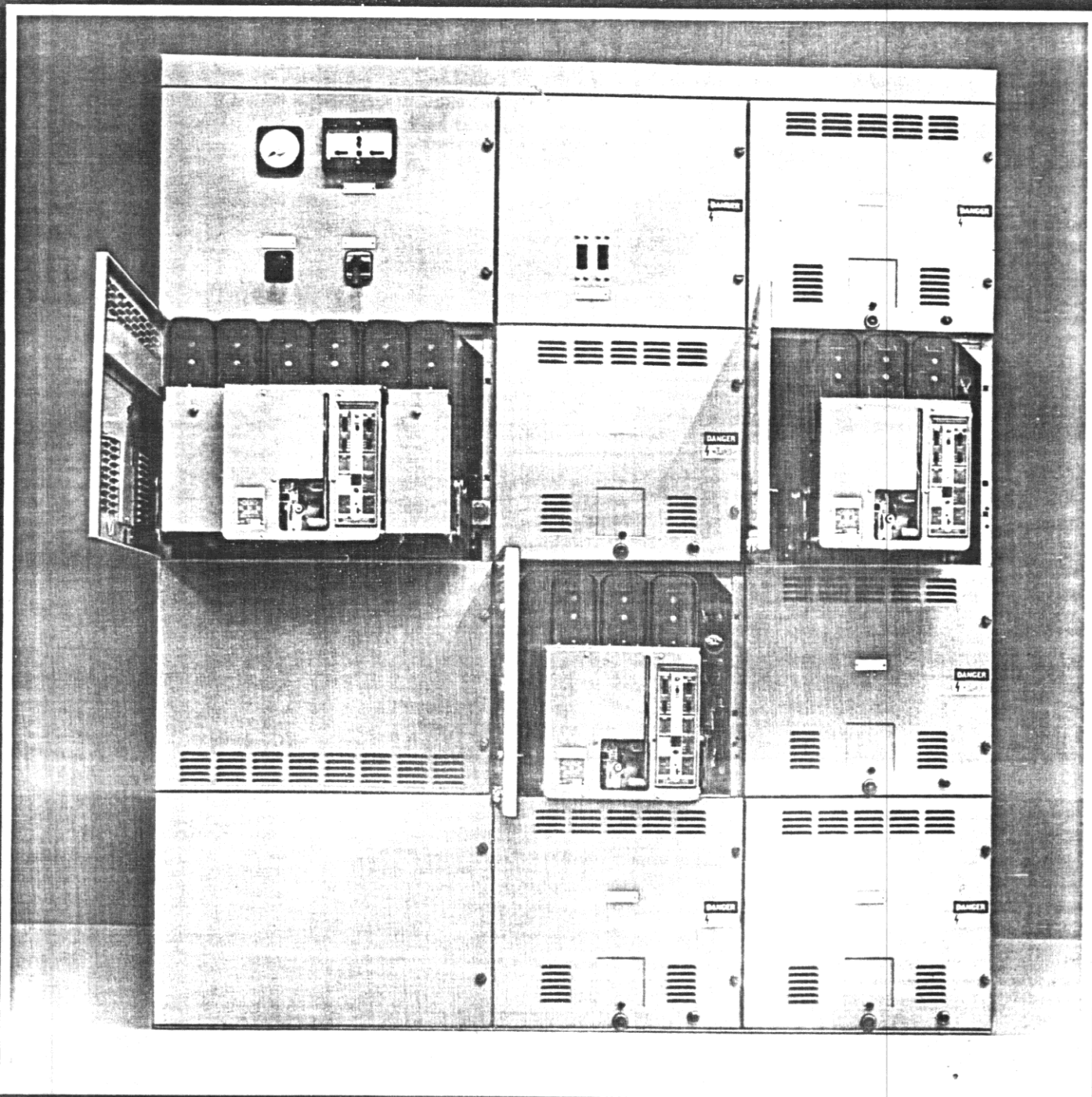


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FORD

Type LK Low Voltage Metal Enclosed Drawout Switchgear

208 to 600 Vac / 30 kA to 200 kA / up to 4200A. Continuous



➔ GOULD-BROWN BOVERI

LK Low Voltage Metal Enclosed Power Switchgear

I-T-E switchgear has been known for its innovative design leadership since the turn of the century. From this background of proven engineering and quality manufacturing, the new line of I-T-E type LK low voltage switchgear is introduced.

Featuring a totally new family of circuit breaker designs, the new LK switchgear provides positive protection and control of power circuits on low voltage power distribution systems up to 630V ac and 60 Hertz. Continuous rating of the LK switchgear main bus is from 1600 to 4200A.

The switchgear features new LK solid-state trip circuit breakers which save space and permit more switchgear to be installed in a smaller area. The 800A and 1600A sizes can be installed in compartments as narrow as 20 inches and a 24-inch wide design is also available. The three larger frame sizes, 2500A 3200A and 4200A, are installed in 32-inch wide compartments.

FEATURES

- Front access wiring
- True closed door operation
- Positive racking stops
- Interconnection wireway on top
- Safety shutter to shield stationary power disconnects
- Reduced floor space requirements
- Design flexibility
- Integral circuit breaker drawout cradle

LK TOTAL CIRCUIT BREAKERS

The entire family of LK circuit breakers is designed with care and forethought to fill your total requirements today, tomorrow, and for years to come. Totally new, LK breakers will meet complex and ever-growing needs for electrical protection and versatility of application and control.

Three types of LK circuit breakers offer protection to 200,000A.

LK Standard interrupting ratings from 30,000 to 130,000A, 800 to 4200A continuous.

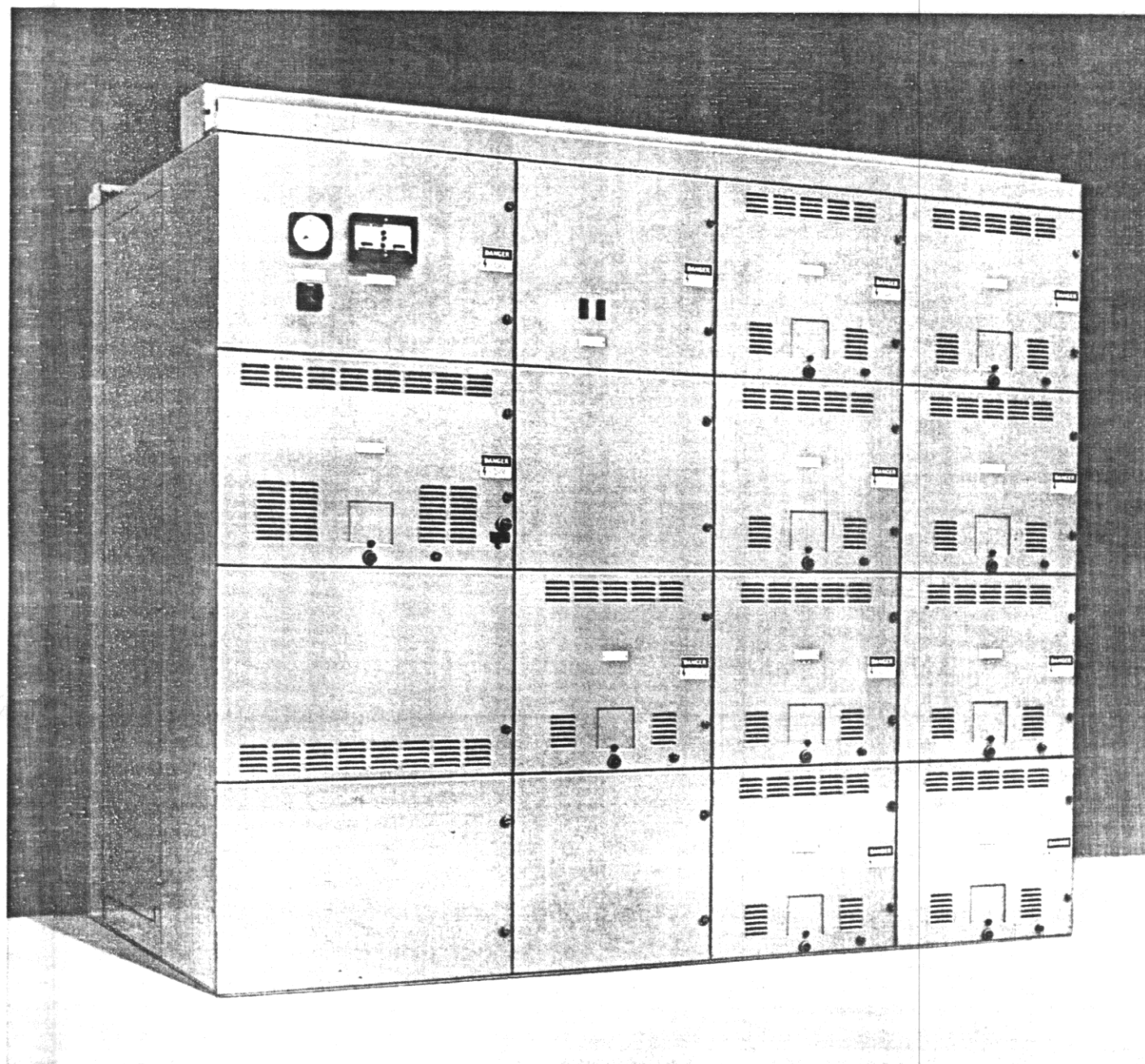
LKE Extended interrupting ratings from 50,000 to 130,000A, 800 to 4200A continuous.

LKD Integral fused circuit limiting. 200,000A interrupting rating, 800 to 4000A continuous.

All LK and LKE frame sizes have the same depth dimensions for compartment standardization. LKD circuit breakers are 6 inches deeper. Two compartment widths accommodate all the circuit breakers. Uniform heights of the new LK circuit breaker family enables four-high construction for all frame sizes.

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Typical LK Low Voltage Power Switchg

Table 1 SWITCHGEAR RATINGS

Switchgear Construction	Circuit Breaker Type	Nominal Voltage, V	Maximum Design Voltage, V	Maximum Continuous Current, A	Insulation Level, kV	Limit of Hottest Spot	
					Power Frequency Withstand (RMS)	Temp. Rise (C)	Total Temp. (C)
Indoor or Outdoor	LK, LKE	600	635	4200	2.2	65	105
	LKD	600	600	4000	2.2	65	105

