INSTRUCTIONS

GEK-24992

SCR POWER CONVERSION MODULES
THREE PHASE FULL WAVE

OPERATION TROUBLESHOOTING – MAINTENANCE

GENERAL ELECTRIC

TABLE OF CONTENTS

WARNING: HIGH VOLTAGE

ELECTRIC SHOCK CAN CAUSE PERSONAL INJURY OR LOSS OF LIFE. WHETHER THE AC VOLTAGE SUPPLY IS GROUNDED OR NOT, HIGH VOLTAGE TO GROUND WILL BE PRESENT AT MANY POINTS. WHEN INSTRUMENTS SUCH AS OSCILLOSCOPES ARE USED TO WORK ON LIVE EQUIPMENT, GREAT CAUTION MUST BE USED. WHEN ONE OF THE INSTRUMENT LEADS IS CONNECTED TO THE CASE OR OTHER METAL PARTS OF THE INSTRUMENT, THIS LEAD SHOULD NOT BE CONNECTED TO AN UNGROUNDED PART OF THE SYSTEM UNLESS THE INSTRUMENT IS ISOLATED FROM GROUND AND ITS METAL PARTS TREATED AS LIVE EQUIPMENT. USE OF AN INSTRUMENT HAVING BOTH LEADS ISOLATED FROM THE CASE PERMITS GROUNDING OF THE CASE. EVEN WHEN MEASUREMENTS MUST BE MADE BETWEEN TWO LIVE PARTS.

GENERAL DESCRIPTION

A three phase AC to DC SCR Power Conversion Module converts three phase AC power into adjustable voltage DC power. The output voltage is controlled by means of gate pulse signals from an external control function. Protective circuits and Feedback circuits are used to protect the SCR's and to monitor the output from the SCR Conversion Module.

The SCR conversion module always contains the power conversion circuit components. The components of the protective circuitry, firing circuitry, and feedback circuitry may be located in either the SCR conversion module, a control module, or on the control panel. Refer to system elementary for details.

The power conversion circuit is a three phase, full wave bridge, each of its six legs containing a silicon controlled rectifier (SCR). This arrangement supplies unidirectional current, and can control the voltage output in either polarity; that is, it can control a DC motor in both the first and fourth quadrants. When two of these modules are connected back–to–back, they can power a DC motor through all four quadrants.

The SCR conversion module is panel mounted.

RATINGS AND SPECIFICATIONS

AC POWER INPUT FOR RATED DC OUTPUT

(a) Voltage – Three Phase:

230V +10%, –5%
460V +10%, –5%
600V +10%, –5%

(b) Frequency – 60 or 50 Hz ±2%

DC POWER OUTPUT

(a) Voltage – controllable over the following maximum ranges at –5% AC voltage.

AC Power Input	Controllable DC Voltage Range Motoring	Regenerating
230V	0 to 285 Volts	0 to 250 Volts
460V	0 to 570 Volts	0 to 500 Volts
600V	0 to 740 Volts	0 to 650 Volts

(b) Current – depending on cooling, overload requirements, ambient temperature, and the conversion module current rating system requirements.

CONTROL INPUT

(a) Gate pulses – six gate pulse trains spaced 60 degrees apart, each capable of being phase shifted over a range of 150 electric degrees; each pulse to be at least 15 volts in magnitude (at 15 milliamps loading) and be at least 10 microseconds, but no more than 50 microseconds, in width.

(b) Power Supply: +20 volts DC for operation of gate pulse amplifying circuitry.

CONTROL OUTPUT

(a) Current Feedback – 0 to approximately +2.5 volts DC for rated operating current range.

(b) Thermoswitch Interlock – normally closed interlock which opens for excessive Conversion Module temperature due to loss of cooling air (Custom Modules only).

PRINCIPLES OF OPERATION

It will be helpful in understanding the following theory of operation to refer to the SCR conversion module elementary diagram. A copy of the diagram which applies to the specific drive furnished, will be found in the diagram section of the system instruction book.

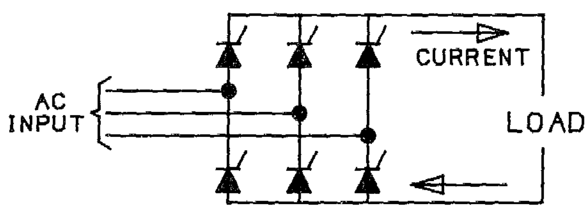
POWER CONVERSION

The function of converting AC power to adjustable voltage DC power is performed by silicon controlled rectifiers (SCR's). The SCR is a semiconductor device which can block voltage in both directions, but is capable of conducting current in one direction when "fired" by a proper gate signal. With reverse voltage applied, the SCR behaves the same as a diode rectifier. With forward voltage applied, the SCR will block current until it is switched into the conducting state by means of a gate signal. The SCR will remain in the conducting state even after gate signal is removed, as long as forward current is maintained. Controlling the instant in time, relative to the AC voltage wave, when the gate signal is applied to the SCR controls the amount of DC voltage and current that is furnished to the load.

The SCR conversion module uses six SCR's connected together to form a three phase, full wave bridge. Each SCR is mounted on an aluminum heat sink. The heat sink transmits the heat produced inside the SCR to the surrounding air. Convection cooling is adequate for the lower rated conversion modules, however, higher ratings require forced cooling.

POWER CONVERSION (continued)

The operation of the three phase SCR bridge is converting AC power to adjustable voltage DC power is best explained by referring to Figures 1 through 6. These figures show the AC voltage and DC voltage wave shapes into and out of the SCR bridge, plus the voltage wave shape across each SCR. The first three figures show control of the SCR bridge in a motoring mode; that is, with positive voltage output and positive current output, or first quadrant operation.



The last two figures show control of the SCR bridge in a regenerative mode; that is, with negative voltage output and positive current output, or fourth quadrant operation. The voltage wave shapes shown in these figures are all based on loaded operation. This means that for the regenerative cases, the load must be capable of delivering power (that is, both voltage and current) to the SCR bridge.

Figure 1 shows the voltage wave shapes for the zero degree phase back condition, or full advance. This is not a normal operating condition since it is the absolute maximum output voltage obtainable. It is shown to provide a starting point to understanding SCR operation. To obtain this operating condition each SCR must be fired as soon as forward voltage appears across it. The operation is, therefore, the same as if the bridge consisted of diode rectifiers.

Figure 2 shows the effect of delaying the SCR firing 30 degrees in time with respect to the zero phaseback condition. Note that the average voltage level has decreased.

Figure 3 shows the voltage wave shapes for the 60 degree phaseback condition. The DC voltage wave varies from almost the peak value to zero, six times a cycle. This would produce high peak to average DC current in a DC motor armature if it were not for the smoothing effect of armature inductance. (See Figure 18 in the TROUBLESHOOTING section)

Figure 4 shows the 90 degree phaseback condition under sufficient load to keep current continuous. Note that the average voltage is actually zero. This would be motor stall condition if the IR drop voltage were neglected. Since current, and therefore IR drop, can only have positive values, the motor CEMF would have to be slightly negative in practice to obtain zero terminal voltage.

Figure 5 shows the voltage wave shapes for the 120 degree phaseback condition. This is a regenerative operating condition with the DC voltage negative and the DC current positive.

Figure 6 shows the 150 degree phaseback condition, which is the maximum allowable phase retard. The current must be switched (commutated) from one AC supply line to the next while correct polarity voltage still exists to turn off the first SCR. If the SCR firing is retarded to the 180 degree phaseback condition, there is no commutating voltage available to turn off the preceding SCR, and faulty operation will result. Therefore a 30 degree margin for SCR commutation is reserved.

PROTECTIVE COMPONENTS

The protective components described below protect the SCR's.

Metal oxide varistors are connected across the AC supply lines to suppress voltage transients. They are special devices which limit voltage transients to a safe value. RC networks are connected across each SCR, both to suppress voltage transients and to limit the rate of rise of voltage (dv/dt) across the SCR. If the dv/dt applied to the SCR in the forward direction is excessive, the SCR could turn on.

Chokes are used in series with the SCR or in the AC supply line to limit the rate of rise of voltage (dv/dt) applied to each SCR and also the rate of rise of current (di/dt) through the SCR when it switches on. If the (di/dt) through the SCR at turn-on exceeds a certain value, the cell may be destroyed. The combination of chokes and R–C circuits across the SCR's limit both dv/dt and di/dt to well within safe operating limits. The chokes (reactors) also act with the R–C circuits and metal oxide varistors to limit AC line voltage transients applied to SCR's.

When a thermoswitch is mounted on a bus attached to a heat sink or on a heat sink, it monitors the module temperature. This protects against high ambient temperatures or loss of cooling air. Operation of this thermoswitch shuts down the drive, usually by opening the start–stop circuit.

PROTECTIVE COMPONENTS (continued)

Large SCR conversion modules have indicating lights connected across the incoming AC line to detect a loss of phase voltage (such as the failure of an AC line fuse).

FEEDBACK CIRCUITRY

Current feedback circuitry is used to limit the module current to a preset value.

The current feedback circuitry in paralleled SCR modules consists of three AC current transformers plus rectifiers and loading circuitry. The current transformers are mounted on the incoming AC supply lines of the SCR conversion module. The output of each current transformer is rectified and the three rectified outputs are summed together. This rectification and summation of the three AC line currents produces a current signal of the same wave shape and having a constant ratio of magnitude to the DC output current of the SCR conversion module. The current signal is changed into a voltage signal by means of a selected value of loading resistance. The correct loading resistor is chosen, depending on the drive rated current, by means of the XA to XD taps. The correct loading produces about a 2.5 volt current feedback signal at rated drive current. All of the current feedback circuitry is contained on a printed circuit card mounted in the SCR conversion module.

The table on the SCR conversion module elementary diagram specifies the correct tap (XA to XD) to use for the specific drive horsepower rating.

Drives with a single SCR module obtain a current feedback signal from a DC line shunt.

START–UP

The Power Conversion Module is ready for operation when ventilation is proper and three phase power of 1, 2, 3, sequence is applied to the SCR Conversion Module input terminals (T1, T2 and T3) and when the control harness with gate pulse signals has been connected to the conversion module.

TROUBLESHOOTING

GENERAL APPROACH

When incorrect operation is first noticed, the overall servicing time can be reduced by studying the symptoms in order to localize the trouble. A good understanding of the functional operation will be very helpful in isolating the problem. A systematic check of voltage wave shapes and comparison of them with the correct readings, as given later in this section, should reveal the source of many malfunctions.

The use of a good quality oscilloscope is required to properly troubleshoot this equipment.

WARNING

HIGH VOLTAGE. ELECTRIC SHOCK CAN CAUSE SERIOUS OR FATAL INJURY. WHETHER THE AC VOLTAGE SUPPLY IS GROUNDED OR NOT, HIGH VOLTAGES TO GROUND WILL BE PRESENT AT MANY POINTS WITHIN THE SCR DRIVE. EXTREME CARE MUST BE EXERCISED IN THE SELECTION AND USE OF TEST INSTRUMENTS.

OPERATORS SHOULD NOT STAND ON GROUNDED SURFACES OR BE IN CONTACT WITH GROUND WHEN APPLYING TEST INSTRUMENTS TO TEST POINTS. TEST INSTRUMENTS SHOULD NOT HAVE CHASSIS GROUNDED WHILE TESTS ARE BEING MADE. EXTREME CARE SHOULD BE TAKEN DURING THE USE OF TEST INSTRUMENTS, SUCH AS AN OSCILLOSCOPE, SINCE THEIR CHASSIS WILL BE AT A HIGH VOLTAGE WITH RESPECT TO GROUND DURING TESTING.

The use of an oscilloscope with a differential amplifier will result in much greater safety to operating personnel, since the oscilloscope chassis may then be grounded. However, much greater care in the selection of probes and leads and in the adjustment of the oscilloscope must be used to produce accurate readings. The DC balance and the voltage gain calibration of each channel must be accurately adjusted to obtain common mode voltage rejection.

When properly adjusted, good results can be obtained with the differential amplifier connected oscilloscope for most readings. However, unless the common mode voltage rejection is perfect, it may be difficult to obtain accurate readings of low voltages such as SCR gate signals.

No matter which oscilloscope connection is used, voltage attenuating probes will be required for most readings. The probes should be adjusted for correct frequency compensation using the voltage calibrator as a square wave standard. The vertical gain and the sweep should also be calibrated to allow interpretation of observations.

CHECKING FOR MALFUNCTIONS

NOTE

When using an oscilloscope without a differential amplifier to check the operation of the pulse transformer card, the common (chassis) lead of the oscilloscope should be connected only to the SCR cathode or the input common terminals. Connecting the oscilloscope common leads to any other point(s) on this card may cause improper operation of the drive by permitting firing of SCR's at incorrect times.

Missing output voltage and current pulses causing unbalanced wave shape.

(a) Check for firing pulses at input to pulse transformer cards, and at output of card to SCR's and compare with those given in Figures 20 and 21 of the voltage wave shape checklist. If no input is present, refer to the control module instruction book. If input is OK but no output is present, the pulse transformer card must be defective and should be replaced.

(b) Check SCR's to see if one of them is open or will not fire. Use the test circuit and follow the instructions under "Checking SCR's" in this section.

Cannot obtain any output voltage or current.

(a) Check for firing pulses at input to pulse transformer cards and at output of cards to SCR's. If no input is present, refer to the control instruction book. Check the cable connections between the control module and the SCR conversion module. If inputs are OK but no outputs are present, check 20 volt power supply to pulse transformer card terminals A and B.

(b) Check for AC power at incoming terminals T1, T2 and T3 of the SCR conversion module.

SCR conversion module thermoswitch open or trips often.

If the thermoswitch opens, check for air flow obstruction or for correct fan or blower rotation. If there is no air obstruction and the rotation is correct, the thermoswitch may be defective.

Erratic operation with motor load

(a) Check for correct phase sequence (see START–UP, page 5).

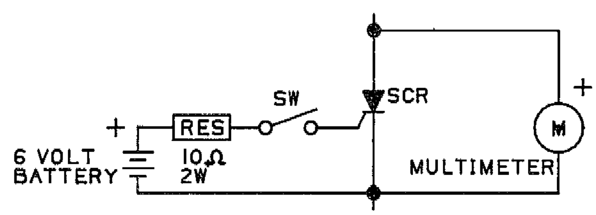
(b) Check for excessive dv/dt spikes across SCR's and wide voltage notches in AC voltage wave. If a number of large SCR drives are operating off the same AC supply, line filtering may be necessary. Consult the General Electric Company.

CHECKING SCR'S

Disconnect the AC power and make sure the DC armature circuit is open. Using a multimeter selected to read ohms on the times – 1K scale, check the forward and reverse resistance of each individual SCR cell. This is done by reading across module terminals T1 and DC1, T2 and DC1, T3 and DC1, DC2 and T1, DC2 and T2, and DC2 and T3. (See SCR Conversion Module elementary diagram) Good or faulty SCR's will give the following typical readings.

SCR Description	Fwd. Reading	Reverse Reading
Good SCR	100K to Infinity	100K to Infinity
Shorted SCR	Zero	Zero
Inoperative SCR	1 to 2K	100K to Infinity
Open SCR	100K to Infinity	100K to Infinity

Since an open SCR will give about the same resistance reading as a good SCR, another method must be used to find this type of fault. It should be pointed out however, that practically all cells fail by shorting and very few by opening. If an open SCR is suspected, or if it is desired to check the switching operation of an SCR, the following circuit should be used:



The multimeter is selected to read ohms on the 1K scale, and is connected to read the forward resistance of the SCR. When switch SW is closed, the forward resistance of a good SCR will change from a high value (100K to infinity) to a low value (1 to 10K). When the switch is opened, a good SCR will revert to its high forward resistance or blocking state if the holding current source (multimeter battery) is momentarily removed. A faulty SCR will not switch, remaining in either an open or a conducting state.

CHECKING SCR'S (continued)

If any SCR's are suspected of being faulty from the above resistance checks, the suspected SCR heat sink assembly should be removed from the module.

After the SCR heatsink assembly has been disconnected, recheck the forward and reverse resistances before replacing the SCR. This should be done before an SCR is definitely classified as damaged or faulty, since a fault in another SCR or another part of the circuitry can produce a faulty reading from a good SCR before it is disconnected from the circuit.

VOLTAGE WAVE SHAPE CHECK LIST

Voltage Wave Shape	Figure No.
AC voltage input, under load	7
DC voltage output, motoring, under load	8
DC voltage output, motoring, no load	9
DC voltage output, regenerating, under load	10
DC voltage output, regenerating, no load	11
SCR cell voltage, motoring, under load	12
SCR cell voltage, motoring, no load	13
SCR cell voltage, regenerating, under load	14
SCR cell voltage, regenerating, no load	15
AC current, full load	16
AC current, no load	17
DC current, full load	18
DC current, no load	19
Firing pulse train input (to card)	20
Firing pulse train across SCR gate	21

The voltage signals shown were measured at full potential. In many cases attenuated signals are available as test points in the systems control function, thus high voltage measurements can be avoided.

Also refer to the DC and SCR voltage wave shapes given in "Principles of Operation" section as Figures 1 through 6. These diagrams do not show firing notches but are otherwise similar to actual readings.

