REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

SQUARE D COMPANY
SMYRNA, TN

ENGINEERING STANDARD

E 50176

SUBJECT
VAD-2 BREAKER RATINGS

VAD-2 METAL CLAD CIRCUIT BREAKER RATINGS (1)

IDENTIFICATION			RATED VALUES								RELATED REQUIRED CAPABILITIES						
			VOLTAGE		INSULATION		CURRENT					CURRENT VALUES					
Square D Catalog Number	Nominal Voltage Class KV, RMS	Nominal 3 Phase MVA Class	Maximum Voltage KV, RMS	Voltage Range Factor	Rated Withstand Test Voltage: Low Freq. KV, RMS	Rated Withstand Test Voltage: Impulse 1.2 x 50 KV, CREST	Continous @ 60 HZ. A, RMS	Int. Capability (2) at Maximum Voltage KA, RMS	Interrupting Time CY	Permissible Trip Delay SEC	Rated Minimum (3) Voltage KV, RMS	Max. Sym. (4) Int. Cap. KA, RMS	3 Sec. Short Time Current Carrying Capability KA, RMS	Close & Latch Capability KA, RMS	ANSI Rating	(5) Availability	(6) Rated for Reclosing Service
VAD-2-05007-12	4.16	75	4.76	1.36	19	60	1200	8.8	3	2	3.5	12	12	19	X	A	X
VAD-2-05015-12							1200									A	X
VAD-2-05015-20		150		1.36			2000	18			3.5	24	24	39		A	X
VAD-2-05015-30							3000									N/A	
VAD-2-05025-12							1200								X	A	X
VAD-2-05025-20		250		1.24			2000	29			3.85	36	36	58	X	A	X
VAD-2-05025-30							3000									N/A	
VAD-2-05035-12							1200								X	A	X
VAD-2-05035-20		350		1.19			2000	41			4	49	49	78	X	A	X
VAD-2-05035-30							3000								X	N/A	
VAD-2-08025-12	7.2	250	8.25	1.79	36	95	1200	17			4.6	30	30	49		N/A	
VAD-2-08025-20							2000									N/A	
VAD-2-08050-12							1200								X	N/A	
VAD-2-08050-20		500		1.25			2000	33			6.6	41	41	66	X	N/A	
VAD-2-08050-30							3000									N/A	
VAD-2-15050-12	13.8		15.0				1200								X	A	X
VAD-2-15050-20		500		1.30			2000	18			11.5	23	23	37	X	A	X
VAD-2-15050-30							3000									N/A	
VAD-2-15075-12							1200								X	A	X
VAD-2-15075-20		750		1.30			2000	28			11.5	36	36	58	X	A	X
VAD-2-15075-30							3000									N/A	
VAD-2-15100-12							1200								X	A	X
VAD-2-15100-20		1000		1.30			2000	37			11.5	48	48	77	X	A	X
VAD-2-15100-30							3000								X	N/A	

NOTES:

(1) Refer to ANSI STD. C37.04 for definitions of terms used.

(2) Rated Short Circuit Current at Maximum Rated Voltage.

(3) Rated Maximum Voltage divided by K.

(4) Rated Short Circuit Current at Minimum Rated Voltage.

(5) N/A means Not Presently Available
A means Available

(6) Refer to Engineering Standard E50180 for Reclosing Duty Cycles.

