

Type SLB

Effective: April 1987 Supersedes I.L. 41-775.1 Dated June 1978

0 Denotes Change From Superseded issue

10 Amp Continuous Rating

**Breaker Pole Failure Relay** 

**CAUTION:** It is recommended that the user of this equipment become acquainted with the information in this instruction leaflet before energizing the equipment. Failure to observe this precaution may result in damage to the equipment. Printed circuit modules should not be removed or inserted while the relay is energized unless specific instructions elsewhere in this instruction leaflet state that such action is permissible. Failure to observe this precaution can result in an undesired tripping output and cause component damage.

# **APPLICATION**

The SLB pole failure relay protects against breaker pole failure, i.e. "pole disagreement". Pole failure is here defined as having one or more breaker poles open while one or more poles are **e** closed during non fault conditions. This relay is recommended for "single-breaker" applications. Where "ring-bus" or "breaker-and-a-half' configurations are used the SLB-1 relay is recommended (See IL. 41-775.2.)

# Types of Breaker Pole Disagreement

- 1) Pole disagreement during the attempted clearing of a fault. This "breaker failure" O 18 to 60 mA and the I H range is 40 to 500mA. condition is detected by conventional breaker failure relay and is cleared by tripping adjacent breakers in normal manner.
- 2) Pole failure during a breaker closure. This close during a breaker close operation, not involving a fault. This is detected by the SLB

current comparison logic which trips the protected breaker after time delay, T2.

3) Pole failure during a breaker opening operation. This involves the failure of one or two poles to interrupt current during a breaker trip operation, not involving a fault. This is detected by the SLB current comparison logic, which calls for another attempt at tripping the protected breaker after delay T2. This attempt will probably not successfully interrupt the stuck pole(s). Therefore, the current comparison logic will continue to operate and ultimately time-out T3 which either operates 86BF to clear the adjacent breakers or alarms the operator.

The SLB outputs are connected as shown in Q the external schematic diagram  $\mathfrak{I}$ .

As explained in the Operation section of this leaflet, the current comparison logic of the SLB has an output whenever one or more phase(s) carries current above the III level (6.5 mA) while one or more phase(s) carries current below the IL level (20 mA). Though these IL and III settings are factory calibrations and not intended to be changed by the user, other levels can be set in the field if necessary. The IL calibration range is

# **Optional Relay Application – Alarm Only**

In some instances it may be desirable to alarm-only for the pole failure condition. This is involves the failure of one or more poles to Qillustrateci in Fig. 5B, the external schematic for the SLB with one timer. A suggested setting for T2 is approximately one second.

All possible contingencies which may arise during installation, operation or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding this particular installation, operation or maintenance of this equipment, the local ABB Power T&D Company Inc. representative should be contacted.

# **CONSTRUCTION & OPERATION**

The type SLB relay is a solid state package mounted in FT42 case (See I.L. 41-076). Re-• ferring to Fig. 3, the circuitry consists of 3 current to voltage transformers, 3 varistors, 3 sets of full wave rectifiers, 3 filters, 3 sensing circuits, 1 level detector, and a standard output circuit. It contains a 20-volt zener supply that energizes the relay logic. It also contains one (or two) timers for adjustable time delay applications. In addition, a telephone relay circuit (TR1) is included to keep the timer(s) deenergized until the level logic produces a "pole disagreement" output. This eliminates standby power dissipation in the timer power supply circuitry, keeping heat buildup inside the relay case to a minimum. All 3 transformers, TA, TB, TC have a center-tapped secondary which is connected to dc negative for a common ground. The transformer secondaries are connected to individual varistors to keep the secondary voltages at a safe level.

There are 2 sets of full wave rectifiers for each phase. The odd numbered diodes are used to rectify the quantities related to the  $I_H$  or high current. These quantities will be compared to a reference at the level detector. The even numbered diodes rectify quantities that will provide a signal for phase current detection. Rectified quantities are then filtered by a capacitor and the input to the current sensors is then kept at a safe value by means of zener diodes.

The level detector is adjusted by means of R45 & R46 to provide a 20-volt output whenever one or more phase current is equal to or greater • than the "high-set" level (factory adjusted for 65 mA). This produces an output at TP9 if at least one of the phase currents drops below 20 mA as detected by the related current sensing circuit. The basic current sensing circuit consists of a transistor that is biased into a normally on condition for a phase current equal or greater than 20 mA. This biasing is performed through adjustments of R39, R40, and R41. If any phase current drops below 20 mA the related transistor (Q1, Q2, or Q3) will turn off allowing any output from the level detector to deliver power to the output circuit and thus producing a relay output.

The level detector output is delayed by about 15 ms to avoid undesired tripping due to normal breaker unsymmetries. This delay circuit consists of an R-C circuit, a zener diode, and an output transistor. The output of this time delay circuit is used as the B+ supply for the current sensing circuits. Figs. 5, 6, and 7 show some of the basic circuits described above. The SLB Relay produces telephone relay output which is delayed by means of the timer logic. Standard time delay ranges are 0.1 to 1.0 sec. asnd 0.2 to 4 seconds. Operation of the timer begins when an input signal to the starting transistors Q3 and Q11 is present at TP9 and an internal telephone relay contact (TR1) in series with the dc control voltage closes. The capacitor (C1) in the RC timing circuit begins to increase in voltage until it is greater than the voltage setting on the brush of the R48 potentiometer. At this point current will flow into the gate of the silicon controlled rectifier (Q2) which will conduct similar to the closing of a switch. This actuates the telephone relay (TR2) in the time set on the front dial.

The output contact (TR2) normally energizes a trip circuit, actuating the ICS contact as shown in the external connection diagram.

The rate at which the capacitor charges is determined by the rheostat setting. The charging rate is not a linear function of rheostat setting, since R6 gives a parallel resistive path. This has the effect of expanding the scale for short times and thereby permitting more accurate settings.

# **CHARACTERISTICS**

### A. Current Rating

Continuous	10 Amperes per phase
One Second	200 Amperes per phase

### **B.** Operating Time \*

Time Equal to Timer Settings

\* Level Logic Time Delay & TRI Relay Time Delay Included In Timer Calibration.

# C. Current Burden Per Phase

90 mA	.05 VA	١
5 A	11.5 VA	١

# D. DC Burden

Timers Deenergized0.10Amps. continuousOne timer - 48 Vdc0.20Amps. additional θTwo timer - 48 Vdc0.40Amps. additional θOne timer - 125 Vdc0.15Amps. additional θTwo timer - 125 Vdc0.30Amps. additional θ

 $\theta$  = only during SLB relay operation.

# **E.** Tripping Condition

At least one phase conducting 0.065 ampere or more while at least one phase is conducting less than 0.020 amperes.

# F. Restraining Conditions

- 1) Sudden increase of current from 0.0 ampere to any value greater than 0.065 ampere in all phases, whether balanced or not.
- Any sudden change in current, increase or decrease, balanced or not, as long as the minimum current is greater than 0.065 ampere in all three phases.
- 3) Simultaneous interruption of three currents, balanced or not.

# G. Time Delay Range and Voltage Rating

Time Delay Range (Seconds)	Voltage Rating (Volts dc)		
.10-1.0	48		
.10-1.0	125		
.10-1.0	250		
0.2-4.0	48		
0.2-4.0	125		
0.2-4.0	250		

# H. Timer Reset Time

TR drop-out time = 0.1 sec. or less.

Discharge of timing capacitor; C1 is essentially instantaneous, the R-C time constant through R48 being less than 20 milliseconds, in most cases. However, the discharge path through R48 is limited by silicon voltage drops through Q2 and D7, totalling approximately through R48 down to about one volt and then more slowly through R6 down to zero volts.

### I. Timer Accuracy

The accuracy of the time delay depends upon the repetition rate of consecutive timings, the supply voltage, and the ambient temperature. Self-heating has a neglibible effect on the time accuracy.

# (1) Nominal Setting

The first time delay, as measured with the test circuit shown in Fig. 13, taken at  $25^{\circ}$ C. and rated voltage, will be within  $\pm 5\%$  of its setting for settings of 0.2 seconds or less. For settings above 0.2 seconds, this accuracy will be  $\pm 3\%$ .

# (2) Consecutive Timings

Incomplete capacitor discharge will cause changes in time delay. These changes are a function of discharge rate. Timing accuracy for slow repetitions will be per Table I.

Table I

Relay Rating	Delay Between Readings	Accuracy as Percent of Setting		
0.1-1.0 seconds	at least 3 seconds	±3%		
0.2-4.0 seconds	at least 5 seconds	±3%		

Timing accuracy for fast repetitions will be per Table II.

Table II

Relay Rating	Delay Between Readings	Accuracy as Percent of Setting
0.1-1.0 seconds	instantaneous	±5%
0.2-4.0 seconds	instantaneous	±5%

### (3) Supply Voltage

Changes in supply voltage, between 80% and 110% of nominal, cause time delay variation of no more than  $\pm 3$  milliseconds for settings of 0.3 seconds or less, and no more than  $\pm 1\%$  for settings above 0.3 seconds.

#### (4) Ambient Temperature

Changes in ambient temperature cause changes in time delay. This variation in time delay is a direct function of capacitance change with temperature. Typical variation of time delay with temperature is shown in Figure 10.

# SETTINGS

# A. Current Levels

0

The I<sub>H</sub> level is adjustable from 40 to 500 mA. The I<sub>L</sub> level is adjustable from 18 to 60 mA. A setting of 20 mA is recommended. I<sub>H</sub> should be set sufficiently high that it will not operate at light load when one phase current is below the I<sub>L</sub> setting. It should be set no higher than necessary.

#### **B.** Timer Settings

A current comparison output condition could occur during a "breaker failure" in which case it is imperative that adjacent breakers be quickly cleared in order to maintain system stability. This is achieved through conventional breaker failure protection which incorporates a timer, device 62, which is set as fast as is required to maintain stability. This is very often a low setting (12 cycles or less) and is sometimes as low as nine cycles. The pole failure timers (T2 and T3) can be set considerably higher than the breaker failure timer, since system stability is not endangered. A suggested setting for T2 is one second.

