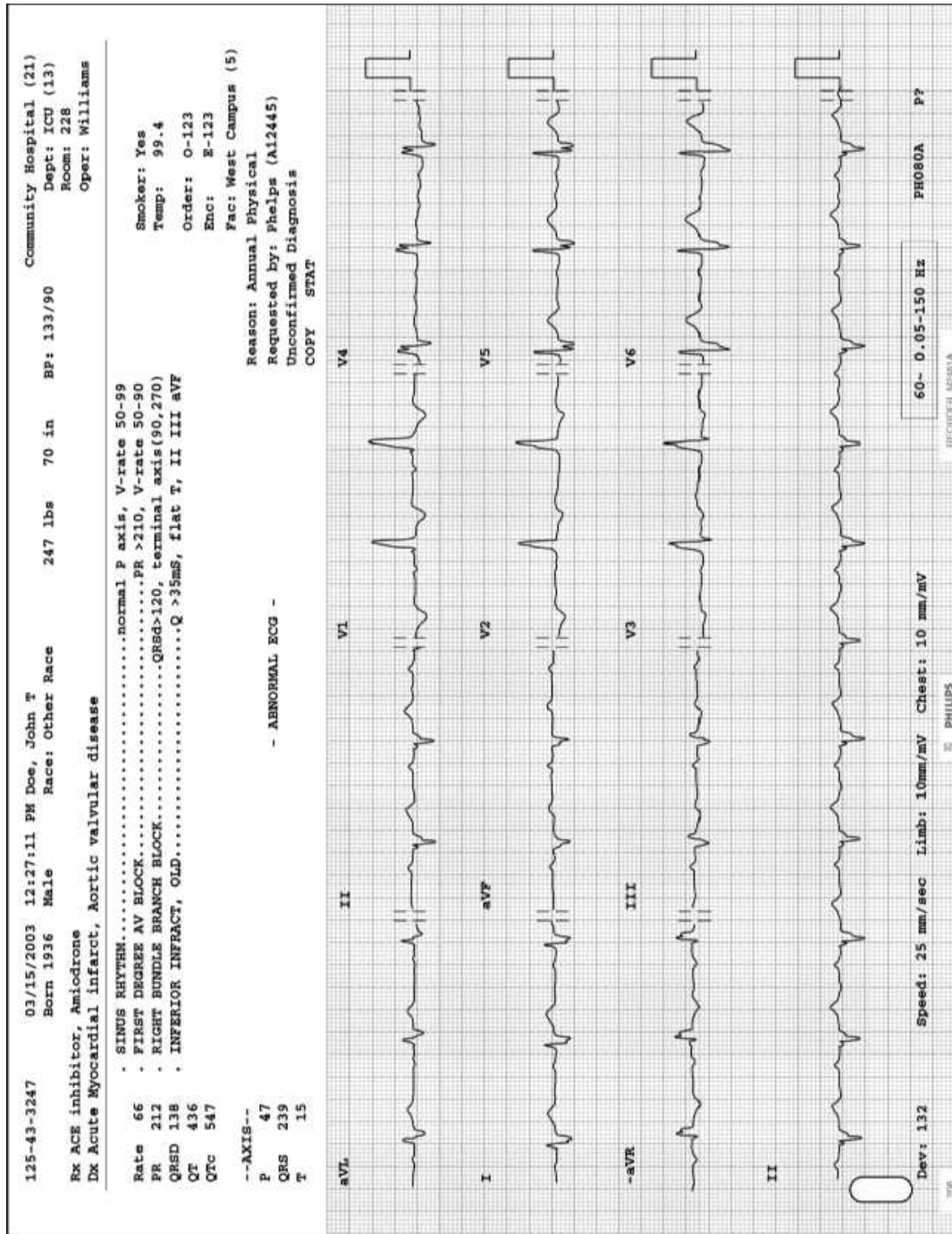


Figure 5-24 6x2 Report with Cabrera Leads

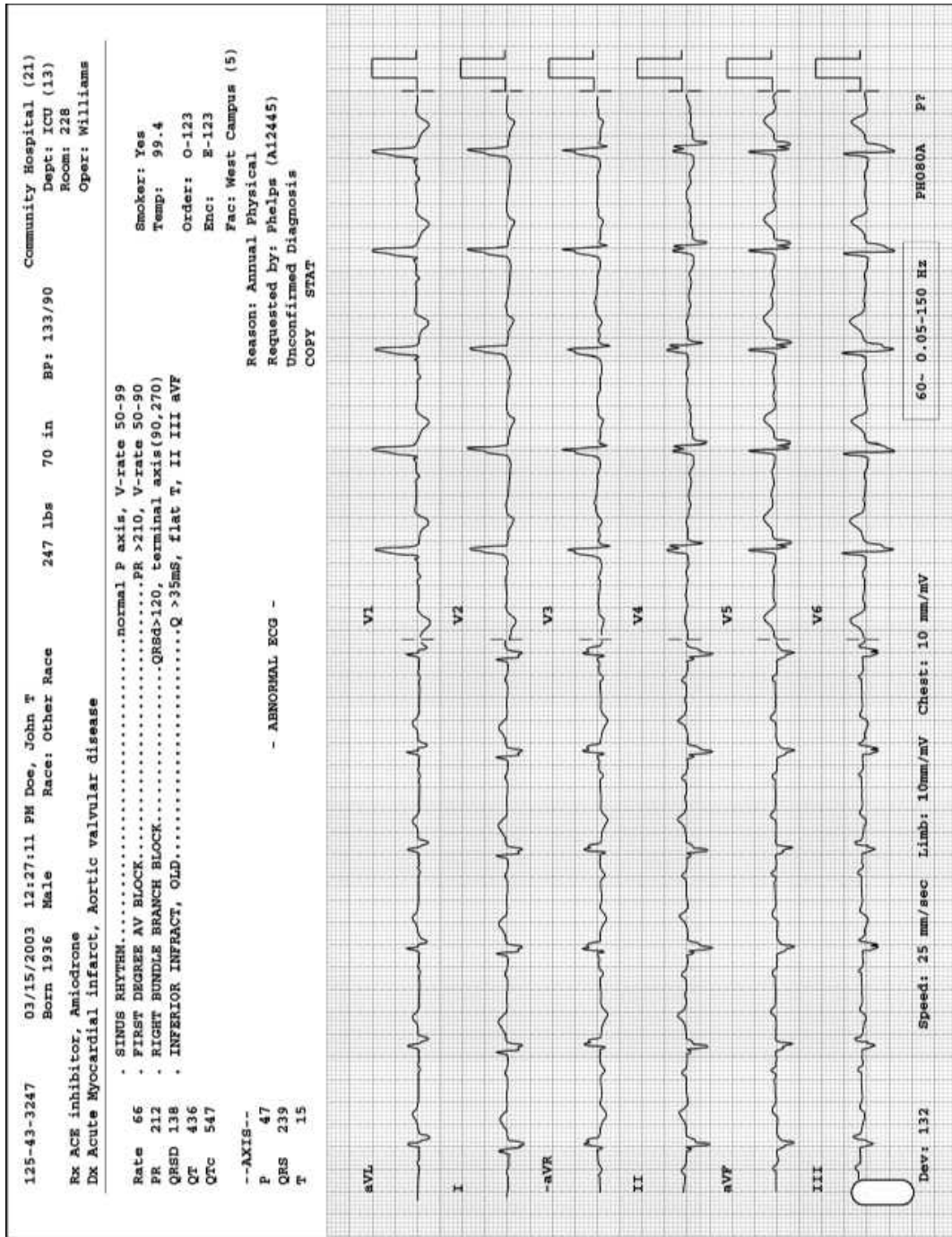


Figure 5-25 12x1 Report with Cabrera Leads (page one)

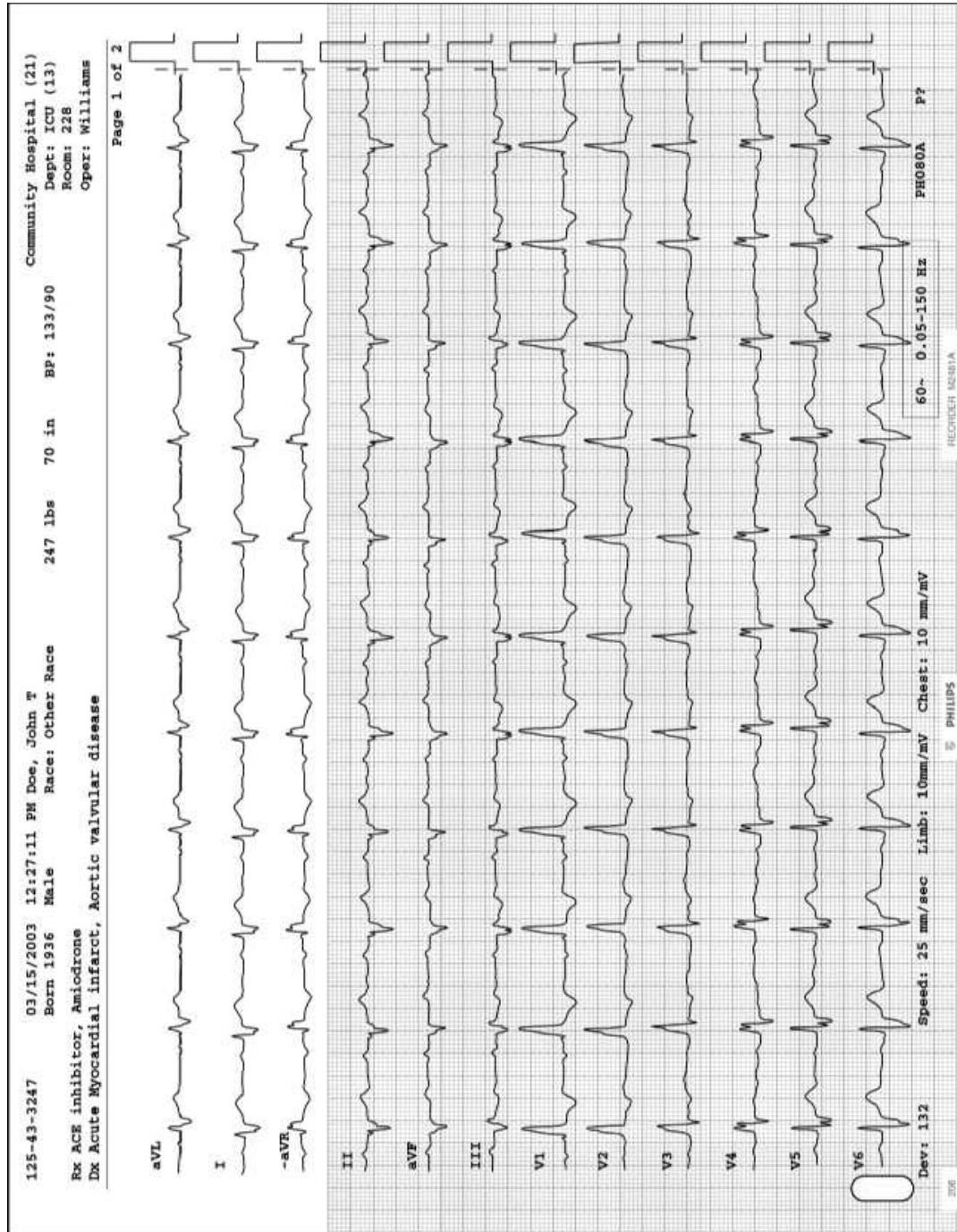


Figure 5-26 12x1 Report with Cabrera Leads (page two)

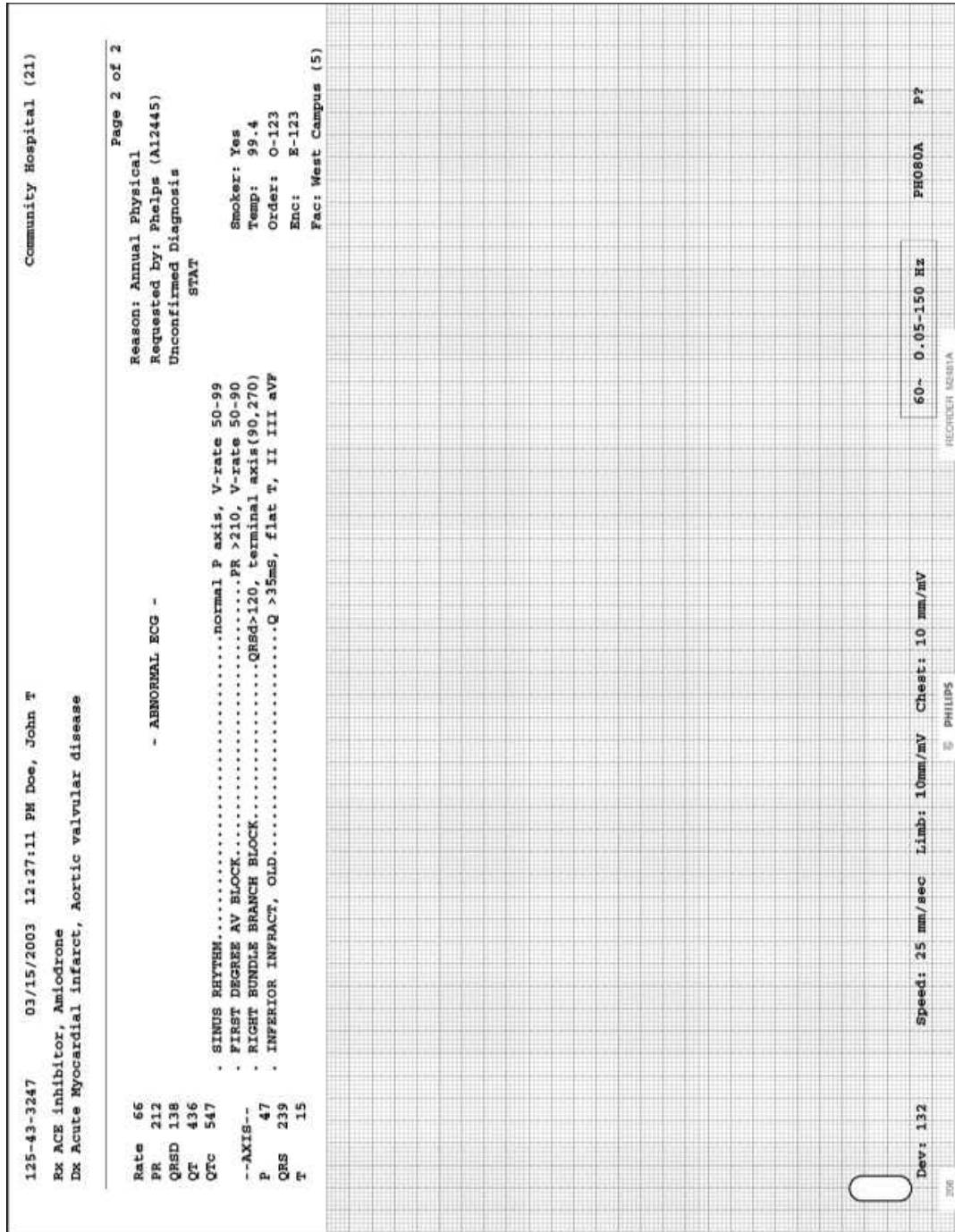
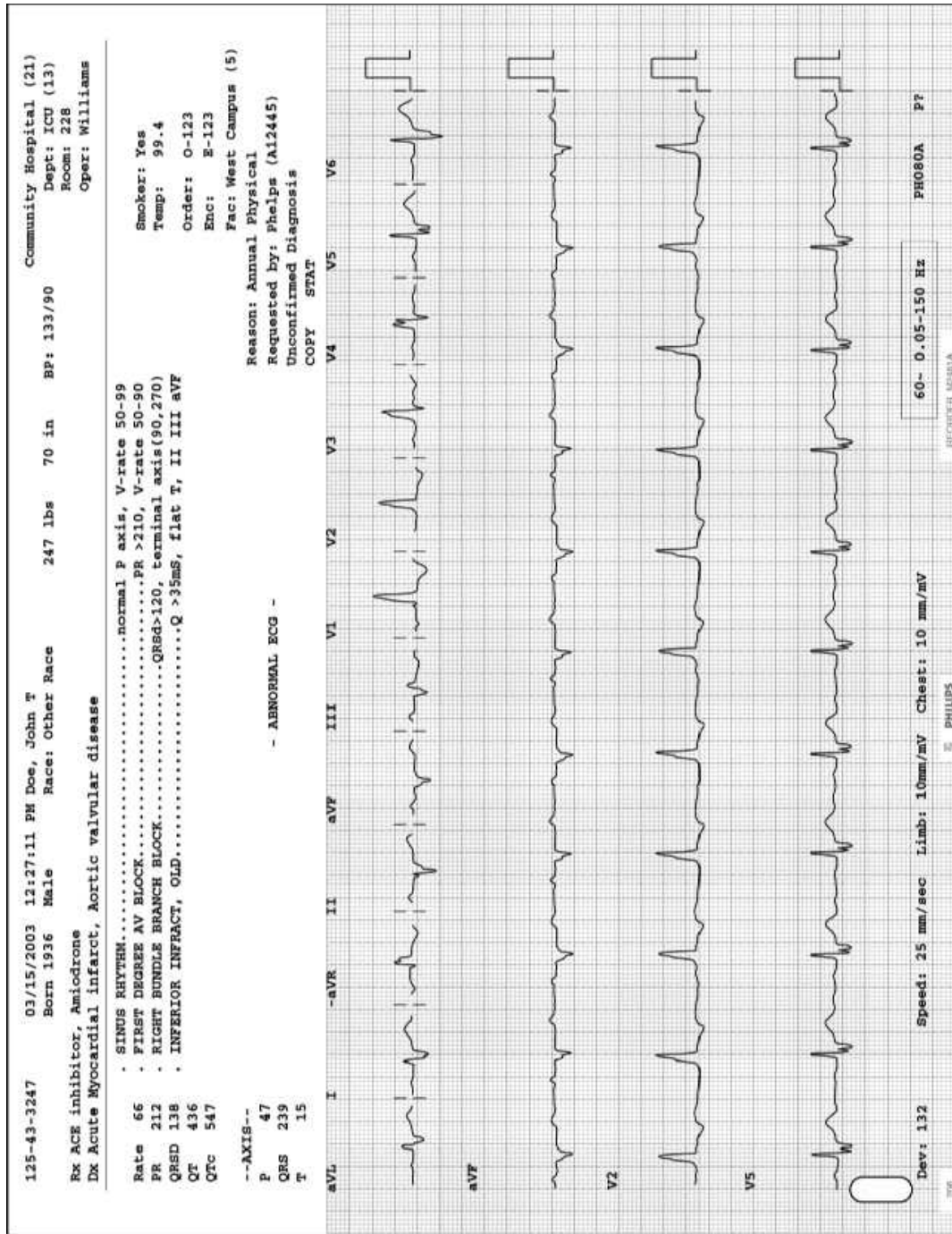


Figure 5-27 Panoramic (Pan-12) Report



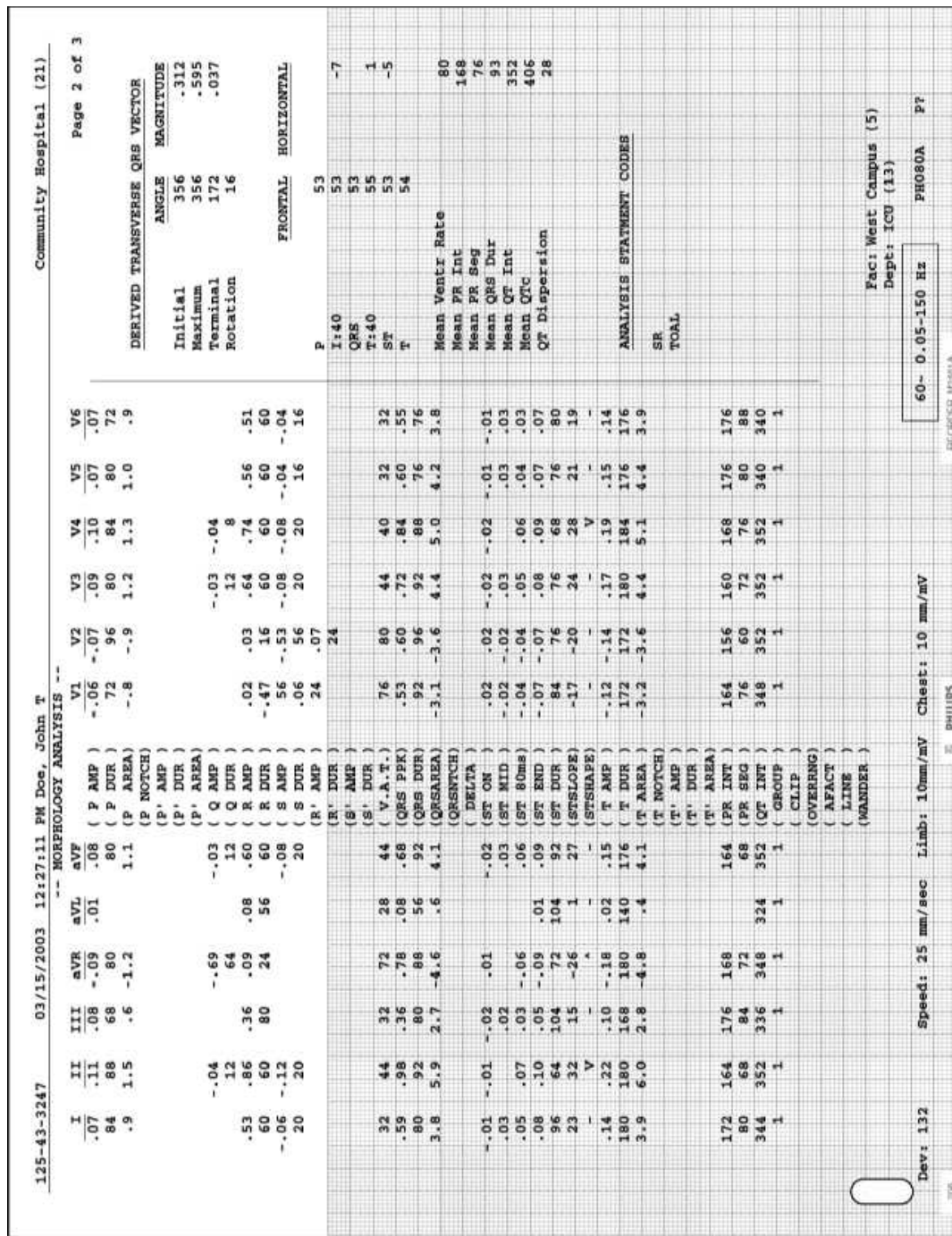
NOTE Leads are displayed in Cabrera sequence on the Panoramic (Pan-12) Report regardless of the selected lead standard on the acquisition equipment.

Extended Measurements Report

The Extended Measurements report summarizes the output of the Philips 12-Lead Algorithm. The report includes the morphology characteristics for the individual leads, and the rhythm characteristics for the rhythm groups. The algorithm uses this measurement information to generate interpretive statements. The Extended Measurements report is especially useful if you want to examine the measurements used to generate an interpretation.

Morphology Analysis

Figure 5-28 Morphology Analysis page of the Extended Measurements Report



The following tables define the parameters in the order that they appear on the Morphology Analysis page of the Extended Measurements report.

Morphology Lead Measurements

The parameter measurements are shown in the illustration below. The following table describes every representative measurement in each lead.

Figure 5-29 ECG Morphology Measurements

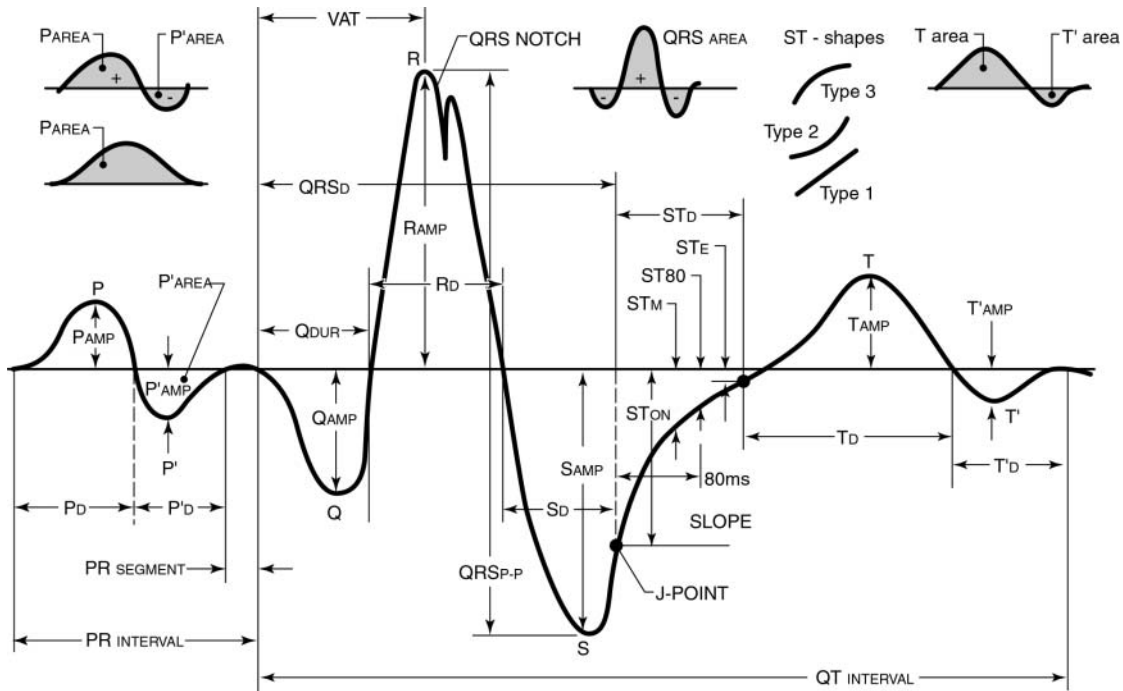


Table 5-15 Morphology Lead Measurements

| Parameter | Units or Value | Description |
|-----------|---|--|
| P AMP | millivolts | P wave amplitude |
| P DUR | milliseconds | P wave duration |
| P AREA | Ashman units ^a (40 ms x 0.1 mV) | P wave area for monophasic P waves or the area of the initial portion of a biphasic P wave |
| P NOTCH | Yes or No | Indicates the presence or absence of a notch in the P wave |
| P' AMP | millivolts | P' wave amplitude |
| P' DUR | milliseconds | P' wave duration |
| P' AREA | Ashman units ^a (40 ms x 0.1 mV) | Area of the terminal portion of a biphasic P wave |
| Q AMP | millivolts | Q wave amplitude |

^aAn Ashman unit is the area of 1 square millimeter at normal speed (25 mm/sec) and normal sensitivity (10 mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Table 5-15 Morphology Lead Measurements (continued)

| Parameter | Units or Value | Description |
|-----------|---|--|
| Q DUR | milliseconds | Q wave duration |
| R AMP | millivolts | R wave amplitude |
| R DUR | milliseconds | R wave duration |
| S AMP | millivolts | S wave amplitude |
| S DUR | milliseconds | S wave duration |
| R' AMP | millivolts | R' wave amplitude |
| R' DUR | milliseconds | R' wave duration |
| S' AMP | millivolts | S' wave amplitude |
| S' DUR | milliseconds | S' wave duration |
| V.A.T. | milliseconds | Ventricular Activation Time is the interval from the onset of the QRS complex to the latest positive peak in the complex, or the latest substantial notch on the latest peak (whichever is later) |
| QRS PPK | millivolts | Peak-to-peak QRS complex amplitude |
| QRS DUR | milliseconds | QRS complex duration, measured from its onset to the ST segment onset (J point) |
| QRSAREA | Ashman units ^a (40 ms x 0.1 mV) | The area of the QRS complex |
| QRSNTCH | + or - | <ul style="list-style-type: none"> ■ Indicates a notch in the QRS complex ■ + indicates a notch or slur in the R or R' wave ■ - indicates a notch or slur in the Q, S, or S' wave |
| DELTA | Yes or No | Indicates the presence or absence of pronounced delta waves preceding QRS complexes |
| ST ON | millivolts | Elevation or depression at the onset (J point) of the ST segment |
| ST MID | millivolts | Elevation or depression at the midpoint of the ST segment |
| ST 80ms | millivolts | Elevation or depression of the ST segment 80 ms after the end of the QRS complex (J point) |
| ST END | millivolts | Elevation or depression at the end of the ST segment |

^aAn Ashman unit is the area of 1 square millimeter at normal speed (25 mm/sec) and normal sensitivity (10 mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Table 5-15 Morphology Lead Measurements (continued)

| Parameter | Units or Value | Description |
|-----------|---|---|
| ST DUR | milliseconds | ST segment duration |
| STSLOPE | degrees | ST segment slope. Slope is measured in degrees for 25 mm/sec, 1mV/cm scaling, and can range from -90 to +90 degrees. |
| STSHAPE | -, V, or ^ | The ST segment shape: - = Straight V = Concave upward ^ = Concave downward |
| T AMP | millivolts | T wave amplitude |
| T DUR | milliseconds | T wave duration |
| T AREA | Ashman units ^a (40 ms x 0.1 mV) | T wave area for monophasic T waves or the area of the initial portion of a biphasic T wave |
| T NOTCH | Yes or No | Indicates the presence or absence of a notch in the T wave |
| T' AMP | millivolts | T' wave amplitude |
| T' DUR | milliseconds | T' wave duration |
| T' AREA | Ashman units ^a (40 ms x 0.1 mV) | Area of the terminal portion of a biphasic T wave |
| PR INT | milliseconds | Interval from the onset of the P wave to the onset of the QRS complex |
| PR SEG | milliseconds | Interval from the end of the P wave to the onset of the QRS complex |
| QT INT | milliseconds | Interval from the onset of the QRS complex to the end of the T wave |
| GROUP | 1 (or 2-5) | Indicates the rhythm group used to derive the representative beat waveform, from which measurements are calculated. Will be Group 1 unless no Group 1 beats were detected during the analysis interval for this lead. |
| CLIP | Y = Yes | Indicates clipping of QRS complexes |
| OVERRNG | Y = Yes | Indicates that the ECG signal is outside the measurement parameters of the instrument |

^aAn Ashman unit is the area of 1 square millimeter at normal speed (25 mm/sec) and normal sensitivity (10 mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Table 5-15 Morphology Lead Measurements (continued)

| Parameter | Units or Value | Description |
|-----------|---|---|
| AFACT | MOD = Moderate artifact MARK = Significant artifact SEV = Severe artifact | Artifact (most likely muscle tremor) is present when more than 16 up-and-down strokes exceeding 1mm in amplitude are detected within 1 second |
| LINE | MOD = Moderate noise MARK = Significant noise SEV = Severe noise | AC (power line) noise is present |
| WANDER | MOD = Moderate wander MARK = Significant wander SEV = Severe wander | A steady baseline wander exceeding 10mm/sec is present |

^aAn Ashman unit is the area of 1 square millimeter at normal speed (25 mm/sec) and normal sensitivity (10 mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Derived Transverse QRS Vector

The derived transverse QRS vector is a three-dimensional signal made up of X, Y, and Z (Frank leads) signals projected onto a transverse plane. The values are derived by estimating the X, Y, and Z signals from a standard 12-lead. The following table lists the derived transverse QRS vector parameters.

