

SORENSEN
POWER SUPPLIES

**instruction
manual
for**

**DCR-B SERIES
1800-WATT
POWER SUPPLIES**

Manual Covers DCR-B Models:

10-120B
20-80B
40-40B
60-30B

80-20B
150-12B
300-6B
600-3B

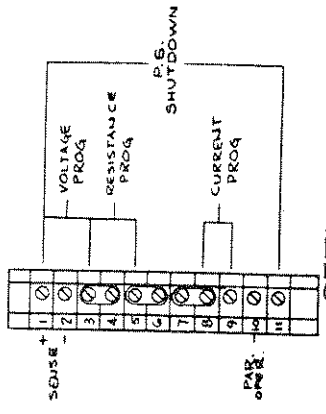
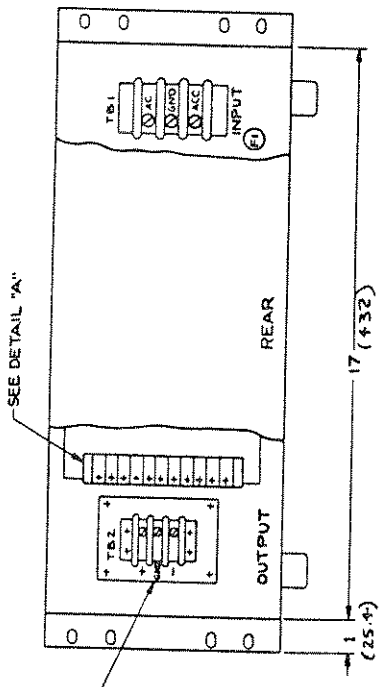
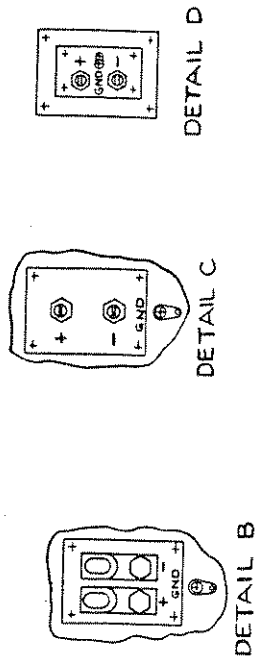
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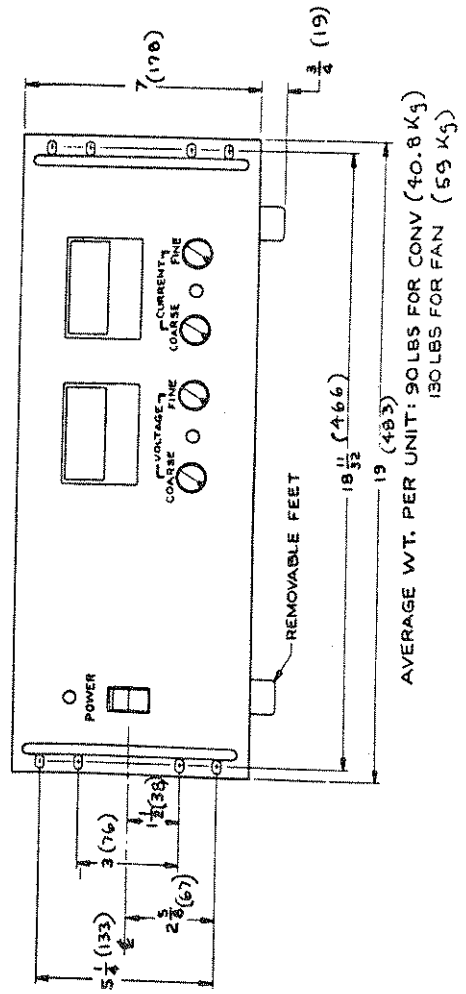


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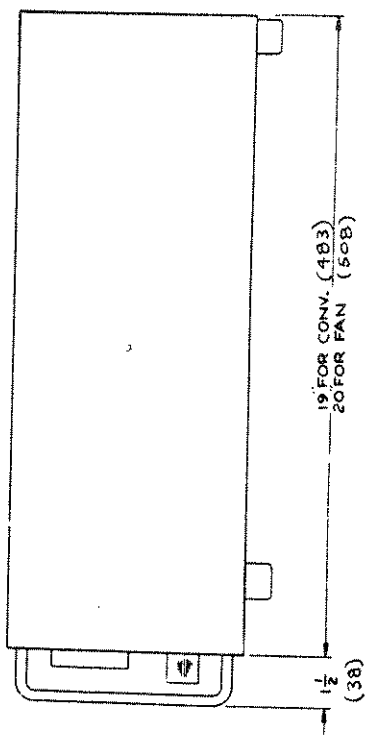


DETAIL "A"
REFER TO MANUAL FOR COMPLETE DETAILS

SEE DETAIL "B" FOR:
DCR 10-120 B CONV
DCR 10-120 B FAN
DCR 20-80 B CONV
DCR 20-115 B FAN
SEE DETAIL "C" FOR:
DCR 40-70 B FAN
SEE DETAIL "D" FOR:
DCR 40-70 B CONV
DCR 60-45 B FAN



