

The S&C Micro-AT Source-Transfer Control In Weatherproof Enclosure is designed for use in conjunction with pole-mounted or steel-structure-mounted S&C Alduti-Rupter® Switches that are power operated by S&C Switch Operator-Type AS-1A (for rotating operating mechanisms) or Type AS-10 (for reciprocating operating mechanisms) equipped for this application. This arrangement provides automatic source transfer for grounded primary-selective overhead distribution systems rated 7.2 kv through 46 kv.

When so applied, the Micro-AT Source-Transfer Control assures a high degree of critical-load continuity by minimizing interruptions resulting from the loss of one source. Excluding the intentional time delay to coordinate with upstream protective devices and/or transition dwell time, ▲ transfer is achieved in 1.5 seconds maximum (when Type AS-1A Switch Operators are used) or 2.4 seconds maximum (when Type AS-10 Switch Operators are used).

Under normal operating conditions, the preferred-source interrupter switch is closed and the alternate-source interrupter switch is open. See the system diagram on page 2.

The Micro-AT Source-Transfer Control monitors the condition of both power sources and initiates automatic switching when preferred-source voltage has been lost (or reduced below a predetermined level) for a period of time sufficient to confirm that the loss is not transient. The preferred-source interrupter switch is automatically opened and the alternate-source interrupter switch is then automatically closed, restoring service to the load.

▲ An adjustable time delay to allow motor residual voltage—the voltage appearing at the terminals of a connected motor when the source is interrupted—to drop sufficiently before service is restored.



S&C Micro-AT Source-Transfer Control In Weatherproof Enclosure.

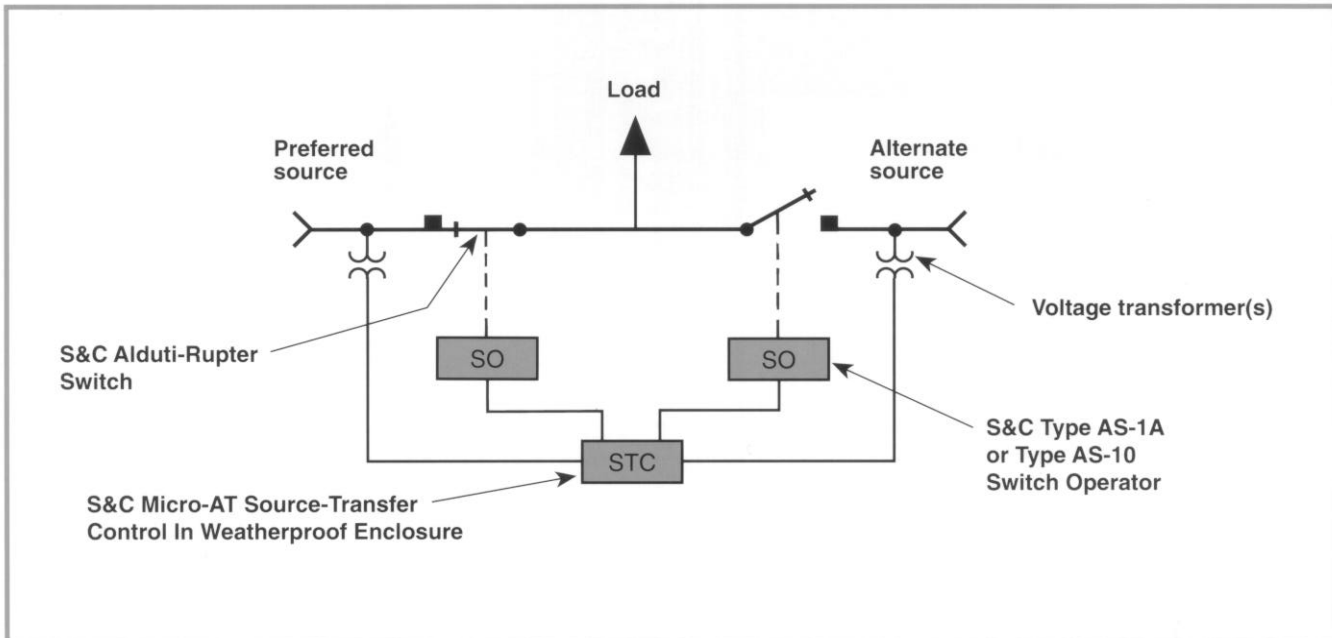
Depending on the manner in which the control has been field programmed, return to the normal circuit configuration-preferred-source interrupter switch closed, alternate-source interrupter switch open-may be performed automatically on restoration of normal voltage to the preferred source, after a delay sufficient to establish that the return is not temporary (*automatic return mode*) or manually at a convenient time (*hold return mode*).