Table 5-16 Derived QRS Vector Parameters

| Parameter | Units or Value | Description |
|-----------|---|--|
| Initial | <ul style="list-style-type: none"> ■ vector angle in degrees ■ vector magnitude in mV | The vector for the initial (first 40 ms) transverse QRS signal |
| Maximum | <ul style="list-style-type: none"> ■ vector angle in degrees ■ vector magnitude in mV | The maximum transverse QRS vector |
| Terminal | <ul style="list-style-type: none"> ■ vector angle in degrees ■ vector magnitude in mV | The vector from the terminal (last 40 ms) or last part of the transverse QRS signal |
| Rotation | <ul style="list-style-type: none"> ■ 100 to -100 | <ul style="list-style-type: none"> ■ The direction of the vector rotation over the entire QRS complex <ul style="list-style-type: none"> – A positive rotation value indicates a clockwise vector rotation – A negative rotation value indicates a counterclockwise vector rotation ■ A larger magnitude indicates a higher confidence in the rotation estimate |

Frontal/Horizontal Plane Axis Parameters

The following table lists frontal and horizontal plane axis parameters.

Table 5-17 Frontal/Horizontal Plane Axis Parameters

| Parameter | Units or Value | Description |
|-----------|--------------------------------|---------------------------------|
| P | degrees or ind (indeterminate) | Mean P wave axis |
| I:40 | degrees or ind (indeterminate) | Initial 40 ms QRS complex axis |
| QRS | degrees or ind (indeterminate) | Mean QRS complex axis |
| T:40 | degrees or ind (indeterminate) | Terminal 40 ms QRS complex axis |
| ST | degrees or ind (indeterminate) | Mean ST wave axis |
| T | degrees or ind (indeterminate) | Mean T wave axis |

Global Measurements

The following table lists the global measurements representative of the entire ECG.

Table 5-18 Global Measurement Parameters

| Parameter | Units or Value | Description |
|-----------------|------------------|--|
| Mean Ventr Rate | beats per minute | Representative ventricular rate for the entire ECG |
| Mean PR Int | milliseconds | Representative PR interval for the entire ECG |
| Mean PR Seg | milliseconds | Representative PR segment for the entire ECG |
| Mean QRS Dur | milliseconds | Representative QRS duration for the entire ECG |
| Mean QT Int | milliseconds | Representative QT interval for the entire ECG |
| Mean QTc | milliseconds | Representative QT interval adjusted for heart rate |
| QT Dispersion | milliseconds | Difference between the longest and shortest QT interval for the entire ECG |

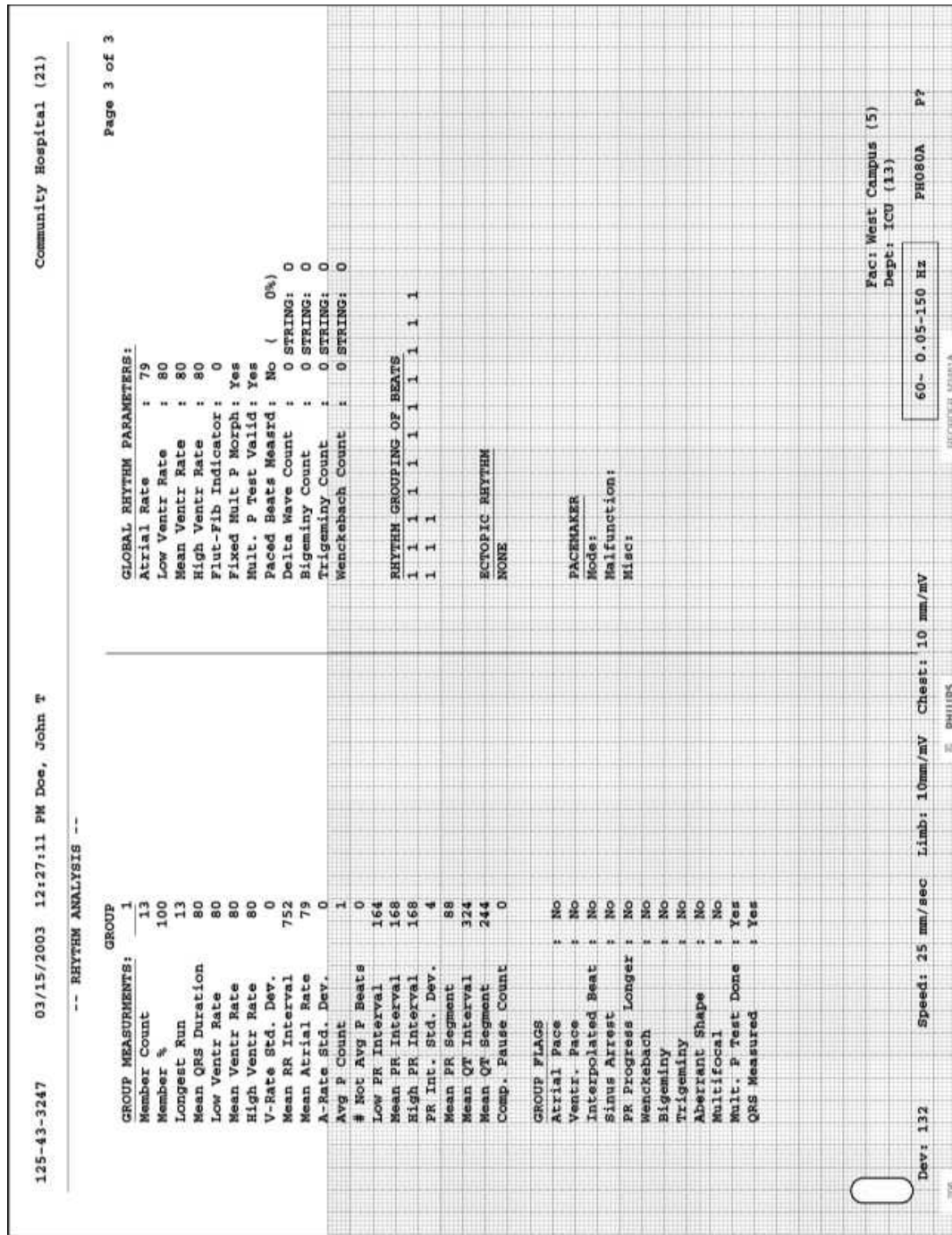
Analysis Statement Codes

These statement codes are the abbreviated criteria codes for the interpretive statements. These statement codes are used when editing reports with a Philips ECG Management System.

For lists of codes and statements, see Appendix B, “Interpretive Statements (by Category) and Appendix C, “Interpretive Statements (Alphabetical).”

Rhythm Analysis

Figure 5-30 Rhythm Analysis Section of the Extended Measurements Report



The following parameters are given for each rhythm group detected by the cardiograph during the analysis interval.

Group Measurements

The group measurements are listed in the table below.

Table 5-19 Group Measurements

| Parameter | Units or Value | Description |
|-------------------|--|--|
| Member Count | not applicable | Number of beats in the rhythm group |
| Member % | percentage | Percentage of the total number of beats represented by the rhythm group |
| Longest Run | not applicable | Longest contiguous run of beats in the rhythm group |
| Mean QRS Duration | milliseconds | Average QRS duration in the rhythm group |
| Low Ventr Rate | beats per minute | Lowest ventricular rate in the rhythm group |
| Mean Ventr Rate | beats per minute | Average ventricular rate in the rhythm group |
| High Ventr Rate | beats per minute | Highest ventricular rate in the rhythm group |
| V-Rate Std Dev | same units as the associated measurement | Standard deviation of the ventricular rate in the rhythm group |
| Mean RR Interval | milliseconds | Average interval between R waves in the rhythm group |
| Mean Atrial Rate | beats per minute | Average atrial rate in the rhythm group |
| A-Rate Std Dev | same units as the associated measurement | Standard deviation of the atrial rate in the rhythm group |
| Avg P Count | not applicable | Average number of P waves per QRS complex in the rhythm group |
| # Not Avg P Beats | not applicable | Number of QRS complexes in the rhythm group that do not have the average number of P waves per QRS complex |
| Low PR Interval | milliseconds | Shortest PR interval in the rhythm group |
| Mean PR Interval | milliseconds | Average PR interval in the rhythm group |
| High PR Interval | milliseconds | Longest PR interval in the rhythm group |

Table 5-19 Group Measurements (continued)

| Parameter | Units or Value | Description |
|-------------------|--|--|
| PR Int Std Dev | same units as the associated measurement | Standard deviation of the PR interval in the rhythm group |
| Mean PR Segment | milliseconds | Average PR segment in the rhythm group |
| Mean QT Interval | milliseconds | Average QT interval in the rhythm group |
| Comp. Pause Count | not applicable | Number of beats followed by a compensatory pause in the rhythm group |

Group Flags

The parameters in this part of the rhythm analysis indicate the presence or absence of various rhythm-related conditions in the rhythm groups identified.

Table 5-20 Group Flags

| Parameter | Units or Value | Description |
|--------------------|----------------|---|
| Atrial Pace | Yes or No | Beats in the rhythm group are atrial paced |
| Ventricular Pace | Yes or No | Indicates that beats in the rhythm group are paced. All paced beats are grouped together unless the pacing is a mixture of atrial and ventricular/dual chamber paced beats. In this case, the atrial paced beats fall together in a separate group. |
| Interpolated Beat | Yes or No | Indicates the rhythm group contains only interpolated beats |
| Sinus Arrest | Yes or No | Indicates a prolonged R-to-R interval. Set for the sinus arrest resumption group. |
| PR Progress Longer | Yes or No | Indicates the PR interval is getting progressively longer in the rhythm group |
| Wenckebach | Yes or No | Indicates presence of the Wenckebach phenomenon in the rhythm group |
| Bigeminy | Yes or No | Indicates presence of a bigeminy rhythm. Set for the group consisting of ectopic beats. |
| Trigeminy | Yes or No | Indicates presence of a trigeminy rhythm. Set for the group consisting of ectopic beats. |

Table 5-20 Group Flags (continued)

| Parameter | Units or Value | Description |
|-------------------|----------------|--|
| Aberrant Shape | Yes or No | Indicates that beats in the rhythm group are in the minority, and are either wider or of a different polarity from other beats in the same lead(s) |
| Multifocal | Yes or No | Indicates that beats in the rhythm group have different foci or origin |
| Mult. P Test Done | Yes or No | Indicates that beats in the rhythm group were tested for multiple P waves |
| QRS Measured | Yes or No | Indicates that QRS-related parameters were measured in the rhythm group |

Global Rhythm Parameters

The following parameters provide global information for beats in the ECG.

Table 5-21 Global Rhythm Parameters

| Parameter | Units or Value | Description |
|--------------------|------------------|---|
| Atrial Rate | beats per minute | The representative atrial rate for the analysis interval. This is not a simple arithmetic average. |
| Low Ventr Rate | beats per minute | The lowest ventricular rate during the analysis interval |
| Mean Ventr Rate | beats per minute | The average ventricular rate during the analysis interval |
| High Ventr Rate | beats per minute | The highest ventricular rate during the analysis interval |
| Flut-Fib Indicator | not applicable | Indicates approximate number of flutter-like or coarse fibrillatory waves per lead |
| Fixed Mult P Morph | Yes or No | Indicates that all P waves are of consistent morphology |
| Mult P Test Valid | Yes or No | Indicates that the tests performed to detect multiple P waves produced consistent results |
| Paced Beats Measrd | Yes or No | Indicates that a dual or ventricular paced beat group was used for the representative beat (no non-paced or atrial paced beats were measured) |

Table 5-21 Global Rhythm Parameters (continued)

| Parameter | Units or Value | Description |
|-------------------|----------------|---|
| Delta Wave Count | not applicable | Number of QRS complexes with pronounced delta waves |
| Delta Wave % | percentage | Percent of total beats with pronounced delta waves |
| Bigeminy Count | not applicable | Total number of beats in a bigeminy pattern, whether or not they are contiguous |
| Bigeminy String | not applicable | Total number of beats in the longest continuous bigeminy pattern |
| Trigeminy Count | not applicable | Total number of beats in a trigeminy pattern, whether or not they are contiguous |
| Trigeminy String | not applicable | Total number of beats in the longest continuous trigeminy pattern |
| Wenckebach Count | not applicable | Total number of Wenckebach cycles. A Wenckebach cycle is a series of beats whose PR intervals grow progressively longer, culminating in an unusually long RR interval (a dropped beat). |
| Wenckebach String | not applicable | The number of beats preceding the dropped beat |

Rhythm Grouping of Beats

The Rhythm Grouping of Beats is a number sequence that shows the rhythm group number for each beat as determined by the rhythm analysis portion of the algorithm.

Table 5-22 Rhythm Grouping of Beats

| Number | Description |
|------------------|--------------------------------|
| 1, 2, 3, 4, or 5 | Rhythm group number |
| 0 | Beat unclassifiable by program |

Ectopic Rhythm

The parameters in this section indicate the type of ectopic beats detected including their underlying rhythm.

NOTE If more than one ectopic rhythm code is generated for the report, only the highest severity rhythm code is printed in this section.

Table 5-23 Ectopic Rhythm Parameters

| Parameter | Description |
|------------------|---|
| NONE | No ectopic beats detected |
| APC | Atrial Premature Complex |
| JPC | Junctional Premature Complex |
| APCs | Atrial Premature Complexes |
| JPCs | Junctional Premature Complexes |
| ABIG | Supraventricular Bigeminy |
| VPC | Ventricular Premature Complex |
| VPCs | Ventricular Premature Complexes |
| APC & VPC | Ectopic beats of Supraventricular and Ventricular origin |
| VTRIG | Ventricular Trigeminy |
| VBIG | Ventricular Bigeminy |
| MFPVCs | Multiform Premature Ventricular Complexes |
| PAIR | One or more pairs of Ventricular Complexes |
| MFPAIR | One or more pairs with Multiform Ventricular Complexes (not necessarily in the same pair) |
| RUN | Runs of three or more Ventricular Complexes |
| MFRUN | Runs with Multiform Ventricular Complexes (not necessarily in the same run) |

Pacemaker

The parameters in this section indicate the type of paced rhythm detected. There are three types of pacemaker information included: Mode, Malfunction, and Miscellaneous.

The Mode information indicates the type of pacing identified.

Table 5-24 Pacemaker Mode Parameters

| Parameter | Description |
|------------------|---|
| APACE | Continuous Atrial Paced |
| VPACE | Continuous Ventricular Paced |
| ASVPR | Continuous Atrial-Sensed Ventricular Paced (with P-wave tracking) |

Table 5-24 Pacemaker Mode Parameters (continued)

| Parameter | Description |
|-----------|--|
| AVDPR | A-V Dual Paced |
| MIXPR | Mixed pacing type with inhibition of at least one chamber |
| IAPACE | Intermittent Atrial Paced |
| IVPACE | Intermittent Ventricular Paced |
| IASVRP | Intermittent Atrial-Sensed Ventricular Paced |
| IAVDPR | Intermittent A-V Dual Paced |
| IVPACD | Intermittent Ventricular Paced (On Demand) |
| IAPACD | Intermittent Atrial Paced (On Demand) |
| IMIXPR | Intermittent Paced Beats with inhibition of at least one chamber detected in the paced beats |
| UNKPR | Unrecognized Pacemaker Rhythm where pacer spikes or artifact are present |

The Malfunction information identifies any detected pacing system malfunctions.

Table 5-25 Pacing Malfunction Parameters

| Parameter | Description |
|-----------|---|
| PACENC | Pacer Non-Capture |
| PACENS | Pacer Non-Sense |
| PACNCNS | Pacer Non-Capture and Non-Sense |
| PACERA | <ul style="list-style-type: none"> ■ Runaway Pacer (asynchronous pacing, for example fixed rate pacing with no sensing) ■ A pacemaker magnet may be present |

The Miscellaneous information section contains pacing information not included in any other section.

Table 5-26 Miscellaneous Pacing Information

| Parameter | Description |
|-----------|--|
| PACART | Miscellaneous pacing artifact was detected |
| MAGNET | The ECG was specified as being acquired with a pacemaker magnet or interrogator in place |

Rhythm Report

Rhythm reports show up to 12 leads of continuous waveform data. The amount of report information that is included on the report is dependent upon the number of leads selected for recording. Information at the top of the report may include:

- Patient ID information
- Date and time of recording
- Settings information (scale and sensitivity, filter settings)

Rhythm reports are not analyzed, so they do not provide measurement information or interpretive statements. The calibration pulse appears at the beginning of the ECG trace.

Figure 5-31 A Rhythm Report with 6 Leads

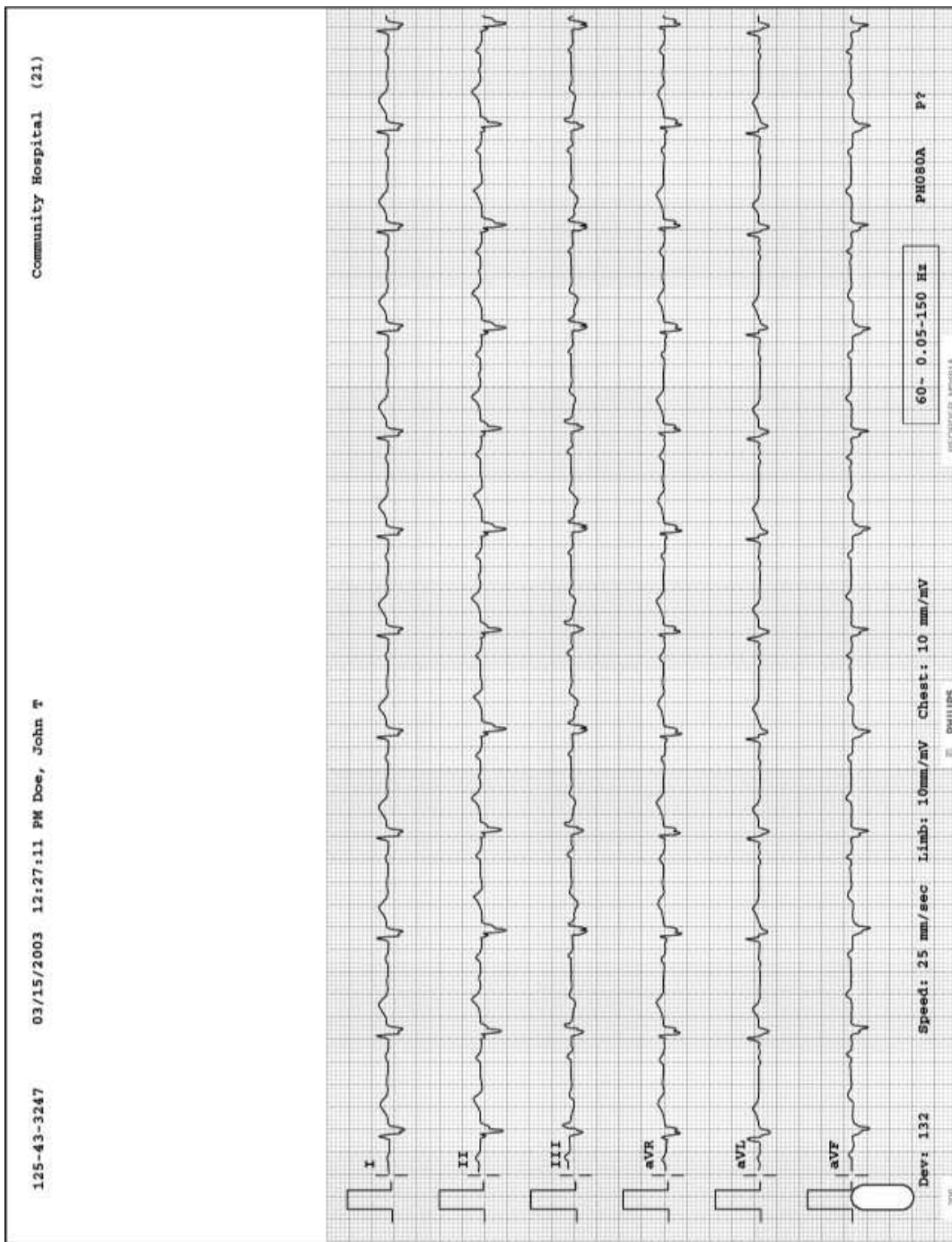
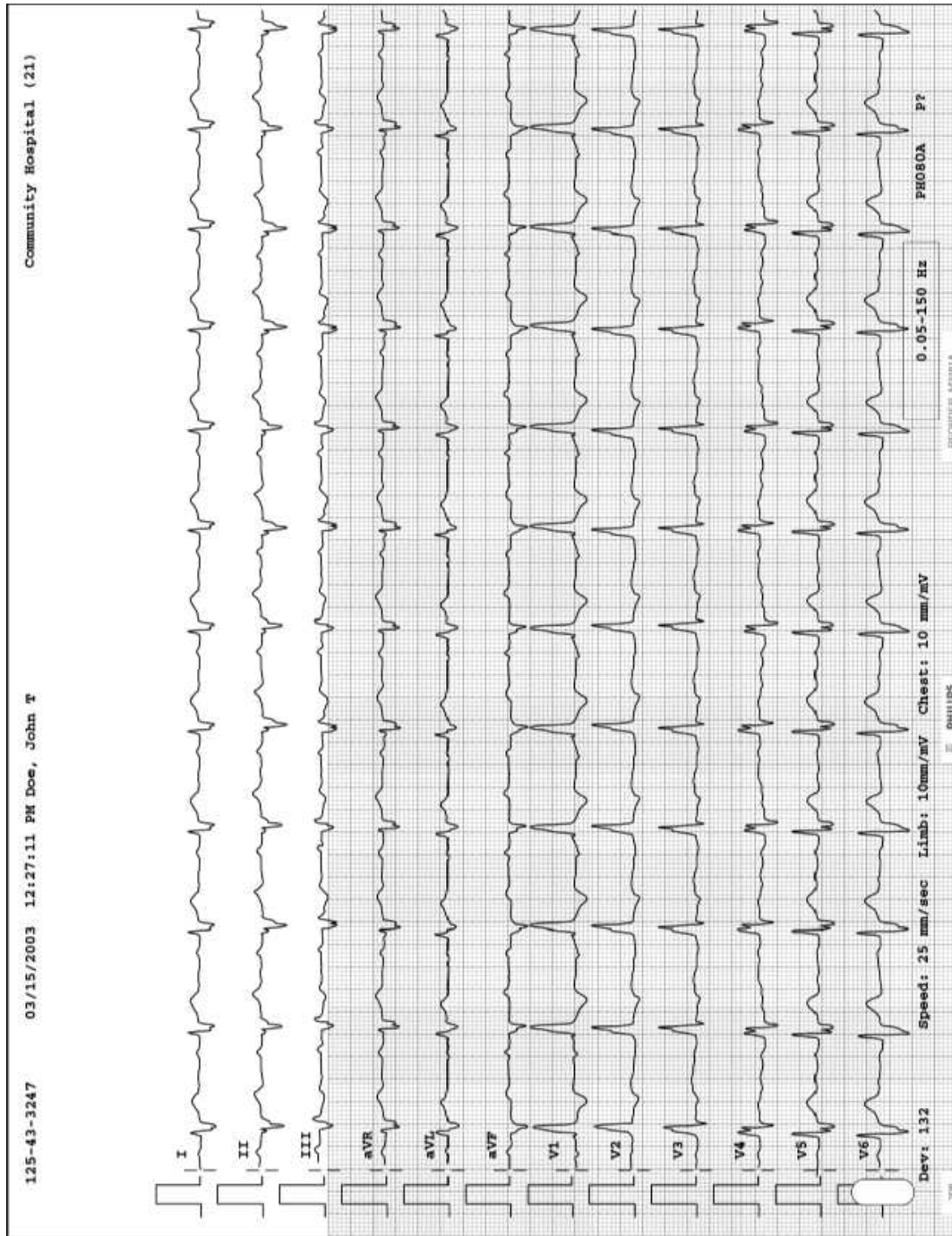


Figure 5-32 A Rhythm Report with 12 Leads



Disclose Report

The Disclose report (available on some equipment) displays up to 5 minutes of continuous ECG waveforms for 1 to 3 selected leads. A 1 minute report (1 lead) or a 5 minute report (up to 3 leads) may be printed.

Disclose reports are not analyzed, so they do not provide measurement information or interpretive statements.