AVERAGE WT. PER UNIT: 90 LBS FOR CONV (40.8 Kg)
130 LBS FOR FAN (59 Kg)



DCR-B SPECIFICATIONS
1800-WATT SERIES

DCR Model	OUTPUT POWER		Constant Voltage Ripple (PAR) (mV rms)	Constant Current Ripple (PAR) (mA rms)	TEMPCO (mV/°C) (mA/°C)	REMOTE PROGRAMMING (Ohms/V) (Ohms/A)	SIGNAL (Volt In/Volt Out)	Efficiency (% Typ.)	INPUT POWER Voltage Range (Vac) Note 3 Note 4	Power Factor (Typ.)	OUTPUT IMPEDANCE (typical) 120Hz 1KHz 10KHz
	Voltage (Vdc)	Current (A dc) 71°C 40°C									
10-120B	0-10	120	65	785	1.5	1200	1/1	62	103-127	.67	.007
20-80B	0-20	80	65	260	3	600	1/2	70	103-127	.66	.009
40-40B	0-40	40	90	90	6	300	1/4	78	103-127	.66	.016
60-30B	0-60	30	125	63	9	200	1/6	84	103-127	.68	.022
80-20B	0-80	20	150	38	12	150	1/8	82	103-127	.66	.035
150-12B	0-150	12	300	24	22.5	80	1/15	84	103-127	.69	.16
300-6B	0-300	6	700	14	45	40	1/30	84	103-127	.69	.65
600-3B	0-600	3	1200	6	90	20	1/60	86	103-127	.66	2.17

NOTES:

1. Overvoltage protector internal (optional), factory-installed.
2. Average weight, 70 lbs.
3. Optional Inputs: 208V, 220V, 230V, 230V (Options M1, M2, M3 respectively)
4. At 115V input.

COMMON SPECIFICATIONS

Voltage Mode:

Regulation: 0.03% with load change (NL-to-FL or FL-to-NL) and a full line-voltage change combined.

Resolution: 0.05% of Eo max. (typical)

Drift (% Eo max): 0.1% typical, for 8 hours after 30-minute warmup with constant line, load, and ambient temperature.

Transient Response: 50ms (typical) to return to ±1% band for a step load change 50%-100% or 100%-50% of full load (10V models ±3% band, 20V models ±2%). Below 60 Hz, ripple and transient response characteristics will deteriorate by a factor of (60/f) where f is the input frequency.

Current Mode:

Regulation: 0.25% with 0-95% compliance-voltage change and ±10% line voltage change combined.

Resolution: 0.05% of Io max (typical)

Drift (% Io max): 0.15% (typical)

General:

Series Operation: To 200 Vdc Maximum. (150 and 300 volt models, two in series).

Parallel Operation: By master-slave or straight parallel, four units maximum.

Remote Sensing: 8 volts drop maximum per load lead, but not to exceed 10% Eo max.

Operating Temperature Range: 0°C to 71°C

Storage Temperature: -40°C to +85°C

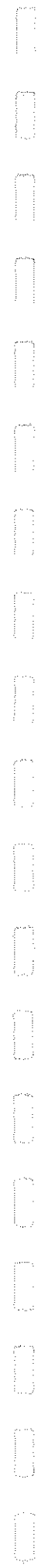
Cooling: Convection

Isolation Voltage: 1000Vdc input to output.

Finish: Bonderize-Black semi-gloss with white lettering

Overload/ Short-circuit Protection: Adjustable current limiting with automatic recovery.

Overvoltage Protector: Available option on all models. Add M5 suffix to model number.



1. INTRODUCTION AND DESCRIPTION

1.1 INTRODUCTION

This manual contains operation and maintenance data on the 1.8-kilowatt DCR-B Series Sorensen Power Supplies. It is intended to familiarize the user with the functioning of the unit, to introduce the varied applications to which the unit may be adapted, and to furnish sufficient maintenance data to assure long operating life.

Seven major sections form the manual divisions. Section 1 contains a brief functional description of the DCR-B series power supplies. Initial inspection and checkout procedures are outlined in section 2. Operating instructions, including methods for adapting units to various applications, comprise section 3. Sections 4 and 5 provide the principles of operation and maintenance procedures respectively. System drawings, and the replacement parts list are provided in section 6. Concluding the manual, section 7 describes the DCR-B OVP (overvoltage protector) accessory.

1.2 DESCRIPTION

1.2.1 General

Designed for either bench or rack use, the typical DCR-B power supply provides a highly regulated, precise d-c output, adjustable over a wide range. It operates from a nominal 115 Vac (208/220/230-Vac inputs are available as options) and exhibits a rapid response to transients, both load and line. Highly efficient, it can easily be adapted to numerous applications.*

Silicon-type semiconductors are used extensively in DCR-B circuitry, and contribute significantly to the units' wide ambient-temperature-range characteristic. Low-dissipation transistors and diodes are located on a single printed-circuit board while high-dissipation devices are heat-sinked to aluminum brackets.