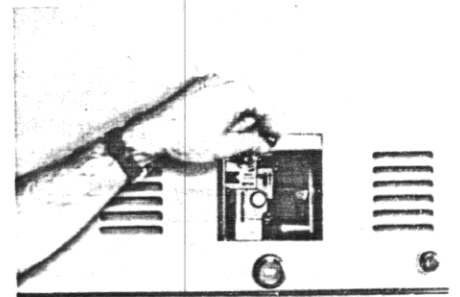
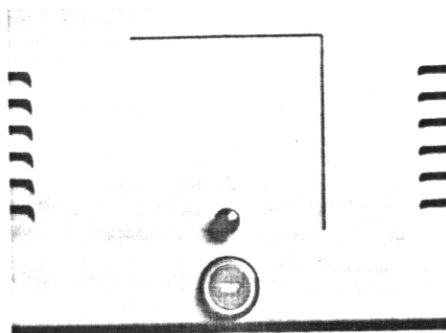
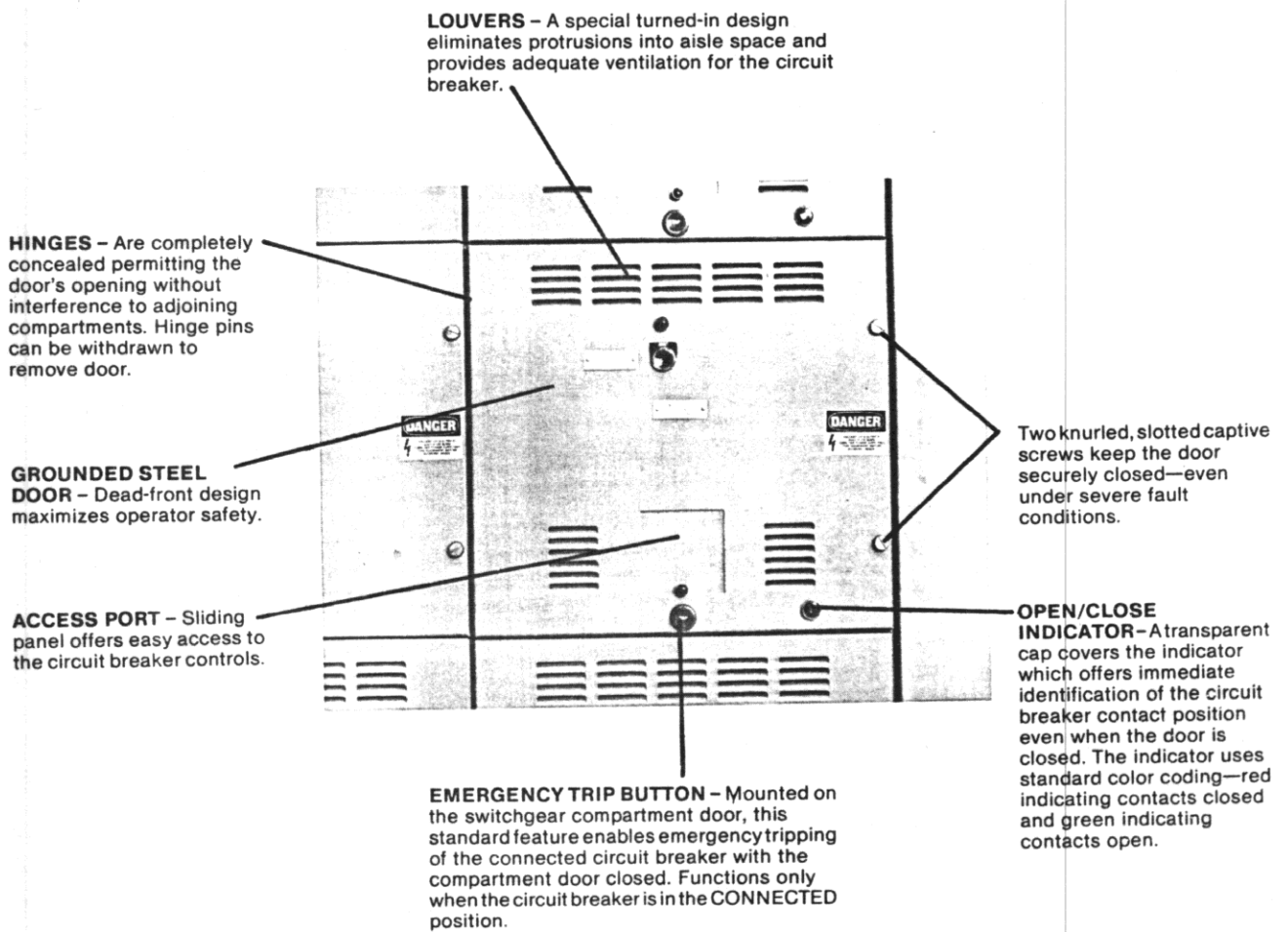
Complete Closed-Door Operation

CLOSED DOOR OPERATION

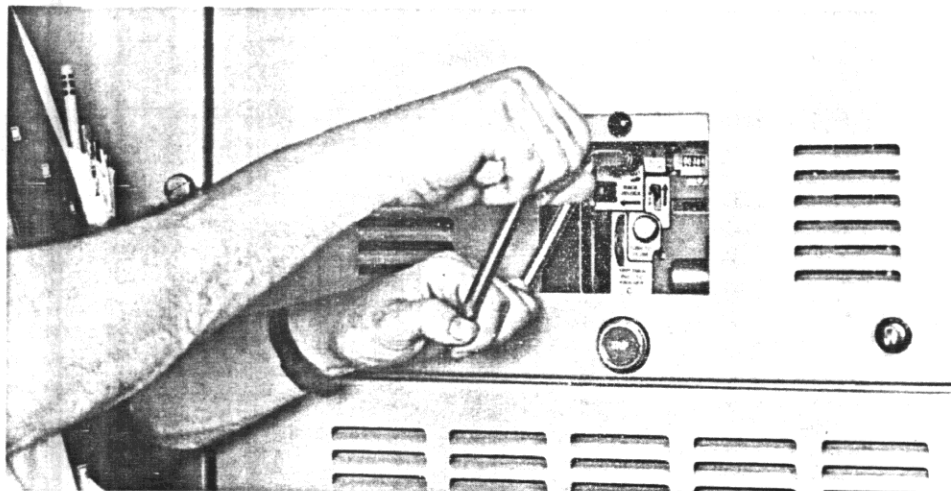
Access to controls, locks and racking mechanism is through an access port on the breaker door.

The circuit breaker can be tripped quickly, without opening any door, by a manual trip button at the bottom center of the compartment door. For convenience and safety, a transparent cap covers an indicator showing circuit breaker contact position, open or closed, at the bottom right of the compartment door.

Gould-Brown Boveri's complete closed door operation feature permits circuit breaker withdrawal to any position without opening the compartment door. With this exclusive feature, the circuit breaker can be racked into its connected, test, disconnected and withdrawn positions with the grounded metal compartment door safely closed. This design also eliminates accidental damage or tripping that could be caused by external protrusions in aisle space.

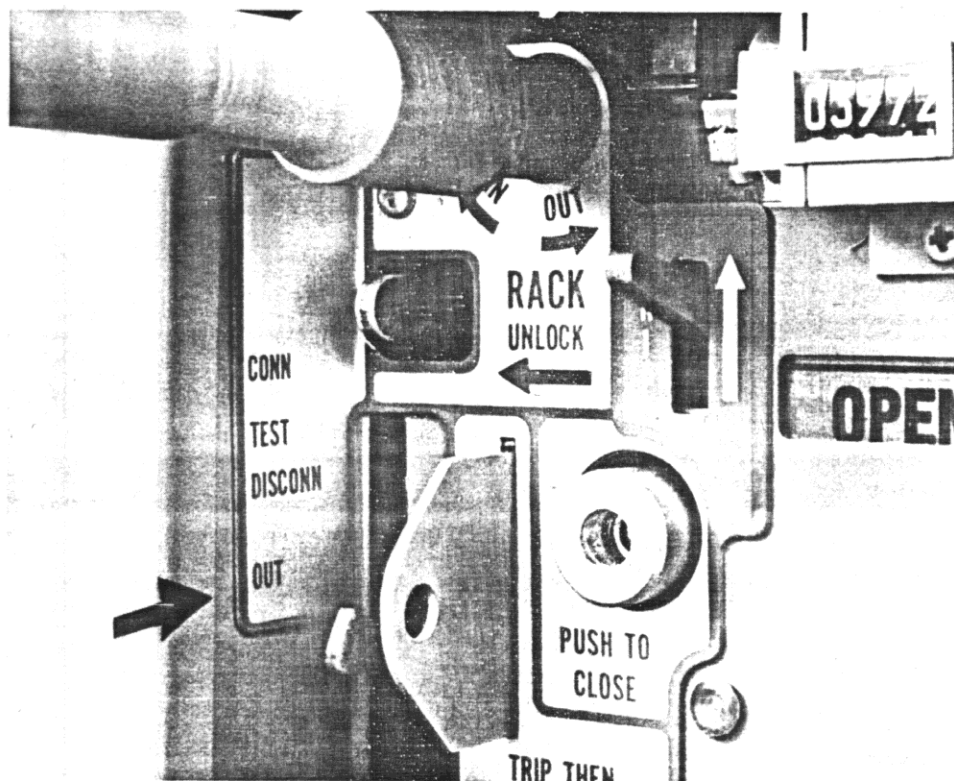


Lift access port to retainer stop with



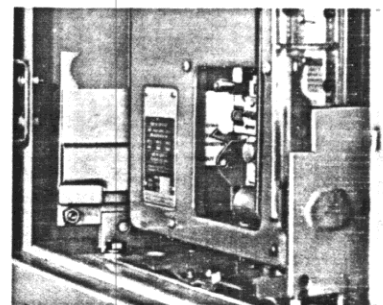
BREAKER OPERATION WITH DOOR CLOSED

All circuit breaker controls are readily accessible on the control center through the access port. This access port provides the ultimate in user safety and convenience by allowing complete control of the circuit breaker behind the protective grounded steel door. Once the sliding panel is raised, the circuit breaker can be manually closed and manually tripped. It can be racked into any of four positions using the racking shaft, racking crank, release latch and drawout position indicator. Circuit breaker contact position is shown on the control center by red/closed and green/open indicators. The closing spring status is shown by the Spring Charged/Discharged flag indicator. Automatic Trip by either the Power Shield Solid State (Type LSS) Unit or the open fuse trip device is also indicated on this control center and is reset manually. A padlock hasp, allowing up to three padlocks is also available.



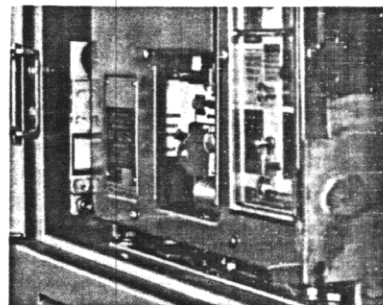
DRAWOUT POSITIONS

The type LK circuit breakers provide four positive closed door drawout positions. By raising the access port, the circuit breaker may be racked to any of the four positions with the cubicle door closed. There is no protrusion of the circuit breaker beyond the cubicle door in any position. The breaker is captive in all positions except WITHDRAWN. In all captive positions, the circuit breaker may be padlocked open and in position with racking prevented.



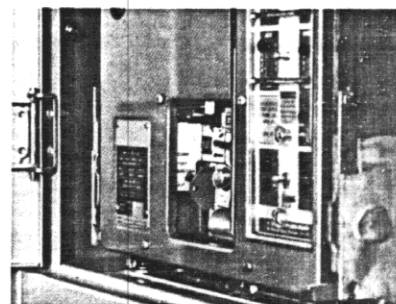
CONNECTED

In the "CONNECTED" position, both the primary and selected secondary disconnect terminals are engaged.



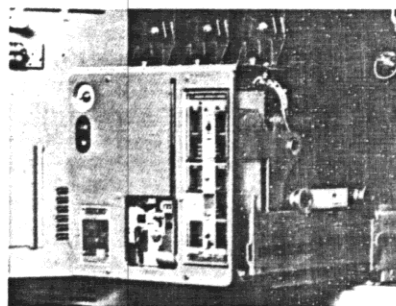
TEST

In the "TEST" position, the primary disconnecting terminals are disengaged; however, selected control contacts are connected to permit operation of the circuit breaker.



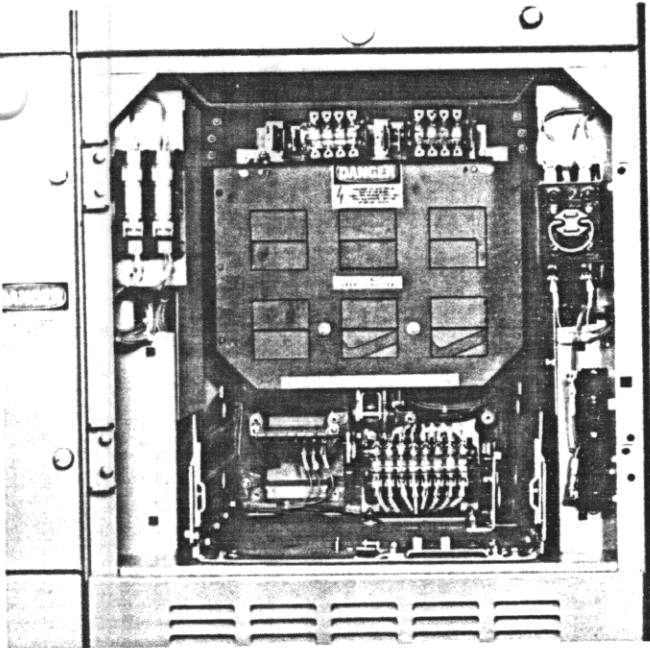
DISCONNECT

In the "DISCONNECT" position, the primary and secondary disconnect terminals are disengaged and separated a safe distance from the corresponding stationary terminals.



WITHDRAWN

In the WITHDRAWN or "Out" position, both primary and secondary contacts are disconnected. The circuit breaker may be inspected by rotating on the cradle tracks or may be removed for more complete accessibility.

