



Model 601

Fiber Optic Pressure Measurement Instrument

USER INSTRUCTIONS



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1 INTRODUCTION TO INSTRUMENT COMPONENTS

1.1 PRESSURE SENSOR ASSEMBLY



1.2 MODEL 601 CONNECTIVITY GUIDE



Right Side

12VDC POWER
Input, 12VDC, 2.5A

USB (type B)
Connects to computer for serial port emulation

PATIENT MONITOR (PMI)
Simulated strain gauge output



Left Side

SENSOR ATTACH
Connection point for Pressure Sensor Assemblies

ANALOG OUTPUT
-1 to 3V, 10mV/mmHg

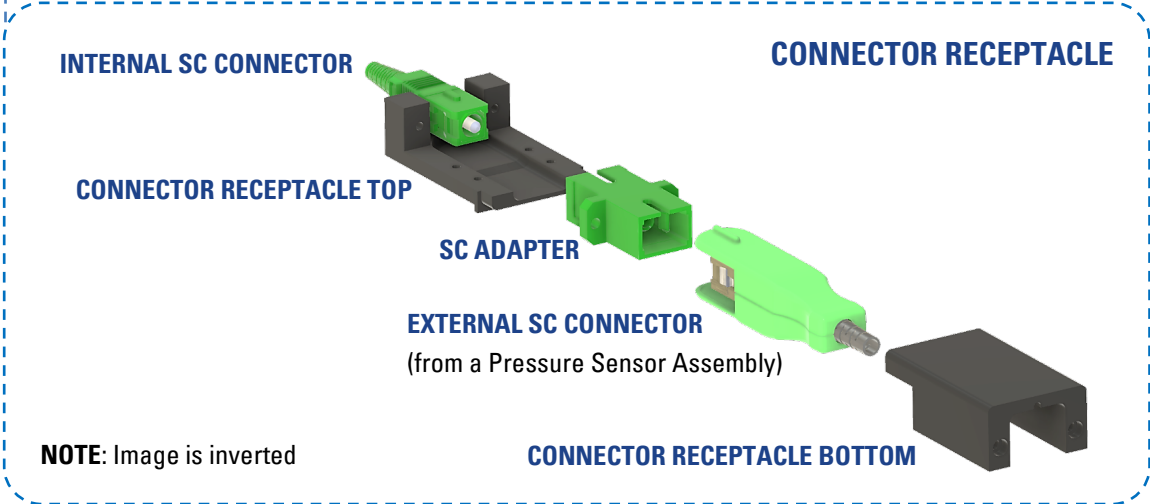
NOTE: Every Model 601 comes with the following:

POWER SUPPLY

- Input: 100-240VAC, 50-60Hz
- Output: 12VDC, 3.34A, 40W

POWER CORD

- 18AWG, 3COND M/F



2 GETTING YOUR MODEL 601 UP AND RUNNING

2.1 INCLUDED COMPONENTS

ⓘ An Analog Output Cable is available upon request.

POWER SUPPLY

Input: 100-240VAC, 50-60Hz
Output: 12VDC



POWER CORD

18AWG, 3COND M/F



2.2 STARTUP ACCESSORIES PACK

The Startup Accessories Pack provides the user with all the components necessary to begin working with the Model 601. The pack is included with the first Model 601 purchase. Additional packs may be purchased separately.

ⓘ The Quick Start Guide assumes the user has access to a Startup Accessories Pack.

PACK COMPONENTS:

FLASH DRIVE, contains:

- FTDI Driver
- DotNet Library
- Sensor Logging and Display Tool
- ⓘ Software is for demonstration purposes only
- RJC Model 601 User Instructions PDF
- Instructions for using RJC Fiber Optic Pressure Sensors PDF

