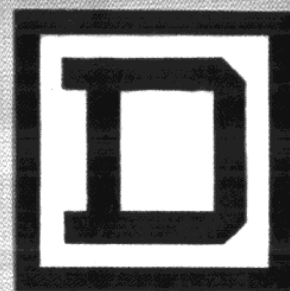
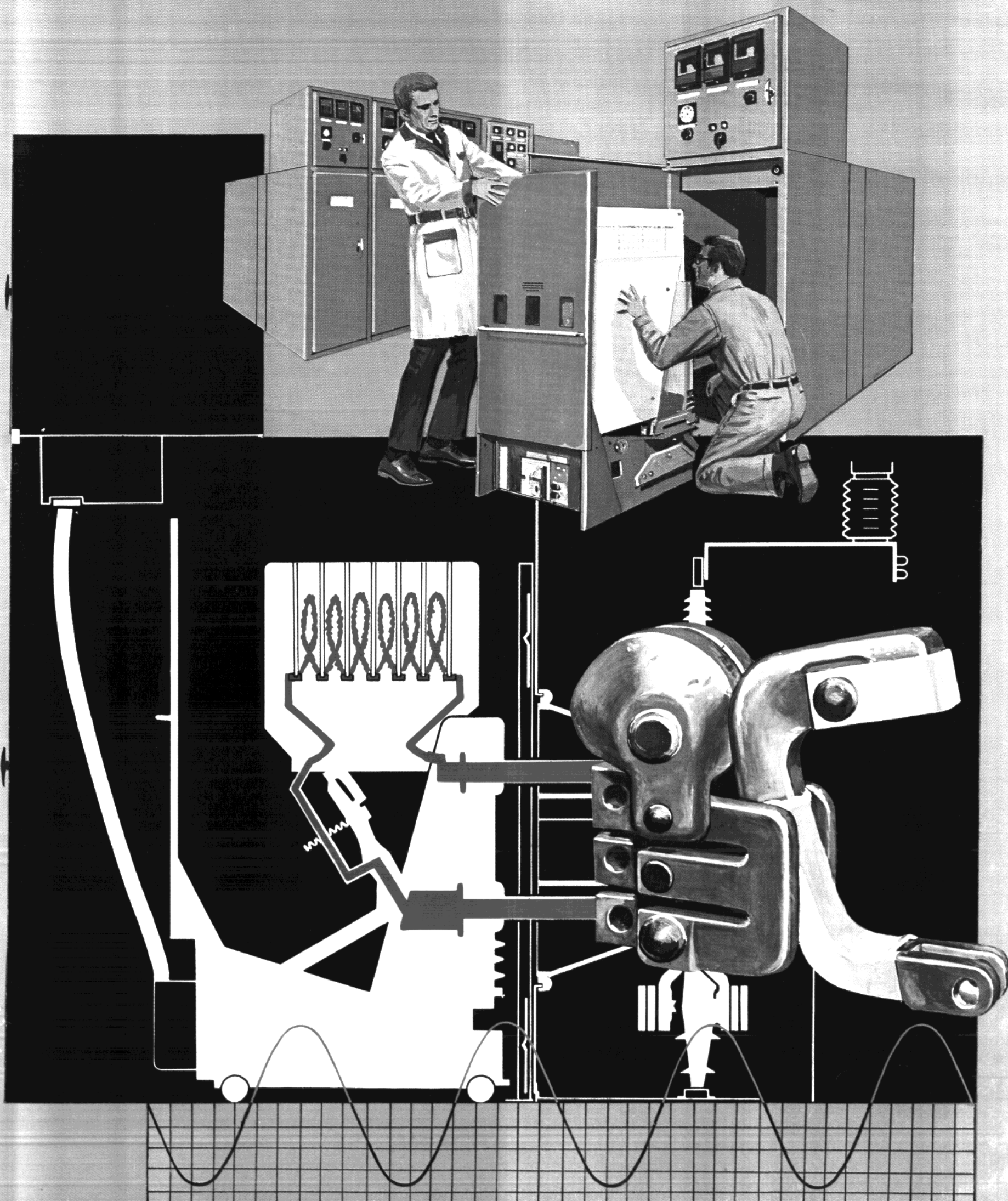