In the *automatic return mode*, such return-of-source transfer may be accomplished with *open transition* or *closed transition*. With *open transition* retransfer-used when the power sources are not to be paralleled-the alternate-source interrupter switch opens before the preferred-source interrupter switch closes. with a momentary interruption of service to the load. With *closed transition* retransfer-selected when it is permissible to parallel the sources so that there will be no interruption of service to the load-the alternate-source interrupter switch will open after the preferred-source interrupter switch closes. In the *hold return mode*, by the way, if the alternate-source voltage fails (and voltage has been restored to the preferred source), an automatic open-transition return-of-source transfer will take place so that the load is sewed from the preferred source.

The S&C Micro-AT Source-Transfer Control In Weatherproof Enclosure includes the following standard features illustrated on page 3:

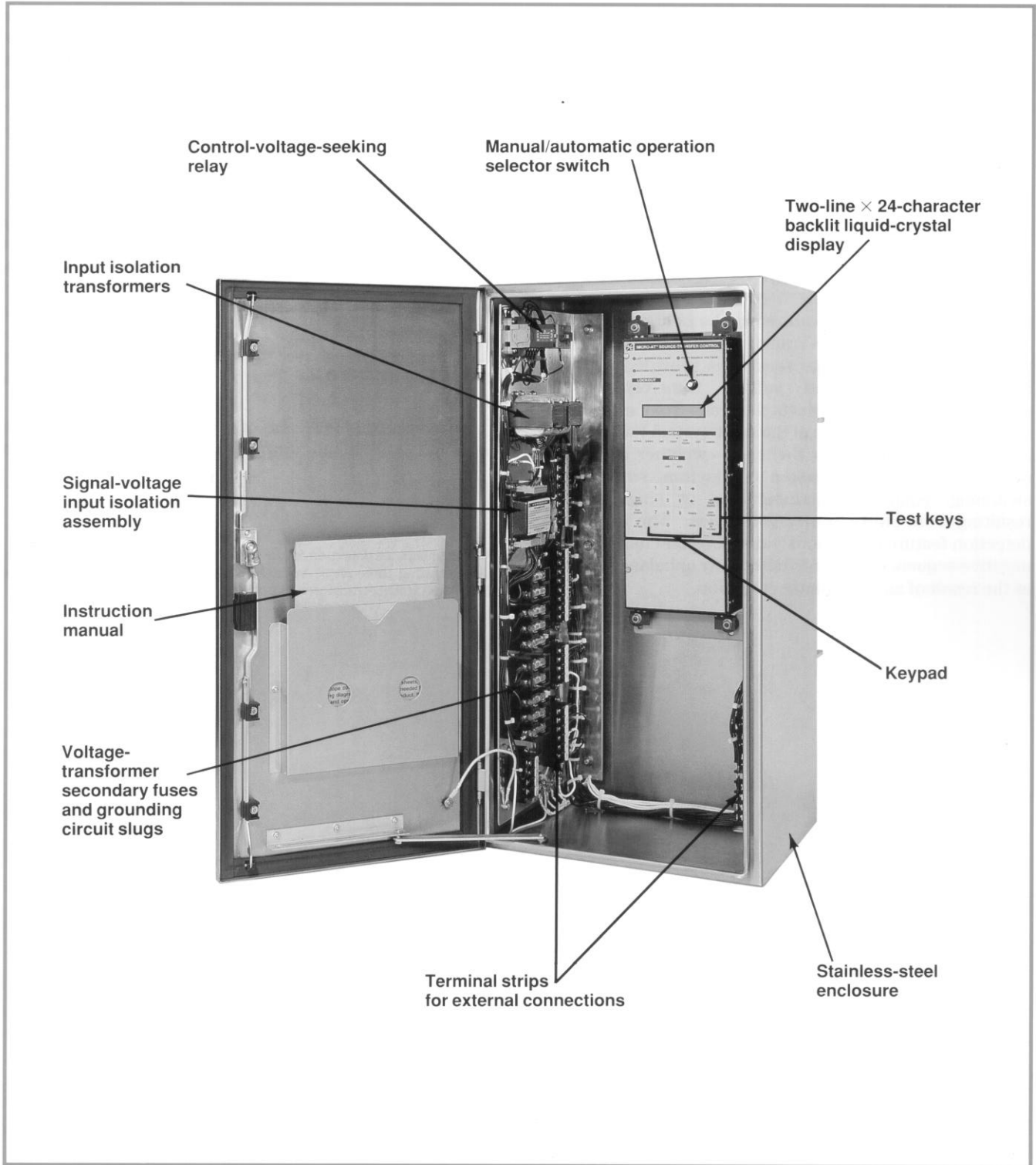
- Manual/automatic operation selector switch.