USB CABLE

- Connector type A-to-B, USB 2.0

FIBER OPTIC CABLE SAMPLE

- 100/140/170µm cable, ~80 inches

CABLE JACKET STRIPPER

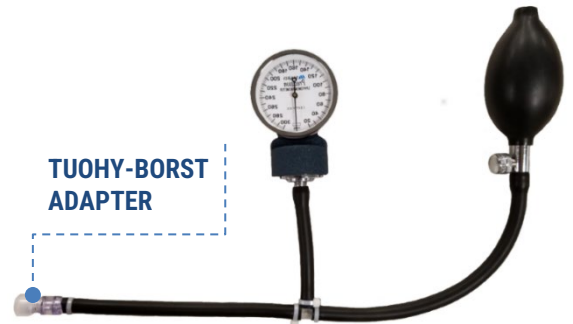
- Jonard Tools WS-5

CLEANING SWABS

- Swabs for cleaning the **CONNECTOR RECEPTACLE**

SENSOR PRESSURIZATION ASSEMBLY

- Used to apply pressure to the Model 45/65 Test Sensor



TUOHY-BORST ADAPTER

MODEL 45/65 TEST SENSOR

- Contains an RJC pressure sensor



2.3 QUICK START GUIDE

STEP 1 CONNECT THE POWER SUPPLY

Using the provided **POWER CORD**, connect the **POWER SUPPLY** to a 110 VAC wall outlet and the Model 601 **12VDC POWER**.

If the display is off, activate it by pressing the **ON/STANDBY**  button.

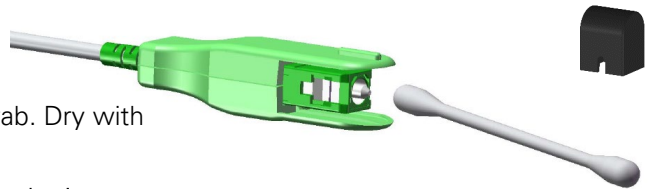
A required ~5 minute warm-up of the optical system will begin.

STEP 2 CLEAN THE MODEL 45/65 TEST SENSOR

Remove the **MODEL 45/65 TEST SENSOR** connector cap.

Clean the connector with an alcohol-soaked cotton swab. Dry with compressed air.

NOTE: Clean the sensor connector between each insertion!



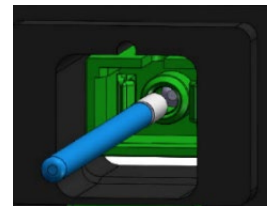
STEP 3 CLEAN THE MODEL 601 CONNECTOR RECEPTACLE

Remove the connector receptacle plug.

Soak a provided **CLEANING SWAB** in alcohol and insert into the **CONNECTOR RECEPTACLE**. Rotate several times. Remove the swab.

Insert a dry swab and rotate several times. Remove the swab, then dry with compressed air.

 Cleaning the receptacle during instrument warm-up may result in temporary errors. This is expected.



STEP 4 CONNECT THE MODEL 45/65 TEST SENSOR

When the instrument is ready, an **INSERT SENSOR CONNECTOR** message will display on the Model 601.

Confirm the connector is properly oriented, then insert into the **CONNECTOR RECEPTACLE**. Push gently until you feel a click.

The Model 601 will run through the sensor load cal and zeroing process.



STEP 5 CONNECT THE SENSOR PRESSURIZATION ASSEMBLY

Install the **TUOHY-BORST ADAPTER** of the **SENSOR PRESSURIZATION ASSEMBLY** onto the **MODEL 45/65 TEST SENSOR** and tighten.



STEP 6 APPLY PRESSURE

Apply pressure using the squeeze bulb of the **SENSOR PRESSURIZATION ASSEMBLY**.

Resulting pressures will be displayed as **INDICATED PRESSURE** on the screen.

Repeat from STEP 2 for each pressure sensor assembly.

3 DETAILS ON USING YOUR INSTRUMENT

3.1 LOAD SENSOR CALIBRATION & ZEROING



Immediately after 12VDC power has been applied, the Model 601 will begin a required ~5-minute warm-up of the optical system.

NOTES:

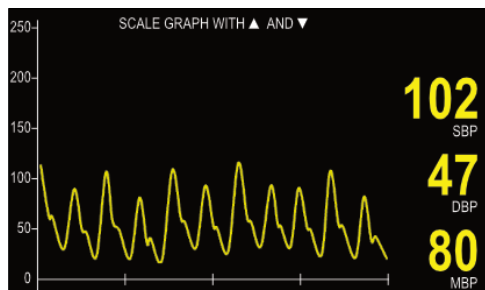
- For optimal system performance and accuracy, a 45-minute warm-up is recommended.
- Cycling 12VDC power will restart the warm-up period, cycling the display (⏻) will not.

After warm-up, the user is prompted to **INSERT SENSOR CONNECTOR**. At this time – or any time during the warm-up period – an RJC pressure sensor assembly may be connected to the Model 601. Once connected, the assembly's unique calibration data is loaded.

Following **CALIBRATION LOADING**, the Model 601 performs an offset adjustment to ensure the indicated pressure is zero.

3.1.1 GRAPH SCREEN

Pressure waveform data is displayed once the sensor zeroing process is complete.