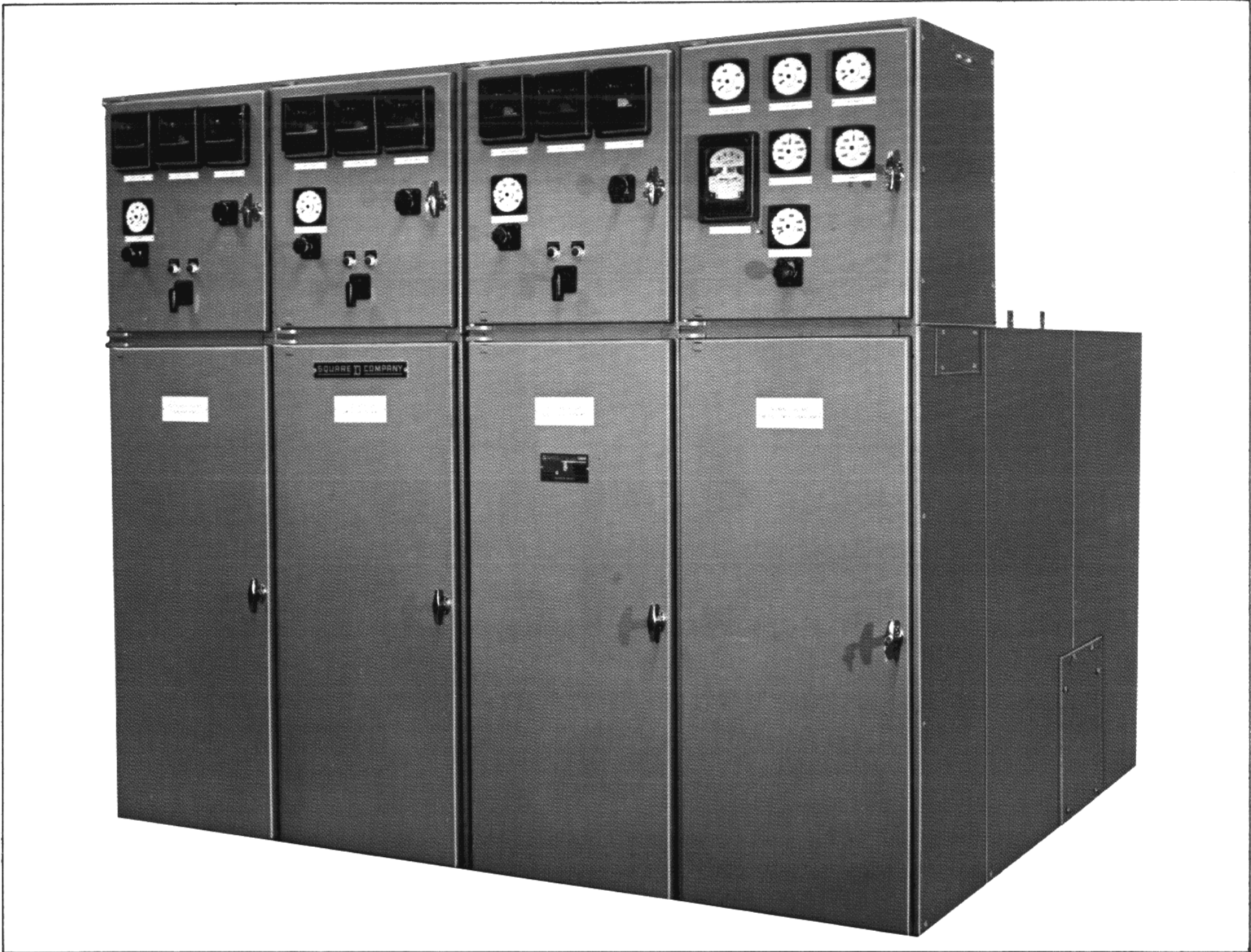
SOLENARC DSE METAL-CLAD SWITCHGEAR



A.I.A. File No. 1623 Electrical Substations



SOLENARC DSE metal-clad switchgear



SOLENARC METAL-CLAD SWITCHGEAR MULTIPLE UNIT ASSEMBLY

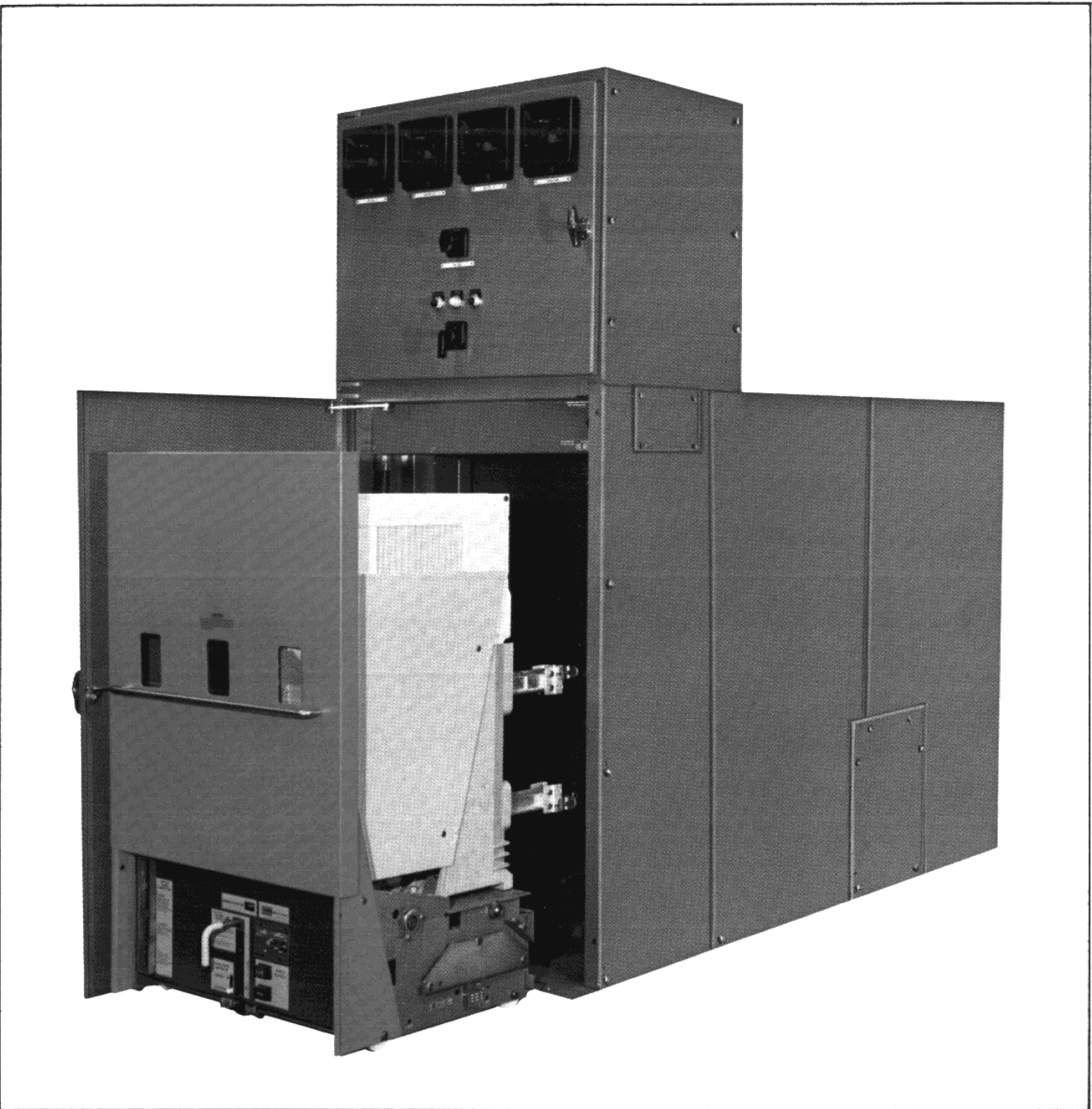
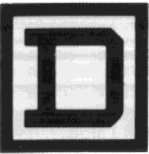
SOLENARC metal-clad switchgear, is designed to protect primary electrical distribution systems and assure continuity of service which is so necessary for today's industrial, commercial and institutional applications. Safety for operating personnel was and is the key describing the development of this uniquely designed switchgear. Combine these features with ease of maintenance and accessibility of major components and the complete concept of Solenarc switchgear is brought into focus.