The T3 timer, which either trips adjacent breakers via 86BF or optionally alarms to notify the operator that one of the breaker poles is stuck closed, should be set to coordinate with T2 with a comfortable margin. A suggested setting for T3 is two seconds.

Proper time delay is selected by turning the knob of potentiometers R47 and R50 (dialed).

#### C. Indicating Contactor Switch (ICS)

The only setting required on the ICS unit is the selection of the 0.2 or 2.0 ampere tap. This selection is made by connecting the lead located in front of the tap block to the desired setting by means of the connecting screw. The tap should be chosen to be compatible with the trip current that will flow through the coil. The ICS unit contacts will close and the operation indicator target will drop for any current above tap value.

# **EXTERNAL CONNECTIONS**

Fig. 4 shows the external connections for the type SLB relay.

# **RECEIVING ACCEPTANCE**

Make a visual inspection to make sure that there are no loose connections, broken resistors, or broken resistor wires.

#### **Relay Check**

- A. Refer to Figs. 3 or 4.
- B. Connect per test Fig. 14 and apply rated dc voltage.
- C. Apply  $I_A = 15mA$ ,  $I_B = I_C = 100mA$ . 18-20 volts peak output should be observed at logic PCB terminal #19, and telephone relay TR2 (and TR3 for 2 timer relays) should operate.
- D. Apply  $I_B = 15mA$ ,  $I_A = I_C = 100mA$ , and check relay output per step C.
- E. Apply  $I_C = 15$ mA,  $I_A = I_B = 100$ mA, and check relay output per part C.

# **Timing Check**

SLB timers and their dials are calibrated and set at the factory and should not be disturbed in the field. However, the maximum calibration point on the timer dial(s) may be checked to insure that the timers are operating properly.

The recommended test circuit for this check is shown in Fig. 13.

- A. Connect per test Fig. 13 and apply rated dc voltage. Switch (S1) should be in the closed position.
- B. Set  $I_A$ ,  $I_B$ , &  $I_C = 1.0$  amperes. Reset the electronic timer to zero.
- C. Set SLB timer dial at the maximum calibration mark and open switch (S1). The electronic timer should display the time set on the SLB timer dial to within  $\pm 3\%$ .
- D. Allow a minimum of 10 seconds between repeat readings.
- E. Return setting to value desired for the application.

# INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration and heat. Mount the relay vetically by means of the rear mounting stud or studs for the type FT projection case or by means of the four mounting holes on the flange for the semi-flush type FT case. Either the stud or the mounting screws may be utilized for grounding the relay. External toothed washers are provided for use in the locations shown on the outline and drilling plan to facilitate making a good electrical connection between the relay case, its mounting screws or studs, and the relay panel. Ground wires are affixed to the mounting screws or studs as required for poorly grounded or insulating panels. Other electrical connections may be made direcly to the terminals by means of screws for steel panel mounting or to the terminal stud furnished with the relay for thick panel mounting. The terminal stud may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detail information on the FT case refer to I.L. 41-076.

# **ROUTINE MAINTENANCE**

All relays should be checked at least once every year at such time intervals as may be dictated by experience to be suitable to the particular application.

### CALIBRATION

Use the following procedure for calibrating the relay if the relay adjustments have been changed or disturbed. This procedure should not be used unless it is apparent the relay is not in proper working order.

#### A. Level Detector (Refer to Fig. 12)

0

0

0

0

- 1. Connect per test diagram Fig. 14 and apply rated dc voltage.
- 2. Apply  $I_B = I_C = 0$ ,  $I_A = 65$  mA or any other desired value for  $I_H$  up to 500 mA.
  - 3. Monitor relay output at TP9 (current board Fig. 12 top left) and adjust R45 (trim-pot – same board) until full relay output (18-20 volts) each is *just* observed on an oscilloscope.
  - 4. Reduce I<sub>A</sub> by about 3 mA and adjust R46 (same board top right), until output just drops to zero.
  - 5. Increase  $I_A$  and relay output should be observed as current reaches 65 mA or some other desired  $I_H$  value.
    - 6. Reduce  $I_A$  and recheck per step 4.
    - In general adjust R45 for pickup, and R46 for drop out until relay produces an output (full output) as current approaches 65 mA (or the desired I<sub>H</sub> value) and drops out quickly if current is, then, reduced.

#### B. Current Sensors (Refer to Fig. 12).

- 1. Connect per test diagram Fig. 14 and apply rated dc voltage.
- 2. Apply  $I_A = 20mA$ ,  $I_B = I_C = 1$  Amp. Monitor relay output at TP9 (circuit board Fig. 12-top left).
- 3. Adjust R39 (circuit board bottom left) until the first output indication (18-20 volts peak), is *just* observed on a scope. If relay was already picked up, adjust R39 until it drops out, and then adjust it again as specified above.
- 4. Reduce current  $I_A$ , observing the relay output. Complete relay output (Vo = 20) should be observed within 3mA. Recheck first output indication at 20mA.

- 5. Adjust R40 (bottom center) per steps 3 and 4, this time setting  $I_A = I_C = 1$ Amp,  $I_B = 20$ mA.
- 6. Adjust R41 (Bottom right) per steps 3 and 4, this time setting  $I_A = I_B = 1$  Amp,  $I_C = 20$ mA.

#### C. Timing Check

Check timers using procedure given under RECEIVING ACCEPTANCE.

# **RENEWAL PARTS**

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.



Fig. 1. SLB Relay (2 Timer) Chassis (Front View).

Fig. 2. SLB Relay Chassis (Rear View).



7	CARACITOR	STYLE	1050	ecc
ſ	CAPACITION	1874508404		19 MED
		107AJUOHU4	<del>  '-</del>	
			<del> </del>	
	DIODE		L	
	DI-08	837A692 H03	6	IN645A
١.			1	!·
	TRANSISTOR			
	01	184A638H20	1	2N1132
	0.2	1854517003		2N886
:		1034 517 1105	ŀ÷-	28697
	43	1844638H18		28637
-	RESISTOR		L	
	¥ R2	862A375H77	1	619 - 1/2W - + 1%
1	RI - R5	836A503H42	2	4,990A-1/2W-±1%
	83	1844763813	1	2700-1/28-+5%
1	84			1.5000-1/2-
1		836A303H30		1,30011-1/2 # = 1 1/2
		<u> </u>		l
	<u>R7</u>	836A503H34	1	2,210A-1/2W-±1%
	R 8	836A503H53	1	15K -1/2W-±1%
	¥ R6	862A377H77	1	61.9K -1/2W-±1%
	CAPACITOR			
	CI-C2-C2-C9-C10	8774241403		0.27 450
	01-02-03 08 010	BSTAL THUS	<u></u>	G.ET MPD
	C4	876A 409H09	1	I,O MFD.
	C5	187A508HIO	<u> </u>	IS MFD.
	C11	3509A33H0F		2.Q.M.FD -
1	C7	837A 241 H 16	1	2.2 MED.
	C 9	8764409401	1	ISMED
	<b>~</b>		<u> </u>	
		<u> </u>		<u>+ · · ·</u>
	DIODE		<u> </u>	
1	DI TO DI2	188A342H11	12	IN 4822
I	D13-D14-D15-D18	188A342H06	4	IN 4818
I	D16 - D17	184A855H14	2	IN 4385
Ì	D19-D21	8374692403	2	INGASA
I	020	IRAARELIAT		114474
ļ		107403380/		18437A
ļ	TRANSFORMEN			
l	TI-T2-T3	2908300602	3	
Į	TRANSISTOR			
ł	QU	8374617403		2 N 3590
ł	01-02-03-05-07-09	8484851 H02	6	2N3417
ł	04	1944639418		24607
ł		1044030110		28637
ļ	06	184A638H20		21132
ł	98-910	849441H01	2	2 N 3645
ł	RESISTOR			,
Į	R28	184A763H41	-	3.9K 1/2W - ± 5%
i	R1-R2-R3	184A763H62	3	30K -1/2W - + 5 %
ł	P4 - P5 - P6 - P19	8374237421		12000-11- + 5.4
ł	000 - 825-829-812	194 4 76 3 447		
ł	ROU- REJ-RES-ROE	104A763H47		6.6 K - 1/2W - 1 5%
ļ	RIO - RII - RIZ	629A531H67	3	30K -1/2W - ± 2%
I	R13-R14-R15-R24	1844763451	7	10 K -1/2W-+ KW
L	R30 - R31 - R34			10K = 172W = 2 3 /2
ł	R16-R17-R18-R35	184A763H59	4	22K -1/2W - + 5%
ľ	R20	1844763461	1	278 -1/28 -+ 5%
ŧ	821 - 822	1844763435		2.24 -1/2 - + 5.4
ł	<b>P27</b> P36	1044703/133	-	
ł	R23-R36	104A703H43	2	/ K = 1/2 W = 1 3%
ş	R26-R33-R37	184A763H73	3	82 K - 1/2 W - ± 5%
ŀ	R27	184A763H53		12 X - 1/2 W - ± 5%
Ł	R38	762A679H01	1	150A-3W
I	R46	629A430H01	1	50 K - 1/4 W - ± 20%
I	R42 - R43 - R44	185A211H05	3	20.0000 - + 10%
t	P45	8624405802	1	204 - 54 - 10%
t			- <u>-</u>	
ł	P/2			
ŀ	N+8	183AU67H05	_!_	230Л
L	R49 (125 VDC)	1336173	1	560A-40W- ± 5%
ſ	R49 (48 VDC)	04D1299H66	1	95A-40W-± 5%
ſ	R53	184A763H67		47K-1/2W + 5%
ſ	ZENER DIODE			
ľ	Z1 - Z2 - 73	8494515405	-	IN 4751A
ŀ	24-25-76-79	1864797417		117484
ł	7.8	1894107		111704
F	4.6	1804302H17		IN 30218
ŀ	210	662A285H01	1	IN 36 88 A
F	DZP	762A631H01	<u>1</u>	IN2984 B
L	DZPI	629A798H03	1	IN2986B
ſ	27	188A302HI8		IN30358
ŗ	Z11	878A619HOI	11	1,5 KE 200
ľ			$\rightarrow$	
F	VARSISTOR		+	
t	VRI - VR2 - VR1	1834122402	-, +	124 - + 204
ł	THE THE THU			
Ļ				
f	TELEPHONE RELAY			
t	TR2	4070614006		
t	T 81	403000	<del>.</del> +	
F	1.81	407C280H19	1	
L	RESISTOR			
٢	RDC (125VDC)	1267293	11	1.5K - 25W - + 5%
t	RDC (AR VDC)	1202587	<del>- i t</del>	4000-25 + +
ł		1202301	<u>+</u> +	
L	R47	184A756H01	1	40 K
I	R39- R40 - R41	629A430H05	3	200K-1/4W-±20%
ſ	R7-R8-R9	629A53IH60	3	15K - 1/2W-+ 2%
t	857 (49 VOC)	1267247	÷	
		120/203	÷	000-1-25W - 5%
ł		1/08562		50504-25W I 5%
ŧ	P54	1844753		
ł	R56	184A763H37		2.7K 1/2 W = 5%
	R56 R59	184A763H37	1	270 1/2 W ± 5%
	R59 R56	1844763H37 1844763H33 8484821H13	1	270 V2W ± 5% 270 V2W ± 5% 49.9 1/2W ± 1%



