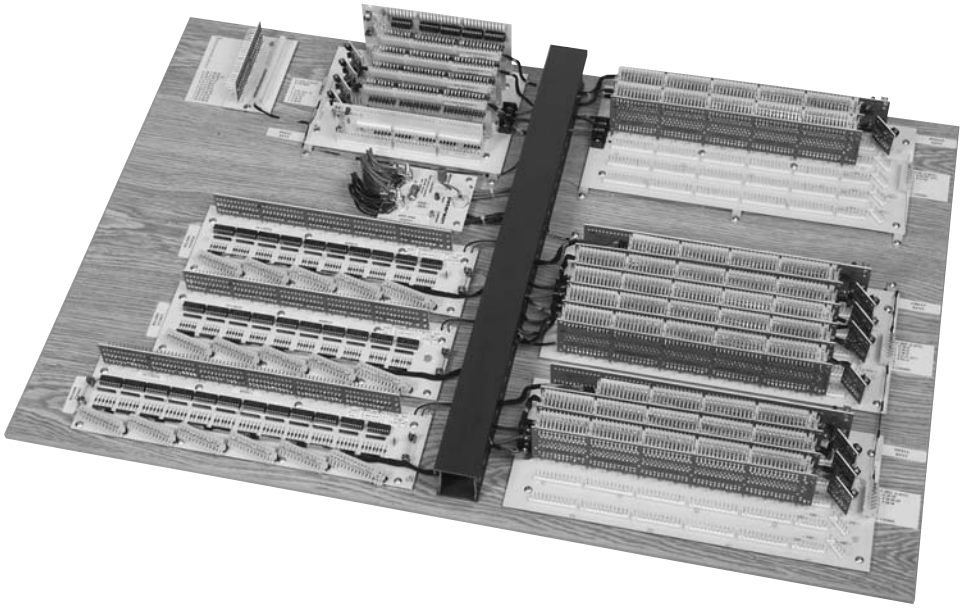
Diode Matrix Switching System

Solid state coupler/relay for pipe organs



- Modular design.
- "Low tech" electronic circuitry.
- Decades of proven reliability in thousands of installations.
- Lowest cost for many applications.
- Specifications easily expanded or changed.
- Provided totally configured, tested and documented.

The Peterson Diode Matrix Solid State Switching System has become a standard in the pipe organ industry, used by hundreds of organ builders in many thousands of organs world wide. Early installations have now been in use for well over thirty years, and although the details have evolved as improvements were made, the innovative yet simple modular design pioneered by Peterson in the 1960s still makes this a favorite for many projects today. The quick response, maintenance-free reliability due in part to its lack of moving parts, and silent operation all contribute to this system's phenomenal success. For many applications, the relatively low technology level of diode matrix means less cost than with multiplexing and computer based systems. This product is credited by many for transforming the way electric action organs are controlled throughout the pipe organ industry.

Each Peterson Diode Matrix Switching System is a custom built electronic panel for performing the key switching and stop control functions of a pipe organ. Designed to work with any wind chest having an electric action, it is equally applicable to electro-pneumatic or all-electric types. Stops can be straight, or any degree of duplexing or unification can be employed.

Diode Matrix Switching Systems consist of a number of modular assemblies of solid state components including transistors, diodes, integrated circuits and resistors on one or more panels designed to mount in or near the organ chamber(s). Specially designed disconnectable junctions allow the various modules to be factory tested and assembled. At the time of installation, the installer simply wires a cable from each chest to a connector provided, which is then plugged onto its related assembly. Similarly, single switch contacts associated with the keys of each playing manual, the pedal board, and from the stop tablets, must be wired to connectors which also plug in as clearly labeled. Other than the above, the Peterson Solid State Switching System is supplied completely wired, tested and documented.