Switchgear housings are fabricated of eleven gauge steel and assembled into rugged enclosures which resist deformation under electrical stress conditions. Standard frames can be combined in many combinations to fit almost any system requirement such as bus entrance, bus transition to transformers or load interrupter

switchgear, transfer tie bus, breaker and half, ring bus and double bus schemes. Standard enclosures and bus configurations include provisions for future extension which will minimize down time when connecting new switchgear to existing equipment. Installation problems are reduced to a minimum because cable terminations and bus bars are readily accessible.

A complete line of indoor and outdoor enclosures are available to meet your requirements.

SOLENARC® DSE Circuit Breakers with the SOLENARC air interrupting principle



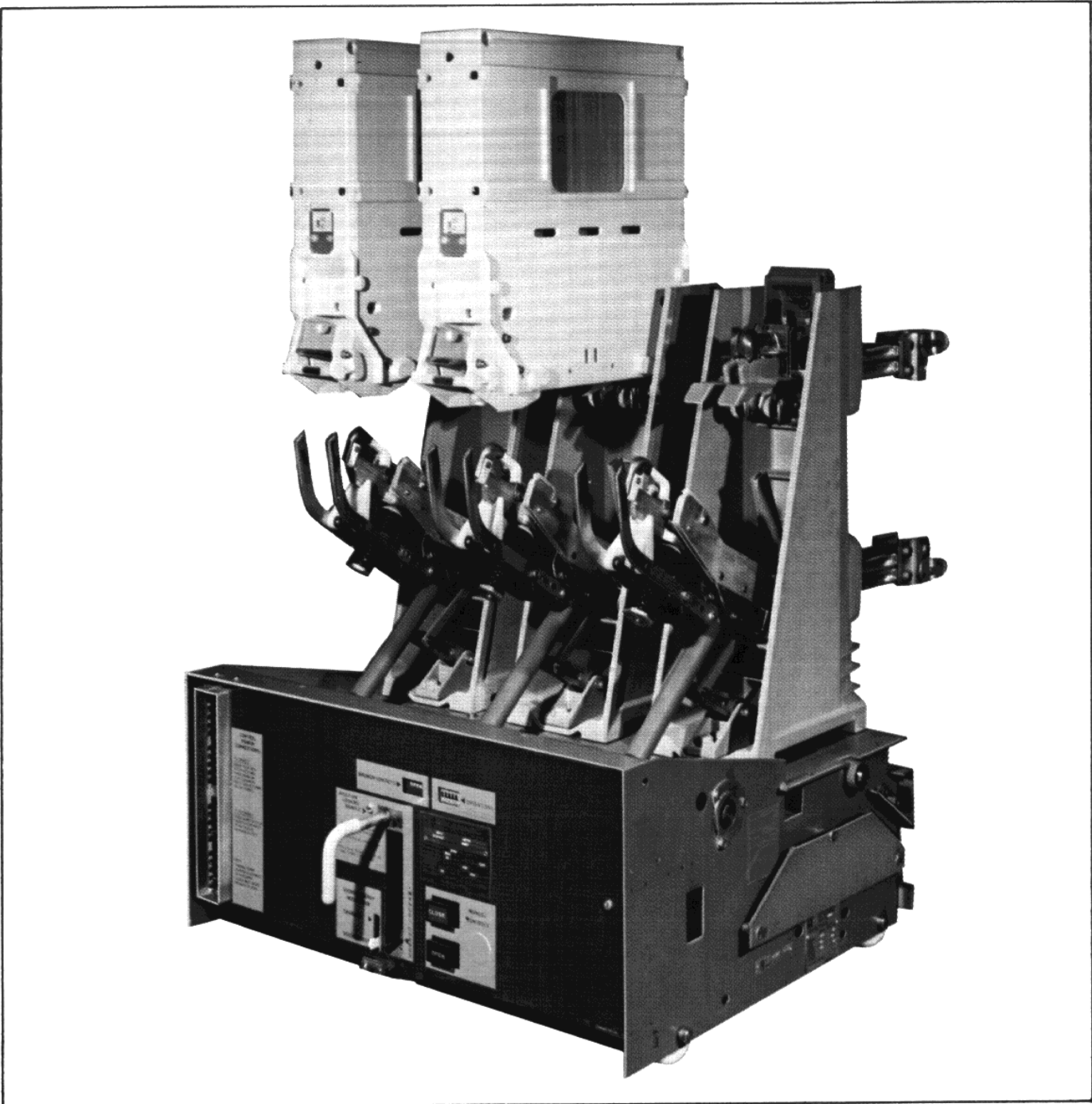
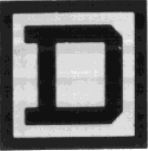
SOLENARC METAL-CLAD SWITCHGEAR SINGLE UNIT ASSEMBLY WITH
DSE CIRCUIT BREAKER WITHDRAWN

Switchgear assemblies will deliver full nameplate symmetrical MVA interrupting capacities on all circuit breakers. The heart of this metal-clad switchgear design is the SOLENARC DSE circuit-breaker. SOLENARC DSE circuit breakers use ambient air for circuit interruption and insulation. The dielectric is automatically renewed after each interruption. All risks of oil leakage or similar alterations of the insulating system are eliminated. The circuit breaker, bus, and cable compartments are separated from one another by substantial steel or insulating barriers. This partitioning reduces the risk of contact with live parts and fault propagation between compartments in any one cubicle or between adjacent cubicles.

