

ZOLL R Series ®

Annual Inspection Checklist

The PDF version of this document may be saved as digital record of the annual inspection procedure for ZOLL R Series defibrillators. This PDF contains a fillable checklist for each procedure detailed within the R Series Service Manual. A completed checklist will be automatically filled out at the end of this document as you progress.

This checklist is in alignment with R Series Service Manual: 9650-0903-01 Rev. N - October 2020

Serial Number

Software Version

Organization

Technician's Name

Month

Day

Year



TEST SETUP

- 1.0 Ensure the R Series is plugged into AC power and a fully charged battery is installed.

PROCEDURE

PASS

FAIL

Main Housing

- 1.1 Inspect the device to ensure it is clean and without any obvious signs of damage, loose housing parts, cracks or excessive wear.
- 1.2 Inspect the printer door to ensure it can open and close properly.
- 1.3 Remove all accessories and ensure that the input connectors are clean and undamaged.

Control Dials

- 1.4 Ensure the main control knob can easily rotate and switch into all available modes.
- 1.5 Ensure the pacer "OUTPUT" dial is able to rotate freely in both directions.
- 1.6 Ensure the pacer "RATE" dial is able to rotate freely in both directions.

Paddles (if applicable)

- 1.7 Do the adult shoes slide on and off easily to expose the pediatric plates?
- 1.8 Do the paddle plates show any deep scratches or show signs of damage?
- 1.9 Ensure paddles are clean and free of any paddle gel.

TEST 1

PHYSICAL INSPECTION

R Series + Available Accessories



Instructional Video

PROCEDURE		PASS	FAIL
Paddles Continued...			
1.10	Ensure the OneStep cable cannot be inserted with reversed polarity (upside-down).	☐	☐
Cables			
1.11	Inspect all cables (including accessories) for cuts, cracks, or exposed wires.	☐	☐
Battery & Power			
1.12	Ensure the battery seats properly into the battery well.		
1.13	Verify the AC Power LED is illuminated as a solid green LED.	☐	☐
1.14	Verify the battery LED shows either a solid green or solid amber LED.	☐	☐

Note: If the battery LED is flashing, ensure the battery is properly seated into the battery well and that the battery is not displaying a fault indicator. Inspect the pins and contacts both on the battery and within the battery well to ensure they are not damaged or in need of cleaning.

TEST 2

READY FOR USE TEST

Battery + AC Power + OneStep Cable



Instructional Video

TEST SETUP

- 1.0 Ensure the R Series is plugged into AC power and a fully charged battery is installed.
- 2.0 Power the R Series into either the "On" or "Defib" positions. Confirm "Manual" mode if required.
- 3.0 Ensure the OneStep MFC is connected to the R Series

PROCEDURE

		PASS	FAIL
2.1	Connect the OneStep cable to the right side panel test port. Verify "DEFIB PAD SHORT" appears on the display.	☐	☐
2.2	Using the energy select and charge buttons, charge the device to 30 Joules.	☐	☐
2.3	Verify that the charging tone sounds.	☐	☐
2.4	Press the SHOCK button and verify that the "30J TEST OK" message displays on the screen. (Note this message is only briefly displayed)	☐	☐
2.5	Verify a green check mark appears within the RFU window. 	☐	☐
2.6	On the print out, verify the following values: TEST_CUR=10-14A and DEFIB_IMPED = 0-5 Ohms.	☐	☐
NOTE	If the device shows a persistent Red "X" in the RFU window, access the device test log to identify any recorded faults. This log can be accessed by turning the main control dial into either the "ON" or "Monitor" positions, then pressing Report Data > Test Log		
2.7	Unplug the OneStep cable from the test port and verify that the "Check Pads" message appears on the display.	☐	☐
2.8	Disconnect AC Power from the R Series.		
2.9	Remove the battery from the battery well. Verify that a Red X appears in the RFU window. 	☐	☐
2.10	Replace the battery back into the battery well, and confirm that the RFU window now reverts back to a green check mark. 	☐	☐

TEST 3

FRONT PANEL BUTTON TEST

R Series + ECG Cable + OneStep Cable



Instructional Video

TEST SETUP

- 1.0 Ensure the R Series is plugged into AC power and a fully charged battery is installed.
- 2.0 Power the R Series into either the "On" or "Defib" positions. Confirm "Manual" mode if required.
- 3.0 Connect both ECG cables and the OneStep MFC to the analyzer. Enter the appropriate mode on the analyzer to receive defibrillation energy.

PROCEDURE

		PASS	FAIL
3.1	Press the "LEAD" button, and verify that the ECG Lead changes. Press the button again until "PADS" is the selected choice.	☐	☐
3.2	Press the "SIZE" button, and verify that the ECG size value changes. Press the button again until "x1" is the selected choice.	☐	☐
3.3	Press the "ALARM SUSPEND" button, and verify that the alarm bell state changes. If alarms begin to sound, press and hold the button for at least 4 seconds. Alarms will now be disabled.	☐	☐
3.4	Press the "RECORDER" button, and verify that the recorder begins to print. You may press the button again to cancel printing.	☐	☐
3.5	Press the "ENERGY SELECT" button once up, and once down. Verify energy selection changes in both directions.	☐	☐
3.6	Press the "CHARGE" button and verify that R Series begins to charge.	☐	☐
3.7	Verify the "SHOCK" button illuminates and then press the shock button to discharge into the analyzer.	☐	☐
3.8	Press the "ANALYZE" button and confirm an ECG analysis begins.	☐	☐
3.9	Turn the main control knob down into "PACER" mode.		
3.10	<u>Press and HOLD</u> the 4:1 button. Visually verify that the distance between stimulus markers widen on the display while the button is held.	☐	☐
3.11	Rotate the OUTPUT and RATE dials. Verify that the mA and PPM values change correspondingly.	☐	☐
3.12	(If Applicable) Press the NIBP button and verify that the NIBP pump inflates. You may press the button a second time to cancel the NIBP reading.	☐	☐



TEST SETUP

- 1.0 Power the R Series into either the "On" or "Monitor" positions. Confirm "Manual" mode if required.
- 2.0 Connect ECG Leads to the simulator. If possible the simulator should be operating on battery power.
- 3.0 Press the "LEAD" button on the R Series and select ECG Lead II.
- 4.0 Ensure that the alarms enabled and activated on the device.