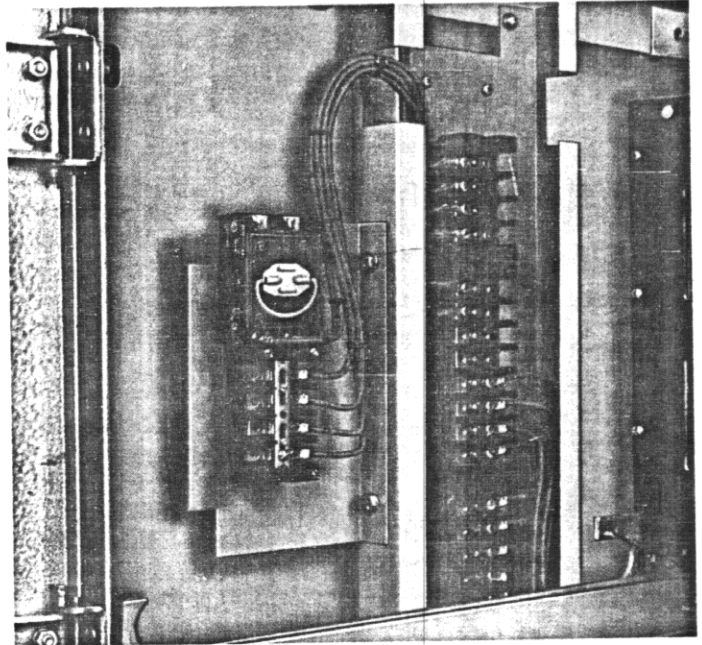


SAFETY SHUTTER

One of the major safety advances on LK switchgear is the polyester-glass insulating shutter that protects operators from primary terminals.

The shutter covers both upper and lower primary stationary contacts when the circuit breaker is withdrawn. As the circuit breaker is racked into position, the shutter opens to allow the contacts to engage.

This unique personnel safety feature is another Gould-Brown Boveri design exclusive, and it is now available for the first time in the U.S. on low voltage power switchgear.



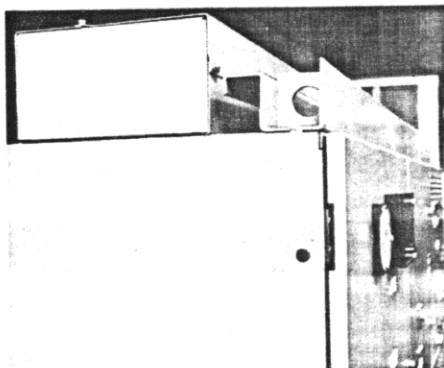
FRONT ACCESS CONTROL WIRING

For personnel safety during maintenance and troubleshooting, all terminal blocks, fuses, control devices and associated wiring are located in the circuit breaker or instrument compartment.

Front access to control wiring minimizes the need for entering the rear power termination department.

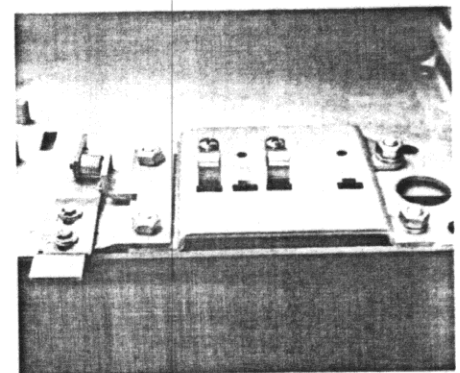
Vertical covered wiring troughs, located on either side of the compartments, provide the interconnection between circuit breaker and the horizontal wireway, when needed, located on top of the switchgear assembly.

Control conduit entrance is located at top or bottom, at front.



WIREWAY

A horizontal wireway, when required, is located on top of the switchgear near the front, is utilized for interconnecting wiring between frames. The wireway is a grounded metal enclosure with a removable cover.



INTERFERENCE BLOCKS

Interference blocks mounted on cradle interface with circuit breaker. Prevents the interchanging of different circuit breaker frame sizes, fused versus non-fused circuit breakers, and nuclear class 1E versus non 1E class circuit breakers.

New LK Total Breaker Family

A totally new circuit breaker, the LK, was developed to handle today's complete needs of electrical growth and system flexibility. LK circuit breakers have been designed for protection of feeder circuits and for use as main breakers with continuous current ratings up to 4200A. and interrupting current ratings up to 130KA. These breakers are available in frame sizes of 800, 1600, 2500, 3200 and 4200 A.

LK LK circuit breakers are compact and come equipped with many other features which are particularly adaptable to all low voltage power switchgear applications.

LKE The LKE circuit breaker incorporates all of the functions of the LK but offers higher interrupting, short-time and delayed trip ratings.

LKD The LKD circuit breaker, a compact, protective device, incorporates all the features of LK circuit breakers with the current-limiting characteristics of AMP-TRAP® fuses. The fuses are integrally mounted on all frame sizes from 800 to 4000 A.

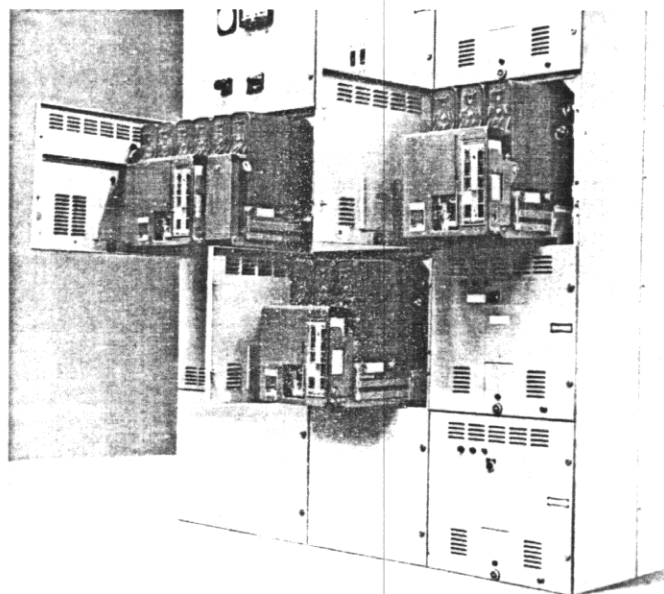


Table 2 LK POWER CIRCUIT BREAKER RATINGS

Circuit Breaker Type	Maximum Continuous Current, A	Interrupting Rating, Symmetrical RMS A.			Symmetrical Close and Latch, Delayed Trip and 30-Cycle Short-Time
		240 V	480 V	600 V	
LK 8	800	42,000	30,000	30,000	30,000
LK16	1600	65,000	50,000	50,000	50,000
LK25	2500	130,000	100,000	100,000	100,000
LK32	3200	130,000	100,000	100,000	100,000
LK42	4200	130,000	100,000	100,000	100,000

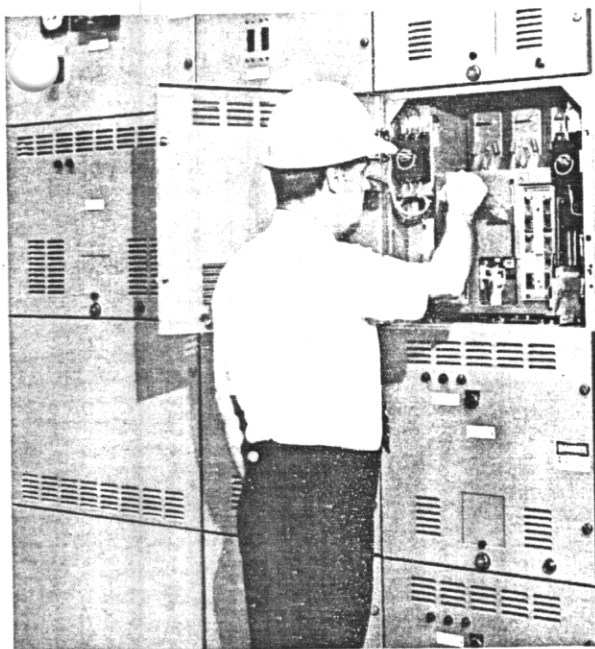
Table 2A LKE POWER CIRCUIT BREAKER RATINGS

Circuit Breaker Type	Maximum Continuous Current, A	Interrupting Rating, Symmetrical RMS A.			Symmetrical Close and Latch, Delayed Trip and 30-Cycle Short-Time
		240 V	480 V	600 V	
LKE 8	800	50,000	50,000	42,000	42,000
LKE16	1600	65,000	65,000	65,000	65,000
LKE25	2500	130,000	130,000	130,000	130,000
LKE32	3200	130,000	130,000	130,000	130,000
LKE42	4200	130,000	130,000	130,000	130,000

Table 3 LKD CIRCUIT BREAKER RATINGS

Circuit Breaker Type	Frame Size, A	AC Voltage	Maximum Continuous Current, A	Maximum Interrupting Symmetrical RMS A	AMP-TRAP Continuous Current A
LKD 8	800	Up to 600	800	200,000	300—1600
LKD16	1600	Up to 600	1600	200,000	600—2500
LKD25	2500	Up to 600	2500	200,000	1600—6000
LKD30	3000	Up to 600	3000	200,000	2000—6000
LKD40	4000	Up to 600	4000	200,000	2500—6000

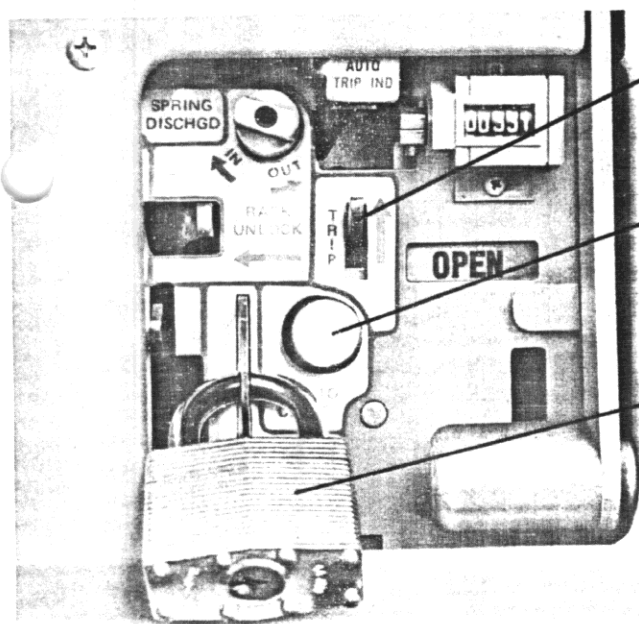
Operational Features



MANUAL OPERATION

Complete control of the closing and tripping operation has been designed into the operating mechanism on all LK circuit breakers. Closing and tripping of the main contacts is accomplished by the stored energy of a set of springs. The closing springs are charged with the built-in spring charging handle which stores flush with the front of the circuit breaker.

Pumping the handle will charge the closing springs; and, when fully charged, will produce an audible "click." The spring charged indicator will now read "charged." The closing springs remain fully charged until released by the manual close button. The closing springs stored energy is sufficient to provide the necessary force to close and latch the breaker safely under any conditions within the circuit breaker ratings. The tripping springs are charged during the closing motion. Their energy is released by a manual mechanical trip operation or by the solid-state automatic trip function.



MANUAL MECHANICAL TRIP LEVER

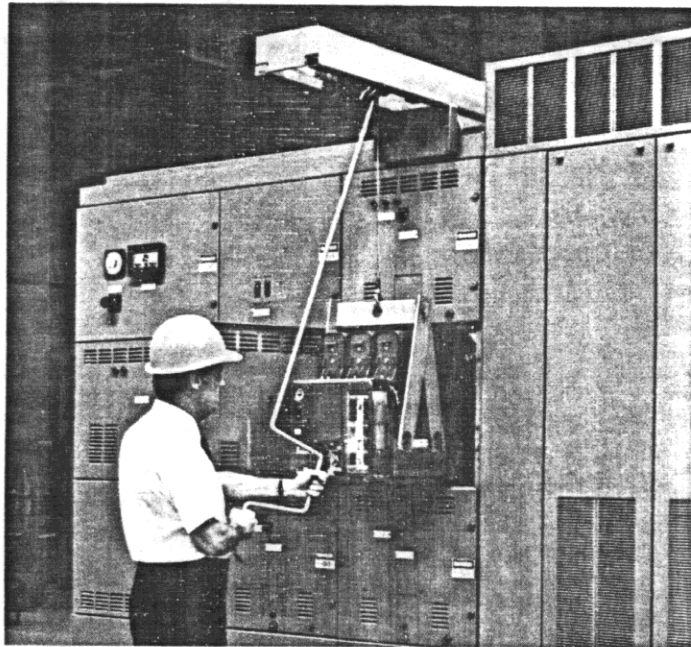
The Manual Mechanical Trip Lever, when raised, releases the stored energy of the opening springs to accomplish circuit breaker opening.