Figure 5-33 1 Minute Disclose Report

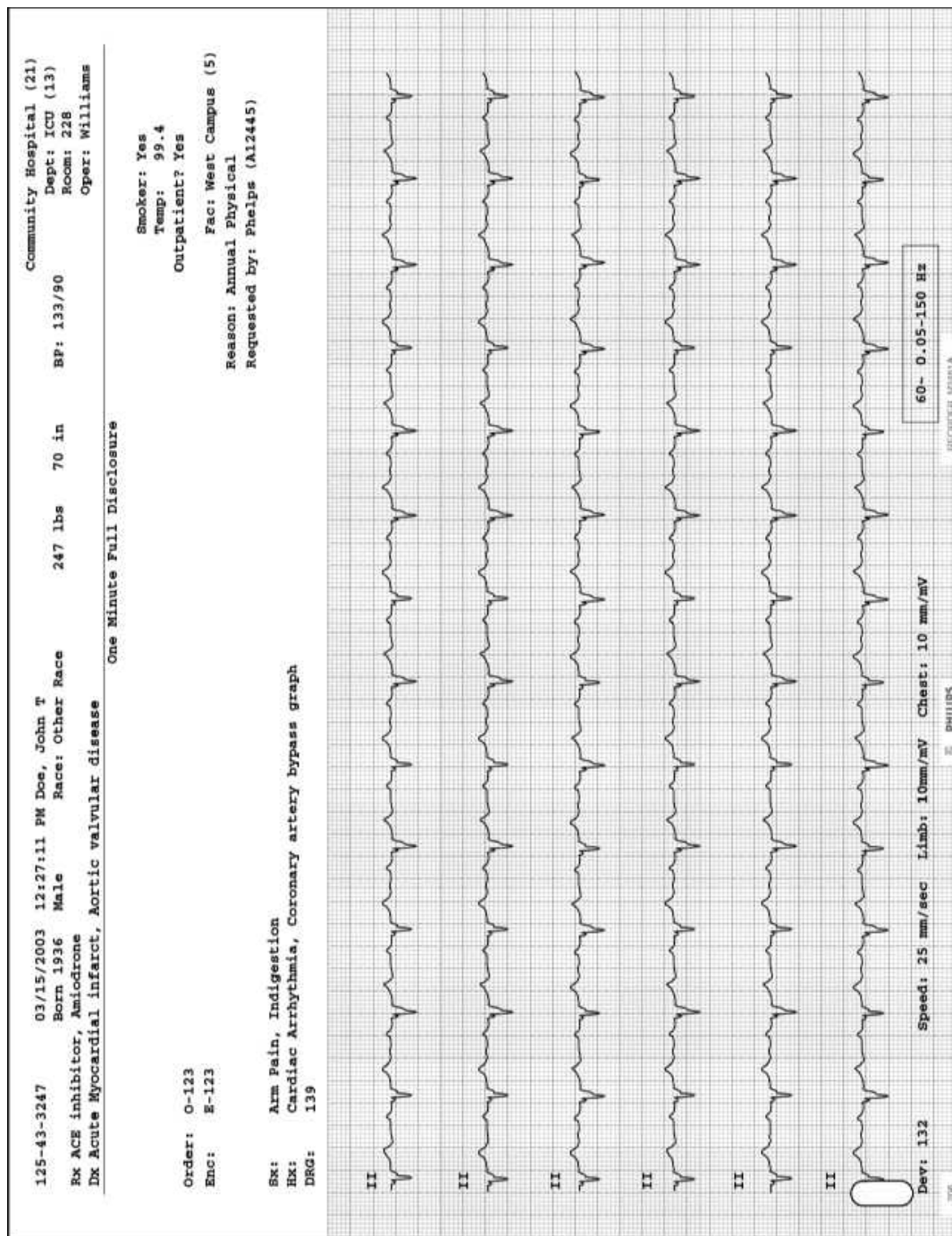
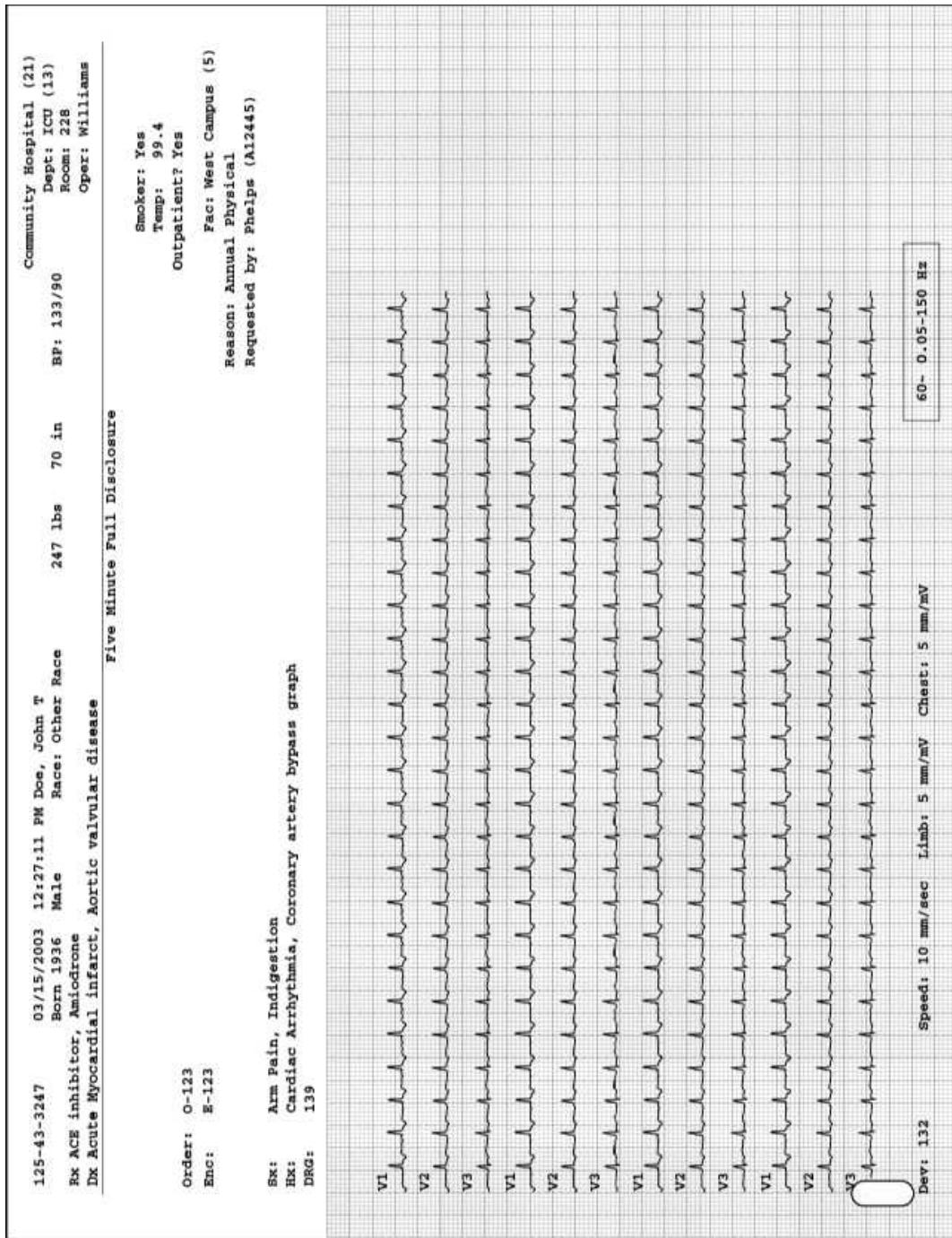


Figure 5-34 A Full (5 Minute) Disclose Report (page one of three total pages)



Normal Measurement Values

Table A-1 Summary of Normal Values

| Age Group | Heart Rate (beats/min)* | Frontal Plane QRS Vector (degrees) | PR Interval (sec) | QRS Duration V ₅ | Q III (mm) ^{†‡} | Q V ₆ (mm) [†] | RV ₁ (mm) | SV ₁ (mm) |
|-----------------|-------------------------|------------------------------------|-------------------|-----------------------------|--------------------------|------------------------------------|----------------------|----------------------|
| Less than 1 day | 93-154 (123) | +59 to -163 (137) | 0.08-0.16 (.11) | .03-0.07 (.05) | 4.5 | 2 | 5-26 (14) | 0-23 (8) |
| 1 to 2 days | 91-159 (123) | +64 to -161 (134) | 0.08 - 0.14 (.11) | .03-.07 (.05) | 6.5 | 2.5 | 5-27 (14) | 0-21 (9) |
| 3 to 6 days | 91-166 (129) | +77 to -163 (132) | 0.07-0.14 (.10) | .03-.07 (.05) | 5.5 | 3 | 3-24 (13) | 0-17 (7) |
| 1 to 3 weeks | 107-182 (148) | +65 to +161 (110) | 0.07 - 0.14 (.10) | .03-.08 (.05) | 6 | 3 | 3-21 (11) | 0-11 (4) |
| 1 to 2 months | 121-179 (149) | +31 to +113 (74) | 0.07-0.13 (10) | .03-.08 (.05) | 7.5 | 3 | 3-18 (10) | 0-12 (5) |
| 3 to 5 months | 106-186 (141) | +7 to +104 (60) | 0.07-0.15 (.11) | .03-.08 (.05) | 6.5 | 3 | 3-20 (10) | 0-17 (6) |
| 6 to 11 months | 109-169 (134) | +6 to +99 (56) | 0.07 - 0.16 (.11) | .03-.08 (.05) | 8.5 | 3 | 1.5-20 (9.5) | .5-18 (4) |
| 1 to 2 years | 89-151 (119) | +7 to +101 (55) | 0.08 - 0.15 (.11) | .04-.08 (.06) | 6 | 3 | 2.5-17 (9) | .5-21 (8) |
| 3 to 4 years | 73-137 (108) | +6 to +104 (55) | 0.09-0.16 (.12) | .04-.08 (.06) | 5 | 3.5 | 1-18 (8) | .2-21 (10) |
| 5 to 7 years | 65-133 (100) | +11 to +143 (65) | 0.09-0.16 (.12) | .04-.08 (.06) | 4 | 4.5 | .5-14 (7) | .3-24 (12) |
| 8 to 11 years | 62-130 (91) | +9 to +114 (61) | 0.09-0.17 (.13) | .04-.09 (.06) | 3 | 3 | 0-12 (5.5) | .3-25 (12) |
| 12 to 15 years | 60-119 (85) | +11 to +130 (59) | 0.09-0.18 (.14) | .04-.09 (.07) | 3 | 3 | 0-10 (4) | .3-21 (11) |

Source: Garson A, Bricker JT, Fisher DJ, Neish SR (eds): *The Science and Practice of Pediatric Cardiology, Volume I (Second Edition)*, Baltimore, Williams & Wilkins p. 736 (1998). Reproduced by permission of the publisher.

* 2 to 98% (mean)

†Ninety-eighth percentile

‡Millimeters at normal standarization

§Undefined

Table A-1 Summary of Normal Values (continued)

| Age Group | R/SV₁ | RV₆ (mm) | SV₆ (mm) | R/SV₆ | R + S V₄ (mm)[†] | SV₁ + RV₆ (mm)[†] |
|------------------------|-----------------------------|--------------------------------|--------------------------------|------------------------------|---|---|
| Less than 1 day | .1-U [§] (2.2) | 0-11 (4) | 0-9.5 (3) | .1-U [§] (2.0) | 52.5 | 28 |
| 1 to 2 days | .1-U [§] (2.0) | 0-12 (4.5) | 0-9.5 (3) | .1-U [§] (2.5) | 52 | 29 |
| 3 to 6 days | .2-U [§] (2.7) | .5-12 (5) | 0-10 (3.5) | .1-U [§] (2.2) | 49 | 24.5 |
| 1 to 3 weeks | 1.0-U [§] (2.9) | 2.5-16.5 (7.5) | 0-10 (3.5) | .1-U [§] (3.3) | 49 | 21 |
| 1 to 2 months | .3-U [§] (2.3) | 5-21.5 (11.5) | 0-6.5 (3) | .2-U [§] (4.8) | 53.5 | 29 |
| 3 to 5 months | .1-U [§] (2.3) | 6.5-22.5 (13) | 0-10 (3) | .2-U [§] (6.2) | 61.5 | 35 |
| 6 to 11 months | .1-3.9 (1.6) | 6-22.5 (12.5) | 0-7 (2) | .2-U [§] (7.6) | 53 | 32 |
| 1 to 2 years | .05-4.3 (1.4) | 6.5-22.5 (13) | 0-6.5 (2) | .3-U [§] (9.3) | 49.5 | 39 |
| 3 to 4 years | .03-2.8 (.9) | 8-24.5 (15) | 0-5 (1.5) | .6-U [§] (10.8) | 53.5 | 42 |
| 5 to 7 years | .02-2.0 (.7) | 8.5-26.5 (16) | 0-4 (1) | .9-U [§] (11.5) | 54 | 47 |
| 8 to 11 years | 0-1.8 (.5) | 9-25.5 (16) | 0-4 (1) | 1.5-U [§] (14.3) | 53 | 45.5 |
| 12 to 15 years | 0-1.7 (.5) | 6.5-23 (14) | 0-4 (1) | 1.4-U [§] (14.7) | 50 | 41 |

Source: Garson A, Bricker JT, Fisher DJ, Neish SR (eds): *The Science and Practice of Pediatric Cardiology, Volume I (Second Edition)*, Baltimore, Williams & Wilkins p. 736 (1998). Reproduced by permission of the publisher.

* 2 to 98% (mean)

†Ninety-eighth percentile

‡Millimeters at normal standarization

§Undefined

Interpretive Statements (by Category)

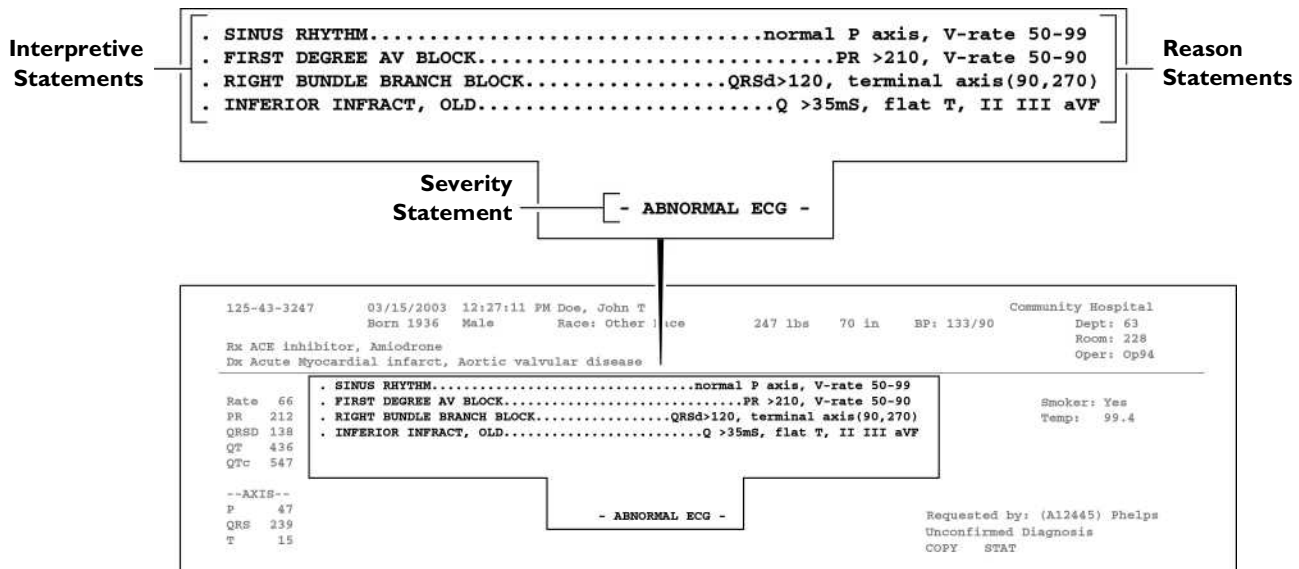
Introduction

Appendix B contains a listing (by diagnostic category) of all of the Adult, Pediatric, and Technical Quality statements available in the Philips 12-Lead Algorithm.

See Appendix C “Interpretive Statements (Alphabetical)” for a listing of all interpretive statements in alphabetical order (by statement code).

Statement Format

Figure B-1 Interpretive, Reason, and Severity Statement on the ECG Report



NOTE The symbol *** in an interpretive statement is replaced with a numeric value on the ECG report.

Table B-1 Overall ECG Severity

| Severity | Code |
|-------------|------|
| No Severity | NS |
| Normal ECG | NO |

Table B-1 Overall ECG Severity (continued)

| Severity | Code |
|----------------------|-------------|
| Otherwise Normal ECG | ON |
| Borderline ECG | BO |
| Abnormal ECG | AB |
| Defective ECG | DE |

Statement Listings

The statements are presented in the following order:

- Cardiac rhythm categories (Adult and Pediatric)
- Adult morphology Categories
- Pediatric morphology categories
- Technical quality

Cardiac Rhythm Categories (Adult and Pediatric)

| | |
|---------------------------------|-------------|
| Paced Rhythm | (page B-5) |
| Basic Cardiac Rhythm | (page B-7) |
| Premature Complexes | (page B-11) |
| AV Conduction Disorders | (page B-13) |
| Ventricular Preexcitation | (page B-14) |

Adult Morphology Categories

| | |
|---|-------------|
| Dextrocardia | (page B-15) |
| Right Atrial Abnormality | (page B-15) |
| Left Atrial Abnormality | (page B-15) |
| Biatrial Abnormality | (page B-16) |
| QRS Axis Deviation | (page B-16) |
| Ventricular Conduction Delays | (page B-17) |
| Right Ventricular Hypertrophy | (page B-18) |
| Left Ventricular Hypertrophy | (page B-19) |
| Low Voltage and Chronic Obstructive Pulmonary Disease Pattern | (page B-21) |
| Inferior Myocardial Infarction | (page B-21) |
| Lateral Myocardial Infarction | (page B-23) |
| Anteroseptal and Anterior Myocardial Infarction | (page B-25) |
| Anterolateral and Extensive Anterior Myocardial Infarct | (page B-28) |
| Posterior Myocardial Infarction | (page B-30) |
| ST Depression and Myocardial Ischemia | (page B-31) |
| T Wave Abnormalities and Myocardial Ischemia | (page B-33) |
| Repolarization Abnormalities and Myocardial Ischemia | (page B-35) |
| ST Elevation, Myocardial Injury, Pericarditis, and Early Repolarization | (page B-38) |
| Tall T Waves | (page B-39) |
| QT Abnormalities, Electrolyte Disturbance, and Drug Effects | (page B-40) |

Pediatric Morphology Categories

| | |
|---|-------------|
| Dextrocardia | (page B-41) |
| Right Atrial Abnormality | (page B-41) |
| Left Atrial Abnormality | (page B-41) |
| Biatrial Abnormality | (page B-42) |
| QRS Axis Deviation | (page B-42) |
| Ventricular Conduction Delays | (page B-42) |
| Right Ventricular Hypertrophy | (page B-43) |
| Left Septal Hypertrophy | (page B-45) |
| Left Ventricular Hypertrophy | (page B-45) |
| Biventricular Hypertrophy | (page B-46) |
| Low Voltage | (page B-47) |
| Q Wave Abnormality and Myocardial Infarct | (page B-47) |
| ST Depression | (page B-48) |
| T Wave Abnormality | (page B-48) |
| Repolarization Abnormality | (page B-49) |
| ST Elevation, Myocardial Injury, Pericarditis, and Early Repolarization | (page B-50) |
| Tall T Waves | (page B-51) |
| QT Abnormality and Electrolyte Disturbance | (page B-51) |
| Congenital Heart Defects | (page B-52) |

Miscellaneous Category

| | |
|-------------------------|-------------|
| Technical Quality | (page B-52) |
|-------------------------|-------------|

Cardiac Rhythm

Paced Rhythm

| | | | |
|----------|----|--|-----------------------------------|
| (APACEC) | AB | ATRIAL-PACED COMPLEXES | other complexes also detected |
| (APACED) | AB | A-PACED COMPLEXES WITH SOME INHIBITION | non-paced complexes also detected |
| (APACE) | AB | ATRIAL-PACED RHYTHM | |
| (VPACEC) | AB | VENTRICULAR-PACED COMPLEXES | other complexes also detected |
| (VPACCF) | AB | AFIB/FLUT AND V-PACED COMPLEXES | other complexes, A-rate>240 |
| (VPACCD) | AB | V-PACED COMPLEXES WITH SOME INHIBITION | non-paced complexes also detected |
| (VPACFD) | AB | AFIB/FLUT, V-PACED COMPLEXES WITH INHIBITION | non-paced complexes, A-rate>240 |
| (VPACE) | AB | VENTRICULAR-PACED RHYTHM | |
| (ASVPC) | AB | ATRIAL-SENSED VENTRICULAR-PACED COMPLEXES | other complexes also detected |
| (ASVP) | AB | ATRIAL-SENSED VENTRICULAR-PACED RHYTHM | ventricular pacing tracks p-waves |
| (VPACEF) | AB | AFIB/FLUTTER AND VENTRICULAR-PACED RHYTHM | V-paced rhythm, A-rate>240 |
| (AVDPC) | AB | ATRIAL-VENTRICULAR DUAL-PACED COMPLEXES | other complexes also detected |

| | | |
|----------|----|--|
| (AVDPCF) | AB | DUAL-PACEMAKER W/ A-NONCAPT DUE TO AFIB/FLUT other complexes and A-rate>240 |
| (AVDP) | AB | ATRIAL-VENTRICULAR DUAL-PACED RHYTHM |
| (AVDPF) | AB | DUAL-PACEMAKER W/ A-NONCAPT DUE TO AFIB/FLUT dual pacing with A-rate>240 |
| (PCMMC) | AB | A-V DUAL-PACED COMPLEXES W/ SOME INHIBITION other complexes also detected |
| (PCMM) | AB | A-V DUAL-PACED RHYTHM WITH SOME INHIBITION atrial and/or vent inhibition |
| (BVPACE) | AB | BIVENTRICULAR PACED RHYTHM non-simultaneous bi-vent pacing |
| (ABVPC) | AB | ATRIAL- BIVENTRICULAR PACED RHYTHM non-simultaneous bi-vent pacing |
| (PACENC) | AB | PACEMAKER FAILURE TO CAPTURE APPROPRIATELY |
| (PACENS) | AB | PACEMAKER FAILURE TO SENSE APPROPRIATELY |
| (PCNSNC) | AB | PACEMAKER FAILURE TO CAPTURE AND SENSE |
| (PACEM) | AB | FAILURE TO SENSE AND/OR CAPTURE (?MAGNET) fixed pacing with async rhythm |
| (AOO) | NS | RHYTHM CONSISTENT WITH AOO PACING |
| (VOO) | NS | RHYTHM CONSISTENT WITH VOO PACING |
| (DOO) | NS | RHYTHM CONSISTENT WITH DOO PACING |
| (AAI) | NS | RHYTHM CONSISTENT WITH AAI PACING |
| (VVI) | NS | RHYTHM CONSISTENT WITH VVI PACING |

| | | |
|---------|----|---|
| (DVI) | NS | RHYTHM CONSISTENT WITH DVI PACING |
| (DDI) | NS | RHYTHM CONSISTENT WITH DDI PACING |
| (VDD) | NS | RHYTHM CONSISTENT WITH VDD PACING |
| (DDD) | NS | RHYTHM CONSISTENT WITH DDD PACING |
| (UNKRM) | NS | UNDETERMINED RHYTHM: REVIEW rhythm measurements incomplete |
| (PSAR) | AB | PACEMAKER SPIKES OR ARTIFACTS timing non-diagnostic |
| (NFRA) | NS | NO FURTHER RHYTHM ANALYSIS ATTEMPTED DUE TO PACED RHYTHM |
| (NFAD) | NS | NO FURTHER ANALYSIS ATTEMPTED DUE TO PACED RHYTHM |

Basic Cardiac Rhythm

| | | |
|--------|----|---|
| (SR) | NO | SINUS RHYTHM normal P axis, V-rate ***-*** |
| (SB) | ON | SINUS BRADYCARDIA V-rate<*** |
| (ST) | ON | SINUS TACHYCARDIA V-rate>*** |
| (SEAR) | ON | SINUS OR ECTOPIC ATRIAL RHYTHM P axis (-45,135) |
| (SEAB) | ON | SINUS OR ECTOPIC ATRIAL BRADYCARDIA P axis (-45,135), V-rate<*** |
| (SEAT) | ON | SINUS OR ECTOPIC ATRIAL TACHYCARDIA P axis (-45,135), V-rate>*** |

| | | | |
|--------|----|---|---------------------------------|
| (EAR) | BO | ECTOPIC ATRIAL RHYTHM | abnormal P axis, normal rate |
| (EAB) | BO | ECTOPIC ATRIAL BRADYCARDIA | abnormal P axis, V-rate<*** |
| (EAT) | AB | ECTOPIC ATRIAL TACHYCARDIA | abnormal P axis, V-rate>*** |
| (LLAR) | NS | LOW LEFT ATRIAL RHYTHM | |
| (HLAR) | NS | HIGH LEFT ATRIAL RHYTHM | |
| (LRAR) | NS | LOW RIGHT ATRIAL RHYTHM | |
| (HRAR) | NS | HIGH RIGHT ATRIAL RHYTHM | |
| (JERA) | AB | ACCELERATED JUNCTIONAL ESCAPE RHYTHM | absent P waves, V-rate 50-70 |
| (JER) | AB | JUNCTIONAL ESCAPE RHYTHM | absent P waves, slow V-rate |
| (JRA) | AB | ACCELERATED JUNCTIONAL RHYTHM | absent P waves, accele'd V-rate |
| (JT) | AB | JUNCTIONAL TACHYCARDIA | absent P waves, rapid V-rate |
| (RVAR) | BO | UNKNOWN RHYTHM, IRREGULAR RATE ***-*** | V-rate variation>10% |
| (BWRV) | BO | BRADYCARDIA WITH IRREGULAR RATE ***-*** | mean V-rate<***, variation>8% |
| (TWRV) | BO | SINUS TACHYCARDIA WITH IRREGULAR RATE ***-*** | V-rate>***, variation>10% |

| | | | |
|---------|----|---|------------------------------|
| (SA) | ON | SINUS ARRHYTHMIA, RATE ***-*** | V-rate variation >10% |
| (SAB) | ON | SLOW SINUS ARRHYTHMIA, RATE ***-*** | varied V-rate, mean<*** |
| (SAT) | ON | FAST SINUS ARRHYTHMIA, RATE ***-*** | varied V-rate, mean>*** |
| (WPACE) | BO | WANDERING PACEMAKER | varying PR interval & P axis |
| (AVDIS) | AB | AV DISSOCIATION | PR variation>15% |
| (ETACH) | AB | EXTREME TACHYCARDIA | V-rate >(220-age) |
| (SVT) | AB | SUPRAVENTRICULAR TACHYCARDIA | V-rate>(220-age), QRSd<*** |
| (AFIBT) | AB | ATRIAL FIBRILLATION WITH RAPID V-RATE | A-rate>240, V-rate>(180-age) |
| (TACHW) | AB | WIDE COMPLEX TACHYCARDIA | V-rate>***, QRSd>*** |
| (VTACH) | AB | EXTREME TACHYCARDIA WITH WIDE COMPLEX, NO FURTHER RHYTHM ANALYSIS ATTEMPTED | |
| (ARYP) | AB | POSSIBLE ATRIAL ARRHYTHMIA, A-RATE *** | multiple Ps |
| (FLFIB) | AB | ATRIAL FLUTTER/FIBRILLATION, A-RATE *** | multiple Ps |
| (AFIB0) | AB | ATRIAL FIBRILLATION | ? Atrial activity |

| | | |
|---------|----|---|
| (AFIB) | AB | ATRIAL FIBRILLATION, V-RATE ***-*** var'd rate, irreg atrial activity |
| (AFLT) | AB | ATRIAL FLUTTER, A-RATE *** A-rate 220-340 |
| (AFLT2) | AB | A-FLUTTER W/ PREDOM 2:1 AV BLOCK, A-RATE *** A-rate 220-340, multiple Ps |
| (AFL2) | AB | ATRIAL FLUTTER WITH 2:1 AV BLOCK A-rate 220-340, V-rate>*** |
| (AFLT3) | AB | A-FLUTTER W/ PREDOM 3:1 AV BLOCK, A-RATE *** A-rate 220-340, multiple Ps |
| (AFLT4) | AB | A-FLUTTER W/ PREDOM 4:1 AV BLOCK, A-RATE *** A-rate 220-340, multiple Ps |
| (AFLTV) | AB | A-FLUTTER W/ VARIED AV BLOCK, A-RATE *** A-rate 220-340, var'd AV conduc'n |
| (2AVB) | AB | SECOND DEGREE AV BLOCK multiple P waves |
| (2AVB2) | AB | PREDOMINANT 2:1 AV BLOCK most complexes 2 Ps |
| (2AVB3) | AB | PREDOMINANT 3:1 AV BLOCK most complexes 3 Ps |
| (2AVB4) | AB | PREDOMINANT 4:1 AV BLOCK most complexes 4 Ps |
| (2AVBV) | AB | VARYING SECOND DEGREE AV BLOCK multiple Ps, varied AV conduction |
| (3AVB) | AB | COMPLETE AV BLOCK, A-RATE *** V-rate<45, AV dissociation |

(3AVBIR) AB COMPLETE AV BLOCK WITH WIDE QRS COMPLEX
V-rate<***, QRSd>***, dissociated

(3AVBFF) AB A-FLUTTER/FIBRILLATION W/ COMPLETE AV BLOCK
A-rate>220, V-rate<***, AV dissociated