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85	DLD	9/12/85	

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E 50177
SUBJECT VAD-2 BREAKER/VOLTAGE DERATING FACTORS		PAGE 1 OF 2

BREAKER	VOLTAGE CLASS	RATED MVA	OPERATING VOLTAGE (V)	MAX. SYM. INT. CAPAB. @ OPER. VOLTAGE(kA)①	DERATED MVA②
VAD-2-05007-XX*	4.16	75	2400	12	50
VAD-2-05015-XX	4.16	150	2400	24	100
VAD-2-05025-XX	4.16	250	2400	36	150
VAD-2-05035-XX	4.16	350	2400	49	204
VAD-2-05007-XX	4.16	75	4160	10.07	75
VAD-2-05015-XX	4.16	150	4160	20.60	150
VAD-2-05025-XX	4.16	250	4160	33.18	250
VAD-2-05035-XX-	4.16	350	4160	46.91	350
VAD-2-15050-XX	13.8	500	4800	23	191
VAD-2-15075-XX	13.8	750	4800	36	299
VAD-2-15100-XX	13.8	1000	4800	48	399
VAD-2-15050-XX	13.8	500	7200	23	287
VAD-2-15075-XX	13.8	750	7200	36	449
VAD-2-15100-XX	13.8	1000	7200	48	599
VAD-2-15050-XX	13.8	500	8320	23	331
VAD-2-15075-XX	13.8	750	8320	36	519
VAD-2-15100-XX	13.8	1000	8320	48	692
VAD-2-15050-XX	13.8	500	12000	22.5	500
VAD-2-15075-XX	13.8	750	12000	35	750
VAD-2-15100-XX	13.8	1000	12000	46.25	1000
VAD-2-15050-XX	13.8	500	12470	21.65	500
VAD-2-15075-XX	13.8	750	12470	33.68	750
VAD-2-15100-XX	13.8	1000	12470	44.51	1000
VAD-2-15050-XX	13.8	500	13200	20.45	500
VAD-2-15075-XX	13.8	750	13200	31.82	750
VAD-2-15100-XX	13.8	1000	13200	42.05	1000
VAD-2-15050-XX	13.8	500	13800	19.56	500
VAD-2-15075-XX	13.8	750	13800	30.43	750
VAD-2-15100-XX	13.8	1000	13800	40.22	1000

* -12, -20, or -30 Derating values are valid for all, as listed, if available.

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85	DJD	9/12/85	

E001

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E50177
SUBJECT VAD-2 BREAKER VOLTAGE DERATING FACTORS		PAGE 2 OF 2

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

NOTES:

1. Maximum Symmetrical Interrupting Capability at Operating Voltage = $\frac{\text{Rated Short Circuit Current x Rated Maximum Voltage}}{\text{Operating Voltage}}$

   This value shall not exceed the value shown in Engineering Standard E50176 for maximum symmetrical interrupting capability at rated minimum voltage.

2. Derated MVA = $\sqrt{3}$ x Operating Voltage x Maximum Symmetrical Interrupting Capability at Operating Voltage

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85			

E001

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E50226
SUBJECT VAD-2 METAL CLAD BREAKER WEIGHTS		PAGE 1 OF 1

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

BREAKER CATALOG NUMBER	WEIGHT (LBS.)
VAD-2-05007-12	550
VAD-2-05015-12	
VAD-2-05025-12	
VAD-2-05035-12	
VAD-2-15050-12	
VAD-2-15075-12	
VAD-2-15100-12	
VAD-2-05007-20	600
VAD-2-05015-20	
VAD-2-05025-20	
VAD-2-05035-20	
VAD-2-15050-20	
VAD-2-15075-20	
VAD-2-15100-20	

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85	DLD	9/12/85	

E001

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E 50251
SUBJECT VAD-2 BREAKER MOC SWITCH ASSEMBLY		PAGE 1 OF 1

This optional assembly is required on VAD-2 breakers which are used in breaker cells which have MOC switch assemblies. The assembly consists of a roller connected to the breaker operating mechanism through a series of mechanisms and linkages. It should be specified on the VAD-2 breaker specification sheet, if required, as MOC provisions.

The roller protrudes from the right side of the breaker, about one third the way up from the floor. See Figure 1.

The operation of the cell mounted MOC contacts is the same as for the standard breaker mounted auxiliary switches. When the breaker is closed in the test or connected position, the roller, mechanically linked to the breaker operating mechanism, moves up a distance of 2". This action changes the mode of the cell mounted contacts. When the breaker is opened, the roller moves back down to its original position, and the contacts return to their original mode. See Engineering Standard E50507 for MOC operating details for the cell mounted portion.