PROCEDURE

		PASS	FAIL
4.1	Simulate a Normal Sinus Rhythm at 60 BPM.		
4.2	Verify the ECG signal appears on the display.	☐	☐
4.3	Verify the HR is between 59-61 BPM.	☐	☐
4.4	Disconnect a single lead from the simulator and verify the "ECG LEAD OFF" message displays within 3 seconds.	☐	☐
4.5	Verify that the HR alarm sounds. You may press and hold the alarm suspend button for 4 seconds to permanently deactivate the alarm.		
4.6	Reconnect the ECG Lead, and then repeat these steps for the remaining leads. When each lead is removed, verify the "ECG LEAD OFF" message displays.		

Note

If the "ECG LEAD OFF" message does not appear during this test, check the supervisor configuration, and ensure the setting under the ECG menu "Enable Leads Off" is set to "Yes". Be sure to restore the original configuration setting after testing is complete.



TEST 5

PRINT CALIBRATION TEST

Paper



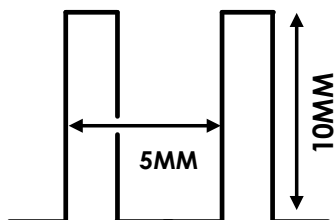
Instructional Video

TEST SETUP

- 1.0 Power the R Series into either the "On" or "Monitor" positions. Confirm "Manual" mode if required.
- 2.0 Ensure paper is correctly installed into the recorder tray.

PROCEDURE

- | | PASS | FAIL |
|--|--------------------------|--------------------------|
| 5.1 Press and <u>hold</u> the " SIZE " button on the R Series to introduce a 1mV square wave at 300 per minute onto the display. | | |
| 5.2 Activate the recorder to print a strip. (Note: the recorder prints on a 6 second delay.) | | |
| 5.3 The strip chart displays a signal of 300 ppm with an amplitude of 10 mm +/- 1 mm. The signal also appears on the video display. (You can verify that the rate is 300ppm by measuring 5mm from the left edge of one pulse to the left edge of the following pulse.) See the illustration below for reference. | ☐ | ☐ |



TEST 6

NOTCH FILTER TEST

Defib Analyzer + ECG Cables



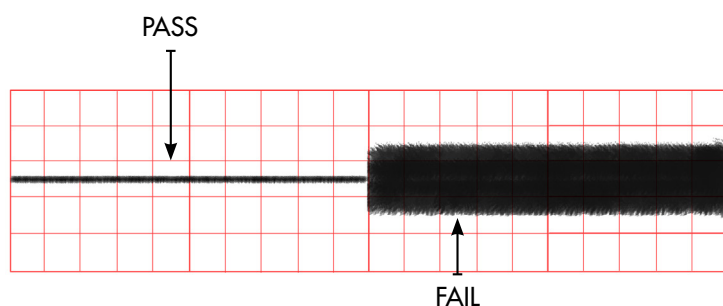
Instructional Video

TEST SETUP

- 1.0 Connect ECG leads to the analyzer and power the R Series into either the "On" or "Monitor" positions. Confirm "Manual" mode if required.
- 2.0 Press the LEAD button on the R Series and select ECG lead II. Press the "SIZE" button to select X3.
- 3.0 Enter the appropriate mode on your analyzer for simulating sine waves.

PROCEDURE

		PASS	FAIL
6.1	Using your analyzer simulate either a 50Hz or 60Hz sine wave per your local AC Mains frequency and device configuration.		
6.2	Press the " RECORDER " button to print a 10 second strip.		
6.3	Verify the waveform amplitude on the strip chart is less than 1.5mm. (One and a half small boxes, on the graph paper)	☐	☐
6.4	Press the " SIZE " button to reset back to x1.		
Note	If the test fails, check the "Notch filter" setting under system configuration. Ensure the filter choice matches your local AC Mains frequency.		





TEST SETUP

- 1.0 Connect the R Series to a Defib Analyzer via MFC or Paddles.
- 2.0 Place the analyzer into the appropriate mode for displaying energy output.
- 3.0 Ensure the R Series is turned on into "Defib" Mode for an ALS device or the mode selector is in the "ON" position for a BLS/Plus device. Confirm "Manual" mode if necessary.

WARNING! SHOCK HAZARD:

TAKE THE NECESSARY PRECAUTIONS TO GUARD AGAINST SHOCK OR INJURY BEFORE YOU START CONDUCTING THE DEFIBRILLATOR TESTS.

- Keep hands and all other objects clear of the multi-function cable connections and defibrillator analyzer when discharging the defibrillator.
- Before you discharge the defibrillator, warn everyone near the equipment to STAND CLEAR.

CAUTION:

DO NOT internally disarm the unit more than 3 times in 1 minute. Rapidly repeating internal discharges at more than 30 joules may damage the unit.

PROCEDURE

- 7.1 Charge and Shock according to the energy selection chart below. Ensure joule output is within the expected tolerance range. A complete energy output chart can be found on the following page.