- Two-line × 24-character backlit liquid-crystal display.
- Automatic-transfer “ready” indicating lamp, source-voltage indicating lamps, and overcurrent-lockout indicating lamp with reset key.
- Keypad for entry of the control’s operating characteristics and voltage-, current-, and time-related operating parameters.
- Test keys for simulating overcurrent and loss of voltage on the sources.
- Input isolation transformers and signal-voltage input isolation assembly, to isolate the source-transfer control from potential ground loops-as may occur because of differences in voltage between the grounding points of the voltage transformers and the control.
- Control-voltage-seeking relay which transfers between the two sources, as required, to ensure adequate control voltage for the switch operaton.
- Terminal strip for external connections. All necessary internal connections are prewired.
- Fuseholders for secondary fuses of user-furnished voltage transformers.
- Unpainted 304L stainless-steel NEMA 4X padlockable enclosure for steel structure mounting.



System diagram.





Closeup of interior.

Voltage Sensing

The voltage-sensing input circuitry of the Micro-AT Source-Transfer Control In Weatherproof Enclosure accommodates the following single-phase or three-phase voltage-sensing schemes, utilizing user-furnished voltage transformers having 240/120-volt, 60-hertz secondaries:

- For single-phase sensing, one line-to-ground or line-to-line connected voltage transformer per source, or
- For three-phase sensing, three line-to-ground connected voltage transformers per source, or on delta-connected systems only two line-to-line connected voltage transformers per source.

Unbalance Detection

An unbalance detection feature may be field programmed in the Micro-AT Source-Transfer Control in instances where three-phase voltage sensing is provided by three line-to-ground connected voltage transformers per source. ■ This feature protects the loads from any *source-side* open-phase condition at the same system voltage level as the S&C Alduti-Rupter Switches—whether caused by utility-line burndown, broken conductors, single-phase switching, equipment malfunctions, or single-phasing resulting from blown *source-side* fuses. The unbalance detection feature continuously develops and monitors the negative-sequence voltage to detect any unbalance present as the result of an open-phase condition.

If the voltage unbalance exceeds a preset reference level for a period of time sufficient to confirm that the loss is not transient, an output signal is produced which initiates automatic transfer to the other source. By monitoring negative-sequence voltage, the unbalance detection feature detects virtually all source-side open-phase conditions, even those where backfeed defeats simple voltage-magnitude sensing schemes.

Overcurrent Lockout

An overcurrent-lockout feature may be optionally furnished in the Micro-AT Source-Transfer Control In Weatherproof Enclosure. This feature prevents an automatic-transfer operation that would close a source interrupter switch into a fault, thereby avoiding further utility-system disturbance. The overcurrent-lockout feature requires three user-furnished Fisher Pierce Series 1301 Powerflex® Line Post Current Sensors for each source.

