Rain Bird® Two-Wire PAR+ES Controllers

Two-Wire PAR+ES Controllers install quickly, boast the best-in-class user interface pedestal enclosure and are durably constructed. The base configuration of 16 stations can be upgraded at any time — in eight-station increments up to 72 stations — to accommodate changing course irrigation requirements. In the central control mode, an unlimited number of irrigation schedules can be programmed to further enhance watering flexibility and precision. To safeguard the controller investment, a choice of pedestals in either green or grey are available to provide superior environmental protection.

In this section are the recommended Rain Bird troubleshooting procedures for these performance challenges:

- Controller Does Not Power Up Properly
- Front Panel Does Not Power Up Properly
- Tripping Circuit Breaker
- Stations Not Working
- Key Pad Not Responding
- Controller Not Responding To MAXI® Signal
Troubleshooting

Two-Wire PAR+ES Controllers

Component Flow Chart

Tools Required
- Flat head screwdriver
- Philips screwdriver
- Digital multi-meter
- Clip-on fuse holder and set of alligator clips

Error Codes
- Error. Incompatible OSM: ROM-8 being used or damaged OSM
- ROM Memory Error: EPROM is defective
- RAM Memory Error: Dallas Chip is defective
- Breaker Tripped: Circuit breaker is open
- RT Clock Error: Dallas Chip is defective
- No Boards Found: No OSM installed or first OSM is damaged
- Hardware Failure: PIB is defective or main power not clean

Terminology and Acronyms
- Control Module Assembly = Front Panel = Faceplate
- Erasable Programmable Read-only Memory: EPROM
- Light Emitting Diode: LED
- Liquid Crystal Display: LCD
- Main Logic Board: MLB
- Maxi Interface Module: MIM
- Output Station Module: OSM
- Power Interconnect Board: PIB
- Random Access Memory: RAM, e.g. Dallas Chip
- Relay Output Module: ROM-8
- Two-wire Interface Module: IFB
Recommended Rain Bird® Troubleshooting Procedure for
“Controller Does Not Power Up Properly”

START
Verify voltage selector switch is set for power line voltage.

Okay

Verify power switch is ON.

Okay

Check to see if left PIB LED light is on.

No

Check output voltage from transformer at PIB connection.
Orange Wires: 26.5VAC
Blue Wires: 8.5VAC

Okay

Disconnect all black OSM power wires, all green station plug-in connectors and OSM ribbon cables. Replace PIB F1 fuse with a temporary replaceable fuse holder. Reconnect each OSM one at a time and turn ON controller each time until bad OSM is found.

Okay

Blown fuse. Replace PIB and check if issue resolved.

BLOWN FUSE AGAIN

Check incoming voltage to transformer.

Okay

Check incoming voltage to surge arrestor and/or third party lightning protection device.

Okay

Check Power Wire and Power Source
*Refer any power source issues to a certified electrician

Blown fuse.
Replace PIB and check if issue resolved.

BLOWN FUSE

Replace Transformer

Blown fuse.
Replace OSM and check if issue resolved.

BLOWN FUSE

Replace Surge Arrester and/or Lightning Protection Device

BLOWN FUSE

NO VOLTAGE

NO VOLTAGE

NO VOLTAGE

BLOWN FUSE

NO VOLTAGE

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BLOWN FUSE

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BLOWN FUSE
Troubleshooting

Two-Wire PAR+ES Controllers

POWER INTERCONNECT BOARD (PIB)

- Orange ~26.5 VAC
- Blue ~8.5 VAC
- Circuit Breaker
- Board Power Status LED
- Station Power Status LED
- P4: Power/Communication to Control Module Assembly
- Power/Communication with OSM 7–9
- Transformer Incoming Power
- Circuit Breaker
- F1: 2.5 Amp Slow Blow Fuse

**Note:** PAR+/PAR+ES and MSC+ PIB’s are not interchangeable. Installing the wrong boards will result in a “Hardware Failure” error code.

OUTPUT STATION MODULE (OSM)

- From Previous OSM or from PIB if OSM-1
- Station Switches
- Incoming Power to OSM
- To Next OSM
- Station LED
- Outgoing OSM Power
- Station Wire Output

**Note:** OSMs replaced Relay Output Modules (ROM-8) in 2002. Installing ROM-8s in a controller manufactured after 2002 will result in an “Incompatible OSM” error code.