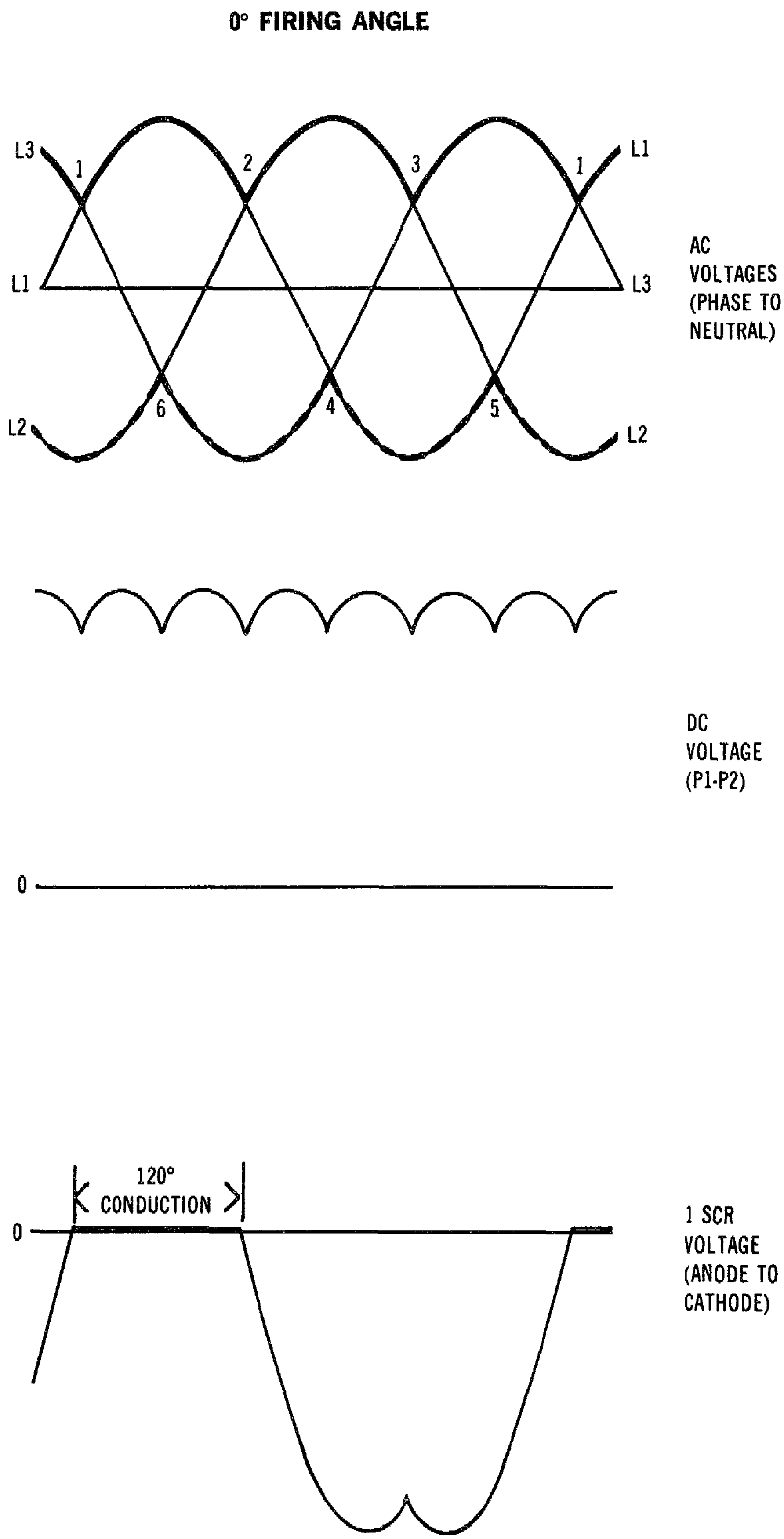

0° FIRING ANGLE
L3
1
2
3
1
L1
L1
L3
AC
VOLTAGES
(PHASE TO
NEUTRAL)
L2
6
4
5
L2
DC
VOLTAGE
(P1-P2)
0
120°
CONDUCTION
0
1 SCR
VOLTAGE
(ANODE TO
CATHODE)