All controls used during normal operation are mounted on the front panel. These include a power circuit breaker, FINE and COARSE VOLTAGE adjust potentiometers, and FINE and COARSE CURRENT adjust potentiometers. In all DCR-B units over 1 kilowatt, the system output is taken across a terminal pair at the rear terminal strip.

*A variety of Sorensen power supply application notes are available through your Sorensen Service Representative.



1.2.2 Automatic Crossover.

There are two basic operating modes; voltage and current. In the voltage mode, the voltage is held constant while the current varies with the load, while in the current mode, the voltage varies, and current is held constant. The automatic crossover feature enables the unit to switch operating modes as a function of load requirements. If, for example, load current attempts to increase above a preset current limit, the unit will switch operation automatically from the voltage to the current mode. In this mode, the current will be regulated at the value preset on the front panel. If load requirements are lowered, return to the voltage-regulating mode will occur automatically. A red lamp on the front panel glows to indicate the current-mode operation.

1.2.3 Remote Sensing.

Terminals located on the rear-mounted terminal board offer the means of extending a unit's regulating point from the output terminals to the load. This effectively compensates for variations in the load-lead IR drop. Section 3 outlines the connections for remote sensing.

1.2.4 Series Operation.

For applications requiring output voltages higher than a single unit can provide, DCR-B power supplies may be connected in series (See Section 3). Regulation in series operation is the sum of the regulations for all units.

1.2.5 Parallel Operation.

Parallel operation may be used to service those applications requiring an output current higher than a single supply can provide. Using a "master-slave" approach, a maximum of four units may be connected in parallel. An alternate method is direct paralleling. With this approach, there is no limit to the number of units which can be paralleled. The regulation will deteriorate, and could be the sum of the regulations for the individual settings plus the output-voltage differences between units at no load.

1.2.6 Remote Programming.

Output voltage or current of DCR-B power supplies may be programmed in either the voltage or current mode by resistance or voltage signal. This feature permits the user to change the output voltage or current to preset values from remote locations.

1.2.7 Unit Shutdown Circuit.

In the DCR-B line, application of the (+) sense (terminal 1) to terminal 11 of terminal board J1 instantly shuts down the supply. This function can provide unit protection by connecting a temperature-or voltage-sensitive switch (or transistor) in this line to shut the system down under specified conditions. An example is in the master-slave connection of two DCR-B power supplies (refer to section 3, Operating Instructions). If the shutdown function is adapted to the master unit, the system output goes to zero; applied to the slave unit, only that unit is affected and the system output is reduced accordingly.

1.2.8 Protection Features

Protection against the effects of overloads and internal short circuits is provided. Overload protection is inherent in automatic crossover. The main power circuit components are protected by the unit circuit breaker.

1.3 OPTIONAL MODIFICATIONS

The standard DCR-B unit is designed for operation from a nominal 115-Vac input; however, units may be purchased factory-modified to accept inputs of 208, 220 or 230 Vac (modifications M1, M2 or M3 respectively).

1.4 ACCESSORY OVP

An overvoltage-protector circuit (OVP) is available as an accessory to Sorensen's DCR-B power supplies. The circuit may be factory-installed or purchased as a kit and field-installed. Complete installation and operation procedures are provided in section 7 of this manual.



2. PREPARATION FOR USE

2.1 GENERAL

After unpacking, initial inspections and preliminary electrical check procedures should be performed to assure that the unit is in good working order. If it is determined that the unit is damaged, the carrier should be notified immediately. Repair problems should be directed to the nearest Sorensen representative, or to the Service Department, Sorensen Company, Manchester, New Hampshire, 03103.

2.2 INITIAL INSPECTION

Proceed as follows to inspect for damage incurred during shipment:

1. Inspect panel and chassis for scratches, dents and chips.
2. Turn front-panel voltage and current controls from stop to stop. Rotation should be smooth through a 300-degree angle.
3. Check meter faces for cracked or broken windows. Check each meter pointer for zero indication. If necessary, use "adjust" screw to bring indicator to zero.
4. Look for cracked or broken lenses on indicating lights.
5. Alternate power switch between ON and OFF a few times. Action should be both positive and audible. Terminate check with switch in OFF position.
6. Remove rear cover, and check terminal board. Make sure that links are firmly in place across terminals 3-4, 5-6, and 7-8.
7. Remove top-cover retaining screws. Inspect components and printed-circuit board for damage.

2.3 ELECTRICAL INSTALLATION

Standard units are shipped ready for use with a nominal 115-Vac input, but may be factory-modified to operate from a nominal 208-, 220-, or 230-volt input.

Input power connections are made to the INPUT terminal board (TB1) at the rear of the supply. Connect No. 10 wires to the outer terminals; high line to AC, low to AC C (common) and ground wire to the center (GND) terminal.