MANUAL MECHANICAL CLOSE PUSHBUTTON

The Manual Mechanical Close Pushbutton permits releasing, via mechanical linkages, the stored energy of the closing spring to accomplish circuit breaker closing. It is standard on both manually and electrically operated circuit breakers permitting local manual closing independent of control power.

PADLOCKING

LK circuit breakers are supplied with provisions for padlocking the circuit breaker mechanism in an open trip-free position. The mechanism is maintained open and trip-free preventing the circuit breaker from being closed.



SWITCHGEAR MOUNTED CIRCUIT BREAKER LIFT DEVICE

For ease of handling LK circuit breakers, a traveling overhead lift device is provided as standard on outdoor and optional on indoor construction.

This device is mounted on the front section of the switchgear assembly and will not affect any incoming power terminations. The hoist can be moved the full length of the switchgear. Using a lifting yoke, a circuit breaker can be lifted from the floor or from its completely withdrawn position on its cradle. Lifting power is supplied by a removable hand crank, worm-driven mechanism and sturdy flexible cable.

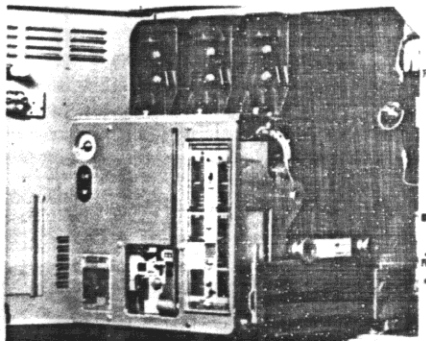
Although the driving mechanism is designed for easy hand operation, the circuit breaker's weight cannot accidentally move the mechanism when the crank is unattended or removed.



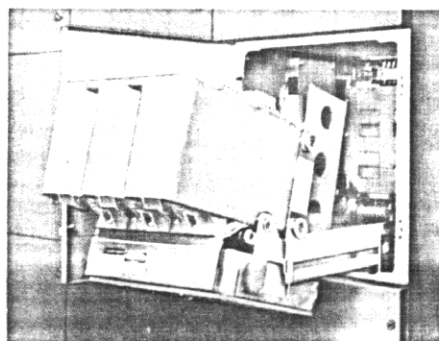
KIRK KEY® INTERLOCK

This important optional feature permits circuit breaker operation only under prearranged conditions when the key is properly turned. It not only assures safe working conditions, but also maintains security by preventing operation by unauthorized persons.

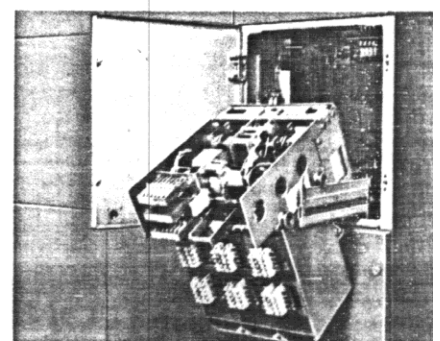
Normally the key can be removed when the circuit breaker is locked open in the connected position. The breaker cannot be closed until the key is inserted and turned thereby unblocking the trip mechanism.



Circuit breaker shown here has been manually moved to the fully withdrawn position.



Circuit breaker shown tilted approximately 80° for easy inspection of the back of the circuit



Circuit breaker shown rotated over 180° for easy inspection of the bottom of the circuit breaker.

Solid-State Trip System—Type LSS

POWER SHIELD TRIP UNIT

The Power Shield Trip Unit is visible on the front of the circuit breaker on the right hand side. It is completely self-powered, taking its tripping energy from the primary current flowing through the circuit breaker without the necessity of any additional power supply.

The solid-state trip system includes the sensors, the general purpose or total purpose Power Shield Trip Unit, the magnetic latch and the interconnecting wiring. A current sensor is integrally mounted on each phase of the circuit breaker to supply a value of current to the Power Shield Trip Unit that is directly proportional to the current flowing in the primary circuit. When the value of current flowing in the primary exceeds the Power Shield Trip Unit settings for a given time a signal is sent to the magnetic latch causing the circuit breaker to trip. On a three-phase, three-wire system, ground faults are detected through a residual connection of all three sensors. On a three-phase, four-wire system, provisions are made for input from an additional remotely mounted sensor either surrounding the neutral bus or encircling all three phases and neutral to provide complete ground fault protection.

PROTECTIVE ELEMENTS

Four basic trip elements with the Power Shield Trip Unit perform the protective functions. (1) long-time, (2) short-time, (3) instantaneous and (4) ground fault. Selection of type is dependent upon the protection and coordination requirements for the specific power circuit.

GENERAL PURPOSE

The General Purpose Power Shield Trip Unit includes adjustable long-time and instantaneous pickup elements (Type LSS-1) for basic protection on the standard LK circuit breaker and will be supplied when no specific requirement is indicated. Two options on the general purpose trip unit offer adjustable ground fault pickup and delay or short-time pickup and delay (Type LSS-1G and LSS-2 respectively) and are supplied as requested.

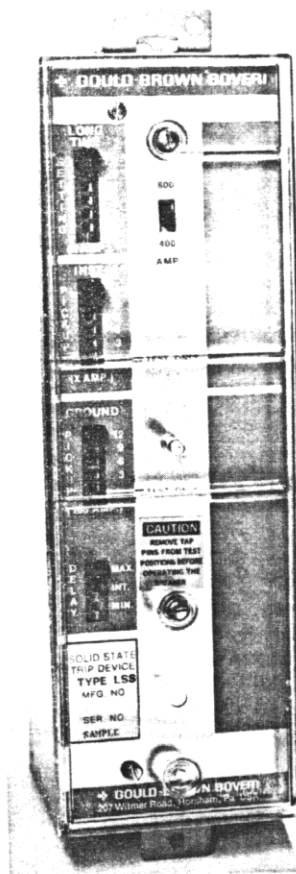
TOTAL PURPOSE

The Total Purpose Power Shield Trip Unit offers all four trip elements in combinations. It provides complete protection on all low voltage power switchgear applications along with optional operation indicators (targets) with each trip element supplied. The following trip characteristics are available: long-time pickup and delay, short-time pickup and delay, instantaneous pickup, ground fault pickup and delay.

The Power Shield Trip Unit must be properly set, as required by the individual circuit, in order to provide the necessary protection for the electrical circuit. With the transparent cover removed, the movable plugs on the unit faceplate enable independent selection of the long-time, short-time, instantaneous and ground fault characteristics as applicable. The Power Shield Trip Unit protective element(s), with the exception of ground fault, will cause the circuit breaker to trip at a value of ampere range selector position times the plug setting of the various pickup elements. The ground fault trip value in primary amperes will be the plug setting times 100, as indicated on the faceplate.

All Power Shield Solid-State Trip Units (Type LSS) allow full 100% use of the LK circuit breaker capabilities with a long-time element that actuates at 100% of the tap plug setting, not 90% or 95%.

General Purpose



Total Purpose



AMPERE RANGE SELECTOR

The ampere range selector provides two settings—50% and 100% of phase sensor rating. In the upper position, the setting is 100% of phase sensor rating. In the lower position, the setting is 50% of the phase sensor rating. This exclusive feature effectively expands all trip element settings except ground fault by 100%.

TAP PLUGS

When tap plugs are removed from the Power Shield Trip Unit, the settings automatically revert to minimum. Changes in tap setting are not recommended while the breaker is closed and in service as inadvertent or nuisance tripping may occur.

The Power Shield Trip Unit also provides test positions which are available only with the transparent cover removed.

TARGETS

Operation indicators (targets) can be provided as an optional feature on total purpose types of Power Shield Trip Units. When targets are specified, one indicator will be provided for each of the trip elements included; long-time, short-time, instantaneous and ground. Therefore, up to a maximum of 4 targets will be supplied based on the number of trip elements on the particular unit. When a trip occurs, the target for the element which functioned will display orange. The target will retain its position despite shock or vibration until reset manually to black by means of an integral magnet on the faceplate of the Power Shield Trip Unit.

Table 4 LK, LKE and LKD Phase Sensor Ampere Ratings and Ground Pick-Up Ranges

Circuit Breaker Type	Available Sensor Rating A	SETTINGS		PICKUP		Primary Ground Pickup A
		Long-Time	Short-Time	Instantaneous		
		Times Range Selector Amperes				
LK 8 LKE 8 LKD 8	200, 800	1.0				
		0.9	10	12		
		0.8	6	7	1200	
		0.7	4	5	600	
		0.6	3	4	300	
		0.5	2	3	100	
LK 16 LKE 16 LKD 16	200, 800	1.0				
		0.9	10	12		
		0.8	6	7	1200	
		0.7	4	5	900	
		0.6	3	4	600	
	1600	0.5	2	3	300	
LK 25 LKE 25 LKD 25	2500	1.0				
		0.9	10	12		
		0.8	6	7	1200	
		0.7	4	5	900	
		0.6	3	4	600	
		0.5	2	3	300	
LK 32 LKE 32 LKD 30	3200	1.0				
		0.9	10	12		
		0.8	6	7	1200	
		0.7	4	5	1000	
		0.6	3	4	800	
	*3000	0.5	2	3	500	
LK 42 LKE 42 LKD 40	4200	1.0				
		0.9	10	12	1200	
		0.8	6	7	1000	
		0.7	4	5		
		0.6	3	4	800	
	*4000	0.5	2	3	500	

*Maximum continuous current rating

Table 4A Power-Shield Type LSS Trip Unit Time Delay Settings

Type	Trip Function	Time Delay Band	Time Delay	
LSS-1 *	Long Time	Non-Adjustable	† 4 sec.	
General Purpose	Ground Fault	Maximum	Δ 0.35 Sec.	
		Intermediate	Δ 0.20 Sec.	
		Minimum	Δ 0.08 Sec.	
LSS-2	Long Time	Non-Adjustable	† 4 sec.	
	Short Time	Maximum	Δ 0.35 Sec.	
		Intermediate	Δ 0.20 Sec.	
		Minimum	Δ 0.08 Sec.	
LSS-4	Long Time	Maximum	Long Time	† 15.0 Sec.
LSS-4G	Short Time	Intermediate		† 5.0 Sec.
LSS-5 *	Ground Fault	Minimum		† 2.0 Sec.
LSS-6 *	Long Time	Maximum	Short Time	Δ 0.35 Sec.
LSS-6G *	Ground Fault	Intermediate		Δ 0.20 Sec.
		Minimum		Δ 0.08 Sec.
LSS-8	Short Time	Maximum	Ground Fault	Δ 0.35 Sec.
LSS-8G	Ground Fault	Intermediate		Δ 0.20 Sec.
		Minimum		Δ 0.08 Sec.

† Measured at six (6) times range selector amperes at the lower limit of the time delay band

Δ Measured at the lower limit of the maximum, intermediate, or minimum short time and ground time delay bands at any point above pickup. (Definite Time Delay)

* Includes instantaneous trip function

LK Switchgear Construction Features

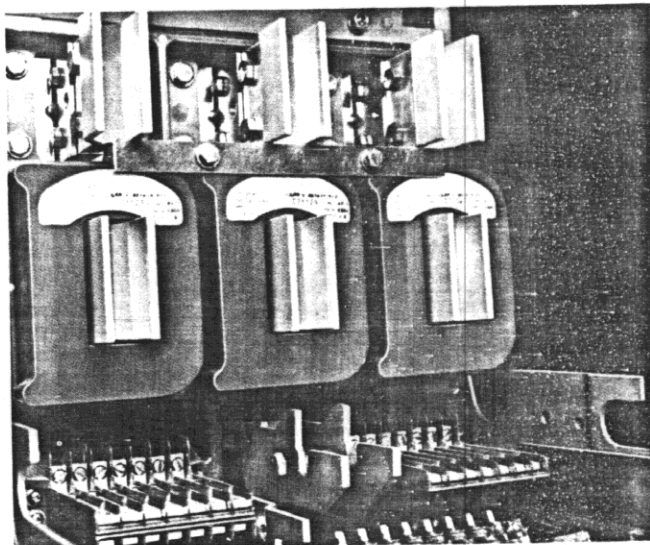
CRADLE

Large LK drawout circuit breakers utilize a mating CRADLE in order to be racked into and out of their cells through the WITHDRAWN, DISCONNECTED, TEST and CONNECTED positions.