Selected Energy	Resistance	Expected Output	JOULES	PASS	FAIL
5 Joules	50 Ohms	3-7 Joules		☐	☐
50 Joules	50 Ohms	46-62 Joules		☐	☐
100 Joules	50 Ohms	93-125 Joules		☐	☐
200 Joules*	50 Ohms	196-264 Joules		☐	☐
7.2*	At 200J verify that the Patient Current is between 23.9-25.9A. Defib Impedance is between 46-54 Ohms and charge time is between 1.0-7.0 Seconds. Perform this test once both on battery and AC Power.			☐	☐

TEST 7

DELIVERED ENERGY CHART

The ZOLL Rectilinear Biphasic waveform compensates for impedance measured between both electrodes. Delivered energy may be higher or lower than selected, based on impedance. Accuracy is assessed based on delivered energy which is determined by energy selection and measured impedance. As an example, if 200 Joules is selected and then delivered into 50 Ohms, the expected output is 230 Joules. The allowed 15% tolerance is then assessed from 230, not 200. Therefor the acceptable range would be 196-264 Joules.

Selected Energy	Load							Accuracy*
	25Ω	50Ω	75Ω	100Ω	125Ω	150Ω	175Ω	
1 J	1 J	1 J	1 J	1 J	1 J	1 J	1 J	±15%
2 J	1 J	2 J	2 J	2 J	2 J	2 J	2 J	±15%
3 J	2 J	3 J	3 J	3 J	3 J	3 J	3 J	±15%
4 J	3J	4 J	4 J	5 J	5 J	5 J	4 J	±15%
5 J	3 J	5 J	6 J	6 J	6 J	6 J	6 J	±15%
6 J	4 J	6 J	7 J	7 J	7 J	7 J	7 J	±15%
7 J	5 J	7 J	8 J	8 J	8 J	8 J	8 J	±15%
8 J	5 J	8 J	9 J	9 J	10 J	9 J	9 J	±15%
9 J	6 J	9 J	10 J	11 J	11 J	11 J	10 J	±15%
10 J	7 J	10 J	12 J	12 J	12 J	12 J	12 J	±15%
15 J	10 J	16 J	17 J	18 J	18 J	18 J	17 J	±15%
20 J	14 J	21 J	23 J	24 J	24 J	24 J	23 J	±15%
30 J	21 J	32 J	35 J	36 J	37 J	36 J	35 J	±15%
50 J	35 J	54 J	59 J	61 J	62 J	61 J	59 J	±15%
70 J	49 J	76 J	83 J	85 J	87 J	86 J	83 J	±15%
85 J	60 J	92 J	101 J	104 J	106 J	104 J	101 J	±15%
100 J	71 J	109 J	119 J	122 J	125 J	123 J	119 J	±15%
120 J	85 J	131 J	143 J	147 J	150 J	147 J	143 J	±15%
150 J	107 J	164 J	180 J	183 J	188 J	184 J	179 J	±15%
200 J	142 J	230 J	249 J	253 J	269 J	261 J	260 J	±15%

TEST 8

SYNCHRONIZED CARDIOVERSION

Defib Analyzer + Multi-Function Cable



Instructional Video

TEST SETUP

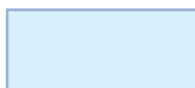
- 1.0 Connect the R Series to a Defib Analyzer via MFC or Paddles.
- 2.0 Place the analyzer into the appropriate mode for Synchronized Cardioversion.
- 3.0 Ensure the R Series is turned on into "Defib" mode for an ALS device or the mode selector is in the "ON" position for a BLS/Plus device. Confirm "Manual" mode if necessary.

PROCEDURE

PASS

FAIL

- | | | | |
|-----|--|--------------------------|--------------------------|
| 8.1 | On the analyzer simulate a Normal Sinus Rhythm at 60 BPM. | | |
| 8.2 | On the R Series press the " SYNC " softkey to enable synchronized cardioversion. | | |
| 8.3 | Verify that sync markers appear over each "R" wave in the ECG signal. The sync markers appear as a down arrow over each R Wave peak. | ☐ | ☐ |
| 8.4 | Press the "Charge" button to charge the R Series to any Joule setting. | | |
| 8.5 | When the shock button illuminates, press and HOLD the shock button to deliver energy. | | |
| 8.6 | On the analyzer, verify the sync delay is less than 60ms . | ☐ | ☐ |



Observed
Delay



TEST 9

REMOTE CARDIOVERSION TEST (IF APPLICABLE)

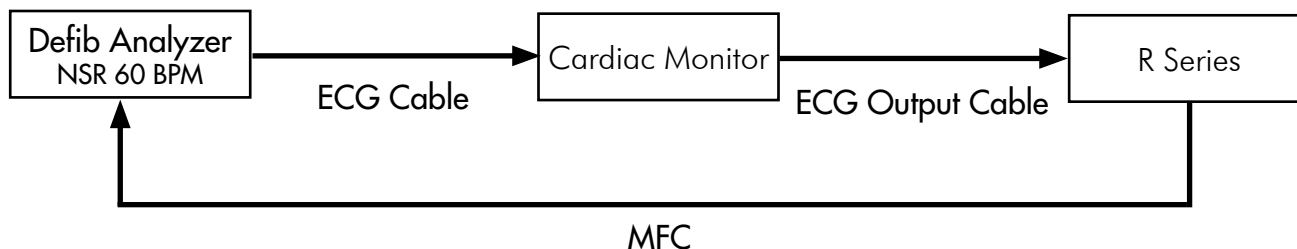
Defib Analyzer + Multi-Function Cable + Cardiac Monitor

TEST SETUP

Note	This test measures signal delay between a bedside or cardiac monitor and the R Series. This test is only applicable, if the device is being used in an area where the ECG signal is slaved from an external monitor.
1.0	Following the diagram below, connect the cardiac monitor between the R Series and Defib Analyzer.
2.0	Place the analyzer into the appropriate mode for Synchronized Cardioversion
3.0	Ensure the R Series is turned on into "Defib" mode for an ALS device or the mode selector is in the "ON" position for a BLS/Plus device. Confirm "Manual" mode if necessary.
4.0	Ensure the cardiac monitor is outputting an ECG signal to the ECG input on the R Series.