2.4 MECHANICAL INSTALLATION

As received, the unit is ready for bench use. To adapt for rack mounting, simply invert the unit, remove feet and reinstall the feet-retaining screws.

2.5 ELECTRICAL CHECK

2.5.1 Voltage Mode

To check voltage-mode operation, proceed as follows:

1. With POWER switch OFF, connect appropriate input power per paragraph 2.3.
2. Turn COARSE and FINE VOLTAGE controls fully counterclockwise, and COARSE CURRENT control fully clockwise.
3. Set unit power to ON with zero load current.
4. Turn COARSE VOLTAGE control slowly clockwise while observing the unit voltmeter. The pointer should swing upscale, and the voltage indicator light should be ON.
5. With the pointer at half scale, rotate the FINE VOLTAGE control from stop to stop. The voltage should vary according to Table 2-1.

Table 2-1 DCR-B Fine-Tuning Voltage Range

Model Voltage	Fine-Tuning Range
10	0.041V
20	0.083V
40	0.166V
60	0.250V
80	0.333V
150	0.625V
300	1.25V
600	2.5V

2.5.2 Current Mode

1. With unit power OFF, turn COARSE and FINE CURRENT controls fully counterclockwise, and set COARSE VOLTAGE control to its approximate mid-position.
2. Connect approximately four feet of copper wire across the output terminals (wire sizes are listed in Table 2-2).
3. Set unit power to ON. CURRENT mode indicator will illuminate.
4. Rotate COARSE CURRENT control slowly clockwise until a current indication appears. Continue clockwise rotation, and the meter indication will increase accordingly.
5. Set unit power to OFF, and remove shorting wire.



Table 2-2 Wire Sizes, Current-Mode Check

DCR-B Model	Wire Size
10-120	No. 6
20-80	No. 8
40-40	No. 10
60-30	No. 12
80-20	No. 14
150-12	No. 14
300-6	No. 20
600-3	No. 24



3. OPERATING INSTRUCTIONS

3.1 GENERAL

This section provides basic operating instructions, and details the methods by which DCR-B power supplies may be adapted to their more common applications including remote sensing, remote programming, and series and parallel operation. Table 3-1 describes the function of the operating controls shown in Figure 3-1.

WARNING

1. *Full system voltage appears across the unit output terminals. Follow operating procedures exactly, and do not make terminal-board or load-terminal alterations with unit power ON.*
2. *High-voltage output (which may damage the load or injure personnel) and loss of current limiting (which may damage the unit) can result from loosening or removing links on the rear-mounted terminal board. Do not remove or loosen any links unless specifically instructed to do so in subsequent procedures.*

3.2 VOLTAGE-MODE OPERATION

3.2.1 Local Sensing

DCR-B series units are shipped ready for use in the local-sensing configuration, that is, with unit regulation occurring at the output terminals. This may be undesirable if variations in the load-lead voltage drops are expected to be large in comparison with the unit's specified regulation. To compensate for prohibitive drops, remote sensing may be used (paragraph 3.2.2).

To operate unit in the voltage-mode, local-sensing configuration proceed as follows:

1. Rotate the FINE and COARSE VOLTAGE controls fully counterclockwise, and the CURRENT controls fully clockwise.
2. With unit power OFF, connect appropriate input voltage.
3. Set unit power to ON. Power light will illuminate.

Table 3-1 Front-Panel Controls and Indicators

CONTROL/INDICATOR	FUNCTION
POWER switch (CB1)	A 125-volt, 50-ampere circuit breaker used to connect or disconnect input line voltage.
POWER indicator (DS1)	A white light connected across the primary of input transformer T2. Illuminates when the unit POWER switch is in the ON position.
Panel voltmeter (M1)	A meter connected internally across the sense terminals to indicate unit output voltage.*
COARSE VOLTAGE adjust (R10)	A 12-K ohm potentiometer across which the reference voltage for voltage-mode operation is developed. Used to adjust the output voltage.
VOLTAGE mode indicator (DS2)	A red light which illuminates when the unit is operating in the voltage-regulating mode.
FINE VOLTAGE adjust and FINE CURRENT adjust (R11/R14)	80-ohm potentiometers connected in series with the COARSE VOLTAGE and CURRENT potentiometers, used to make slight variations in the output voltage or current.
COARSE CURRENT adjust (R13)	A 650-ohm potentiometer used in the first stage of the current-mode amplifier to vary the reference, and subsequently the output current.
CURRENT mode indicator (DS3)	A red light which illuminates when the unit is operating in the current-regulating mode.
Panel current meter (M2)	A meter connected in series with the negative output to indicate unit output current.

*In local sense mode only; when remote sensing is used, indicates voltage across load.