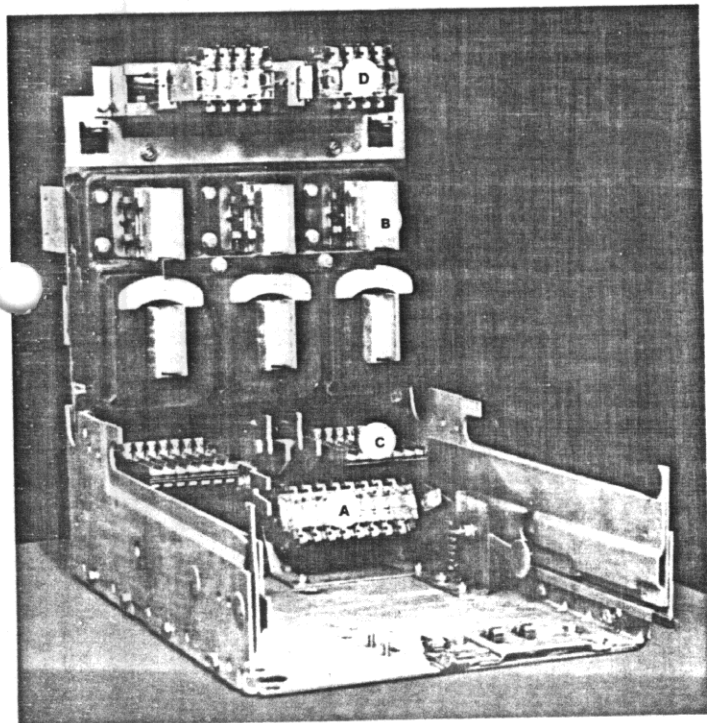
The cradle incorporates the stationary primary and stationary secondary disconnects, a shutter, emergency trip linkage, circuit breaker open/close position indicator, grounding connection and interference blocks.

Only two sizes of cradles allow the mounting of 800 and 1600 A. breakers into 20 or 24 inch wide compartments and 2500, 3200 and 4200 A. breakers into 32-inch wide compartments.

Provisions for mounting one current transformer per phase are incorporated into all cradles. Current transformers are mounted on the lower primary terminals on LK 8, LKD 8, LKE 8, LK 16, LKD 16, and LKE 16 cradles only. CT's are mounted on the upper primary terminals on LK 25, LKD 25, LKD 30, LK 32, LKD 40 and LK 42 cradles.



Cradle mounted, fully insulated, high-dielectric, epoxy molded toroidal current transformers. Shutter assembly removed.



A. Mechanism Operated Cells (Optional)

The M.O.C. auxiliary contact assembly mounts on the cradle floor and provides contacts for remote indication of whether the circuit breaker primary contacts are in the Open or Closed position. Two assembly arrangements are available. In the standard arrangement the auxiliary contacts operate in the CONNECTED position only. In the special arrangement the auxiliary contacts operate in both the CONNECTED and TEST positions. The M.O.C. auxiliary contact assembly is available in a 4 or 8 contact arrangement. Unless specified otherwise, half of the contacts are open while the other half are closed.

B. Stationary Primary Disconnects

The stationary primary disconnects interface with the moving primary disconnects mounted on the circuit breaker to provide the primary phase connections to and from the circuit breaker.

C. Stationary Secondary Disconnects

The stationary secondary disconnects interface with the moving secondary disconnects mounted on the circuit breaker to provide the control and indicating connections to and from the circuit breaker. Connecting points of each function are dedicated positions to provide interchangeability of circuit breakers.

D. Truck Operated Cell (Optional)

The T.O.C. auxiliary contact assembly mounts above the safety shutter and provides contacts for remote indication of the circuit breaker's drawout position. The assembly is available in two separate arrangements. In the standard arrangement the auxiliary contacts operate between the CONNECTED and TEST positions. In the special arrangement the auxiliary contacts operate between the TEST and DISCONNECTED positions. The T.O.C. auxiliary contact assembly is available in a 4 or 8 contact arrangement. Unless specified otherwise, half of the contacts are normally open while the other half are normally closed.

SWITCHGEAR FRAME

The individual switchgear frame consists of a bus and cable area and up to four circuit breakers or instrument compartments. Each frame is formed and welded to assure rigid and uniform construction. Frames are erected and securely bolted to each other to form a complete switchgear assembly.

All individual circuit breaker compartments are isolated from each other and from the bus area by grounded steel barriers. All parts are safely behind the front doors whether in the connected, test, disconnected or withdrawn positions.

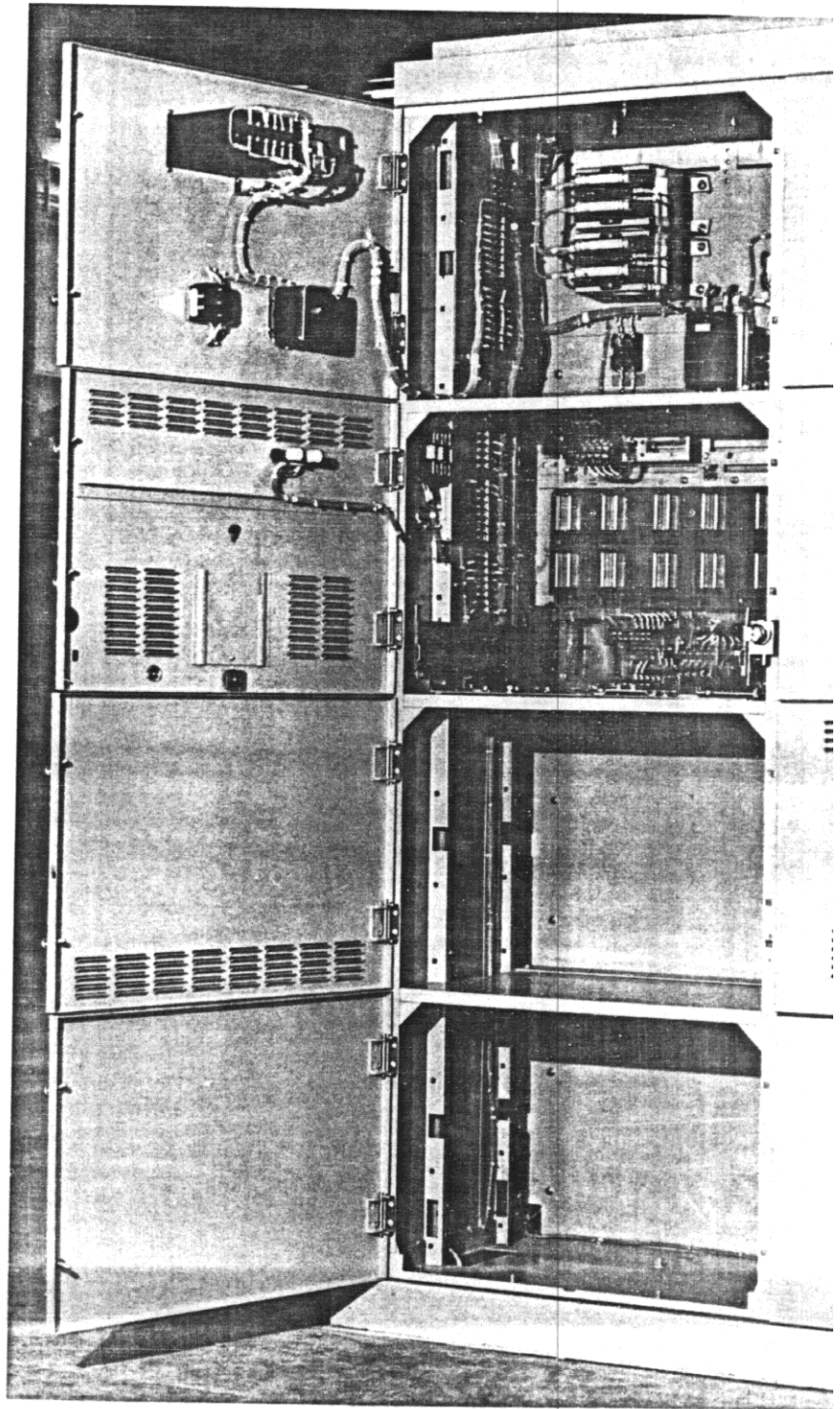
The LK switchgear arrangement at right is typical of 4-high construction. The instrument compartment at top contains fused potential transformer, fuse pull-out devices, terminal blocks and other auxiliary devices.

The safety shutters have been removed from the upper middle compartment to show the primary bus terminals, truck operated switch (top left) and mechanism operated switch (bottom right). Up front secondary control wiring trough (covers removed) is available on the right or left side with circuit breaker control fuse assembly. The Kirk Key lock at right locks the circuit breaker in the open position. (Optional)

The bottom two blank compartments illustrate the ease of installing the primary terminals and the accessibility for electrical wiring of these components.

The four-inch channel base is supplied as a shipping member and may serve as a permanent mounting for indoor installation.

The overhead lift device track and the six-inch high wireway are located at the top of the switchgear for convenient and accessible interframe wiring.



LB Switchgear Construction Features

SWITCHGEAR BUS

The three-phase main horizontal bus, vertically arranged one phase above the other, is located as close to the front of the termination compartment as possible to provide a large area for cable makeup. Vertical arrangement of bus provides maximum efficiency.

Tin-plated aluminum bus is braced to withstand stresses resulting from the maximum short-circuit available. Silver plated bus is available as an option.

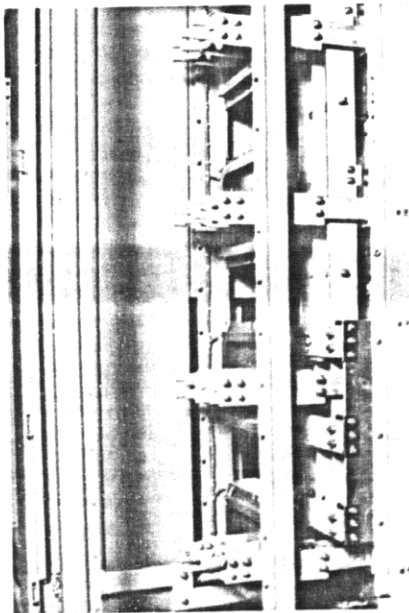
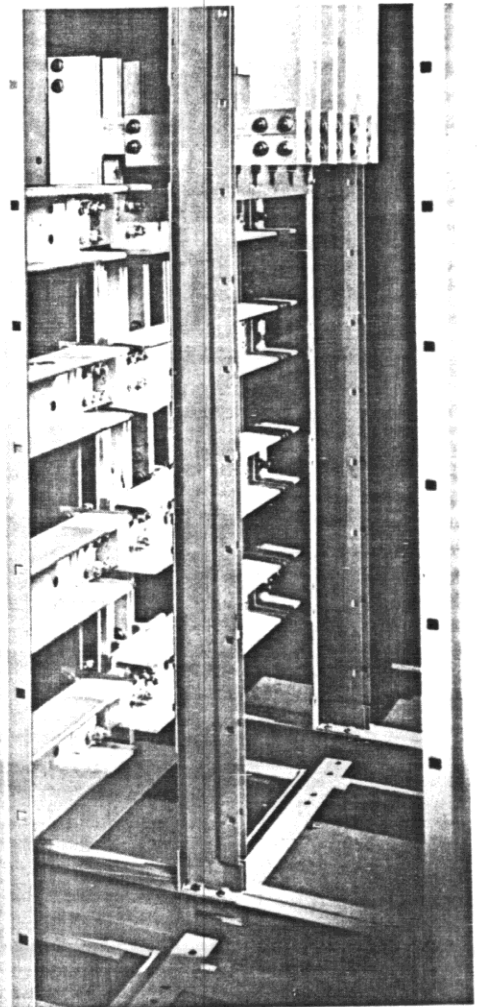
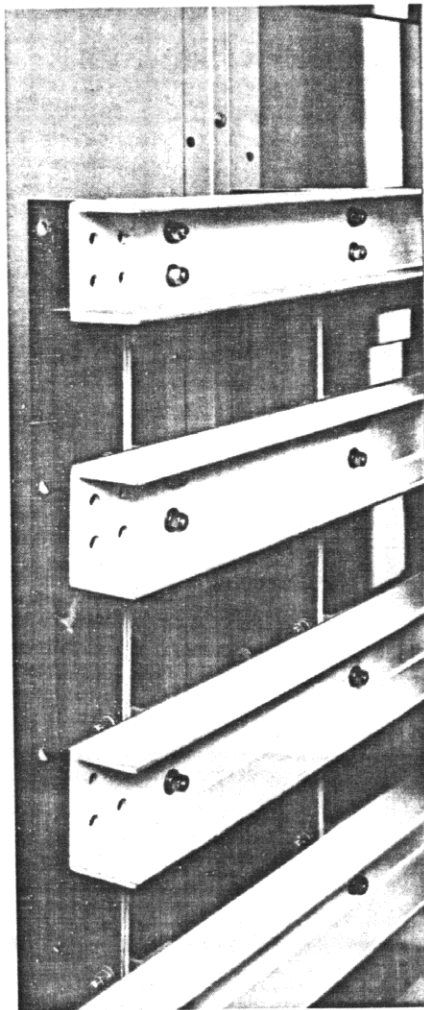
Bus is designed for an allowable temperature rise of 65°C above a 40°C ambient. The main bus capacity matches the main breaker with the exception of 800A (1600A is minimum bus rating). All connections are bolted. Copper main bus, jumps, risers and extended leads are available as an option.