TWO-WIRE INTERFACE MODULE (IFB)

- P1: Power/Communication from PIB
- Board Assembly Date Code
- F1: 4 Amp Slow Blow Fuse
- Socket: Two-wire path connector

MAIN LOGIC BOARD (MLB)

- LCD Display with Backlight
- Power Wire
- EPROM
- Microprocessor
- RAM
- Microprocessor; Dallas Chip (Date-Channel-ID-Time)
- LCD Potentiometer
- Flat header connector to overlay membrane

**Note:** Two-wire path connector.
Recommended Rain Bird®
Troubleshooting Procedure for
“Front Panel Does Not Power Up Properly”

START

Verify power switch is on and check display.

NO DISPLAY

Check to see if left PIB LED light is on.

Check output voltage from transformer at PIB connection. Orange Wires: 26.5V Blue Wires: 8.5V

CHECK VOLTAGE

Check incoming voltage to transformer.

CHECK VOLTAGE

Check incoming voltage to surge arrestor and/or third party lightning protection device.

CHECK VOLTAGE

Fuse Blown; Replace PIB Soldered Fuse

Replace Transformer

Problem With Power Wire Path or Source

No Further Action

No Further Action

Reconnect or replace ribbon cable.

Reconnect wire and check display.

Check display wire connection to MLB.

Check to see if any front panel LEDs are on.

Replace MLB

NO

Adjust display potentiometer on MLB.

No Further Action

Verifying power switch is on and check display.

WORKING

Check ribbon cable to PIB at P4 for proper connection or damage.

BAG

GOOD

Open front panel and check ribbon cable to MLB at P2 for proper connection or damage.

BAD

GOOD

Verify front panel is working.

YES

NO

Verify front panel is working.

GOOD

Fuse Blown; Replace PIB Soldered Fuse

Replace Surge Arrestor and/or Lightning Protection Device

Replace Transformer

Check to see if left PIB LED light is on.

GOOD

Reconnect or replace ribbon cable.

No Further Action

NO VOLTAGE

No Further Action

GOOD

Check display wire connection to MLB.

GOOD

Check to see if any front panel LEDs are on.

YES

NO

Adjust display potentiometer on MLB.

NO DISPLAY

GOOD

BAD
Troubleshooting
Two-Wire PAR+ES Controllers

POWER INTERCONNECT BOARD (PIB)

- Orange ~26.5 VAC
- Blue ~8.5 VAC
- Circuit Breaker
- Board Power Status LED
- Station Power Status LED
- P1: Power/Communication from PIB
- Board Assembly Date Code
- F1: 4 Amp Slow Blow Fuse
- Socket: Two-wire path connector
- LED Potentiometer
- EPROM Microprocessor
- RAM Microprocessor; Dallas Chip (Date-Channel-ID-Time)
- Flat header connector to overlay membrane

**Note:** PAR+/PAR+ES and MSC+ PIB’s are not interchangeable. Installing the wrong boards will result in a “Hardware Failure” error code.

OUTPUT STATION MODULE (OSM)

- From Previous OSM or from PIB if OSM-1
- Station Switches
- Incoming Power to OSM
- Station Wire Output
- Outgoing OSM Power
- Station LED

**Note:** OSMs replaced Relay Output Modules (ROM-8) in 2002. Installing ROM-8s in a controller manufactured after 2002 will result in an “Incompatible OSM” error code.

TWO-WIRE INTERFACE MODULE (IFB)

**Note:** EPROMs assembled in Carrier Socket soldered in PWB

MAIN LOGIC BOARD (MLB)

- LCD Display with Backlight
- Power Wire
- EPROM without Carrier
- Socket Soldered in PWB
- Pre-April 2005 Design
- Pre-May 2006
- Post-May 2006
Recommended Rain Bird® Troubleshooting Procedure for
“Tripping Circuit Breaker”

START

No Further Action

Reset circuit breaker. See if problem is resolved.

No

Disconnect 26.5VAC black wire to top OSM. Reset circuit breaker. See if problem is resolved.