Premature Complexes

(UNKBIG) NS BIGEMINY PATTERN, UNCERTAIN MECHANISM

(UNKTRI) NS TRIGEMINY PATTERN, UNCERTAIN MECHANISM

(SVTRI) NS SUPRAVENTRICULAR TRIGEMINY

(JBIG) NS JUNCTIONAL RHYTHM WITH VPC'S IN A BIGEMINY PATTERN

(JTRI) NS JUNCTIONAL RHYTHM WITH VPC'S IN A TRIGEMINY PATTERN

(ABAPC) NS ABERRANTLY CONDUCTED ATRIAL PREMATURE COMPLEXES

(UNKPC) NS PREMATURE COMPLEX, UNCERTAIN MECHANISM

(VSVPC) NS PREMATURE COMPLEX, VENT OR ABERRANT SUPRAVENT

(APC) ON ATRIAL PREMATURE COMPLEX
SV complex w/ short R-R interval

(JPC) ON JUNCTIONAL PREMATURE COMPLEX
SV complex w/ short R-R, absent P

(MAPC) AB MULTIPLE ATRIAL PREMATURE COMPLEXES
SV complexes w/ short R-R intervals

(VPC) ON VENTRICULAR PREMATURE COMPLEX
V complex w/ short R-R interval

| | | |
|----------|----|--|
| (MVPC) | AB | MULTIPLE VENTRICULAR PREMATURE COMPLEXES V complexes w/ short R-R intervals |
| (MVSPC) | AB | MULTIPLE PREMATURE COMPLEXES, VENT & SUPRAVEN V and SV complexes w/ short R-R |
| (SVBIG) | AB | SUPRAVENTRICULAR BIGEMINY bigeminy string>4 w/ SV complexes |
| (VBIG) | AB | VENTRICULAR BIGEMINY bigeminy string>4 w/ V complexes |
| (VTRI) | AB | VENTRICULAR TRIGEMINY trigeminy string>6 w/ V complexes |
| (MFVPC) | AB | MULTIFORM VENTRICULAR PREMATURE COMPLEXES short R-R, variable morphology |
| (PVPC) | AB | PAIRED VENTRICULAR PREMATURE COMPLEXES sequence of 2 V complexes |
| (RVPC) | AB | RUN OF VENTRICULAR PREMATURE COMPLEXES sequence of 3 or more V complexes |
| (MFPVPC) | AB | PAIRED MULTIFORM VENTRICULAR COMPLEXES sequence of 2 V complexes |
| (MFRVPC) | AB | RUN OF MULTIFORM VENTRICULAR COMPLEXES sequence of 3 or more V complexes |
| (LRRV) | BO | LONG R-R WITH VENTRICULAR ESCAPE R-R>175% of normal, wide QRS |
| (SARV) | AB | SINUS PAUSE/ARREST WITH VENTRICULAR ESCAPE long R-R interval, wide QRS |
| (WENCK) | AB | MOBITZ I AV BLOCK (WENCKEBACH) PR lengthens & dropped complexes |

| | | | |
|---------|----|---|-----------------------------------|
| (RECA) | NS | RETROGRADE ATRIAL CAPTURE | |
| (VIC) | ON | VENTRICULAR INTERPOLATED COMPLEX | interpolated complex, wide QRS |
| (MVIC) | AB | MULTIPLE VENTRICULAR INTERPOLATED COMPLEXES | interpolated complexes, wide QRS |
| (IVPC) | ON | INTERPOLATED VENTRICULAR PREMATURE COMPLEX | interpolated complex, wide QRS |
| (MIVPC) | AB | MULT INTERPOLATED VENT PREMATURE COMPLEXES | interpolated complexes, wide QRSd |
| (ABC) | ON | ABERRANT COMPLEX | small R-R variation, aberrant QRS |
| (ABCS) | ON | ABERRANT COMPLEX, POSSIBLY SUPRAVENTRICULAR | aberrant shape, PR 80-220 |

AV Conduction Disorders

| | | | |
|---------|----|--|-------------------------|
| (SPRB) | ON | BORDERLINE SHORT PR INTERVAL | PR int <*** mS |
| (SPR) | BO | SHORT PR INTERVAL, ACCELERATED AV CONDUCTION | PR <*** mS |
| (BAVCD) | BO | BORDERLINE AV CONDUCTION DELAY | PR >***, V-rate ***-*** |
| (1AVB) | AB | FIRST DEGREE AV BLOCK | PR >***, V-rate ***-*** |
| (2AVBA) | NS | ADVANCED SECOND DEGREE AV BLOCK | |

| | | |
|---------|----|---|
| (SARSV) | AB | SINUS PAUSE/ARREST W/ SUPRAVENTRICULAR ESCAPE long R-R interval, normal QRSd |
| (SARN) | AB | SINUS PAUSE/ARREST WITH JUNCTIONAL ESCAPE long R-R, normal QRSd, absent P |
| (SARA) | AB | SINUS PAUSE/ARREST WITH ATRIAL ESCAPE long R-R, normal QRSd, normal P |
| (I2AVB) | AB | INTERMITTENT SECOND DEGREE AV BLOCK long R-R with multiple Ps |
| (MOBII) | AB | MOBITZ II AV BLOCK dropped ventricular complex |
| (A2AVB) | AB | ALTERNATING SECOND DEGREE AV BLOCK alternating long R-R, multiple Ps |

Ventricular Preexcitation

| | | |
|---------|----|--|
| (VPELP) | NS | VENTRICULAR PREEXCITATION, A LEFT POSTEROSEPTAL ACCESSORY PATHWAY |
| (VPERP) | NS | VENTRICULAR PREEXCITATION, A RIGHT POSTEROSEPTAL ACCESSORY PATHWAY |
| (VPERA) | NS | VENTRICULAR PREEXCITATION, A RIGHT ANTEROSEPTAL ACCESSORY PATHWAY |
| (VPELA) | NS | VENTRICULAR PREEXCITATION, A LEFT ANTEROSEPTAL ACCESSORY PATHWAY |
| (VPELL) | NS | VENTRICULAR PREEXCITATION, A LEFT LATERAL ACCESSORY PATHWAY |
| (VPERL) | NS | VENTRICULAR PREEXCITATION, A RIGHT LATERAL ACCESSORY PATHWAY |
| (VPE) | AB | VENTRICULAR PREEXCITATION |

Delta waves

(VPEL) AB VENT PREEXCITATION, LEFT ACCESSORY PATHWAY
Delta wave & initial axis(30,120)

(VPER) AB VENT PREEXCITATION, RIGHT ACCESSORY PATHWAY
Delta wave & initial axis(-60,29)

Adult Morphology

Dextrocardia

(DEXC) AB CONSIDER DEXTROCARDIA
P, QRS axis rightward

Right Atrial Abnormality

(RAE) NS RIGHT ATRIAL ENLARGEMENT

(CRAA) ON CONSIDER RIGHT ATRIAL ABNORMALITY
P >0.24 mV limb lead

(PRAA) ON PROBABLE RIGHT ATRIAL ABNORMALITY
biphasic P >0.20 mV in V1

(RAA) AB RIGHT ATRIAL ABNORMALITY
P>0.25 mV 2 lds or<-0.24 mV aVR/aVL

Left Atrial Abnormality

(LAE) NS LEFT ATRIAL ENLARGEMENT

(CLAA) ON CONSIDER LEFT ATRIAL ABNORMALITY
wide or notched P waves

(PLAA) BO PROBABLE LEFT ATRIAL ABNORMALITY
P >50 mS, <-0.10 mV V1

(PPND) BO PROMINENT P WAVES, NONDIAGNOSTIC
wide/notched/biphasic P waves

(LAA) AB LEFT ATRIAL ABNORMALITY
P, P' > 60 ms, < -0.15 mV V1

Batrial Abnormality

(LAACB) AB LAA, CONSIDER BIATRIAL ABNORMALITIES
P > 80 ms < -0.15 mV V1 & > 0.25 mV limb lds

(RAACB) AB RAA, CONSIDER BIATRIAL ABNORMALITIES
P > 0.30 mV 2 lds & < -0.30 mV aVR/aVL

(BAA) AB BIATRIAL ABNORMALITIES
P > 80 ms, < -0.15 mV V1 & > 0.30 mV 2 lds

QRS Axis Deviation

(AXR) ON BORDERLINE RIGHT AXIS DEVIATION
QRS axis (***,***)

(RAD) ON RIGHT AXIS DEVIATION
QRS axis (***,***)

(AXL) ON BORDERLINE LEFT AXIS DEVIATION
QRS axis (***,***)

(LAD) ON LEFT AXIS DEVIATION
QRS axis (***,***)

(AXSUP) ON SUPERIOR QRS AXIS
QRS axis (-91,240)

(AXIND) ON INDETERMINATE QRS AXIS
QRS axis indeterminate

(S123) ON S1, S2, S3 PATTERN
S > 30 ms & > 0.2 mV, I II III

(AXPST) BO MARKEDLY POSTERIOR QRS AXIS
late V-lead transition

Ventricular Conduction Delays

(IVCD) NS INTRAVENTRICULAR CONDUCTION DELAY

(BIVCD) ON BORDERLINE INTRAVENTRICULAR CONDUCTION DELAY
QRSd >*** mS

(BIVCDL) BO BORDERLINE IVCD WITH LAD
QRSd >*** mS, axis(-90,-30)

(NIVCD) AB NONSPECIFIC INTRAVENTRICULAR CONDUCTION DELAY
QRSd >*** mS, not LBBB/RBBB

(NIVCDL) AB NONSPECIFIC IVCD WITH LAD
QRSd >*** mS & LAD

(IRBBB) AB INCOMPLETE RIGHT BUNDLE BRANCH BLOCK
QRSd >***, terminal axis (90,270)

(ARBBB) AB IVCD, CONSIDER ATYPICAL RBBB
QRSd>120 mS, terminal axis(90,270)

(CLAFB) AB LAD, CONSIDER LEFT ANTERIOR FASCICULAR BLOCK
axis(240,-40), S>R II III aVF

(LAFB) AB LEFT ANTERIOR FASCICULAR BLOCK
axis(240,-40), init forces inf

(CAFBI) AB LAD, CONSIDER LAFB OR INFERIOR INFARCT
axis(240,-30), Q&R II III aVF

(IRAFB) AB INCOMPLETE RBBB AND LAFB
axis(240,-40), S>R II III aVF

| | | | |
|---------|----|-------------------------------------|------------------------------------|
| (LPFB) | AB | LEFT POSTERIOR FASCICULAR BLOCK | trm axis(110,210), init force sup |
| (IRPFB) | AB | IRBBB AND LPFB | RAD, QRSd>120, term axis(90,270) |
| (RBBB) | AB | RIGHT BUNDLE BRANCH BLOCK | QRSd>120, terminal axis(90,270) |
| (RLAFB) | AB | RBBB AND LAFB | QRSd >120 mS, axis(-40,240) |
| (RLPFB) | AB | RBBB AND LPFB | QRSd >120 mS, axis(90,210) |
| (ILBBB) | AB | INCOMPLETE LEFT BUNDLE BRANCH BLOCK | QRSd>110 mS, terminal axis(-90,-1) |
| (ALBBB) | AB | IVCD, CONSIDER ATYPICAL LBBB | QRSd>***, notch/slur R I aVL V5-6 |
| (LBBB) | AB | LEFT BUNDLE BRANCH BLOCK | QRSd>***, broad/notched R |

Right Ventricular Hypertrophy

| | | | |
|----------|----|---|------------------------------|
| (RSR1) | ON | RSR' IN V1 OR V2, PROBABLY NORMAL VARIANT | small R' only |
| (LT) | ON | LATE PRECORDIAL R/S TRANSITION | QRS area negative in V5/V6 |
| (ET) | ON | EARLY PRECORDIAL R/S TRANSITION | QRS area positive in V2 |
| (ETRSR1) | ON | RSR' IN V1 OR V2, RIGHT VCD OR RVH | QRS area positive & R' V1/V2 |

| | | | |
|----------|----|---|----------------------------------|
| (CRHPI) | BO | CONSIDER RVH OR POSTERIOR INFARCT | large R in V1 |
| (CRHPIR) | BO | CONSIDER RVH OR PMI W/ SEC REPOL ABNORMALITY | large R V1, repol abnormality |
| (CRVH) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | large R or R' V1/V2 |
| (CRVHR) | AB | CONSIDER RVH W/ SECONDARY REPOL ABNORMALITY | large R in V1/V2 & repol abnrm |
| (PRVH) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY | prominent R or R' w/ RAD or RAA |
| (PRVHR) | AB | PROBABLE RVH W/ SECONDARY REPOL ABNORMALITY | prominent R or R' & repol abnrm |
| (RVH) | AB | RIGHT VENTRICULAR HYPERTROPHY | prominent R or R' w/ RAD or RAA |
| (RVHR) | AB | RVH WITH SECONDARY REPOLARIZATION ABNORMALITY | prom R/R', RAD/RAA & repol abnrm |

Left Ventricular Hypertrophy

| | | | |
|----------|----|---|-----------------------|
| (LVHST) | NS | LVH WITH SECONDARY REPOLARIZATION CHANGES | |
| (HVOLT) | NS | HIGH QRS VOLTAGE | |
| (LVHV) | BO | LVH BY VOLTAGE | R >*** in aVL |
| (LVHR56) | BO | LVH BY VOLTAGE | R >*** mV in V5 or V6 |
| (LVHRSI) | BO | LVH BY VOLTAGE | (R I+S III) >*** mV |

| | | |
|----------|----|--|
| (LVHSR) | AB | CONSIDER LEFT VENTRICULAR HYPERTROPHY (S V1/V2+R V5/V6) >*** mV |
| (LVHCNV) | AB | CONSIDER LEFT VENTRICULAR HYPERTROPHY (R aVL+S V3) >*** mV |
| (LVHC) | AB | CONSIDER LEFT VENTRICULAR HYPERTROPHY R5/6/aVL, RISIII, S12R56, S3RaVL |
| (LVHVP) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY R56L/RISIII/S12R56/S3RL & LAA/LAD |
| (LVHCNP) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY (RaVL+SV3) x QRSd >*** |
| (LVHPRE) | AB | PROBABLE LVH WITH SECONDARY REPOL ABNRM R56L/RISIII/S12R56/S3RL & rep abn |
| (LVH) | AB | LEFT VENTRICULAR HYPERTROPHY (SV1+RV5)>3.5/ (RaVL+SV3)>*** |
| (LVH1) | AB | LEFT VENTRICULAR HYPERTROPHY R56L/RISIII/S12R56/S3RL & LAA/LAD |
| (LVHREP) | AB | LVH WITH SECONDARY REPOLARIZATION ABNORMALITY R56L/RISIII/S12R56/S3RL & rep abn |
| (LVHCO) | AB | LVH WITH IVCD AND SECONDARY REPOL ABNRM RISIII/S12R56, wQRSd, repol abnrm |
| (LVHCOL) | AB | LVH WITH IVCD, LAD AND SECONDARY REPOL ABNRM RISIII/S12R56, wQRS, LAD, rep abn |
| (BVH) | AB | BIVENTRICULAR HYPERTROPHY R/R'1 & R56L/RISIII/S12R56/S3RaVL |

Low Voltage and Chronic Obstructive Pulmonary Disease Pattern

| | | | |
|----------|----|---|-----------------------------------|
| (LVOLFB) | ON | BORDERLINE LOW VOLTAGE IN FRONTAL LEADS | all frontal leads <0.6 mV |
| (LVOLF) | ON | LOW VOLTAGE IN FRONTAL LEADS | all frontal leads <0.5 mV |
| (LVOLT) | BO | LOW VOLTAGE THROUGHOUT | frontal<0.5 mV, precordial<1.0 mV |
| (LVORAD) | BO | LOW VOLTAGE WITH RIGHT AXIS DEVIATION | low voltage, RAD |
| (CPDP) | BO | CHRONIC PULMONARY DISEASE PATTERN | P rightward, QRS small & vertical |
| (CPDLV) | BO | LOW VOLTAGE CONSISTENT WITH COPD | low voltage and Dx COPD |

Inferior Myocardial Infarction

| | | | |
|---------|----|---|-----------------------------------|
| (IMI) | NS | INFERIOR INFARCT | |
| (IMI3) | BO | BORDERLINE INFERIOR Q WAVES | Qs add to 80 mS in II III aVF |
| (IMI4) | BO | CONSIDER LAFB OR INFERIOR INFARCT | Qs add to 65 mS II III aVF & LAD |
| (IMI10) | BO | CONSIDER INFERIOR INFARCT | Q >35 mS in II III aVF |
| (IMI12) | BO | CONSIDER INFERIOR INFARCT | Q >25 mS, initial axis(240,-30) |
| (IMI18) | BO | INFERIOR Q WAVES, PROBABLY NORMAL VARIATION | Q >30 mS, age<31 male, <40 female |

| | | |
|----------|----|---|
| (IMI20) | AB | PROBABLE INFERIOR INFARCT, AGE INDETERMINATE Q >35 mS, II III aVF |
| (IMI22) | AB | PROBABLE INFERIOR INFARCT, AGE INDETERMINATE Q >35 mS, initial axis(240,-30) |
| (IMI26) | AB | PROBABLE INFERIOR INFARCT, AGE INDETERMINATE Q>35 mS, T neg, II III aVF |
| (IMI24) | AB | PROBABLE INFERIOR INFARCT, OLD Q>35 mS, abnormal ST-T, II III aVF |
| (IMI30) | AB | PROBABLE INFEROLATERAL INFARCT, AGE INDETERM Q >30 mS in V5 V6 & IMI |
| (IMI49M) | AB | PROBABLE INFERIOR INFARCT, POSSIBLY RECENT Q>35 mS, ST>0.1mV, T neg, II-aVF |
| (PINJI) | AB | ST ELEVATION, PROBABLE INFERIOR INJURY inf ST>0.1 mV, lat ST<-0.05 mV |
| (IMI50) | AB | PROBABLE INFERIOR INFARCT, ACUTE Q>25 mS, ST>0.10 mV, II III aVF |
| (IMI54) | AB | PROBABLE INFERIOR INFARCT, RECENT Q>25 mS, ST>0.07 mV, T neg, II-aVF |
| (IMIQ) | AB | INFERIOR INFARCT, AGE INDETERMINATE Q>35 mS, II III aVF |
| (IMI62) | AB | INFERIOR INFARCT, AGE INDETERMINATE Q >35 mS, initial axis(240,-30) |
| (IMI64) | AB | INFERIOR INFARCT, OLD Q >35 mS, flat T, II III aVF |
| (IMI66) | AB | INFERIOR INFARCT, AGE INDETERMINATE Q >35 mS, T neg, II III aVF |

| | | |
|---------|----|--|
| (IMI67) | AB | INFERIOR INFARCT, POSSIBLY ACUTE Q >35 mS, ST >0.10 mV, II III aVF |
| (IMIEA) | AB | INFERIOR INJURY, PROBABLE EARLY ACUTE INFARCT ST>0.15 mV, II III aVF |
| (IMI80) | AB | INFERIOR Q WAVES, POSSIBLY DUE TO LBBB Q >35 mS, II III aVF & LBBB |
| (IMI81) | AB | INFERIOR ST ELEVATION, POSSIBLY DUE TO LBBB ST>0.15 mV, II III aVF & LBBB |
| (IMI82) | AB | PROBABLE INFERIOR INFARCT WITH LBBB Q>35 mS, II III aVF & LBBB |
| (IMI74) | AB | INFERIOR INFARCT, RECENT Q>35 mS, ST>0.07 mV, T neg, II-aVF |
| (IMIA) | AB | INFERIOR INFARCT, ACUTE Q>35 mS, ST>0.10 mV, II III aVF |

Lateral Myocardial Infarction

| | | |
|---------|----|--|
| (LMI) | NS | LATERAL INFARCT |
| (ILMI) | NS | INFEROLATERAL INFARCT |
| (ILMIQ) | NS | INFEROLATERAL INFARCT, AGE INDETERMINATE |
| (ILMIA) | NS | INFEROLATERAL INFARCT, ACUTE |
| (LMI10) | BO | BORDERLINE LATERAL Q WAVES Q >35 mS, I aVL V5 V6 |
| (LMI20) | AB | PROBABLE LATERAL INFARCT, AGE INDETERMINATE Q >35 mS, I aVL V5 V6 |

| | | |
|---------|----|---|
| (LMI26) | AB | PROBABLE LATERAL INFARCT, AGE INDETERMINATE Q >35 mS, T neg, I aVL V5 V6 |
| (LMI24) | BO | PROBABLE LATERAL INFARCT, OLD Q>35 mS, abnormal ST-T, I aVL V5-6 |
| (LMI28) | BO | LATERAL Q WAVES, PROBABLY DUE TO LVH Q >35 mS, I aVL V5 V6 & LVH |
| (LMI40) | AB | LATERAL INFARCT, AGE INDETERMINATE Q >35 mS, I aVL V5 V6 |
| (LMI44) | AB | LATERAL INFARCT, OLD Q>35 mS, abnormal ST-T, I aVL V5 V6 |
| (LMI46) | AB | LATERAL INFARCT, AGE INDETERMINATE Q>35 mS, T neg, I aVL V5 V6 |
| (LMI49) | ON | LATERAL Q WAVES, PROBABLY NORMAL VARIATION Q >35 mS, age<31 male, <40 female |
| (LMI54) | AB | PROBABLE LATERAL INFARCT, RECENT Q>35 mS, ST>.07 mV, T neg, I aVL V5-6 |
| (LMI50) | AB | PROBABLE LATERAL INFARCT, ACUTE Q >25 mS, ST>0.10 mV, I aVL V5 V6 |
| (LMIQ) | AB | LATERAL INFARCT, AGE INDETERMINATE Q >35 mS, I aVL V5 V6 |
| (LMI64) | AB | LATERAL INFARCT, OLD Q>35 mS, flat T, I aVL V5 V6 |
| (LMI66) | AB | LATERAL INFARCT, AGE INDETERMINATE Q>35 mS, T neg, I aVL V5 V6 |
| (LMI67) | AB | LATERAL INFARCT, POSSIBLY ACUTE Q >35 mS, ST >0.07 mV, I aVL V5 V6 |

| | | |
|---------|----|--|
| (PINJL) | AB | ST ELEVATION, PROBABLE LATERAL INJURY ST >0.08 mV, I aVL V5 V6 |
| (LMIEA) | AB | LATERAL INJURY, PROBABLE EARLY ACUTE INFARCT ST >0.10 mV, I aVL V5 V6 |
| (LMI74) | AB | LATERAL INFARCT, RECENT ST>.07 mV, T neg, Q>35, I aVL V5-6 |
| (LMIA) | AB | LATERAL INFARCT, ACUTE ST >.20 mV, Q >35 mS, I aVL V5 V6 |

Anteroseptal and Anterior Myocardial Infarction

| | | |
|---------|----|---|
| (AMI) | NS | ANTERIOR INFARCT |
| (ASMI) | NS | ANTEROSEPTAL INFARCT |
| (ASMIQ) | NS | ANTEROSEPTAL INFARCT, AGE INDETERMINATE |
| (AMI1) | BO | BORDERLINE R WAVE PROGRESSION, ANTERIOR LEADS R < 0.15 mV |
| (AMI3) | BO | Q WAVE IN V1 Q >15 mS in V1 |
| (AMI4) | AB | ABNRM R PROG, CONSIDER ASMI OR LEAD PLACEMENT Q >30 mS, diminished R, V2 |
| (AMI8) | AB | CONSIDER ANTEROSEPTAL INFARCT Q >30 mS, V1 V2 |
| (AMI10) | AB | CONSIDER ANTEROSEPTAL INFARCT, POSSIBLY ACUTE Q >30 mS, dimin R, ST>0.15 mV, V1-V3 |
| (AMI12) | AB | CONSIDER ANT-SEPT INFARCT, POSSIBLY RECENT Q, dim R, ST>0.15 mV, T neg, V1-V3 |

| | | |
|----------|----|--|
| (AMI14) | AB | PROBABLE ANTEROSEPTAL INFARCT, OLD Q >30 mS, V1 V2 |
| (AMI16) | AB | ANTERIOR Q WAVES, POSSIBLY DUE TO ILBBB Q >30 mS, V1 V2 & ILBBB |
| (AMI17) | AB | ANTERIOR Q WAVES, POSSIBLY DUE TO LVH Q >30 mS, V1 V2 & LVH |
| (AMI20) | AB | PROBABLE ANTEROSEPTAL INFARCT, OLD Q >30 mS & abn ST-T, V1-V3 |
| (AMI21) | AB | PROBABLE ANTEROSEPTAL INFARCT, AGE INDETERM Q >30 mS, T neg, V1-V3 |
| (AMI21A) | AB | PROBABLE ANTEROSEPTAL INFARCT, ACUTE Q >30 mS, ST>0.15 mV, V1-V3 |
| (AMI22) | AB | ANT-SEPT INJURY, PROBABLE EARLY ACUTE INFARCT ST >0.40 mV V1-V3 |
| (ASMIA) | AB | ANTEROSEPTAL INFARCT, ACUTE Q >30 mS, ST >0.25 mV, V1-V3 |
| (AMI26) | AB | ANTEROSEPTAL INFARCT, RECENT Q >30 mS, ST >0.15 mS, T neg, V1-V3 |
| (AMI30) | AB | PROBABLE ANTERIOR INFARCT, ACUTE Q >30 mS, ST >0.15 mV, V1-V4 |
| (AMI32) | AB | ANTERIOR INFARCT, ACUTE Q >30 mS, ST >0.25 mV, V1-V4 |
| (AMI34) | AB | PROBABLE ANTERIOR INFARCT, RECENT Q >30 mS, ST >0.15 mV, T neg, V2-V4 |
| (AMI36) | AB | ANTERIOR INFARCT, RECENT Q >30 mS, ST >0.15 mV, T neg, V1-V4 |

| | | | |
|----------|----|--|-------------------------------------|
| (AMI41) | BO | CONSIDER ANTERIOR INFARCT | diminished R <0.15 mV V3 |
| (AMI44) | BO | CONSIDER ANTERIOR INFARCT | Q >30 mS in V3 |
| (AMI48) | BO | CONSIDER ANTERIOR INFARCT | diminished R <0.15 mV in V4 |
| (AMI49) | BO | CONSIDER ANTERIOR INFARCT | Q >30 mS in V4 |
| (AMI50) | AB | PROBABLE ANTERIOR INFARCT, ACUTE | Q >30 mS, dim R, ST >0.15 mV, T neg |
| (AMI52) | AB | PROBABLE ANTERIOR INFARCT, RECENT | Q >30 mS, dim R, ST >0.15 mV, T neg |
| (AMI54) | AB | ANTERIOR INFARCT, AGE INDETERMINATE | Q >30 mS in V2 V3 |
| (AMI57) | AB | ANTERIOR Q WAVES, POSSIBLY DUE TO LVH | Q >30 mS in V1-V3 & LVH |
| (AMIQ) | AB | ANTERIOR INFARCT, AGE INDETERMINATE | Q >30 mS in V2-V5 |
| (AMI60) | AB | ANTERIOR INFARCT, OLD | Q >30 mS, abnormal ST-T, V2-V5 |
| (AMI61) | AB | ANTERIOR INFARCT, AGE INDETERMINATE | Q >30 mS, T neg, V2-V5 |
| (AMI61A) | AB | ANTERIOR INFARCT, POSSIBLY ACUTE | Q >30 mS, ST >0.15 mV, V1-V5 |
| (PINJA) | AB | ST ELEVATION, PROBABLE ANTERIOR INJURY | ST >0.25 mV in V1-V5 |

| | | |
|---------|----|---|
| (AMIEA) | AB | ANTERIOR INJURY, EARLY ACUTE INFARCT ST >0.35 mV in V1-V5 |
| (AMI66) | AB | ANTERIOR INFARCT, RECENT Q >30 mS, ST >0.15 mV, T neg, V1-V5 |
| (AMIA) | AB | ANTERIOR INFARCT, ACUTE ST >0.25 mV, T neg, V1-V5 |

Anterolateral and Extensive Anterior Myocardial Infarction

| | | |
|---------|----|--|
| (ALI) | NS | ANTEROLATERAL INFARCT |
| (EAMI) | NS | EXTENSIVE ANTERIOR INFARCT |
| (ALI10) | AB | CONSIDER ANTEROLATERAL INFARCT Q >30 mS, I aVL V3-V6 |
| (ALI20) | AB | PROBABLE ANTEROLATERAL INFARCT, AGE INDETERM Q >30 mS, V3-V6 |
| (ALI24) | AB | PROBABLE ANTEROLATERAL INFARCT, OLD Q >30 mS, abnormal ST-T, V2-V6 |
| (ALI26) | AB | PROBABLE ANTEROLATERAL INFARCT, AGE INDETERM Q >30 mS, T neg, V2-V6 |
| (ALI40) | AB | ANTEROLATERAL INFARCT, AGE INDETERMINATE Q >35 mS, V4-V6 |
| (ALI44) | AB | ANTEROLATERAL INFARCT, OLD Q >35 mS, abnormal ST-T, V2-V6 |
| (ALI46) | AB | ANTEROLATERAL INFARCT, AGE INDETERMINATE Q >35 mS, T neg, V2-V6 |
| (ALI48) | BO | ANTEROLATERAL Q WAVES, PROBABLY DUE TO LVH Q >35 mS in V4-V6 & LVH |