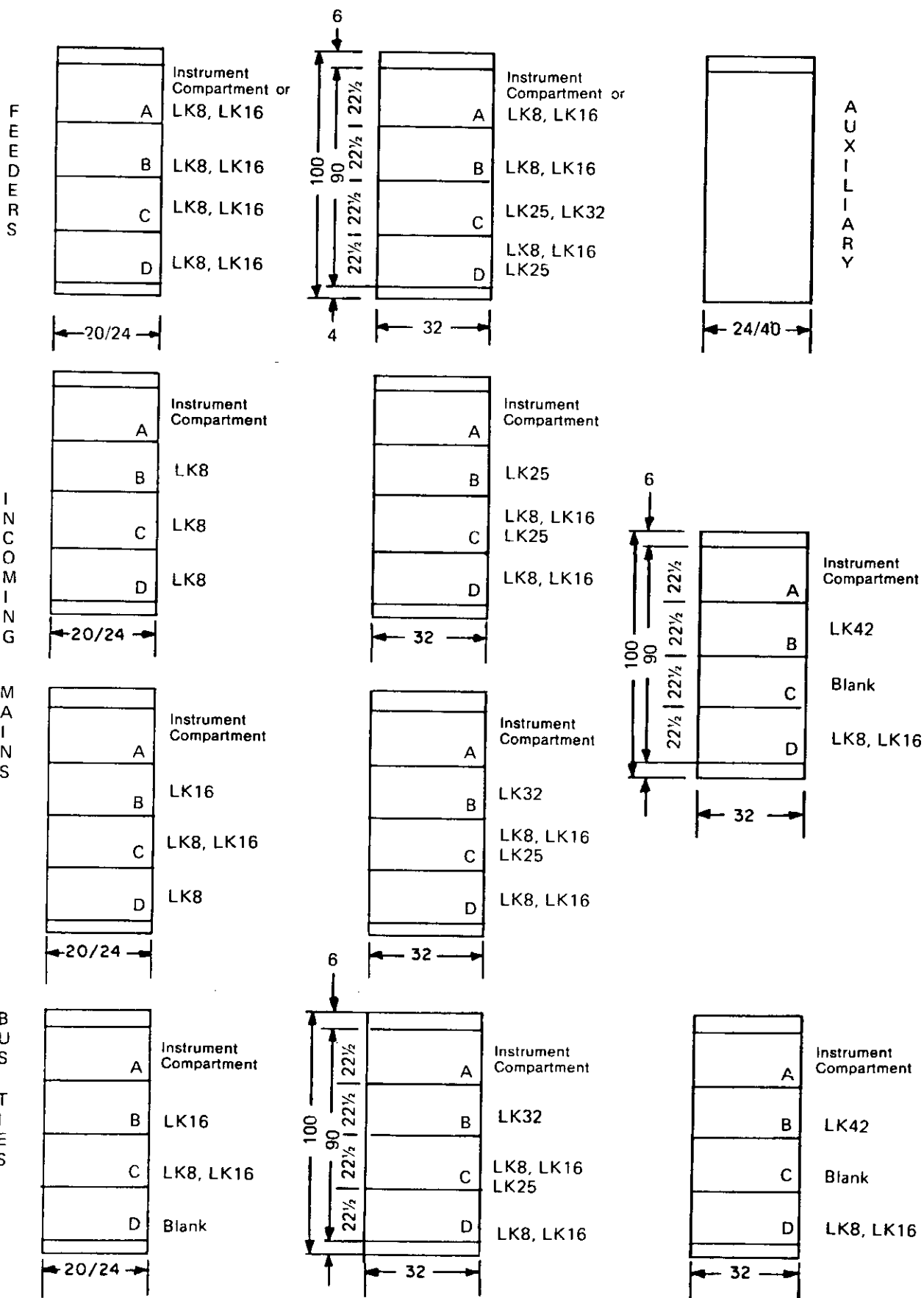
All switchgear insulating parts are made of high strength polyester-glass. Each insulated part is especially designed in shape and strength to fulfill its part of a truly integrated bus support system.

POWER TERMINATION COMPARTMENT

The rear located power termination compartment is designed to provide top and bottom entrance for power cables. A section of the top sheet of each frame is removable to facilitate installation of overhead conduit and cable or bus duct. All rear terminals are easily accessible for simple connection with a minimum of cable bending. Provision has been made to allow addition of cable supports as required for field installation.

Optional vertical barriers can be provided to safely separate the main bus from the cable termination area. However, Gould-Brown Boveri's front access wiring concept minimizes any need for entering the bus section for access to control wiring and devices, making the need for optional barriers almost unnecessary. Load terminals are designed to accommodate various lug sizes for cable connection. A full height hinged door is provided with optional locking provisions.





LKD breakers require 24" wide & 68" deep units. LK and LKE require depths 58" or 68". Only one main breaker may be adjacent to any bus tie arrangement. Adjacent unit must be the same width as the bus tie unit.

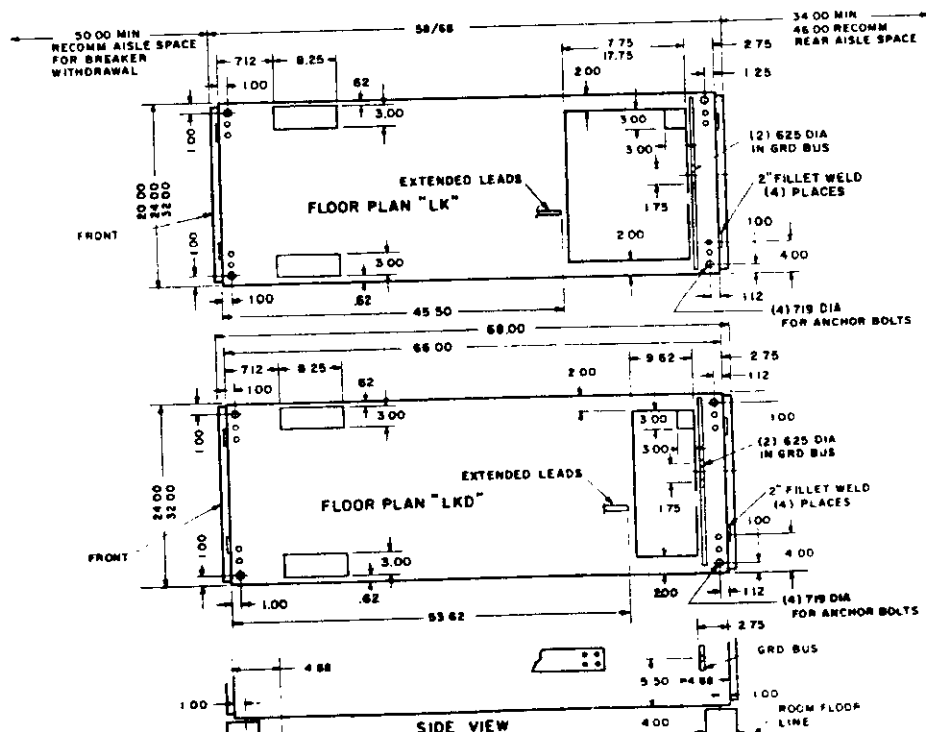
Table 5 LOW VOLTAGE SWITCHGEAR—WEIGHT, LBS.

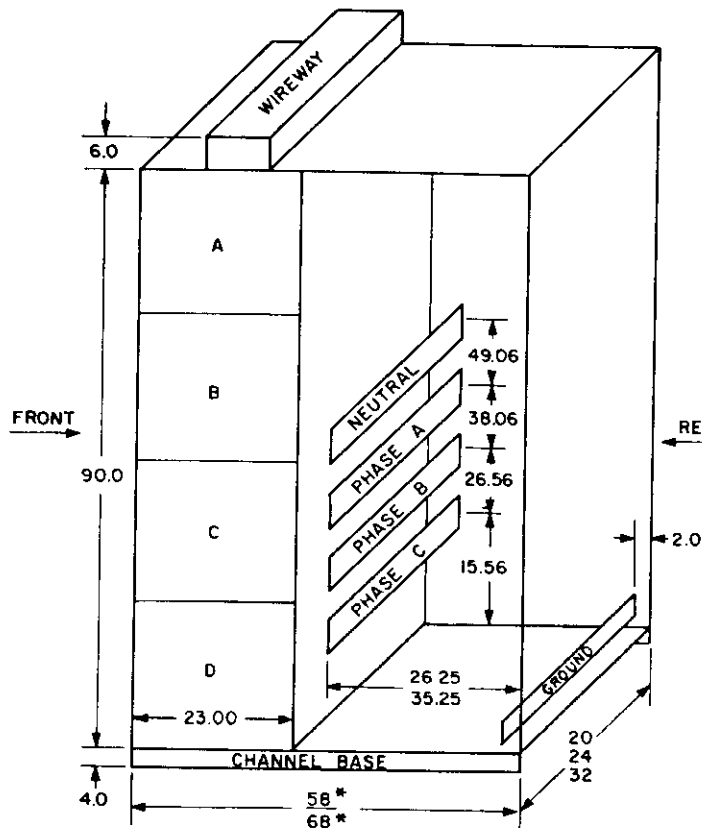
Breaker Type	Frame Width Inches	Switchgear Weight (lbs)		
		Indoor		Outdoor
		58" Depth	68" Depth	103, 113" Depth
LK8, LK16, LKD (1) LKE8, LKE16	20	1150	1250	1550
LK8, LK16, LKD (1) LKE8, LKE16	24	1250	1350	1750
LK25, LK32, LK42, LKD (1) LKE25, LKE32, LKE42	32	1900	2000	2550
Auxiliary Units Include Bus	24	800	900	1450
	40	1100	1200	1650
Overhead Lift Device		100 Per Switchgear Assembly		
Main Bus Barriers	20		80	80
	24		90	90
	32		120	120

(1) LKD only available in 68 inch deep frames

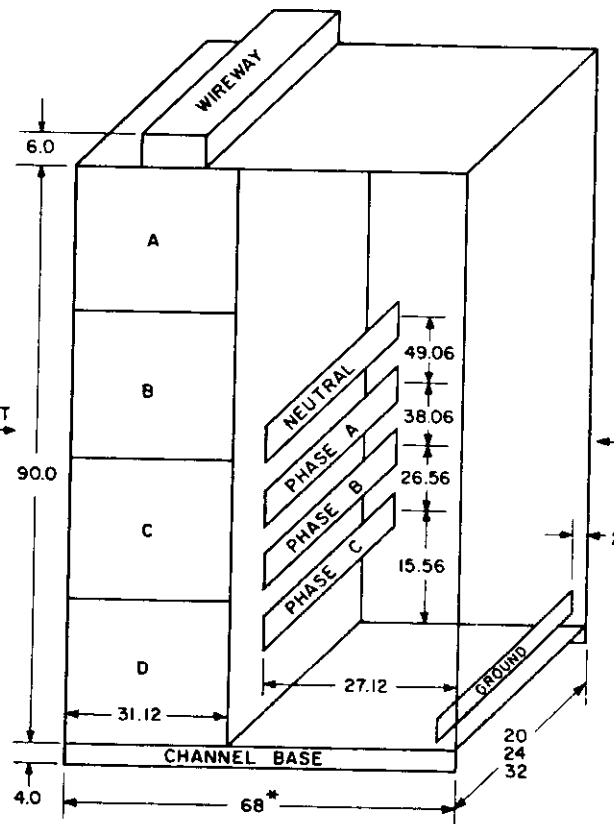
Table 5A CIRCUIT BREAKER—WEIGHT, LBS.