Visible Blades — An exclusive feature of the DSE Circuit Breaker. Windows in the front of the circuit breaker permit operating personnel to visibly determine if contacts are open or closed.

SOLENARC is a registered trademark of Merlin Gerin.

SOLENARC DSE Circuit Breaker



DRAWOUT SOLENARC DSE CIRCUIT BREAKER

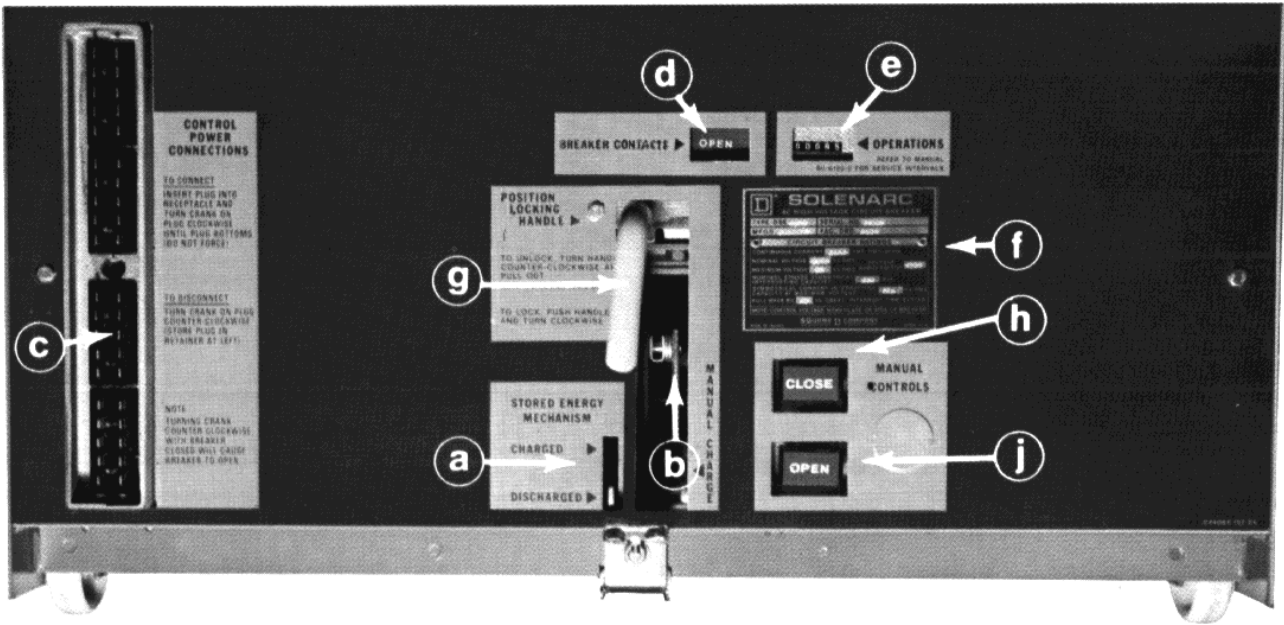
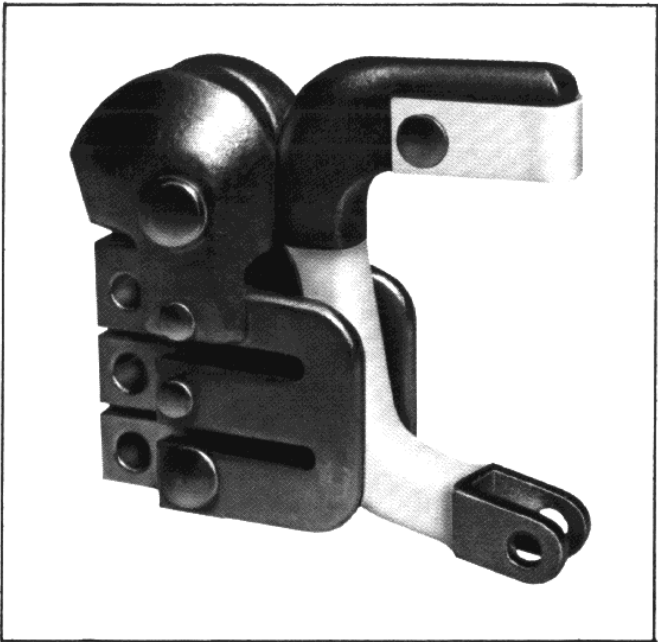
A truck carries the SOLENARC Circuit Breaker, its operating mechanism, all interlocking guides and protective elements. The circuit breaker has four distinct positions relative to the compartment, the connected, test, disconnected, and remove position. Individual pole units and pole contacts can be inspected with or without removing the arc chute. All pole units are identical and interchangeable.

SOLENARC Circuit Breakers are operated by a stored-energy spring operating mechanism. The circuit breaker springs must be completely charged in order to close the breaker and the springs are automatically and immediately recharged after each closing operation. Spring charging is accomplished by a geared motor. In the event of an auxiliary power failure, spring charging can be made manually by use of a detachable

handle. The quick-make feature is independent of the operator and spring energy can be released with either a manual or electrical operation.

The circuit breaker is locked into the connected, test, and disconnected positions by 2 one inch diameters pins. When the breaker element is moved out of the cubical a cam will automatically discharge the closing springs (if charged) to protect maintenance personnel. The discharge of the stored energy springs in this manner will not affect or shorten the life of the operating mechanism.