- (ALI49) BO ANTEROLATERAL Q WAVE, PROBABLY NORMAL FOR AGE
Q >35 mS, age<31 male, <40 female
- (ALI50) AB PROBABLE ANTEROLATERAL INFARCT, ACUTE
ST >0.15 mV, Q >30 mS, V2-V6
- (ALI54) AB PROBABLE ANTEROLATERAL INFARCT, RECENT
Q >30 mS, ST >0.07 mV, T neg, V2-V6
- (ALIQ) AB ANTEROLATERAL INFARCT, AGE INDETERMINATE
Q >35 mS & >0.10 mV in V3-V6
- (ALI64) AB ANTEROLATERAL INFARCT, OLD
Q>35 mS &>.10 mV, abnrm ST-T, V3-V6
- (ALI66) AB ANTEROLATERAL INFARCT, AGE INDETERMINATE
Q >35 mS & >0.10 mV, T neg, V3-V6
- (ALI67) AB ANTEROLATERAL INFARCT, POSSIBLY ACUTE
Q >35 mS, ST >0.15 mV, V2-V6
- (PINJAL) AB ST ELEVATION, PROBABLE ANTEROLATERAL INJURY
ST >0.15 mV, I aVL V2-V6
- (ALIEA) AB ANTEROLATERAL INJURY, EARLY ACUTE INFARCT
ST >0.15 mV, I aVL V2-V6
- (ALIA) AB ANTEROLATERAL INFARCT, ACUTE
Q >35 mS, ST >0.20 mV, V2-V6
- (ALIR) AB ANTEROLATERAL INFARCT, RECENT
Q >35 mS, ST >0.07 mV, T neg, V2-V6
- (EAMIQ) AB EXTENSIVE ANTERIOR INFARCT, AGE INDETERMINATE
Q >35 mS, V1-V6
- (ALI86) AB EXTENSIVE ANTERIOR INFARCT, AGE INDETERMINATE
Q >35 mS, flat/neg T, V1-V6

- (ALI94) AB EXTENSIVE ANTERIOR INFARCT, RECENT
Q >35 mS, ST >0.07 mV, T neg, V1-V6
- (ALI88) AB EXTENSIVE ANTERIOR INFARCT, POSSIBLY ACUTE
Q >35 mS, ST >0.15 mV, V1-V6
- (EAMIA) AB EXTENSIVE ANTERIOR INFARCT, ACUTE
Q >35 mS, ST >0.15 mV, V1-V6

Posterior Myocardial Infarction

- (PMIQ) NS POSTERIOR INFARCT, AGE INDETERMINATE
- (CRPMI) BO TALL R WAVE IN V2, CONSIDER RVH OR PMI
R/S ratio >3, T >0.30 mV V1 V2
- (CPMI) AB CONSIDER POSTERIOR INFARCT
prom R & T in V1 V2
- (CIPMI) AB CONSIDER INFEROPOSTERIOR INFARCT
inf Q, ant R or ST dep V1-3
- (CPWI) AB CONSIDER POSTERIOR WALL INVOLVEMENT
prominent R T in V1 V2
- (PPMI) AB PROBABLE POSTERIOR INFARCT
prominent R T & ST dep V1-V3
- (PPMIA) AB PROBABLE POSTERIOR INFARCT, ACUTE
prominent R T, ST <-.05 V1-V3
- (PIPMI) AB PROBABLE INFEROPOSTERIOR INFARCT
IMI, R>S V1-2 or ST dep V1-V3
- (PMI) AB POSTERIOR INFARCT
prominent R T, ST dep V1-V3

| | | | |
|---------|----|--------------------------------|-------------------------------------|
| (PMIA) | AB | POSTERIOR INFARCT, ACUTE | prominent R T, ST $<-.05$ V1-V4 |
| (IPMI) | AB | INFEROPOSTERIOR INFARCT | inf Q & prom R T, ST dep V1-V3 |
| (IPMIA) | AB | INFEROPOSTERIOR INFARCT, ACUTE | ST $>.10$ II III aVF, $<-.05$ V1-V4 |

ST Depression and Myocardial Ischemia

| | | | |
|---------|----|--|------------------------------------|
| (NDSTD) | NS | NONDIAGNOSTIC ST DEPRESSION | |
| (SDJ) | ON | JUNCTIONAL ST DEPRESSION | ST <-0.10 mV any 3 leads |
| (SDM) | ON | MINIMAL ST DEPRESSION | ST <-0.05 mV in 2 leads |
| (SDCU) | ON | MINIMAL ST DEPRESSION | ST concave upward |
| (SD0NS) | ON | MINIMAL ST DEPRESSION | ST <-0.03 mV, T neg, any 2 leads |
| (SD0AN) | ON | MINIMAL ST DEPRESSION, ANTERIOR LEADS | ST <-0.03 mV, V2-V4 |
| (SD0LA) | ON | MINIMAL ST DEPRESSION, LATERAL LEADS | ST <-0.03 mV, I aVL V5 V6 |
| (SD0AL) | ON | MINIMAL ST DEPRESSION, ANTEROLATERAL LEADS | ST <-0.03 mV, I aVL V2-V6 |
| (SD0IN) | ON | MINIMAL ST DEPRESSION, INFERIOR LEADS | ST <-0.03 mV, II III aVF |

| | | | |
|----------|----|---|---------------------------|
| (SD0DI) | ON | MINIMAL ST DEPRESSION, DIFFUSE LEADS | ST <-0.03 mV, ant/lat/inf |
| (SD1AN) | BO | BORDERLINE ST DEPRESSION, ANTERIOR LEADS | ST <-0.07 mV, V2-V4 |
| (SD1LA) | BO | BORDERLINE ST DEPRESSION, LATERAL LEADS | ST <-0.07 mV, I aVL V5 V6 |
| (SD1AL) | BO | BORDERLINE ST DEPRESSION, ANTEROLATERAL LEADS | ST <-0.07 mV, I aVL V2-V6 |
| (SD1IN) | BO | BORDERLINE ST DEPRESSION, INFERIOR LEADS | ST <-0.07 mV, II III aVF |
| (SD1DI) | BO | BORDERLINE ST DEPRESSION, DIFFUSE LEADS | ST <-0.07 mV, ant/lat/inf |
| (SD15NS) | AB | NONSPECIFIC ST DEPRESSION | ST <-0.10 mV any 2 leads |
| (SD15AN) | AB | NONSPECIFIC ST DEPRESSION, ANTERIOR LEADS | ST <-0.10 mV, V2-V4 |
| (SD15LA) | AB | NONSPECIFIC ST DEPRESSION, LATERAL LEADS | ST <-0.10 mV, I aVL V5 V6 |
| (SD15AL) | AB | NONSPECIFIC ST DEPRESSION, ANT-LAT LEADS | ST <-0.10 mV, I aVL V2-V6 |
| (SD15IN) | AB | NONSPECIFIC ST DEPRESSION, INFERIOR LEADS | ST <-0.10 mV, II III aVF |
| (SD15WI) | AB | NONSPECIFIC ST DEPRESSION, DIFFUSE LEADS | ST <-0.10 mV, ant/lat/inf |
| (SD2NS) | AB | NONSPECIFIC ST DEPRESSION | ST <-0.10 mV, any 2 leads |

(SD2AN) AB ST DEPRESSION, CONSIDER ISCHEMIA, ANT LEADS
ST <-0.10 mV, V2-V4

(SD2LA) AB ST DEPRESSION, CONSIDER ISCHEMIA, LAT LEADS
ST <-0.10 mV, I aVL V5 V6

(SD2AL) AB ST DEPRESSION, CONSIDER ISCHEMIA, ANT-LAT LDS
ST <-0.10 mV, I aVL V2-V6

(SD2IN) AB ST DEPRESSION, CONSIDER ISCHEMIA, INF LEADS
ST <-0.10 mV, II III aVF

(SD2WI) AB ST DEPRESSION, CONSIDER ISCHEMIA, DIFFUSE LDS
ST <-0.10 mV, ant/lat/inf

(SDPRR) AB ST DEPRESSION, PROBABLY RATE RELATED
ST <-0.10 mV & extreme tachycardia

T Wave Abnormalities and Myocardial Ischemia

(PUW) NS PROMINENT U WAVES

(TALVH) BO ABNORMAL T, PROBABLY DUE TO LVH, ANT-LAT LDS
LVH & T neg, I aVL V2-V6

(LOWT) BO BORDERLINE T WAVE ABNORMALITIES
flat T

(TAXAB) BO BORDERLINE T WAVE ABNORMALITIES
T axis not between (-10,100)

(TAXQT) BO BORDERLINE T WAVE ABNORMALITIES
QRS-T axis angle (91,180)

(T0NS) BO BORDERLINE T WAVE ABNORMALITIES
T/QRS ratio < 1/20 or flat T

| | | |
|----------|----|---|
| (T0AN) | BO | BORDERLINE T ABNORMALITIES, ANTERIOR LEADS T flat or neg, V2-V4 |
| (T0LA) | BO | BORDERLINE T ABNORMALITIES, LATERAL LEADS T flat/neg, I aVL V5 V6 |
| (T0AL) | BO | BORDERLINE T ABNORMALITIES, ANT-LAT LEADS T flat/neg, I aVL V2-V6 |
| (T0IN) | BO | BORDERLINE T ABNORMALITIES, INFERIOR LEADS T flat/neg, II III aVF |
| (T0DI) | BO | BORDERLINE T ABNORMALITIES, DIFFUSE LEADS T flat/neg |
| (T1AN) | AB | NONSPECIFIC T ABNORMALITIES, ANTERIOR LEADS T <-0.10 mV, V2-V4 |
| (T1LA) | AB | NONSPECIFIC T ABNORMALITIES, LATERAL LEADS T <-0.10 mV, I aVL V5 V6 |
| (T1AL) | AB | NONSPECIFIC T ABNORMALITIES, ANT-LAT LEADS T <-0.10 mV, I aVL V2-V6 |
| (T1IN) | AB | NONSPECIFIC T ABNORMALITIES, INFERIOR LEADS T <-0.10 mV, II III aVF |
| (T1DI) | AB | NONSPECIFIC T ABNORMALITIES, DIFFUSE LEADS T <-0.10 mV, ant/lat/inf |
| (T3AN) | AB | ABNORMAL T, CONSIDER ISCHEMIA, ANTERIOR LEADS T <-0.25 mV, V2-V4 |
| (TIALVH) | AB | LVH W/ REPOL ABNORMALITIES, POSSIBLE ISCHEMIA T <-0.25 mV, V1-V3 & LVH |
| (T3LA) | AB | ABNORMAL T, CONSIDER ISCHEMIA, LATERAL LEADS T <-0.25 mV, I aVL V5 V6 |

| | | |
|--------|----|---|
| (T3AL) | AB | ABNORMAL T, CONSIDER ISCHEMIA, ANT-LAT LEADS T <-0.25 mV, I aVL V2-V6 |
| (T3IN) | AB | ABNORMAL T, CONSIDER ISCHEMIA, INFERIOR LEADS T <-0.20 mV, II III aVF |
| (T3WI) | AB | ABNORMAL T, CONSIDER ISCHEMIA, DIFFUSE LEADS T <-0.20 mV, ant/lat/inf |
| (T6AN) | AB | ABNORMAL T, PROBABLE ISCHEMIA, ANTERIOR LEADS T <-0.50 mV, V2-V4 |
| (T6LA) | AB | ABNORMAL T, PROBABLE ISCHEMIA, LATERAL LEADS T <-0.50 mV, I aVL V5 V6 |
| (T6AL) | AB | ABNORMAL T, PROBABLE ISCHEMIA, ANT-LAT LEADS T <-0.50 mV, I aVL V2-V6 |
| (T6IN) | AB | ABNORMAL T, PROBABLE ISCHEMIA, INFERIOR LEADS T <-0.40 mV, II III aVF |
| (T6IL) | AB | ABNORMAL T, PROBABLE ISCHEMIA, INFEROLATERAL T <-0.40 mV, I-III aVL aVF V5-6 |
| (T6WI) | AB | ABNORMAL T, PROBABLE ISCHEMIA, WIDESPREAD T <-0.50 mV, ant/lat/inf |

Repolarization Abnormalities and Myocardial Ischemia

| | | |
|---------|----|---|
| (ISCAS) | NS | REPOLARIZATION ABNORMALITIES SUGGEST ANTEROSEPTAL ISCHEMIA |
| (ISCIL) | NS | REPOLARIZATION ABNORMALITIES SUGGEST INFEROLATERAL ISCHEMIA |
| (ISCPS) | NS | REPOLARIZATION ABNORMALITIES SUGGEST POSTERIOR ISCHEMIA |

| | | |
|-----------|----|--|
| (REPB) | BO | BORDERLINE REPOLARIZATION ABNORMALITY ST dep & abnormal T |
| (REPBAN) | BO | BORDERLINE REPOL ABNORMALITY, ANT LEADS ST dep, T flat/neg, V2-V4 |
| (REPBLA) | BO | BORDERLINE REPOL ABNORMALITY, LATERAL LEADS ST dep, T flat/neg, I aVL V5 V6 |
| (REPBAL) | BO | BORDERLINE REPOL ABNORMALITY, ANT-LAT LEADS ST dep, T flat/neg, I aVL V2-V6 |
| (REPBIN) | BO | BORDERLINE REPOL ABNORMALITY, INFERIOR LEADS ST dep, T flat/neg, II III aVF |
| (REPBI L) | BO | BORDERLINE REPOL ABNORMALITY, INF-LAT LEADS ST dep, T flat/neg, inf/lat |
| (REPBDI) | BO | BORDERLINE REPOL ABNORMALITY, DIFFUSE LEADS ST dep, T flat/neg, ant/lat/inf |
| (REPNS) | AB | NONSPECIFIC REPOLARIZATION ABNORMALITIES ST dep, T neg, 2-3 leads |
| (REPAN) | AB | NONSPECIFIC REPOL ABNORMALITY, ANTERIOR LEADS ST dep, T neg, V2-V4 |
| (REPLA) | AB | NONSPECIFIC REPOL ABNORMALITY, LATERAL LEADS ST dep, T neg, I aVL V5 V6 |
| (REPAL) | AB | NONSPECIFIC REPOL ABNORMALITY, ANT-LAT LEADS ST dep, T neg, I aVL V2-V6 |
| (REPLVH) | AB | REPOL ABNORMALITY PROBABLY SECONDARY TO LVH ST dep, T neg, I aVL V2-V6 |
| (REPIN) | AB | NONSPECIFIC REPOL ABNORMALITY, INFERIOR LEADS ST dep, T neg, II III aVF |

| | | |
|----------|----|---|
| (REPIL) | AB | NONSPECIFIC REPOL ABNORMALITY, INF-LAT LEADS ST dep, T neg, I-III aVL aVF V5-6 |
| (REPII) | AB | NONSPECIFIC REPOL ABNORMALITY, DIFFUSE LEADS ST dep, T flat/neg, ant/lat/inf |
| (REPIA) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, ANTERIOR LEADS ST dep, T neg, V2-V4 |
| (REPILA) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, LATERAL LEADS ST dep, T neg, I aVL V5 V6 |
| (REPIAL) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, ANT-LAT LEADS ST dep, T neg, I aVL V2-V6 |
| (REPII) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, INFERIOR LEADS ST dep, T neg, II III aVF |
| (REPIIL) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, INFEROLATERAL ST dep, T neg, I-III aVL aVF V5-6 |
| (REPIDI) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, DIFFUSE LEADS ST-T neg, ant/lat/inf |
| (REPPAN) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, ANTERIOR LDS ST dep, T neg, V2-V4 |
| (REPPLA) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, LATERAL LEADS ST dep, T neg, I aVL V5 V6 |
| (REPPAL) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, ANT-LAT LEADS ST dep, T neg, I aVL V2-V6 |
| (REPPIN) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, INFERIOR LDS ST dep, T neg, II III aVF |
| (REPPIL) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, INF-LAT LDS ST dep, T neg, I-III aVL aVF V5-6 |

(REPPWI) AB REPOL ABNRM, PROBABLE ISCHEMIA, DIFFUSE LEADS
ST dep, T neg, ant/lat/inf

(REPRR) AB REPOLARIZATION ABNORMALITY, PROB RATE RELATED
ST dep, T neg, tachycardia

(LLINV) AB LATERAL LEADS ARE ALSO INVOLVED
lat Q or ST-T abnormalities

ST Elevation, Myocardial Injury, Pericarditis, and Early Repolarization

(STEND) NS NONDIAGNOSTIC ST ELEVATION

(STE) NS ST ELEVATION, SUBEPICARDIAL INJURY

(MSTEA) ON MINIMAL ST ELEVATION, ANTERIOR LEADS
ST >0.08 mV, V1-V4

(MSTEL) ON MINIMAL ST ELEVATION, LATERAL LEADS
ST >0.07 mV, I aVL V5 V6

(MSTEAL) ON MINIMAL ST ELEVATION, ANTEROLATERAL LEADS
ST >0.06 mV, I aVL V2-V6

(MSTEI) ON MINIMAL ST ELEVATION, INFERIOR LEADS
ST >0.06 mV, II III aVF

(MSTED) ON MINIMAL ST ELEVATION, DIFFUSE LEADS
ST >0.10 mV, ant/lat/inf

(BSTE) BO BORDERLINE ST ELEVATION
ST >0.10 mV in 2 leads

(BSTEAL) BO BORDERLINE ST ELEVATION, ANTERIOR LEADS
ST >0.10 mV in V1-V4

| | | |
|----------|----|--|
| (STELVH) | BO | ANTERIOR ST ELEVATION, PROBABLY DUE TO LVH ST >0.20 mV in V1-V4 & LVH |
| (BSTEL) | BO | BORDERLINE ST ELEVATION, LATERAL LEADS ST >0.06 mV, I aVL V5 V6 |
| (BSTEAL) | BO | BORDERLINE ST ELEVATION, ANTEROLATERAL LEADS ST >0.06 mV, I aVL V2-V6 |
| (BSTEI) | BO | BORDERLINE ST ELEVATION, INFERIOR LEADS ST >0.06 mV, II III aVF |
| (PERI) | AB | ST ELEVATION SUGGESTS PERICARDITIS ST >0.06 mV, ant/lat/inf |
| (CINJI) | AB | ST ELEVATION, CONSIDER INFERIOR INJURY ST >0.08 mV, II III aVF |
| (CINJA) | AB | ST ELEVATION, CONSIDER ANTERIOR INJURY ST >0.15 mV, V1-V5 |
| (CINJL) | AB | ST ELEVATION, CONSIDER LATERAL INJURY ST >0.10 mV, I aVL V5 V6 |
| (CINJAL) | AB | ST ELEVATION, CONSIDER ANTEROLATERAL INJURY ST >0.15 mV, I aVL V2-V6 |
| (EREPOL) | NO | ST ELEV, PROBABLE NORMAL EARLY REPOL PATTERN ST elevation, age<55 |
| (PERI1) | AB | ST ELEVATION SUGGESTS PERICARDITIS ST >0.10 mV, ant/lat/inf |

Tall T Waves

| | | |
|-------|----|--------------|
| (TTW) | NS | TALL T WAVES |
|-------|----|--------------|

| | | | |
|---------|----|---|----------------------|
| (TTW10) | BO | TALL T, CONSIDER METABOLIC/ISCHEMIC ABNRM | T >1.2 mV |
| (TTW20) | BO | TALL T WAVES, CONSIDER HYPERKALEMIA | widespread tall T |
| (TTW30) | ON | TALL T WAVES, PROBABLY NORMAL VARIANT | T >1.2 mV, age 16-30 |

QT Abnormalities, Electrolyte Disturbance, and Drug Effects

| | | | |
|---------|----|--|----------------------------------|
| (SQT) | ON | SHORT QT INTERVAL | QTc <340 mS |
| (HPRCA) | BO | SHORT QT INTERVAL, CONSIDER HYPERCALCEMIA | QTc <310 mS |
| (LQTB) | BO | BORDERLINE PROLONGED QT INTERVAL | QTc >*** mS |
| (LQTS) | AB | PROLONGED QT, PROBABLY SECONDARY TO WIDE QRS | QTc >*** mS w/ VCD/RVH/LVH |
| (LQT) | AB | PROLONGED QT INTERVAL | QTc >*** mS |
| (HPOCA) | AB | PROLONGED QT INTERVAL, CONSIDER HYPOCALCEMIA | QTc >520 mS |
| (HPOK) | AB | PROLONGED QT INTERVAL, CONSIDER HYPOKALEMIA | QTc >520 mS & ST-T abnormalities |
| (DIG1) | AB | REPOL ABNORMALITY, CONSIDER DIGITALIS EFFECT | short QTc & negative ST |
| (DIG2) | AB | REPOL ABNORMALITIES C/W DIGITALIS EFFECT | ST concave upward & digitalis |

(DIG3) AB REPOL ABNORMALITIES C/W DIGITALIS EFFECT
ST-T negative & digitalis

Pediatric Morphology

Dextrocardia

(DEXC) AB CONSIDER DEXTROCARDIA
P, QRS axis rightward

Right Atrial Abnormality

(RAE) NS RIGHT ATRIAL ENLARGEMENT

(CRAA) ON CONSIDER RIGHT ATRIAL ABNORMALITY
P >0.24 mV limb lead

(PRAA) ON PROBABLE RIGHT ATRIAL ABNORMALITY
biphasic P >0.20 mV in V1

(RAA) AB RIGHT ATRIAL ABNORMALITY
P >0.25 mV 2 lds or <-0.24 mV aVR/aVL

Left Atrial Abnormality

(LAE) NS LEFT ATRIAL ENLARGEMENT

(CLAA) ON CONSIDER LEFT ATRIAL ABNORMALITY
wide or notched P waves

(PLAA) BO PROBABLE LEFT ATRIAL ABNORMALITY
P >50 mS, <-0.10 mV V1

(PPND) BO PROMINENT P WAVES, NONDIAGNOSTIC
wide/notched/biphasic P waves

(LAA) AB LEFT ATRIAL ABNORMALITY
P, P' >60 mS, <-0.15 mV V1

Batrial Abnormality

| | | |
|---------|----|---|
| (LAACB) | AB | LAA, CONSIDER BIATRIAL ABNORMALITIES P>80mS <-.15 mV V1 & >.25 mV limb lds |
| (RAACB) | AB | RAA, CONSIDER BIATRIAL ABNORMALITIES P>0.30 mV 2 lds & <-0.30 mV aVR/aVL |
| (BAA) | AB | BIATRIAL ABNORMALITIES P>80 mS, <-0.15 mV V1 & >0.30 mV 2 lds |

QRS Axis Deviation

| | | |
|---------|----|---|
| (AXR) | ON | BORDERLINE RIGHT AXIS DEVIATION QRS axis ***-*** |
| (RAD) | ON | RIGHT AXIS DEVIATION QRS axis ***-*** |
| (AXL) | ON | BORDERLINE LEFT AXIS DEVIATION QRS axis ***-*** |
| (LAD) | ON | LEFT AXIS DEVIATION QRS axis ***-*** |
| (AXSUP) | ON | SUPERIOR QRS AXIS QRS axis (-91,240) |
| (AXIND) | ON | INDETERMINATE QRS AXIS QRS axis indeterminate |
| (S123) | ON | S1,S2,S3 PATTERN S >30 mS & >0.2 mV, I II III |

Ventricular Conduction Delays

| | | |
|---------|----|--|
| (IVCDP) | AB | NONSPECIFIC INTRAVENTRICULAR CONDUCTION DELAY QRS >*** mS |
|---------|----|--|

| | | | |
|----------|----|--------------------------------------|------------------------------------|
| (LAFBP) | AB | LEFT ANTERIOR FASCICULAR BLOCK | QRS axis (-60,-90) |
| (LBBBP) | AB | LEFT BUNDLE BRANCH BLOCK | QRSd >*** mS, late forces leftward |
| (IRBBTA) | BO | INCOMPLETE RIGHT BUNDLE BRANCH BLOCK | RSR' in V1, late forces anterior |
| (IRBBBP) | BO | INCOMPLETE RIGHT BUNDLE BRANCH BLOCK | QRSd >***, RSR' or pure R |
| (RBBBP) | AB | RIGHT BUNDLE BRANCH BLOCK | QRSd >***, RSR' or pure R or QR |
| (RBBBM) | AB | MARKED RIGHT BUNDLE BRANCH BLOCK | QRSd >160 mS |
| (RLAFBP) | AB | RBBB AND LAFB | QRSd >90, QRS (-60,-90) |
| (IVCD) | NS | INTRAVENTRICULAR CONDUCTION DELAY | |

Right Ventricular Hypertrophy

| | | | |
|----------|----|--|---------------------------------|
| (RSRNV) | NO | RSR' IN V1, NORMAL VARIATION | term-vector post-rightward |
| (IRBBRV) | BO | IRBBB, THE RSR' PATTERN MAY ALSO REFLECT RVH | IRBBB, R or R' >0.5 mV in V1-V3 |
| (RVHS6) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | S <*** mV in V6 |
| (RVHS5) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | S <*** mV in V5 |

| | | |
|----------|----|--|
| (RVHRS6) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY R/S <*** in V6 |
| (RVHTA) | AB | CONSIDER RIGHT VENTRICULAR HYPERTROPHY late forces posterior rightward |
| (RVHA) | AB | RIGHT AXIS DEVIATION, CONSIDER RVH frontal & init-horiz'l axis right |
| (RVHRP1) | AB | CONSIDER RIGHT VENTRICULAR HYPERTROPHY R' >0.5 mV in V1 |
| (RVHRS) | AB | CONSIDER RIGHT VENTRICULAR HYPERTROPHY R V1 + S V5 >*** mV |
| (RVHR1) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY prominent R>*** V1 or *** V2 |
| (RVHPR1) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY pure R>*** mV in V1 |
| (RVHT1) | AB | UPRIGHT T IN V1 OR V2, PROBABLE RVH T >0.10 V1, 3d-9y |
| (RVHRD) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY RAD & 1 of R/R'1/2, S5/6, R1S5 ,T1 |
| (RVHQR) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY QR pattern V1, 0h-2d |
| (RVH2V) | AB | RIGHT VENTRICULAR HYPERTROPHY 2 of R/R'V1/2, SV5/6, RV1SV5, TV1 |
| (RVHAT) | AB | RIGHT VENTRICULAR HYPERTROPHY RAD & upright T |
| (RVHVT) | AB | RIGHT VENTRICULAR HYPERTROPHY TV1 & 1 of R/R'V1/2, SV5/6, R1S5 |

(RVHQRV) AB RIGHT VENTRICULAR HYPERTROPHY
QRV1 & 1 of R/R'V1/2, SV5/6, R1S5

(RVHQR3) AB RIGHT VENTRICULAR HYPERTROPHY
QR pattern V1, 3d-15y

Left Septal Hypertrophy

(LSHC) AB PROMINENT Q, CONSIDER LEFT SEPTAL HYPERTROPHY
deep Q in V5-6

(LSH) AB LEFT SEPTAL HYPERTROPHY
deep Q in V5-6, tall R in V1

Left Ventricular Hypertrophy

(LVHQ) BO CONSIDER LEFT VENTRICULAR HYPERTROPHY
deep Q in V5-6 or II III aVF

(LVHTA) BO CONSIDER LEFT VENTRICULAR HYPERTROPHY
prominent leftward forces

(LVHR6) BO LVH BY VOLTAGE
R >*** mV in V6

(LVHS12) BO LVH BY VOLTAGE
S <*** in V1 or *** in V2

(LVHRS) BO CONSIDER LEFT VENTRICULAR HYPERTROPHY
RV6+SV1 >*** mV

(LVHQR) AB PROBABLE LEFT VENTRICULAR HYPERTROPHY
Q>0.4 & R >*** in V5 or *** in V6

(LVHQV) AB PROBABLE LEFT VENTRICULAR HYPERTROPHY
Q56/II-aVF & 1 of S1/2, R6, S1R6

| | | |
|----------|----|--|
| (LVHSTE) | AB | REPolarization Abnormality suggests LVH ST>0.1 mV, T>1.0 mV, I aVL V4-6 |
| (LVHSTD) | AB | REPolarization Abnormality suggests LVH ST<-0.01 mV, T<-0.05, I aVL V4-6 |
| (LVHR) | AB | REPolarization Abnormality suggests LVH ST dep, T neg, I aVL V4-V6 |
| (LVHVA) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY LAD & 1 of SV1/2, RV6, SV1+RV6 |
| (LVHP) | AB | PROBABLE LVH W/ SECONDARY REPOL ABNORMALITIES LAD, S1/2, R6, S1R6 & repol abnrm |
| (LVHEV) | AB | LEFT VENTRICULAR HYPERTROPHY extreme leftward forces |
| (LVHVAQ) | AB | LEFT VENTRICULAR HYPERTROPHY LAD, Q or 1 of SV1/2, RV6, SV1RV6 |
| (LVHRE) | AB | LVH W/ SECONDARY REPolarization Abnormalities LAD, Q/SV12/RV6/S1R6, repol abnrm |