		STYLE	DEO	000
ſ	61 - 161	1874508H04	2	39 MED.
Ł		1012300104	-	
	01005			
E	DIODE	8374602407	16	INCARA
	DI TO DE-IDI TO IDE	83/A692HU3	10	INGADA
Ł				
1	TRANSISTOR			
Ł	<u>Q1 - 1Q1</u>	184A638H20	2	2N1132
i e	92 - 192	185A 517 H03	2	2N886
Ξ	93 - 193	184A638H18	2	2N697
2	RESISTOR			
F	₩ R2	862A375H77	1	619 1/2w - ± 1%
Г	R1-R5-181-185	836A503H42	4	4,990A-1/2W-±1%
	<b>0</b> 182	862A 376 H51		3.32 K -1/2W-±1%
1	R3-1R3	184 A763 H13	2	270A -1/2W-15%
1	R4-1R4	836A503H30	2	1,500 A-1/2 W-+1%
	¥ 86	862A 377H77		61.9K -1/2W-±1%
1	R7-187	8364503H34	2	2 2100-1/2W-+1%
ł	88-188	8364503453	2	15 K -1/2W-+1%
L.	186	8624378442		267K -1/2W-+1%
	CARACITOR	BOLAS/ONVL		201R -0.24 _ 1.0
		0374 7 41 HO3		
	01-02-03-08-00	03/A24/ NU3	3	0.27 # 0.
	64	876A409H09		1.0-4FD.
	C5	187A508H10		IS MFD.
	ÇII	3509A33H0I		2.0MFD
	C7	837A241H16	1	2.2 MFD.
	C9	876A409H01	1 I	-18 M F D
į	DIODE			
i	DI TO DI2	188A342H11	12	IN 4822
	013-014-015-018	188A342H06	4	IN 4818
l	DI6 - DI7	184A855H14	2	IN 4385
	019-D21	837A692H03	2	IN 645A
1	020	1844855 807	1	IN4574
	TRANSFORMER			
i	TI-T2-T3	2908300602	3	
	TRANSICTOR			
		0774617407		0117500
		837A617H03		2N 3590
	01-02-03-03-07-09	8484851HU2	•	283417
	04	184A638H18	-	28697
	96	184A638H20	1	2 N 11 3 2
	08-010	849A441H01	2	2 N 3645
	RESISTOR			
Ì	R28	184A763H41		3.9K 1/2W ± 5%
- 1	RI-R2-R3	1844763862	3	30K -1/2W- ± 5 %
	R4 - R5 - R6 - R19	837A237H21	4	1200A-11W-±5%
	R60 - R25-R29-R32	184A763H47	4	6,8 K 1/2 W - ± 5%
	RIO - RII - RI2	629A53IH67	3	30K -1/2W- + 2%
	R13-R14-R15-R24			1
	R30 - R31 - R34	1844763851	7	10 K -1/2W 5%
	016 017 010 036		4	22K -1/2W-+ 5%
	RIG * RI( * RIG - RJJ	1844/65859		
	R20	1844763H61		278 -1/28-+ 5%
	R20 R21 - R22	1844763H51	1	27K -1/2W-± 5%
	R20 R21 - R22	1844763H59 1844763H61 1844763H35	1	27K -1/2W-± 5% 2.2K -1/2W-± 5%
	R10 - R17 - R18 - R35 R20 R21 - R22 R23 - R36	1844763H59 1844763H61 1844763H35 1844763H43	1 2 2	$\frac{27 \text{ K} - \frac{1}{2} \text{ W} - \frac{1}{2} 5\%}{2.2 \text{ K} - \frac{1}{2} \text{ W} - \frac{1}{2} 5\%}$ $\frac{4.7 \text{ K} - \frac{1}{2} \text{ W} - \frac{1}{2} 5\%}{12 \text{ W} - \frac{1}{2} 5\%}$
	R20 R20 R21 - R22 R23 - R36 R26 - R33 - R37	1844763H59 1844763H61 1844763H35 1844763H43 1844763H73	 2 2 3	$\frac{27 \text{ K} - 1/2 \text{ W} - \pm 5\%}{2.2 \text{ K} - 1/2 \text{ W} - \pm 5\%}$ $\frac{4.7 \text{ K} - 1/2 \text{ W} - \pm 5\%}{82 \text{ K} - 1/2 \text{ W} - \pm 5\%}$
	RIG - RI7 - RIG - RI3 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27	1844763H59 1844763H61 1844763H35 1844763H43 1844763H73 1844763H53	1 2 3 1	$\frac{27 \text{ K} - 1/2 \text{ W} - \pm 5\%}{2.2 \text{ K} - 1/2 \text{ W} - \pm 5\%}$ $\frac{4.7 \text{ K} - 1/2 \text{ W} - \pm 5\%}{12 \text{ K} - 1/2 \text{ W} - \pm 5\%}$ $\frac{12 \text{ K} - 1/2 \text{ W} - \pm 5\%}{12 \text{ K} - 1/2 \text{ W} - \pm 5\%}$
	RC - RI7 - RI6 - R33 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38	1844763H59 1844763H61 1844763H35 1844763H35 1844763H33 1844763H73 1844763H53 7624679H01	 2 2 3 1	$\frac{27 \text{ k} - 1/2 \text{ w} - \pm 5\%}{4.7 \text{ k} - 1/2 \text{ w} - \pm 5\%}$ $\frac{82 \text{ k} - 1/2 \text{ w} - \pm 5\%}{62 \text{ k} - 1/2 \text{ w} - \pm 5\%}$ $\frac{12 \text{ k} - 1/2 \text{ w} - \pm 5\%}{150 \text{ ch} - 3\text{ w}}$
	R16 - R17 - R18 - R35 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R36 R46	1844763H61 1844763H61 1844763H35 1844763H35 1844763H73 1844763H53 7624679H01 629A430H01	 2 3   1	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm \ 5\% \\ 2.2 \ K & -1/2 \ W - \pm \ 5\% \\ 4.7 \ K & -1/2 \ W - \pm \ 5\% \\ 82 \ K & -1/2 \ W - \pm \ 5\% \\ 12 \ K & -1/2 \ W - \pm \ 5\% \\ 150 \ \Omega - \ 3W \\ \hline \begin{array}{c} 50 \ K & -1/4 \ W - \pm \ 20\% \\ \hline \end{array}$
	R16 - R17 - R18 - R35 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44	1844763H59 1844763H61 1844763H35 1844763H43 1844763H43 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 1844763H61 185421H05	 2 3   1   3	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R16 - R17 - R18 - R35 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45	1844763H59 1844763H61 1844763H35 1844763H35 1844763H33 1844763H33 7624679H01 6294430H01 1854211H05 8624406H02	 2 3       3   1	$\begin{array}{r} 27 \ \kappa - 1/2 \ w - \pm \ 5\% \\ 2.2 \ \kappa - 1/2 \ w - \pm \ 5\% \\ 4.7 \ \kappa - 1/2 \ w - \pm \ 5\% \\ 1.2 \ \kappa - 1/2 \ w - \pm \ 5\% \\ 12 \ \kappa - 1/2 \ w - \pm \ 5\% \\ 13 \ \kappa - 1/2 \ w - \pm \ 5\% \\ 15 \ \kappa - 1/4 \ w - \pm \ 20\% \\ 20 \ \kappa5 \ w - \pm \ 10\% \\ 20 \ \kappa5 \ w - \pm \ 10\% \end{array}$
	R10 - R12 - R35 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47	1844763H51 1844763H61 1844763H61 1844763H43 1844763H43 1844763H53 7624679H01 6294430H01 1854211H05 8624406H02 1844756H01	 2 3   1   1   3   1	$\begin{array}{r} 27 \\ K \\ -1/2 \\ W \\ -1/2 \\$
	RIG - RIJ - RIG - RJS R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51	1844763H53 1844763H61 1844763H53 1844763H33 1844763H33 1844763H53 7624679H01 6294430H01 1854211H05 8624406H02 1844756H01 1854067H05	 2 3 1 1 1 3 1 1 3 1 1 2	$\begin{array}{c} 27 \\ k - 1/2 \\ w - \pm 5\% \\ 2.2 \\ k - 1/2 \\ w - \pm 5\% \\ 4.7 \\ k - 1/2 \\ w - \pm 5\% \\ 12 \\ k - 1/2 \\ w - \pm 5\% \\ 15 \\ 0.7 \\ 0.0 \\ 0.7 \\ w - \pm 5\% \\ 10 \\ 0.0 $
	R16 - R17 - R18 - R33 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47 R47 R47 R49 - R51 R49 - R52 (125 VDC)	1844 / 63H3 1844 / 63H6 1844 / 63H6 1844 / 63H3 1844 / 63H3 7624 67H0 1854 / 63H73 7624 67H0 1854 / 64H02 1854 / 66H02 1854 / 66H02 1854 / 66H02 1336173	 2 3   1   1   3   1   1   3   1   2   2	$\begin{array}{r} 27 \\ K - 1/2 \\ W - \pm 5 \\ 2.2 \\ K - 1/2 \\ W - \pm 5 \\ 4.7 \\ K - 1/2 \\ W - \pm 5 \\ 3.0 \\ K - 1/2 \\ W - \pm 5 \\ 12 \\ K - 1/2 \\ W - \pm 5 \\ 13 \\ 12 \\ K - 1/2 \\ W - \pm 5 \\ 12 \\ 10 \\ W - \pm 5 \\ 20 \\ 0 \\ 0 \\ K - 1/4 \\ W - \pm 10 \\ 10 \\ W \\ 20 \\ K5 \\ W - \pm 10 \\ M \\ 10 \\ W \\ 20 \\ K5 \\ W - \pm 10 \\ M \\ 10 \\ W \\ 10 \\ $
	R16 - R17 - R16 - R35 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (126 VDC)	1844763H51 1844763H61 1844763H63 1844763H43 1844763H73 1844763H73 1844763H53 7624679H01 6294430H01 185421H05 8624406H02 1844756H01 1854067H05 1336173 0401299H66	 2 3   1   1   3   2 2 2 2	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R16 - R17 - R16 - R33 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R36 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (48 VDC) R53	1844763H51 1844763H61 1844763H53 1844763H53 1844763H53 7624679H01 6294430H01 1854211H05 8624406H02 1844756H01 185406H02 1336173 04D1299H66 1844763H67	 2 3 1 1 1 1 3 1 2 2 2 2 1	$\begin{array}{c} 27 \\ K \\ -1/2 \\ W \\ -1/2 \\$
	R15-R17-R18-R33 R20 R21-R22 R23-R36 R26-R33-R37 R27 R38 R46 R42-R43-R44 R45 R47 R47 R47 R47 R47 R47 R47 R47	1844763H51 1844763H61 1844763H53 1844763H53 1844763H53 7624679H01 6294430H01 1854211H05 8624406H02 1844756H01 1854067H05 1336173 0401299H56 1844763H67	 2 3 1 1 1 3 1 2 2 2 1	$\begin{array}{c} 27 \ k & -1/2 \ w - \pm \ 5\% \\ 2.2 \ k & -1/2 \ w - \pm \ 5\% \\ 4.7 \ k & -1/2 \ w - \pm \ 5\% \\ 4.7 \ k & -1/2 \ w - \pm \ 5\% \\ 12 \ k & -1/2 \ w - \pm \ 5\% \\ 13 \ c \ A.7 \ w & -1/2 \ w - \pm \ 5\% \\ 13 \ c \ A.7 \ w & -1/2 \ w - \pm \ 5\% \\ 20,000 \ A & - \pm \ 10\% \\ 20 \ k &5 \ w & - \pm \ 10\% \\ 20 \ k &5 \ w & - \pm \ 10\% \\ 40 \ k &5 \ w & - \pm \ 10\% \\ 560 \ A & -40 \ w - \pm \ 5\% \\ 550 \ A & -1/2 \ w - \pm \ 5\% \\ 47 \ k & -1/2 \ w - \pm \ 5\% \\ \end{array}$
