

# Bridge Power Board User Manual

## Important Disclaimer

This product is intended for use by individuals with appropriate technical knowledge of electrical systems. Installation involves working with potentially hazardous voltages and improper handling may result in equipment damage, personal injury, or fire.

By installing or using this board, the user assumes all responsibility for any risks associated with its use. The designer and distributor of this board shall not be held liable for any damage to equipment, property, or persons resulting from improper installation, misuse, or failure to follow recommended procedures.

Installation is performed at the user's own risk. If you are unsure about any aspect of the installation process, consult a qualified technician before proceeding.

## 1. Introduction

The Bridge Power Board is a modernized power rectification and filtering solution designed to replace aging and failure-prone components in legacy pinball systems. Traditional designs often relied on discrete rectifiers and large electrolytic capacitors that degrade over time, leading to unstable voltage levels and increased system risk. This board consolidates these functions into a compact and reliable module, significantly improving electrical performance and long-term reliability.

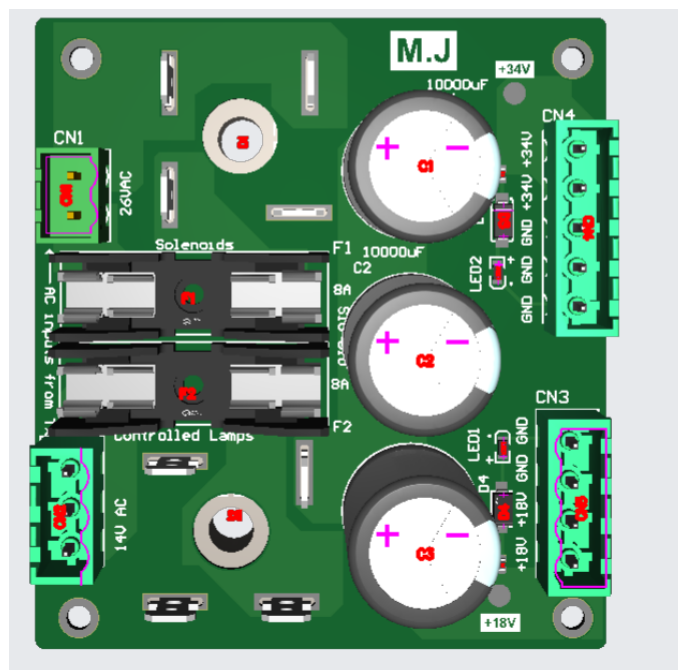


Figure 1: Bridge Power Board Overview

## 2. Purpose of the Board

The primary purpose of this board is to address known design weaknesses in older systems, including the absence of proper fuse protection and the degradation of high-value capacitors. By integrating modern components and protective features, the board minimizes the risk of catastrophic failures such as transformer

damage, wiring burnout, or excessive current flow.

### 3. Key Features

- High-current bridge rectifiers (35A, 1000V)
- Multiple capacitors for improved filtering and lower ESR
- Integrated fuse protection
- LED indicators for voltage presence
- Zener diode voltage regulation
- Screw terminal connections for easy installation

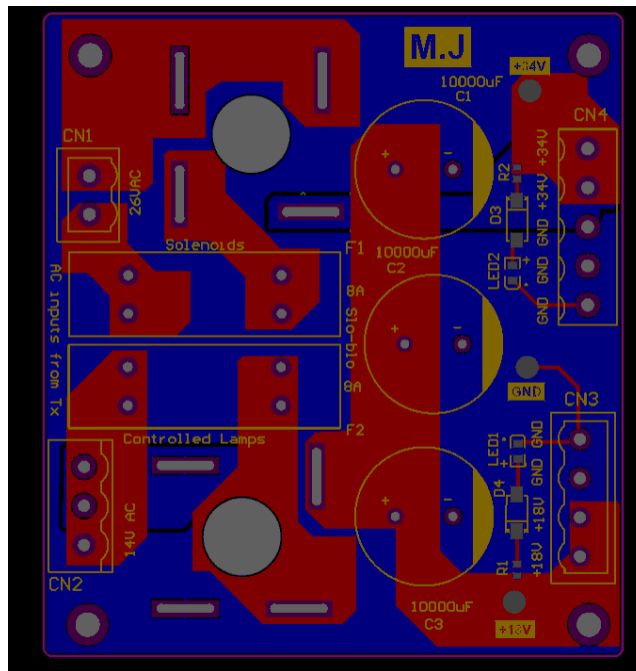


Figure 2: PCB Layout

### 4. Technical Specifications

The board operates using dual AC inputs and provides stable DC outputs for both solenoid and lamp circuits. High-current components ensure reliable performance under load, while parallel capacitors improve ripple suppression and extend system lifespan.

- Input: 26VAC (solenoids), 14VAC (lamps)
- Output: ~34VDC, ~18VDC
- Bridge Rectifiers: 35A, 1000V
- Capacitors: 10,000 µF (multiple)
- Fuse Rating: 8A slow-blow
- Zener Diodes: 24V and 10V

### 5. Safety Information

Always follow proper safety procedures when working with electrical systems. Ensure the system is powered off and disconnected before installation. Capacitors may retain charge after power is removed, so they must be discharged safely before handling.