FIGURE 1

30° FIRING ANGLE

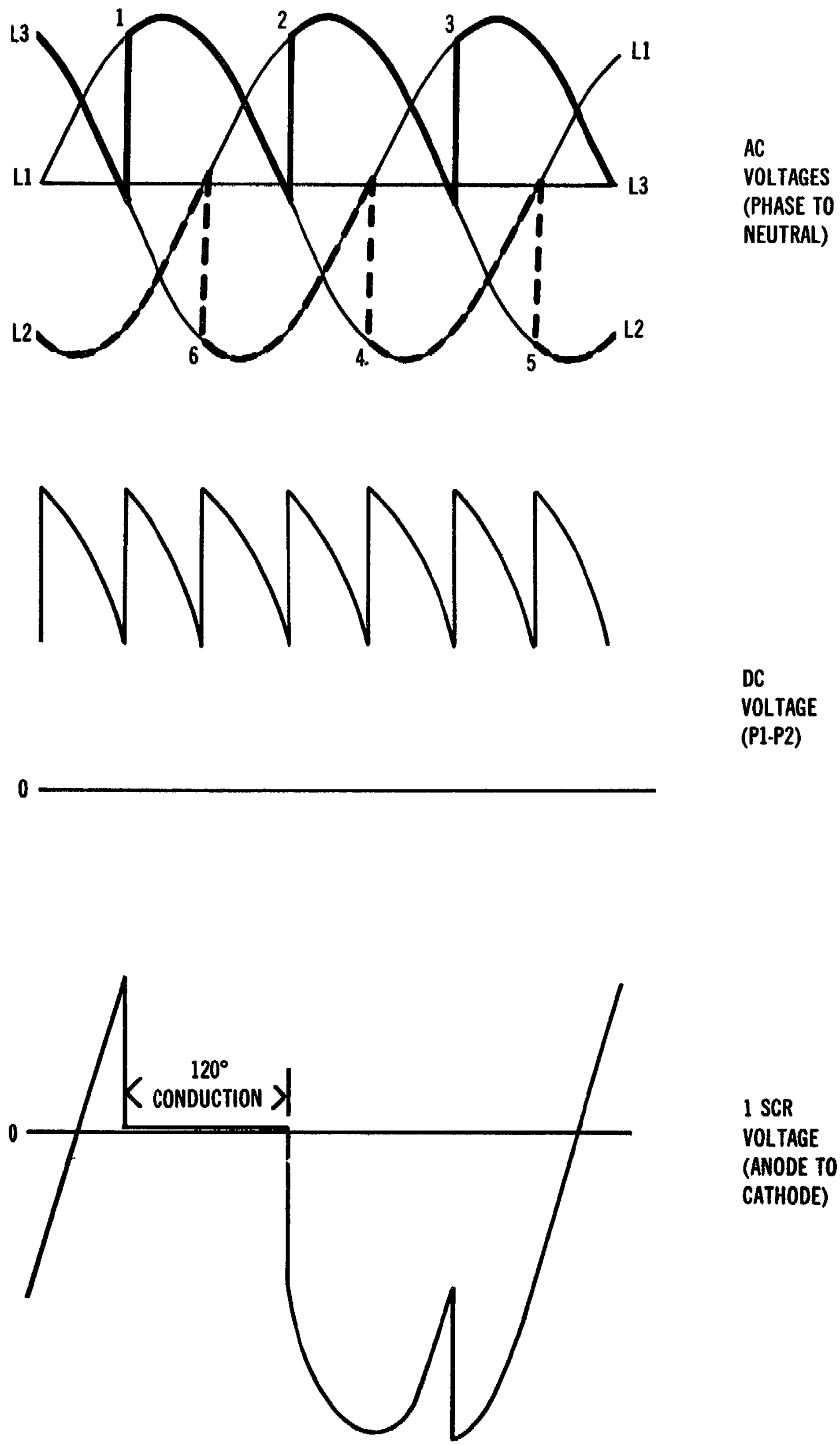


FIGURE 2

60° FIRING ANGLE

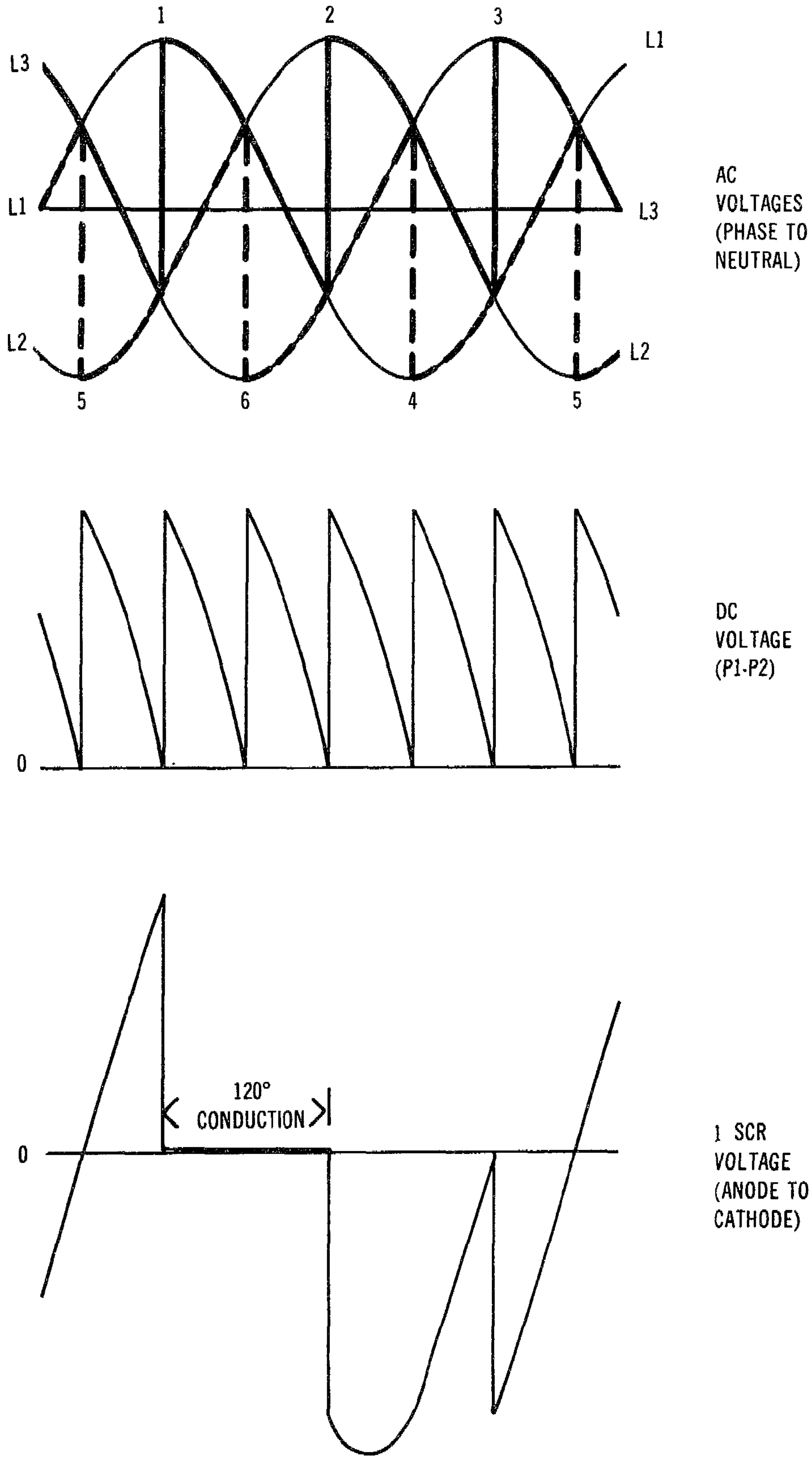


FIGURE 3

90° FIRING ANGLE

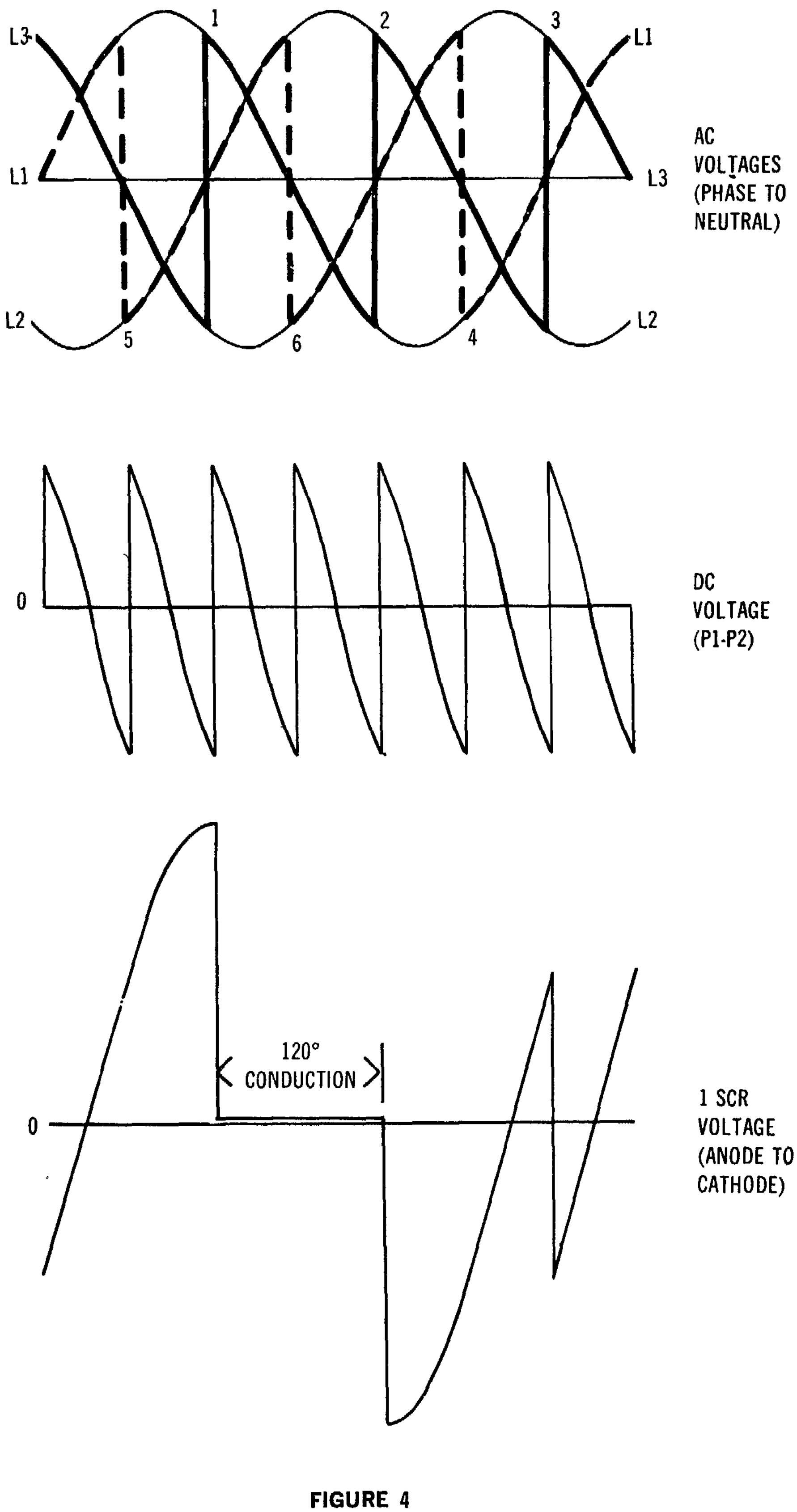


FIGURE 4

120° FIRING ANGLE

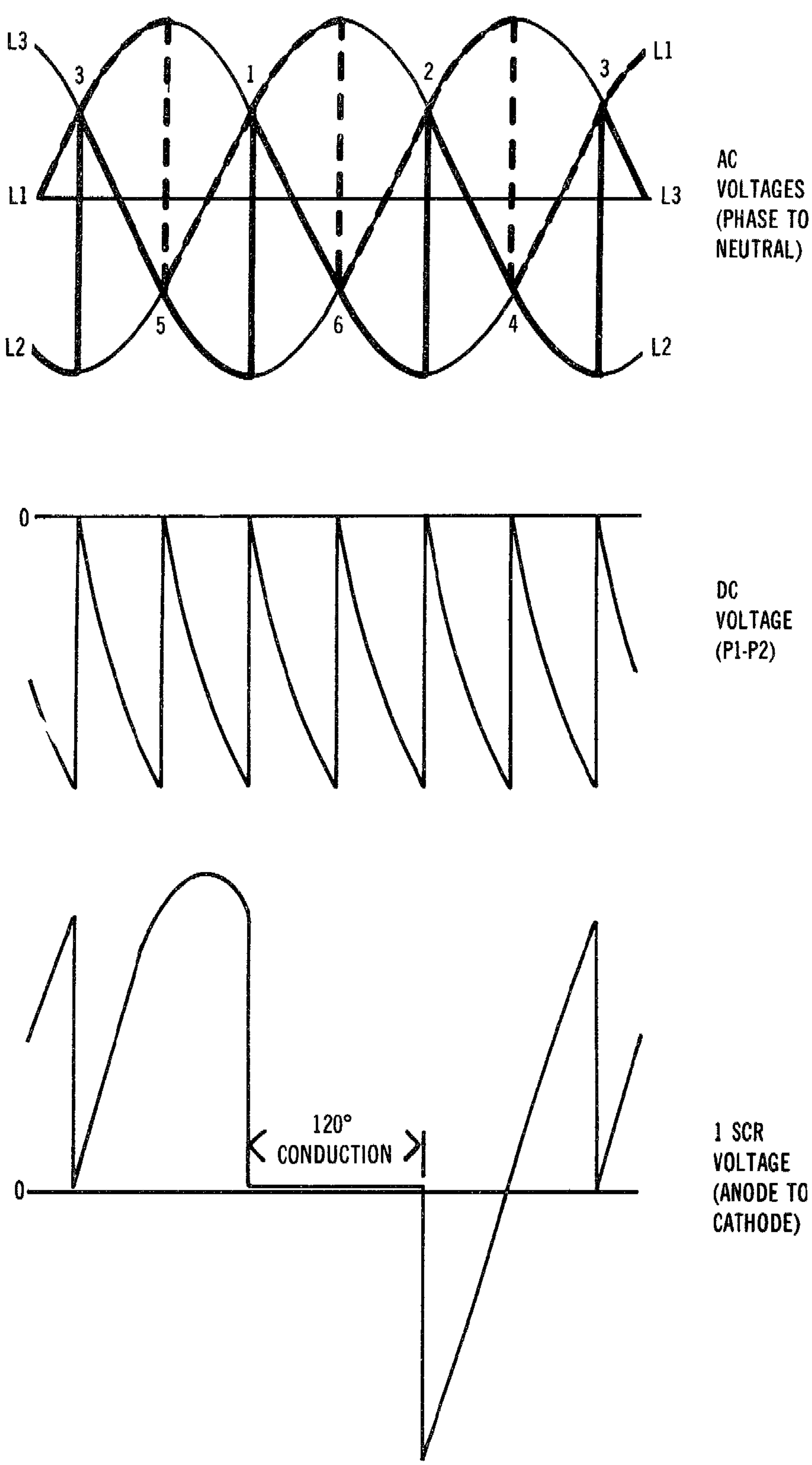


FIGURE 5

150° FIRING ANGLE

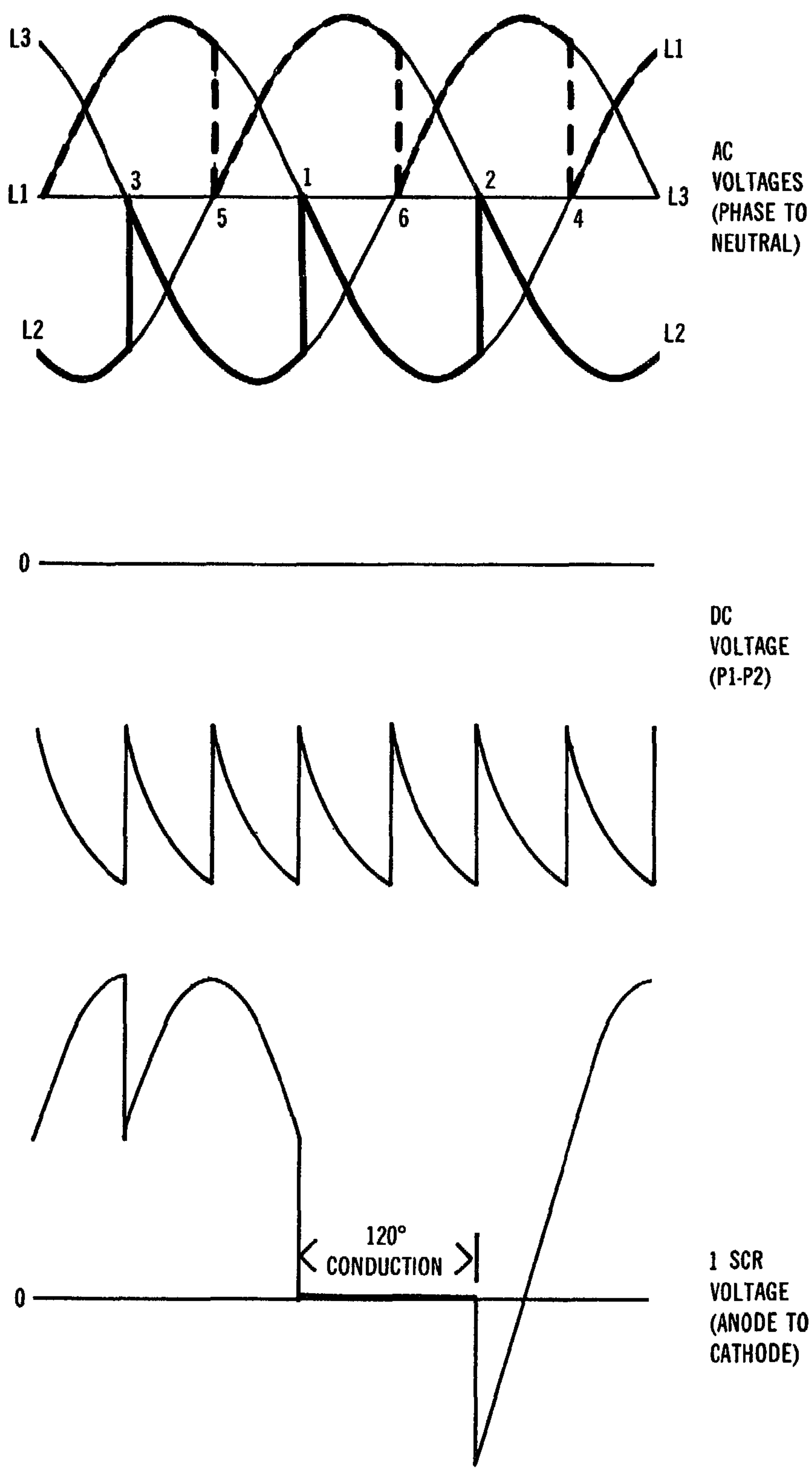
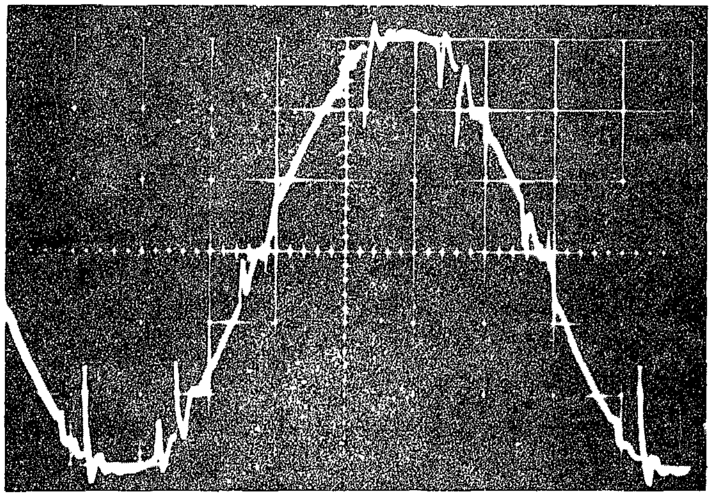


FIGURE 6

AC VOLTAGE INPUT (UNDER LOAD)



–0

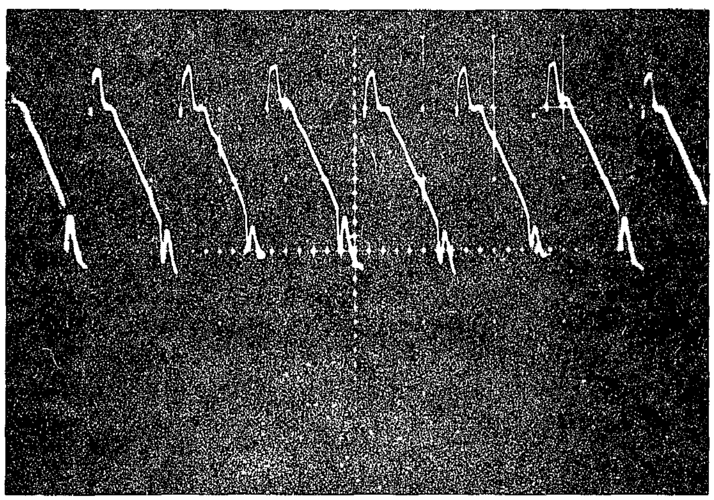
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2MS/CM

FIGURE 7

DC VOLTAGE OUTPUT (MOTORING, UNDER LOAD)



–0

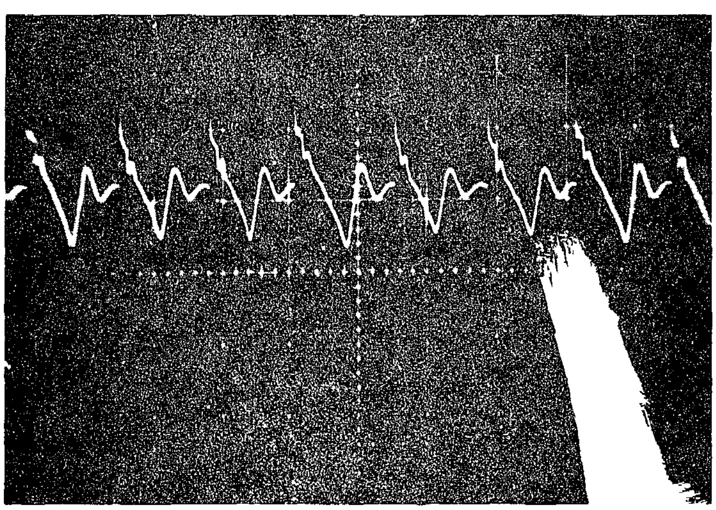
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 8

DC VOLTAGE OUTPUT (MOTORING, NO LOAD)



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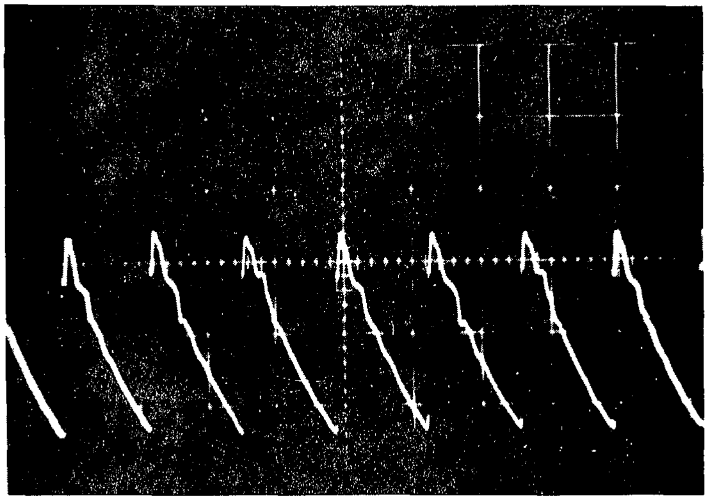
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 9

DC VOLTAGE OUTPUT (REGENERATING, UNDER LOAD)



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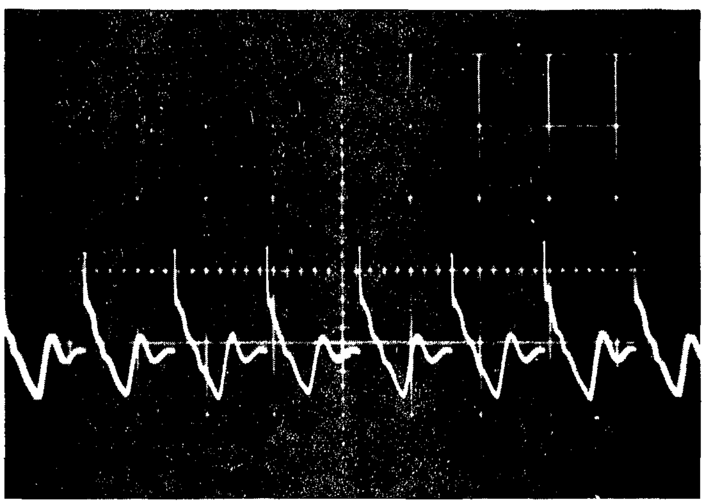
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 10

DC VOLTAGE OUTPUT (REGENERATING, NO LOAD)



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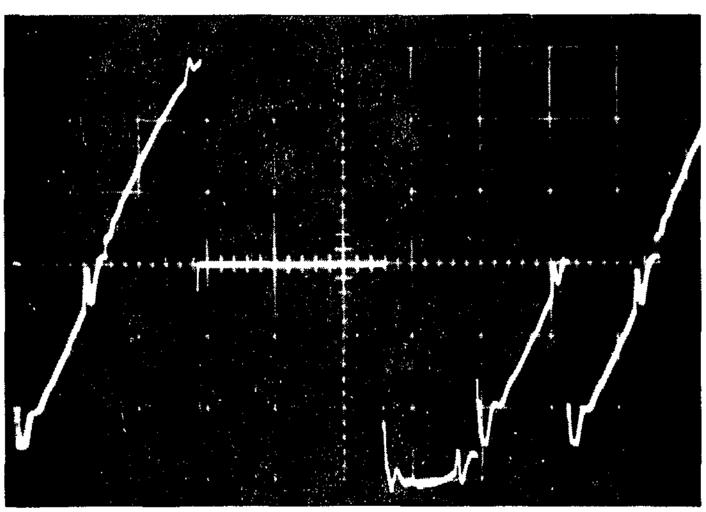
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 11

SCR CELL VOLTAGE (MOTORING, UNDER LOAD)



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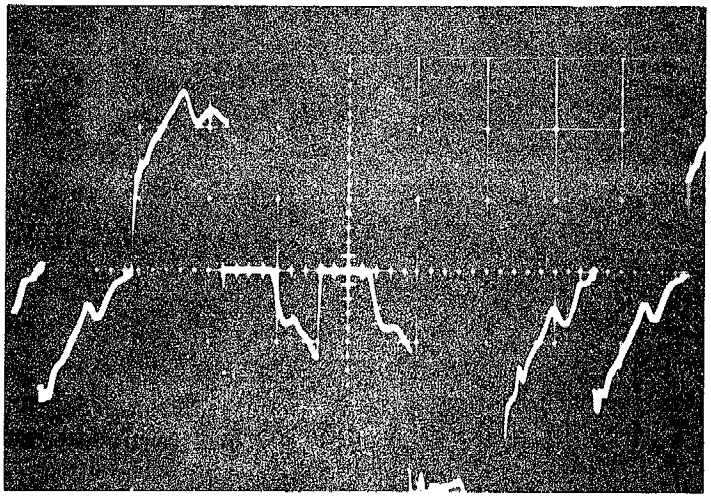
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 12

SCR CELL VOLTAGE (MOTORING, NO LOAD)



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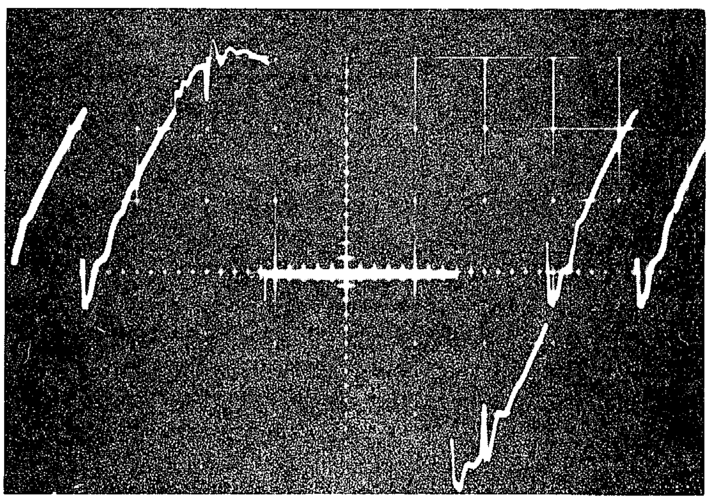
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 13

SCR CELL VOLTAGE (REGENERATING, UNDER LOAD)



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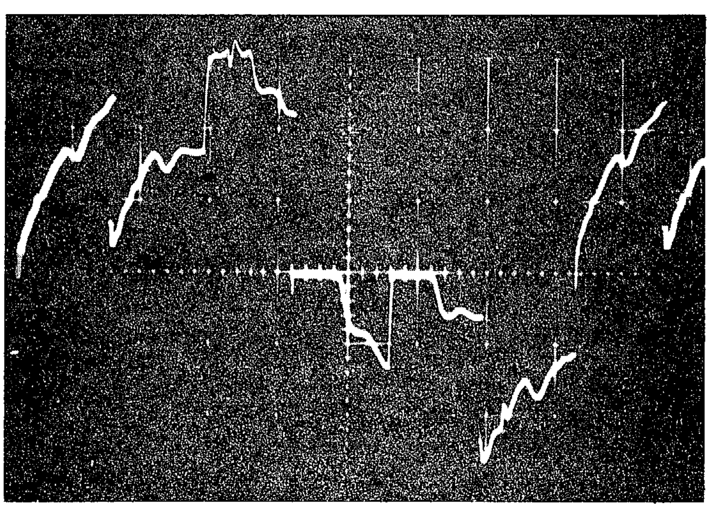
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 14

SCR CELL VOLTAGE (REGENERATING, NO LOAD)



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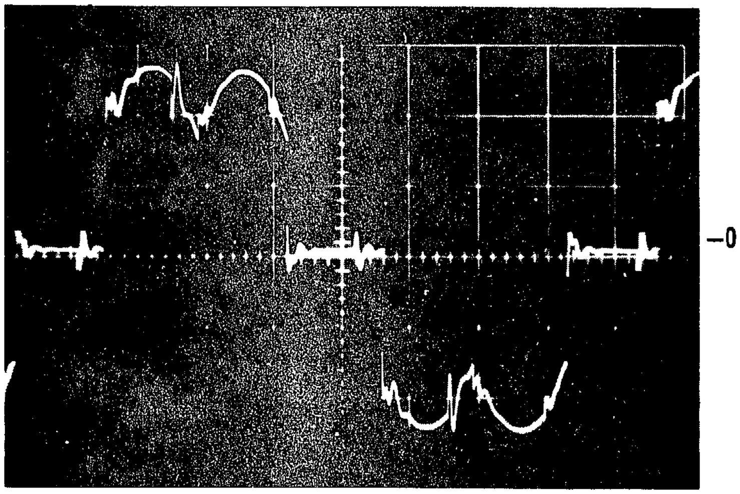
CALIB.

VERT.
100 VOLTS/CM

HORIZ.
2 MS/CM

FIGURE 15

AC CURRENT (FULL LOAD)

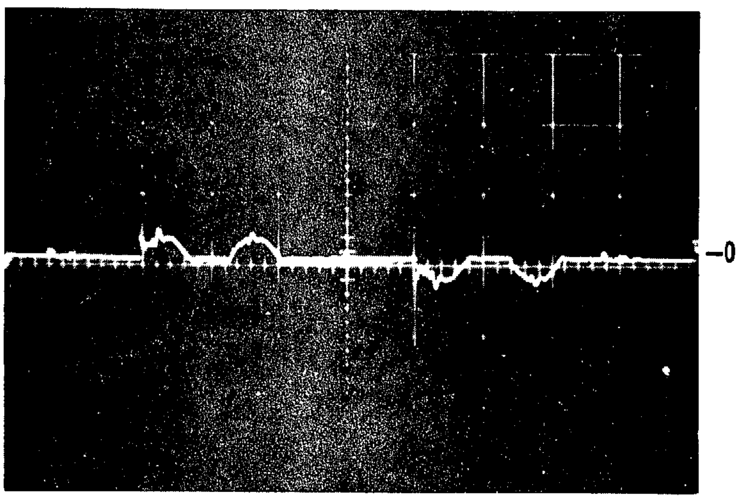


CALIB.

HORIZ.
2 MS/CM

FIGURE 16

AC CURRENT (NO LOAD)

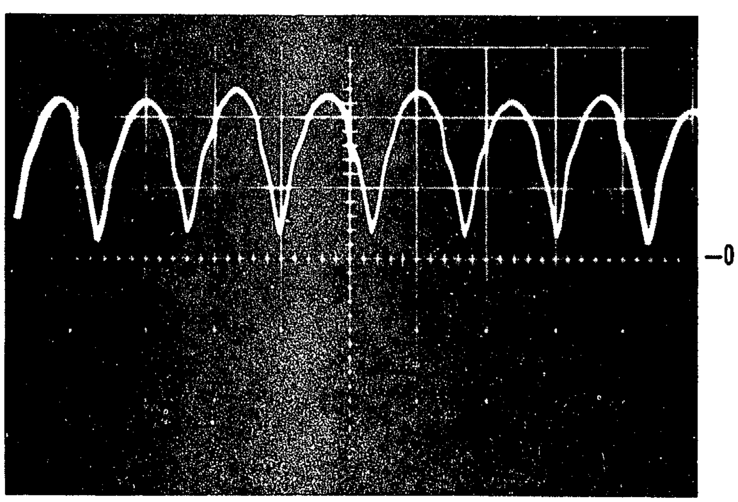


CALIB.

HORIZ.
2 MS/CM

FIGURE 17

DC CURRENT (FULL LOAD)



CALIB.

