



**Model 455Jr
Single-Point Insertion
"SMART" Mass Flow Meter
User's Guide**

360148A

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1 Introduction

This section describes the procedure for returning damaged equipment, an overview of the Model 455 Jr System, and the NIST-traceable calibration and unit specifications.

1.1 Receipt of Equipment

When you receive your equipment, carefully check that your order has been filled correctly and that no damage has occurred:

1. Check the outside packing carton for damage incurred in shipment. If the packing carton is damaged, the local carrier should be notified at once regarding their liability. Submit a report to:

**Kurz Instruments, Inc.
2411 Garden Road
Monterey, CA 93940**

Attn: Customer Service

2. Remove the packing slip from its envelope and check that the carton contains all parts listed.
3. Make sure spare parts or accessories are not discarded with the packing material. If any parts are missing, contact Customer Service toll-free at (800) 424-7356.

1.2 Return Shipment

If equipment must be returned to Kurz for warranty repair, the shipper pays for transportation charges. Kurz will return the equipment under warranty prepaid.

To return equipment to Kurz, follow these steps:

1. Obtain a Return Material Authorization (RMA) from Kurz Customer Service; call:

(800) 424-7356

DO NOT return any equipment without an RMA.

2. Your correspondence must include,

- The Kurz purchase order number on the customer invoice
- The name and telephone number, including the area code and extension (if any), of the person Kurz can contact regarding the equipment
- A description the problem and request corrections to be performed at the Kurz factory

3. Return the equipment and report to this address:

**Kurz Instruments, Inc.
2411 Garden Road
Monterey, CA 93940**

Attn: Customer Service

1.3 Product Description

The Model 455 Jr consists of the following components:

- Series 450 insertion mass flow element
- Model 155 Jr flow computer/transmitter

The Series 450 insertion mass flow element consists of a dual-sting sensor and probe support that attaches to a sensor electronics card, which receives power from and send signals out to the Model 155 Jr flow computer/transmitter.

There are two sensor electronics configurations:

- With the Transmitter Attached (TA) configuration, the two-wire sensor electronics card is mounted in the Killark enclosure, directly attached to the sensor support.
- With the Transmitter Separate (TS) configuration, the two-wire electronics card is mounted in a remote enclosure connected by a sensor extension cable to a terminal junction box directly attached to the sensor support. The maximum separation length is 500 feet, if each sensor extension wire is less than 2 ohms.

1.3.1 The Series 450 Insertion Mass Flow Element

The 455 Jr uses thermal convective mass flow measurement, which utilizes a constant temperature anemometer. Kurz mass flow meters feature the MetalClad™ dual-sting, thermal sensor. The flow element is constructed from a variety of materials, with two sensor support diameters and five sensor types to meet the customer's application. The dual-sting sensor can withstand yaw and rotational deviations of ± 15 degrees from an ideal mounting attitude with only 1% measurement error.

1.3.2 The Model 155 Jr Flow Computer/Transmitter

The Model 155 Jr is a microprocessor-based flow computer/transmitter. Kurz Instruments preprograms the Model 155 Jr before shipment.

The standard system transmitter enclosure is constructed of either painted steel or fiberglass. UL listed and CSA certified enclosures are constructed to these specifications:

- NEMA 4X fiberglass enclosure
- NEMA 4 painted steel enclosure
- NEMA 7 and 9
- NEMA 7 and 9 with window

Features of the Model 155 Jr include the following:

- 20-key keypad, two-line 16 character LCD display/exterior, and user-friendly help screens, 24-hour clock/calendar
- American or International units (such as SCFM or SCMM)
- Two RS-232 ports to connect a serial printer or computer terminal to receive output from the Model 155 Jr.
- Displays user-entered meter I.D. number, 24 hour clock/calendar, flow rate (SCFM or PPH), average velocity (SFPM), specific gravity (if PPH selected), variable velocity profile factor for each defined meter, user-entered flow area and averaged channels
- User and Technician security codes limit access to critical areas of the system.
- Easy, all-digital input calibration
- Lagrangian polynomial linear interpolation for maximum accuracy
- Conditions and linearizes up to 2 sensor inputs (flow rate or temperature)
- Outputs up to 2 scaled linear 0-5 Vdc analog signals indicating the flow measurements for selected meters
- User-selected digital filtering
- Kicks out sensor readings outside of a specified range
- Reads and displays input voltages from each sensor
- Built-in flow totalizers for each meter

You can purchase the following accessories for the Model 155 Jr:

- An IBM-PC compatible, laptop Personal Computer with the Upload/Download/Dump software program, which functions as a remote terminal and data recorder.
- Upload/Download/Dump software programs, which you can use on an IBM-PC compatible computer connected to the Model 155 Jr.