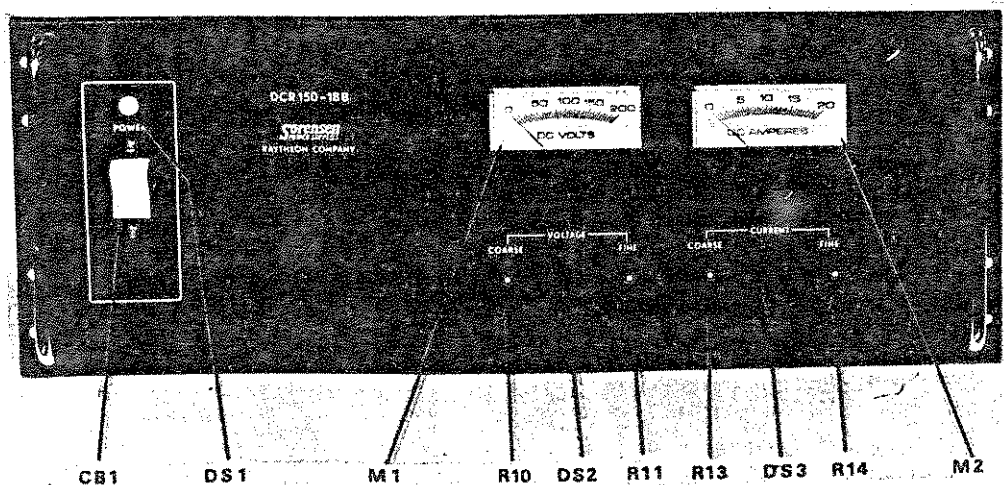


Figure 3-1
DCR-B Controls and Indicators



4. Rotate COARSE VOLTAGE control until the unit voltmeter indicates the desired output voltage. Use FINE VOLTAGE control for small sensitive adjustments.
5. Set unit power to OFF.
6. Remove rear cover and connect load lines to terminals (+) and (-).
Remount cover.

7. Set unit power to ON, and turn CURRENT control to the desired current-limiting value. POWER light will illuminate, and the unit is in voltage-mode operation.

NOTE

With unit in the voltage mode, an increase in load-current requirements above the value set in step 7 preceding will cause an automatic crossover to the current-mode (current-limiting). The current-mode indicator will illuminate when this occurs.

3.2.2 Remote Sensing (Figure 3-2)

In the remote-sensing condition, voltage regulation is at the load rather than at the unit output terminals, thus compensating for voltage-drop variations in the load lines.

NOTE

A voltage drop not to exceed 10% of full unit output is the maximum for which remote sensing will compensate. Voltage across load is equal to voltage output of unit minus line drops.

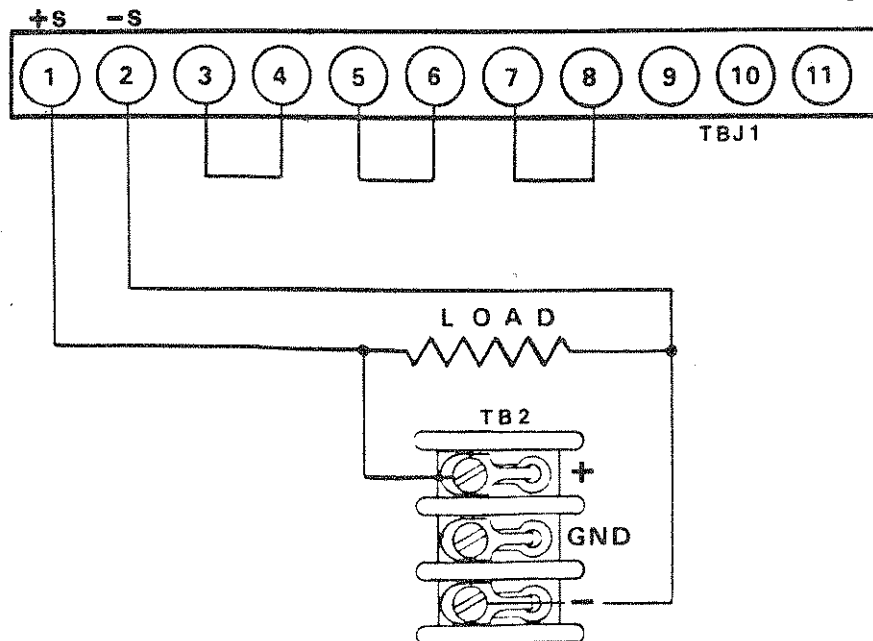


Figure 3-2
Remote Sensing Connections



To adapt unit for remote-sensing operation, proceed as follows:

1. With no load on unit, apply input power and set output voltage to the desired value; then set power to OFF.
2. Remove rear cover and disconnect red and black wires going from (+) and (-) output terminals to (+S) and (-S) sensing terminals.
3. Run output lead from the load through the holes in the rear cover to the (+) and (-) output terminals.
4. Connect sensing leads from (+S) and (-S) terminals to the load. Observe Polarity. To reduce stray pickup, use shielded pair (shield grounded at the supply) or a twisted pair of wires for sensing leads.
5. Remount the rear access cover and set unit power to ON.