HORIZ.
2 MS/CM

FIGURE 18

DC CURRENT (NO LOAD)

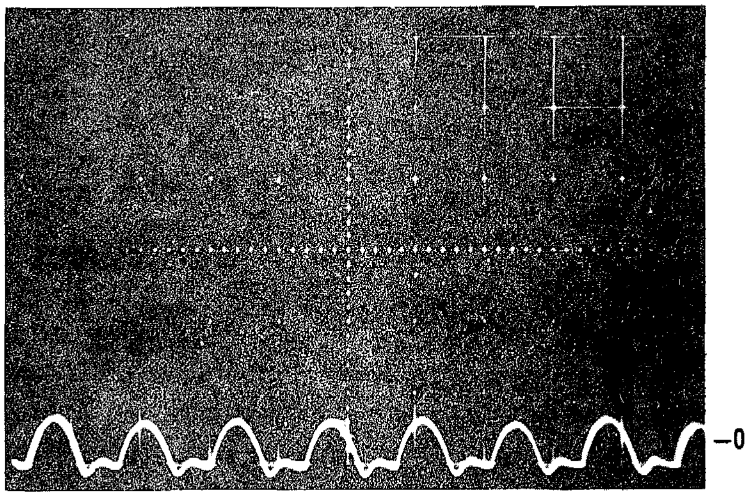


FIGURE 19

FIRING PULSE TRAIN INPUT

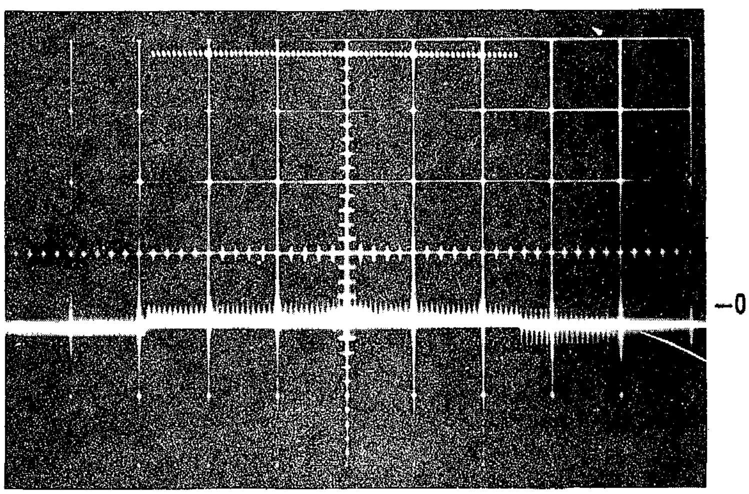


FIGURE 20

FIRING PULSE TRAIN ACROSS SCR GATE

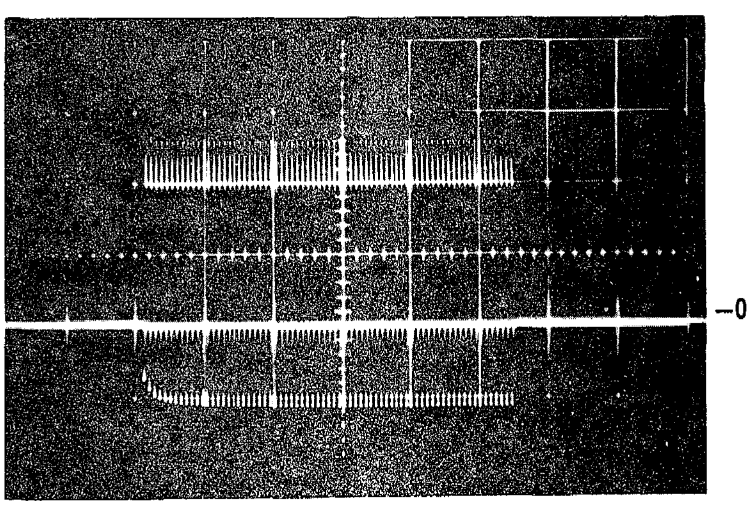


FIGURE 21

REPAIR AND REPLACEMENT

SMALL VALUTROL* SCR CONVERSION MODULE

Heatsink Removal

Disconnect the three AC power leads. Disconnect the DC power leads located beneath the AC power leads.

Disconnect the SCR gate and cathode leads from the terminal board. If the markings are not legible re–mark prior to removal.

Loosen two nuts on the right hand side and remove the slotted spacer.

Slide the Module to the right and remove.

SCR Replacement

The joint between the SCR and the heatsink performs two functions:

1) It carries the current, and
2) It conducts the heat out of the SCR.

To perform these functions properly, special care must be taken when re–assembling an SCR and its clamp to the heatsink.

Stud Mount SCR's

Clean all surfaces of old lubricant and dust. Apply a thin film of VERSILUBE* G322L Silicone lubricant and tighten with a torque wrench to the following specifications:

Stud Size	Torque
1/4–28	30 in./lbs.
1/2–30	135 in./lbs.

Press–Pak SCR's

Clean both surfaces of old lubricant and dust. Apply thin film of General Electric VERSILUBE* G322L lubricant. Orient the SCR's and clamp parts properly. Line up the assembly and evenly tighten the clamp nuts finger tight. Tighten the nuts, one at a time, alternating between nuts according to the following specifications:

Cell Thickness	Torque
1/2", 5/8"	40 in./lbs.
1"	80 in./lbs.

LARGE SCR CONVERSION MODULE

The large power conversion module contains three heatsink assemblies with two SCR's per assembly.

In general, factory equipment is required to properly replace an SCR in the large module heatsink assembly. Accordingly, an SCR should be replaced by exchanging the heatsink assembly containing a bad SCR with a factory supplied assembly.

Heatsink Removal

a. Open all electrical circuits in the case in which the conversion module is located.

b. Remove the front cover (air baffle)

c. Remove two bolts to disconnect the AC power bus from the heatsink asm.

d. Disconnect the control wire near the AC power connection.

e. Remove the two control wires to each SCR and the current transformer from the terminal board above the heatsink.

f. Hold the heatsink assembly in place and remove the 2 nuts and conical washers at each end of heatsink asm.

g. Remove the heatsink assembly from the conversion module.

h. Remove the plastic cover by removing 6 screws at the rear of the heatsink assembly.

i. Remove the 3 control leads at the heatsink assembly that connect to the resistor–capacitor cover.

j. Reassemble, with the replacement heatsink assembly used in place of the original heatsink assembly.

SCR Replacement

The joint between the SCR and heatsink performs two functions:

1) It carries the current and
2) It conducts the heat out of the SCR's

* Registered Trademark of General Electric Company, U.S.A.

Large SCR Conversion Module (continued)

To perform these functions properly, special care must be taken when re–assembling an SCR and its clamp.

Clean both surfaces of old lubricant and dust. Apply a thin film of VERSILUBE* G322L Silicone lubricant. Line up the assembly and evenly tighten the nuts finger tight. Tighten the nuts, one at a time, alternating between nuts to the following specifications.

[2]SCR Loading Code	SCR Load Pounds	Number of Clamp Springs	Turns Beyond [1]Finger Tight (each nut)
22	2250	1	2
32	3250	1	3–1/4
57	5750	2	3
60	6000	2	3–1/2
44	4400	2	2–1/2

[1]*Finger tight is the condition where the load on the* SCR is positive – 50 to 100 lbs.

[2]Find the loading code (which is the last two digits) following the date code on the body of SCR.

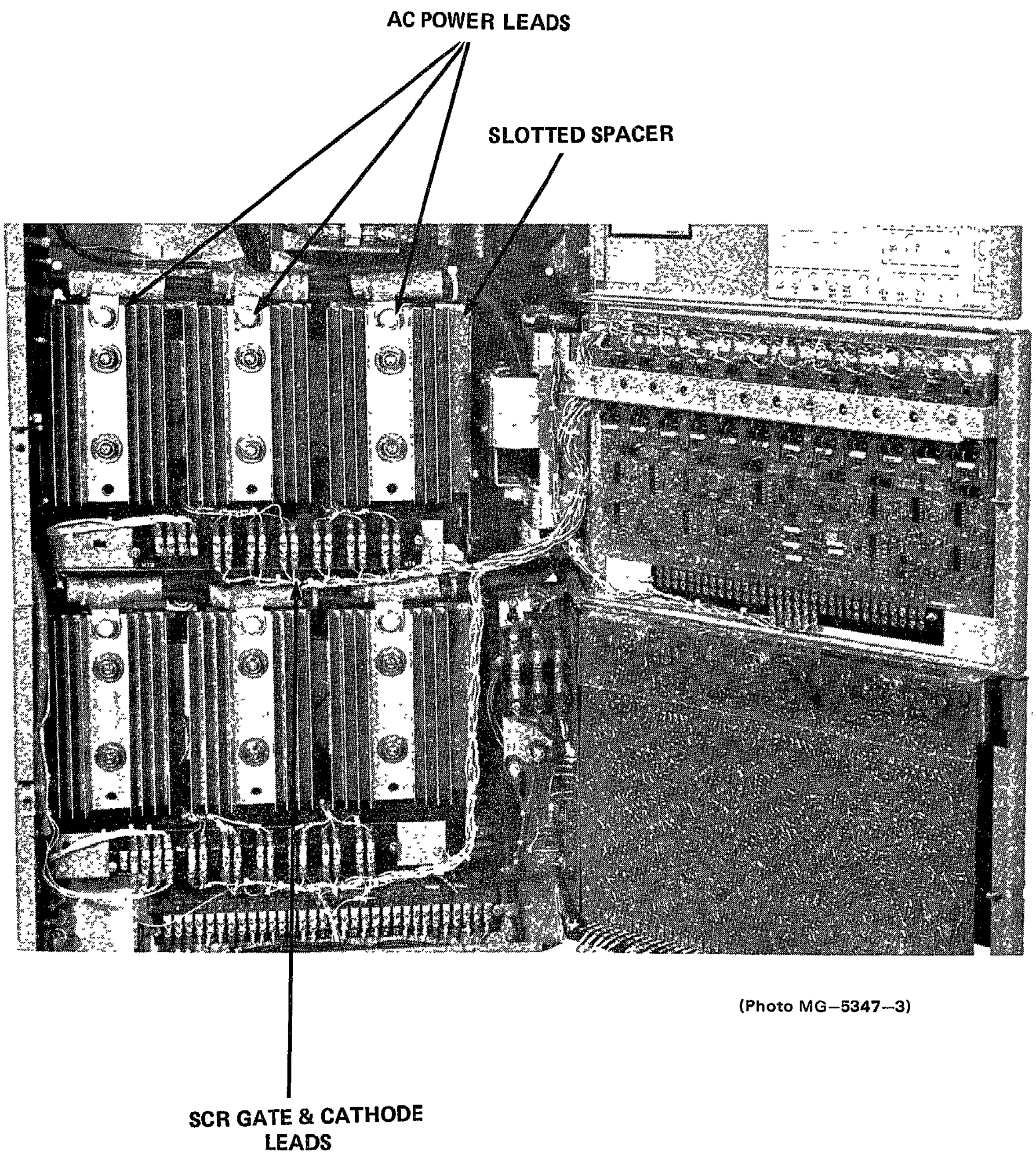
Example: 9 / 30 / 77 / 22

month day year loading code

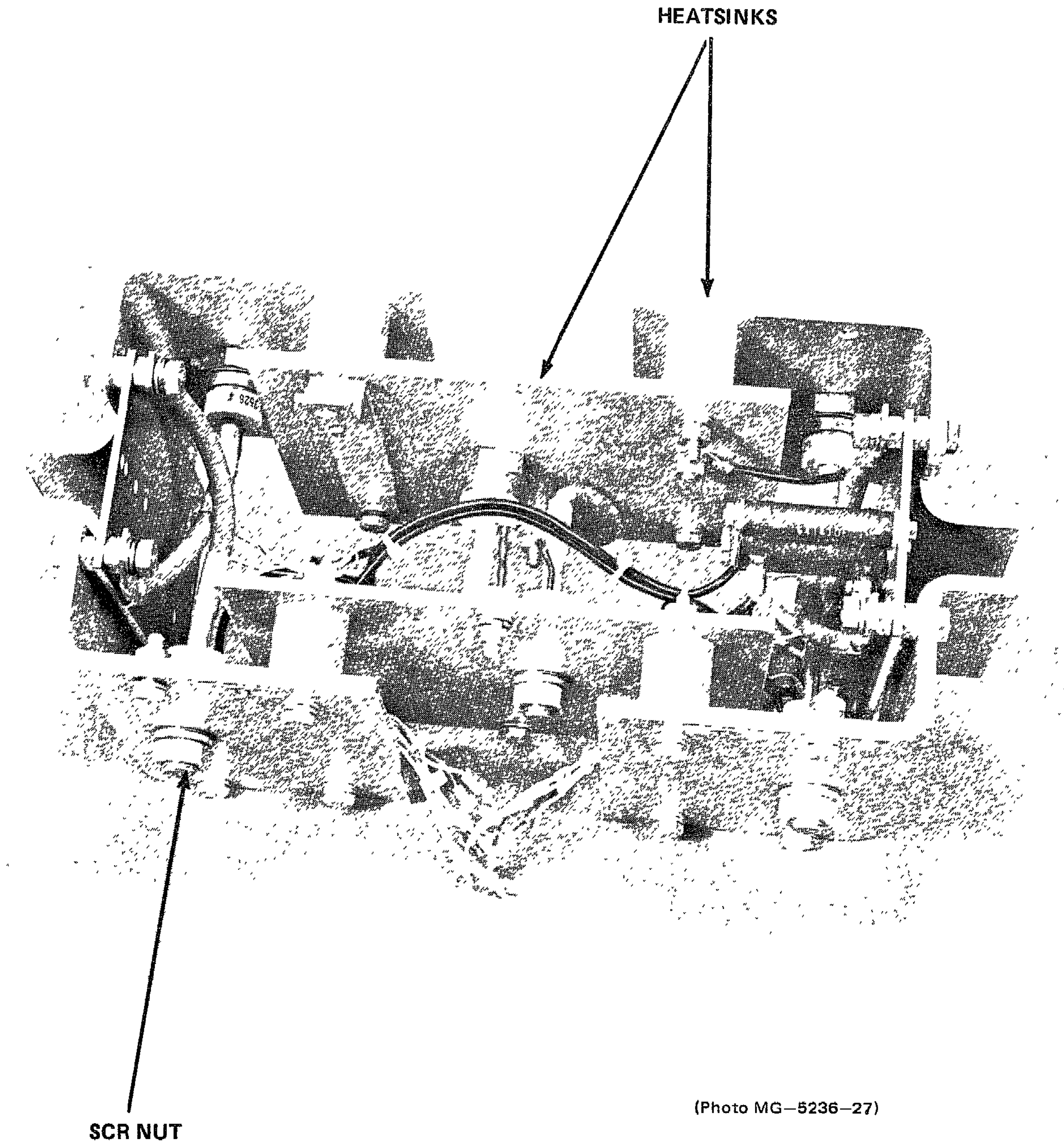
* Registered trademark of General Electric Company U.S.A.

DESCRIPTIVE PHOTOGRAPHS

1. Small Press–Pak SCR Conversion Module
2. Small Heatsink – Stud Mounted SCR's
3. Small Heatsink – Press Pak SCR's
4. Large SCR Conversion Module – Front Cover Removed
5. Large SCR Conversion Module – Heatsink Assembly & Parts