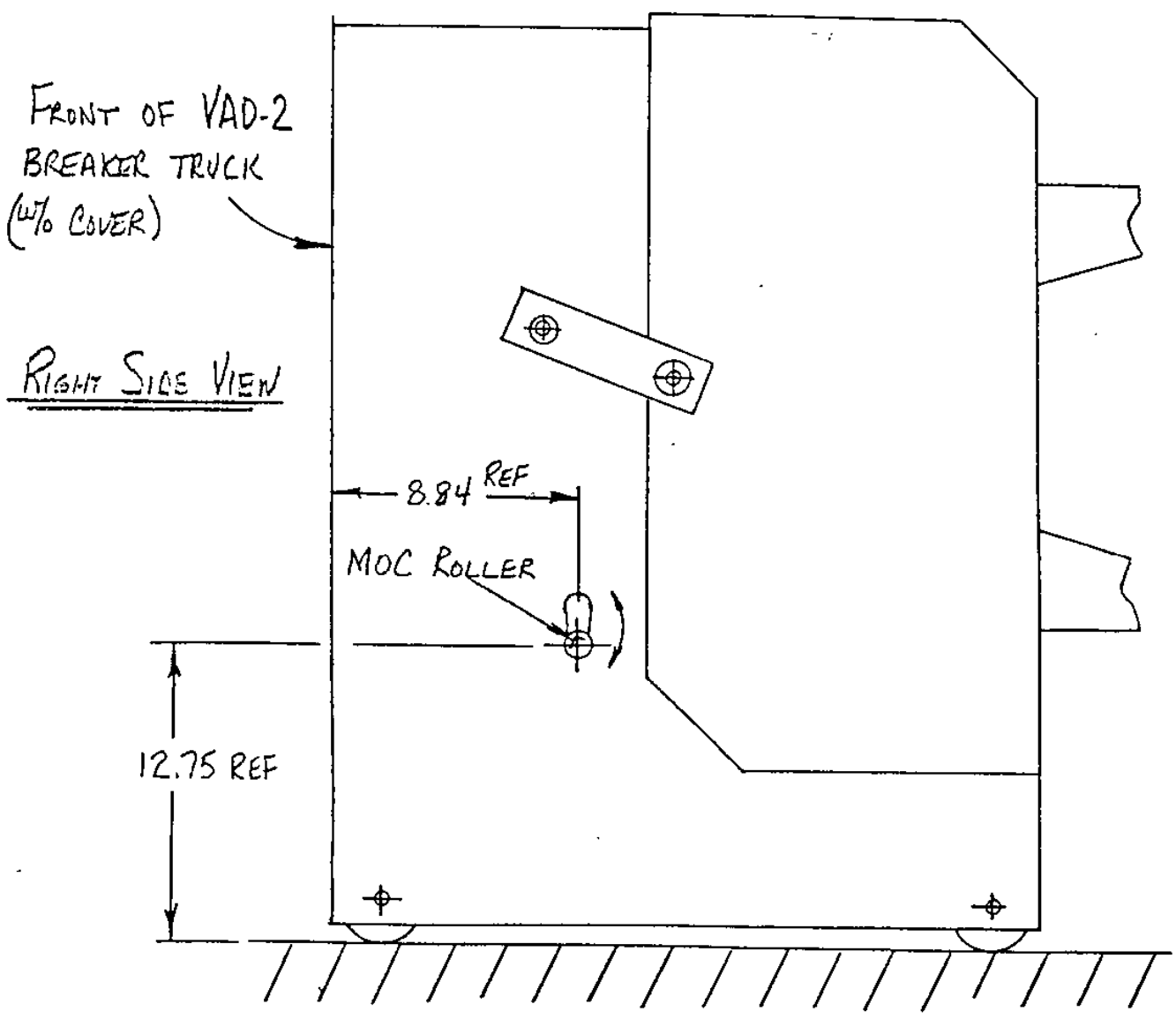


FIGURE 1

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85		9/12/85	

E001

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E50252
SUBJECT VAD-2 BREAKER TOC SWITCH ASSEMBLY		PAGE 1 OF 1

This optional assembly is required on VAD-2 breakers which are used in breaker cells which have TOC Switch Assemblies. The assembly consists of a formed cam plate and the hardware to mount it. It should be specified on the VAD-2 Breaker Specification Sheet, if required, as TOC provisions. The cam plate is mounted on the lower left side of the breaker toward the front of the breaker. See Figure 1. As the breaker is moved from the test position to the connected position and vice versa, the cam plate operates the cell mounted TOC Switch Assembly. See Engineering Standard E50508 for the operating details of the cell mounted assembly.