Breaker Type	Manual Weight (lbs)	Electrical Weight (lbs)
LK 8, LKE 8	152	167
LK16, LKE16	170	185
LK25, LKE25	280	295
LK32, LKE32	290	305
LK42, LKE42	294	309
LKD 8	228	243
LKD16	266	281
LKD25	380	395
LKD30	390	405
LKD40	394	409





*Includes front & rear doors
Figure 2 LK, LKE - INDOOR SIDE SECTION



*Includes front & rear doors
Figure 3 LKD - INDOOR SIDE SECTION

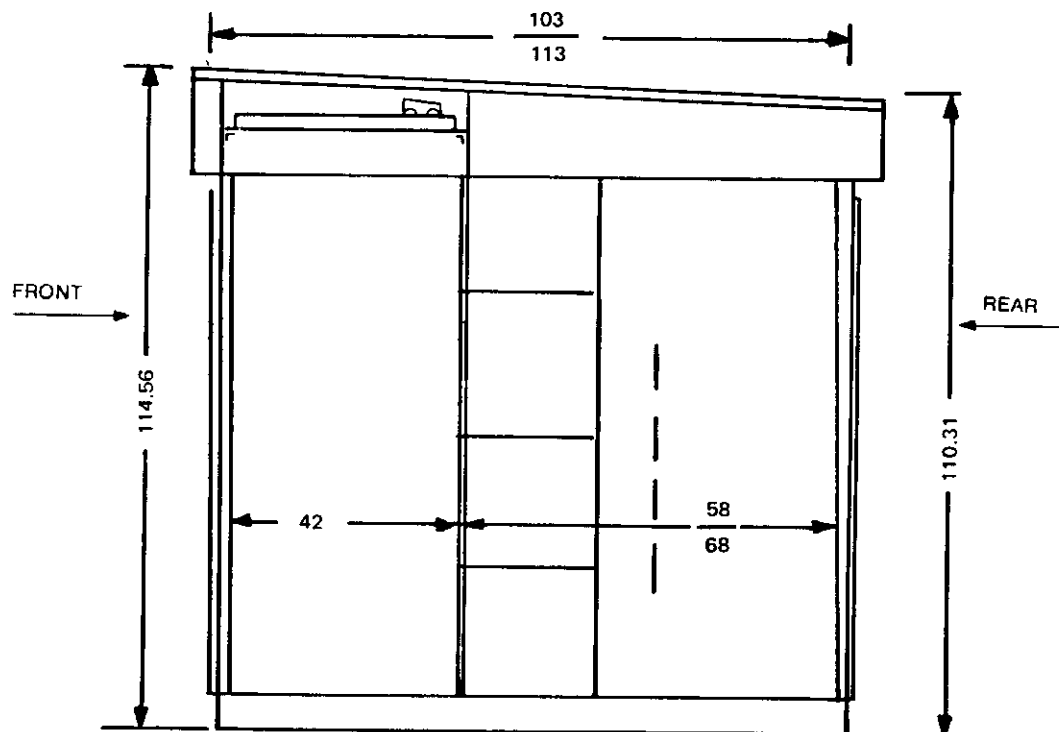


Figure 4 OUTDOOR WALK-IN ARRANGEMENT SIDE SECTION

Table 6 LOW VOLTAGE POWER CIRCUIT BREAKER APPLICATION—208 VOLTS

Transformer Rating 3-ph kVA and Impedance Per Cent	Primary System Max Short- Circuit kVA	Normal Load Continuous Current, A	Current Total RMS Symmetrical Amperes			Minimum Frame Size Air Circuit Breaker Recommended		
			Transformer Alone	Motor Load ‡	Combined	M* Main Breaker	I Feeder with Instant. Trip	S Feeder with Selective Trip
112.5 2.25% §	50,000	312	13,160	600	13,770	LK 8	LK 8	LK 8
	100,000		13,480		14,080			
	150,000		13,640		14,240			
	250,000		13,760		14,330			
	500,000		13,840		14,440			
	Unlimited		13,870		14,470			
150 3.00% §	50,000	416	11,260	800	12,080	LK 8	LK 8	LK 8
	100,000		11,580		12,380			
	150,000		11,640		12,440			
	250,000		11,820		12,620			
	500,000		12,000		12,800			
	Unlimited		13,870		14,670			
225 4.5%	50,000	625	12,640	1200	13,840	LK 8	LK 8	LK 8
	100,000		13,120		14,320			
	150,000		13,360		14,560			
	250,000		13,600		14,800			
	500,000		13,760		14,960			
	Unlimited		13,890		15,090			
300 5.0%	50,000	834	14,880	1700	16,580	LK16	LK 8	LK 8
	100,000		15,680		17,380			
	150,000		16,000		17,700			
	250,000		16,240		17,940			
	500,000		16,400		18,100			
	Unlimited		16,680		18,380			
500 5.0%	50,000	1388	23,120	2800	25,920	LK16	LK 8	LK 8
	100,000		25,200		28,000			
	150,000		26,000		28,800			
	250,000		26,640		29,440			
	500,000		27,200		30,000			
	Unlimited		27,760		30,560			
750 5.75%	50,000	2080	28,640	4200	32,840	LK25	LK 8	LKE 8
	100,000		32,000		36,200			
	150,000		33,360		37,560			
	250,000		34,400		38,600			
	500,000		35,280		39,480			
	Unlimited		36,170		40,370			
1000 5.75%	50,000	2780	35,840	5600	41,440	LK32	LK 8	LKE 8
	100,000		41,120		46,720		LKE 8	LK16
	150,000		43,360		48,960			
	250,000		45,200		50,800			
	500,000		46,720		52,320		LK16	LKE16
	Unlimited		48,350		53,950			

Table 7 LOW VOLTAGE POWER CIRCUIT BREAKER APPLICATION—240 VOLTS

112.5 2.25% §	50,000	271	9,800	1100	10,700	LK 8	LK 8	LK 8
	100,000		11,680		12,780			
	150,000		11,840		12,940			
	250,000		11,920		13,020			
	500,000		12,020		13,120			
	Unlimited		12,050		13,150			
150 3.00% §	50,000	361	11,280	1400	12,680	LK 8	LK 8	LK 8
	100,000		11,460		12,860			
	150,000		11,650		13,050			
	250,000		11,800		13,200			
	500,000		11,910		13,310			
	Unlimited		12,030		13,430			
225 4.5%	50,000	541	10,930	2200	13,130	LK 8	LK 8	LK 8
	100,000		11,460		13,660			
	150,000		11,630		13,830			
	250,000		11,740		13,990			
	500,000		11,990		14,190			
	Unlimited		12,020		14,220			
300 5.0%	50,000	722	12,880	2900	15,780	LK16	LK 8	LK 8
	100,000		13,600		16,500			
	150,000		13,920		16,820			
	250,000		14,080		16,980			
	500,000		14,320		17,220			
	Unlimited		14,440		17,340			
500 5.0%	50,000	1203	20,080	4800	24,880	LK16	LK 8	LK 8
	100,000		21,840		26,640			
	150,000		22,560		27,360			
	250,000		23,120		27,920			
	500,000		23,600		28,400			
	Unlimited		24,060		28,860			
750 5.75%	50,000	1804	24,960	7200	32,160	LK25	LK 8	LKE 8
	100,000		27,780		34,960			
	150,000		28,880		36,080			
	250,000		29,920		37,120			
	500,000		30,640		37,840			
	Unlimited		31,380		38,580			
1000 5.75%	50,000	2406	31,120	9600	40,720	† LK25	LK 8	LKE 8
	100,000		35,680		45,280		LK16	LK16
	150,000		37,520		47,120			
	250,000		39,120		48,720			
	500,000		41,360		50,960			LKE16
	Unlimited				51,440			

Table 8 LOW VOLTAGE POWER CIRCUIT BREAKER APPLICATION—480 VOLTS

Transformer Rating 3-ph kVA and Impedance Per Cent	Primary System Max Short-Circuit kVA	Normal Load Continuous Current, A	Short-Circuit Current Total RMS Symmetrical Amperes			Minimum Frame Size Air Circuit Breaker Recommended		
			Transformer Alone	100% Motor Load	Combined	M*	I	S
112.5 2.25% §	50,000	135	5,720	500	6,220	LK8	LK8	LK8
	100,000		5,840		6,340			
	150,000		5,880		6,380			
	250,000		5,960		6,460			
	500,000		6,000		6,500			
	Unlimited		6,000		6,500			
150 3.0% §	50,000	180	5,400	700	6,100	LK8	LK8	LK8
	100,000		5,790		6,490			
	150,000		5,865		6,565			
	250,000		5,895		6,595			
	500,000		5,955		6,655			
	Unlimited		6,000		6,700			
225 4.5%	50,000	271	5,460	1100	6,560	LK8	LK8	LK8
	100,000		5,720		6,820			
	150,000		5,800		6,900			
	250,000		5,900		7,000			
	500,000		5,960		7,060			
	Unlimited		6,020		7,120			
300 5.0%	50,000	361	6,480	1400	7,880	LK8	LK8	LK8
	100,000		6,800		8,200			
	150,000		6,960		8,360			
	250,000		7,040		8,440			
	500,000		7,120		8,520			
	Unlimited		7,220		8,620			
500 5.0%	50,000	601	10,000	2400	12,400	LK8	LK8	LK8
	100,000		10,960		13,360			
	150,000		11,280		13,680			
	250,000		11,600		14,000			
	500,000		11,840		14,240			
	Unlimited		12,020		14,420			
750 5.75%	50,000	902	12,400	3600	16,000	LK16	LK8	LK8
	100,000		13,840		17,440			
	150,000		14,480		18,080			
	250,000		14,960		18,560			
	500,000		15,360		18,960			
	Unlimited		15,690		19,290			
1000 5.75%	50,000	1203	15,600	4800	20,400	LK16	LK8	LK8
	100,000		17,920		22,720			
	150,000		18,800		23,600			
	250,000		19,600		24,400			
	500,000		20,240		25,040			
	Unlimited		20,920		25,720			
1000 8.0%	50,000	1203	12,030	4800	16,830	LK16	LK8	LK8
	100,000		13,350		18,150			
	150,000		13,980		18,750			
	250,000		14,315		19,115			
	500,000		14,555		19,355			
	Unlimited		15,040		19,840			
1500 5.75%	50,000	1804	20,640	7200	27,840	LK25	LK8	LK8
	100,000		24,960		32,160		LK16	LK16
	150,000		26,800		34,000			
	250,000		28,480		35,680			
	500,000		29,840		37,040			
	Unlimited		31,370		38,570			
2000 5.75%	50,000	2406	24,170	9600	34,320	† LK25	LK16	LK16
	100,000		30,560		40,160			
	150,000		34,080		43,680			
	250,000		36,720		46,320			
	500,000		38,960		48,560			
	Unlimited		41,840		51,440		LK25	LK25
2500 5.75%	50,000	3010	27,900	12000	39,900	LK32 †	LK16	LK16
	100,000		36,300		48,300			
	150,000		40,400		52,400			
	250,000		44,500		56,500			
	500,000		48,100		62,100		LK25	LK25
	Unlimited		52,350		64,350			

* The transformer main secondary breakers are in most cases determined by continuous current instead of fault current. For this reason breakers in the M column are usually larger than those listed in the I column. The values listed in the M column allow a breaker continuous rating approximately 25% above the transformer self-cooled full-load current. If the transformer has a fan cooled rating a main secondary breaker larger than indicated by column M may be required.

§ Short-circuit currents are calculated with impedances shown applying to liquid-immersed transformers only.

† Motor load contribution for 208 volts is based on 50% 240 volt application table based on 100% motor load contribution.

† These circuit breakers are applied at less than 25% above transformer full-load rating. If 25% is required, use the next larger frame size.