1.4 NIST-Traceable Calibration

The Model 455 Jr is factory-calibrated and traceable to the National Institute of Standards & Technology (NIST).

A Calibration Data and Certification Document is packaged with each unit per specified scaled velocity or mass flow range. The factory calibration are in standard conditions referenced to a temperature of 77°F (25°C) and an atmospheric pressure of 29.92 inches (760 mm) of mercury (Hg).

NOTE: _____ Factory calibration is also available at 32°F (0°C) and 1 BAR pressure.

End of Section 1



2 Installation

Portions of the installation procedures described in this section might not apply to your system configuration, however, we recommend that you read this section. If further assistance is needed with your installation, contact your Kurz sales representative or contact Customer Service.

To install the 455 Jr, follow these steps:

1. If possible, locate the probe at least three pipe or duct diameter upstream and ten diameter downstream from the nearest bend, elbow, or other obstruction in the pipe or duct to be monitored.
2. Check that the location provides clearance for inserting and removing the Series 450 probe; the clearance from the pipe or duct and any obstruction should be at least the probe's length, plus the Killark enclosure, and 2–3 inches for maneuverability.

NOTE:

Do not install the Killark enclosure close to a hot duct or stack. The ambient temperature around the Killark enclosure should not exceed 50°C.

3. Mount the sensor in the pipe or duct at a point where the velocity closely approximates the average velocity. For some applications, you can assume that the center point of the pipe or duct represents a point of average velocity, such as:
 - a high degree of accuracy is not critical.
 - the pipe or duct is so small that it is impractical to mount the sensor anywhere other than the center.
 - the flow profile is turbulent and of high velocity; many points of average velocity are likely.
 - the flow profile is known to be uniform.

Even under these circumstances, you might want to calculate a half-traverse or double-traverse average before deciding on center mounting. If you need information about how to perform these calculations, contact Kurz Customer Service, (800) 424-7356.

4. Rotate the probe so that the sensor shield window allows unobstructed air flow over the sensor. The shorter element should be upstream of the longer element.
5. Connect the two-wire, twisted, shielded pair from the Killark enclosure to the Model 155 Jr enclosure ground lug. The wire connects to terminal block 3 (TB3) on the Model 155 Jr input/output board. See the engineering drawings in Appendix A to identify and locate terminal specifics.
6. Connect the Model 155 Jr to the power source.

NOTE: Do not supply power to the system without connecting the sensors; otherwise, you could overheat the board components.

7. After plugging in the power cord, turn on the power switch.

2.1 Mechanical Installation

To ensure a successful installation, do not locate the enclosure subject to sudden temperature changes, drafts or near equipment radiating significant heat. Allow adequate space for cable connectors and wiring. Proper clearance ensures easy access for routine maintenance and trouble-shooting.

In securing the system transmitter enclosure, use the highest quality fasteners in a configured installment offering generous safety factors.

NOTE: Refer to the engineering drawings in Appendix A for the outline dimensions and mounting holes for the system transmitter enclosure.

2.2 Electrical Connections

Connect all wires as shown in the engineering drawings in Appendix A.

If not already connected by the Kurz factory before shipment, the wiring connections pertaining to the Model 155 Jr consist of the following:

- Input power wiring connections
- Two-wire hookup cable connections
- Customer-supplied external devices connections

2.2.1 Power Input Wiring Connections

Power sources to the system should be checked to ensure that the power is fairly clean and stable, for example 115 Vac \pm 10.0% at 60 Hz (Standard), 230Vac \pm 10.0% at 50/60 Hz, and 24.000 Vdc, 0.5% regulation. After you check all connections, you can turn on the power to the system.

Tables 2-1 and 2-2 list the power input connections for the Model 155 Jr input/output board.

Table 2-1. AC Power Input Wiring

Terminal Placements	A.C. Power
TB1-1	AC
TB1-2	ACC
TB1-3	GND

Table 2-2. DC Power Input Wiring

Terminal Placements	D.C. Power
TB2-1	+24.000 Vdc
TB2-2	GND

2.2.2 Two-Wire Conductor Cable Connections

Kurz Instruments provides a limited length of test cable (18 AWG) for bench-test purposes only. Do not use the test cable for process operations. Customer to replace as required.