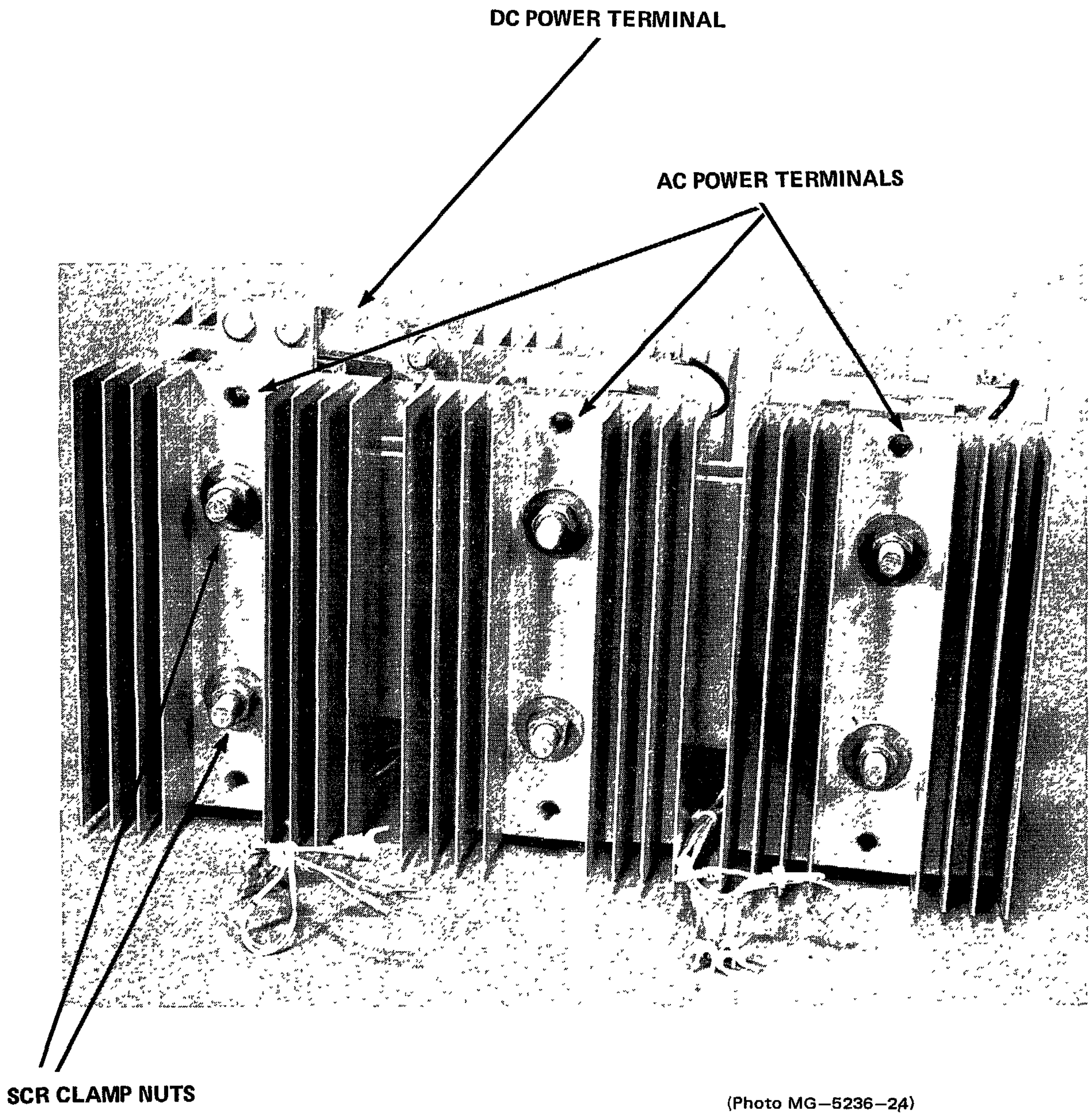


SMALL PRESS–PAK SCR CONVERSION MODULE



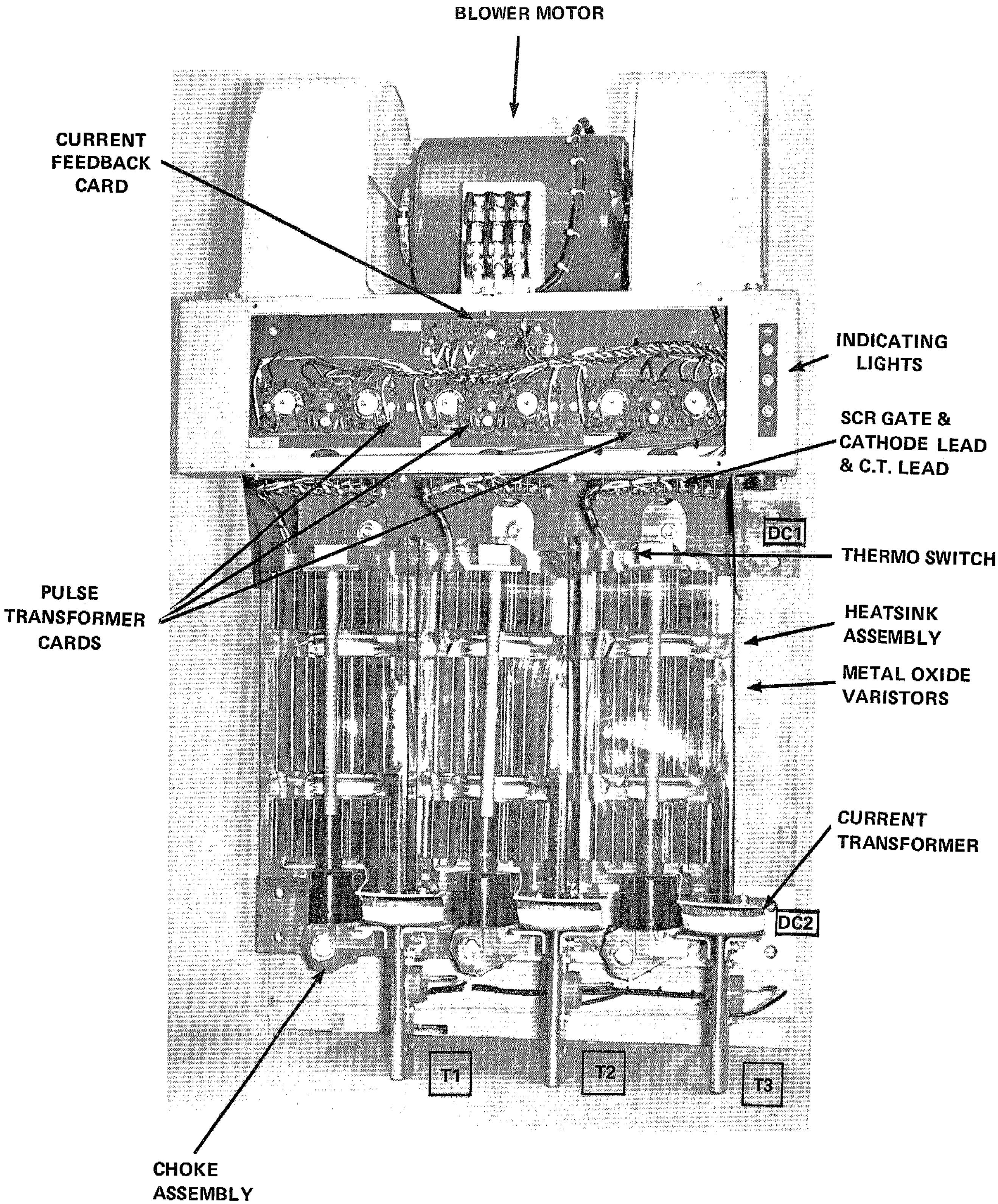
(Photo MG–5236–27)

SMALL HEATSINK STUD MOUNTED SCR'S



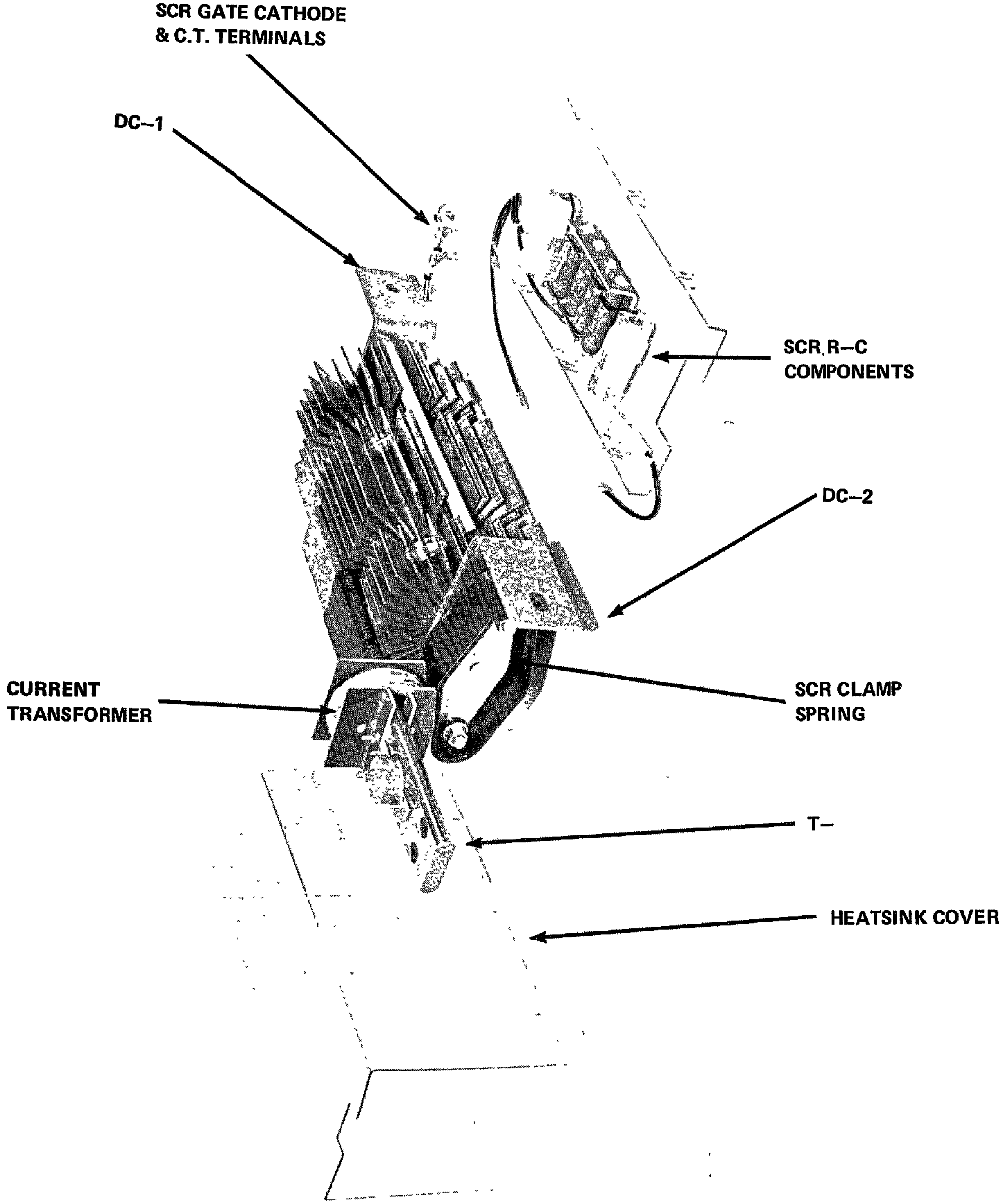
(Photo MG–5236–24)

SMALL HEATSINK PRESS–PAK SCR'S



(Photo–MG–5124–4)

LARGE SCR CONVERSION MODULE
FRONT COVER REMOVED



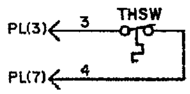
(Photo–MG–5124–5)

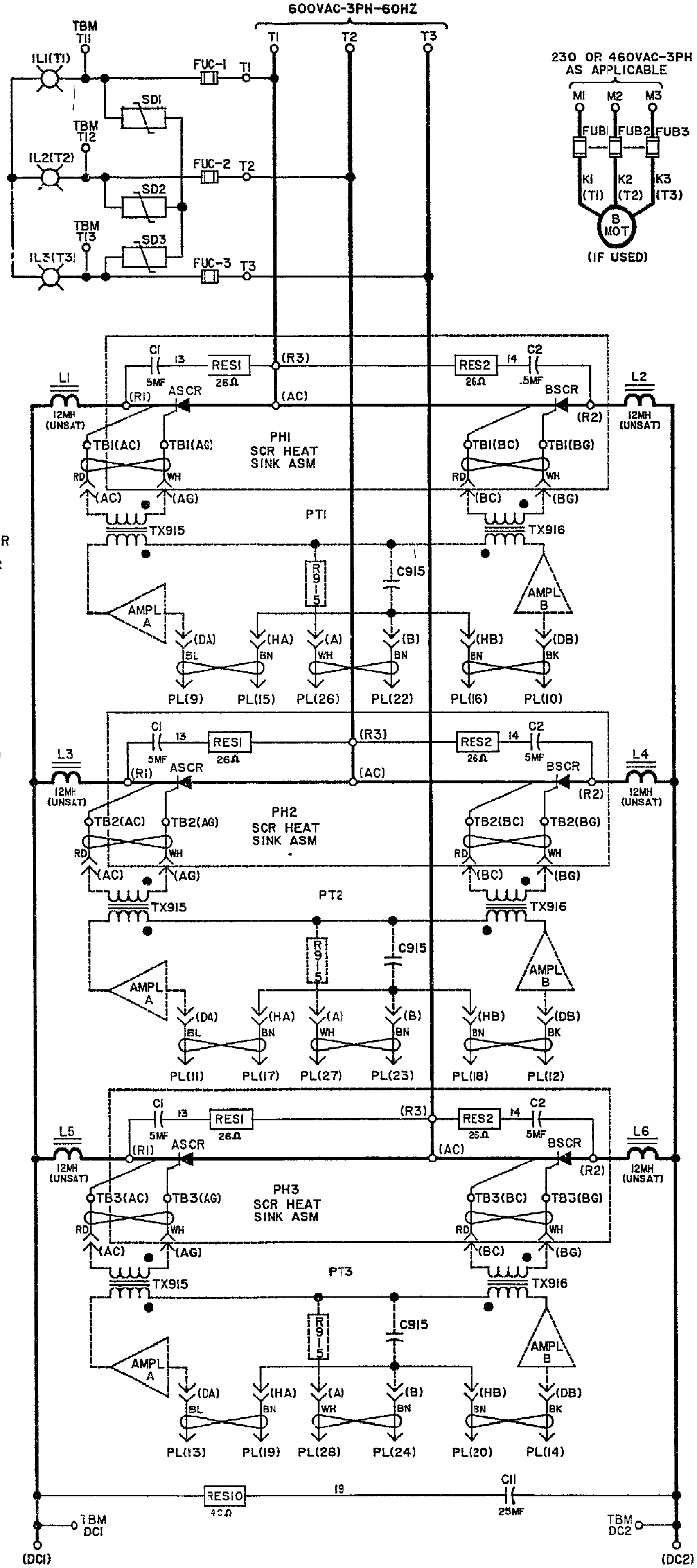
LARGE SCR CONVERSION MODULE –
HEATSINK ASSEMBLY AND PARTS

GENERAL ELECTRIC COMPANY — DC MOTOR & GENERATOR DEPARTMENT
SPEED VARIATOR PRODUCTS OPERATION
ERIE, PENNSYLVANIA 16531

GENERAL ELECTRIC

GEK-24992 (11/78) 3M (F)





NOMENCLATURE

PL	-MALE PLUG FOR SCR GATE LEADS AND CONTROL LEADS
C1 & C2	-SCR PROTECTIVE CAPACITOR
C11	-COMMUTATION SUPPRESSION CAPACITOR
RES1, RES2	-SCR PROTECTIVE RESISTOR
RES10	-COMMUTATION SUPPRESSION RESISTOR
ASCR, BSCR	-SILICON CONTROLLED RECTIFIER
SD	-METAL OXIDE VARISTOR (MOV)
THSW	-TEMPERATURE SWITCH
L1 THRU L6	-SCR LEG CHOKE
IL1,IL2,IL3	-FUSE FAILURE INDICATING LIGHTS
BMOT	-BLOWER MOTOR
FUB1,FUB2,FUB3	-BLOWER MOTOR FUSES

NOTES

1 REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.

2 THE PULSE TRANSFORMER CIRCUITRY, SHOWN SYMBOLICALLY AND IN DASHED LINES, IS A PRINTED CIRCUIT CARD MOUNTED ON THE SCR CONVERSION MODULE. REFER TC PRINTED DIAGRAM IN THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.

3. MF = MICROFARAD
MH = MICROHENRY

4 INDICATES THAT THE TWO CONDUTORS ARE A TWISTED PAIR.

TITLE ELEMENTARY DIAGRAM
SCR CONVERSION MODULE
FIRST MADE FOR 33IX466AAG01 DC3064 VALUTROL
600VAC

36C764897AA

MADE BY [signature] APR 21,1978
ISSUED [signature] APR 24,1978
APPROVALS [signature]

SPEED VARIATOR DIV OR DEPT
ERIE, PA. LOCATION

36C764897AA
CONT ON SH | SH NO.

REVISIONS

PRINTS TO
5B(GM) | 5J(GW)
5R(2)BW
5L(2)BW
AW(BW)
5D(CD)
JA(CD)

REVNO 0

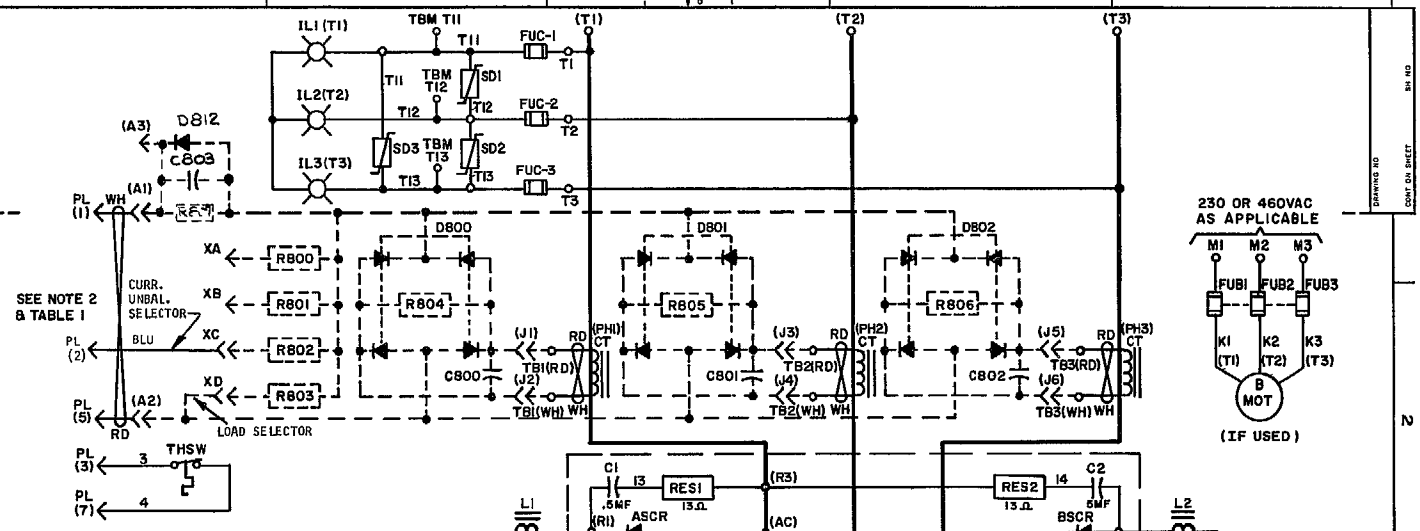
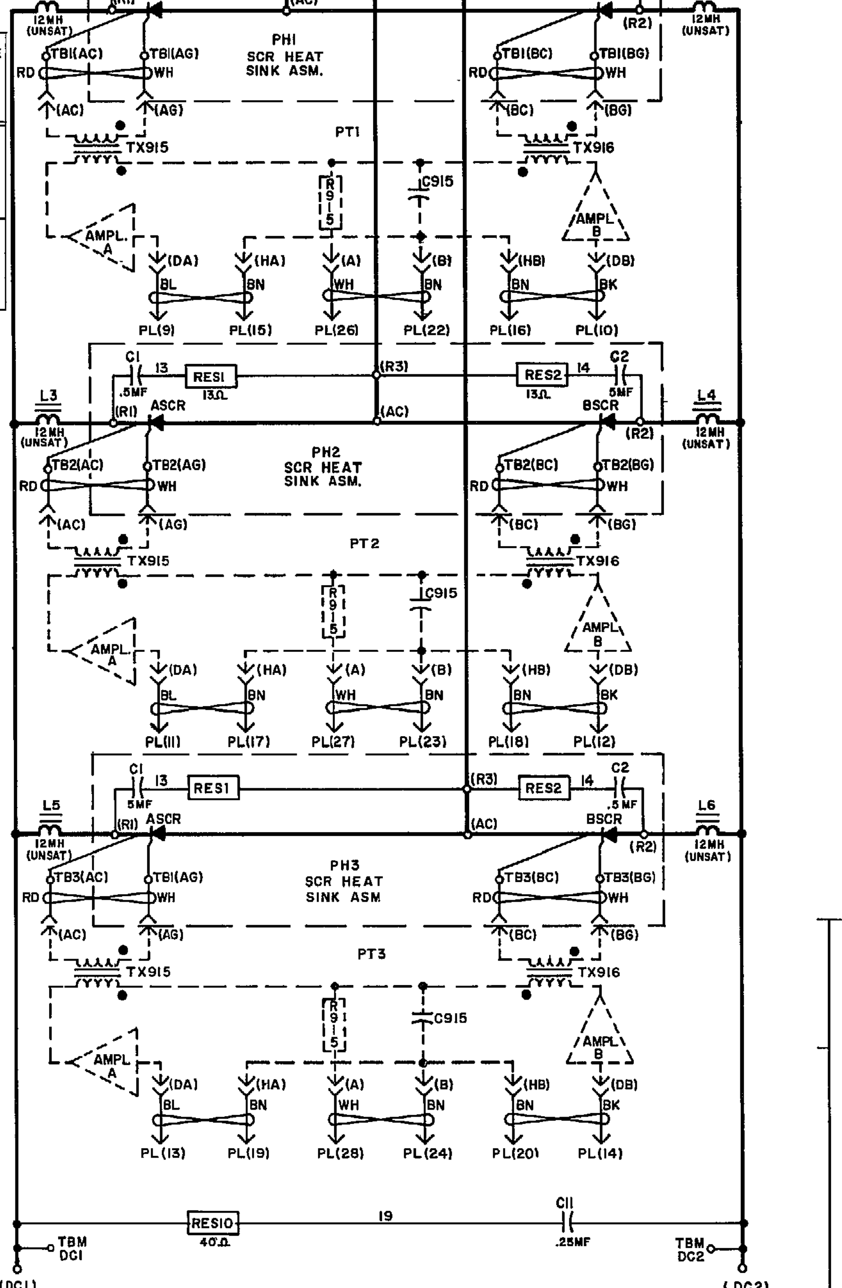