Biventricular Hypertrophy

| | | |
|---------|----|---|
| (LCRVH) | AB | LVH BY VOLTAGE, ALSO CONSIDER RVH R >1 V1 & 1 of SV1/2, RV6, SV1RV6 |
| (RCLVH) | AB | RVH, CONSIDER ASSOCIATED LVH RVH & Q<-.07 mV, R >1 mV V6 |
| (BVHVC) | AB | CONSIDER BIVENTRICULAR HYPERTROPHY LVH & 1 of R/R'1/2, S5/6, R1+S5, T1 |
| (BVHC) | AB | CONSIDER BIVENTRICULAR HYPERTROPHY R + S >6.0 mV in 2 of V2-V4 |

(BVHPED) AB BIVENTRICULAR HYPERTROPHY
R/R'1/2, S5/6, R1S5 & S1/2, R6, S1R6

Low Voltage

(LVOLFB) ON BORDERLINE LOW VOLTAGE IN FRONTAL LEADS
all frontal leads <0.6 mV

(LVOLF) ON LOW VOLTAGE IN FRONTAL LEADS
all frontal leads <0.5 mV

(LVOLT) BO LOW VOLTAGE THROUGHOUT
frontal<0.5 mV, precordial<1.0 mV

(LVORAD) BO LOW VOLTAGE WITH RIGHT AXIS DEVIATION
low voltage, RAD

Q Wave Abnormality and Myocardial Infarct

(PQIN) BO BORDERLINE Q WAVES IN INFERIOR LEADS
Qs add to 80 mS in II III aVF

(PQLA) BO BORDERLINE Q WAVES IN LATERAL LEADS
Q >35 mS in I aVL V5 V6

(PQAN) BO BORDERLINE Q WAVE IN ANTERIOR LEADS
Q >30 mS in V2-V5

(PQAL) BO BORDERLINE Q WAVE IN ANTEROLATERAL LEADS
Q >35 mS, I aVL V3-V6

(PIMI) AB ABNORMAL Q SUGGESTS INFERIOR INFARCT
Q >35 mS in II III aVF

(PLMI) AB ABNORMAL Q SUGGESTS LATERAL INFARCT
Q >35 mS in I aVL V5 V6

| | | | |
|---------|----|---|---------------------|
| (PASMI) | AB | ABNORMAL Q SUGGESTS ANTEROSEPTAL INFARCT | Q >30 mS in V1 V2 |
| (PAMI) | AB | ABNORMAL Q SUGGESTS ANTERIOR INFARCT | Q >30 mS in V2-V4 |
| (PALMI) | AB | ABNORMAL Q SUGGESTS ANTEROLATERAL INFARCT | Q>30 mS I aVL V4-V6 |

ST Depression

| | | | |
|---------|----|--|------------------------------------|
| (NDSTD) | NS | NONDIAGNOSTIC ST DEPRESSION | |
| (SDANP) | BO | NONSPECIFIC ST DEPRESSION, ANTERIOR LEADS | ST <-0.10 mV, V2-V5 |
| (SDINP) | BO | NONSPECIFIC ST DEPRESSION, INFERIOR LEADS | ST <-0.10 mV, II III aVF |
| (SDALP) | BO | NONSPECIFIC ST DEPRESSION, ANTEROLATERAL LDS | ST <-0.10 mV, I aVL V2-V6 |
| (SDPRR) | AB | ST DEPRESSION, PROBABLY RATE RELATED | ST <-0.10 mV & extreme tachycardia |

T Wave Abnormality

| | | | |
|---------|----|--|--------------------|
| (PUW) | NS | PROMINENT U WAVES | |
| (TIN1) | AB | ABNORMAL T WAVES, INFERIOR LEADS | T neg, II III aVF |
| (TAS1) | AB | ABNORMAL T WAVES, ANTEROSEPTAL LEADS | T neg, V1 V2 V3 |
| (TARVH) | BO | ABNORMAL T, PROB SECONDARY TO RVH, ANT LEADS | RVH & T neg, V1-V3 |

| | | | |
|--------|----|---------------------------------------|--------------------|
| (TAN1) | AB | ABNORMAL T WAVES, ANTERIOR LEADS | T neg, V1-V5 |
| (TLA1) | AB | ABNORMAL T WAVES, LATERAL LEADS | T neg, I aVL V5-V6 |
| (TAL1) | AB | ABNORMAL T WAVES, ANTEROLATERAL LEADS | T neg, I aVL V2-V6 |

Repolarization Abnormality

| | | | |
|----------|----|---|---------------------------------|
| (ISCAS) | NS | REPOLARIZATION ABNORMALITIES SUGGEST ANTEROSEPTAL ISCHEMIA | |
| (ISCIL) | NS | REPOLARIZATION ABNORMALITIES SUGGEST INFEROLATERAL ISCHEMIA | |
| (ISCPS) | NS | REPOLARIZATION ABNORMALITIES SUGGEST POSTERIOR ISCHEMIA | |
| (REPB) | BO | BORDERLINE REPOLARIZATION ABNORMALITY | ST dep & abnormal T |
| (REPBAN) | BO | BORDERLINE REPOL ABNORMALITY, ANT LEADS | ST dep, T flat/neg, V2-V4 |
| (REPBLA) | BO | BORDERLINE REPOL ABNORMALITY, LATERAL LEADS | ST dep, T flat/neg, I aVL V5 V6 |
| (REPBAL) | BO | BORDERLINE REPOL ABNORMALITY, ANT-LAT LEADS | ST dep, T flat/neg, I aVL V2-V6 |
| (REPBIN) | BO | BORDERLINE REPOL ABNORMALITY, INFERIOR LEADS | ST dep, T flat/neg, II III aVF |
| (REPBIL) | BO | BORDERLINE REPOL ABNORMALITY, INF-LAT LEADS | ST dep, T flat/neg, inf/lat |

| | | |
|----------|----|---|
| (REPBDI) | BO | BORDERLINE REPOL ABNORMALITY, DIFFUSE LEADS ST dep, T flat/neg, ant/lat/inf |
| (REPNS) | AB | NONSPECIFIC REPOLARIZATION ABNORMALITIES ST dep, T neg, 2-3 leads |
| (REPAN) | AB | NONSPECIFIC REPOL ABNORMALITY, ANTERIOR LEADS ST dep, T neg, V2-V4 |
| (REPLA) | AB | NONSPECIFIC REPOL ABNORMALITY, LATERAL LEADS ST dep, T neg, I aVL V5 V6 |
| (REPAL) | AB | NONSPECIFIC REPOL ABNORMALITY, ANT-LAT LEADS ST dep, T neg, I aVL V2-V6 |
| (REPLVH) | AB | REPOL ABNORMALITY PROBABLY SECONDARY TO LVH ST dep, T neg, I aVL V2-V6 |
| (REPIN) | AB | NONSPECIFIC REPOL ABNORMALITY, INFERIOR LEADS ST dep, T neg, II III aVF |
| (REPIL) | AB | NONSPECIFIC REPOL ABNORMALITY, INF-LAT LEADS ST dep, T neg, I-III aVL aVF V5-6 |
| (REPDI) | AB | NONSPECIFIC REPOL ABNORMALITY, DIFFUSE LEADS ST dep, T flat/neg, ant/lat/inf |

ST Elevation, Myocardial Injury, Pericarditis, and Early Repolarization

| | | |
|---------|----|--|
| (STEND) | NS | NONDIAGNOSTIC ST ELEVATION |
| (SEANP) | NO | ST ELEV, PROBABLY NORMAL VARIATION, ANT LEADS ST>0.15 mV, V2-V5 |
| (SEINP) | NO | ST ELEVATION, PROBABLY NORMAL VARIATION, INF ST>0.15 mV, II III aVF |

(SEALP) NO ST ELEVATION, PROB NORMAL VARIATION, ANT-LAT
ST >0.15 mV, I aVL V2-V6

(PERI) AB ST ELEVATION SUGGESTS PERICARDITIS
ST >0.06 mV, ant/lat/inf

(EREPOL) NO ST ELEV, PROBABLE NORMAL EARLY REPOL PATTERN
ST elevation, age<55

Tall T Waves

(TTW) NS TALL T WAVES

(TTW1) ON TALL T, PROBABLY NORMAL VARIANT, ANT-LAT LDS
T >1.0 mV, I aVL V2-V6

QT Abnormality and Electrolyte Disturbance

(SQT) ON SHORT QT INTERVAL
QTc <340 mS

(HPRCA) BO SHORT QT INTERVAL, CONSIDER HYPERCALCEMIA
QTc <310 mS

(LQTB) BO BORDERLINE PROLONGED QT INTERVAL
QTc >*** mS

(LQTS) AB PROLONGED QT, PROBABLY SECONDARY TO WIDE QRS
QTc >*** mS w/ VCD/RVH/LVH

(LQT) AB PROLONGED QT INTERVAL
QTc >*** mS

(HPOCA) AB PROLONGED QT INTERVAL, CONSIDER HYPOCALCEMIA
QTc >520 mS

(HPOK) AB PROLONGED QT INTERVAL, CONSIDER HYPOKALEMIA
QTc >520 mS & ST-T abnormalities

Congenital Heart Defects

| | | | |
|---------|----|--|----------------------------------|
| (ARVO) | NS | ACUTE RIGHT VENTRICULAR OVERLOAD | |
| (ACP) | NS | ACUTE COR PULMONALE | |
| (ASD) | NS | ATRIAL SEPTAL DEFECT | |
| (AVSD) | NS | ATRIOVENTRICULAR SEPTAL DEFECT | |
| (CM) | NS | CARDIOMYOPATHY | |
| (CTA) | AB | CONSIDER TRICUSPID ATRESIA | RAA, LAD & LVH |
| (CECD) | AB | CONSIDER ENDOCARDIAL CUSHION DEFECT | axis(-30,-170), RVH or RBBB |
| (CASD) | AB | CONSIDER ATRIAL SEPTAL DEFECT, SEPTUM SECUNDUM | QRS(1,180), RSR' in V1 |
| (CAOCA) | AB | PROB ANT-LAT INFARCT, CONS ANOM ORIG OF C. A. | T <-0.1 mV, Q >30 mS, I aVL V4-6 |
| (CEA) | AB | CONSIDER EBSTEIN ANOMALY | RAA, RBBB, R' <1.0 mV in V1 |

Technical Quality

| | | | |
|----------|----|---|--|
| (AGEUNK) | NS | AGE IS NOT ENTERED, ASSUMED TO BE AGE *** YEARS OLD FOR PURPOSE OF ECG INTERPRETATION | |
| (PLMP) | NS | PRECARDIAL LEADS MISPLACED | |
| (PLRV) | NS | PRECARDIAL LEAD REVERSAL | |
| (LALLV) | NS | LEFT ARM AND LEFT LEG LEAD REVERSAL | |

(ECGSIM) DE INPUT FROM ECG SIMULATOR OR V1-V4 SHORTED ...
NO ANALYSIS PERFORMED

(NAPHF) DE NO ANALYSIS DUE TO POSSIBLE HARDWARE FAILURE
Channels 1, 2, 3 identical

(TPT) DE TECHNICALLY POOR TRACING - PLEASE REPEAT ECG!

(RALARV) DE RIGHT AND LEFT ARM LEADS REVERSED, PLEASE REPEAT
ECG

(12ML) DE ALL 12 LEADS ARE MISSING

(MISLDS) NS INCOMPLETE ANALYSIS DUE TO MISSING DATA IN
PRECARDIAL LEAD(S)

(MAGNET) NS ECG ACQUIRED WITH MAGNET IN PLACE

(NFAMLD) DE NO FURTHER ANALYSIS ATTEMPTED FOR THIS ECG - NOT
ENOUGH LEADS COULD BE MEASURED

(QMA04) NS LEAD(S) *LEAD* WERE NOT USED FOR MORPHOLOGY
ANALYSIS

(QMART) NS ARTIFACT IN LEAD(S) *LEAD*

(QMBW) NS BASELINE WANDER IN LEAD(S) *LEAD*

(QMAB) NS ARTIFACT IN LEAD(S) *LEAD* AND BASELINE WANDER IN
LEAD(S) *LEAD*

(QMMLD) NS MISSING LEAD(S) *LEAD*

(PSREC) NS RECONSTRUCTED PACER SPIKES IN LD(S) *LEAD*
bedside recording

Interpretive Statements (Alphabetical)

Introduction

This chapter contains an alphabetical listing (by statement code) of all of the interpretive statements available in the Philips 12-Lead Algorithm.

See Appendix B “Interpretive Statements (by Category)” for a description of the interpretive statement format and a table of severity codes.

Numeric

| | | | |
|---------|----|---------------------------------|-----------------------------------|
| (1AVB) | AB | FIRST DEGREE AV BLOCK | PR >***, V-rate ***-*** |
| (2AVB) | AB | SECOND DEGREE AV BLOCK | multiple P waves |
| (2AVBA) | NS | ADVANCED SECOND DEGREE AV BLOCK | |
| (2AVB2) | AB | PREDOMINANT 2:1 AV BLOCK | most complexes 2 Ps |
| (2AVB3) | AB | PREDOMINANT 3:1 AV BLOCK | most complexes 3 Ps |
| (2AVB4) | AB | PREDOMINANT 4:1 AV BLOCK | most complexes 4 Ps |
| (2AVBV) | AB | VARYING SECOND DEGREE AV BLOCK | multiple Ps, varied AV conduction |

(3AVB) AB COMPLETE AV BLOCK, A-RATE ***
V-rate<45, AV dissociation

(3AVBFF) AB A-FLUTTER/FIBRILLATION W/ COMPLETE AV BLOCK
A-rate>220, V-rate<***, AV dissoc

(3AVBIR) AB COMPLETE AV BLOCK WITH WIDE QRS COMPLEX
V-rate<***, QRSd>***, AV dissoc

A

(A2AVB) AB ALTERNATING SECOND DEGREE AV BLOCK
alternating long R-R, multiple Ps

(AAI) NS RHYTHM CONSISTENT WITH AAI PACING

(ABAPC) NS ABERRANTLY CONDUCTED ATRIAL PREMATURE COMPLXS

(ABC) ON ABERRANT COMPLEX
small R-R variation, aberrant QRS

(ABCS) ON ABERRANT COMPLEX, POSSIBLY SUPRAVENTRICULAR
aberrant shape, PR 80-220

(ABVPC) AB ATRIAL-BIVENTRICULAR PACED RHYTHM
non-simultaneous bi-vent pacing

(ACP) NS ACUTE COR PULMONALE

(AFIB) AB ATRIAL FIBRILLATION RATE, V RATE ***-***
var'd rate, irreg atrial activity

(AFIB0) AB ATRIAL FIBRILLATION
? Atrial activity

(AFIBT) AB ATRIAL FIBRILLATION WITH RAPID V-RATE
A-rate>240, V-rate>(180-age)

(AFL2) AB ATRIAL FLUTTER WITH 2:1 AV BLOCK
A-rate 220-340, V-rate>***

(AFLT) AB ATRIAL FLUTTER, A-RATE ***
A-rate 220-340

(AFLT2) AB A-FLUTTER W/ PREDOM 2:1 AV BLOCK, A-RATE ***
A-rate 220-340, multiple Ps

(AFLT3) AB A-FLUTTER W/ PREDOM 3:1 AV BLOCK, A-RATE ***
A-rate 220-340, multiple Ps

(AFLT4) AB A-FLUTTER W/ PREDOM 4:1 AV BLOCK, A-RATE ***
A-rate 220-340, multiple Ps

(AFLTV) AB A-FLUTTER W/ VARIED AV BLOCK, A-RATE ***
A-rate 220-340, var'd AV conduc'n

(ALBBB) AB IVCD, CONSIDER ATYPICAL LBBB
QRSd>***, notch/slur R I aVL V5-6

(ALI) NS ANTEROLATERAL INFARCT

(ALI10) AB CONSIDER ANTEROLATERAL INFARCT
Q >30 mS, I aVL V3-V6

(ALI20) AB PROBABLE ANTEROLATERAL INFARCT, AGE INDETERM
Q >30 mS, V3-V6

(ALI24) AB PROBABLE ANTEROLATERAL INFARCT, OLD
Q >30 mS, abnormal ST-T, V2-V6

(ALI26) AB PROBABLE ANTEROLATERAL INFARCT, AGE INDETERM
Q >30 mS, T neg, V2-V6

(ALI40) AB ANTEROLATERAL INFARCT, AGE INDETERMINATE
Q >35 mS, V4-V6

- (ALI44) AB ANTEROLATERAL INFARCT, OLD
Q >35 mS, abnormal ST-T, V2-V6
- (ALI46) AB ANTEROLATERAL INFARCT, AGE INDETERMINATE
Q >35 mS, T neg, V2-V6
- (ALI48) BO ANTEROLATERAL Q WAVES, PROBABLY DUE TO LVH
Q >35 mS in V4-V6 & LVH
- (ALI49) BO ANTEROLATERAL Q WAVE, PROBABLY NORMAL FOR AGE
Q >35 mS, age<31 male, <40 female
- (ALI50) AB PROBABLE ANTEROLATERAL INFARCT, ACUTE
ST >0.15 mV, Q >30 mS, V2-V5
- (ALI54) AB PROBABLE ANTEROLATERAL INFARCT, RECENT
Q >30 mS, ST >0.07 mV, T neg, V2-V6
- (ALI64) AB ANTEROLATERAL INFARCT, OLD
Q>35 mS & >.10 mV, abnrm ST-T, V3-V6
- (ALI66) AB ANTEROLATERAL INFARCT, AGE INDETERMINATE
Q >35 mS & >0.10 mV, T neg, V3-V6
- (ALI67) AB ANTEROLATERAL INFARCT, POSSIBLY ACUTE
Q >35 mS, ST >0.15 mV, V2-V6
- (ALI86) AB EXTENSIVE ANTERIOR INFARCT, AGE INDETERMINATE
Q >35 mS, flat/neg T, V1-V6
- (ALI88) AB EXTENSIVE ANTERIOR INFARCT, POSSIBLY ACUTE
Q >35 mS, ST >0.15 mV, V1-V6
- (ALI94) AB EXTENSIVE ANTERIOR INFARCT, RECENT
Q >35 mS, ST >0.07 mV, T neg, V1-V6
- (ALIA) AB ANTEROLATERAL INFARCT, ACUTE
Q >35 mS, ST >0.20 mV, V2-V6

| | | |
|---------|----|---|
| (ALIEA) | AB | ANTEROLATERAL INJURY, EARLY ACUTE INFARCT ST >0.15 mV, I aVL V2-V6 |
| (ALIQ) | AB | ANTEROLATERAL INFARCT, AGE INDETERMINATE Q >35 mS & >0.10 mV in V3-V6 |
| (ALIR) | AB | ANTEROLATERAL INFARCT, RECENT Q >35 mS, ST >0.07 mV, T neg, V2-V6 |
| (AMI) | NS | ANTERIOR INFARCT |
| (AMI1) | BO | BORDERLINE R WAVE PROGRESSION, ANTERIOR LEADS R < 0.15 mV |
| (AMI3) | BO | Q WAVE IN V1 Q >15 mS in V1 |
| (AMI4) | AB | ABNRM R PROG, CONSIDER ASMI OR LEAD PLACEMENT Q >30 mS, diminished R, V2 |
| (AMI8) | AB | CONSIDER ANTEROSEPTAL INFARCT Q >30 mS, V1 V2 |
| (AMI10) | AB | CONSIDER ANTEROSEPTAL INFARCT, POSSIBLY ACUTE Q >30 mS, dimin R, ST>0.15 mV, V1-V3 |
| (AMI12) | AB | CONSIDER ANT-SEPT INFARCT, POSSIBLY RECENT Q, dim R, ST>0.15 mV, T neg, V1-V3 |
| (AMI14) | AB | PROBABLE ANTEROSEPTAL INFARCT, OLD Q >30 mS, V1 V2 |
| (AMI16) | AB | ANTERIOR Q WAVES, POSSIBLY DUE TO ILBBB Q >30 mS, V1 V2 & ILBBB |
| (AMI17) | AB | ANTERIOR Q WAVES, POSSIBLY DUE TO LVH Q >30 mS, V1 V2 & LVH |

| | | |
|----------|----|--|
| (AMI20) | AB | PROBABLE ANTEROSEPTAL INFARCT, OLD Q >30 mS & abn ST-T, V1-V3 |
| (AMI21) | AB | PROBABLE ANTEROSEPTAL INFARCT, AGE INDETERM Q >30 mS, T neg, V1-V3 |
| (AMI21A) | AB | PROBABLE ANTEROSEPTAL INFARCT, ACUTE Q >30 mS, ST>0.15 mV, V1-V3 |
| (AMI22) | AB | ANT-SEPT INJURY, PROBABLE EARLY ACUTE INFARCT ST >0.40 mV V1-V3 |
| (AMI26) | AB | ANTEROSEPTAL INFARCT, RECENT Q >30 mS, ST >0.15 mS, T neg, V1-V3 |
| (AMI30) | AB | PROBABLE ANTERIOR INFARCT, ACUTE Q >30 mS, ST >0.15 mV, V1-V4 |
| (AMI32) | AB | ANTERIOR INFARCT, ACUTE Q >30 mS, ST >0.25 mV, V1-V4 |
| (AMI34) | AB | PROBABLE ANTERIOR INFARCT, RECENT Q >30 mS, ST >0.15 mV, T neg, V2-V4 |
| (AMI36) | AB | ANTERIOR INFARCT, RECENT Q >30 mS, ST >0.15 mV, T neg, V1-V4 |
| (AMI41) | BO | CONSIDER ANTERIOR INFARCT diminished R <0.15 mV V3 |
| (AMI44) | BO | CONSIDER ANTERIOR INFARCT Q >30 mS in V3 |
| (AMI48) | BO | CONSIDER ANTERIOR INFARCT diminished R <0.15 mV in V4 |
| (AMI49) | BO | CONSIDER ANTERIOR INFARCT Q >30 mS in V4 |

(AMI50) AB PROBABLE ANTERIOR INFARCT, ACUTE
Q >30 mS, dim R, ST >0.15 mV, T neg

(AMI52) AB PROBABLE ANTERIOR INFARCT, RECENT
Q >30 mS, dim R, ST >0.15 mV, T neg

(AMI54) AB ANTERIOR INFARCT, AGE INDETERMINATE
Q >30 mS in V2 V3

(AMI57) AB ANTERIOR Q WAVES, POSSIBLY DUE TO LVH
Q >30 mS in V1-V3 & LVH

(AMI60) AB ANTERIOR INFARCT, OLD
Q >30 mS, abnormal ST-T, V2-V5

(AMI61) AB ANTERIOR INFARCT, AGE INDETERMINATE
Q >30 mS, T neg, V2-V5

(AMI61A) AB ANTERIOR INFARCT, POSSIBLY ACUTE
Q >30 mS, ST >0.15 mV, V1-V5

(AMI66) AB ANTERIOR INFARCT, RECENT
Q >30 mS, ST >0.15 mV, T neg, V1-V5

(AMIA) AB ANTERIOR INFARCT, ACUTE
ST >0.25 mV, T neg, V1-V5

(AMIEA) AB ANTERIOR INJURY, EARLY ACUTE INFARCT
ST >0.35 mV in V1-V5

(AMIQ) AB ANTERIOR INFARCT, AGE INDETERMINATE
Q >30 mS in V2-V5

(AOO) NS RHYTHM CONSISTENT WITH AOO PACING

(APACE) AB ATRIAL-PACED RHYTHM

| | | | |
|----------|----|---|------------------------------------|
| (APACEC) | AB | ATRIAL-PACED COMPLEXES | other complexes also detected |
| (APACED) | AB | A-PACED COMPLEXES WITH SOME INHIBITION | non-paced complexes also detected |
| (APC) | ON | ATRIAL PREMATURE COMPLEX | SV complex w/ short R-R interval |
| (ARBBB) | AB | IVCD, CONSIDER ATYPICAL RBBB | QRSD>120 mS, terminal axis(90,270) |
| (ARVO) | NS | ACUTE RIGHT VENTRICULAR OVERLOAD | |
| (ARYP) | AB | POSSIBLE ATRIAL ARRHYTHMIA, A-RATE *** | multiple Ps |
| (ASD) | NS | ATRIAL SEPTAL DEFECT | |
| (ASMI) | NS | ANTEROSEPTAL INFARCT | |
| (ASMIA) | AB | ANTEROSEPTAL INFARCT, ACUTE | Q >30 mS, ST >0.25 mV, V1-V3 |
| (ASMIQ) | NS | ANTEROSEPTAL INFARCT, AGE INDETERMINATE | |
| (ASVP) | AB | ATRIAL-SENSED VENTRICULAR-PACED RHYTHM | ventricular pacing tracks p-waves |
| (ASVPC) | AB | ATRIAL-SENSED VENTRICULAR-PACED COMPLEXES | other complexes also detected |
| (AVDIS) | AB | AV DISSOCIATION | PR variation>15% |
| (AVDP) | AB | ATRIAL-VENTRICULAR DUAL-PACED RHYTHM | |

(AVDPC) AB ATRIAL-VENTRICULAR DUAL-PACED COMPLEXES
other complexes also detected

(AVDPCF) AB DUAL-PACEMAKER W/ A-NONCAPT DUE TO AFIB/FLUT
other complexes and A-rate>240

(AVDPF) AB DUAL-PACEMAKER W/ A-NONCAPT DUE TO AFIB/FLUT
dual pacing with A-rate>240

(AVSD) NS ATRIOVENTRICULAR SEPTAL DEFECT

(AXIND) ON INDETERMINATE QRS AXIS
QRS axis indeterminate

(AXL) ON BORDERLINE LEFT AXIS DEVIATION
QRS axis (***-***)

(AXPST) BO MARKEDLY POSTERIOR QRS AXIS
late V-lead transition

(AXR) ON BORDERLINE RIGHT AXIS DEVIATION
QRS axis (***-***)

(AXSUP) ON SUPERIOR QRS AXIS
QRS axis (-91,240)

B

(BAA) AB BIATRIAL ABNORMALITIES
P>80 mS, <-0.15 mV V1 & >0.30 mV 2 lds

(BAVCD) BO BORDERLINE AV CONDUCTION DELAY
PR >***, V-rate ***-***

(BIVCD) ON BORDERLINE INTRAVENTRICULAR CONDUCTION DELAY
QRSd >*** mS

| | | |
|----------|----|---|
| (BIVCDL) | BO | BORDERLINE IVCD WITH LAD QRSd >*** mS, axis(-90,-30) |
| (BSTE) | BO | BORDERLINE ST Elevation ST >0.10 mV in 2 leads |
| (BSTEAL) | BO | BORDERLINE ST ELEVATION, ANTERIOR LEADS ST >0.10 mV in V1-V4 |
| (BSTEAL) | BO | BORDERLINE ST ELEVATION, ANTEROLATERAL LEADS ST >0.06 mV, I aVL V2-V6 |
| (BSTEI) | BO | BORDERLINE ST ELEVATION, INFERIOR LEADS ST >0.06 mV, II III aVF |
| (BSTEAL) | BO | BORDERLINE ST ELEVATION, LATERAL LEADS ST >0.06 mV, I aVL V5 V6 |
| (BVH) | AB | BIVENTRICULAR HYPERTROPHY R/R'1 & R56L/RISIII/S12R56/S3RaVL |
| (BVHC) | AB | CONSIDER BIVENTRICULAR HYPERTROPHY R + S >6.0 mV in 2 of V2-V4 |
| (BVHPED) | AB | BIVENTRICULAR HYPERTROPHY R/R'1/2, S5/6, R1S5 & S1/2, R6, S1R6 |
| (BVHVC) | AB | CONSIDER BIVENTRICULAR HYPERTROPHY LVH & 1 of R/R'1/2, S5/6, R1+S5, T1 |
| (BVPACE) | AB | BIVENTRICULAR PACED RHYTHM non-simultaneous bi-vent pacing |
| (BWRV) | BO | BRADYCARDIA WITH IRREGULAR RATE ***-*** mean V-rate<***, variation>8% |