An overcurrent in excess of a preset level will set up the lockout feature in the control. If the overcurrent is due to a

■ The unbalance detection feature should not be programmed in applications utilizing three-phase voltage sensing provided by two line-to-line connected voltage transformers per source.

fault that is cleared by a source-side protective device, the prolonged loss of voltage will cause the associated source interrupter switch to open. At the same time, a lockout mode will be set up in the source-transfer control, so that the other source interrupter switch will not automatically close into the fault. (If the overcurrent is due to a fault that is cleared by a load-side protective device, however, there will be no prolonged loss of voltage and hence the source-transfer control will not initiate any switching operations.) The lockout mode may be externally reset; a terminal block is included in the weatherproof enclosure for attachment of user-furnished control wiring providing the appropriate reset signal.

The lockout level of the source-transfer control is factory-set at 480 amperes, but may be field adjusted to any value between 200 and 1500 amperes; the setting chosen should take into account the emergency peak-load current of the system, so as to preclude nuisance lockouts.

Remote Indication

A remote indication feature may also be optionally furnished in the Micro-AT Source-Transfer Control In

Weatherproof Enclosure. This feature permits remote monitoring of presence or absence of source voltages, manual or automatic operating mode, status of the "ready" indicator, "event" indicator, and (if furnished) overcurrent lockout. A terminal block is included in the weatherproof enclosure for attachment of user-furnished control wiring to remote indicators.

Test Panel

A test panel feature may also be optionally furnished. This feature permits the use of an external, adjustable three-phase source to verify, through independent measurement, the response of the control to loss-of-source, phase-unbalance, and overcurrent-lockout conditions.

Supervisory Control

A supervisory control feature may be optionally furnished as well. This feature permits switch operation from a remote location. A terminal block is included in the weatherproof enclosure for attachment of user-furnished control wiring providing the appropriate supervisory control signals.



Keypad Programming

The Micro-AT Source-Transfer Control utilizes an advanced electronic microprocessor to perform control operations, as directed by settings programmed into the device at the factory and in the field. Such settings-consisting of the control's operating characteristics and voltage, current-, and time-related operating parameters-are entered into the control by means of a keypad on the front panel illustrated on page 7.

To simplify entry of this information and to permit its quick review on the liquid-crystal display, the operating characteristics have been grouped together as a series of "items" in the "CONFIGURE" menu. Similarly, the voltage-, current-, and time-related operating parameters have been grouped together as a series of items in the "VOLTAGE," "CURRENT," and "TIME" menus, respectively. A particular item can be accessed for display by first pressing the appropriate menu key and then scrolling through the items, using the "NEXT" or "LAST" item key. To prevent unauthorized changes to the operating characteristics and operating parameters, each item is protected by an access code; the correct access code must be entered before the item can be altered.

The "TEST" menu provides the means for checking the functioning of the source-transfer control and is also used to enable the test keys for simulating overcurrent and/or loss of voltage on the sources.