PROCEDURE

		PASS	FAIL
9.1	On the analyzer simulate a Normal Sinus Rhythm at 60 BPM.		
9.2	On the R Series press the "SYNC" softkey to enable synchronized cardioversion.		
9.3	Verify that sync markers appear over each "R" wave in the ECG signal. The sync markers appears a down arrow over each R Wave peak.	☐	☐
9.4	Press the "Charge" button to charge the R Series to any Joule setting.		
9.5	When the shock button illuminates, press and HOLD the shock button to deliver energy.		
9.6	On the analyzer, verify the sync delay is less than 60ms .	☐	☐
	Observed Delay		



TEST 10

PACER OUTPUT TEST

Pacer Analyzer + Multi-Function Cable



Instructional Video

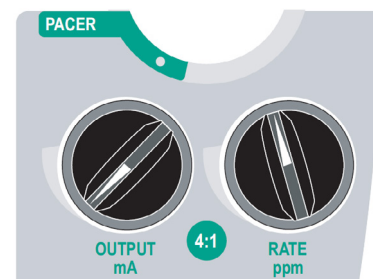
TEST SETUP

- 1.0 Turn the main selector knob down to "PACER" Mode. If this is a BLS/Plus device make sure to confirm "Manual Mode" operation.
- 2.0 Connect the R Series to a Pacer Analyzer via the OneStep MFC.
- 3.0 Enter the appropriate mode for receiving pacing current on the analyzer. Load resistance must be less than 250 Ohms.

PROCEDURE

		PASS	FAIL
10.1	Set the pacer to 14 mA , and disconnect the OneStep cable from the analyzer. Verify that the "Check Pads" message appears and the alarm activates.	☐	☐
10.2	Reconnect the OneStep cable to the analyzer, and press the "Clear Pace Alarm" soft-key. Verify that the alarm is no longer active.	☐	☐
10.3	With the analyzer, observe for rate and output based on the below chart:		

RATE (ppm)	OUTPUT	TOLERANCE	mA	PASS	FAIL
70	0 mA	No Output Is Detected		☐	☐
70	20 mA	20 mA +/- 5 mA Rate is between 69-71 ppm.		☐	☐
180	140 mA	140 mA +/- 7 mA Rate is between 177.3-182.7 ppm. Pulse width 40ms +/- 2ms.		☐	☐
4:1 Pacer Test			Rate		
Using the last settings in the chart above, press and hold the 4:1 Button. Ensure the pacer rate is between 44.3 and 45.6 PPM.				☐	☐



Pacing Controls

TEST 11

SYNCHRONIZED PACING TEST

Pacer Analyzer + OneStep Cable + ECG cables



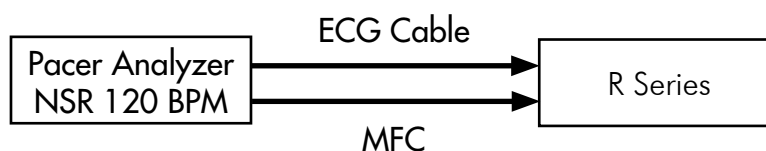
Instructional Video

TEST SETUP

- 1.0 Turn the main selector knob down to "PACER" Mode. Confirm "Manual" mode if necessary.
- 2.0 Connect the R Series to a Pacer Analyzer via the OneStep MFC.
- 3.0 Connect ECG leads from the R Series to the analyzer.

PROCEDURE

		PASS	FAIL
11.1	Set the pacer rate to 100 PPM, and then simulate a Normal Sinus Rhythm at 120 BPM. Lead selection should be set to ECG Lead II.		
11.2	A NSR at 120 BPM +/- 2 is displayed and no stimulus markers appear on the display.	☐	☐
11.3	Press the "ASYNC" softkey.		
11.4	Verify the "ASYNC PACE" message appears on the display and stimulus markers are now visible.	☐	☐



TEST 12

SPO2 FUNCTION CHECK (IF APPLICABLE)

SPO2 Simulator + SPO2 Cable + SPO2 Sensor



Instructional Video

TEST SETUP

- 1.0 Turn the main selector knob down to "On" or "Monitor" mode. Confirm "Manual" mode if necessary.

Note: Simulators cannot be utilized to assess clinical accuracy of SPO2 technology. The following procedure has been designed as a functional check of the SPO2 system.

PROCEDURE

		PASS	FAIL
12.1	Inspect the SPO2 sensor for any signs of damage or excessive wear.	☐	☐
12.2	Place the SPO2 sensor onto an appropriately sized finger, and ensure that the sensor's emitter is placed directly over the fingernail. Ensure, that the sensor is shielded from any bright ambient light sources.		
12.3	View the SPO2 pleth and verify that the waveform is present and without signs of artifact. (Note, certain cardiac arrhythmias such as Atrial Fibrillation may produce irregular rate and waveform irregularities)	☐	☐
12.4	Verify SPO2 readings are between 93-100%.	☐	☐
Note	If the SPO2 Waveform does not automatically appear. You can display the waveform by using the softkeys below the screen to enable the setting. Navigate to: Options>Traces>Trace 3>SPO2 . Any changes will revert back to default settings after a 10 second power cycle.		
Note	Individuals with certain diseases of the lungs such as COPD or emphysema may chronically have SPO2 saturation levels below 95%.		



TEST SETUP

- 1.0 Turn the main selector knob down to "On" or "Monitor" mode. Confirm "Manual" mode if necessary.
- 2.0 Ensure the ETCO₂ accessory is connected to the R Series.
- 3.0 Install the airway adapter / consumable to the sensor or module.