C

| | | |
|----------|----|---|
| (CAFBI) | AB | LAD, CONSIDER LAFB OR INFERIOR INFARCT axis(240,-30), Q&R II III aVF |
| (CAOCA) | AB | PROB ANT-LAT INFARCT, CONS ANOM ORIG OF C. A. T <-0.1 mV, Q >30 mS, I aVL V4-6 |
| (CASD) | AB | CONSIDER ATRIAL SEPTAL DEFECT, SEPTUM SECUNDUM QRS(1,180), RSR' in V1 |
| (CEA) | AB | CONSIDER EBSTEIN ANOMALY RAA, RBBB, R' <1.0 mV in V1 |
| (CECD) | AB | CONSIDER ENDOCARDIAL CUSHION DEFECT axis(-30,-170), RVH or RBBB |
| (CINJA) | AB | ST ELEVATION, CONSIDER ANTERIOR INJURY ST >0.15 mV, V1-V5 |
| (CINJAL) | AB | ST ELEVATION, CONSIDER ANTEROLATERAL INJURY ST >0.15 mV, I aVL V2-V6 |
| (CINJI) | AB | ST ELEVATION, CONSIDER INFERIOR INJURY ST >0.08 mV, II III aVF |
| (CINJL) | AB | ST ELEVATION, CONSIDER LATERAL INJURY ST >0.10 mV, I aVL V5 V6 |
| (CIPMI) | AB | CONSIDER INFEROPOSTERIOR INFARCT inf Q, ant R or ST dep V1-3 |
| (CLAA) | ON | CONSIDER LEFT ATRIAL ABNORMALITY wide or notched P waves |
| (CLAFB) | AB | LAD, CONSIDER LEFT ANTERIOR FASCICULAR BLOCK axis(240,-40), S>R II III aVF |
| (CM) | NS | CARDIOMYOPATHY |

| | | | |
|----------|----|--|-----------------------------------|
| (CPDLV) | BO | LOW VOLTAGE CONSISTENT WITH COPD | low voltage and Dx COPD |
| (CPDP) | BO | CHRONIC PULMONARY DISEASE PATTERN | P rightward, QRS small & vertical |
| (CPMI) | AB | CONSIDER POSTERIOR INFARCT | prom R & T in V1 V2 |
| (CRAA) | ON | CONSIDER RIGHT ATRIAL ABNORMALITY | P >0.24 mV limb lead |
| (CRHPI) | BO | CONSIDER RVH OR POSTERIOR INFARCT | large R in V1 |
| (CRHPIR) | BO | CONSIDER RVH OR PMI W/ SEC REPOL ABNORMALITY | large R V1, repol abnormality |
| (CRPMI) | BO | TALL R WAVE IN V2, CONSIDER RVH OR PMI | R/S ratio >3, T >0.30 mV V1 V2 |
| (CPWI) | AB | CONSIDER POSTERIOR WALL INVOLVEMENT | prominent R T in V1 V2 |
| (CRVH) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | large R or R' V1/V2 |
| (CRVHR) | AB | CONSIDER RVH W/ SECONDARY REPOL ABNORMALITY | large R in V1/V2 & repol abnrm |
| (CTA) | AB | CONSIDER TRICUSPID ATRESIA | RAA, LAD & LVH |

D

| | | |
|--------|----|---|
| (DDD) | NS | RHYTHM CONSISTENT WITH DDD PACING |
| (DDI) | NS | RHYTHM CONSISTENT WITH DDI PACING |
| (DEXC) | AB | CONSIDER DEXTROCARDIA P, QRS axis rightward |
| (DIG1) | AB | REPOL ABNORMALITY, CONSIDER DIGITALIS EFFECT short QTc & negative ST |
| (DIG2) | AB | REPOL ABNORMALITIES C/W DIGITALIS EFFECT ST concave upward & digitalis |
| (DIG3) | AB | REPOL ABNORMALITIES C/W DIGITALIS EFFECT ST-T negative & digitalis |
| (DOO) | NS | RHYTHM CONSISTENT WITH DOO PACING |
| (DVI) | NS | RHYTHM CONSISTENT WITH DVI PACING |

E

| | | |
|---------|----|---|
| (EAB) | BO | ECTOPIC ATRIAL BRADYCARDIA abnormal P axis, V-rate<*** |
| (EAMI) | NS | EXTENSIVE ANTERIOR INFARCT |
| (EAMIA) | AB | EXTENSIVE ANTERIOR INFARCT, ACUTE Q >35 mS, ST >0.15 mV, V1-V6 |
| (EAMIQ) | AB | EXTENSIVE ANTERIOR INFARCT, AGE INDETERMINATE Q >35 mS, V1-V6 |

(EAR) BO ECTOPIC ATRIAL RHYTHM
abnormal P axis, normal rate

(EAT) AB ECTOPIC ATRIAL TACHYCARDIA
abnormal P axis, V-rate>***

(EREPOL) NO ST ELEV, PROBABLE NORMAL EARLY REPOL PATTERN
ST elevation, age<55

(ET) ON EARLY PRECORDIAL R/S TRANSITION
QRS area positive in V2

(ETACH) AB EXTREME TACHYCARDIA
V-rate >(220-age)

(ETRSR1) ON RSR' IN V1 OR V2, RIGHT VCD OR RVH
QRS area positive & R' V1/V2

F

(FLFIB) AB ATRIAL FLUTTER/FIBRILLATION, A-RATE***
multiple Ps

H

(HLAR) NS HIGH LEFT ATRIAL RHYTHM

(HPOCA) AB PROLONGED QT INTERVAL, CONSIDER HYPOCALCEMIA
QTc >520 mS

(HPOK) AB PROLONGED QT INTERVAL, CONSIDER HYPOKALEMIA
QTc >520 mS & ST-T abnormalities

(HPRCA) BO SHORT QT INTERVAL, CONSIDER HYPERCALCEMIA
QTc <310 mS

| | | |
|---------|----|--|
| (HRAR) | NS | HIGH RIGHT ATRIAL RHYTHM |
| (HVOLT) | NS | HIGH QRS VOLTAGE |
| (I2AVB) | AB | INTERMITTENT SECOND DEGREE AV BLOCK long R-R with multiple Ps |
| (ILBBB) | AB | INCOMPLETE LEFT BUNDLE BRANCH BLOCK QRSd>110 mS, terminal axis(-90,-1) |
| (ILMI) | NS | INFEROLATERAL INFARCT |
| (ILMIA) | NS | INFEROLATERAL INFARCT, ACUTE |
| (ILMIQ) | NS | INFEROLATERAL INFARCT, AGE INDETERMINATE |
| (IMI) | NS | INFERIOR INFARCT |
| (IMI3) | BO | BORDERLINE INFERIOR Q WAVES Qs add to 80 mS in II III aVF |
| (IMI4) | BO | CONSIDER LAFB OR INFERIOR INFARCT Qs add to 65 mS II III aVF & LAD |
| (IMI10) | BO | CONSIDER INFERIOR INFARCT Q >35 mS in II III aVF |
| (IMI12) | BO | CONSIDER INFERIOR INFARCT Q >25 mS, initial axis(240,-30) |
| (IMI18) | BO | INFERIOR Q WAVES, PROBABLY NORMAL VARIATION Q >30 mS, age<31 male, <40 female |
| (IMI20) | AB | PROBABLE INFERIOR INFARCT, AGE INDETERMINATE Q >35 mS, II III aVF |

- (IMI22) AB PROBABLE INFERIOR INFARCT, AGE INDETERMINATE
Q >35 mS, initial axis(240,-30)
- (IMI24) AB PROBABLE INFERIOR INFARCT, OLD
Q>35 mS, abnormal ST-T, II III aVF
- (IMI26) AB PROBABLE INFERIOR INFARCT, AGE INDETERMINATE
Q>35 mS, T neg, II III aVF
- (IMI30) AB PROBABLE INFEROLATERAL INFARCT, AGE INDETERM
Q >30 mS in V5 V6 & IMI
- (IMI49M) AB PROBABLE INFERIOR INFARCT, POSSIBLY RECENT
Q>35 mS, ST>0.1 mV, T neg, II-aVF
- (IMI50) AB PROBABLE INFERIOR INFARCT, ACUTE
Q>25 mS, ST>0.10 mV, II III aVF
- (IMI54) AB PROBABLE INFERIOR INFARCT, RECENT
Q>25 mS, ST>0.07 mV, T neg, II-aVF
- (IMI62) AB INFERIOR INFARCT, AGE INDETERMINATE
Q >35 mS, initial axis(240,-30)
- (IMI64) AB INFERIOR INFARCT, OLD
Q >35 mS, flat T, II III aVF
- (IMI66) AB INFERIOR INFARCT, AGE INDETERMINATE
Q >35 mS, T neg, II III aVF
- (IMI67) AB INFERIOR INFARCT, POSSIBLY ACUTE
Q >35 mS, ST >0.10 mV, II III aVF
- (IMI74) AB INFERIOR INFARCT, RECENT
Q>35 mS, ST>0.07 mV, T neg, II-aVF
- (IMI80) AB INFERIOR Q WAVES, POSSIBLY DUE TO LBBB
Q >35 mS, II III aVF & LBBB

- (IMI81) AB INFERIOR ST ELEVATION, POSSIBLY DUE TO LBBB
ST>0.15 mV, II III aVF & LBBB
- (IMI82) AB PROBABLE INFERIOR INFARCT WITH LBBB
Q>35 mS, II III aVF & LBBB
- (IMIA) AB INFERIOR INFARCT, ACUTE
Q>35 mS, ST>0.10 mV, II III aVF
- (IMIEA) AB INFERIOR INJURY, PROBABLE EARLY ACUTE INFARCT
ST>0.15 mV, II III aVF
- (IMIQ) AB INFERIOR INFARCT, AGE INDETERMINATE
Q>35 mS, II III aVF
- (IPMI) AB INFEROPOSTERIOR INFARCT
inf Q & prom R T, ST dep V1-V3
- (IPMIA) AB INFEROPOSTERIOR INFARCT, ACUTE
ST >.10 II III aVF, <-.05 V1-V4
- (IRAFB) AB INCOMPLETE RBBB AND LAFB
axis(240,-40), S>R II III aVF
- (IRBBB) AB INCOMPLETE RIGHT BUNDLE BRANCH BLOCK
QRSd >***, terminal axis(90,270)
- (IRBBBP) BO INCOMPLETE RIGHT BUNDLE BRANCH BLOCK
QRSd >***, RSR' or pure R
- (IRBBRV) BO IRBBB, THE RSR' PATTERN MAY ALSO REFLECT RVH
IRBBB, R or R' >0.5 mV in V1-V3
- (IRBBTA) BO INCOMPLETE RIGHT RUNDLE BRANCH BLOCK
RSR' in V1, late forces anterior
- (IRPFB) AB IRBBB AND LPFB
RAD, QRSd>120, term axis(90,270)

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|----------|----|--|
| (ISCAS) | NS | REPOLARIZATION ABNORMALITIES SUGGEST ANTEROSEPTAL ISCHEMIA |
| (ISCIL) | NS | REPOLARIZATION ABNORMALITIES SUGGEST INFEROLATERAL ISCHEMIA |
| (ISCPS) | NS | REPOLARIZATION ABNORMALITIES SUGGEST POSTERIOR ISCHEMIA |
| (IVCD) | NS | INTRAVENTRICULAR CONDUCTION DELAY |
| (IVCDP) | AB | NONSPECIFIC INTRAVENTRICULAR CONDUCTION DELAY QRS >*** mS |
| (IVPC) | ON | INTERPOLATED VENTRICULAR PREMATURE COMPLEX interpolated complex, wide QRS |
| J | | |
| (JBIG) | NS | JUNCTIONAL RHYTHM WITH VPC'S IN A BIGEMINY PATTERN |
| (JER) | AB | JUNCTIONAL ESCAPE RHYTHM absent P waves, slow V-rate |
| (JERA) | AB | ACCELERATED JUNCTIONAL ESCAPE RHYTHM absent P waves, V-rate 50-70 |
| (JPC) | ON | JUNCTIONAL PREMATURE COMPLEX SV complex w/ short R-R, absent P |
| (JRA) | AB | ACCELERATED JUNCTIONAL RHYTHM absent P waves, accele'd V-rate |
| (JT) | AB | JUNCTIONAL TACHYCARDIA absent P waves, rapid V-rate |
| (JTRI) | NS | JUNCTIONAL RHYTHM WITH VPC'S IN A TRIGEMINY PATTERN |

L

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|---------|----|--------------------------------------|---|
| (LAA) | AB | LEFT ATRIAL ABNORMALITY | P, P' > 60 mS, < -0.15mV V1 |
| (LAACB) | AB | LAA, CONSIDER BIATRIAL ABNORMALITIES | P > 80 mS < -0.15 mV V1 & > .25 mV limb lds |
| (LAD) | ON | LEFT AXIS DEVIATION | QRS axis ***, *** |
| (LAE) | NS | LEFT ATRIAL ENLARGEMENT | |
| (LAFB) | AB | LEFT ANTERIOR FASCICULAR BLOCK | axis(240, -40), init forces inf |
| (LAFBP) | AB | LEFT ANTERIOR FASCICULAR BLOCK | QRS axis(-60, -90) |
| (LBBB) | AB | LEFT BUNDLE BRANCH BLOCK | QRSd > ***, broad/notched R |
| (LBBBP) | AB | LEFT BUNDLE BRANCH BLOCK | QRSd > ***, late forces leftward |
| (LCRVH) | AB | LVH BY VOLTAGE, ALSO CONSIDER RVH | R > 1 V1 & 1 of SV1/2, RV6, SV1RV6 |
| (LLAR) | NS | LOW LEFT ATRIAL RHYTHM | |
| (LLINV) | AB | LATERAL LEADS ARE ALSO INVOLVED | lat Q or ST-T abnormalities |
| (LMI) | NS | LATERAL INFARCT | |
| (LMI10) | BO | BORDERLINE LATERAL Q WAVES | Q > 35 mS, I aVL V5 V6 |

- (LMI20) AB PROBABLE LATERAL INFARCT, AGE INDETERMINATE
Q >35 mS, I aVL V5 V6
- (LMI24) BO PROBABLE LATERAL INFARCT, OLD
Q>35mS, abnormal ST-T, I aVL V5-6
- (LMI26) AB PROBABLE LATERAL INFARCT, AGE INDETERMINATE
Q >35 mS, T neg, I aVL V5 V6
- (LMI28) BO LATERAL Q WAVES, PROBABLY DUE TO LVH
Q >35 mS, I aVL V5 V6 & LVH
- (LMI40) AB LATERAL INFARCT, AGE INDETERMINATE
Q >35 mS, I aVL V5 V6
- (LMI44) AB LATERAL INFARCT, OLD
Q>35 mS, abnormal ST-T, I aVL V5 V6
- (LMI46) AB LATERAL INFARCT, AGE INDETERMINATE
Q>35 mS, T neg, I aVL V5 V6
- (LMI49) ON LATERAL Q WAVES, PROBABLY NORMAL VARIATION
Q >35 mS, age<31 male, <40 female
- (LMI50) AB PROBABLE LATERAL INFARCT, ACUTE
Q >25 mS, ST>0.10 mV, I aVL V5 V6
- (LMI54) AB PROBABLE LATERAL INFARCT, RECENT
Q>35 mS, ST>.07 mV,T neg,I aVL V5-6
- (LMI64) AB LATERAL INFARCT, OLD
Q>35 mS, flat T, I aVL V5 V6
- (LMI66) AB LATERAL INFARCT, AGE INDETERMINATE
Q>35 mS, T neg, I aVL V5 V6
- (LMI67) AB LATERAL INFARCT, POSSIBLY ACUTE
Q >35 mS, ST >0.07 mV, I aVL V5 V6

(LMI74) AB LATERAL INFARCT, RECENT
ST>.07 mV, T neg, Q>35, I aVL V5-6

(LMIA) AB LATERAL INFARCT, ACUTE
ST >.20 mV, Q >35 mS, I aVL V5 V6

(LMIEA) AB LATERAL INJURY, PROBABLE EARLY ACUTE INFARCT
ST >0.10 mV, I aVL V5 V6

(LMIQ) AB LATERAL INFARCT, AGE INDETERMINATE
Q >35 mS, I aVL V5 V6

(LOWT) BO BORDERLINE T WAVE ABNORMALITIES
flat T

(LPFB) AB LEFT POSTERIOR FASCICULAR BLOCK
trm axis(110,210), init force sup

(LQT) AB PROLONGED QT INTERVAL
QTc >*** mS

(LQTB) BO BORDERLINE PROLONGED QT INTERVAL
QTc >*** mS

(LQTS) AB PROLONGED QT, PROBABLY SECONDARY TO WIDE QRS
QTc >*** mS w/ VCD/RVH/LVH

(LRAR) NS LOW RIGHT ATRIAL RHYTHM

(LRRV) BO LONG R-R WITH VENTRICULAR ESCAPE
R-R>175% of normal, wide QRS

(LSH) AB LEFT SEPTAL HYPERTROPHY
deep Q in V5-6, tall R in V1

(LSHC) AB PROMINENT Q, CONSIDER LEFT SEPTAL HYPERTROPHY
deep Q in V5-6

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|----------|----|--|
| (LT) | ON | LATE PRECORDIAL R/S TRANSITION QRS area negative in V5/V6 |
| (LVH) | AB | LEFT VENTRICULAR HYPERTROPHY (SV1+RV5) > 3.5 / (RaVL+SV3) >*** |
| (LVH1) | AB | LEFT VENTRICULAR HYPERTROPHY R56L/RISIII/S12R56/S3RL & LAA/LAD |
| (LVHC) | AB | CONSIDER LEFT VENTRICULAR HYPERTROPHY R5/6/aVL, RISIII, S12R56, S3RaVL |
| (LVHCNP) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY (RaVL+SV3) x QRSd >*** |
| (LVHCNV) | AB | CONSIDER LEFT VENTRICULAR HYPERTROPHY (R aVL+S V3) >*** mV |
| (LVHCO) | AB | LVH WITH IVCD AND SECONDARY REPOL ABNRM RISIII/S12R56, wQRSd, repol abnrm |
| (LVHCOL) | AB | LVH WITH IVCD, LAD AND SECONDARY REPOL ABNRM RISIII/S12R56, wQRS, LAD, rep abn |
| (LVHEV) | AB | LEFT VENTRICULAR HYPERTROPHY extreme leftward forces |
| (LVHP) | AB | PROBABLE LVH W/ SECONDARY REPOL ABNORMALITIES LAD, S1/2, R6, S1R6 & repol abnrm |
| (LVHPRE) | AB | PROBABLE LVH WITH SECONDARY REPOL ABNRM R56L/RISIII/S12R56/S3RL & rep abn |
| (LVHQ) | BO | CONSIDER LEFT VENTRICULAR HYPERTROPHY deep Q in V5-6 or II, III, aVF |
| (LVHQR) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY Q>0.4 & R >*** in V5 or *** in V6 |

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| (LVHQV) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY Q56/II-aVF & 1 of S1/2, R6, S1R6 |
| (LVHR) | AB | REPOLARIZATION ABNORMALITY SUGGESTS LVH ST dep, T neg, I aVL V4-V6 |
| (LVHR56) | BO | LVH BY VOLTAGE R >*** mV in V5 or V6 |
| (LVHR6) | BO | LVH BY VOLTAGE R >*** in V6 |
| (LVHRE) | AB | LVH W/ SECONDARY REPOLARIZATION ABNORMALITIES LAD, Q/SV12/RV6/S1R6, repol abnrm |
| (LVHREP) | AB | LVH WITH SECONDARY REPOLARIZATION ABNORMALITY R56L/RISIII/S12R56/S3RL & rep abn |
| (LVHRS) | BO | CONSIDER LEFT VENTRICULAR HYPERTROPHY RV6+SV1 >*** |
| (LVHRSI) | BO | LVH BY VOLTAGE (R I+S III) >*** mV |
| (LVHS12) | BO | LVH BY VOLTAGE S <*** in V1 or *** in V2 |
| (LVHSR) | AB | CONSIDER LEFT VENTRICULAR HYPERTROPHY (S V1/V2+R V5/V6) >*** mV |
| (LVHST) | NS | LVH WITH SECONDARY REPOLARIZATION CHANGES |
| (LVHSTD) | AB | REPOLARIZATION ABNORMALITY SUGGESTS LVH ST<-0.01 mV, T<-0.05, I aVL V4-6 |
| (LVHSTE) | AB | REPOLARIZATION ABNORMALITY SUGGESTS LVH ST>0.1 mV, T>1.0 mV, I aVL V4-6 |

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|----------|----|--|
| (LVHTA) | BO | CONSIDER LEFT VENTRICULAR HYPERTROPHY prominent leftward forces |
| (LVHV) | BO | LVH BY VOLTAGE R >*** in aVL |
| (LVHVA) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY LAD & 1 of SV1/2, RV6, SV1+RV6 |
| (LVHVAQ) | AB | LEFT VENTRICULAR HYPERTROPHY LAD, Q or 1 of SV1/2, RV6, SV1RV6 |
| (LVHVP) | AB | PROBABLE LEFT VENTRICULAR HYPERTROPHY R56L/RISIII/S12R56/S3RL & LAA/LAD |
| (LVOLF) | ON | LOW VOLTAGE IN FRONTAL LEADS all frontal leads <0.5 mV |
| (LVOLFB) | ON | BORDERLINE LOW VOLTAGE IN FRONTAL LEADS all frontal leads <0.6 mV |
| (LVOLT) | BO | LOW VOLTAGE THROUGHOUT frontal<0.5 mV, precordial<1.0 mV |
| (LVORAD) | BO | LOW VOLTAGE WITH RIGHT AXIS DEVIATION low voltage, RAD |

M

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|----------|----|---|
| (MAPC) | AB | MULTIPLE ATRIAL PREMATURE COMPLEXES SV complexes w/ short R-R intvls |
| (MFPVPC) | AB | PAIRED MULTIFORM VENTRICULAR COMPLEXES sequence of 2 V complexes |
| (MFRVPC) | AB | RUN OF MULTIFORM VENTRICULAR COMPLEXES sequence of 3 or more V complexes |

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|----------|----|--|
| (MFVPC) | AB | MULTIFORM VENTRICULAR PREMATURE COMPLEXES short R-R, variable morphology |
| (MIVPC) | AB | MULT INTERPOLATED VENT PREMATURE COMPLEXES interpolated complexes, wide QRSd |
| (MOBII) | AB | MOBITZ II AV BLOCK dropped ventricular complex |
| (MSTEA) | ON | MINIMAL ST ELEVATION, ANTERIOR LEADS ST >0.08 mV, V1-V4 |
| (MSTEAL) | ON | MINIMAL ST ELEVATION, ANTEROLATERAL LEADS ST >0.06 mV, I aVL V2-V6 |
| (MSTED) | ON | MINIMAL ST ELEVATION, DIFFUSE LEADS ST >0.10 mV, ant/lat/inf |
| (MSTEI) | ON | MINIMAL ST ELEVATION, INFERIOR LEADS ST >0.06 mV, II III aVF |
| (MSTEL) | ON | MINIMAL ST ELEVATION, LATERAL LEADS ST >0.07 mV, I aVL V5 V6 |
| (MVIC) | AB | MULTIPLE VENTRICULAR INTERPOLATED COMPLEXES interpolated complexes, wide QRS |
| (MVPC) | AB | MULTIPLE VENTRICULAR PREMATURE COMPLEXES V complexes w/ short R-R intervals |
| (MVSPC) | AB | MULTIPLE PREMATURE COMPLEXES, VENT & SUPRAVEN V and SV complexes w/ short R-R |

N

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|----------|----|--|
| (NAPHF) | DE | NO ANALYSIS DUE TO POSSIBLE HARDWARE FAILURE Channels 1, 2, 3 identical |
| (NDSTD) | NS | NONDIAGNOSTIC ST DEPRESSION |
| (NFAD) | NS | NO FURTHER ANALYSIS ATTEMPTED DUE TO PACED RHYTHM |
| (NFRA) | NS | NO FURTHER RHYTHM ANALYSIS ATTEMPTED DUE TO PACED RHYTHM |
| (NIVCD) | AB | NONSPECIFIC INTRAVENTRICULAR CONDUCTION DELAY QRSd >*** mS, not LBBB/RBBB |
| (NIVCDL) | AB | NONSPECIFIC IVCD WITH LAD QRSd >*** mS & LAD |

P

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|----------|----|---|
| (PACEM) | AB | FAILURE TO SENSE AND/OR CAPTURE (?MAGNET) fixed pacing with async rhythm |
| (PACENC) | AB | PACEMAKER FAILURE TO CAPTURE APPROPRIATELY |
| (PACENS) | AB | PACEMAKER FAILURE TO SENSE APPROPRIATELY |
| (PALMI) | AB | ABNORMAL Q SUGGESTS ANTEROLATERAL INFARCT Q>30 mS I aVL V4-V6 |
| (PAMI) | AB | ABNORMAL Q SUGGESTS ANTERIOR INFARCT Q >30 mS in V2-V4 |
| (PASMI) | AB | ABNORMAL Q SUGGESTS ANTEROSEPTAL INFARCT Q >30 mS in V1 V2 |

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|----------|----|--|
| (PCMM) | AB | A-V DUAL-PACED RHYTHM WITH SOME INHIBITION atrial and/or vent inhibition |
| (PCMMC) | AB | A-V DUAL-PACED COMPLEXES W/ SOME INHIBITION other complexes also detected |
| (PCNSNC) | AB | PACEMAKER FAILURE TO CAPTURE AND SENSE |
| (PERI) | AB | ST ELEVATION SUGGESTS PERICARDITIS ST >0.06 mV, ant/lat/inf |
| (PERI1) | AB | ST ELEVATION SUGGESTS PERICARDITIS ST >0.10 mV, ant/lat/inf |
| (PIMI) | AB | ABNORMAL Q SUGGESTS INFERIOR INFARCT Q >35 mS in II III aVF |
| (PINJA) | AB | ST ELEVATION, PROBABLE ANTERIOR INJURY ST >0.25 mV in V1-V5 |
| (PINJAL) | AB | ST ELEVATION, PROBABLE ANTEROLATERAL INJURY ST >0.15 mV, I aVL V2-V6 |
| (PINJI) | AB | ST ELEVATION, PROBABLE INFERIOR INJURY inf ST>0.1 mV, lat ST<-0.05 mV |
| (PINJL) | AB | ST ELEVATION, PROBABLE LATERAL INJURY ST >0.08 mV, I aVL V5 V6 |
| (PIPMI) | AB | PROBABLE INFEROPOSTERIOR INFARCT IMI, R>S V1-2 or ST dep V1-V3 |
| (PLAA) | BO | PROBABLE LEFT ATRIAL ABNORMALITY P >50 mS, <-0.10 mV V1 |
| (PLMI) | AB | ABNORMAL Q SUGGESTS LATERAL INFARCT Q >35 mS in I aVL V5 V6 |

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|---------|----|--|---------------------------------|
| (PLMP) | NS | PRECARDIAL LEADS MISPLACED | |
| (PLRV) | NS | PRECARDIAL LEAD REVERSAL | |
| (PMI) | AB | POSTERIOR INFARCT | prominent R T, ST dep V1-V3 |
| (PMIA) | AB | POSTERIOR INFARCT, ACUTE | prominent R T, ST <-.05 V1-V4 |
| (PMIQ) | NS | POSTERIOR INFARCT, AGE INDETERMINATE | |
| (PPMI) | AB | PROBABLE POSTERIOR INFARCT | prominent R T & ST dep V1-V3 |
| (PPMIA) | AB | PROBABLE POSTERIOR INFARCT, ACUTE | prominent R T, ST <-.05 V1-V3 |
| (PPND) | BO | PROMINENT P WAVES, NONDIAGNOSTIC | wide/notched/biphasic P waves |
| (PQAL) | BO | BORDERLINE Q WAVE IN ANTEROLATERAL LEADS | Q >35 mS, I aVL V3-V6 |
| (PQAN) | BO | BORDERLINE Q WAVE IN ANTERIOR LEADS | Q >30 mS in V2-V5 |
| (PQIN) | BO | BORDERLINE Q WAVES IN INFERIOR LEADS | Qs add to 80 mS in II III aVF |
| (PQLA) | BO | BORDERLINE Q WAVES IN LATERAL LEADS | Q >35 mS in I aVL V5 V6 |
| (PRAA) | ON | PROBABLE RIGHT ATRIAL ABNORMALITY | biphasic P >0.20 mV in V1 |
| (PRVH) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY | prominent R or R' w/ RAD or RAA |