No

Check connection between transformer wire and P1 connector at PIB or bent pin on P1 connection. See if problem is resolved.

No

Replace PIB and see if problem is resolved.

No

Disconnect all black wires to OSMs and all green station OSM ribbon cable plug-in connectors.

No

Reconnect black wires and OSM ribbon cables one OSM at a time, starting with the top one until circuit breaker trips again.

No

In system information, check number of valves per stations. (Maximum of 4).

No

Adjust number of valves. See if problem is resolved.

No

Replace harness. See if problem is resolved.

No

Reconnect green station connectors. Using switch, activate stations one by one until circuit breaker trips.

No

Check harness for damage.

Good

Check terminal board for damage.

Good

Replace terminal board. Check to see if problem is resolved.

No

Not a Controller Issue – Short on Wire Path or Bad Solenoid

No Further Action

Recommended Rain Bird® Troubleshooting Procedure for
“Tripping Circuit Breaker”
Troubleshooting
Two-Wire PAR+ES Controllers

POWER INTERCONNECT BOARD (PIB)

From Previous OSM or from PIB if OSM-1
Station Switches
Incoming Power to OSM

To Next OSM
Station LED
Output OSM Power
Station Wire Output

>> Note: OSMs replaced Relay Output Modules (ROM-8) in 2002. Installing ROM-8s in a controller manufactured after 2002 will result in an “Incompatible OSM” error code.

OUTPUT STATION MODULE (OSM)

P4: Power/Communication to Control Module Assembly
Power/Communication with OSM 7–9
Transformer Incoming Power
Circuit Breaker
F1: 2.5 Amp Slow Blow Fuse

Board Power Status LED
Station Power Status LED
P3: Power/Communication to Two-Wire Interface Module
Power/Communication to OSM 1–6
Board Power LED

Station Power LED
P2: Power/Communication with OSM 7–9
Transformer Incoming Power
Circuit Breaker
F1: 2.5 Amp Slow Blow Fuse

>> Note: PAR+/PAR+ES and MSC+ PIB’s are not interchangeable. Installing the wrong boards will result in a “Hardware Failure” error code.

TWO-WIRE INTERFACE MODULE (IFB)

P1: Power/Communication from PIB
Board Assembly Date Code
F1: 4 Amp Slow Blow Fuse

Socket: Two-wire path connector

MAIN LOGIC BOARD (MLB)

LED Potentiometer
LCD Display with Backlight
Power Wire
EPROM Microprocessor
RAM Microprocessor; Dallas Chip (Date-Channel ID-Time)

Flat header connector to overlay membrane

PRE-MAY 2006
EPROM without Carrier
Socket Soldered in PWB

POST-MAY 2006
EPROM assembled in Carrier
Socket soldered in PWB

PRE-APRIL 2005 DESIGN
PRE-APRIL 2005 DESIGN
Recommended Rain Bird® Troubleshooting Procedure for

“All/Some Stations Not Working”

Front panel indicates that stations are running but no irrigation

»» Note: This troubleshooting card assumes that water and pressure are ok.

START

YES

Reset circuit breaker and verify problem is resolved.

NO

Verify right LED at PIB is ON.

NO

Replace PIB

YES

Verify station switches are on AUTO.

NO

Verify that number of valves per station is between 1 and 4.

NO

Clean and reconnect. See if problem is still present.

DIRTY

See if 26.5VAC black OSM wires are connected, or if connections are dirty.

YES

Disconnect all black wires to OSM’s and all green station plug-in connectors.

YES

Reconnect black wires one OSM at a time, starting with the top one.

NO

Replace OSM and verify if problem still present.

NO

Using the station switches, turn on one station at a time and measure output voltage. Verify voltage is 26.5VAC.

YES

Replace harness and verify if problem still present.

NO

Check input voltage (26.5VAC) at OSM board.

YES

Replace terminal board and verify if problem still present.

NO

Check output voltage (26.5V) at OSM board.