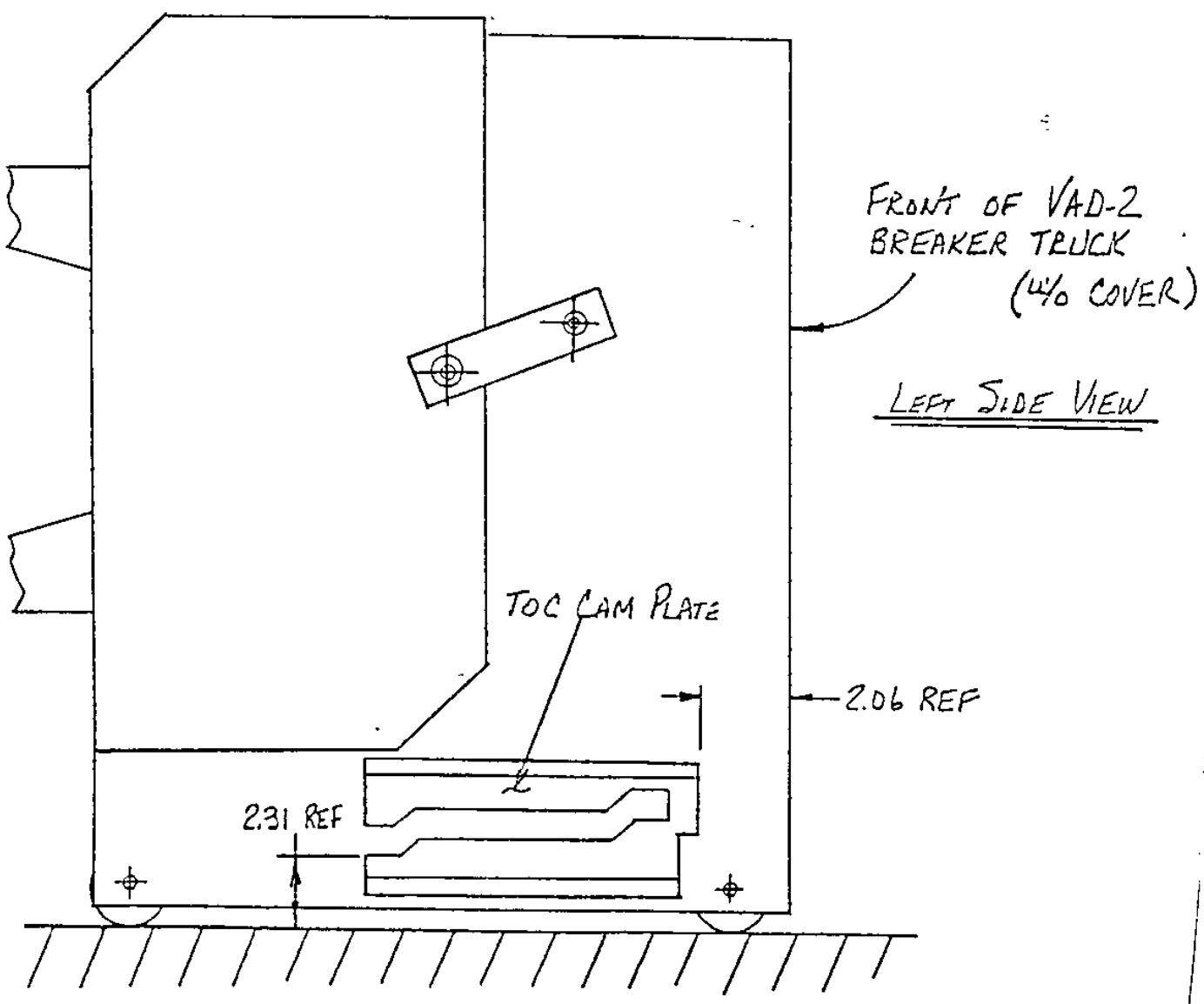


FIGURE 1

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85	DLO	9/12/85	

E001

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E 50301
SUBJECT VAD-2 CIRCUIT BREAKER SCHEMATIC/ELECTRICAL OPERATION		PAGE 1 OF 2

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
J		

Type VAD-2 circuit breakers are normally operated electrically. They are wired such that when the closing springs are discharged upon closing the breaker, the springs are automatically recharged (if control power is available). The following description of operation assumes the initial conditions that the breaker is open, the closing springs are charged, the breaker is in the test or connected position, and control power has just been applied. It also assumes AC tripping power is used. Refer to Figure 1 for schematic details and terminal locations. For motor and coil data for specific control voltages, refer to Engineering Standard E50302.