3.2.3 Resistance Programming (Figure 3-3)

The output voltage of any model in the DCR-B series may be controlled from remote locations by connecting a resistance (fixed or variable) into the voltage-mode amplifier reference circuit. Terminals on the rear terminal board are provided for this purpose.

The ohms/volt sensitivity for each unit is listed in the specifications. The programming resistor should have a low temperature coefficient ($\pm 30\%$ ppm), and will dissipate approximately 10 milliwatts. Programming current is approximately 1.0 milliamperes. If changes in the programmed output are to be made by abrupt changes in programming resistance, make-before-break switching should be used.

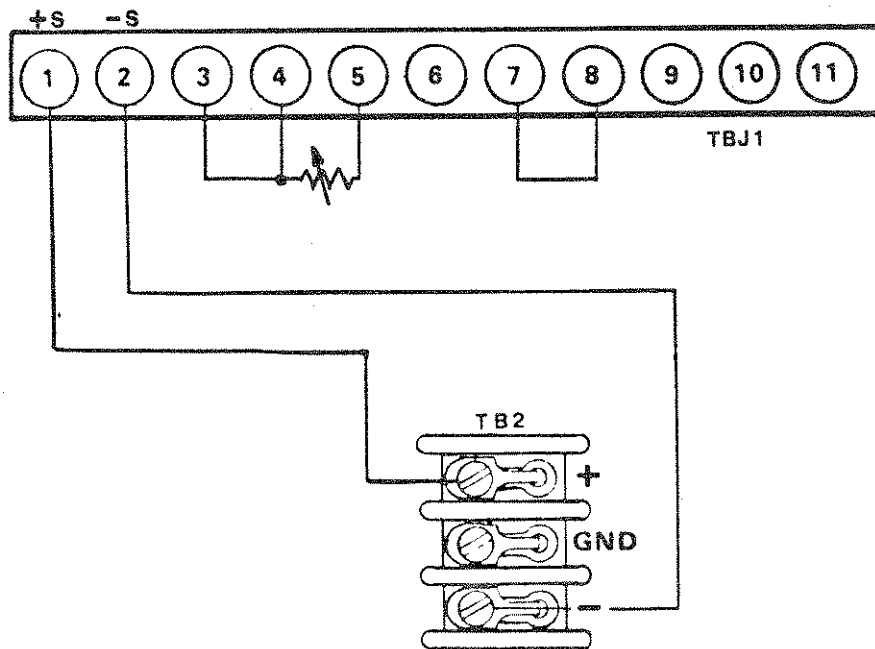


Figure 3-3
Voltage-Mode Programming Connections

To adapt unit to resistance-programming operation, proceed as follows:

1. Set unit power to OFF.
2. Remove link between terminals 5 and 6, and connect programming resistor between terminals 4 and 5 (Figure 3-3). Use shielded or twisted wire for interconnecting leads.
3. Rotate COARSE and FINE VOLTAGE controls fully counterclockwise. Set POWER switch to ON.
4. Rotate CURRENT control to desired limiting value. Remove input power, and connect load to output terminals.
5. Set unit power to ON. Unit supplies programmed voltage to load.

CAUTION

If programming operation is to be discontinued, set unit power to OFF, remove programming resistor, and reconnect link between terminals 5 and 6.

3.2.4 Signal Programming

A fixed or variable voltage signal may be impressed on the voltage-mode amplifier circuit to provide a fixed or variable voltage output. The selected signal source output should be "Floating", unless the (+) output of the supply is grounded. Proceed as follows:

1. Remove link from between terminals 3 and 4.
2. Connect the signal source between terminals 3 and 1. Observe Polarity (positive end to terminal 3). Signal level should not exceed 12 volts.

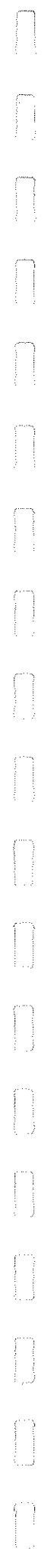
3.3 CURRENT-MODE OPERATION

In current-mode operation, the current output is regulated at the value determined by the setting of the current controls. The output voltage varies as a function of load. To operate unit in the current mode proceed as follows:

1. Rotate FINE and COARSE VOLTAGE controls fully counterclockwise, and adjust COARSE CURRENT control approximately three quarters clockwise.
2. Set unit power to ON.
3. Rotate COARSE VOLTAGE control clockwise until unit voltmeter indicates the desired voltage limit.
4. Set unit power to OFF.
5. Connect load to output terminals. Observe Polarity.
6. Set unit power to ON, and turn current controls to desired current regulation setting. POWER and CURRENT MODE lights will illuminate, and unit will deliver constant, regulated current to load.

NOTE

Any output instability (such as oscillations due to inductive loading) can be eliminated by adjusting potentiometer R45 on the unit PCB (Figure 6-3, page 6-7)



NOTE

If voltage increases above the limit set in step 3 preceding, unit automatically crosses over to voltage-mode operation.