	RIG-RI - RIG-RIS RZO RZO RZO RZI - RZZ RZ3 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47 R48 - R45 R47 R48 - R51 R49 - R52 (125 VDC) R53 ZENER DIODE ZI - Z2 - Z3	1844763H61 1844763H61 1844763H63 1844763H73 1844763H73 1844763H73 1844763H73 1844763H53 7624679H01 6294430H00 185421H05 8624406H02 1844756H01 1854067H05 1336173 0401299H66 1844763H67 8494515H05	1 2 2 3 1 1 1 1 3 1 1 2 2 2 1 2 1 3	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R10 - R12 - R13 - R33 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z5 - Z6 - Z9	1844763H51 1844763H61 1844763H53 1844763H53 1844763H53 7624679H01 6294430H01 185421H05 8624406H02 1844756H01 1854067H05 1336173 04D1299H66 1844763H67 1844763H67 1864797H13	1 2 3 1 1 1 1 3 1 2 2 2 1 3 4	$\begin{array}{r} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R16 - R12 - R13 - R33 R20 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (48 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z5 - Z6 - Z9 Z8	1844763H53 1844763H53 1844763H53 1844763H53 1844763H53 7624679H01 6294430H01 1854211H05 8624406H02 1844756H01 1854067H05 1336173 04D1299H66 1844763H67 1844763H67 1864302H17	1 2 3 1 1 1 1 3 1 2 2 2 1 1 3 4	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	RIG-RI - RIG-RIS RZO RZO RZI - RZZ RZ3 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R53 ZENER DIODE ZI - ZZ - Z3 Z4 - Z5 - Z6 - Z9 Z10	1844 763H51 1844 763H61 1844 763H63 1844 763H43 1844 763H43 7624 679H01 6294430H01 6294430H01 85421H05 8624406H02 1844 756H01 185421H05 1836173 04D1299H66 1844 763H67 1864 797H13 1864 797H13 1862 77H13	1 2 3 1 1 1 1 1 2 2 2 2 1 1 3 4 1 1	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R16 - R17 - R16 - R35 R20 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R51 R49 - R52 (48 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z5 - Z5 - Z9 Z6 Z10 DZP	1844763H61 1844763H61 1844763H63 1844763H73 1844763H73 1844763H73 1844763H73 1844763H73 18476451 185479H01 629430H01 185421H05 185406402 1844756H01 1854067H05 1864756H01 1854067H05 1864797H13 1884302H17 8624288H01 762463H01	1 2 2 3 1 1 1 1 3 1 2 2 2 2 1 1 3 4 4 1 1	$\begin{array}{r} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	RIG-RIJ-RIJS R20 R21-R22 R23-R36 R26-R33-R37 R27 R38 R42-R43-R44 R45 R47 R47 R47 R47 R47 R47 R47 R47	184 A 763 H51 184 A 763 H51 184 A 763 H51 184 A 763 H53 184 A 763 H53 762 A 679 H01 629 A 430 H01 185 A 211 H05 186 A 766 H02 184 A 756 H01 185 A 06 H02 184 A 756 H01 185 A 06 H02 184 A 756 H01 185 A 067 H05 184 A 763 H67 186 A 302 H17 186 A 30	1 2 2 3 1 1 1 1 3 1 1 2 2 2 1 1 3 4 1 1 2 2 2 1 1	$\begin{array}{c} 27 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 2.2 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 12 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 12 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 13 \ {\rm GA} - 3 \ {\rm W} \\ 50 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 20\% \\ 20,000 \ {\rm A} - \pm \ 10\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 20\% \\ 20,000 \ {\rm A} - \pm \ 10\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 20\% \\ 20,000 \ {\rm A} - \pm \ 10\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 5\% \\ 10 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 5\% \\ 35 \ {\rm A} - 40 \ {\rm W} - \pm \ 5\% \\ 35 \ {\rm A} - 40 \ {\rm W} - \pm \ 5\% \\ 47 \ {\rm K} - 1/2 \ {\rm W} - \pm \ 5\% \\ 1 \ {\rm W} \ 4751 \ {\rm A} \\ 1 \ {\rm W} \ 302 \ {\rm IB} \\ 1 \ {\rm W} \ 302 \ {\rm IB} \\ 1 \ {\rm W} \ 306 \ {\rm B} \\ 1 \ {\rm W} \ 306 \ {\rm B} \\ 1 \ {\rm W} \ 306 \ {\rm B} \\ 1 \ {\rm W} \ 306 \ {\rm B} \end{array}$
	RIG-RI - RIG-RIS RZO RZO RZO RZI - RZZ RZ3 - R36 R26 - R33 - R37 R27 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R53 ZENER DIODE ZI - ZZ - Z3 Z4 - Z5 - Z6 - Z9 Z0 DZP DZP1 - DZP2 Z7	1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H53 1844 7 63 H53 7624 67 9 H01 6294 30 H01 1854 21 H H05 8624 4 06 H02 1844 7 56 H01 1854 21 H H05 1836 173 04 D1299 H66 1844 7 63 H67 1864 7 9 H17 862 A 288 H01 762 A 63 H H01 629 A 79 H13 188 A 302 H17 188 B A 302 H18 188 B A 302 H18 18	1 2 2 3 1 1 1 1 3 1 1 2 2 2 2 1 1 3 4 1 1 1 2 2 2 2 1 1 1 1 2 2 2 2 1 1 1 1	$\begin{array}{r} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R16 - R11 - R16 - R35 R20 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z5 - Z5 - Z9 Z6 Z10 DZP DZP DZP1 - DZP2 Z7 711	1844763H51 1844763H61 1844763H61 1844763H33 1844763H33 7624679H01 629430H01 1854211H05 8624406H02 1844756H01 1854067H05 1336173 0401299H56 1864797H13 1864302H17 8624288H01 7524631H01 6294798H03 1864302H18 187684041	I 2 2 3 1 1 1 1 1 2 2 2 2 1 1 1 2 2 2 1 1 1 2 2 2 1 1 1 1 2 2 2 1 1 1 1 1 2 2 1	$\begin{array}{c} 27 \\ k - 1/2 \\ w - \pm 5\% \\ 2.2 \\ k - 1/2 \\ w - \pm 5\% \\ 32 \\ k - 1/2 \\ w - \pm 5\% \\ 32 \\ k - 1/2 \\ w - \pm 5\% \\ 12 \\ k - 1/2 \\ w - \pm 5\% \\ 13 \\ 0.6 \\ - 1/2 \\ w - \pm 5\% \\ 10 \\ 0.0 \\ 0.0 \\ - 5\% \\ - \pm 10\% \\ 20 \\ 0.0 \\ 0.0 \\ - 5\% \\ - \pm 10\% \\ 20 \\ 0.0 \\ - 5\% \\ - \pm 10\% \\ 10\% \\ 20 \\ - 5\% \\ - \pm 10\% \\ 10$
	RIG-RIJ-RIJS RZO R2O R2I-R22 R23-R36 R26-R33-R37 R27 R38 R42-R43-R44 R45 R47 R47 R47 R47 R49-R52 (125 VDC) R49-R52 (125 VDC) R49-R52 (48 VDC) R53 ZENER DIODE ZI-Z2-Z3 Z4-Z5-Z6-Z9 Z8 Z10 D2P D2PI-DZP2 Z7 ZII	1844763H51 1844763H61 1844763H53 1844763H53 1844763H53 7624679H01 6294430H01 1854211H05 8624406H02 1844756H01 185406H02 1844756H01 185406H02 1844756H01 185406H02 1844756H01 185406H02 1844756H05 1864797H13 1884302H17 8624288H01 7624631H01 6294798H03 1884302H18 8764619H01	1 2 3 1 1 1 1 3 6 1 2 2 2 1 1 3 4 1 1 2 2 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1	$\begin{array}{c} 27 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5 \ {\rm K} \\ 2.2 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5 \ {\rm K} \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5 \ {\rm K} \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5 \ {\rm K} \\ 12 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5 \ {\rm K} \\ 13 \ {\rm GA} - 3 \ {\rm W} \\ 15 \ {\rm GA} - 3 \ {\rm W} \\ 15 \ {\rm GA} - 3 \ {\rm W} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 20,000 \ {\rm A} - \pm \ 10 \ {\rm K} \\ 10 \ {\rm K} \$
	R16 - R13         R33           R20         R21 - R22           R23 - R36         R27           R38         R27           R38         R27           R38         R47           R45         R44           R45         R47           R48 - R51         R48 - R51           R49 - R52 (125 VDC)         R49 - R52 (48 VDC)           R53         ZENER DIODE           Z1 - Z2 - Z3         Z4 - Z 5 - Z6 - Z9           Z6         Z10           DZP         DZP           Z7         Z11           VARSISTOR	1844 763H51 1844 763H61 1844 763H63 1844 763H73 1844 763H73 7624 679H01 1854 211H05 1854 211H05 1854 211H05 1854 765H01 1854 211H05 1854 765H01 1854 765H01 1854 763H67 1864 757H13 1864 763H67 7624 631H01 1854 302H17 6294 798H03 1884 302H17 1884 302H17 1894 302H17 1994	I 2 2 3 1 1 1 1 2 2 2 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 1 2 2 2 1 1 1 1 2 2 1 1 1 1 1 2 2 1	$\begin{array}{c} 27 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 2.2 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 12 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 13 \ {\rm GA} - 3 \ {\rm W} \\ 20 \ {\rm C} & -1/2 \ {\rm W} - \pm \ 5\% \\ 13 \ {\rm GA} - 3 \ {\rm W} \\ 20 \ {\rm CO} & -1/2 \ {\rm W} - \pm \ 5\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 20\% \\ 20 \ {\rm CO} & -5 \ {\rm W} - \pm \ 10\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 20\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 10\% \\ 20 \ {\rm K} - 1/2 \ {\rm W} - \pm \ 5\% \\ 55 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 55 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 55 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 55 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 55 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \ {\rm S} \\ 10\% \ {\rm S} & 5\% \ {\rm S} \ {$