TABLE I CURRENT FEEDBACK LOADING

REGEN. DRIVE HP 240 VDC	REGEN. DRIVE HP 500 VDC	NON REGEN. DRIVE HP 240 VDC	NON REGEN. DRIVE HP 500 VDC	NON REGEN. DRIVE HP 550 VDC	CURRENT FDBK CARD GROUP 193X269AB	LOADING SELECTOR POSITION (SEE NOTE 6)	CURRENT UNBALANCE SELECTOR POSITION (SEE NOTE 7)
150	300	150	300	300	G05	XA	XC
175		175			G05	XA	XC
200	400	200	400	400	G05	XB	XC
250	500	250	500	500	G05	XC	XB
300	600	300	600	600	G05	XD	XC
				700	G06	XA	XC
	700		700	800	G06	XB	XC
400	800	400	800	900	G06	XC	XB
	900		900		G06	XD	XC



NOMENCLATURE

- PL -MALE PLUG FOR SCR GATE LEADS AND CONTROL LEADS
- C1 & C2 -SCR PROTECTIVE CAPACITOR
- C11 -COMMUTATION SUPPRESSION CAPACITOR
- CT -CURRENT TRANSFORMER
- RES1,RES2 -SCR PROTECTIVE RESISTOR
- RES10 -COMMUTATION SUPPRESSION RESISTOR
- ASCR, BSCR -SILICON CONTROLLED RECTIFIER
- SD -METAL OXIDE VARISTOR (MOV)
- THSW -TEMPERATURE SWITCH
- L1 THRU L6 -SCR LEG CHOKE
- 1L1,1L2,1L3 -FUSE FAILURE INDICATING LIGHTS
- BMOT -BLOWER MOTOR
- FUB1,FUB2,FUB3 -BLOWER MOTOR FUSES

NOTES

1. REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION
2. THE CURRENT FEEDBACK CIRCUITRY, SHOWN IN DASHED LINES, IS A PRINTED CIRCUIT CARD MOUNTED ON THE SCR CONVERSION MODULE. REFER TO PRINTED CIRCUIT DIAGRAM IN THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION
3. THE PULSE TRANSFORMER CIRCUITRY, SHOWN SYMBOLICALLY AND IN DASHED LINES, IS A PRINTED CIRCUIT CARD MOUNTED ON THE SCR CONVERSION MODULE. REFER TO PRINTED CIRCUIT DIAGRAM IN THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.
4. MF = MICROFARAD
   MH = MICROHENRY
5. (twisted-pair symbol) INDICATES THAT THE TWO CONDUCTORS ARE A TWISTED PAIR.
6. LOAD SELECTOR IS POSITIONED FOR SETTING CURRENT FEEDBACK SIGNAL.
7. CURRENT UNBALANCE SELECTOR IS POSITIONED FOR CURRENT UNBALANCE SENSING IN PARALLEL MODULES.

GENERAL ELECTRIC

TITLE ELEMENTARY DIAGRAM
SCR CONVERSION MODULE

FIRST MADE FOR STANDARD LINE 460VAC

36C764854AA

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING— APPLIED PRACTICES / SURFACES / TOLERANCES ON MACHINED DIMENSIONS: FRACTIONS ± DECIMALS ± ANGLES ±

MADE BY Q. Mette — SEPT 10, 1974

SPEED VARIATOR PROD. DEPT
ERIE, PA USA

REVISIONS

No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department

PRINTS TO: 5P(BW) 5TS(GO) IT(BW) JA(CD) 5(S) DS(BW) / 5B(3)23 5D(BK) 5K(BW) 5L(BW) 5C(BW) 5Q(BK)

36C764854AA

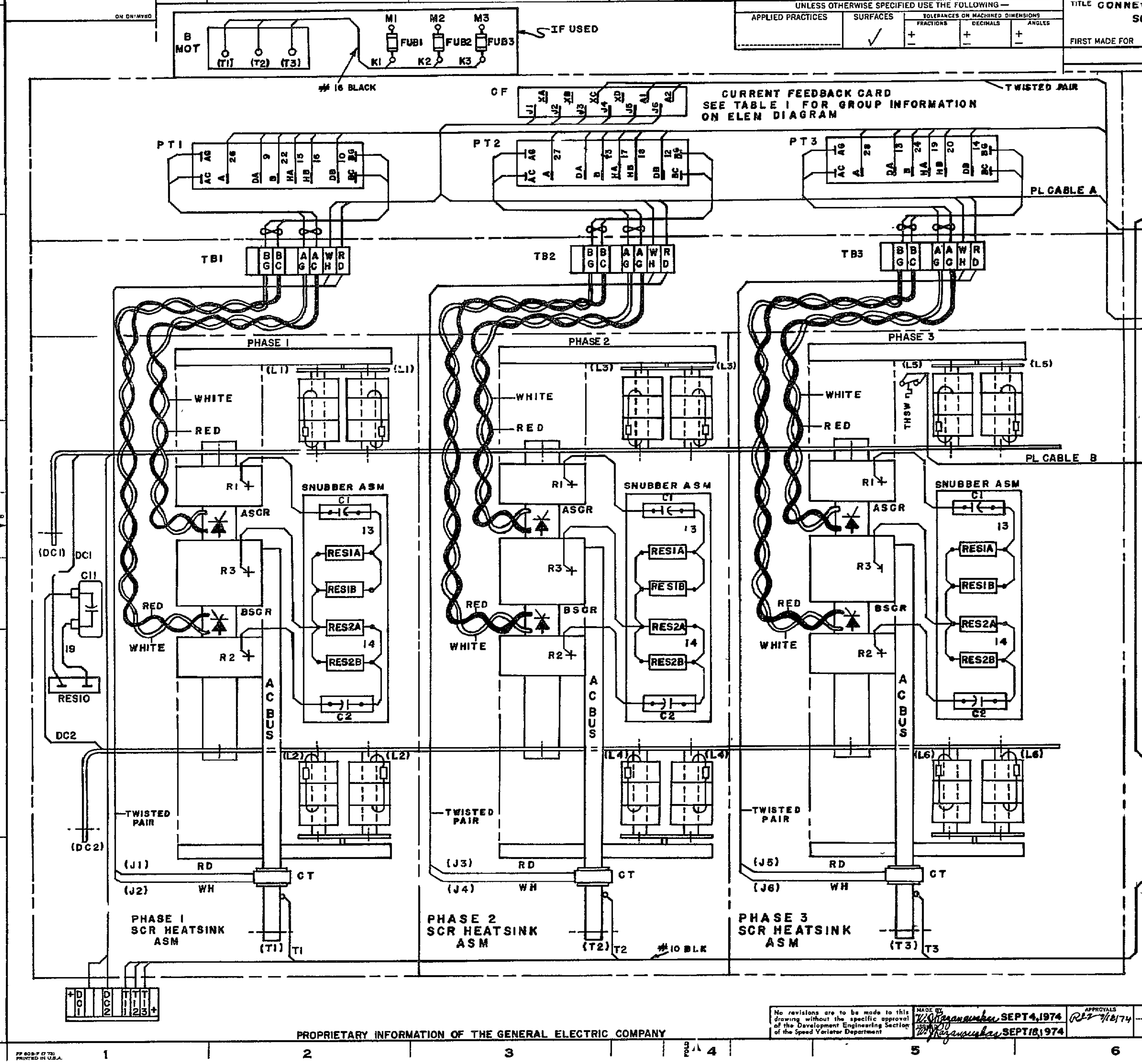
GENERAL ELECTRIC

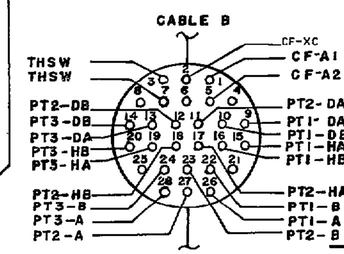
36C764853AA

TITLE CONNECTION DIAGRAM
SCR CONVERSION MODULE

FIRST MADE FOR STANDARD LINE 460VAC

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING —				
APPLIED PRACTICES	SURFACES	TOLERANCES ON MACHINED DIMENSIONS FRACTIONS	DECIMALS	ANGLES
	✓	+ −	+ −	+ −





BACK VIEW OF MOUNTED END OF PI
SKETCH "A"

NOTES:

1. ALL POWER WIRING IS EITHER BUS OR CONNECTORS PER MECHANICAL ASSEMBLY DRAWINGS.
2. WIRES ARE MARKED AS INDICATED. AC, AG AND BC, BG ARE TWISTED PAIRS OF #20 RED AND WHITE. GATES (G) ARE WHITE. TWISTED PAIR WIRES DA AND HA ARE #20 BLUE AND BROWN WIRES, DB AND HB ARE #20 BLACK AND BROWN WIRES; AND A AND B ARE #20 WHITE AND BROWN WIRES.
3. ALL OTHER CONTROL WIRE IS #18 BLACK EXCEPT AS OTHERWISE INDICATED.

REVISIONS		
1	DEC 5, 1974	PER SV-856 #2A
2	JAN 27, 1976	PER SV-856 #4A
3	JAN 20, 1977	PER SV 830 3A
4		PER SV884 #1

GEN. CHG'S. RECORD COPY FILED

PRINTS TO	
5K(BW)	5S(REA)
5L(BW)	5D(BK)
5P(BW)	5B(323)
1T(BW)	5(TS)50
JA(CD)	5(QC)BW
5(S)	5QC(BK) 5

No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department

MADE BY SEPT 4, 1974 — ISSUED SEPT 18, 1974 — APPROVALS 9/18/74

SPEED VARIATOR — ERIE, PA — 36C764853AA

PROPRIETARY INFORMATION OF THE GENERAL ELECTRIC COMPANY

FF 603-F (7-73) PRINTED IN U.S.A.

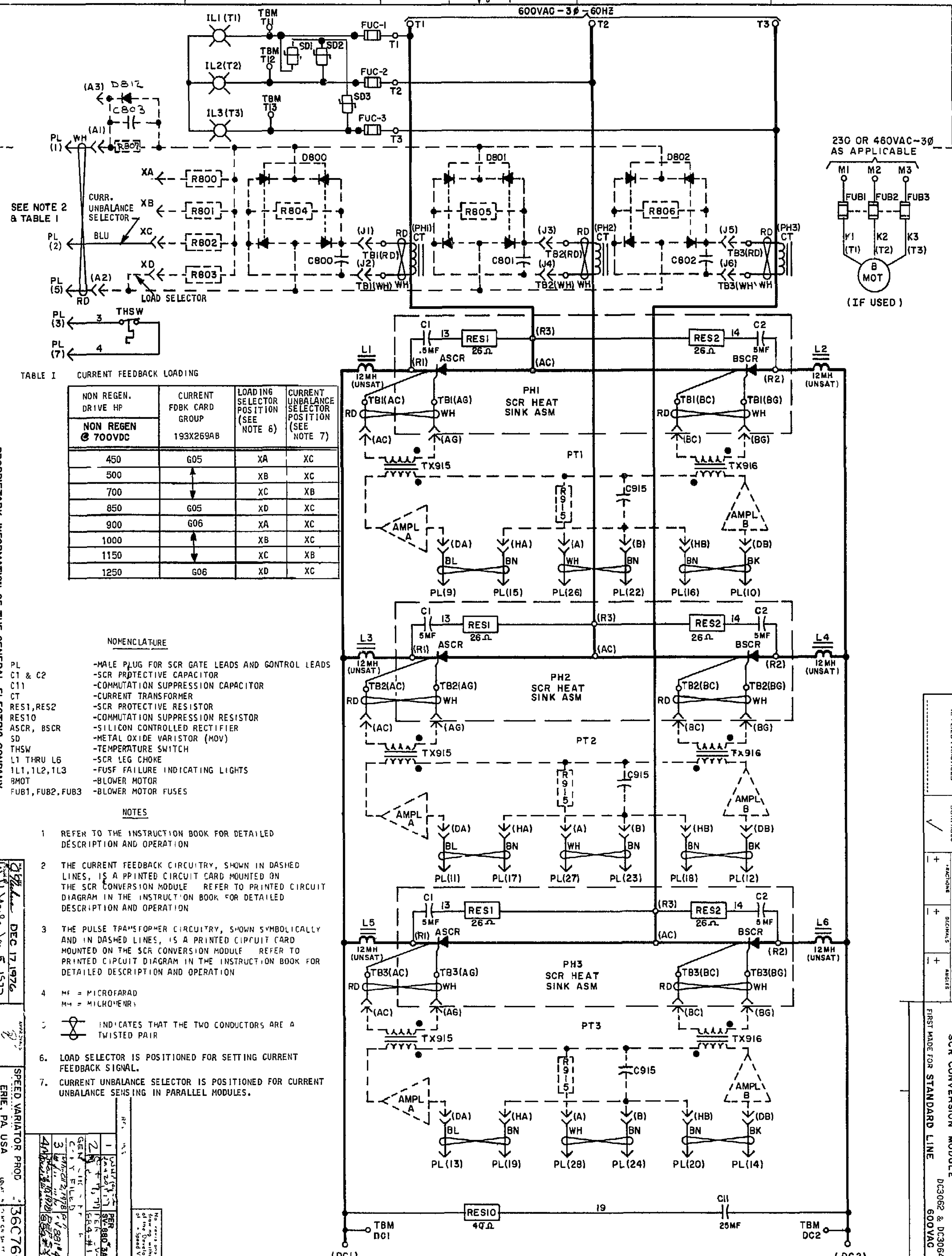


TABLE I CURRENT FEEDBACK LOADING

NON REGEN. DRIVE HP NON REGEN @ 700VDC	CURRENT FDBK CARD GROUP 193X269AB	LOADING SELECTOR POSITION (SEE NOTE 6)	CURRENT UNBALANCE SELECTOR POSITION (SEE NOTE 7)
450	G05	XA	XC
500	↕	XB	XC
700	↕	XC	XB
850	G05	XD	XC
900	G06	XA	XC
1000	↕	XB	XC
1150	↕	XC	XB
1250	G06	XD	XC

NOMENCLATURE

PL	-MALE PLUG FOR SCR GATE LEADS AND CONTROL LEADS
C1 & C2	-SCR PROTECTIVE CAPACITOR
C11	-COMMUTATION SUPPRESSION CAPACITOR
CT	-CURRENT TRANSFORMER
RES1,RES2	-SCR PROTECTIVE RESISTOR
RES10	-COMMUTATION SUPPRESSION RESISTOR
ASCR, BSCR	-SILICON CONTROLLED RECTIFIER
SD	-METAL OXIDE VARISTOR (MOV)
THSW	-TEMPERATURE SWITCH
L1 THRU L6	-SCR LEG CHOKE
1L1,1L2,1L3	-FUSE FAILURE INDICATING LIGHTS
BMOT	-BLOWER MOTOR
FUB1,FUB2,FUB3	-BLOWER MOTOR FUSES

NOTES

1. REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION
2. THE CURRENT FEEDBACK CIRCUITRY, SHOWN IN DASHED LINES, IS A PRINTED CIRCUIT CARD MOUNTED ON THE SCR CONVERSION MODULE. REFER TO PRINTED CIRCUIT DIAGRAM IN THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION
3. THE PULSE TRANSFORMER CIRCUITRY, SHOWN SYMBOLICALLY AND IN DASHED LINES, IS A PRINTED CIRCUIT CARD MOUNTED ON THE SCR CONVERSION MODULE. REFER TO PRINTED CIRCUIT DIAGRAM IN THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION
4. MF = MICROFARAD
   MH = MICROHENRY
5. INDICATES THAT THE TWO CONDUCTORS ARE A TWISTED PAIR
6. LOAD SELECTOR IS POSITIONED FOR SETTING CURRENT FEEDBACK SIGNAL.
7. CURRENT UNBALANCE SELECTOR IS POSITIONED FOR CURRENT UNBALANCE SENSING IN PARALLEL MODULES.