Selection and Application Data

Table 9 LOW VOLTAGE POWER CIRCUIT BREAKER APPLICATION—480 VOLTS

Transformer Rating 3-ph kVA and Impedance Per Cent	Primary System Max Short- Circuit kVA	Normal Load Continuous Current, A	Short-Circuit Current Total RMS Symmetrical Amperes			Minimum Frame Size Air Circuit Breaker Recommended		
			Transformer Alone	100% Motor Load	Combined	M*	I	S
112.5 2.25% Z	50,000	135	5,720	500	6,220	LK8	LK8	LK8
	100,000		5,840		6,340			
	150,000		5,880		6,380			
	250,000		5,960		6,460			
	500,000		6,000		6,500			
	Unlimited		6,000		6,500			
150 3.0% Z	50,000	180	5,400	700	6,100	LK8	LK8	LK8
	100,000		5,790		6,490			
	150,000		5,865		6,595			
	250,000		5,895		6,595			
	500,000		5,955		6,655			
	Unlimited		6,000		6,700			
225 4.5% Z	50,000	271	5,460	1100	6,560	LK8	LK8	LK8
	100,000		5,720		6,820			
	150,000		5,800		6,900			
	250,000		5,900		7,000			
	500,000		5,960		7,060			
	Unlimited		6,020		7,120			
300 5.0% Z	50,000	361	6,480	1400	7,880	LK8	LK8	LK8
	100,000		6,800		8,200			
	150,000		6,960		8,360			
	250,000		7,040		8,440			
	500,000		7,120		8,520			
	Unlimited		7,220		8,620			
500 5.0% Z	50,000	601	10,000	2400	12,400	LK8	LK8	LK8
	100,000		10,960		13,360			
	150,000		11,280		13,680			
	250,000		11,600		14,000			
	500,000		11,840		14,240			
	Unlimited		12,020		14,420			
750 5.75% Z	50,000	902	12,400	3600	16,000	LK16	LK8	LK8
	100,000		13,840		17,440			
	150,000		14,480		18,080			
	250,000		14,960		18,560			
	500,000		15,360		18,960			
	Unlimited		15,690		19,290			
1000 5.75% Z	50,000	1203	15,600	4800	20,400	LK16	LK8	LK8
	100,000		17,920		22,720			
	150,000		18,800		23,600			
	250,000		19,600		24,400			
	500,000		20,240		25,040			
	Unlimited		20,920		25,720			
1000 8.0% Z	50,000	1203	12,030	4800	16,830	LK16	LK8	LK8
	100,000		13,350		18,150			
	150,000		13,980		18,750			
	250,000		14,315		19,115			
	500,000		14,555		19,355			
	Unlimited		15,040		19,840			
1500 5.75% Z	50,000	1804	20,640	7200	27,840	LK25	LK8	LK8
	100,000		24,960		32,160		LKE8	LKE8
	150,000		26,800		34,000			
	250,000		28,480		35,680			
	500,000		29,840		37,040			
	Unlimited		31,370		38,570			
2000 5.75% Z	50,000	2406	24,720	9600	34,320	LK25 †	LKE8	LKE8
	100,000		30,560		40,160			LK16
	150,000		34,080		43,680			
	250,000		36,720		46,320		LKE16	LKE16
	500,000		38,960		48,560			
	Unlimited		41,840		51,440		LKE8	LKE8
2500 5.75% Z	50,000	3010	27,900	12000	39,900	LK32 †		
	100,000		36,300		48,300		LKE16	LKE16
	150,000		40,400		52,400			
	250,000		44,500		56,500			
	500,000		48,100		62,100			
	Unlimited		52,350		64,350			

See Page 21 for footnote references

Table 10 LOW VOLTAGE POWER CIRCUIT BREAKER APPLICATION—600 VOLTS

Transformer Rating 3-ph kVA and Impedance Per Cent	Primary System Max Short-Circuit kVA	Normal Load Continuous Current, A	Short-Circuit Current Total RMS Symmetrical Amperes			Minimum Frame Size Air Circuit Breaker Recommended		
			Transformer Alone	100% Motor Load	Combined	M*	I	S
						Main Breaker	Feeder with Instant. Trip	Feeder with Selective Trip
112.5 2.25% §	50,000	108	4,580	400	4,980	LK8	LK8	LK8
	100,000		4,680		5,080			
	150,000		4,720		5,120			
	250,000		4,760		5,160			
	500,000		4,780		5,180			
	Unlimited		4,800		5,200			
150 3.00% §	50,000	144	4,500	600	5,100	LK8	LK8	LK8
	100,000		4,650		5,250			
	150,000		4,695		5,295			
	250,000		4,740		5,340			
	500,000		4,770		5,370			
	Unlimited		4,800		5,400			
225 4.5%	50,000	217	4,380	900	5,280	LK8	LK8	LK8
	100,000		4,590		5,490			
	150,000		4,670		5,570			
	250,000		4,730		5,630			
	500,000		4,770		5,670			
	Unlimited		4,820		5,720			
300 5.0%	50,000	289	5,160	1200	6,360	LK8	LK8	LK8
	100,000		5,450		6,650			
	150,000		5,560		6,760			
	250,000		5,640		6,840			
	500,000		5,710		6,910			
	Unlimited		5,780		6,980			
500 5.0%	50,000	481	8,020	1900	9,920	LK8	LK8	LK8
	100,000		8,740		10,640			
	150,000		9,020		10,920			
	250,000		9,250		11,150			
	500,000		9,430		11,330			
	Unlimited		9,620		11,520			
750 5.75%	50,000	722	9,960	2900	12,860	† LK8	LK8	LK8
	100,000		11,110		14,010			
	150,000		11,550		14,450			
	250,000		11,930		14,830			
	500,000		12,240		15,140			
	Unlimited		12,560		15,460			
1000 5.75%	50,000	962	12,410	3800	16,210	LK16	LK8	LK8
	100,000		14,250		18,050			
	150,000		14,980		18,780			
	250,000		15,640		19,440			
	500,000		16,170		19,970			
	Unlimited		16,730		20,530			
1500 5.75%	50,000	1444	16,500	5800	22,300	‡ LK16	LK8	LK8
	100,000		19,920		25,720			
	150,000		21,390		27,190			
	250,000		22,740		28,540			
	500,000		23,870		29,670			
	Unlimited		25,110		30,910		LKE8	LKE8
2000 5.75%	50,000	1924	19,730	7700	27,430	LK25	LK8	LK8
	100,000		24,830		32,530		LKE8	LKE8
	150,000		27,180		34,880		LKE8	LKE8
	250,000		29,370		37,070			
	500,000		31,280		38,980			
	Unlimited		33,630		41,330			
2500 5.75%	50,000	2406	22,380	9600	31,980	† LK25	LKE8	LKE8
	100,000		29,160		38,760		LK16	LK16
	150,000		32,430		42,030			
	250,000		35,640		45,240			
	500,000		38,500		48,100			
	Unlimited		41,840		51,440		LKE16	LKE16

* The transformer main secondary breakers are in most cases determined by continuous current instead of fault current. For this reason breakers in the M column are usually larger than those listed in the I column. The values listed in the M column allow a breaker continuous rating approximately 25% above the transformer self-cooled full-load current. If the transformer has a fan cooled rating a main secondary breaker larger than indicated by column M may be required.

§ Short-circuit currents are calculated with impedances shown applying to liquid-immersed transformers only.

† These circuit breakers are applied at less than 25% above transformer full-load rating. If 25% is required, use the next larger frame size.

‡ These circuit breakers are applied at less than 25% above transformer full-load rating. If 25% is required, use the next larger frame size.

Specification Guide for H-B Type LK Low Voltage Power Switchgear

Switchgear shall consist of one metal-enclosed (indoor) (outdoor) assembly, drawout type, rated 635 V ac and arranged for _____ volt service on a _____ volt 3-phase (3) (4)-wire (grounded) (ungrounded) system. It shall be designed, factory assembled and tested in accordance with the latest applicable IEEE, NEMA, and ANSI requirements. (ANSI C37.20 for the assembly and C37.13, C37.16, C37.17 and C37.50 for the power circuit breakers.)

SWITCHGEAR (indoor) (outdoor)

Switchgear shall consist of sufficient vertical frames to house the number of circuits specified below, with a minimum number of empty spaces remaining. Each individual frame shall be divided into a front breaker section and a rear bus section isolated by steel panels. In addition, each circuit breaker compartment shall be completely isolated from adjacent compartment by steel panels. All surfaces shall be phosphate treated and painted with an oven baked, corrosion-resistant epoxy enamel finish. Color of finish shall be light gray, ANSI No. 61.

SWITCHGEAR (outdoor only)

Switchgear shall be of the walk-in outdoor type with gasketing throughout. Sufficient filtered louvers and screened vents shall be provided to afford adequate ventilation. Sufficient strip heaters shall be provided. Interior lighting and convenience outlets shall be furnished in the aisle space. A manually-operated lifting device running the full length of the walk-in aisle shall be provided for easy handling of breakers. Suitable undercoating shall be applied to prevent corrosion. The color of the finish coat shall be light gray, ANSI No. 61.

BUS

A main bus shall extend through all frames of the switchgear, with connections to the circuit breakers in each individual compartment. All bus shall be tin-plated aluminum. The main bus shall be of the same current rating as the main circuit breaker or the power source. It shall be braced to withstand stresses resulting from the maximum short-circuit current available. Minimum bracing to be 50,000 amperes symmetrical. Minimum size main bus to be 1600 amperes continuous.

DISCONNECTING DEVICES & DRAWOUT MECHANISM

The breakers shall be of the drawout type, provided with self-aligning disconnecting devices, with the disconnecting fingers mounted on the breaker for ease of maintenance. The drawout mechanism shall hold the circuit breaker rigidly in the fully-connected test and fully-disconnected positions. Interlocks shall be provided that will prevent moving the circuit breaker from the fully-connected, test or fully-disconnected positions, unless the breaker is open. Interlocks shall prevent closing the breaker between any of these positions. Provision shall be made for padlocking the breaker open and in any of the positions noted above.

CIRCUIT BREAKERS

Air circuit breakers shall be three pole, each pole equipped with a solid-state overcurrent tripping device providing adjustable long-time overcurrent and (short-time) and/or (instantaneous) short-circuit protection (with) (without) ground protection. All (manually) (electrically) operated breakers shall be equipped with (manual) (motor) charged stored-energy closing mechanism to provide quick-make operation.

The drawout mechanism shall be designed so that the breaker can be racked to any position without opening the door, for maximum protection to operating personnel. A hasp on the breaker escutcheon shall be provided that can receive up to three padlocks when the breaker is in the open position, positively preventing unauthorized closing or racking of the breaker.

ADDITIONAL SAFETY FEATURES REQUIRED

- (a) Indicator showing breaker is open or closed that is visible with the door closed.
- (b) Safety shutters covering the stationary primary disconnects.
- (c) Manual trip feature, operable with the breaker door closed.
- (d) Up-front wiring to minimize wiring in the rear bus compartment.

THE FOLLOWING EQUIPMENT SHALL BE SUPPLIED:

_____ main secondary breaker(s), _____ amp maximum continuous current, _____ amp interrupting capacity at _____ V ac, (manually) (electrically) operated. _____ tie breaker (s), _____ amp maximum continuous current, _____ amp interrupting capacity at _____ V ac (manually) (electrically) operated. _____ feeder breaker(s), _____ amp maximum continuous current, _____ amp interrupting capacity at _____ V ac (manually) (electrically) operated. _____ feeder breaker(s), _____ amp maximum continuous current, _____ amp interrupting capacity at _____ V ac (manually) (electrically) operated. _____ space(s) for future breaker(s), _____ maximum continuous current, _____ amp interrupting capacity at _____ V ac, (manually) (electrically) operated. _____ control-power transformer(s) for electrically operated breaker(s).

TRANSFORMER SECONDARY METERING

_____ voltmeter(s), with 3-phase transfer switch.
_____ ammeter with 3-phase transfer switch.
_____ watthour meter(s), (two) (three)-element (with) (without) demand attachment.
_____ current transformer(s), _____/5 or suitable rating.
_____ potential transformer(s), suitable rating.

FEEDER METERING

_____ ammeter(s), with 3-phase transfer switch.
_____ watthour meter(s), (two) (three) element.
_____ current transformer (s) _____/5 or suitable ratings.

ENCLOSURE - 3-Phase Tie

Bus shall be non-segregated phase, metal-enclosed (indoor) (outdoor), rated 600 Volts, _____ amperes, 3-phase (3), (4)-wire 60 Hertz and shall consist of tin-plated aluminum conductors, insulated supports and housing.