The Peterson Solid State Switching System originated as a modern substitute for mechanical relays that could offer much higher reliability with virtually no maintenance. With solid state, thousands of switch contacts are replaced by semiconductor devices, which can never pit, corrode or require adjustment. All components are sealed against humidity, dust and other environmental factors. Except for one contact per playing key, and one contact per stop control, there are absolutely no contacts to ever require adjusting or cleaning. Because there are no moving parts, there is nothing to stick, bind or make noise. Except for the movement of the stop tablets and the playing keys, the action is totally silent. It is indeed startling to push the Sforzando piston and have the full organ appear without the slightest attendant noise.

Since the solid state switches operate at the speed of light, the action is totally responsive without the lag that is frequently associated with mechanical relays. Because the playing keys must each operate only a single key switch, the loading on the key is insignificant, and the key tension and type of return spring can be selected and adjusted for the best possible "feel."

Key contact reliability and durability is enhanced in that the key switch current is less than that required by even a single chest magnet; in addition, it is non-inductive. This means no contact sparking ... never any pitting or burning. Finally, because there are no action

magnets to constantly consume power, a much smaller and less costly rectifier can be used. The total power consumption is essentially that required to operate the chest magnets.

With the Diode Matrix Switching System, no special power supplies are required, and a regular 12 to 18 Volt organ rectifier may be used. Voltage appearing at the chest magnet is about one volt less than the voltage at the rectifier. As in any organ, the minimum voltage required depends on the characteristics of the chest magnets. Polarity is important and normally the key switch feed must be positive. The standard stop tablet feed is positive, with negative available by special order.

Where couplers are used, a separate solid state coupler system may be mounted in the console or in the organ chamber. When certain features are required, a Peterson OrgaPlex™ coupler system is often used with a Diode Matrix relay. If desired, a conventional console having mechanical couplers can be connected in the usual manner. Where any Peterson Solid State Coupler System is used, each playing key operates a single key contact, which controls all functions.

The modular design of this system, together with its unique proprietary connector system, allows unlimited future additions or changes with no preparations and with no cost penalty. It is also practical to add a Diode Matrix System to control new ranks that are being added to an old organ with an electropneumatic or other existing relay.

Each Peterson Solid State Switching System includes a Sforzando terminal which, when energized, turns on all stops. Any stops not desired in the Sforzando combination may be deleted by clipping a wire or unsoldering a connection. The provision of the Sforzando terminal saves the very considerable cost of special Sforzando switches and wiring that was traditionally required.

The operation of the Diode Matrix relay is remarkably simple. A comprehensive technical manual, which describes in simple terms how the equipment works, is supplied with each system. Even without this resource the modular concept, logical layout of the various components, connectors and built-in test junctions make trouble shooting easier than with most other relays, electronic or otherwise. Consider, for example, the common “cross” or “run” where two or more notes sound together. Usually, the short circuit causing this can be in any of several locations, but with the modular concept, the various assemblies can be quickly disconnected from one another and the trouble immediately localized. Components and connector terminals are mounted on special printed wiring boards in octave groups so that the parts related to a specific function are readily identified. While a complete system necessarily looks complex, a more careful examination shows it to consist of a large number of identical, very simple, easily understood circuits. Any technician who can find his way around a mechanical relay will quickly feel at home with Peterson Solid State.

Each type of Peterson control system has advantages for particular organ specifications. The Peterson Diode Matrix Switching System is often less expensive on small organs with all or most of their ranks straight rather than unified and where features such as a transposer, MIDI interface and/or a movable console are not required. In some cases, Peterson will recommend a “hybrid” control system using OrgaPlex™ couplers connected to a Diode Matrix Switching System to operate the note actions. Peterson’s technical staff will be happy to discuss options and pricing with you.

Specifications

Operating Voltage: **12 -18 VDC.**

Key Common Polarity: **Positive.**

Stop Common Polarity: **Standard is positive; specify negative when ordering if required.**

Chest Return Common Polarity: **Standard is negative; inquire if positive chest returns are required.**

Output Load Ratings: **Please specify the locations and resistance of all magnets below 50 Ohms. Outputs are flyback protected.**