Note: The R Series may or may not be configured to initialize the EtCO₂ sensor upon power up. The warm up period may last up to 3 minutes. If the "WARM UP" message does not appear on the display and the EtCO₂ parameter window displays "Disabled", you must enable the feature by navigating to: **Param>CO₂>Enable EtCO₂**

PROCEDURE

PASS

FAIL

13.1 When the WARM UP message disappears, press the **Param** softkey, then select **EtCO₂**.

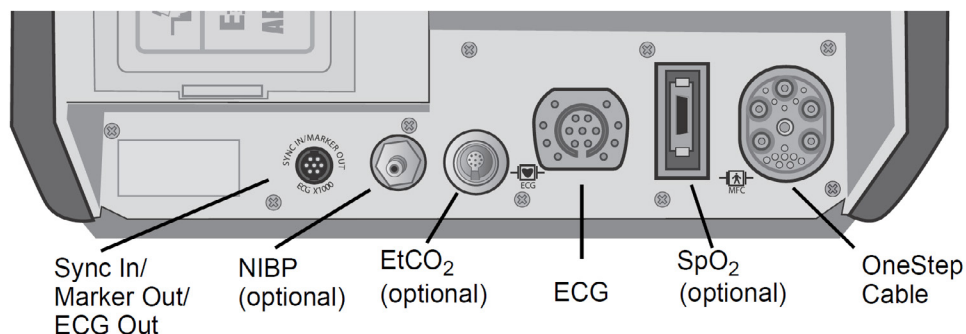
13.2 Press the **ZERO** softkey, and wait for the zeroing process to complete, this will take approximately 10 seconds. Verify that the **ZERO DONE** message appears on the display.

13.3 Press the **Return** Softkey

13.4 If not already displayed, enable the EtCO₂ waveform by navigating to: **Options>Traces>Trace 2>EtCO₂**

13.5 Verify that a flat baseline appears within the trace.

13.6 Breathe normally into the airway adapter, and verify that a capnograph waveform appears on the display.



TEST 14

CO2 ACCURACY CHECK (IF APPLICABLE)

CAPNOSTAT 5 Mainstream or LoFlo Sidestream Module +
5% CO2 Calibration Gas + Barometer



Instructional Video

TEST SETUP

- 1.0 Ensure the ETCO2 accessory is connected to the R Series.
- 2.0 Connect the mainstream or sidestream disposable adapter to the accessory.
- 3.0 If currently powered on, turn off the R Series and wait 10 seconds. Then, turn the device to either the "On" or "Monitor" positions while continuing to press and hold the 2nd softkey.

BAROMETRIC PRESSURE CALIBRATION PROCEDURE		PASS	FAIL
14.1	Press the Baro Pr. softkey to enter the Barometric Pressure Calibration screen.		
NOTE	The Barometric Pressure displays as the second value in mmHg. As an example, if the values shown are 3530, 760 then the barometric pressure measurement is 760 mmHg.		
14.2	Use the Inc> and Dec< softkeys to adjust the measurement to your local barometric pressure. Verify that the Barometric Pressure displayed on the R Series, matches your local pressure reading.	☐	☐
NOTE	For accurate results, measurements should be compared against a calibrated barometer.		
14.3	Press the Return softkey to store the offset and return to the main calibration screen.		
EtCO2 Accuracy Verification			
NOTE	If the CO2 WARM UP message is displayed, wait for the message to disappear before continuing. This may take up to 3 minutes.		
NOTE	If the ambient temperature of the room is different than the temperature in Celsius shown on the display, adjust the temperature by choosing Select Gas Temp followed by increasing or decreasing as needed. Press "Return" when complete.		
14.4	Once the CO2 WARM UP message disappears, press the Zero softkey to zero the sensor. Verify "ZERO DONE" is shown on the display once complete.	☐	☐
14.5	Attach a regulated flowing gas mixture of 5% CO2, balance Nitrogen (N2) to the airway adapter. The gas flow rate should already be preset to 2 to 5 LPM for mainstream and 2 LPM if utilizing the LoFlo sidestream module.		
14.6	Allow several seconds for the gas mixture to stabilize and observe the CO2 Percent value. Verify the CO2 percentage is between 4.8 and 5.2%	☐	☐
14.7	Once complete, you may turn off the device.		



TEST SETUP

- 1.0 Connect the MFC to the paddles.
- 2.0 Connect the paddles into each side well on the R Series.
- 3.0 Turn the main selector knob to "On" or "Monitor" mode. Confirm "Manual" mode if necessary.

WARNING! SHOCK HAZARD:

TAKE THE NECESSARY PRECAUTIONS TO GUARD AGAINST SHOCK OR INJURY BEFORE YOU START CONDUCTING THE DEFIBRILLATOR TESTS.

- Keep hands and all other objects clear of the multi-function cable connections and defibrillator analyzer when discharging the defibrillator.
- Before you discharge the defibrillator, warn everyone near the equipment to STAND CLEAR.

CAUTION:

DO NOT internally disarm the unit more than 3 times in 1 minute. Rapidly repeating internal discharges at more than 30 joules may damage the unit.

PROCEDURE		PASS	FAIL
15.1	Press the ENERGY SELECT DOWN button on the sternum paddle and verify that the energy level decreases.	☐	☐
15.2	Press and release the ENERGY SELECT UP button on the sternum paddle and verify that the energy level increases.	☐	☐
15.3	Press and release the RECORDER button on the sternum paddle. Verify that the recorder starts printing. You may press the button a second time to stop printing.	☐	☐
15.4	Using the Energy Select Buttons on the paddles, select 30 Joules , and then press the CHARGE button on the APEX Paddle.	☐	☐
15.5	Verify that the unit charges to 30J and the red LED charge indicator on the apex paddle illuminates.	☐	☐
15.6	Press and release the APEX SHOCK button. Verify the unit does not discharge.	☐	☐