The two-wire conductor cable connects the Model 465R_x Current-Transmitter Board and the Model 155 Jr. One wire provides a voltage supply to the current-transmitter board from the linearizer board; the other wire transmits the sensor's return signal from the current-transmitter board to the system transmitter (linearizer board).

NOTE: If you are using shielded cable, connect the shield as shown on the field wiring drawing in Appendix A.

Select a cable length and wire gauge so that the maximum loop resistance does not exceed 4.0 ohms. If you use heavier wire, you can position the system transmitter enclosure further from the sensor electronics enclosure. Refer to Table 2-3 for approximate loop resistance for the two-wire cable connected to the Model 155 Jr.

Table 2-3 applies to stranded copper wire at 65°F (18°C). Resistance in other kinds of wire or in stranded copper wire at different temperatures varies. AWG numbers are inversely proportional to the size of wire. For example, the smallest AWG number specifies the largest diameter wire.

Table 2-3. Two-Wire Loop Resistance

APPROXIMATE LOOP RESISTANCE AT 65° F (18° C)			
AWG Number	Ohms Per Feet	Maximum Cable Per Feet	
		Loop	Run
4	.0003	13,333	6,667
8	.0005	8,000	4,000
10	.0008	5,000	2,500
12	.002	2,000	1,000
14	.003	1,333	667
16	.005	800	400
18	.008	500	250
20	.012	333	167
22	.019	211	105
24	.030	133	67
28	.077	52	26

For systems with velocity sensors, the two-wire conductor cable connects to the Model 465R7 Current-Transmitter Board (one per sensor):

- One wire connects to terminal block 1, terminal screw 2 (TB1-2) to provide a 24.000 Vdc supply.
- The second wire connects to terminal block 1, terminal screw 1 (TB1-1) to transmit the sensor's current-return signal.

For systems with a temperature sensor, the two-wire conductor cables connects to the Model 604 Current-Transmitter Board:

- One wire connects to terminal block 2, terminal screw 2 (TB2-2) to provide a 15.000 Vdc supply.
- The second wire connects to terminal block 2, terminal screw 1 (TB2-1) to transmit sensor's current-return signal.

You can connect the temperature sensor's two-wire cable to the Model 604 Current-Transmitter Board interchangeably. Appendix A contains the wiring diagram for the Current-Transmitter Board.

2.2.3 Connecting Optional Modules to the Model 155 Jr

You can connect your own external devices to the signal outputs and alarm contact outputs. Refer to Appendix A for all engineering drawings.

2.3 Verifying Wiring Connections

To verify the wiring connections on the Model 155 Jr, follow these steps:

1. Check system wiring against the Kurz system drawings provided with your equipment and against the architect/engineer or OEM equipment vendor drawing to ensure that terminations have not changed during the design process or installation.
2. Perform point-to-point tests to ensure that signal cables, power cables, ground wires, and other system connections are complete. This test minimizes equipment failures caused by improper wiring.
3. Do NOT supply power to the system until this check-out procedure is satisfactorily completed.

2.4 Maintenance

You can perform minor, routine maintenance on the mechanical and electronic configurations of the 455 Jr.

NOTE: Always turn off the power before dismantling the system for repair, recalibration, or cleaning!

The system transmitter enclosure and the electronic components should be periodically inspected and cleaned. The factory calibration of the unit remains stable for up to several years. To maintain NIST-traceability, Kurz Instruments recommends annual recalibrations. If the unit requires recalibration while still under warranty, contact Kurz Customer Service.

Even minor repairs can require electronic components or wiring connections to be replaced or repaired. For all repairs, use only certified electrical technician familiar with electronic test equipment and measurements. For major repairs, return the unit to the Kurz factory for service. Kurz Instruments provides technical assistance over the phone to qualified repair personnel. For more information, call Customer Service.

End of Section 2



3 Operation

This section describes the Model 155 Jr keys and functions, what happens at startup, and how to use the Model 155 Jr menus and user-definable commands.

NOTE: Keep in mind that not all the menus and commands described in this manual might pertain to your specific system configuration; however, this section describes each command and function.

Appendix A contains a state diagram of Model 155 Jr operation. See Appendix B for Technician-Level menus and commands, Appendix C for PID (Proportional Integral Derivative) displays and menus, and Appendix C for Upload/Download Tunnel Data procedures.