SOLENARC DSE Drawout breaker escutcheon



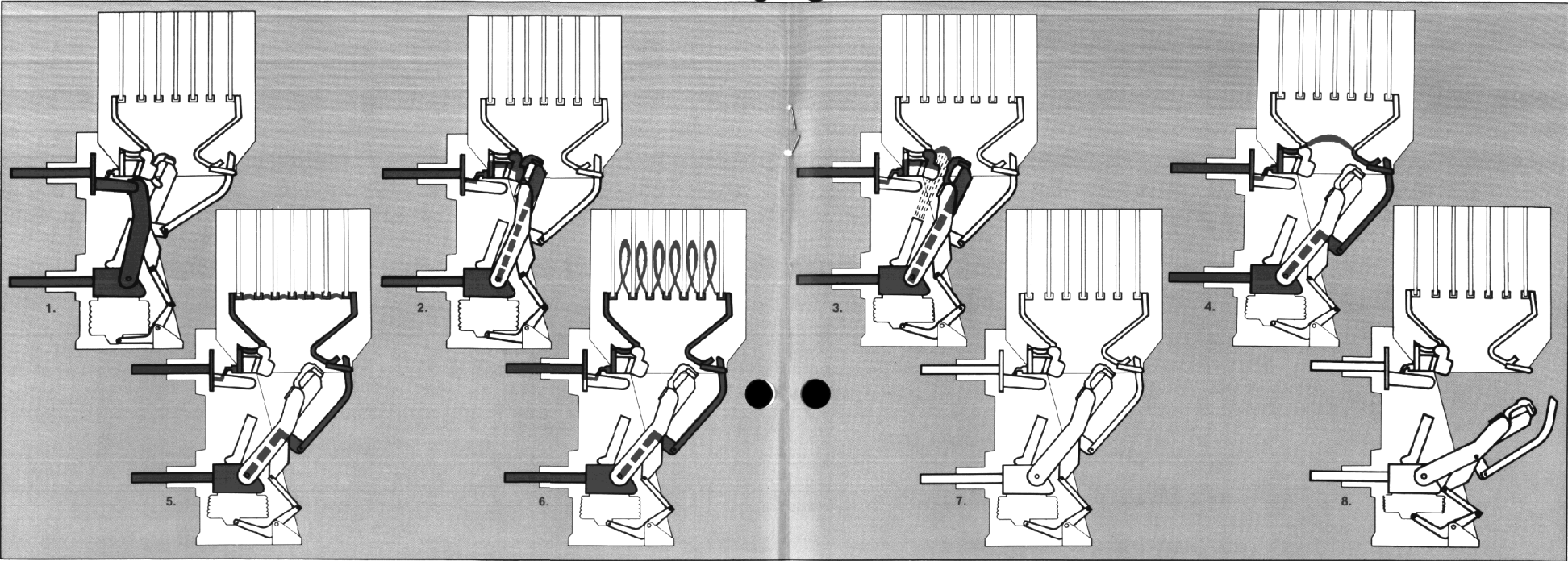
DSE DRAWOUT BREAKER ESCUTCHEON PLATE

Compensated arcing contacts are exclusive in the SOLENARC DSE circuit breaker and are designed to make use of the electromagnetic forces associated with the current to assist in closing the circuit breaker. The flow of current in the stationary contacts is divided between two copper loops which are insulated to control the current path on closing of the arcing contacts. This controlled path will tend to “blow on” the main moving arcing contact in a closing operation. The circuit breaker can perform many closing operations against short circuits without contact deterioration. Closing stresses on these contacts are small and the operating mechanism is sturdy which insures high mechanical endurance.

The main moving current carrying contacts consist of silver plated fingers which grip the compensated blades of the main moving contact carried. They carry the continuous

current and are separate from the arcing contacts.

- a. spring “Charged — Discharged” indication
- b. manual charging handle socket
- c. secondary control connection
- d. “Closed — Open” breaker position indicator (red for “Closed”, green for “Open”)
- e. operation counter (optional)
- f. rating nameplate
- g. position locking handle
- h. local “Close” push-button
- j. local “Open” push-button

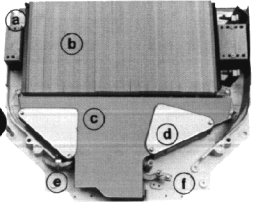


1. Breaker in closed position.
2. Main contacts separate, arcing contacts still closed.
3. Arcing contacts separate and arc strikes.
4. Arc transfers to runners.
5. Arc transfers to splitter to form a number of short series arcs.
6. Small arcs are stretched into loops.
7. Current interrupted, auxiliary blades still gripped by contact fingers.
8. Visible break, auxiliary blades disconnected from contact fingers.

SOLENARC circuit breakers are designed so the arc provides its own electromagnetic blowout by taking a helical form. This unique design in arc interruption technique dispenses with auxiliary means such as blowout coils and magnetic circuits. The arc chutes are therefore lighter and simpler in construction.

The arc chute consists of two distinct parts — the lower part through which the arc flows very rapidly toward the bottom of the refractory plates and the upper part in which the arc is stretched into loops between the refractory plates where it lengthens, cools and extinguishes at a current zero. The lower part which sees the arc during an extremely short period remains cool and, therefore, its dielectric strength is not affected. The upper part comprising heavy refractory material of high specific heat (zirconium silicate) has a high thermal inertia. After dissipation of the hot air, which flows in the same direction as the arc, the refractory stack recovers its initial dielectric strength. Therefore the interruption does not alter the dielectric strength of the circuit breaker.

- a. Insulating Shell
- b. Refractory Plates
- c. Refractory Side Cheeks
- d. Gas Control Screen
- e. Front and Rear Arc Runners
- f. Front Terminal