Since the closing springs are discharged, limit switch contact LS is closed. Motor relay MR is energized causing contact MR(1) to close. This energizes the motor which charges the closing springs. When the springs are charged, contact LS opens, de-energizing the motor relay MR, which causes contact MR(1) to open, de-energizing the motor. The closing springs are now charged and waiting for a "CLOSE" command. A "CLOSE" command is given by closing an external closing control switch. This energizes closing coil X through contacts Y(1), 52/b(1), and MR(3). This causes the breaker to close. When the breaker closes, contact 52/b(2) opens, turning off the green "Breaker Open" pilot light. At the same time, contact 52/a(2) closes, turning on the red "Breaker Closed" pilot light. Additionally, upon closing the breaker, the closing springs are discharged causing limit switch LS to close. This again energizes the motor circuit, recharging the closing springs.

Anti-pump relay Y is included to limit the circuit breaker to one closing operation per "CLOSE" command. Should the "CLOSE" command be maintained and the breaker trips open, an automatic reclosure of the breaker following the recharging of the closing springs is prevented. The anti-pump circuit serves as a lockout to prevent breaker "pumping" until an operator can reclose the breaker under a no-trip condition. The circuit functions as follows: When the breaker closes, contact LS closes energizing the motor relay MR, which causes contact MR(2) to close. This energizes the anti-pump relay Y. Anti-pump relay contact Y(1) opens and prevents additional closing signals from being applied to the closing coil X. Relay contact Y(2) closes and seals in the anti-pump relay Y until the external "CLOSE" command is removed. At that time, anti-pump relay Y is de-energized (assuming that spring charging is complete and motor relay MR is de-energized, causing contact MR(2) to be open).

A "TRIP" command is given by closing an external tripping control switch. This energizes trip coil TC through contacts 52/a(1), which were closed due to an earlier closing of the breaker. The breaker opens. When the breaker opens, the contacts 52/a(1) open, clearing the trip coil TC, and contact 52/a(2) opens, turning off the red "Breaker Closed" pilot light. Contact 52/b(2) also closes, turning on the green "Breaker Open" pilot light. The circuit breaker is now ready for its next "CLOSE" command as the closing springs were recharged following the previous closing operation.

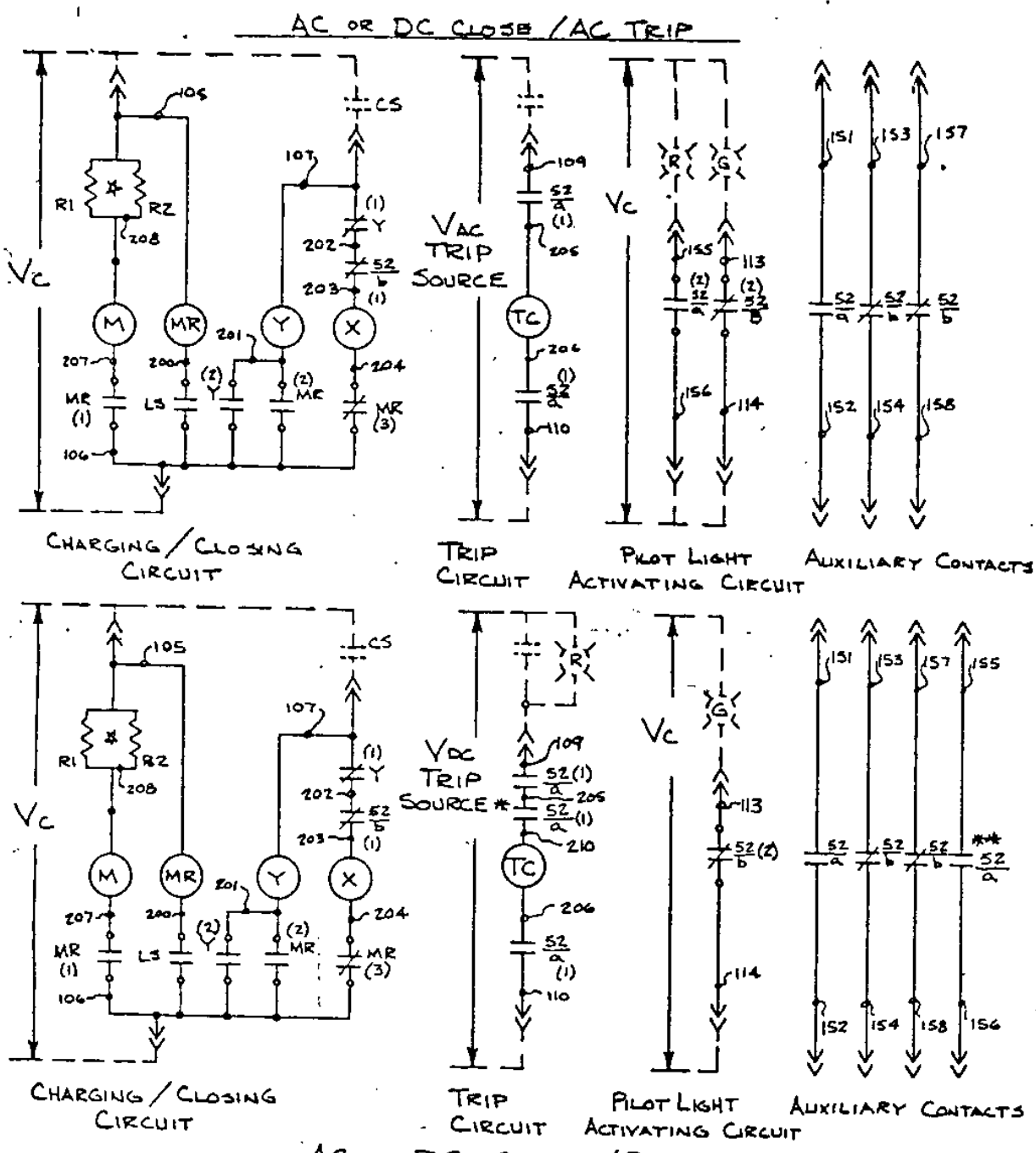
For mechanical operation of the breaker, refer to Engineering Standard E50228.