3.1 Keys and Functions

You can operate the Model 155 Jr directly using the Model 155 Jr display and keypad, or you can use an ASCII terminal, or Personal Computer (PC) executing ASCII terminal emulation software. Using an ASCII terminal or PC offers the advantages of being remote from the system (up to 50 feet) and displaying more data at one time than the 32-character Model 155 Jr display.

Each Model 155 Jr key has a corresponding key on the ASCII terminal or PC keyboard. You press these keys to program and display information about the system setup and status. The Model 155 Jr key functions are described in Table 3-1.

Table 3-1. The Model 155 Jr Keypad and ASCII Keyboard.

MODEL 155 JR KEY	FUNCTION	DESCRIPTION	ASCII KEY
P	Program	Starts Program Mode where you enter an access code, then can reset totalizers, system time and date, log interval, meter data, box filter, and so on.	P
D	Display	Starts Display Mode where you can see Meter ID, time and date, flow rate, totalized flow and elapsed time, average velocity, and so on.	D
L	Log	If you have a Data MPP-20 Serial/Parallel Alphanumeric Thermal Printer connected to the Model 155 Jr, pressing this key sends data to the printer.	L
E	Enter	Enters setup variables in Program Mode.	[CR]
H	Hold	Holds current display until the Clear key is pressed.	H
^ Yes	Up Arrow Yes	Press this key to move to the next item down in a menu, or to move right to the next menu. If you typing alphanumeric keys using the Model 155 Jr keypad, pressing the Up-Arrow key increments to the next letter or number (A,B,C... or 1,2,3...).	^
v No	Down Arrow No	Press this key to move to the previous item in a menu, or to move left to the previous menu. If you are typing alphanumeric keys using the Model 155 Jr keypad, pressing the Down-Arrow key decrements to the previous letter or number (...C,B,A or ...3,2,1).	v
C	Clear	Press this key to cancel a response and return to the previous command or menu. Pressing the Clear key repeatedly returns you to the Executive Mode.	C
-	Hyphen	For text entry.	-
•	Period	For text entry.	•
0-9	0-9	For text entry.	0-9

NOTE:

If you are using an ASCII terminal or PC with the Model 155 Jr, refer to your hardware's documentation for information regarding the location and function of keys. The ASCII terminal or PC keyboard key that corresponds to Model 155 Jr's "E" key (Enter) can differ from terminal to terminal. Sometimes "Enter" is denoted by "Carriage Return" [CR].

If your system is connected to an ASCII terminal or PC, you can:

- Echo Model 155 Jr displays to the terminal or PC
- Send Model 155 Jr log data to the terminal or PC
- Send Model 155 Jr configuration data to the terminal or PC

ASCII KEY	FUNCTION
+	Toggles echo on and echo off to a terminal or PC screen. When echo is on, information sent to the Model 155 Jr display echoes to the ASCII terminal or PC screen. Pressing "+" again turns off the echo.
Q	Sends system configuration data, which are not in a data log, to an ASCII terminal or PC display.
?	Displays a list of help functions for selection.

3.2 Startup

When you turn on the power to the microprocessor module, the data logging system initiates a memory check. As the Model 155 Jr passes the memory test, you see messages indicating the following information:

- System time of day clock
- Initialization messages
- Prints out a "power-failed at ..." message and the data that was stored in non-volatile memory before the power failure occurred
- Allows the analog inputs to stabilize
- Clears and restarts the totalizer
- Calculates the time of the next scheduled printout
- Prints out a "power-up at ..." message and the current data
- Starts Executive Mode

3.3 Executive Mode

After startup, the Model 155 Jr automatically enters the Executive Mode. In Executive Mode, the Model 155 Jr has an Automatic Display Loop where it returns any time the keypad is inactive for 5 minutes. If the system is not in Executive Mode, you can press "C" repeatedly to return there.

The Automatic Display Loop cycles through display screens providing this information:

- Kurz Instruments banner and the system time and date
- Press "D" to exit the Automatic Display Loop and enter an alternate display loop that displays additional information
- Press "P" to exit the Automatic Display Loop and enter the Program Mode
- Press "H" to hold and update one of the displays in the Automatic Display Loop. Press "H" twice to see the Help screens
- Press "L" to log the system status to a serial printer

3.4 Display Mode

From Executive Mode, you press "D," and then "E" to display values other than those in the Automatic Display Loop.