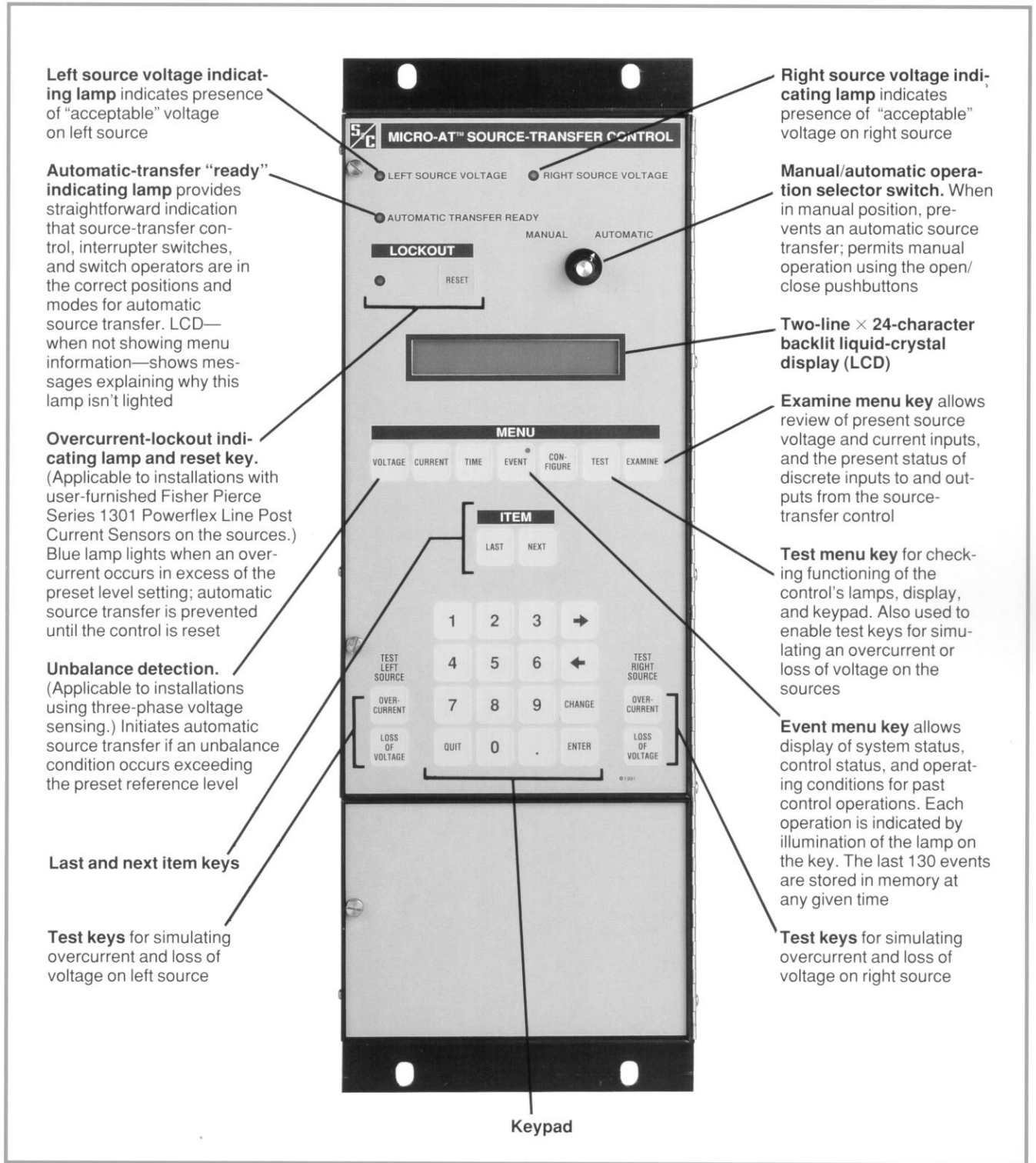
The Micro-AT Source-Transfer Control features powerful built-in diagnostic tools. The control automatically records system status and the status of the device's controller circuits every time a control operation occurs. Each such operation, referred to as an "event," is indicated by the illumination of a lamp on the "EVENT" menu key and is available for display under this menu. Further, the control has available for display, as items under the "EXAMINE" menu, the present source voltage and current inputs, and the present status of discrete inputs to and outputs from the control.

Proven Solid-State Circuitry

S&C solid-state electronic devices offer the superior reliability and serviceability required for the rigors of operation in power equipment. Metal-oxide surge protectors at critical points in the control circuits provide the optimum in surge protection-S&C's unique surge control has been field proven through years of successful application in hostile utility-substation environments. And the capability of every S&C electronic device to withstand voltage surges is confirmed by two factory quality-check tests: The ANSI Surge Withstand Capability Test (ANSI Standard C37.91.1); plus a much more severe (5-kv, 3.75-joule) capacitive-discharge test specially developed by S&C to duplicate or exceed voltage surges measured in EHV power substations. The specified surges are applied at all terminals of the device. Additional tests are performed to identify and eliminate any components that might be prone to early failure. They include a dielectric test; 72-hour screening test consisting of 24 hours at maximum-design operating temperature followed by 48 hours of temperature cycling; and functional tests (both before and after the screening test).

Printed-circuit-board construction assures high reliability. All components are applied at well below MIL-STD design guidelines, minimizing component stress, power-supply requirements, and internal heating. Voltage-level settings are maintained within $\pm 3\%$ accuracy over an ambient temperature range of -40°F to $+160^{\circ}\text{F}$. Interconnecting-cable connector pins and receptacle contacts are gold-over-nickel plated. And all output relay contacts are of silver-cadmium oxide to ensure long service life. Output circuits are relay isolated.





Closeup of front panel features.