3.3.1 Resistance Programming (Figure 3-4)

DCR-B supplies may be programmed externally to provide a predetermined level of output current, fixed or variable. This is done by inserting the fixed or variable resistance into the current-mode amplifier-reference circuit. The programming resistor selected should have a low temperature coefficient (± 30 ppm) and will dissipate approximately 0.5 milliwatt. Programming current is approximately 1.0 milliampere.

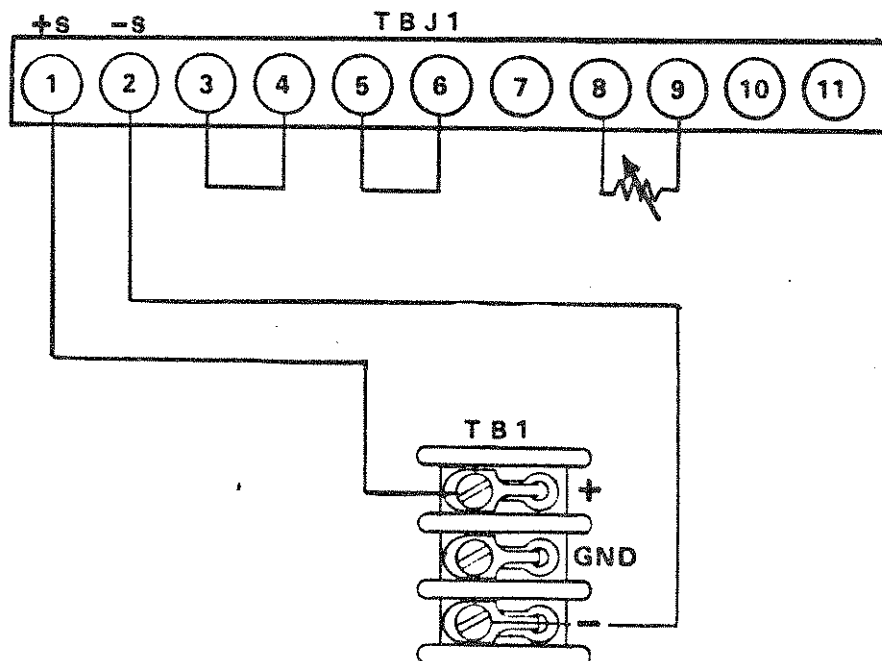


Figure 3-4
Current-Mode Programming Connections

To adapt unit to the current-mode, resistance-programming configuration, proceed as follows:

1. Setup current mode limit settings as outlined in Section 5, Page 5-2, Paragraph 5.4.2 of this manual.
2. With unit power OFF, remove the link between terminals 7 and 8, and rotate voltage controls to mid position.
3. Insert programming resistor between terminals 8 and 9.

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4. Adjust COARSE VOLTAGE control until unit voltmeter indicates desired voltage-limit value.

5. Set unit power to OFF, and connect load leads to output terminals. Observe Polarity.

6. Set unit power to On. POWER-and CURRENT-mode indicators will illuminate.

CAUTION

If resistance programming is to be discontinued, set unit power to OFF, remove programming device, and reconnect link between terminals 7 and 8.

3.3.2 Signal Programming

The procedure for adapting a DCR-B unit to current-mode signal programming is identical to that for current-mode resistance programming (paragraph 3.3.1), except that the signal source, rather than the programming resistor, is connected across terminals 8 and 9. A floating (ungrounded) signal source capable of delivering approximately 1.0 mA should be selected, and twisted wires should be used for the interconnecting leads. For a full-range variation in unit output current, signal must have 0-to 0.6-volt range (0-0.4 volts if negative offset potentiometer is connected per step 2 of paragraph 3.3.1).

3.4 PARALLEL OPERATION

DCR-B single-phase units may be paralleled using either of two methods. One method uses a "master-slave" approach, and the other involves direct paralleling. Each method has its advantages: in "master-slave" operation, output voltage regulation specifications are maintained, but only four units may be paralleled; with the direct method, there is no limit to the number of units which may be paralleled, and no current derating is required, but output-voltage regulation does deteriorate.

CAUTION

Contact the factory if unit(s) to be paralleled contain the overvoltage protection accessory (per section 7).