To display meter information:

1. Press YES/UP-ARROW and NO/DOWN-ARROW to cycle through the list of defined meters. Select a meter, press "D."
2. You will see the meter identification (if you assigned one) or a pre-assigned meter number, and the time and date; press "D" to start the display.

When you display a flow meter, you see the following information; press "E" to proceed to the next display:

- flow rate in the pre-set units, such as SCFM (Standard Cubic Feet per Minute) or PPH (Pounds per Hour)
- totalized flow (TOT) in the pre-set units, such as SCF (Standard Cubic Feet) or LBS (pounds), and elapsed time (ET) in minutes
- average velocity in SFPM (Standard Feet per Minute)
- the specific gravity (if applicable)
- flow area in square feet
- calibration factor
- if the meter is a sum flow meter, you see which meters are added or subtracted to determine the sum
- if the meter is assigned to several meters, you see the meters included
- input volts for each channel in the meter

When you display a temperature meter, you see the following information; press "E" to proceed to the next display:

- temperature (in degrees Fahrenheit or Centigrade)
- calibration factor
- averaged channels for the selected meter, or single channel
- if the meter is assigned to several meters, you see the meters included
- input volts and degree reading for each channel in the meter

NOTE:

The calibration factor is a correction factor applied to the linearized signal to compensate for an uneven profile in a duct or stack. You can apply up to 7 calibration factors to the linearized signal for each meter in the system. This allows the signal to be corrected at different flows, according to the flow profile. See "3.5.4 Set Meter Data."

3.5 Program Mode

From Executive Mode, press "P" to go to Program Mode. Once you are in Program Mode, you enter an access code to see the menus.

The Program Menu offers these options:

- Reset the totalizers
- Set the system time and date
- Set the log interval
- Set the meter data
- Set the box filter
- Select the analog output
- Set the alarms
- Set channel kick out
- See input volts

Appendix A contains a state diagram of the Model 155 Jr interface. Appendix B describes the technician-level access to Program Mode. Appendix C describes the PID display and program menus. Appendix D explains how to use the upload/download/dump configuration files programs.

To enter Program Mode:

1. Press "P" when the system is in Executive Mode.
2. Using the keypad, type a 6-digit access code and press "E."
3. If you enter the correct access code, the system displays the first Program Menu choice. If you incorrectly enter the access code, this message displays for 2 seconds:

INVALID CODE

600-016

4. When you no longer see this message, you can enter the correct access code.

To cycle through the Program Menu options:

1. Press "P."
2. When you reach the option you want, press "E."
3. After you press "E," you can perform the action for the option you chose.

3.5.1 Reset Totalizers

To reset the stack flow totalizers:

1. Press "P" from Program Mode to enter the Program Menu.
2. Enter a valid access code; you will see this message,
PRESS ENTER TO RESET TOTALIZERS
3. If you press "E," you see this message,

ARE YOU SURE?

To answer yes, press YES/UP-ARROW, then press "E."
You will see a message indicating that the totalizers are reset. If you do not want to reset the totalizer, press NO/DOWN-ARROW, and then press "E" to go to "Set Time & Date."

3.5.2 Set Time and Date

The system time of day displayed in this form:

hh:mm mm/dd/yy

Although the time of day is displayed to the second, the system records only to the minute. The system time is kept current with a battery-backed clock.

To set a time or date value, you must set all time and date values in the order in which they display. When you modify a value, you see two lines; the top line shows the current time and date, and the bottom line shows the first digit of the current time displayed.

To set the system time or date:

1. Press "P" from Program Mode to enter the Program Menu.
2. Press YES/UP-ARROW or NO/DOWN-ARROW till you see "Set Time & Date," then press "E."
3. You see two lines; the top line shows the current time and date, and the bottom line shows the current 2-digit hour value.

If the hour value is correct, press "E" to go on to minute. If the hour value is incorrect, enter a new 2-digit value.

If you change the value, the digits you enter display in the bottom line. Press "E" to enter the new hours value and update the top line of the display.

4. Each time you press "E" you proceed to the next value: hour, minute, month, day, and year. Press "E" to keep the current values, or type a new value and then press "E." After you type a value and press "E," the top line is updated to reflect your change.

After you set the year value and press "E," you go to "Set Log Interval."

When you reset the clock, the seconds value is set to 00. If the time of day is critical down to the seconds in your application, press "E" key to enter the year value at precisely the beginning of the minute.

3.5.3 Set Log Intervals

You can program the Model 155 Jr to send the meter data to a printer at specified time intervals. You can also send the meter data from the Model 155 Jr to an ASCII terminal or PC through the RS-232 port.