3.1.2 TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Loading Calibration Failed!		
Sensor Calibration Bad	The sensor's calibration data is corrupt.	Try a different pressure sensor assembly.
Sensor Incompatible	The pressure sensor assembly model is not compatible with the Model 601.	
Failed Gain Range	Sensor is broken / internal instrument problem / sensor behavior does not match its calibration data.	Ensure the sensor connector is <i>clicked</i> fully into receptacle. If the error continues, try a different pressure sensor assembly.
Sensor Zero Failed!		
Excessive Zero Offset	The sensor pressure differs from ambient pressure by more than 25mmHg.	Verify no pressure has been applied to the sensor, then re-zero. If the error continues, try a different pressure sensor assembly.
Measured Pressure Unstable	During the zeroing process, the sensor pressure reading changed by more than 5mmHg over 2.5 seconds.	
EEPROM Write Failed	Internal instrument error.	Return instrument to manufacturer.
Instrument Inoperable		
SEE USER INSTRUCTIONS – WARMUP FAILED	Model 601 is unable to warm up in 5 minutes.	Remove 12VDC power and allow the instrument to cool to room temperature. If the problem continues, return to manufacturer.
SEE USER INSTRUCTIONS – TEMPERATURE BOUNDS	Model 601 temperature unstable/outside allowed range	Remove 12VDC power and move instrument to a more temperature stable environment. If the problem continues, return to manufacturer.
[Any other "Instrument Inoperable" error]	Internal instrument error.	Return instrument to manufacturer.


3.1.3 PREVIOUS ZERO RESTORED

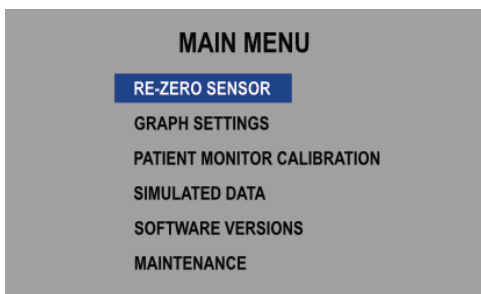
If pressure is unstable during the zeroing process, the Model 601 will use a previous zero, if it exists.

This ensures the continued operation of the system after an unintended power loss or accidental disconnection of the pressure sensor assembly while in use.



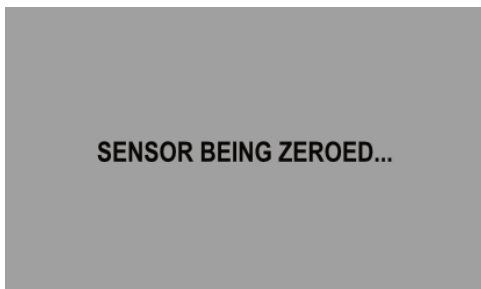
3.2 MAIN MENU

MENU  Press **MENU/BACK** on the keypad to access the **MAIN MENU**.




3.2.1 RE-ZERO SENSOR

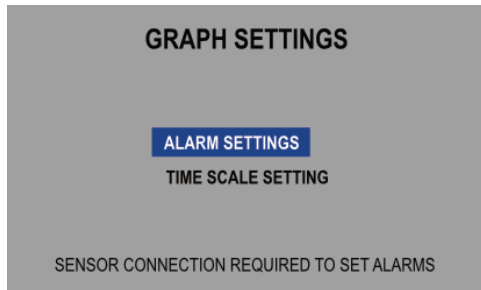
MENU 
RE-ZERO SENSOR Highlight **RE-ZERO SENSOR**, press **ENTER/SELECT**.



3.2.2 GRAPH SETTINGS


MENU 
GRAPH SETTINGS

Highlight **GRAPH SETTINGS**, press **ENTER/SELECT**.



NOTE: The pressure scale can be adjusted on the main graph screen by pressing the up and down arrows.

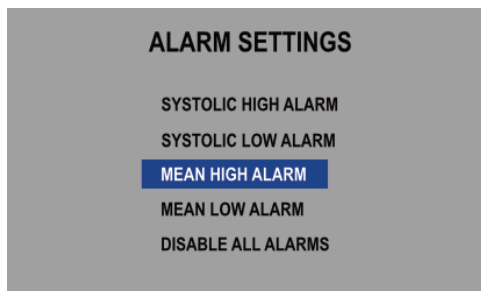
3.2.2.1 ALARM SETTINGS

MENU 
GRAPH SETTINGS
ALARM SETTINGS



NOTE: Alarm settings are only accessible with a sensor connected to the device.