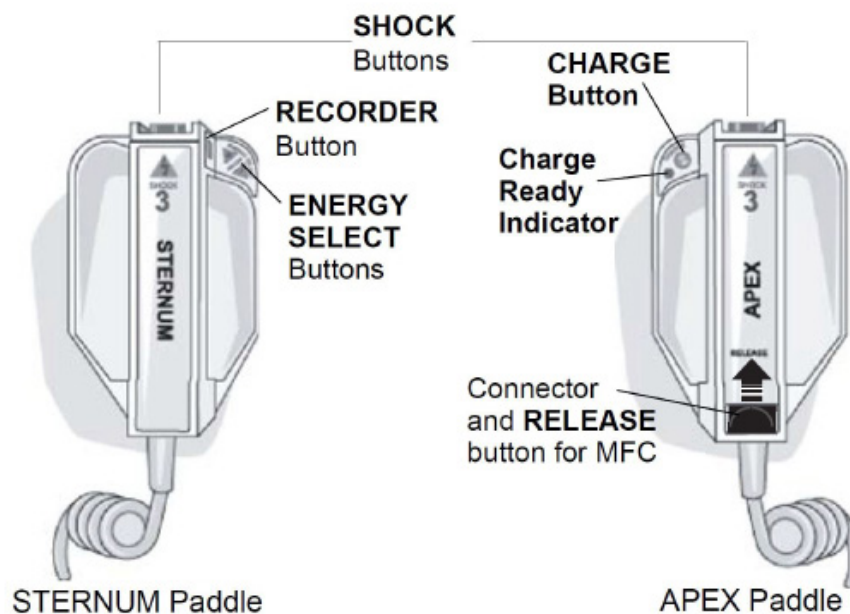
TEST 15

PADDLES TEST (IF APPLICABLE)

External Paddles + MFC Cable + Defib Analyzer



PROCEDURE (Continued...)		PASS	FAIL
15.7	Press and release the STERNUM SHOCK Button . Verify the unit does not discharge.	☐	☐
15.8	Press and hold Both SHOCK buttons on the paddles. Verify the unit discharges. The unit displays "30 J Test OK" on the display. If configured, the recorder prints a strip chart. Note that the 30 J Test OK message will only display briefly.	☐	☐



TEST 16

NIBP LEAK TEST (IF APPLICABLE)

NIBP Analyzer + NIBP Tubing + NIBP Adult Size Cuff or Rigid Volume



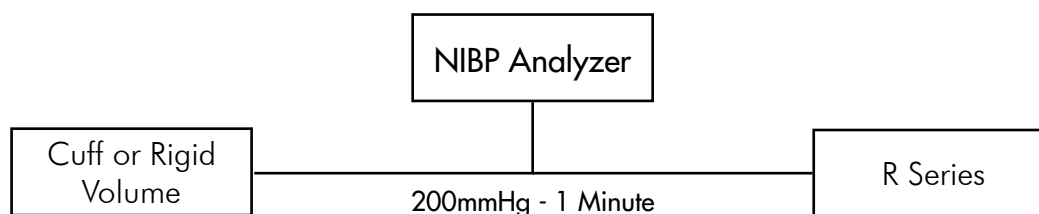
Instructional Video

TEST SETUP

- 1.0 Connect the R Series to the NIBP Analyzer, along with either an adult size cuff or rigid volume. If using a patient cuff, the cuff should be tightly wrapped around a rigid container.
- 2.0 If currently powered on, turn off the R Series, wait 10 seconds and then turn the device to either the "On" or "Monitor" positions while **pressing and holding the 4th softkey.**

NOTE: The volume leak test verifies the integrity of the pneumatic system on the R Series NIBP module. This test should be performed annually or every 10,000 readings, whichever comes first.

PROCEDURE		PASS	FAIL
16.1	Press the Leak Test key and enter the R Series leak test mode.		
16.2	On the NIBP analyzer, set the pressure parameter to 200mmHg .		
16.3	On the NIBP analyzer, set the test duration to 1 minute .		
16.4	On the R Series unit, press the Close Valves softkey. Verify the Valves status changes from OPEN to CLOSED .	☐	☐
NOTE	The NIBP valves will remain closed for a maximum of 3 minutes. After 3 minutes, the valves will automatically open.		
16.5	On the analyzer, begin the test ensuring that the simulator pressurizes to 200mmHg, with a duration of 1 minute.	☐	☐
16.6	After 1 minute, verify that the leak rate is less than 5.5mmHg	☐	☐
16.7	When complete, press the "Exit" softkey to return to the NIBP Service Mode.		



TEST 17

NIBP CALIBRATION TEST (IF APPLICABLE)

NIBP Analyzer + NIBP Tubing + NIBP Adult Size Cuff or Rigid Volume



Instructional Video

TEST SETUP

- 1.0 If continuing from the previous test (NIBP Leak Test) continue to the step 17.1
- 2.0 Connect the R Series to the NIBP Analyzer, along with either an adult size cuff or rigid volume. If using a patient cuff, the cuff should be tightly wrapped around a rigid container.
- 3.0 If currently powered on, turn off the R Series, wait 10 seconds and then turn on the device to either the "On" or "Monitor" positions while pressing and holding the 4th softkey.

PROCEDURE

PASS

FAIL

17.1 Under the NIBP Service Mode, press the **NIBP Calib** softkey. The R series will then enter the transducer calibration menu.

17.2 On the NIBP analyzer, set a pressure of **0mmHg**

17.3 On the R Series, press the **Set Low** softkey to zero the transducer. Verify that the field adjacent to the 0 mmHg value changes to **PASS**.

☐
☐

NOTE

If the R Series displays a "FAIL" message, verify the NIBP analyzer's pressure setting and connection to the R Series then repeat the step.

17.4 On the NIBP analyzer, set a pressure of **250mmHg**. **Wait for the pressure to stabilize.**

17.5 On the R Series, press the **Set High** softkey to calibrate the transducer. Verify that the field adjacent to the 250 mmHg value changes to **PASS**.