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85	DJD	9/12/85	

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E50301
SUBJECT VAD-2 CIRCUIT BREAKER SCHEMATIC/ELECTRICAL OPERATION		PAGE 2 OF 2

AC OR DC CLOSE / AC TRIP



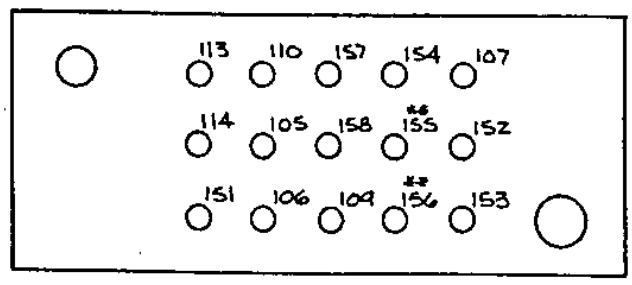
AC OR DC CLOSE / DC TRIP

1. NUMBERS IN PARENTHESES REFER TO NUMBER DESIGNATIONS IN THE ELECTRICAL OPERATION TEXT.
2. CONTACT 52/a(2) IS NOT AVAILABLE WITH 250 VDC. IT IS WIRED INTO THE TRIP CIRCUIT FOR ADDITIONAL BREAKING CAPACITY.

✡ 230 VAC + 250 VDC ONLY * 250 VDC ONLY ** N/A WITH 250 VDC TRIP

LEGEND:

TC	Breaker Trip Solenoid
X	Breaker Closing Solenoid
Y	Anti-Pump Relay (and/or Anti-Pump Relay Contact)
LS	Limit Switch (closed when springs are discharged)
52/a	Auxiliary Switch Contacts - Open when breaker is in the tripped (open) position. Closed when breaker is in the closed position.
52/b	Auxiliary Switch Contacts - Closed when breaker is in the tripped (open) position. Open when breaker is in the closed position.
M	Charging Motor
MR	Motor Relay (and/or Motor Relay Contact)
R1, R2	Resistor



REAR VIEW OF CONTROL PLUG CONNECTOR (SCREW TERMINAL SIDE) CONTROL TERMINAL LOCATIONS

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85			

E001

L	K	H	G	F	E	D	C	B	A	REV.
										DATE
										BY

E001

REPLACES STANDARD	DATED

PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
JOHN RAMMEL	8/30/85		9/12/85	