Highlight **ALARM SETTINGS**, press **ENTER/SELECT**.

Highlight the appropriate alarm, press **ENTER/SELECT**.




On the next screen, highlight **ENABLED**, then press **ENTER/SELECT**.


Use   to adjust the alarm setpoint, press **ENTER/SELECT** to confirm the alarm.



NOTES:

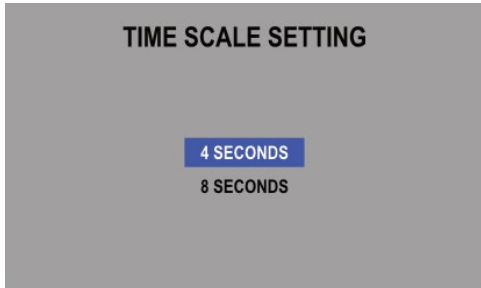
- Alarm setpoints are indicated on the graph screen with .
- When an alarm setpoint has been exceeded, the relevant pressure value is highlighted red on the graph screen and an alarm will sound.
- Systolic and Mean alarms cannot be set concurrently.

3.2.2.2 TIME SCALE SETTING

MENU 
GRAPH SETTINGS
TIME SCALE
SETTING

Highlight **TIME SCALE SETTING**, press **ENTER/SELECT**.

Highlight the appropriate time scale setting, press **ENTER/SELECT**.



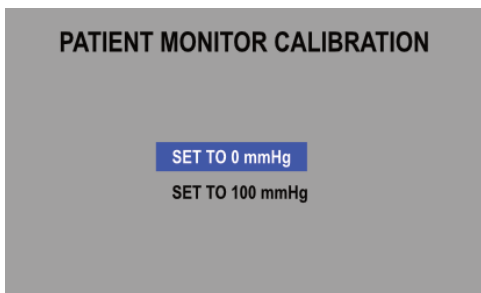
3.2.3 PATIENT MONITOR CALIBRATION

MENU 
PATIENT MONITOR
CALIBRATION

Highlight **PATIENT MONITOR CALIBRATION**, press **ENTER/SELECT**.


On the next screen, highlight **ENABLED**, then press **ENTER/SELECT**.

Highlight the appropriate mmHg setpoint, press **ENTER/SELECT**.



After confirmation, press **MENU/BACK** to continue.

3.2.4 SIMULATED DATA

MENU 
SIMULATED DATA

Artificial static and variable waveform data are available for product demonstrations or for practice with system settings (alarms, time scale, etc.)

Highlight **SIMULATED DATA**, press **ENTER/SELECT**.

Highlight the appropriate data type, press **ENTER/SELECT**.



NOTE: Simulated data is disabled when a pressure sensor assembly is attached.

3.2.5 SOFTWARE VERSIONS

MENU 
SOFTWARE
VERSIONS

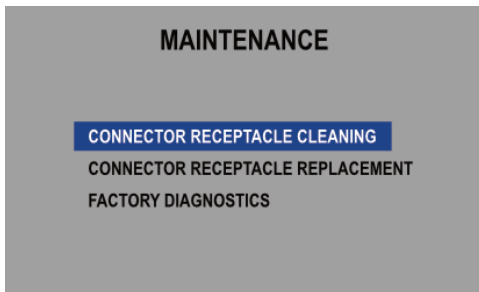
Highlight **SOFTWARE VERSIONS**, press ENTER/SELECT.




3.2.6 MAINTENANCE

MENU 
MAINTENANCE

Highlight **MAINTENANCE**, press ENTER/SELECT.

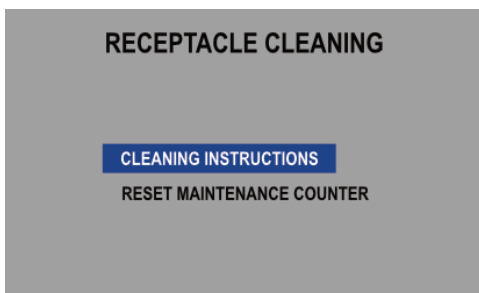


3.2.6.1 RECEPTACLE CLEANING


MENU 
MAINTENANCE
CONNECTOR
RECEPTACLE
CLEANING

Anytime the **MAINTENANCE RECOMMENDED – SEE USER INSTRUCTIONS** message is displayed, it is highly recommended the user complete the Cleaning Instructions (3.2.6.1.1) and Reset Maintenance Counter (3.2.6.1.2) sections before continuing instrument use.