YES

Not a Controller Problem – Check Field Wires

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

No Further Action

Verify right LED at PIB is ON. Reset circuit breaker and verify problem is resolved.
Troubleshooting

Two-Wire PAR+ES Controllers

POWER INTERCONNECT BOARD (PIB)

- Orange ~26.5 VAC
- Blue ~8.5 VAC
- Circuit Breaker
- P1: Power/Communication from PIB
- Board Assembly Date Code
- F1: 4 Amp Slow Blow Fuse
- Socket: Two-wire path connector

OUTPUT STATION MODULE (OSM)

- From Previous OSM or from PIB if OSM-1
- Station Switches
- Incoming Power to OSM
- To Next OSM
- Station LED
- Outlet Station Power
- Station Wire Output

TWO-WIRE INTERFACE MODULE (IFB)

- P1: Power/Communication to Two-Wire Interface Module
- Power/Communication to OSM 1–6
- Power/Communication to OSM 7–9
- Transformer Incoming Power
- Circuit Breaker
- F1: 2.5 Amp Slow Blow Fuse

MAIN LOGIC BOARD (MLB)

- LCD Display with Backlight
- Power Wire
- EPROM without Carrier
- EPROM assembled in Carrier
- Socket Soldered in PWB
- P2: Power/Communication from PIB
- RAM Microprocessor; Dallas Chip (Date - Channel ID - Time)
- Flat header connector to overlay membrane

Note: PAR+/PAR+ES and MSC+ PIB’s are not interchangeable. Installing the wrong boards will result in a “Hardware Failure” error code.

Note: OSMs replaced Relay Output Modules (ROM-8) in 2002. Installing ROM-8s in a controller manufactured after 2002 will result in an “Incompatible OSM” error code.
A cold boot clears the controller's memory and resets all program variables back to original factory defaults.

**Recommended Rain Bird® Troubleshooting Procedure for “Key Pad Not Responding”**

- **Start**
- Verify power switch ON.
- Turn power ON.
- Verify problem is resolved.
- Turn power off and wait five seconds (warm boot).
- Initiate cold boot.
- Turn power on and see if key pad is responding.
- Verify key pad is working.
- Replace Front Panel

**How to perform a Factory Reset/Cold Boot with a non-responding key pad**

1. Turn Power OFF
2. Hold COPY PASTE and SYSTEM INFORMATION
3. Turn Power ON
4. Hold button down until NEW SYSTEM SETUP appears in display

A cold boot clears the controller's memory and resets all program variables back to original factory defaults.
Troubleshooting

Two-Wire PAR+ES Controllers

POWER INTERCONNECT BOARD (PIB)

- Orange ~26.5 VAC
- Blue ~8.5 VAC
- Circuit Breaker
- Power/Communication to Control Module Assembly
- Transformer Incoming Power
- Circuit Breaker
- F1: 2.5 Amp Slow Blow Fuse

Board Power Status LED
Station Power Status LED
P4: Power/Communication to Two-Wire Interface Module
P3: Power/Communication to OSM 1–6
Power/Communication with OSM 7–9
Power Wire
Station Power Status LED
Board Power Status LED

Note: PAR+/PAR+ES and MSC+ PIB’s are not interchangeable. Installing the wrong boards will result in a “Hardware Failure” error code.

OUTPUT STATION MODULE (OSM)

- From Previous OSM or from PIB if OSM-1
- Station Switches
- Incoming Power to OSM
- To Next OSM
- Station LED
- Outgoing OSM Power
- Station Wire Output

Note: OSMs replaced Relay Output Modules (ROM-8) in 2002. Installing ROM-8s in a controller manufactured after 2002 will result in an “Incompatible OSM” error code.

TWO-WIRE INTERFACE MODULE (IFB)

- P1: Power/Communication from PIB
- Board Assembly Date Code
- F1: 4 Amp Slow Blow Fuse
- Socket: Two-wire path connector

MAIN LOGIC BOARD (MLB)

- LCD Display with Backlight
- Power Wire
- EPROM Microprocessor
- RAM Microprocessor; Dallas Chip (Date-Channel ID-Time)
- Socket: Two-Wire path connector
- Flat header connector to overlay membrane
- F2: Power/Communication from PIB

Note: Pre-May 2006 EPROM without Carrier
Note: Socket Soldered in PWB
Note: Post-May 2006 EPROM assembled in Carrier
Note: Socket Soldered in PWB

Pre-May 2006 Design
Post-May 2006 Design
Recommended Rain Bird®
Troubleshooting Procedure for
“Controller Not Responding to MAXI® Signal”

Note 1: This troubleshooting section assumes that the MAXI Interface Module is functioning properly and not the cause of the problem.