☐
☐

17.6 On the NIBP simulator, change the pressure value to stimulate a different cuff pressure (for example, 205 mmHg). **Wait for the pressure to stabilize.**

☐
☐

17.7 On the R Series, press the **Read Cuff** softkey. Verify that the value displayed is accurate within **±3 mmHg** of the pressure parameter set on the NIBP simulator.

☐
☐

17.8 On the R Series unit, press the **EXIT** softkey twice and return to clinical monitoring mode.

TEST 18

LEAKAGE CURRENT TEST

Electrical Safety Analyzer + Applied Parts

TEST SETUP

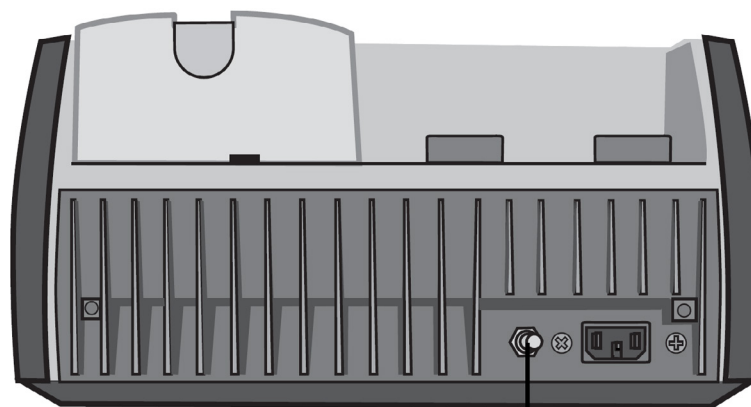
- 1.0 Refer to the manufacturer's instructions or supplied specifications for the leakage tester you use. Repeat the leakage test with accessories: MFC cable, paddles, and ECG leads. Perform these tests at the line-power voltage and frequency used in your installation. The ZOLL R Series is a Class 1 medical device, certified to IEC 60601-1 with CF and BF applied parts.

WARNING! SHOCK HAZARD:

- Do NOT use anti-static robes, benches, floor mats or perform the below tests at an ESD station during electrical safety testing. Follow all specified precautions offered by the ESA manufacturer.
- Do NOT touch the DUT while the testing procedure is underway. Always consider the DUT to be electrified while testing is in progress.

Perform leakage current testing in accordance with either of the following electrical safety standards:

- IEC (International Electrotechnical Commission) 62353 for recurrent test and test after repair of medical electrical equipment.
- IEC (International Electrotechnical Commission) 60601-1.



PROTECTIVE EARTH

IEC 60601-1 LEAKAGE TEST LIMITS				
	TYPE BF		TYPE CF*	
	NC	SFC	NC	SFC
Patient Leakage AC	100 μ A	500 μ A	10 μ A	50 μ A
Patient Auxiliary Current AC	100 μ A	500 μ A	10 μ A	50 μ A
Mains on Applied Parts	N/A	5000 μ A	N/A	100 μ A (PADS, PADDLES) 50 μ A (ECG)

	Normal Condition	Single Fault Condition
Earth Leakage	500 μ A	1000 μ A
Enclosure Leakage	100 μ A	500 μ A

IEC 62353 CLASS 1 LEAKAGE TEST LIMITS – DIRECT METHOD		
	TYPE BF**	TYPE CF*
Equipment Leakage	500 μ A	500 μ A
Patient Leakage Current	5000 μ A	50 μ A

NOTES		
*	CF	ECG
**	BF	PADS, PADDLES

PROCEDURE		PASS	FAIL
18.1	Verify that all electrical safety testing / leakage measurements are within allowable limits.	☐	☐



TEST SETUP - OPTION 1

Tools Needed: MFC, CPR Test Cable (ZOLL PN: 8900-0180), Defib Analyzer

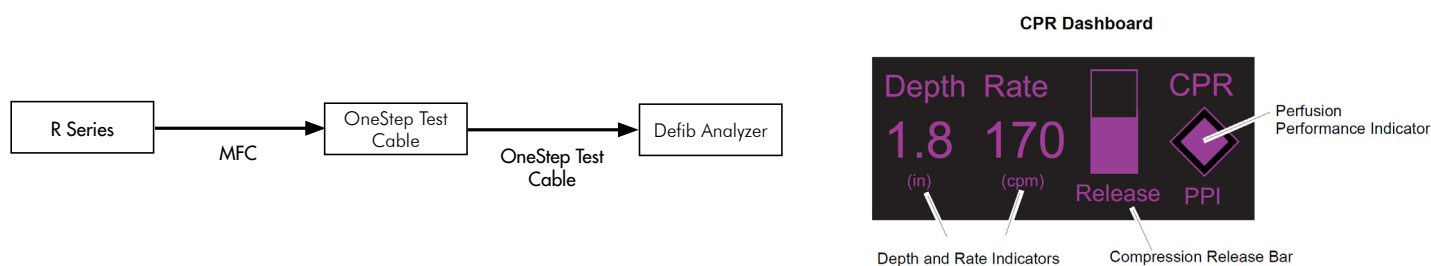
- 1.0 Connect the R Series MFC to the CPR Test Cable (ZOLL PN: 8900-0180).
- 2.0 Connect the test cable to the Defib Analyzer.
- 3.0 Turn the main selector knob to the "Defib" or "On" Position. Confirm "Manual" mode if necessary.

NOTE: This test is only applicable to devices configured for CPR Feedback. Depending on purchased options and software version, the CPR dashboard may appear different than illustrated below. If this test is not applicable, tick the N/A checkbox for this test located on the PM Inspection Report.

NOTE: The following procedure contains two options for completing a functional check of the CPR feedback circuitry. Either option may be utilized as an acceptable method for this test procedure.