SOLENARC DSE Circuit Breaker application data



Nominal Rating		Rated Voltages					Insulation Level Rated With Stand		Interrupting Ratings † Amps — Symmetrical						
Type of Breaker	Three Phase MVA	Voltage KV — RMS	Rated Continuous Current 60 Hertz Amps — RMS	Maximum Voltage KV — RMS	K — Factor Max. KV Min. KV	Minimum Voltage KV — RMS	Low Frequency KV — RMS	▲ Impulse 1.2x50MS KV — CREST	Maximum KV Amps — RMS	Nominal KV Amps — RMS	Minimum KV Amps — RMS	Asym- metrical Rating Factor*	Short Time Rating 3 Sec. Amps — RMS	Close & Latch Rating Amps — RMS	Inter- rupting Time Cycles
DSE—21	75	4.16	1200	4.76	1.36	3.50	19	60	8,800	10,000	12,000	1.1	12,000	19,000	5
DSE—23	150	14.16	1200	4.76	1.36	3.50	19	60	18,000	20,600	24,000	1.1	24,000	39,000	5
DSE—23B	250	4.16	1200	4.76	1.24	3.85	19	60	29,000	33,200	36,000	1.1	36,000	58,000	5
DSE—23BH	250	4.16	1200	4.76	1.24	3.85	19	60	29,000	33,200	36,000	1.1	36,000	78,000	5
DSE—23B	250	4.16	2000	4.76	1.24	3.85	19	60	29,000	33,200	36,000	1.1	36,000	58,000	5
DSE—23BH	250	4.16	2000	4.76	1.24	3.85	19	60	29,000	33,200	36,000	1.1	36,000	78,000	5
DSE—25C	350	4.16	1200	4.76	1.19	4.0	19	60	41,000	46,900	49,000	1.1	49,000	78,000	5
DSE—25C	350	4.16	2000	4.76	1.19	4.0	19	60	41,000	46,900	49,000	1.1	49,000	78,000	5
DSE—25C	350	4.16	3000	4.76	1.19	4.0	19	60	41,000	46,900	49,000	1.1	49,000	78,000	5
DSE—23BU	250	7.20	1200	8.25	1.79	4.6	36	95	17,000	19,500	30,000	1.1	30,000	49,000	5
DSE—25CU	500	7.20	1200	8.25	1.25	6.6	36	95	33,000	37,800	41,000	1.1	41,000	66,000	5
DSE—25CU	500	7.20	2000	8.25	1.25	6.6	36	95	33,000	37,800	41,000	1.1	41,000	66,000	5
DSE—62	250	13.8	1200	15.0	2.27	6.6	36	95	9,300	10,100	21,000	1.1	21,000	34,000	5
DSE—65	500	13.8	1200	15.0	1.30	11.5	36	95	18,000	19,500	23,000	1.1	23,000	37,000	5
DSE—65H	500	13.8	1200	15.0	1.30	11.5	36	95	18,000	19,500	23,000	1.1	23,000	58,000	5
DSE—65	500	13.8	2000	15.0	1.30	11.5	36	95	18,000	19,500	23,000	1.1	23,000	37,000	5
DSE—65H	500	13.8	2000	15.0	1.30	11.5	36	95	18,000	19,500	23,000	1.1	23,000	58,000	5
DSE—57	750	13.8	1200	15.0	1.30	11.5	36	95	28,000	30,400	36,000	1.1	36,000	58,000	5
DSE—57H	750	13.8	1200	15.0	1.30	11.5	36	95	28,000	30,400	36,000	1.1	36,000	78,000	5
DSE—57	750	13.8	2000	15.0	1.30	11.5	36	95	28,000	30,400	36,000	1.1	36,000	58,000	5
DSE—57H	750	13.8	2000	15.0	1.30	11.5	36	95	28,000	30,400	36,000	1.1	36,000	78,000	5
DSE—68	1000	13.8	1200	15.0	1.30	11.5	36	95	37,000	40,200	48,000	1.1	48,000	77,000	5
DSE—68	1000	13.8	2000	15.0	1.30	11.5	36	95	37,000	40,200	48,000	1.1	48,000	77,000	5
DSE—68	1000	13.8	3000	15.0	1.30	11.5	36	95	37,000	40,200	48,000	1.1	48,000	77,000	5

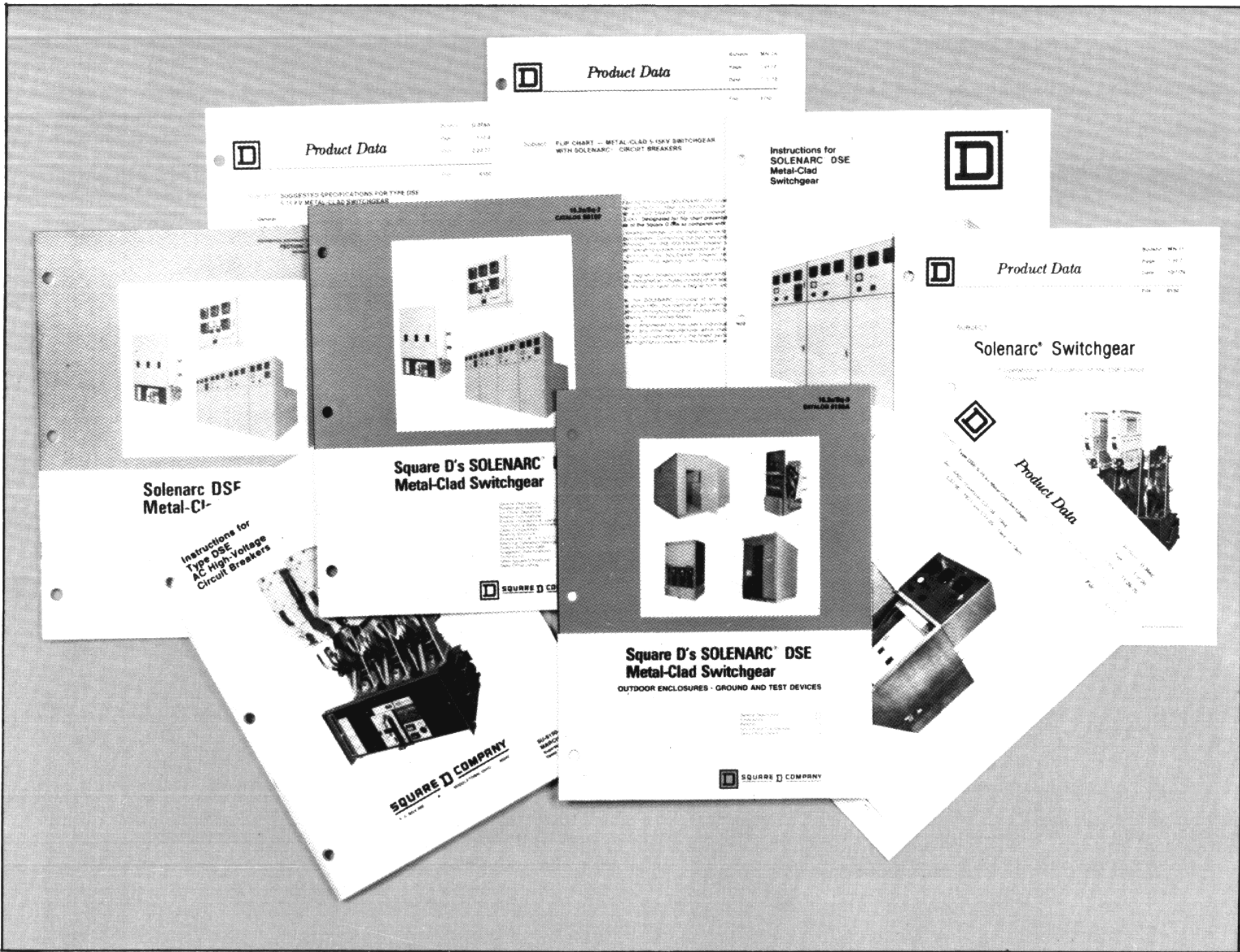
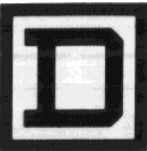
NOTES:

† — For converting voltages other than those listed the
interrupting current = Amps at Max. KV $\frac{\text{max. KV}}{\text{operating KV}}$
but in no case can this current exceed the interrupting
current at minimum KV.

* — Rating factor is based on breaker speed from initiation
to contact parting with 1/2 cycle relay time. Multiply
factor x symmetrical current to obtain asymmetrical
current interrupting capability of breaker.

▲ — These values apply with circuit breaker in or out of
enclosure.

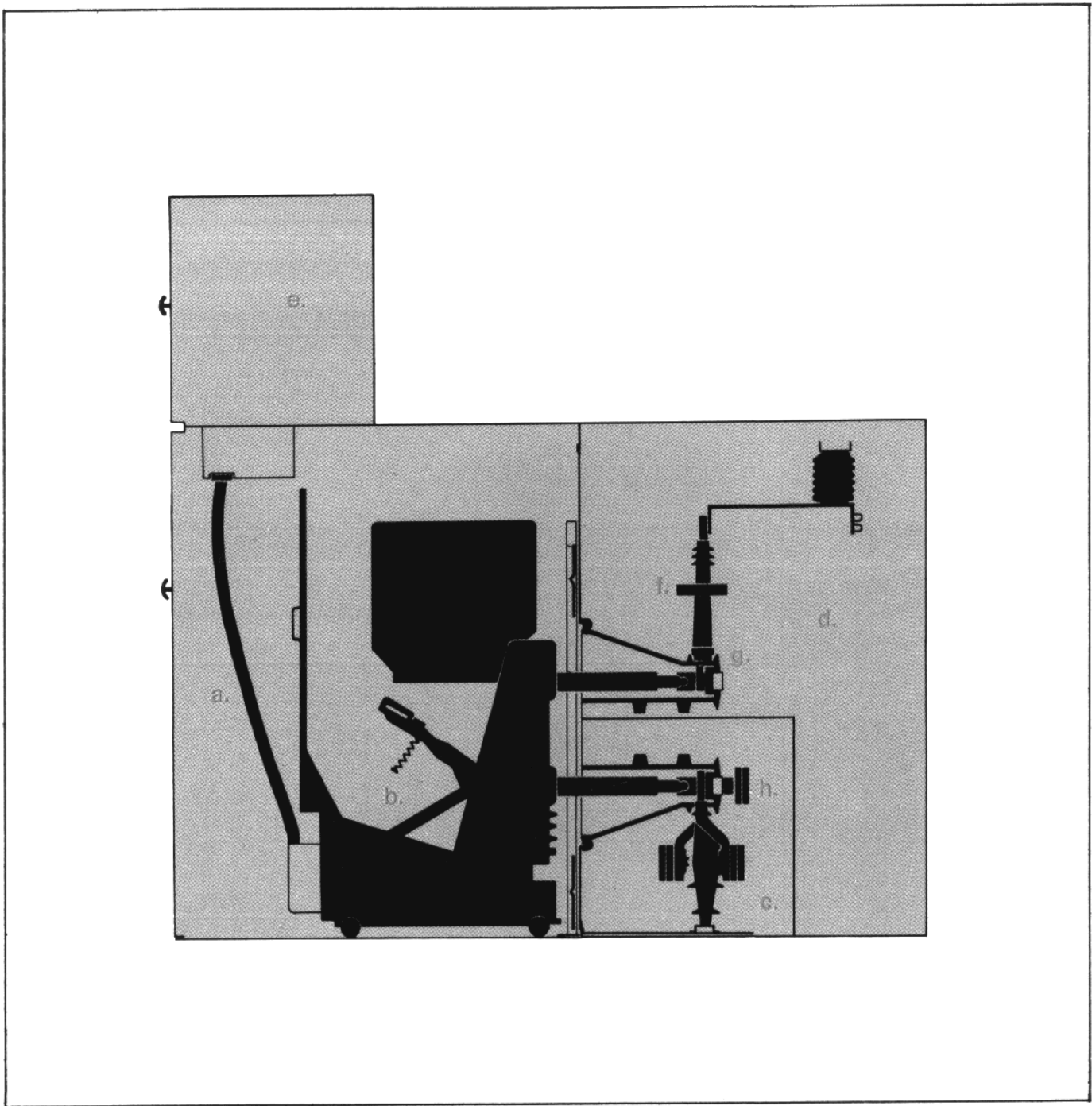
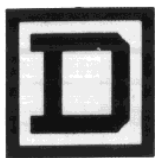
SOLENARC DSE Circuit Breaker test data



Complete detailed information on SOLENARC DSE Circuit Breakers and SOLENARC Metal-Clad Switchgear is available covering construction, maintenance and operation.

SOLENARC equipment is fully tested to the latest NEMA and ANSI standards, insuring proper and safe operation when used in a modern distribution system.