- Disconnect power before installation
- Discharge capacitors before handling
- Verify all wiring connections
- Use correct fuse ratings

## 6. Installation Procedure

Begin by removing the existing bridge rectifiers and large filter capacitor from the system. Carefully cut or desolder all connected wires, ensuring that each wire can be identified later. Any jumper wires between the rectifiers and capacitor should also be removed, as they are no longer required.

Once the original components have been removed, route the wires to the new board and secure them using the screw terminal connectors. Ensure that all connections are firmly tightened to prevent high-resistance joints, which can lead to overheating.

After completing all connections, visually inspect the board to confirm correct wiring before applying power. It is recommended to power the system initially with appropriate precautions, such as using a current-limited supply or inline fuse protection.

### 6.1 Wire Mapping: Original System to New Board

Before installing the board, identify and label the wires connected to the original bridge rectifiers and capacitor. These wires will be reconnected to the new board using the screw terminals. The table below describes where each wire originates and where it should be connected on the new board.

The following mapping has been verified on a Williams System 11A machine (High Speed), which uses standard color conventions. Other systems such as Data East and early Sega machines are generally compatible, but wire colors and configurations may vary. Always verify connections before applying power.

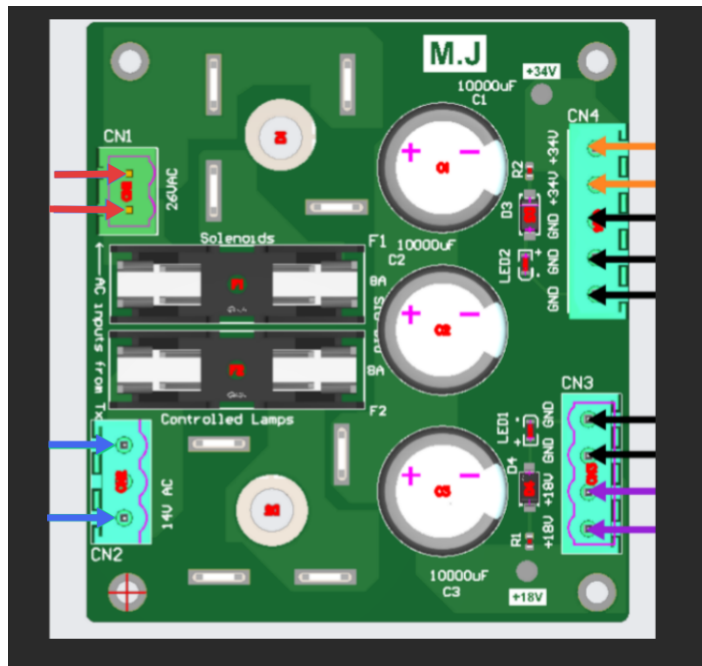


Figure 3: Wiring Diagram

## 6.2 Verified Wiring Connections (Williams Systems)

- CN1 (26VAC Input – Solenoid Supply): Connect the two red or red/white wires from the transformer secondary. Polarity is not important for AC input.
- CN2 (14VAC Input – Lamp Supply): Connect the two blue or blue/white wires supplying AC voltage for controlled lamps. The center pin may remain unused depending on the wiring harness.
- CN3 (18VDC Output – Lamp Circuit): Connect violet wires to the positive terminals and black wires to ground. This output supplies rectified and filtered voltage for controlled lamps.
- CN4 (34VDC Output – Solenoid Circuit): Connect orange wires (or orange/blue in some systems) to the positive terminals and black wires to ground. This output supplies power to coils and solenoids.

## 6.3 Critical Warning: Bridge Rectifier Terminals

Do NOT connect any wires directly to the metal terminals (tabs) of the bridge rectifiers mounted on the board. These terminals are part of the internal rectification circuit and are not intended for external wiring connections.

Connecting wires to these terminals can result in incorrect circuit operation, short circuits, or severe damage to the board and connected components. In high-current systems, this may also pose a fire risk or damage upstream components such as the transformer.

All electrical connections must be made ONLY through the designated screw terminal connectors (CN1–CN4) as labeled on the board. These connectors are specifically designed to safely handle the required currents and ensure correct circuit operation.

## 6.4 Compatibility Notes

While this board has been tested on a Williams System 11A machine, it is also compatible with many Williams, Data East, and early Sega systems that use similar power architectures. However, wire colors and harness configurations may differ between models.

In some older systems, additional wires (such as flipper or auxiliary power lines) may be tied into the same nodes as the main supply lines. These wires should remain grouped together and connected to the corresponding terminals on the new board.

If wire colors do not match the descriptions provided, trace the wires based on their function rather than relying solely on color identification.

## 7. Operation

During operation, AC voltage is converted to DC through bridge rectification. The resulting DC voltage is filtered using high-capacity electrolytic capacitors, ensuring a stable output. Zener diodes provide voltage clamping, and LED indicators offer a visual confirmation of system status.

## 8. Troubleshooting

If the board does not operate correctly, check all wiring connections and fuse conditions. LED indicators can assist in diagnosing whether output voltage is present.

- No output: check AC input and fuse
- Dim output: inspect capacitors
- Fuse blowing: possible short circuit
- LED off: verify voltage and polarity

## **9. Maintenance**

Routine inspection is recommended to ensure long-term reliability. Check for loose connections, damaged components, or capacitor wear. Replace components as necessary to maintain performance.

## **10. Conclusion**

This Bridge Power Board provides a robust and modern replacement for legacy systems. By combining improved protection, filtering, and ease of installation, it significantly enhances system safety and performance.