	RIG-RI - RIG-RIS RZO RZO RZO RZO RZO RZO R2A R2S R2S-RSS R2F-RSS R4F R4F R4F R45 R47 R46 R45 R47 R48 R47 R48 R47 R48 R47 R48 R45 R47 R49 R51 R49 R52 (125 VDC) R53 ZENER DIODE ZI - Z2-Z3 Z4-Z5-Z6-Z9 Z8 Z10 DZP DZPI - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3	1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H53 1844 7 63 H53 7624 67 9 H01 6294 30 H01 1854 21 H05 8624 406 H02 1844 7 56 H01 1854 21 H05 1844 7 56 H01 1854 21 H05 1844 7 56 H01 1854 21 H05 1854 21 H05 1864 7 9 H03 1864 7 9 H03	I           2           3           I	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R10 - R10 - R33         R20         R21 - R22         R23 - R36         R26 - R33 - R37         R38         R47         R45         R47         R48 - R51         R49 - R52 (125 VDC)         R53         ZENER DIODE         Z1 - Z2 - Z3         Z4 - 25 - Z5 - Z9         Z6         Z10         DZP         DZP         DZP         VARSISTOR         VRI - VR2 - VR3	1844 7 63 H51 1844 7 63 H61 1844 7 63 H61 1854 67 9 H01 1854 67 H05 1854 7 63 H61 1854 7 9 H13 1864 7 9 7 H13	1           2           3           1           3           1           2           2           1           3           4           1           1           2           2           1           3           4           1           1           3           3	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R16 - R13     R33       R20     R21 - R22       R23 - R36     R26 - R33 - R37       R27     .       R38     .       R47     R48 - R44       R45     R47       R48 - R51     R47 - R46       R49 - R52 (125 VDC)     .       R53     ZENER DIODE       Z1 - Z2 - Z3     Z4 - Z5 - Z6 - Z9       Z6     Z10       DZP     DZP       DZP - DZP2     Z7       Z11     .       VARSISTOR     VRI - VR2 - VR3	1844 763H51 1844 763H61 1844 763H63 1844 763H73 1844 763H73 7624 679H01 1854 211H05 1854 211H05 1854 211H05 1854 765H01 1854 211H05 1854 765H01 1854 765H01 1854 763H67 1864 757H13 1864 763H67 7624 631H01 7624 631H01 1834 122H02 1834 122H02	I           2           3           I	$\begin{array}{c} 27 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 2.2 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 4.7 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 12 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 13 \ {\rm GA} - 3 \ {\rm W} \\ 20 \ {\rm C} & -1/2 \ {\rm W} - \pm \ 20\% \\ 20 \ {\rm C} & -1/4 \ {\rm W} - \pm \ 20\% \\ 20 \ {\rm C} & -5 \ {\rm W} - \pm \ 10\% \\ 20 \ {\rm K} & -1/4 \ {\rm W} - \pm \ 20\% \\ 40 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 10\% \\ 40 \ {\rm K} & -1/2 \ {\rm W} - \pm \ 5\% \\ 40 \ {\rm K} - 1/2 \ {\rm W} - \pm \ 5\% \\ 56 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 56 \ {\rm GA} - 40 \ {\rm W} - \pm \ 5\% \\ 47 \ {\rm K} - 1/2 \ {\rm W} - \pm \ 5\% \\ 47 \ {\rm K} - 1/2 \ {\rm W} - \pm \ 5\% \\ 10 \ {\rm M} & 751 \ {\rm A} \\ 10 \ {\rm M} & 751 \ {\rm A} \\ 10 \ {\rm M} & 751 \ {\rm A} \\ 10 \ {\rm M} & 202 \ {\rm B} \\ 10 \ {\rm M} & 208 \ {\rm B} \\ 10 \ {\rm M} & 208 \ {\rm B} \\ 10 \ {\rm M} & 205 \ {\rm B} \\ 1.5 \ {\rm K} & 200 \\ 12 \ {\rm K} - \pm \ 20\% \\ \end{array}$
	RIG-RI - RIG-RIS RZO RZO RZO RZO RZO R2A R2A R3S R45 R46-R3S-R37 R46 R47 R46-R43-R44 R45 R47 R47 R48-R43-R44 R45 R47 R49-R52 (125 VDC) R53 ZENER DIODE ZI - Z2-Z3 Z4-Z5-Z6-Z9 Z8 Z10 DZP DZPI - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3 TELEPHONE RELAY	1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H53 1844 7 63 H53 7624 67 9 H01 6294 30 H01 1854 21 H05 8624 406 H02 1844 7 56 H01 1854 21 H05 8624 406 H02 1844 7 56 H01 1854 06 H02 1336 173 04D 1299 H56 1847 56 H01 1854 06 H05 1864 7 9 H13 1864 7 63 H67 8494 51 5H05 1864 7 9 TH13 1864 7 63 H67 1854 28 H01 7624 63 H01 6294 7 9 H03 1884 302 H18 8764 61 9 H01 1834 122 H02	I           2           3           I	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	R10 - R13 - R13         R20         R21 - R22         R23 - R36         R26 - R33 - R37         R47         R38         R44 - R43 - R44         R45         R47 - R45 - R51         R49 - R52 (125 VDC)         R49 - R52 (125 VDC)         R53         ZENER DIODE         Z1 - Z2 - Z3         Z4 - Z5 - Z6 - Z9         Z6         Z10         DZP         DZP1 - DZP2         Z7         Z11         VARSISTOR         VRI - VR2 - VR3         TELEPHONE RELAY         TR2 - TR3	1844 7 63 H51 1844 7 63 H61 1844 7 63 H61 6294 30 H01 1854 21 H05 8624 406 H02 1854 21 H05 8624 406 H02 1854 21 H05 1854 21 H05 1855 21 H05	1           2           3           1           1           2           2           1           1           2           2           2           1           1           1           1           1           1           1           2           2           1           1           2           3           4           1           1           2           3           4           1           3           3           2           2           3           3           2	27K - 1/2 W - ± 5% 2.2K - 1/2 W - ± 5% 4.7K - 1/2 W - ± 5% 12 K - 1/2 W - ± 5% 13 CA - 1/2 W - ± 5% 15 CA - 3 W 20,000 A - ± 10% 20,000 A - ± 10% 40 K 250 A 560 A - 40W - ± 5% 47 K - 1/2 W - ± 5% 47 K - 1/2 W - ± 5% 10% 47 K - 1/2 W - ± 5% 10% 47 K - 1/2 W - ± 5% 10% 10% 10% 10% 10% 10% 10% 10
	RIS-RIS-RISS       R20       R21 - R22       R23 - R36       R26 - R33 - R37       R27       . R38       R47       R48 - R41       R45       R47       R48 - R51       R49 - R52 (125 VDC)       R49 - R52 (125 VDC)       R49 - R52 (48 VDC)       R53       ZENER DIODE       Z1 - Z2 - Z3       Z4 - Z 5 - Z6 - Z9       Z6       Z10       DZP1 - DZP2       Z7       Z11       VARSISTOR       VR1 - VR2 - VR3       TELEPHONE       RELAY       TR1	1844 7 63 H51 1844 7 63 H61 1844 7 63 H61 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 7624 67 H01 1854 21 H05 18624 06 H02 1854 7 56 H01 1854 7 56 H01 1854 7 56 H01 1854 7 63 H67 18624 288 H01 7624 63 1 H01 1834 122 H02 407 C 614 H06 407 C 280 H19	I           2           3           I	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm 5 \% \\ 2.2 \ K & -1/2 \ W - \pm 5 \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \% \\ 12 \ K & -1/2 \ W - \pm 5 \% \\ 12 \ K & -1/2 \ W - \pm 5 \% \\ 13 \ O_{A} & -3 \ W \\ 20,000 \ A & -1/2 \ W - \pm 20\% \\ 20,000 \ A & -\pm 10 \% \\ 20 \ K & -1/4 \ W - \pm 20\% \\ 20,000 \ A & -\pm 10 \% \\ 20 \ K & -5 \ W - \pm 10 \% \\ 20 \ K & -5 \ W - \pm 10 \% \\ 20 \ K & -5 \ W - \pm 10 \% \\ 20 \ K & -5 \ W - \pm 10 \% \\ 20 \ K & -1/2 \ W - \pm 5 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 20 \ K & -1/2 \ W - \pm 5 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 35 \ A & -4 \ M & -\pm 5 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \ M & -\pm 10 \% \\ 10 \ M & -5 \ M & -\pm 10 \ M & -\pm 10 \ M & -\pm 10 \ M \\ 10 \ M & -5 \ M & -\pm 10 \ M & -$