PROCEDURE - OPTION 1

		PASS	FAIL
19.1	To activate CPR feedback, perform compressions with the training sensor at a rate of approximately 100 compressions per minute and at a depth of approximately 2 inches.		
19.2	While compressions are performed, verify that CPR feedback is displayed on the screen. Note that depth and rate numerics may not display depending on device configuration.	☐	☐
Note	CPR feedback will not register until a valid impedance is detected. Ensure that the OneStep CPR Test cable is connected between the MFC and the Defib Analyzer.		
Note	The CPR sensor is not pressure sensitive, it requires physical up and down motion which is measured via an accelerometer.		





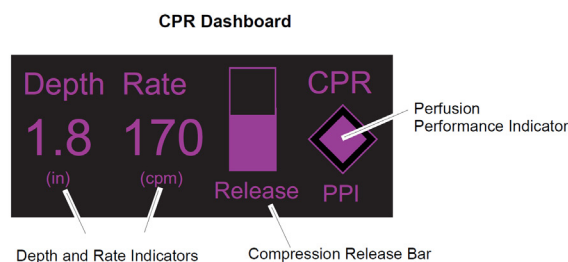
TEST SETUP - OPTION 2

Tools Needed: MFC, MFC to CPR-D Adapter (PN: 8009-0020), ZOLL AED Simulator (PN: 8000-000925)

- 1.0 Connect the R Series MFC to the ZOLL AED Simulator by way of the MFC to CPR-D Adapter.
- 2.0 Turn the main selector knob to the "Defib" or "On" Position. Confirm "Manual" mode if necessary.

PROCEDURE - OPTION 2

		PASS	FAIL
19.3	Press the power button on the AED Simulator followed by pressing the CPR button on the simulator's control panel.		
19.4	Verify that CPR feedback displays on the screen. Note that depth and rate numerics may not display depending on device configuration.	☐	☐
Note	CPR feedback will not register until a valid impedance is detected. If CPR feedback does not activate, check all connections between the MFC, Adapter and Simulator.		
Note	During simulation it will be expected to see intermittent pauses of CPR feedback during this procedure. The ZOLL AED Simulator simulates CPR at a 2/30 ratio. After 30 compressions, the simulation will pause to allow for 2 breaths before compressions resume.		



PM Inspection Report

ZOLL R Series ®

Reset Form

Serial Number

Software Version

Technician

Organization

Month

Day

Year

Physical Inspection

TEST	PASS	FAIL
1.1	☐	☐
1.2	☐	☐
1.3	☐	☐
1.4	☐	☐
1.5	☐	☐
1.6	☐	☐
1.7	☐	☐
1.8	☐	☐
1.9	☐	☐
1.10	☐	☐
1.11	☐	☐
1.13	☐	☐
1.14	☐	☐

Ready for Use Test

TEST	PASS	FAIL
2.1	☐	☐
2.2	☐	☐
2.3	☐	☐
2.4	☐	☐
2.5	☐	☐
2.6	☐	☐
2.7	☐	☐
2.9	☐	☐
2.10	☐	☐

Front Panel Button Test

TEST	PASS	FAIL
3.1	☐	☐
3.2	☐	☐
3.3	☐	☐
3.4	☐	☐
3.5	☐	☐
3.6	☐	☐
3.7	☐	☐
3.8	☐	☐
3.10	☐	☐
3.11	☐	☐
3.12	☐	☐

ECG Test

TEST	PASS	FAIL
4.2	☐	☐
4.3	☐	☐
4.4	☐	☐

Print Calibration Test

TEST	PASS	FAIL
5.3	☐	☐

Notch Filter Test

N/A		☐
TEST	PASS	FAIL
6.3	☐	☐

PM Inspection Report

ZOLL R Series ®

Shock Test

TEST	ENERGY	PASS	FAIL
7.1	5J	☐	☐
	50J	☐	☐
	100J	☐	☐
	200J	☐	☐
7.2	-	☐	☐

SELECTED ENERGY	ENERGY OUTPUT
5 Joules	☐
50 Joules	☐
100 Joules	☐
200 Joules	☐

Synchronized Pacing Test

TEST	PASS	FAIL
11.2	☐	☐
11.4	☐	☐

CO2 Accuracy Check

N/A		☐
TEST	PASS	FAIL
14.2	☐	☐
14.4	☐	☐
14.6	☐	☐

Leakage Current Test

TEST	PASS	FAIL
18.1	☐	☐

Synchronized Cardioversion Test

TEST	PASS	FAIL	OBSERVED DELAY (MS)
8.3	☐	☐	-
8.6	☐	☐	☐

Remote Cardioversion Test

N/A			☐
TEST	PASS	FAIL	OBSERVED DELAY (MS)
9.3	☐	☐	-
9.6	☐	☐	

SPO2 Test

N/A		☐
TEST	PASS	FAIL
12.1	☐	☐
12.3	☐	☐
12.4	☐	☐

Paddles Test

N/A		☐
TEST	PASS	FAIL
15.1	☐	☐
15.2	☐	☐
15.3	☐	☐
15.4	☐	☐
15.5	☐	☐
15.6	☐	☐
15.7	☐	☐
15.8	☐	☐

CPR Feedback Test

N/A		☐
TEST	PASS	FAIL
19.2*	☐	☐
19.4*	☐	☐

Pacer Output Test

TEST	PASS	FAIL
10.1	☐	☐
10.2	☐	☐

TEST	RATE (ppm)	mA	PASS	FAIL
10.3	70	☐	☐	☐
	70	☐	☐	☐
	180	☐	☐	☐

4:1 Pacer Test		
RATE	PASS	FAIL
☐	☐	☐

EtCO2 Functional Test

N/A		☐
TEST	PASS	FAIL
13.2	☐	☐
13.5	☐	☐
13.6	☐	☐

NIBP Leak Test

N/A		☐
TEST	PASS	FAIL
16.4	☐	☐
16.5	☐	☐
16.6	☐	☐

NIBP Calibration Test

N/A		☐
TEST	PASS	FAIL
17.3	☐	☐
17.5	☐	☐
17.6	☐	☐
17.7	☐	☐