To set the log interval:

1. Press "P" when you are in the Program Menu until you see this message,

PRESS ENTER TO SET LOG INTERVAL

2. Press "E" to see the current interval setting in hours and minutes.

The time interval is set in two different entries, first you type an hour value, then a minute value. You see two lines; the top line shows the current log interval, and the bottom line shows the current 3-digit hour value.

3. If the hour value is correct, press "E" to go on to the minute interval. To change the hour value, type a new value, then press "E."

If you change a value, the digits display in the bottom line. Press "E" to enter the new hour value and update the top line of the display.

4. If the minute value is correct, press "E." To change the minute value, type a new value, and then press "E" to go to "Set Meter Data."

3.5.4 Set Meter Data

The Model 155 Jr calculates flow measurements based on the sensor(s) output. Each physical sensor in the system is a "channel" to the Model 155 Jr. A "meter" can be an individual sensor, the measurements of selected channels, or the sum of selected meters.

Set Meter Data lets you generate or change the meter data in Display Mode. The system will prompt you to select one of the meters. Use the YES/UP-ARROW and NO/DOWN-ARROW keys to cycle through the list of meters (up to 16) or enter a meter number.

To set meter identification:

1. Press "P" when you are in the Program Menu until you see this message,

PRESS ENTER TO SET METER DATA

After you press "E," you see this message

**PRESS ENTER TO SET METER #1
(METER 000001)**

To specify an identification for meter #1, press "E."

2. Type up to 12 characters using the YES/UP-ARROW and NO/DOWN-ARROW keys. Pressing these keys cycles through the list of alphanumeric characters and some special characters (such as hyphen and blank space). Press "E" to enter each character.

Meter identifications are pre-set at the factory, however, you can change the identification for a meter, or you can assign an additional meter. You can specify up to 16 meter identifications.

To set meter data:

1. After you have reviewed the meter IDs, press "P." At this point, you can assign functions to each meter. You see the following message:

NEXT TYPE, ^ V

Press YES/UP-ARROW or NO/DOWN-ARROW to cycle through the meter types:

- Insertion flow meter (velocity or mass flow rate)
- In-line flow meter
- Temperature
- Sum flow meter

These options correspond to preset factory definitions based on your order, so you might not see all the options listed above for each meter.

2. Depending on the meter type you assigned in Step 1 (above), you will go to one of these procedures:

For insertion and in-line meters, you see the flow display in SCFM (or SCMM), then PPH (or KGH). When you press "E," you set the specific gravity, indicate which channels to include in this meter. Press YES/UP-ARROW or NO/DOWN-ARROW to the channel prompt.

NOTE:

If you specified PPH as the units, you specify specific gravity before indicating which channels to include in this meter.

For temperature meters, you indicate which channels to include in this meter.

For sum flow meters, you specify which meters to add or subtract from the sum. Press "+" to add, "-" to subtract, or NO/DOWN-ARROW to not use this meter.

3. Type the flow area in square feet (for all meter types except temperature), then press "E."

4. Define the number of calibration factor data points to adjust the meter's readings at various flow rates or temperature rates. You can define up to 7 points possible for digital linearization using second order Lagrangian interpolations; the default calibration factor is 1.
5. Define the calibration factor (correction factor) at a given SCFM. You can enter values from 0.001 to 9.999; the default value is 1.000 at no flow. Press "E" to define more calibration factors. After defining the last calibration factor, pressing "E" cycles lets you set the meter data for Meter #2. When you have set the meter data for all the defined meters, pressing "E" sends you to "Set Box Filter."

3.5.5 Set Box Filter Size

The analog channel inputs to the Model 155 Jr are filtered using a digital filtering algorithm known as a "boxcar filter." This algorithm takes the average of the last several readings. The size of the box filter is equal to the number of readings to be averaged. When you set the box filter size, you specify how many readings will be averaged for each channel.

Averaging over a large number of readings is analogous to putting a large filter capacitor on the input. A large box filter slows down the system response because there is a 2.4 seconds between the reads of each channel. A small box filter can cause the system to be susceptible to transient pulses.

To set box filter size:

1. When you are in the Program Menu, press "P" until you see this message,
PRESS ENTER TO SET BOX FILTER
2. After you press "E," the system prompts you to select a channel; channels display only in sequence.

Press YES/UP-ARROW and NO/DOWN-ARROW to cycle through the channel list; press "E" to select a channel.