	R10 - R13       R33         R20       R20         R21 - R22       R23 - R36         R26 - R33 - R37       R27         R38       R27         R38       R46         R45       R44         R45       R47         R48 - R35 - R32       (125 VDC)         R53       ZENER DIODE         Z1 - Z2 - Z3       Z4 - Z5 - Z6 - Z9         Z8       ZI0         D2P - DZP2       Z7         ZII       VARSISTOR         VRI - VR2 - VR3       TRI         RESISTOR       RELAY	1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           6294 30 H 01           6294 30 H 01           1854 21 H 05           862 44 06 H 02           1844 756 H 01           1854 067 H 05           1366 173           040 1299 H 66           184 4 763 H 67           8493 515 H 05           186 A 797 H 13           188 A 302 H 17           762 A 63 1 H 01           629 A 798 H 03           188 A 302 H 10           762 A 63 1 H 01           762 A 63 1 H 01           762 A 63 1 H 01           763 A 63 1 H 01           763 A 63 1 H 01           183 A 12 2 H 02           407 C 6 14 H 0 6           407 C 28 C H 19	1       2       3       1       1       2       2       1       1       2       2       1       1       1       1       2       2       1       1       1       2       2       1       1       2       1       3       4       1       1       2       1       2       1       2       1       2       1	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm 5 \ \% \\ 2.2 \ K & -1/2 \ W - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \ \% \\ 12 \ K & -1/2 \ W - \pm 5 \ \% \\ 12 \ K & -1/2 \ W - \pm 5 \ \% \\ 13 \ 0.4 \ M & -1/2 \ W - \pm 5 \ \% \\ 13 \ 0.4 \ M & -1/2 \ W - \pm 5 \ \% \\ 20 \ (0 \ 0.4 \ W - \pm 5 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 20 \ K &5 \ W - \pm 10 \ \% \\ 10 \ W - 10 \ W - \pm 10 \ W - \pm 10 \ \% \\ 10 \ W - 10 \ W - \pm 10 \ W -$
	RIG-RIG-RIG-RIG-RIG RZO R21 - R22 R23 - R36 R26 - R33 - R37 R38 R46 R42 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R53 ZENER DIODE ZI - Z2 - Z3 Z4 - Z5 - Z6 - Z9 Z8 Z10 DZP DZPI - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3 TELEPHONE RELAY TR2 - TR3 TR1 RESISTOR RDC (125 VDC)	1844 7 63 H51 1844 7 63 H61 1844 7 63 H61 1844 7 63 H61 1844 7 63 H63 1844 7 63 H63 1844 7 63 H63 1844 7 63 H63 7 624 67 9 H01 6294 30 H01 1854 21 H05 8624 406 H02 1854 21 H05 8624 406 H02 1854 21 H05 8624 406 H02 1854 21 H05 1854 21 H05 1864 7 9 H13 1864 302 H17 7 624 63 1 H01 6294 7 9 8 H03 1884 302 H17 7 624 63 1 H01 6294 7 9 8 H03 1884 302 H17 1834 122 H02 407C 614 H06 407C 280 H19 1267 2 9 3	I       2       2       3       I       I       2       2       1       3       4       1       2       2       1       1       2       1       1       2       1       1       2       1       2       1       2       1       2       1       2       1       1       2       1       1       1       1	27K - 1/2 W - ± 5% 2.2K - 1/2 W - ± 5% 4.7K - 1/2 W - ± 5% 12 K - 1/2 W - ± 5% 13 CA - 1/2 W - ± 5% 15 CA - 3 W 20,000 A - ± 10% 20,000 A - ± 5% 35 A - 40W - ± 5% 10% 47 K - 1/2 W - ± 5% 10% 10% 10% 10% 10% 10% 10% 10
	R10       R13       R33         R20       R21       R23         R23       R36       R27         R38       R27       R38         R26       R33       R37         R37       R47       R46         R45       R47       R48         R48       R37       R44         R45       R47       R46         R45       R47       R46         R47       R48       R37         R49       R52       (125 VDC)         R49       R52       (48 VDC)         R53       ZENER DIODE       Z1 - Z2 - Z3         Z4-25-Z6-Z9       Z6       Z0         DZP       DZP       DZP         DZP       DZP2       Z7         Z11       Z10       DZ2         VARSISTOR       VRI - VR2 - VR3         TELEPHONE       RELAY         TR2       TR3         TR1       RESISTOR         RDC (125VDC)       RDC (125VDC)	1844 763H51 1844 763H61 1844 763H61 1844 763H35 1844 763H435 7624 679H01 1854 211H05 8624 06H02 1854 211H05 8624 06H02 1854 756H01 1854 211H05 1854 756H01 1854 756H01 1854 756H01 1854 756H05 1864 757H13 1864 757H13 187H147 187	I         2           2         3           1         1           3         1           2         2           1         1           2         2           1         1           1         2           2         1           3         4           1         1           2         1           3         2           1         1           1         2           1         1           1         1           1         1           1         1           1         1           1         1           1         1	$\begin{array}{c} 27 \ \text{K} & -1/2 \ \text{W} - \pm \ 5\% \\ 2.2 \ \text{K} & -1/2 \ \text{W} - \pm \ 5\% \\ 4.7 \ \text{K} & -1/2 \ \text{W} - \pm \ 5\% \\ 4.7 \ \text{K} & -1/2 \ \text{W} - \pm \ 5\% \\ 12 \ \text{K} & -1/2 \ \text{W} - \pm \ 5\% \\ 12 \ \text{K} & -1/2 \ \text{W} - \pm \ 5\% \\ 13 \ \text{GA}_{-3} \ \text{W} \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 20\% \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 20\% \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 20\% \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 20\% \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 20\% \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 20\% \\ 20,000 \ \text{A}_{-1} \ \text{W} - \pm \ 5\% \\ 40 \ \text{K} \\ 20 \ \text{K} - \ 5\% - \pm \ 10\% \\ 40 \ \text{K} \\ 20 \ \text{K} - \ 1/2 \ \text{W} - \pm \ 5\% \\ 47 \ \text{K} - \ 1/2 \ \text{W} - \pm \ 5\% \\ 10\% \ \text{M} \\ 10\% \ 20 \ \text{K} \\ 10\% \ 20\% \ \text{K} \\ 10\% \ \text{K} \\ \ \text{K} \ 10\% \ 1$
	RIS-RIS-RISS           R20           R20           R21-R22           R23-R36           R26-R33-R37           R27           R38           R46           R45           R47           R48-R43-R44           R45           R47           R48-R45           R47           R48-R51           R49-R52 (125 VDC)           R53           ZENER DIODE           Z1-Z2-Z3           Z4-Z5-Z6-Z9           Z8           Z10           DZPI           DZP           Z7           Z11           VARSISTOR           VRI - VR2 - VR3           TELEPHONE RELAY           TR1           RESISTOR           R0C (125VDC)           R50	1844 / 63/63           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1844 / 63/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 64/61           1854 / 65/61           1864 / 65/61           1864 / 65/61           1864 / 65/61           1864 / 65/61           1864 / 65/61           1834 / 62/61           1834 / 62/61           184 / 756           184 / 756           184 / 756           184 / 756           184 / 756	1       2       3       1       1       2       2       1       1       2       2       1	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
	RIG - RIG - RIG - RIG R 20 R 40 R 40	1844 7 63 H51 1844 7 63 H53 7624 67 9 H01 6294 30 H01 1854 21 H05 8624 40 6 H02 1854 21 H05 8624 40 6 H02 1854 21 H05 8624 40 6 H02 1854 21 H05 1854 7 5 H01 1854 7 5 H05 1864 7 5 H05 1864 7 5 H05 1804 30 2 H17 7624 63 H H01 6294 7 9 8 H03 1804 30 2 H17 8784 61 9 H01 1834 122 H02 407C 614 H06 407C 614 H06 407C 614 H06 407C 614 H06 6294 30 H05 12672 93 12025 87 1844 7 5 6 H02 6294 30 H05 1864 7 5 H02 6294 30 H05 1864 7 5 6 H02 1864 7 5 6 H02 1864 7 5 6 H02 6294 30 H05 1864 7 5 6 H02 1864 7 6 H02 1864 7 6 H02 1864 7 6 H02 1864 7 6 H02 1864	1         2           2         3           1         1           2         2           1         1           2         2           1         1           1         1           2         2           1         1           1         1           1         1           1         1           2         1           3         3           2         1           1         1           1         1           3         3	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm 5 \ \% \\ 2.2 \ K & -1/2 \ W - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \ \% \\ 12 \ K & -1/2 \ W - \pm 5 \ \% \\ 13 \ Onlymbol{$