SOLENARC metal-clad switchgear components



- a. circuit-breaker compartment
- b. SOLENARC DSE circuit-breaker
- c. busbar compartment
- d. cable-connection compartment
- e. low-voltage compartment
- f. current transformers
- g. disconnecting contact chambers
- h. horizontal cross bus

SOLENARC DSE metal-clad switchgear Circuit Breaker compartment



(SHUTTERS CLOSED)



(SHUTTERS OPEN)*

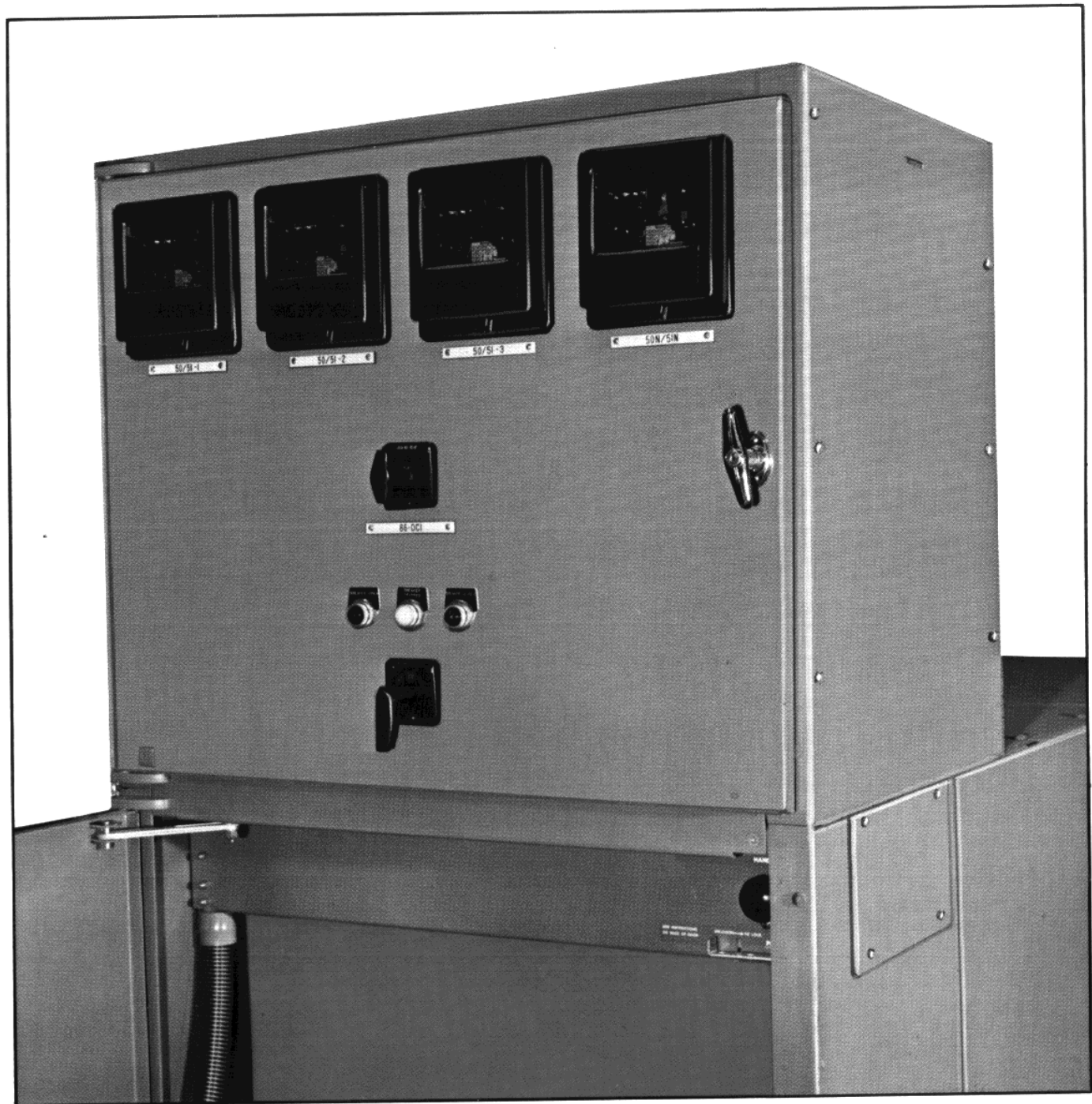
SWITCHGEAR COMPARTMENTS WITH DSE CIRCUIT BREAKER REMOVED

When the DSE circuit breaker is completely withdrawn from the enclosure, grounded steel shutters cover the stationary disconnecting contacts. These shutters isolate live parts and contacts to allow work to be performed with caution within the circuit breaker compartment.

Guide rails are welded into the base of the breaker compartment to properly position the breaker element when it enters the structure. Circuit breaker elements are completely grounded by a heavy duty sliding contact in the test and connected positions. The compartment door can be closed with the circuit breaker in either connected, test, or, disconnect position.

*For display only, shutters not easily opened.

SOLENARC DSE metal-clad switchgear instrument compartment

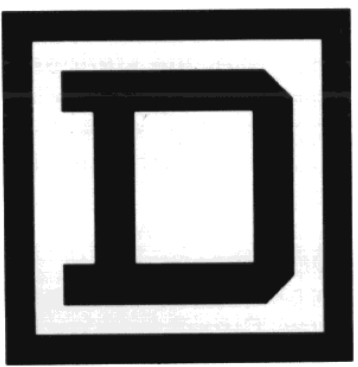


INSTRUMENT COMPARTMENT

The instrument compartment contains protective relays, metering instruments, control switches and control circuit over-current protection. Operating personnel have complete access to the instrument and control circuits without being exposed to the primary voltage. The instrument compartment door can be disconnected at a conveniently located terminal block for maintenance. It is possible to remove the instrument compartment so that the switchgear can be moved through low door ways.

With SOLENARC switchgear, the job of installation is easier. The system is more reliable and is very compact.

Specify Square D SOLENARC 5 KV & 15 KV Metal-Clad switchgear on your next job. Contact your friendly, local Square D fieldman for specific details.



SQUARE D COMPANY