CONTROL DESCRIPTION	YIN PART #	RATED VOLTAGE	REQ'D* OPERATING RANGE (ANSI)	CURRENT AT RATED VOLTAGE (A)	BURDEN (VA)	DC RESISTANCE (OHMS)
CHARGING MOTOR	①N/A	24 VDC	--	--	--	--
	1715D-01	48 VDC	38-56 VDC	9.0	432	--
	1715D-02	125 VDC	100-140 VDC	5.0	625	--
	1715D-02	250 VDC	200-280 VDC	5.0	1250	--
	1715D-02	120 VAC	104-127 VAC	5.0	600	--
	1715D-02	240 VAC	208-254 VAC	5.0	1200	--
MOTOR RELAY	①N/A	24 VDC	--	--	--	--
	2032D-02	48 VDC	38-56 VDC	0.042	2.0	1200
	2032D-03	125 VDC	100-140 VDC	0.016	2.0	6000
	2032D-04	250 VDC	200-280 VDC	0.008	2.0	24000
	2032D-05	120 VAC	104-127 VAC	0.083	10.0	280
	2032D-06	240 VAC	208-254 VAC	0.042	10.0	1200
ANTI-PUMP RELAY	①N/A	24 VDC	--	--	--	--
	2033D-02	48 VDC	38-56 VDC	0.042	2.0	1200
	2033D-03	125 VDC	100-140 VDC	0.016	2.0	6000
	2033D-04	250 VDC	200-280 VDC	0.008	2.0	24000
	2033D-05	120 VAC	104-127 VAC	0.083	10.0	280
	2033D-06	240 VAC	208-254 VAC	0.042	10.0	1200
CLOSING SOLENOID	①N/A	24 VDC	--	--	--	--
	2022D-02	48 VDC	38-56 VDC	13.6	653	2.7
	2022D-03	125 VDC	100-140 VDC	6.0	750	17.5
	2022D-04	250 VDC	200-280 VDC	3.0	750	84.5
	2022D-05	120 VAC	104-127 VAC	6.0	720	4.5
	2022D-06	240 VAC	208-254 VAC	3.0	720	17.5
TRIP SOLENOID	2021D-01	24 VDC	14-28 VDC	28.0	672	0.7
	2021D-02	48 VDC	28-56 VDC	13.6	653	2.7
	2021D-03	125 VDC	70-140 VDC	6.0	750	17.5
	2021D-04	250 VDC	140-280 VDC	3.0	750	84.5
	2021D-05	120 VAC	104-127 VAC	6.0	720	4.5
	2021D-06	240 VAC	208-254 VAC	3.0	720	17.5

* Per Table 10, ANSI C37.06-1979

① 24 VDC Closing is not recommended by ANSI

SQUARE D COMPANY
SMYRNA, TN

ENGINEERING STANDARD

SUBJECT VAD-2 BREAKER OPERATING CONTROLS AND DATA

E50302

PAGE 1 OF 1

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

SQUARE D COMPANY SMYRNA, TN	ENGINEERING STANDARD	E50303
SUBJECT VAD-2 BREAKER AUXILIARY SWITCH DATA		PAGE 1 OF 2

VAD-2 Metal Clad circuit breakers are supplied with one auxiliary switch block. The switch block is a General Electric type 16SB1DB225SUM324 and has four stages, with one "a" contact (open when the breaker is open) and one "b" contact (closed when the breaker is open) per stage. Breaker control circuit contacts as well as auxiliary switch contacts are located on this switch block. Due to the terminal limitations of the circuit breaker control power plug, only three of the auxiliary contacts may be wired out of the breaker. If more are needed, MOC switch assemblies will have to be added for this purpose. Refer to Engineering Standards E50251 and E50507 for further information.

The switch block is located to the right of the main operating mechanism. The four "a" contacts are on the bottom side of the switch and the four "b" contacts are located on the top side of the switch. See Figure 1.