	RIG-RI - RIG-RIS R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 . R38 R47 R48 - R43 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (48 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z 5 - Z6 - Z9 Z6 Z10 DZP DZP1 - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3 TELEPHONE RELAY TR2 - TR3 TR1 RESISTOR RDC (125 VDC) R50 R39 - R40 - R41 P7 - PR - P9	1844 7 63 H53 1844 7 63 H61 1844 7 63 H61 1844 7 63 H73 1844 7 63 H73 7624 67 H73 1844 7 63 H73 7624 67 H01 1854 211 H05 8624 06 H02 1844 7 56 H01 1854 211 H05 8624 06 H02 1854 7 56 H01 1854 7 56 H01 7624 63 H 61 1864 7 97 H13 1864 7 97 H13 187 H13 18	I         2           2         3           1         1           2         2           1         1           2         2           1         1           1         2           2         1           1         1           2         1           1         1           2         1           3         4           1         1           2         1           1         1           3         3	$27 K - 1/2 W - \pm 5\%$ $2.2 K - 1/2 W - \pm 5\%$ $4.7 K - 1/2 W - \pm 5\%$ $4.7 K - 1/2 W - \pm 5\%$ $12 K - 1/2 W - \pm 5\%$ $12 K - 1/2 W - \pm 5\%$ $13 0.0 - 3W$ $20,000 A - \pm 10\%$ $35 A - 40W - \pm 5\%$ $47 K - 1/2 W - \pm 5\%$ $47 K - 1/2 W - \pm 5\%$ $10\%$ $1.5 K = 20\%$ $1.5 K = 20\%$ $100 K$ $200K - 1/4 W - \pm 20\%$ $100 K$
	R16 - R13       R35         R20       R21 - R22         R23 - R36       R27         R23 - R36       R27         R38       R46         R45       R47         R48 - R31       R46         R45       R47         R48 - R51       R47         R49 - R52 (125 VDC)       R53         ZENER DIODE       Z1 - Z2 - Z3         Z4 - Z5 - Z6 - Z9       Z8         Z10       DZP         D2P1 - DZP2       Z7         Z11       VARSISTOR         VRI - VR2 - VR3       TELEPHONE RELAY         TR1       RESISTOR         R0C (125 VDC)       R50         R39 - R40 - R41       R70 - R41         R7 - R8 - R9       P2	1844 7 63 H 5 1844 7 63 H 6 1844 7 63 H 6 1844 7 63 H 6 1844 7 63 H 7 1844 7 63 H 6 1854 21 H 05 8624 4 06 H 02 1854 21 H 05 8624 4 06 H 02 1854 21 H 05 8624 4 06 H 02 1854 7 5 H 05 1864 7 5 H 05 1864 7 5 H 05 1804 7	1       2       3       1       1       2       2       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       3       3       3       3       3       3       3       3       3	$27 K - 1/2 W - \pm 5\%$ $2.2 K - 1/2 W - \pm 5\%$ $4.7 K - 1/2 W - \pm 5\%$ $4.7 K - 1/2 W - \pm 5\%$ $12 K - 1/2 W - \pm 5\%$ $13 0.0 - 3W$ $20,000 A - \pm 10\%$ $20 K5 W - \pm 10\%$ $35 A - 40W - \pm 5\%$ $95 A - 40W - \pm 5\%$ $95 A - 40W - \pm 5\%$ $95 A - 40W - \pm 5\%$ $10\%$ $10 X - 25W - \pm 5\%$ $400A - 25W - \pm 5\%$ $100 K$ $200K - 1/4 W - \pm 20\%$
	R16 - R13         R20         R20         R21 - R22         R23 - R36         R26 - R33 - R37         R27         R38         R46 - R33         R47         R48 - R41         R45         R47         R48 - R51         R49 - R52 (125 VDC)         R53         ZENER DIODE         Z1 - Z2 - Z3         Z4 - Z5 - Z6 - Z9         Z8         Z10         D2P         D2P1 - DZP2         Z7         Z11         VARSISTOR         VR1 - VR2 - VR3         TELEPHONE RELAY         TR2 - TR3         TR1         R50         R39 - R40 - R41         R7 - R8 - R9         R54	1844 7 63 H51 1844 7 63 H53 1844 7 63 H53 7624 67 9 H01 6294 30 H01 1854 21 H05 8624 40 6 H02 1854 21 H05 8624 40 6 H02 1854 21 H05 8624 40 6 H02 1854 7 5 6 H01 1854 7 5 6 H01 1854 7 5 6 H05 1864 7 5 6 H05 1854 7 5 6 H01 1834 122 H02 407C 6 14 H06 407C 6 14 H06 407C 6 14 H06 6294 30 H05 6294 30 H05	1       2       3       1       2       2       1       1       2       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       3       3       3       3       3	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm 5 \% \\ 2.2 \ K & -1/2 \ W - \pm 5 \% \\ 4.7 \ K & -1/2 \ W - \pm 5 \% \\ 12 \ K & -1/2 \ W - \pm 5 \% \\ 12 \ K & -1/2 \ W - \pm 5 \% \\ 13 \ Onlymbol{On$
	RIG - RIG - RIG - RIG R20 R21 - R22 R23 - R36 R26 - R33 - R37 R27 R38 R47 R48 - R43 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z 5 - Z6 - Z9 Z6 Z10 DZP DZP1 - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3 TELEPHONE RELAY TR2 - TR3 TR1 RESISTOR RDC (125 VDC) R50 R39 - R40 - R41 R7-88 - R9 R54 R55	1844 7 63 H53 1844 7 63 H61 1844 7 63 H61 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 7624 67 H01 1854 211 H05 8624 06 H02 1844 7 56 H01 1854 211 H05 8624 06 H02 1854 7 56 H01 1854 7 56 H01 1854 7 56 H05 1864 7 97 H13 1864 7 97 H13 187 H13 18	1       2       3       1       1       2       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       3       3       1       1       1       1       1       1       1       1       1       1       1       1	$\begin{array}{c} 27 \ K & -1/2 \ W & - \pm 5 \ \% \\ 2.2 \ K & -1/2 \ W & - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W & - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W & - \pm 5 \ \% \\ 12 \ K & -1/2 \ W & - \pm 5 \ \% \\ 12 \ K & -1/2 \ W & - \pm 5 \ \% \\ 13 \ K & -1/2 \ W & - \pm 5 \ \% \\ 13 \ K & -1/2 \ W & - \pm 20 \ \% \\ 20,000 \ \Lambda & - \pm 10 \ \% \\ 20 \ K & -1/4 \ W & - \pm 20 \ \% \\ 20,000 \ \Lambda & - \pm 10 \ \% \\ 20 \ K & - 1/4 \ W & - \pm 20 \ \% \\ 35 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ K & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ K & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ K & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/4 \ W & \pm 20 \ \% \\ 15 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\$
	R16 - R13       R35         R20       R21 - R22         R23 - R36       R27         R38       R27         R38       R47         R42 - R43 - R44       R45         R47       R48 - R51         R49 - R52 (125 VDC)       R49 - R51         R49 - R52 (125 VDC)       R53         ZENER DIODE       Z1 - Z2 - Z3         Z4 - Z5 - Z6 - Z9       Z8         Z10       DZP         DZP1 - DZP2       Z7         Z11       VARSISTOR         VRI - VR2 - VR3       TELEPHONE RELAY         TR1       RESISTOR         RDC (125 VDC)       R50         R39 - R40 - R41       R7-R8-R9         R55       R56	1844 7 63 H51 1844 7 63 H61 1844 7 63 H61 1844 7 63 H63 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 1854 21 H05 862 A 4 0 6 H02 1854 21 H H05 862 A 4 0 6 H02 1854 21 H H05 862 A 4 0 6 H02 1854 21 H H05 1854 21 H H05 1854 21 H05 120 25 F7 1844 756 H02 629 A4 30 H05 629	1       2       3       1       1       2       2       1	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm 5\% \\ 2.2 \ K & -1/2 \ W - \pm 5\% \\ 4.7 \ K & -1/2 \ W - \pm 5\% \\ 4.7 \ K & -1/2 \ W - \pm 5\% \\ 12 \ K & -1/2 \ W - \pm 5\% \\ 13 \ K & -1/2 \ W - \pm 5\% \\ 13 \ K & -1/2 \ W - \pm 5\% \\ 13 \ K & -1/2 \ W - \pm 5\% \\ 20,000 \ A & -\pm 10\% \\ 20 \ K & -1/4 \ W - \pm 20\% \\ 20 \ K & -5\% \ -\pm 10\% \\ 40 \ K \\ 250 \ A & -1/2 \ W - \pm 5\% \\ 10\% \ K & -1/2 \ W - \pm 5\% \ K & -1/2 \ W - \pm 5\% \ K & -1/2 \ W - \pm 5\% \ K & -1/2 \ W - \pm 5\% \ K & -1/2 \ W - \pm 5\% \ K & -1/2 \ W - \pm 1\% \ K & -1/2 \ W - \pm 1\% \ K & -1/2 \ W - \pm 1\% \ K & -1/2 \ W - \pm 1\% \ K & -1/2 \ W - \pm 1\% \ K & -1/2 \ W - \pm 1\% \ K \ K$