(PRVHR) AB PROBABLE RVH W/ SECONDARY REPOL ABNORMALITY
prominent R or R' & repol abnrm

(PSAR) AB PACEMAKER SPIKES OR ARTIFACTS
timing non-diagnostic

(PSREC) NS RECONSTRUCTED PACER SPIKES IN LD(S) ***
bedside recording

(PUW) NS PROMINENT U WAVES

(PVPC) AB PAIRED VENTRICULAR PREMATURE COMPLEXES
sequence of 2 V complexes

R

(RAA) AB RIGHT ATRIAL ABNORMALITY
P>0.25 mV 2 lds or<-0.24 mV aVR/aVL

(RAACB) AB RAA, CONSIDER BIATRIAL ABNORMALITIES
P>0.30 mV 2 lds & <-0.30 mV aVR/aVL

(RAD) ON RIGHT AXIS DEVIATION
QRS axis (***,***)

(RAE) NS RIGHT ATRIAL ENLARGEMENT

(RBBB) AB RIGHT BUNDLE BRANCH BLOCK
QRSd>120, terminal axis(90,270)

(RBBBM) AB MARKED RIGHT BUNDLE BRANCH BLOCK
QRSd >160 mS

(RBBBBP) AB RIGHT BUNDLE BRANCH BLOCK
QRSd >***, RSR' or pure R or QR

(RCLVH) AB RVH, CONSIDER ASSOCIATED LVH
RVH & Q<-.07 mV, R >1 mV V6

| | | |
|----------|----|---|
| (RECA) | NS | RETROGRADE ATRIAL CAPTURE |
| (REPAL) | AB | NONSPECIFIC REPOL ABNORMALITY, ANT-LAT LEADS ST dep, T neg, I aVL V2-V6 |
| (REPAN) | AB | NONSPECIFIC REPOL ABNORMALITY, ANTERIOR LEADS ST dep, T neg, V2-V4 |
| (REPB) | BO | BORDERLINE REPOLARIZATION ABNORMALITY ST dep & abnormal T |
| (REPBAL) | BO | BORDERLINE REPOL ABNORMALITY, ANT-LAT LEADS ST dep, T flat/neg, I aVL V2-V6 |
| (REPBAN) | BO | BORDERLINE REPOL ABNORMALITY, ANT LEADS ST dep, T flat/neg, V2-V4 |
| (REPBDI) | BO | BORDERLINE REPOL ABNORMALITY, DIFFUSE LEADS ST dep, T flat/neg, ant/lat/inf |
| (REPBIL) | BO | BORDERLINE REPOL ABNORMALITY, INF-LAT LEADS ST dep, T flat/neg, inf/lat |
| (REPBIN) | BO | BORDERLINE REPOL ABNORMALITY, INFERIOR LEADS ST dep, T flat/neg, II III aVF |
| (REPBLA) | BO | BORDERLINE REPOL ABNORMALITY, LATERAL LEADS ST dep, T flat/neg, I aVL V5 V6 |
| (REPDI) | AB | NONSPECIFIC REPOL ABNORMALITY, DIFFUSE LEADS ST dep, T flat/neg, ant/lat/inf |
| (REPIA) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, ANTERIOR LEADS ST dep, T neg, V2-V4 |
| (REPIAL) | AB | REPOL ABNRM SUGGESTS ISCHEMIA, ANT-LAT LEADS ST dep, T neg, I aVL V2-V6 |

(REPIDI) AB REPOL ABNRM SUGGESTS ISCHEMIA, DIFFUSE LEADS
ST-T neg, ant/lat/inf

(REPII) AB REPOL ABNRM SUGGESTS ISCHEMIA, INFERIOR LEADS
ST dep, T neg, II III aVF

(REPIIL) AB REPOL ABNRM SUGGESTS ISCHEMIA, INFEROLATERAL
ST dep, T neg, I-III aVL aVF V5-6

(REPIL) AB NONSPECIFIC REPOL ABNORMALITY, INF-LAT LEADS
ST dep, T neg, I-III aVL aVF V5-6

(REPILA) AB REPOL ABNRM SUGGESTS ISCHEMIA, LATERAL LEADS
ST dep, T neg, I aVL V5 V6

(REPIN) AB NONSPECIFIC REPOL ABNORMALITY, INFERIOR LEADS
ST dep, T neg, II III aVF

(REPLA) AB NONSPECIFIC REPOL ABNORMALITY, LATERAL LEADS
ST dep, T neg, I aVL V5 V6

(REPLVH) AB REPOL ABNORMALITY PROBABLY SECONDARY TO LVH
ST dep, T neg, I aVL V2-V6

(REPNS) AB NONSPECIFIC REPOLARIZATION ABNORMALITIES
ST dep, T neg, 2-3 leads

(REPPAL) AB REPOL ABNRM, PROBABLE ISCHEMIA, ANT-LAT LEADS
ST dep, T neg, I aVL V2-V6

(REPPAN) AB REPOL ABNRM, PROBABLE ISCHEMIA, ANTERIOR LDS
ST dep, T neg, V2-V4

(REPPIL) AB REPOL ABNRM, PROBABLE ISCHEMIA, INF-LAT LDS
ST dep, T neg, I-III aVL aVF V5-6

(REPPIN) AB REPOL ABNRM, PROBABLE ISCHEMIA, INFERIOR LDS
ST dep, T neg, II III aVF

| | | | |
|----------|----|---|-----------------------------------|
| (REPPLA) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, LATERAL LEADS | ST dep, T neg, I aVL V5 V6 |
| (REPPWI) | AB | REPOL ABNRM, PROBABLE ISCHEMIA, DIFFUSE LEADS | ST dep, T neg, ant/lat/inf |
| (REPRR) | AB | REPOLARIZATION ABNORMALITY, PROB RATE RELATED | ST dep, T neg, tachycardia |
| (RLAFB) | AB | RBBB AND LAFB | QRSd >120 mS, axis(-40,240) |
| (RLAFBP) | AB | RBBB AND LAFB | QRSd>90, QRS(-60,-90) |
| (RLPFB) | AB | RBBB AND LFPB | QRSd >120 mS, axis(90,210) |
| (RSRNV) | NO | RSR' IN V1, NORMAL VARIATION | term-vector post-rightward |
| (RSR1) | ON | RSR' IN V1 OR V2, PROBABLY NORMAL VARIANT | small R' only |
| (RSRNV) | NO | RSR' IN V1, NORMAL VARIATION | term-vector post-rightward |
| (RVAR) | BO | UNKNOWN RHYTHM, IRREGULAR RATE ***-*** | V-rate variation>10% |
| (RVH) | AB | RIGHT VENTRICULAR HYPERTROPHY | prominent R or R' w/ RAD or RAA |
| (RVH2V) | AB | RIGHT VENTRICULAR HYPERTROPHY | 2 of R/R'V1/2, SV5/6, RV1SV5, TV1 |
| (RVHA) | AB | RIGHT AXIS DEVIATION, CONSIDER RVH | frontal & init-horiz'l axis right |

| | | | |
|----------|----|---|------------------------------------|
| (RVHAT) | AB | RIGHT VENTRICULAR HYPERTROPHY | RAD & upright T |
| (RVHPR1) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY | pure R> *** mV in V1 |
| (RVHQR) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY | QR pattern V1, 0h-2d |
| (RVHQR3) | AB | RIGHT VENTRICULAR HYPERTROPHY | QR pattern V1, 3d-15y |
| (RVHQRV) | AB | RIGHT VENTRICULAR HYPERTROPHY | QRV1 & 1 of R/R'V1/2, SV5/6, R1S5 |
| (RVHR) | AB | RVH WITH SECONDARY REPOLARIZATION ABNORMALITY | prom R/R', RAD/RAA & repol abnrm |
| (RVHR1) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY | prominent R>*** V1 or *** V2 |
| (RVHRD) | AB | PROBABLE RIGHT VENTRICULAR HYPERTROPHY | RAD & 1 of R/R'1/2, S5/6, R1S5, T1 |
| (RVHRP1) | AB | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | R' >0.5mV in V1 |
| (RVHRS) | AB | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | R V1 + S V5 >*** mV |
| (RVHRS6) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | R/S <*** in V6 |
| (RVHS5) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | S <*** mV in V5 |
| (RVHS6) | BO | CONSIDER RIGHT VENTRICULAR HYPERTROPHY | S <*** mV in V6 |

(RVHT1) AB UPRIGHT T IN V1 OR V2, PROBABLE RVH
T >0.10 V1, 3d-9y

(RVHTA) AB CONSIDER RIGHT VENTRICULAR HYPERTROPHY
late forces posterior rightward

(RVHVT) AB RIGHT VENTRICULAR HYPERTROPHY
TV1 & 1 of R/R'V1/2, SV5/6, R1S5

(RVPC) AB RUN OF VENTRICULAR PREMATURE COMPLEXES
sequence of 3 or more V complexes

S

(S123) ON S1,S2,S3 PATTERN
S >30 mS & >0.2 mV, I II III

(SA) ON SINUS ARRHYTHMIA, RATE ***-***
V-rate variation >10%

(SAB) ON SLOW SINUS ARRHYTHMIA, RATE ***-***
varied V-rate, mean<***

(SARA) AB SINUS PAUSE/ARREST WITH ATRIAL ESCAPE
long R-R, normal QRSd, normal P

(SARN) AB SINUS PAUSE/ARREST WITH JUNCTIONAL ESCAPE
long R-R, normal QRSd, absent P

(SARSV) AB SINUS PAUSE/ARREST W/ SUPRAVENTRICULAR ESCAPE
long R-R interval, normal QRSd

(SARV) AB SINUS PAUSE/ARREST WITH VENTRICULAR ESCAPE
long R-R interval, wide QRS

(SAT) ON FAST SINUS ARRHYTHMIA, RATE ***-***
varied V-rate, mean>***

(SB) ON SINUS BRADYCARDIA
V-rate<***

(SDALP) BO NONSPECIFIC ST DEPRESSION, ANTEROLATERAL LDS
ST <-0.10 mV, I aVL V2-V6

(SDANP) BO NONSPECIFIC ST DEPRESSION, ANTERIOR LEADS
ST <-0.10 mV, V2-V5

(SDINP) BO NONSPECIFIC ST DEPRESSION, INFERIOR LEADS
ST <-0.10 mV, II III aVF

(SD0AL) ON MINIMAL ST DEPRESSION, ANTEROLATERAL LEADS
ST <-0.03 mV, I aVL V2-V6

(SD0AN) ON MINIMAL ST DEPRESSION, ANTERIOR LEADS
ST <-0.03 mV, V2-V4

(SD0DI) ON MINIMAL ST DEPRESSION, DIFFUSE LEADS
ST <-0.03 mV, ant/lat/inf

(SD0IN) ON MINIMAL ST DEPRESSION, INFERIOR LEADS
ST <-0.03 mV, II III aVF

(SD0LA) ON MINIMAL ST DEPRESSION, LATERAL LEADS
ST <-0.03 mV, I aVL V5 V6

(SD0NS) ON MINIMAL ST DEPRESSION
ST <-0.03 mV, T neg, any 2 leads

(SDPRR) AB ST DEPRESSION, PROBABLY RATE RELATED
ST <-0.10 mV & extreme tachycardia

(SD1AL) BO BORDERLINE ST DEPRESSION, ANTEROLATERAL LEADS
ST <-0.07 mV, I aVL V2-V6

(SD1AN) BO BORDERLINE ST DEPRESSION, ANTERIOR LEADS
ST <-0.07 mV, V2-V4"

| | | |
|----------|----|--|
| (SD1DI) | BO | BORDERLINE ST DEPRESSION, DIFFUSE LEADS ST <-0.07 mV, ant/lat/inf |
| (SD1IN) | BO | BORDERLINE ST DEPRESSION, INFERIOR LEADS ST <-0.07 mV, II III aVF |
| (SD1LA) | BO | BORDERLINE ST DEPRESSION, LATERAL LEADS ST <-0.07 mV, I aVL V5 V6 |
| (SD15AL) | AB | NONSPECIFIC ST DEPRESSION, ANT-LAT LEADS ST <-0.10 mV, I aVL V2-V6 |
| (SD15AN) | AB | NONSPECIFIC ST DEPRESSION, ANTERIOR LEADS ST <-0.10 mV, V2-V4 |
| (SD15LA) | AB | NONSPECIFIC ST DEPRESSION, LATERAL LEADS ST <-0.10 mV, I aVL V5 V6 |
| (SD15IN) | AB | NONSPECIFIC ST DEPRESSION, INFERIOR LEADS ST <-0.10 mV, II III aVF |
| (SD15NS) | AB | NONSPECIFIC ST DEPRESSION ST <-0.10 mV any 2 leads |
| (SD15WI) | AB | NONSPECIFIC ST DEPRESSION, DIFFUSE LEADS ST <-0.10 mV, ant/lat/inf |
| (SD2AL) | AB | ST DEPRESSION, CONSIDER ISCHEMIA, ANT-LAT LDS ST <-0.10 mV, I aVL V2-V6 |
| (SD2AN) | AB | ST DEPRESSION, CONSIDER ISCHEMIA, ANT LEADS ST <-0.10 mV, V2-V4 |
| (SD2IN) | AB | ST DEPRESSION, CONSIDER ISCHEMIA, INF LEADS ST <-0.10 mV, II III aVF |
| (SD2LA) | AB | ST DEPRESSION, CONSIDER ISCHEMIA, LAT LEADS ST <-0.10 mV, I aVL V5 V6 |

(SD2NS) AB NONSPECIFIC ST DEPRESSION
ST <-0.10 mV, any 2 leads

(SD2WI) AB ST DEPRESSION, CONSIDER ISCHEMIA, DIFFUSE LDS
ST <-0.10 mV, ant/lat/inf

(SDCU) ON MINIMAL ST DEPRESSION
ST concave upward

(SDJ) ON JUNCTIONAL ST DEPRESSION
ST <-0.10 mV any 3 leads

(SDM) ON MINIMAL ST DEPRESSION
ST <-0.05 mV in 2 leads

(SDPRR) AB ST DEPRESSION, PROBABLY RATE RELATED
ST <-0.10 mV & extreme tachycardia

(SEAB) ON SINUS OR ECTOPIC ATRIAL BRADYCARDIA
P axis (-45,135), V-rate<***

(SEALP) NO ST ELEVATION, PROB NORMAL VARIATION, ANT-LAT
ST >0.15 mV, I aVL V2-V6

(SEANP) NO ST ELEV, PROBABLY NORMAL VARIATION, ANT LEADS
ST>0.15 mV, V2-V5

(SEAR) ON SINUS OR ECTOPIC ATRIAL RHYTHM
P axis (-45,135)

(SEAT) ON SINUS OR ECTOPIC ATRIAL TACHYCARDIA
P axis (-45,135), V-rate>***

(SEINP) NO ST ELEVATION, PROBABLY NORMAL VARIATION, INF
ST>0.15 mV, II III aVF

(SPR) BO SHORT PR INTERVAL, ACCELERATED AV CONDUCTION
PR <*** mS

(SPRB) ON BORDERLINE SHORT PR INTERVAL
PR int <*** mS

(SQT) ON SHORT QT INTERVAL
QTc <340 mS

(SR) NO SINUS RHYTHM
normal P axis, V-rate ***-***

(ST) ON SINUS TACHYCARDIA
V-rate>***

(STE) NS ST ELEVATION, SUBEPICARDIAL INJURY

(STELVH) BO ANTERIOR ST ELEVATION, PROBABLY DUE TO LVH
ST >0.20 mV in V1-V4 & LVH

(STEND) NS NONDIAGNOSTIC ST ELEVATION

(SVBIG) AB SUPRAVENTRICULAR BIGEMINY
bigeminy string>4 w/ SV complexes

(SVT) AB SUPRAVENTRICULAR TACHYCARDIA
V-rate>(220-age), QRSd<***

(SVTRI) NS SUPRAVENTRICULAR TRIGEMINY

T

(T0AL) BO BORDERLINE T ABNORMALITIES, ANT-LAT LEADS
T flat/neg, I aVL V2-V6

(T0AN) BO BORDERLINE T ABNORMALITIES, ANTERIOR LEADS
T flat or neg, V2-V4

(T0DI) BO BORDERLINE T ABNORMALITIES, DIFFUSE LEADS
T flat/neg

| | | |
|--------|----|--|
| (T0IN) | BO | BORDERLINE T ABNORMALITIES, INFERIOR LEADS T flat/neg, II III aVF |
| (T0LA) | BO | BORDERLINE T ABNORMALITIES, LATERAL LEADS T flat/neg, I aVL V5 V6 |
| (T0NS) | BO | BORDERLINE T WAVE ABNORMALITIES T/QRS ratio < 1/20 or flat T |
| (T1AL) | AB | NONSPECIFIC T ABNORMALITIES, ANT-LAT LEADS T <-0.10 mV, I aVL V2-V6 |
| (T1AN) | AB | NONSPECIFIC T ABNORMALITIES, ANTERIOR LEADS T <-0.10 mV, V2-V4 |
| (T1DI) | AB | NONSPECIFIC T ABNORMALITIES, DIFFUSE LEADS T <-0.10 mV, ant/lat/inf |
| (T1IN) | AB | NONSPECIFIC T ABNORMALITIES, INFERIOR LEADS T <-0.10 mV, II III aVF |
| (T1LA) | AB | NONSPECIFIC T ABNORMALITIES, LATERAL LEADS T <-0.10 mV, I aVL V5 V6 |
| (T3AL) | AB | ABNORMAL T, CONSIDER ISCHEMIA, ANT-LAT LEADS T <-0.25 mV, I aVL V2-V6 |
| (T3AN) | AB | ABNORMAL T, CONSIDER ISCHEMIA, ANTERIOR LEADS T <-0.25 mV, V2-V4 |
| (T3IN) | AB | ABNORMAL T, CONSIDER ISCHEMIA, INFERIOR LEADS T <-0.20 mV, II III aVF |
| (T3LA) | AB | ABNORMAL T, CONSIDER ISCHEMIA, LATERAL LEADS T <-0.25 mV, I aVL V5 V6 |
| (T3WI) | AB | ABNORMAL T, CONSIDER ISCHEMIA, DIFFUSE LEADS T <-0.20 mV, ant/lat/inf |

| | | |
|---------|----|---|
| (T6AL) | AB | ABNORMAL T, PROBABLE ISCHEMIA, ANT-LAT LEADS T <-0.50 mV, I aVL V2-V6 |
| (T6AN) | AB | ABNORMAL T, PROBABLE ISCHEMIA, ANTERIOR LEADS T <-0.50 mV, V2-V4 |
| (T6IL) | AB | ABNORMAL T, PROBABLE ISCHEMIA, INFEROLATERAL T <-0.40 mV, I-III aVL aVF V5-6 |
| (T6IN) | AB | ABNORMAL T, PROBABLE ISCHEMIA, INFERIOR LEADS T <-0.40 mV, II III aVF |
| (T6LA) | AB | ABNORMAL T, PROBABLE ISCHEMIA, LATERAL LEADS T <-0.50 mV, I aVL V5 V6 |
| (T6WI) | AB | ABNORMAL T, PROBABLE ISCHEMIA, WIDESPREAD T <-0.50 mV, ant/lat/inf |
| (TACHW) | AB | WIDE COMPLEX TACHYCARDIA V-rate>***, QRsd>*** |
| (TAL1) | AB | ABNORMAL T WAVES, ANTEROLATERAL LEADS T neg, I aVL V2-V6 |
| (TALVH) | BO | ABNORMAL T, PROBABLY DUE TO LVH, ANT-LAT LDS LVH & T neg, I aVL V2-V6 |
| (TAN1) | AB | ABNORMAL T WAVES, ANTERIOR LEADS T neg, V1-V5 |
| (TAS1) | AB | ABNORMAL T WAVES, ANTEROSEPTAL LEADS T neg, V1 V2 V3 |
| (TAXAB) | BO | BORDERLINE T WAVE ABNORMALITIES T axis not between (-10,100) |
| (TAXQT) | BO | BORDERLINE T WAVE ABNORMALITIES QRS-T axis angle (91,180) |

(TIALVH) AB LVH W/ REPOL ABNORMALITIES, POSSIBLE ISCHEMIA
T <-0.25 mV, V1-V3 & LVH

(TIN1) AB ABNORMAL T WAVES, INFERIOR LEADS
T neg, II III aVF

(TLA1) AB ABNORMAL T WAVES, LATERAL LEADS
T neg, I aVL V5-V6

(TPT) DE TECHNICALLY POOR TRACING - PLEASE REPEAT ECG!

(TTW) NS TALL T WAVES

(TTW1) ON TALL T, PROBABLY NORMAL VARIANT, ANT-LAT LDS
T >1.0 mV, I aVL V2-V6

(TTW10) BO TALL T, CONSIDER METABOLIC/ISCHEMIC ABNRM
T >1.2 mV

(TTW20) BO TALL T WAVES, CONSIDER HYPERKALEMIA
widespread tall T

(TTW30) ON TALL T WAVES, PROBABLY NORMAL VARIANT
T >1.2 mV, age 16-30

(TWRV) BO SINUS TACHYCARDIA WITH IRREGULAR RATE ***-***
V-rate>***, variation>10%

U

(UNKBIG) NS BIGEMINY PATTERN, UNCERTAIN MECHANISM

(UNKPC) NS PREMATURE COMPLEX, UNCERTAIN MECHANISM

(UNKRM) NS UNDETERMINED RHYTHM: REVIEW
rhythm measurements incomplete

(UNKTRI) NS TRIGEMINY PATTERN, UNCERTAIN MECHANISM

V

| | | | |
|----------|----|--|-----------------------------------|
| (VBIG) | AB | VENTRICULAR BIGEMINY | bigeminy string>4 w/ V complexes |
| (VDD) | NS | RHYTHM CONSISTENT WITH VDD PACING | |
| (VIC) | ON | VENTRICULAR INTERPOLATED COMPLEX | interpolated complex, wide QRS |
| (VOO) | NS | RHYTHM CONSISTENT WITH VOO PACING | |
| (VPACCD) | AB | V-PACED COMPLEXES WITH SOME INHIBITION | non-paced complexes also detected |
| (VPACCF) | AB | AFIB/FLUT AND V-PACED COMPLEXES | other complexes, A-rate>240 |
| (VPACE) | AB | VENTRICULAR-PACED RHYTHM | |
| (VPACEC) | AB | VENTRICULAR-PACED COMPLEXES | other complexes also detected |
| (VPACEF) | AB | AFIB/FLUTTER AND VENTRICULAR-PACED RHYTHM | V-paced rhythm, A-rate>240 |
| (VPACFD) | AB | AFIB/FLUT, V-PACED COMPLEXES WITH INHIBITION | non-paced complexes, A-rate>240 |
| (VPC) | ON | VENTRICULAR PREMATURE COMPLEX | V complex w/ short R-R interval |
| (VPE) | AB | VENTRICULAR PREEXCITATION | Delta waves |
| (VPEL) | AB | VENT PREEXCITATION, LEFT ACCESSORY PATHWAY | Delta wave & initial axis(30,120) |

| | | |
|---------|----|--|
| (VPELA) | NS | VENTRICULAR PREEXCITATION, A LEFT ANTEROSEPTAL ACCESSORY PATHWAY |
| (VPELL) | NS | VENTRICULAR PREEXCITATION, A LEFT LATERAL ACCESSORY PATHWAY |
| (VPELP) | NS | VENTRICULAR PREEXCITATION, A LEFT POSTEROSEPTAL ACCESSORY PATHWAY |
| (VPER) | AB | VENT PREEXCITATION, RIGHT ACCESSORY PATHWAY Delta wave & initial axis(-60,29) |
| (VPERA) | NS | VENTRICULAR PREEXCITATION, A RIGHT ANTEROSEPTAL ACCESSORY PATHWAY |
| (VPERL) | NS | VENTRICULAR PREEXCITATION, A RIGHT LATERAL ACCESSORY PATHWAY |
| (VPERP) | NS | VENTRICULAR PREEXCITATION, A RIGHT POSTEROSEPTAL ACCESSORY PATHWAY |
| (VSVPC) | NS | PREMATURE COMPLEX, VENT OR ABERRANT SUPRAVENT |
| (VTACH) | AB | EXTREME TACHYCARDIA WITH WIDE COMPLEX, NO FURTHER RHYTHM ANALYSIS ATTEMPTED |
| (VTRI) | AB | VENTRICULAR TRIGEMINY trigeminy string>6 w/ V complexes |
| (VVI) | NS | RHYTHM CONSISTENT WITH VVI PACING |

W

| | | |
|---------|----|--|
| (WENCK) | AB | MOBITZ I AV BLOCK (WENCKEBACH) PR lengthens & dropped complexes |
| (WPACE) | BO | WANDERING PACEMAKER varying PR interval & P axis |

Glossary

A **AAMI leads**

ECG lead names and identifying colors recommended by the Association for the Advancement of Medical Instrumentation. Limb leads are labeled RA, LA, LL, RL. Chest leads are labeled V1-V6. (See "IEC leads.")

AC filter

Configurable filter that screens out ECG artifact caused by electrical interference.

adult criteria

Interpretive rules used when analyzing ECGs of patients aged 16 years and older. (See "pediatric criteria.")

alternating current (AC)

Electrical current provided by wall outlets. AC may be either 60 or 50 Hz depending on country.

artifact

ECG waveform distortion that may diminish ECG quality. ECG artifact (or noise) may be caused by electrical interference, poor electrode connections, or patient movement.

artifact filter

Philips term for the filter that screens out ECG noise caused by muscle tremor.

Ashman Unit

An Ashman unit is the area of 1 square millimeter at normal speed (25mm/sec) and normal sensitivity (10mm/mV). An Ashman unit equals 40 ms x 0.1 mV.

Auto ECG

Twelve-lead ECG that shows 10 seconds of heart activity and is printed in a preconfigured format.

B **baseline wander**

A slow upward or downward motion on the baseline of any ECG waveform.

baseline wander filter

The configurable filter which reduces baseline wander.

C Cabrera

An alternative limb lead order in which aVR is inverted and shown as -aVR. Lead order is aVL, I, -aVR, II, aVF, III, V1/C1 through V6/C6. (See "Standard.")

calibration pulse

A 200 ms, 1mV square or stepped wave pulse which appears on the printed record. The calibration pulse shows the sensitivity at which the ECG was recorded.

configuration

The manner in which Philips Medical Systems equipment is programmed to function. When equipment is installed, it may default to a preset configuration which may be changed at any time.

E ECG report

Paper copy produced by Philips Medical Systems equipment that includes a graphic representation of the heart's electrical activity (ECG waveforms), identifying information, and may also include interpretive information produced by the algorithm software. ECG reports must be overread by qualified physicians.

F format

The manner in which ECG waveforms are presented on the printed ECG report. ECG format is selected by the operator.

frequency response

The range of frequencies in which the cardiograph records ECG data.

H Hertz (Hz)

A unit of electrical frequency (cycles per second).

I ID fields

Philips term for the areas where patient information may be entered. Using the ID fields, the operator may enter information including patient identification number, name, and age.

IEC leads

Lead names and identifying colors recommended by the International Electrotechnical Commission standard. IEC limb leads are labeled R, L, F, and N. Chest leads are labeled C1-C6. (See "AAMI leads.")

M measurements

The amplitudes, durations, areas, and intervals that characterize the ECG waveform.

morphology

Related to the shape of the ECG waveform.

O overread

To review an ECG report. This review must be completed by a qualified physician.

P pediatric criteria

The interpretive rules used when analyzing ECGs of persons aged 15 years or younger. (See “adult criteria.”)

Philips 12-Lead Algorithm

Program used by Philips Medical Systems equipment to analyze the measurements on the 12-lead ECG and provide an interpretation.

preview screen

Philips term for screen which shows the ECG traces as they will appear on the printed ECG report.

R rhythm strip

Philips term for ten second recording of a particular lead that is printed at the bottom of an Auto ECG report.

S standard leads

The 12-lead set order is I, II, III, aVR, aVL, aVF, and V1/C1 through V6/C6. (See “Cabrera.”)

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