DEC 17, 1976

SPEED VARIATOR PROD.
ERIE, PA USA

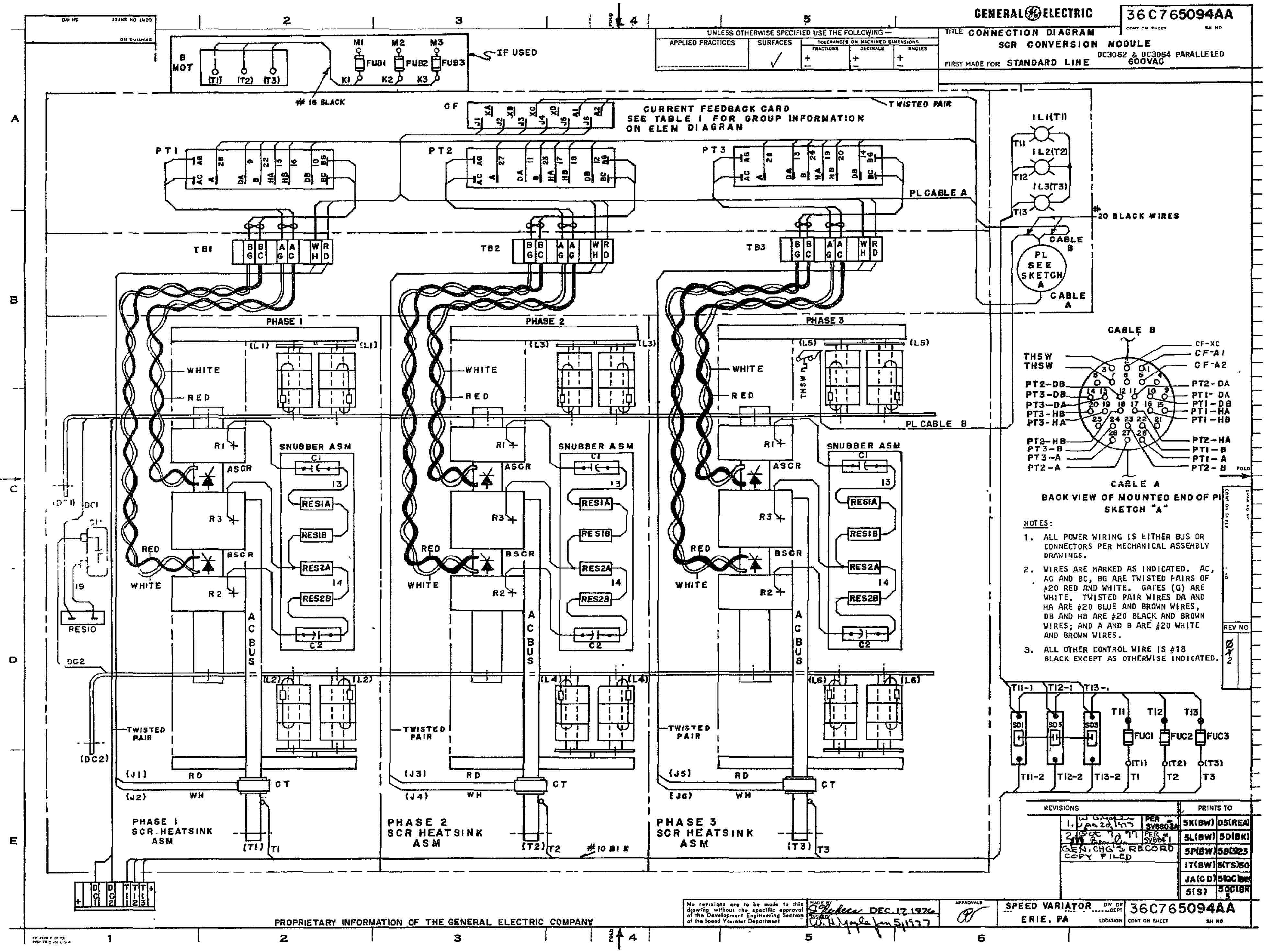
36C765093AA

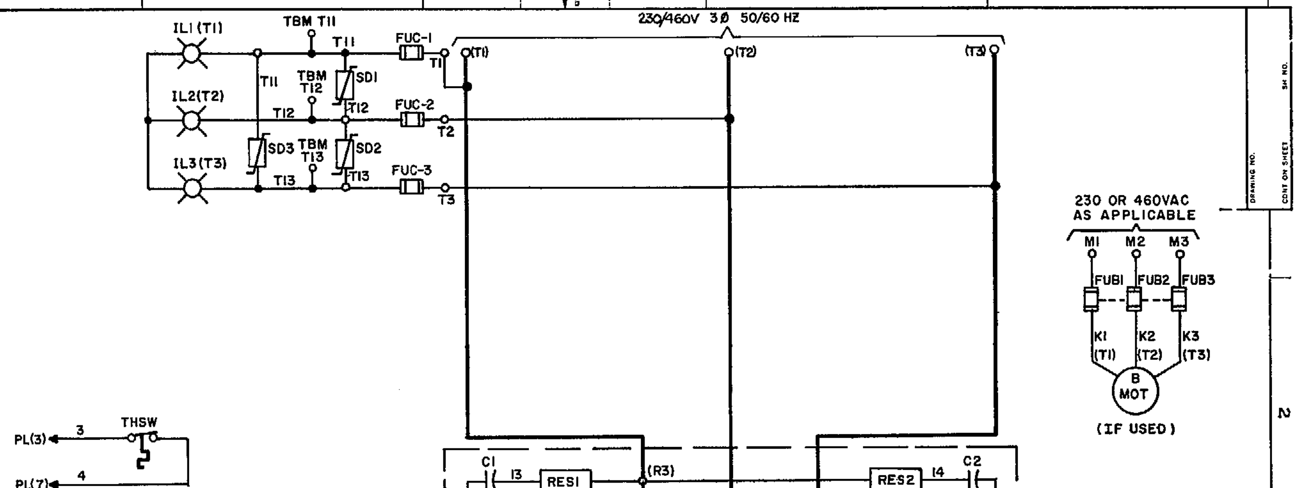
GENERAL ELECTRIC

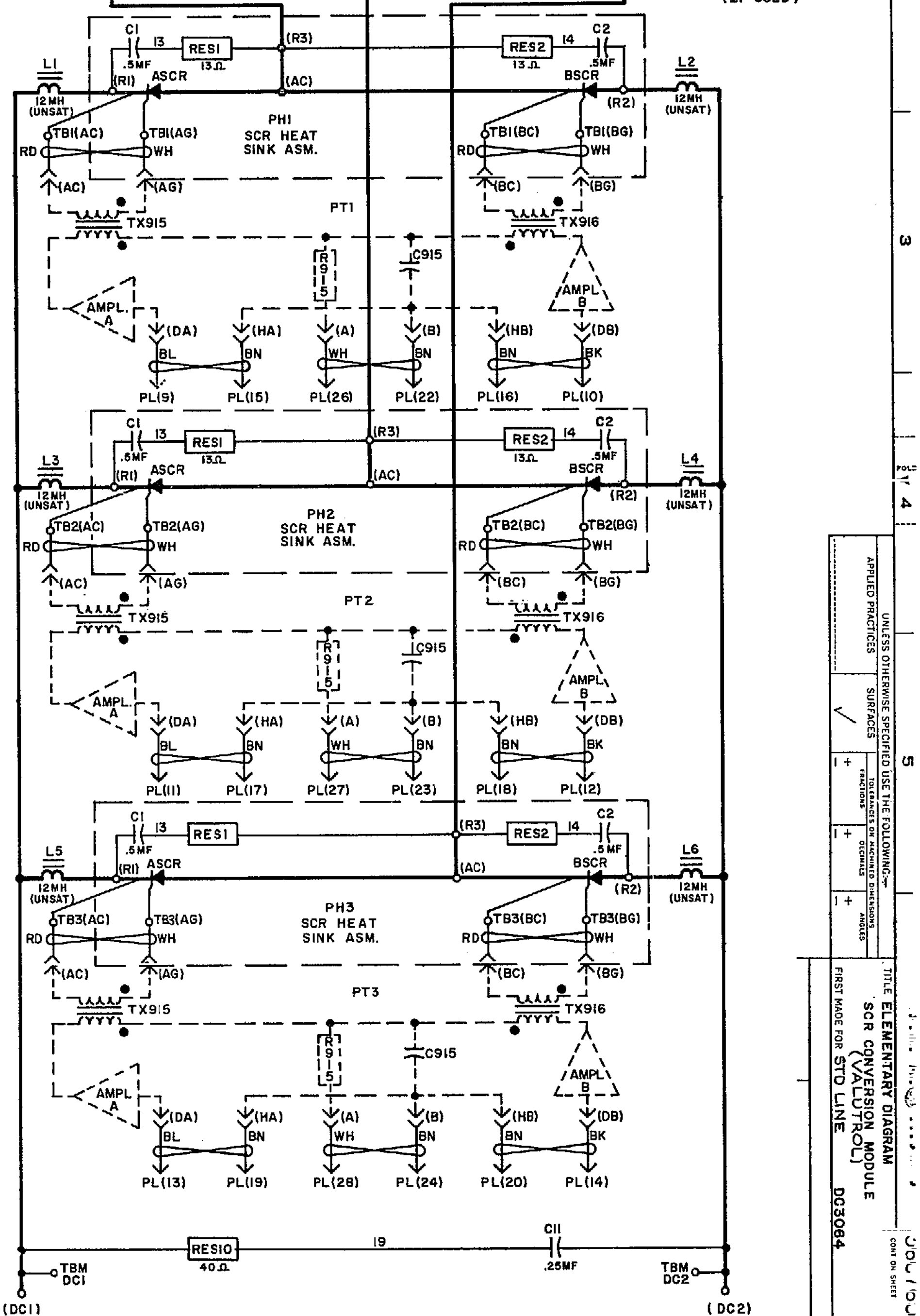
ELEMENTARY DIAGRAM
SCR CONVERSION MODULE
DC3062 & DC3064 PARALLELED 600VAC

FIRST MADE FOR STANDARD LINE

36C765093AA


GENERAL ELECTRIC
36C765094AA
TITLE CONNECTION DIAGRAM
SCR CONVERSION MODULE
DC3062 & DC3064 PARALLELED
600VAC
FIRST MADE FOR STANDARD LINE
UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING —
APPLIED PRACTICES
SURFACES
TOLERANCES ON MACHINED DIMENSIONS
FRACTIONS
DECIMALS
ANGLES
B MOT
(T1) (T2) (T3)
M1 M2 M3
FUB1 FUB2 FUB3
K1 K2 K3
IF USED
#16 BLACK
CF
CURRENT FEEDBACK CARD
SEE TABLE I FOR GROUP INFORMATION
ON ELEM DIAGRAM
TWISTED PAIR
PT1
PT2
PT3
PL CABLE A
PL CABLE B
#20 BLACK WIRES
IL1(T1)
IL2(T2)
IL3(T3)
T11
T12
T13
CABLE B
PL SEE SKETCH A
CABLE A
TB1
TB2
TB3
PHASE 1
PHASE 2
PHASE 3
WHITE
RED
SNUBBER ASM
ASCR
BSCR
R1
R2
R3
C1
C2
RES1A
RES1B
RES2A
RES2B
AC BUS
THSW
TWISTED PAIR
RD
WH
CT
(J1) (J2) (J3) (J4) (J5) (J6)
PHASE 1 SCR HEATSINK ASM
PHASE 2 SCR HEATSINK ASM
PHASE 3 SCR HEATSINK ASM
(T1) T1
(T2) T2
(T3) T3
#10 BLK
DC1
DC2
RES10
THSW
PT2-DB
PT3-DB
PT3-DA
PT3-HB
PT3-HA
PT2-HB
PT3-B
PT3-A
PT2-A
CF-XC
CF-A1
CF-A2
PT2-DA
PT1-DA
PT1-DB
PT1-HA
PT1-HB
PT2-HA
PT1-B
PT1-A
PT2-B
BACK VIEW OF MOUNTED END OF PL
SKETCH "A"
NOTES:
1. ALL POWER WIRING IS EITHER BUS OR CONNECTORS PER MECHANICAL ASSEMBLY DRAWINGS.
2. WIRES ARE MARKED AS INDICATED. AC, AG AND BC, BG ARE TWISTED PAIRS OF #20 RED AND WHITE. GATES (G) ARE WHITE. TWISTED PAIR WIRES DA AND HA ARE #20 BLUE AND BROWN WIRES, DB AND HB ARE #20 BLACK AND BROWN WIRES; AND A AND B ARE #20 WHITE AND BROWN WIRES.
3. ALL OTHER CONTROL WIRE IS #18 BLACK EXCEPT AS OTHERWISE INDICATED.
T11-1 T12-1 T13-1
SD1 SD3 SD5
FUC1 FUC2 FUC3
T11-2 T12-2 T13-2
REV NO.
REVISIONS
PRINTS TO
GEN. CHG'S RECORD COPY FILED
5K(BW) 5D(REA)
5L(BW) 5D(BK)
5P(BW) 5B(323)
1T(BW) 5(TS)50
JA(CD) 5QC(BW)
5(S)
No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department
DEC. 17 1976
SPEED VARIATOR
ERIE, PA
36C765094AA
PROPRIETARY INFORMATION OF THE GENERAL ELECTRIC COMPANY





NOMENCLATURE

PL	-MALE PLUG FOR SCR GATE LEADS AND CONTROL LEADS
C1 & C2	-SCR PROTECTIVE CAPACITOR
C11	-COMMUTATION SUPPRESSION CAPACITOR
RES1,RES2	-SCR PROTECTIVE RESISTOR
RES10	-COMMUTATION SUPPRESSION RESISTOR
ASCR, BSCR	-SILICON CONTROLLED RECTIFIER
SD	-METAL OXIDE VARISTOR (MOV)
THSW	-TEMPERATURE SWITCH
L1 THRU L6	-SCR LEG CHOKE
IL1,IL2,IL3	-FUSE FAILURE INDICATING LIGHTS
BMOT	-BLOWER MOTOR
FUB1,FUB2,FUB3	-BLOWER MOTOR FUSES

NOTES

1. REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.
2. THE PULSE TRANSFORMER CIRCUITRY, SHOWN SYMBOLICALLY AND IN DASHED LINES, IS A PRINTED CIRCUIT CARD MOUNTED ON THE SCR CONVERSION MODULE. REFER TO PRINTED CIRCUIT DIAGRAM IN THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.
3. MF = MICROFARAD
   MH = MICROHENRY
4. INDICATES THAT THE TWO CONDUCTORS ARE A TWISTED PAIR.

TITLE ELEMENTARY DIAGRAM
SCR CONVERSION MODULE
(VALUTROL)

FIRST MADE FOR STD LINE DC3064

SPEED VARIATOR PROD. DEPT.
ERIE, PA USA

36C765091AA

REVISIONS

No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department.

PRINTS TO

5B(323)	5P(BW)
5D(BK)	5TS(5O)
5K(BW)	1T(BW)
5L(BW)	JA(CD)
5QC(BK)	DS(BW)

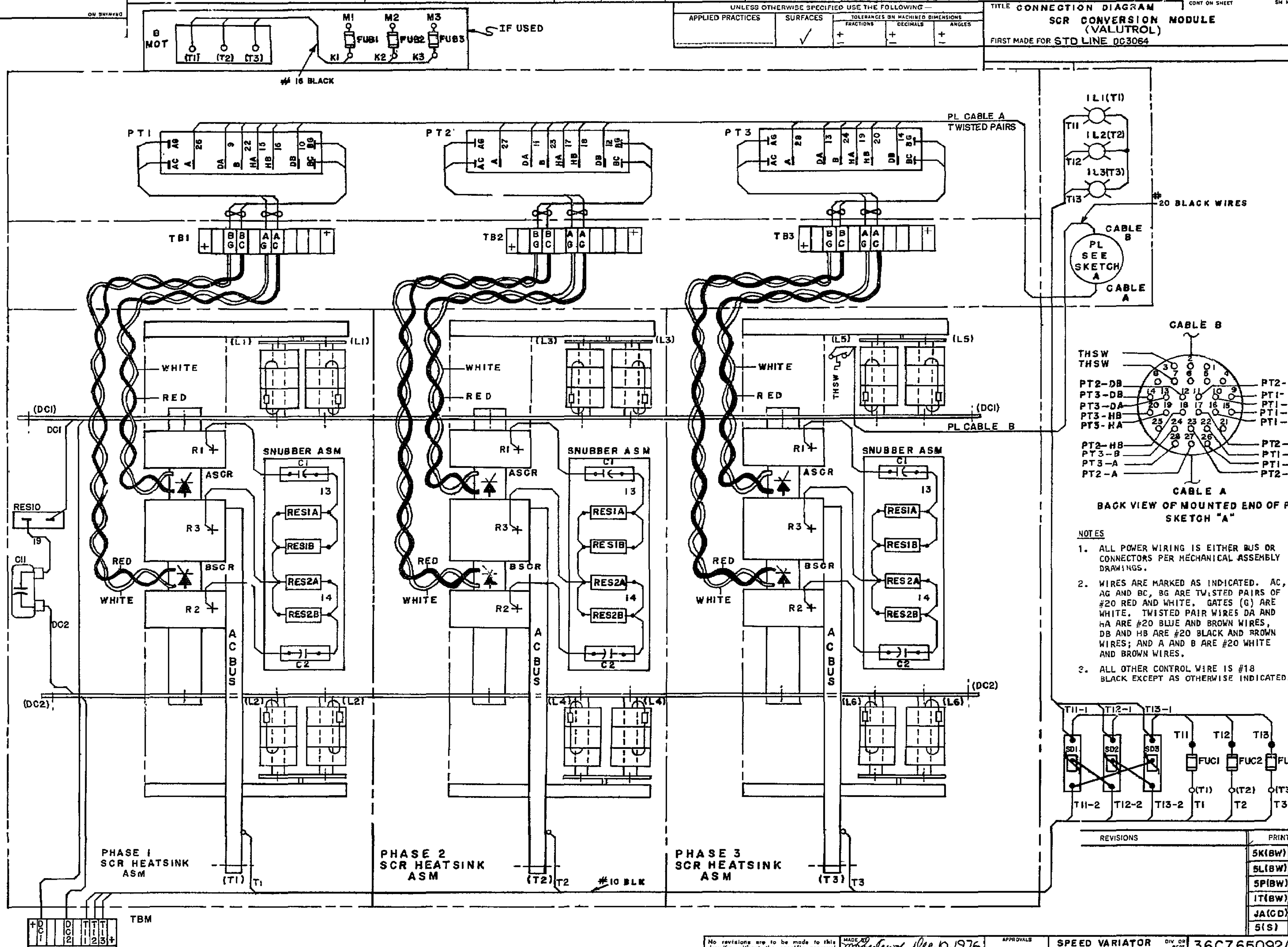
GENERAL ELECTRIC

36C765092AA

TITLE CONNECTION DIAGRAM
SCR CONVERSION MODULE
(VALUTROL)

FIRST MADE FOR STD LINE DC3064

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING — APPLIED PRACTICES | SURFACES | TOLERANCES ON MACHINED DIMENSIONS: FRACTIONS ± | DECIMALS ± | ANGLES ±



NOTES

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3. ALL OTHER CONTROL WIRE IS #18 BLACK EXCEPT AS OTHERWISE INDICATED.