Highlight **CONNECTOR RECEPTACLE CLEANING**, press ENTER/SELECT.



3.2.6.1.1 CLEANING INSTRUCTIONS

MENU 
MAINTENANCE
CONNECTOR
RECEPTACLE
CLEANING
CLEANING
INSTRUCTIONS


It is necessary to periodically clean the **INTERNAL SC CONNECTOR** (part of the **CONNECTOR RECEPTACLE**). Cleaning instructions may be found below, or on the Model 601 by highlighting **CLEANING INSTRUCTIONS**, and pressing **ENTER/SELECT**.

CLEANING INSTRUCTIONS:

- Remove the connector receptacle plug.
- Insert an alcohol-soaked **CLEANING SWAB** into the **CONNECTOR RECEPTACLE** and rotate several times. Remove the swab.
- Insert a dry swab and rotate several times.
- Remove the swab, then dry with compressed air.
- Proceed to the **RESET MAINTENANCE COUNTER** section (3.2.6.1.2).

NOTE: To prevent contamination buildup, blow out the **CONNECTOR RECEPTACLE** with compressed air between each insertion.

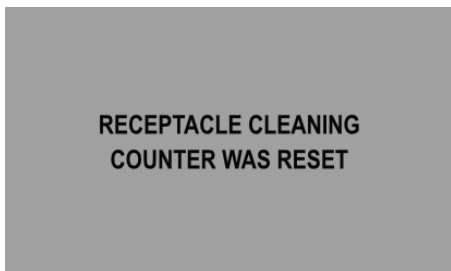
3.2.6.1.2 RESET MAINTENANCE COUNTER

MENU 
MAINTENANCE
CONNECTOR
RECEPTACLE
CLEANING
RESET
MAINTENANCE
COUNTER

With every sensor insertion or cycling of the display  while a sensor is connected, an internal cleaning counter will increase.

Once the counter reaches 10, a **MAINTENANCE RECOMMENDED – SEE USER INSTRUCTIONS** message will display along the bottom of the Model 601 screen.

After cleaning is complete (section 3.2.6.1.1), highlight **RESET MAINTENANCE COUNTER**, and press **ENTER/SELECT**. The internal cleaning counter will be reset to 0.

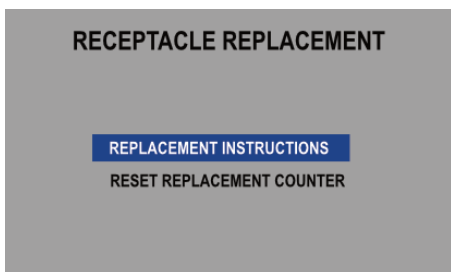


3.2.6.2 RECEPTACLE REPLACEMENT

MENU 
MAINTENANCE
CONNECTOR
RECEPTACLE
REPLACEMENT

Anytime the **ADAPTER REPLACEMENT HIGHLY RECOMMENDED** message is displayed, it is highly recommended the user complete the Replacement Instructions (3.2.6.2.1) and Reset Replacement Counter (3.2.6.2.2) sections before continuing instrument use.

Highlight **CONNECTOR RECEPTACLE REPLACEMENT**, press **ENTER/SELECT**.



3.2.6.2.1 REPLACEMENT INSTRUCTIONS

MENU 
MAINTENANCE
CONNECTOR
RECEPTACLE
REPLACEMENT
REPLACEMENT
INSTRUCTIONS

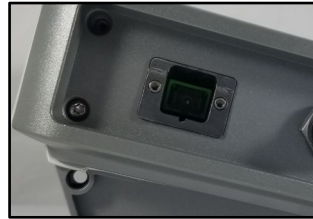
It is necessary to periodically replace the **SC ADAPTER** (part of the **CONNECTOR RECEPTACLE**). Replacement instructions may be found below, or on the Model 601 by highlighting **REPLACEMENT INSTRUCTIONS**, and pressing **ENTER/SELECT**.

REPLACEMENT INSTRUCTIONS:

- Remove the connector receptacle plug.
- Uninstall the two **CONNECTOR RECEPTACLE** screws. Requires a 5/64" hex key.
- Slide out the **CONNECTOR RECEPTACLE BOTTOM** and set aside.




- Disconnect the **INTERNAL SC CONNECTOR** from the **SC ADAPTER**. Use tweezers to pull the adapter/internal connector from the instrument if necessary.
- Clean the internal connector with cotton swab and alcohol. Blow dry with compressed air.
- Connect a new **SC ADAPTER** (slotted-side down) to the internal cable and replace the bottom piece.