Note 2: In a two-wire system, Control Mode LED should turn solid within one minute.

START

See what the MAXI light on the controller is doing.

OFF

Change controller mode to MAXI. Verify issue resolved.

NO – STARTED BLINKING

Turn controller OFF then ON. Verify issue resolved.

SOLID

Assuming the MAXI Interface Module is functioning properly, check channel ID’s (press System Info three to four times). See if ID’s are missing and incorrect or present and correct.

MISSING OR INCORRECT

Enter proper channel ID’s. Verify issue is resolved.

CORRECT

No Further Action

NO

Measure incoming voltage at MSP-1.

UNDER 19VAC

Problem Is Likely a Short on Wire Path

OVER 19VAC

Check incoming voltage to third party lightning protection device, if any.

UNDER 19VAC

Replace lighting device

OVER 19VAC

Measure outgoing voltage at MSP-1.

UNDER 19VAC

Verify continuity of MSP-1

YES

Replace MSP-1

NO

NO

No Further Action

NO

No Further Action

NO

No Fault Found

CALL RAIN BIRD
Troubleshooting Two-Wire PAR+ES Controllers

**POWER INTERCONNECT BOARD (PIB)**

- **Orange ~26.5 VAC**
- **Blue ~8.5 VAC**
- **Circuit Breaker**
- **P4: Power/Communication to Control Module Assembly**
- **Power/Communication with OSM 7–9**
- **Transformer Incoming Power**
- **F1: 2.5 Amp Slow Blow Fuse**
- **Board Power LED**
- **Station Power Status LED**
- **P3: Power/Communication to Two-Wire Interface Module**
- **Power/Communication to OSM 1–6**
- **F1: 4 Amp Slow Blow Fuse**
- **Board Power Status LED**

»» Note: PAR+/PAR+ES and MSC+ PIB’s are not interchangeable. Installing the wrong boards will result in a “Hardware Failure” error code.

**OUTPUT STATION MODULE (OSM)**

- **From Previous OSM or from PIB if OSM-1**
- **Station Switches**
- **Incoming Power to OSM**
- **To Next OSM**
- **Station Wire Output**
- **Station Power LED**
- **Outgoing OSM Power**

»» Note: OSMs replaced Relay Output Modules (ROM-8) in 2002. Installing ROM-8s in a controller manufactured after 2002 will result in an “Incompatible OSM” error code.

**TWO-WIRE INTERFACE MODULE (IFB)**

- **P1: Power/Communication from PIB**
- **Board Assembly Date Code**
- **F1: 4 Amp Slow Blow Fuse**
- **Socket: Two-wire path connector**

**MAIN LOGIC BOARD (MLB)**

- **LCD Display with Backlight Power Wire**
- **EPROM Microprocessor**
- **RAM Microprocessor (Dallas Chip (Date-Channel ID-Time))**
- **F2: Power/Communication from PIB**
- **Flat header connector to overlay membrane**

»» Note: PIB MAY 2006 EPROM without carrier Socket soldered to PWB

PRE-MAY 2006 POST-MAY 2006

**PRE-MAY 2006**
- **EPROM assembled in Carrier Socket soldered in PWB**

**POST-MAY 2006**
- **EPROM assembled in Carrier Socket soldered in PWB**
Testing of MSP-1 Surge Arrestor

When installed properly:

- All three wires are a continuous path through the LINE and EQUIP ends
- The green wire from both ends must be physically grounded together
- The MSP-1 surge arrestor unit is directional and the end marked LINE must be connected to the two-wire path coming from the field.

Test procedure:

Use digital multi-meter on its Ohm setting

- Check for continuity through red to red, black to black, and green to green. Reading should be ~ 0Ω.
- There should NOT be continuity between any wire of mixed colors. Reading should be ~ 750Ω.

The failure of any of the above tests indicates a malfunctioning surge arrestor and will not provide any further protection and necessitates the replacement of the current MSP-1