REVISIONS

PRINTS TO	
5K(BW)	DS(REA)
5L(BW)	5D(BK)
5P(BW)	5B(3)23
1T(BW)	5(TS)50
JA(CD)	5(QC)BW
5(S)	5QC(BK) 5

No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department

MADE BY M. Leslowx Dec 10, 1976
ISSUED M. Zyganski FEB 15, 1977

SPEED VARIATOR DEPT
ERIE, PA

36C765092AA

PROPRIETARY INFORMATION OF THE GENERAL ELECTRIC COMPANY

36C762889AC
DRAWING NO. CONT ON SHEET SH NO

GENERAL ELECTRIC

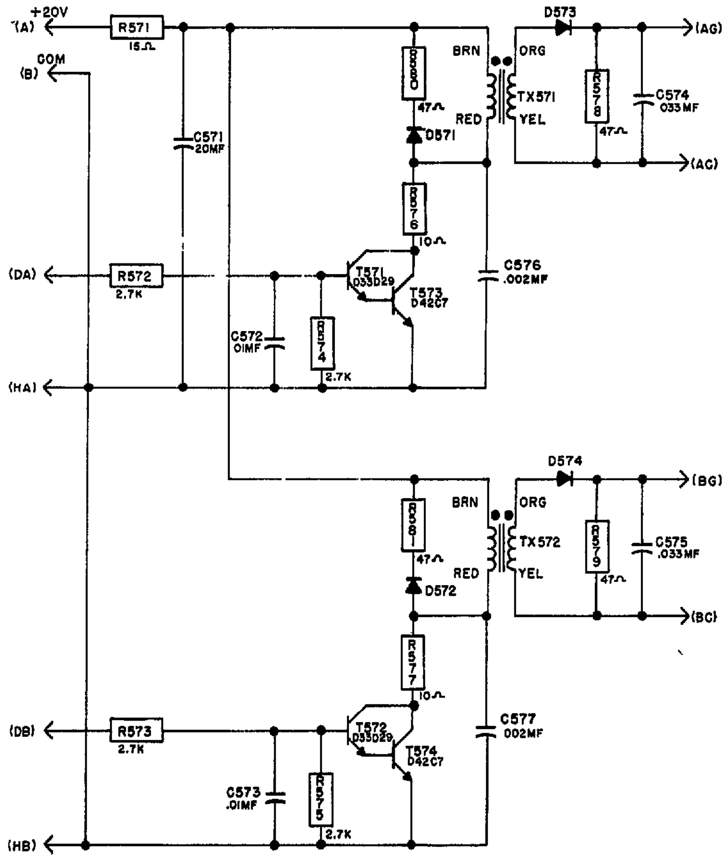
36C762889AC
CONT ON SHEET SH NO

TITLE PRINTED CIRCUIT DIAGRAM
PULSE TRANSFORMER
FIRST MADE FOR STANDARD LINE
193X255ACG02

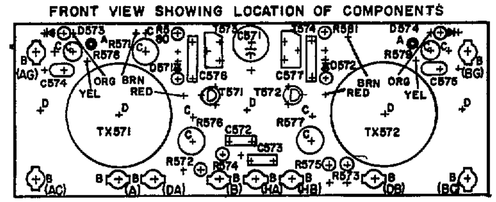
UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING —

APPLIED PRACTICES	SURFACES	TOLERANCES ON MACHINED DIMENSIONS: FRACTIONS	DECIMALS	ANGLES
718A515	✓	+ −	+ −	+ −

SCHEMATIC DIAGRAM



FRONT VIEW SHOWING LOCATION OF COMPONENTS



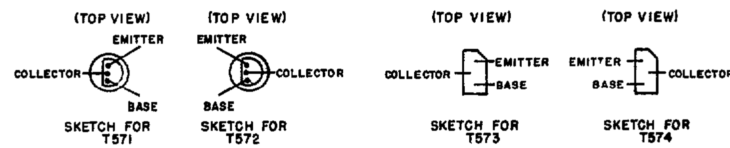
NOTE 1 CARD SIZE, 1.90 ±.020 X 5.130 +.002 −.008

HOLE TABULATION

ALL HOLES .040 DIA. EXCEPT THE HOLES TABULATED BELOW

LOC	DIA.	QUAN
A	.157	2
B	.101	10
C	.062	10
D	.187	5

TRANSISTOR LEAD SKETCHES



REV NO 0

SCALE	ETCHED CIRCUIT BOARD DWG.	SPACE UNIT REQUIREMENT FRONT	BACK
FULL	942B584AB004	—	—

REVISIONS

No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department

PRINTS TO

5QC(BK)	5 (S)
JA(CD)	5D(BK)
IT(BW)	5QC(BW)
	5B(2) 22
	6(TS)50

MADE BY G.R. Baker DEC. 27, 1972 — APPROVALS
ISSUED MAY 1, 1973
SPEED VARIATOR
ERIE, PA
36C762889AC
CONT ON SHEET SH NO

GENERAL ELECTRIC

36C764127AC

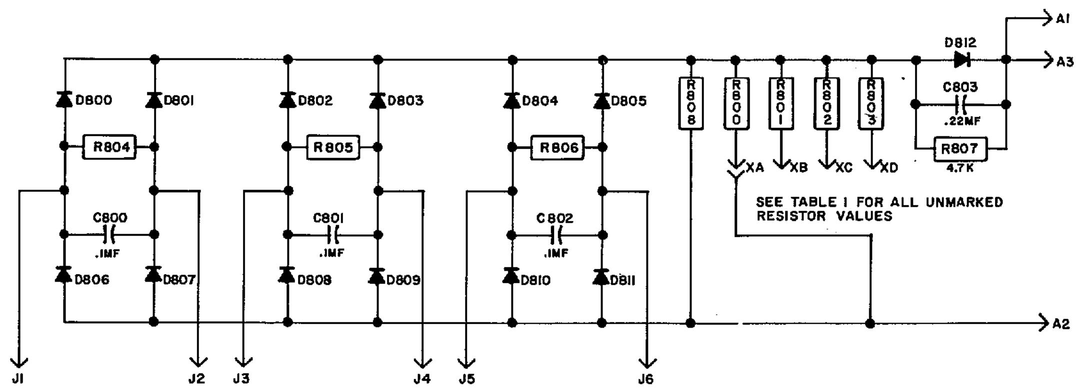
TITLE PRINTED CIRCUIT DIAGRAM CURRENT FEEDBACK

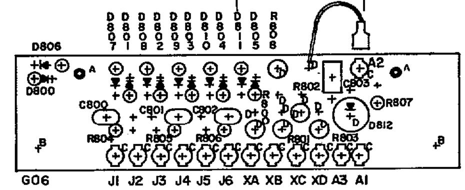
FIRST MADE FOR STANDARD LINE

193X269ACG01–G06

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:—				
APPLIED PRACTICES	SURFACES	TOLERANCES ON MACHINED DIMENSIONS: FRACTIONS	DECIMALS	ANGLES
718A515	✓	±	±	±

SCHEMATIC DIAGRAM





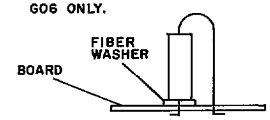
FRONT VIEW SHOWING LOCATION OF COMPONENTS

HOLE TABULATION

ALL HOLES .040 DIA. EXCEPT THE HOLES TABULATED BELOW

LOC.	DIA.	QUAN.
A	.157	2
B	.187	2
C	.101	13
D	.062	12

NOTE
1. CARD SIZE, $4.900^{+.000}_{-.015}$ X $1.300^{+.000}_{-.015}$
2. MOUNT R803 AS SHOWN BELOW TO RAISE IT ABOVE THE SURFACE OF THE BOARD ON G06 ONLY.



3. FACTORY TO CONNECT LEAD CONNECTOR TO TERMINAL XA FOR ALL GROUPS.

TABLE I

RESISTOR		RESISTOR VALUES G01	G02	G03	G04	G05	G06	CONNECTOR
G01,2,3 IS ½ WATT	R800	332Ω*	100Ω*	56.2Ω*	22Ω	—	15Ω	XA
	R801	221Ω*	82.5Ω*	39.2Ω*	15Ω	47Ω	10Ω	XB
G04,5,6 IS 2 WATT	R802	150Ω*	68.1Ω*	33.2Ω*	12Ω	22Ω	8.2Ω	XC
	R803	100Ω*	47.5Ω*	27.4Ω*	10Ω	15Ω	6.8Ω	XD
½ WATT	R804	10K	6.8K	4.7K	3.3K	2.2K	1.5K	
	R805	10K	6.8K	4.7K	3.3K	2.2K	1.5K	
	R806	10K	6.8K	4.7K	3.3K	2.2K	1.5K	
2 WATT	R808	—	—	—	—	12Ω	12Ω	

* – INDICATES 1% TEMPERATURE COMPENSATION

SCALE	ETCHED CIRCUIT BOARD DWG.	SPACE UNIT REQUIREMENT FRONT	BACK
FULL	942B250AC004	———	———

REVISIONS

No revisions are to be made to this drawing without the specific approval of the Development Engineering Section of the Speed Variator Department.

[1] APRIL 25,1978 G.R. Bahus CHG. PER. SV-883#16

PRINTS TO	
5B(6)M	5J(BW)
5R(2)BW	ST(50)
5L(2)BW	
AW(BW)	
5D(CD)	
JA(CD)	

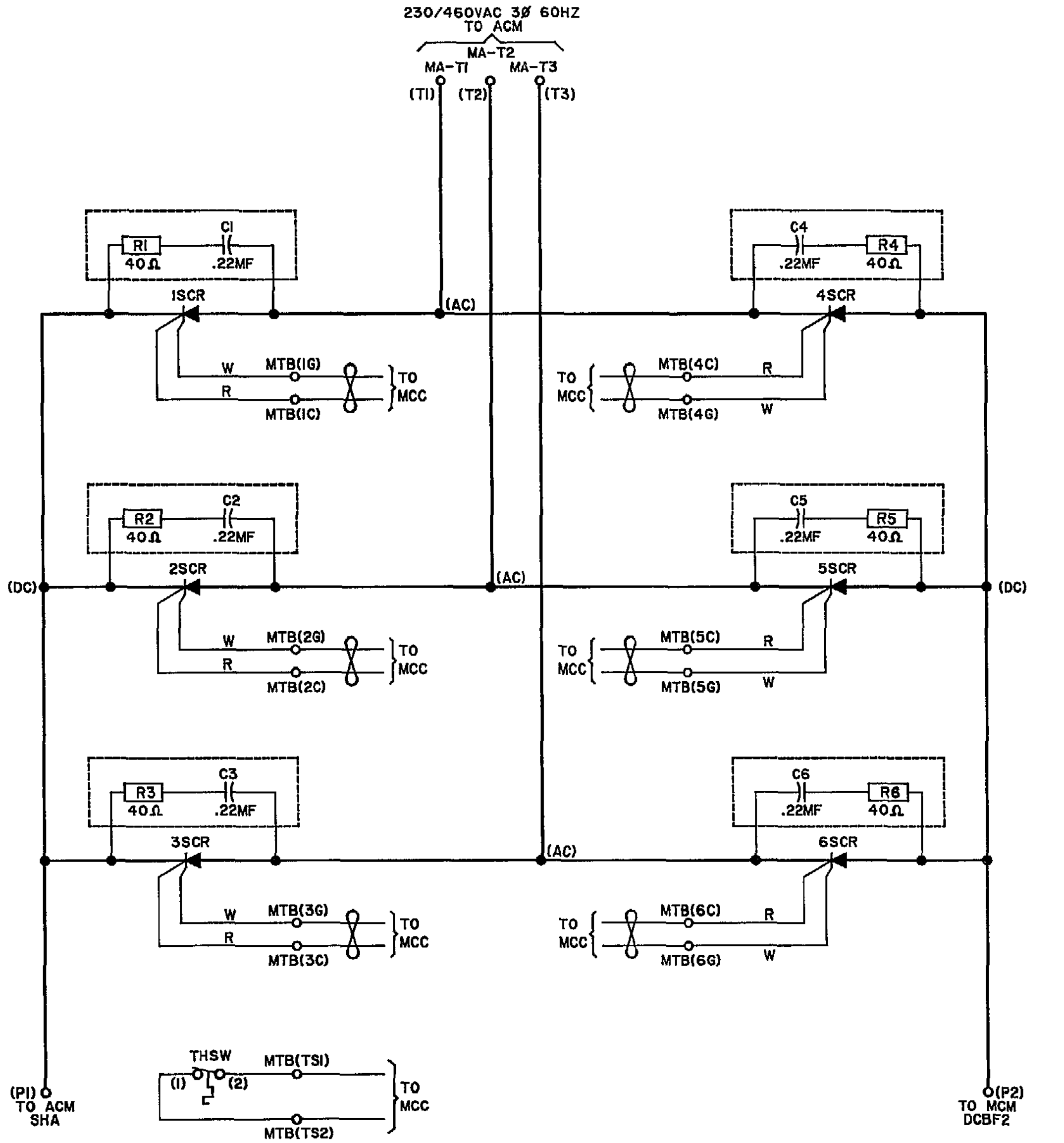
REV NO. Ø 1

MADE BY M.B. Pozha DEC.10,1975
ISSUED D. LaRose MAY 5,1976
APPROVALS

SPEED VARIATOR DIV OR DEPT
ERIE,PA LOCATION

36C764127AC

PROPRIETARY INFORMATION OF THE GENERAL ELECTRIC COMPANY



NOMENCLATURE
1SCR,2SCR,3SCR ETC.
SILICON CONTROLLED RECTIFIER
C1-R1,C2-R2,C3-R3 ETC.
PROTECTIVE CAPACITOR
AND RESISTOR
THSW-TEMPERATURE SWITCH

NOTES
REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.
SNUBBER ASM SHOWN IN DASHED LINES IS PREWIRED AND ASSEMBLED TO A DC BUS BAR AND IS MOUNTED ON THE SCR CONVERSION MODULE.
REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.
MF-MICROFARAD
-INDICATES THAT 2 CONDUCTORS ARE A TWISTED PAIR

TITLE ELEMENTARY DIAGRAM
CONVERSION MODULE ASM
ONE QUADRANT-NON-REGENERATIVE
FIRST MADE FOR DC-3064

SPEED VARIATOR
ERIE, PA. U.S.A.
36C764892AA
CONT ON SH FL SH NO. 1

REVISIONS
PRINTS TO
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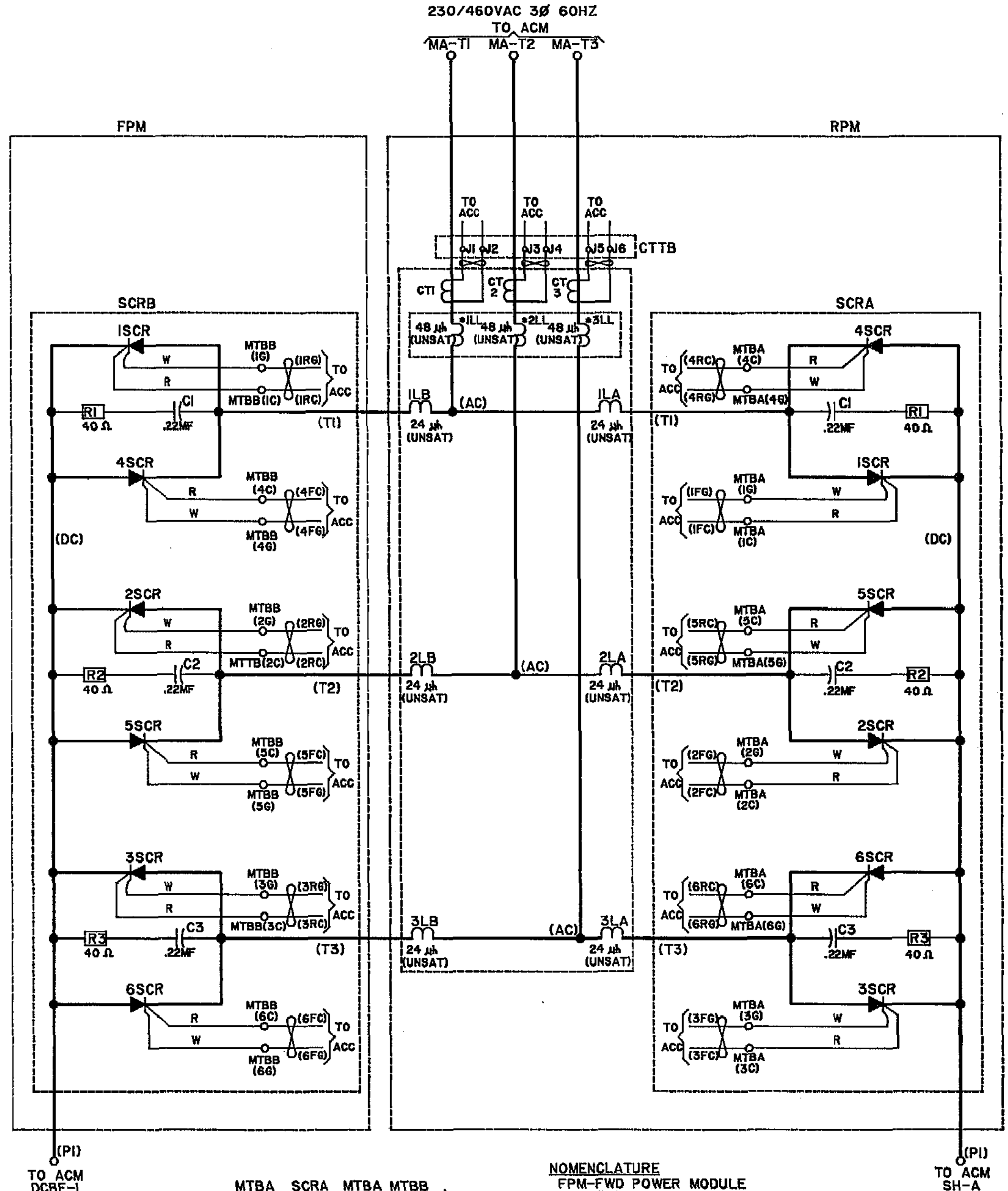

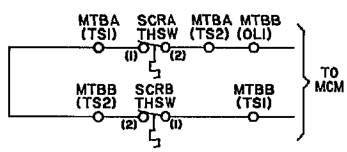

NOMENCLATURE

FPM-FWD POWER MODULE
RPM-REV POWER MODULE
SCRA-CONV MOD ASM
SCRB-CONV MOD ASM
1SCR,2SCR,3SCR,ETC.-SILICON CONTROLLED RECTIFIER
C1-R1,C2-R2,C3-R3,ETC.-PROTECTIVE CAPACATOR AND RESISTOR
CT1,CT2,CT3 CURRENT TRANSFORMER
FCA-FERRITE CORE ASM
THSW-TEMPERATURE SWITCH
1LA,2LA,3LA-SCR LEG CHOKE

NOTES

REFER TO THE INSTRUCTION BOOK FOR DETAILED DESCRIPTION AND OPERATION.
MF-MICROFARAD

-INDICATES THAT 2 CONDUCTORS ARE A TWISTED PAIR

µh -MICROHENRY

* THIS INDUCTANCE IS OMITTED FROM FCA ON DRIVES RATED:
(1) 55HP-240VDC AND ABOVE
(2) 105HP-500VDC AND ABOVE

GENERAL ELECTRIC

TITLE ELEMENTARY DIAGRAM
CONVERSION MODULE ASM
FOUR QUADRANT-REGENERATIVE
FIRST MADE FOR DC-3064R

36C764893AA
CONT ON SH FL. SH NO. 1

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REVISIONS

PRINTS TO

SPEED VARIATOR
ERIE, PA. U.S.A.

36C764893AA
CONT ON SH FL. SH NO. 1