- Insert into the instrument and reinstall the screws.
- Proceed to the **RESET REPLACEMENT COUNTER** section (3.2.6.2.2).

3.2.6.2.2 RESET REPLACEMENT COUNTER

MENU 
MAINTENANCE
RECEPTACLE
REPLACEMENT
RESET
REPLACEMENT
COUNTER

With every sensor insertion or cycling of the display  while a sensor is connected, an internal receptacle replacement counter will increase.

Once the counter reaches 500, an **ADAPTER REPLACEMENT HIGHLY RECOMMENDED** message will display along the bottom of the Model 601 screen.

After replacement is complete (section 3.2.6.2.1), highlight **RESET REPLACEMENT COUNTER**, and press **ENTER/SELECT**. The internal receptacle replacement counter will be reset to 0.



3.2.6.3 FACTORY DIAGNOSTICS

MENU 

MAINTENANCE

FACTORY
DIAGNOSTICS

Highlight **FACTORY DIAGNOSTICS**, press ENTER/SELECT.

```
FACTORY DIAGNOSTICS
RETURN LIGHT LEVEL: 0.00
ZERO OFFSET: 0.1
ZEROED PRESSURE: 0.0
ABSOLUTE PRESSURE: 0.0
ATMOSPHERIC PRESSURE: 747.4
OPTIC TEMPERATURE: 45.00
HOST VOLTAGE: 11.59
STATUS FLAGS: 0000 0600
SESSION RUN TIME: 3708
```

4 DATA FORMAT

The Model 601 USB outputs 1000 calibrated pressure samples per second in a simplified text-based protocol. The Sensor Logging and Display Tool software provided with the Startup Accessories Pack can be used to display this data or write it to a log file. The data is also accessible through a virtual COM port that will appear in the Ports section of the Device Manager as USB Serial Port (COM X), where X is the COM port number. This data can be accessed using a user-created application or terminal emulation program (e.g. PuTTY). The communication parameters should be set to 115,200 bits per second, 8 data bits, one stop bit, no parity, and no flow control. When using Putty, change Terminal settings to enable "Implicit LF in every CR."

Each pressure data sample has the following format: **<Pressure><Comma><Status><Checksum><CR>**

Where:

- **<Pressure>** - the zero adjusted differential pressure in 1/100th mmHg per count with a negative sign bit for negative values
- **<Comma>** - comma character ',' with no space before or after
- **<Status>** - status character which can be one of the following:
 - X – no sensor is inserted
 - U – a sensor has been inserted but is unzeroed
 - Z – a sensor has been inserted and has been zeroed
- **<Checksum>** - two-digit hex value that is a CRC8 checksum of the previous characters on the line
- **<CR>** - Carriage return character (0x0D) without a line feed character

The sensor can be zeroed by sending the command: **zero??** followed by a carriage return.

5 LIMITED WARRANTY

RJC Enterprises, LLC, (RJC) warrants that each new Fiber Optic Measurement Instrument (FOMI) is free from defects in material and workmanship under normal use and service for a period of one(1) year from date of delivery by RJC directly to first purchaser. If any such defect occurs during the warranty period, the purchaser must contact RJC directly for instructions regarding return of the FOMI. In returning the FOMI, the purchaser assumes responsibility for proper packaging and shipping costs; loss or damage during shipment is the responsibility of the purchaser. If the FOMI is returned to RJC and is under warranty, the FOMI will be repaired or replaced free of charge, and then returned to the purchaser.

In no event shall RJC be liable for any incidental, indirect, or consequential damages in connection with the acquisition or use of any RJC product. Further, this warranty shall not apply to any loss arising in connection with the purchase or use of any RJC product which has been repaired by anyone other than an authorized RJC service representative, or altered in any way so as to affect its stability or reliability, or which has been subject to misuse, negligence or accident, or which has been used otherwise than in accordance with the instructions furnished by RJC. This limited warranty is exclusive and in lieu of all other obligations or liabilities on RJC's part, and RJC neither assumes nor authorizes any representative or other person to assume for it any other liability in connection with RJC products.

RJC DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR APPLICATION OR WARRANTY OF QUALITY, OTHER THAN THOSE EXPRESSLY SET FORTH IN THE PRODUCT LABELING, INCLUDING THE APPLICABLE USER INSTRUCTIONS.