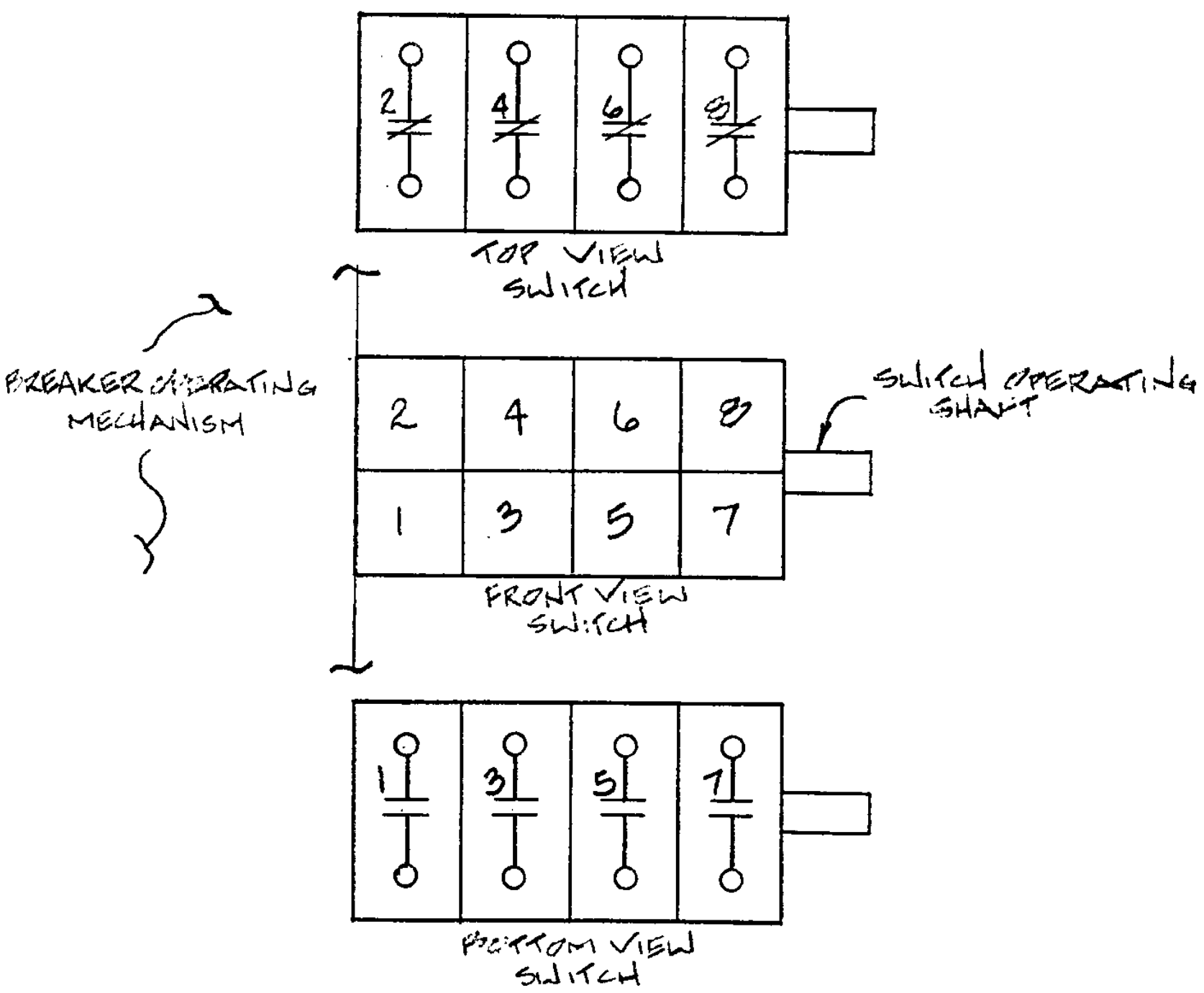


FIGURE 1

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85	DLD	9/12/85	

E001

REV.	DATE	BY
A		
B		
C		
D		
E		
F		
G		
H		
K		
L		

The individual contacts are rated as shown in Table 1. Contacts are rated for 20 amperes continuous up to 600 volts.

Voltage	Interrupting Rating (A.)	
	Non-Inductive Circuit	*Inductive Circuit
24VDC	6.0	4.0
48VDC	5.0	3.0
125VDC	2.5	2.0
250VDC	0.75	0.7
115VAC	40.0	24.0
230VAC	25.0	12.0

*Values of inductance equivalent to that of the average trip circuit.

Table 1

REPLACES STANDARD	DATED	PREPARED BY	DATE	APPROVED BY	DATE	EFFECTIVE
		John Rammel	8/30/85			