	RIG - RIG - RIG - RIG R20 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R38 R46 R42 - R43 - R44 R45 R47 R48 - R43 - R44 R45 R47 R49 - R52 (125 VDC) R49 - R52 (125 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z5 - Z6 - Z9 Z8 Z10 DZP DZP1 - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3 TELEPHONE RELAY TR2 - TR3 TR1 RESISTOR RDC (125 VDC) R50 R39 - R40 - R41 R7 - R8 - R9 R56 R57(44VDC)	1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H51 1844 7 63 H53 1844 7 63 H53 1844 7 63 H53 7624 67 9 H01 6294 30 H01 1854 21 H05 8624 406 H02 1854 21 H05 8624 406 H02 1854 21 H05 8624 406 H02 1854 21 H05 8624 406 H02 1854 21 H05 8494 51 H05 8494 51 H05 8494 51 H05 8494 51 H05 8624 28 H01 7624 63 H01 6294 798 H03 1884 302 H17 8764 61 H06 407C 61 4 H06 407C 61 4 H06 407C 61 4 H06 407C 61 4 H06 6294 30 H05 6294 30 H05 6294 30 H05 6294 30 H05 6294 31 H60 12 02 499 04 01 29 H77 84 68 02 H13 12 6728 3	1       2       3       1       2       2       1       2       2       1       1       2       2       1 <t< td=""><td><math display="block">\begin{array}{c} 27 \ K &amp; -1/2 \ W - \pm 5\% \\ 2.2 \ K &amp; -1/2 \ W - \pm 5\% \\ 4.7 \ K &amp; -1/2 \ W - \pm 5\% \\ 12 \ K &amp; -1/2 \ W - \pm 5\% \\ 12 \ K &amp; -1/2 \ W - \pm 5\% \\ 13 \ OR &amp; -1/2 \ W - \pm 5\% \\ 13 \ OR &amp; -1/2 \ W - \pm 20\% \\ 20,000 \ A &amp; - \pm 10\% \\ 20 \ K &amp; -1/4 \ W - \pm 20\% \\ 20,000 \ A &amp; - \pm 10\% \\ 20 \ K &amp; -1/4 \ W - \pm 20\% \\ 20 \ K &amp; -1/4 \ W - \pm 5\% \\ 10\% \\ 40 \ K \\ 250 \ A \\ 560 \ A &amp; - 40 \ W - \pm 5\% \\ 47 \ K &amp; - 1/2 \ W - \pm 5\% \\ 10\%</math></td></t<>	$\begin{array}{c} 27 \ K & -1/2 \ W - \pm 5\% \\ 2.2 \ K & -1/2 \ W - \pm 5\% \\ 4.7 \ K & -1/2 \ W - \pm 5\% \\ 12 \ K & -1/2 \ W - \pm 5\% \\ 12 \ K & -1/2 \ W - \pm 5\% \\ 13 \ OR & -1/2 \ W - \pm 5\% \\ 13 \ OR & -1/2 \ W - \pm 20\% \\ 20,000 \ A & - \pm 10\% \\ 20 \ K & -1/4 \ W - \pm 20\% \\ 20,000 \ A & - \pm 10\% \\ 20 \ K & -1/4 \ W - \pm 20\% \\ 20 \ K & -1/4 \ W - \pm 5\% \\ 10\% \\ 40 \ K \\ 250 \ A \\ 560 \ A & - 40 \ W - \pm 5\% \\ 47 \ K & - 1/2 \ W - \pm 5\% \\ 10\%$
	RIG - RIG - RIG - RIG R20 R20 R21 - R22 R23 - R36 R26 - R33 - R37 R38 R47 R48 - R44 R45 R47 R48 - R51 R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R49 - R52 (125 VDC) R53 ZENER DIODE Z1 - Z2 - Z3 Z4 - Z5 - Z6 - Z9 Z6 Z10 DZPI - DZP2 Z7 Z11 VARSISTOR VRI - VR2 - VR3 TELEPHONE RELAY TR2 - TR3 TRI RESISTOR RDC (125 VDC) R50 R39 - R40 - R41 R7-R8 - R9 R54 R55 R56 R57(48 VDC) R55 R50	1844 7 63 H53 1844 7 63 H61 1844 7 63 H61 1844 7 63 H73 1844 7 63 H73 1844 7 63 H73 7624 67 H01 1854 21 H05 8624 06 H02 1844 756 H01 1854 21 H05 8624 06 H02 1844 756 H01 1854 06 H05 1844 756 H01 1854 06 H05 1864 797 H13 1864 797 H13 1865 797 H13 186	1       2       3       1       1       2       2       1       1       2       2       1	$\begin{array}{c} 27 \ K & -1/2 \ W & - \pm 5 \ \% \\ 2.2 \ K & -1/2 \ W & - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W & - \pm 5 \ \% \\ 4.7 \ K & -1/2 \ W & - \pm 5 \ \% \\ 12 \ K & -1/2 \ W & - \pm 5 \ \% \\ 12 \ K & -1/2 \ W & - \pm 5 \ \% \\ 13 \ K & -1/2 \ W & - \pm 5 \ \% \\ 13 \ K & -1/2 \ W & - \pm 20 \ \% \\ 20,000 \ \Lambda & - \pm 10 \ \% \\ 20 \ K & - 1/4 \ W & - \pm 20 \ \% \\ 20,000 \ \Lambda & - \pm 10 \ \% \\ 20 \ K & - 5 \ W & - \pm 10 \ \% \\ 20 \ K & - 5 \ W & - \pm 10 \ \% \\ 20 \ K & - 1/2 \ W & - \pm 5 \ \% \\ 35 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 47 \ K & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ K & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 40 \ W & - \pm 5 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 1 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 1 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 1 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 1 \ \% \\ 10 \ \Lambda & - 1/2 \ W & - \pm 1 \ \% \\ 10 \ \Lambda & - 1/2 \ W $
	RIG-RIJ-RIJS RZO RZO RZI-RZZ RZ3-R36 R26-R33-R37 R27 R38 R46-R43-R44 R45 R47 R48-R51 R49-R52 (125 VDC) R49-R52 (125 VDC) R49-R52 (125 VDC) R53 ZENEE DIODE ZI-Z2-Z3 Z4-Z5-Z6-Z9 Z8 Z10 DZP DZPI-DZP2 Z7 Z11 VARSISTOR VRI-VR2-VR3 TELEPHONE RELAY TR2-TR3 TRI RESISTOR RDC (125 VDC) R50 R39-R40-R41 R7-R8-R9 R56 R57(48VDC) R57(125 VDC) R57(125 VDC) R57(125 VDC) R57(125 VDC) R57(125 VDC) R57(125 VDC) R57(125 VDC) R57(125 VDC)	1844 763H51 1844 763H61 1844 763H53 1844 763H53 1844 763H53 7624 679H01 6294430H00 1854 211H05 8624 406H02 1854 211H05 8624 406H02 1854 211H05 8624 406H02 1854 211H05 1854 756H01 1854 756H01 1854 756H05 1864 757H13 1880 77H13 1880 77H13 1880 77H13 1880 77H13 1880 79H03 1880 79H03 79H	1     2       2     3       1     1       3     1       1     2       2     2       1     1       1     1       3     3       3     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1	$27 K - 1/2 W - \pm 5\%$ $2.2 K - 1/2 W - \pm 5\%$ $4.7 K - 1/2 W - \pm 5\%$ $1.2 K - 1/2 W - \pm 5\%$ $12 K - 1/2 W - \pm 5\%$ $13 0.0 - 3W$ $20,000 A - \pm 10\%$ $20,000 A - \pm 10\%$ $20,000 A - \pm 10\%$ $20 K5 W - \pm 10\%$ $40 K$ $25 A - 40 W - \pm 5\%$ $95 A - 40 W - \pm 5\%$ $95 A - 40 W - \pm 5\%$ $10.2 84 B$ $1N298 4B$ $1SK - 25W - \pm 5\%$ $1.5 K - 25W - \pm 5\%$ $100 K$ $200 K - 1/4 W - \pm 2\%$ $150 A - 40 W - \pm 5\%$ $49.9 K 1/2 W - \pm 1\%$ $49.9 K 1/2 W - \pm 1\%$ $600 A - 25W - \pm 5\%$ $3550 A - 40 W - \pm 5\%$ $3550 A - 25W - \pm 5\%$ $3550 A - 25W - \pm 5\%$
	R16 - R13         R35           R20         R21 - R22           R23 - R36         R26 - R33 - R37           R27         R38           R27         R38           R46         R45           R47         R48           R45         R44           R45         R47           R48 - R43 - R44         R45           R47         R48 - R51           R49 - R52 (125 VDC)         R53           ZENER DIODE         Z1 - Z2 - Z3           Z4 - Z5 - Z6 - Z9         28           Z10         DZP           DZP         Z7           ZII         Z           VRI - VR2 - VR3         TELEPHONE RELAY           TR2 - TR3         TR1           RESISTOR         R0C (125 VDC)           RDC (48 VDC)         R50           R39 - R40 - R41         R7 - R8 - R9           R56         R57(48 VDC)           R56         R57(125 VDC)           R58         R59	1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1844 / 63/63           1854 / 64/64           1854 / 64/64           1854 / 64/64           1854 / 64/64           1854 / 64/64           1854 / 64/64           1854 / 64/64           1854 / 64/64           1854 / 65/64           1854 / 65/64           1854 / 65/64           1834 / 62/64           1834 / 62/64           1834 / 62/64           1834 / 62/64           1844 / 65/64           1202567           1844 / 65/64           1202567           1844 / 65/64           1202567           1844 / 65/64           1202567           1844 / 65/64           1202587           1844 / 65/64           1207283	1     2       2     3       1     1       2     2       1     1       2     2       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1       1     1	$\begin{array}{c} 27 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $



Fig. 5. External Connections (1 Timer) (2 Timer).



Fig. 6. Logic Block Diagram.



Fig. 7. Basic Current Sensor Circuit.



Fig. 8. Level Detector.



Fig. 9. Standard Output Circuit.



Fig. 10. Timing Variation with Temperature Changes.



Fig. 11. Component Location (Timer Board).



Fig. 12. Component Location (Logic Board).



Fig. 13. Timer Test Circuit.



Fig. 14. Relay Test Circuit.



S Fig. 15. Outline and Drilling Plan for Type SLB Relay in Type FT-42 Case.