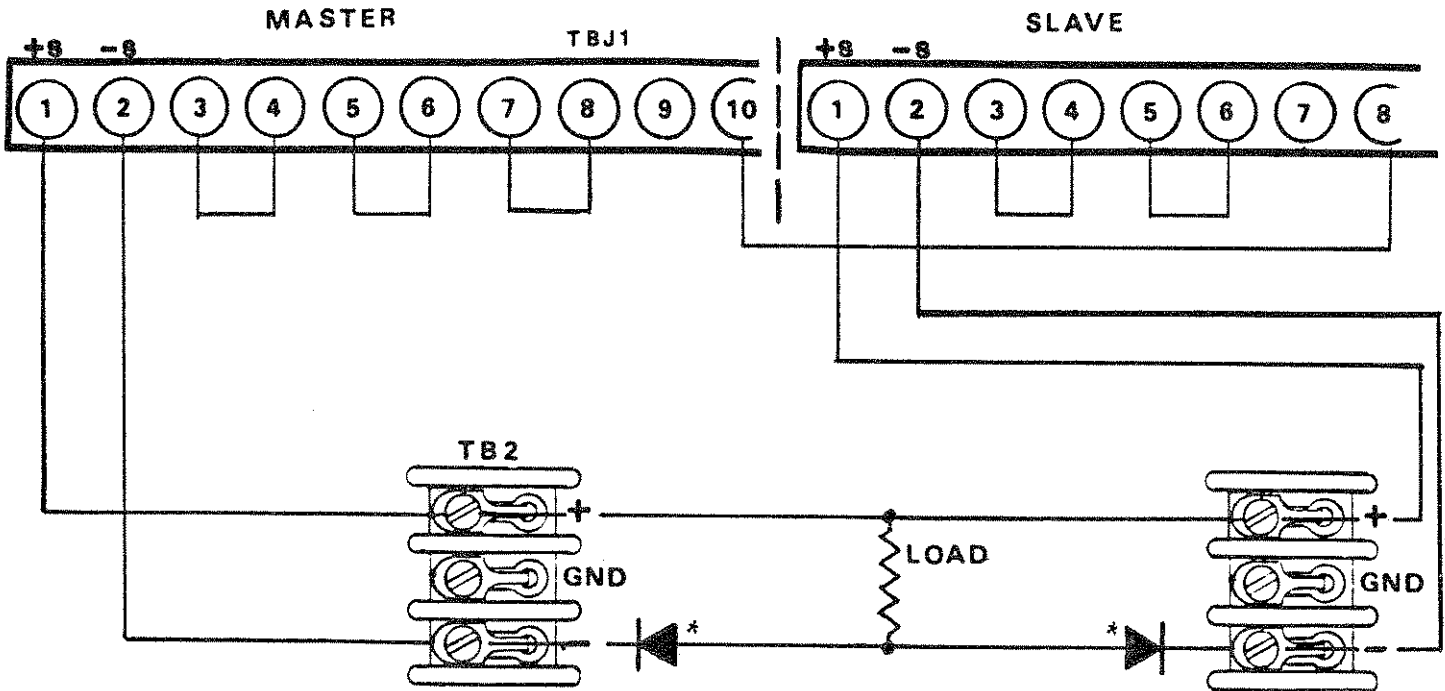


3.4.1 Master-Slave Paralleling (Figure 3-5)

Instructions for connecting two units in parallel follows:

NOTE

Up to three "slave" units may be added by extending this procedure.



**Required only when OVP (see section 7) is used on either unit. Forward diode types listed in Table 3-3 for series connection will be adequate. Heatsinking is also necessary.*

Figure 3-5
Master-Slave
Connections, Parallel Operation

1. With no load applied, set master unit power to ON, and adjust voltage to desired system output (plus total load-lead drop unless in the remote-sensing mode) Set unit power to OFF.
2. Connect load leads from both units to the load. If possible, use load leads of approximately equal length. Observe Polarity.
3. Disconnect link between terminals 7 and 8 on slave unit. Set slave voltage controls fully clockwise. Connect wire between terminal 8 of slave unit and terminal 10 of master unit.
4. Set master-unit power to ON, and then apply the slave-unit power.

4.2 Direct Paralleling (Figure 3-6)

The following steps outline the procedure for connecting two units in parallel (the same procedure may be extended to parallel as many units as desired):

1. At no load, adjust individual unit voltages to desired system output. Attempt to match individual unit outputs with FINE VOLTAGE controls.
2. Set power to each unit to OFF, and run load leads from units to load. Observe Polarity.
3. If remote sensing is to be used, connect sensing leads from units to load, also observing polarity. Use twisted wire or shielded pair for leads.
4. Set each unit power switch to ON. POWER indicators will illuminate.

The unit supplying the highest voltage will supply the load, as it is impossible to identically match the output voltages. If the load requirements exceed the setting on the CURRENT control, this unit will automatically cross over to current-mode operation, and its output voltage will drop. The second unit will then assume that portion of the load rejected by the first. Any further increases in load will be supplied by the second unit up to its current-limit setting. Regulation, therefore, will be the sum of the regulations of the two units (or whatever number of units are being paralleled), plus the difference in the voltage settings.

3.5 SERIES OPERATION

3.5.1 Master-Slave Connection (Figure 3-7)

The voltage range of a DCR-B power-supply system can be increased by series-connecting units up to a total rated output of 200Vdc (150/300/600-volt models, two in series) in a "master-slave" configuration. Two 40-volt supplies thus connected provide 0-to 80-volt range capability with voltage programming of only one unit necessary. External components required are two wire-wound resistors (R_A and R_B in the figure), and a 15-uF bypass capacitor to eliminate noise feedthrough, for each unit except the final unit in the series, and a shunt power rectifier across the output terminals of each unit.

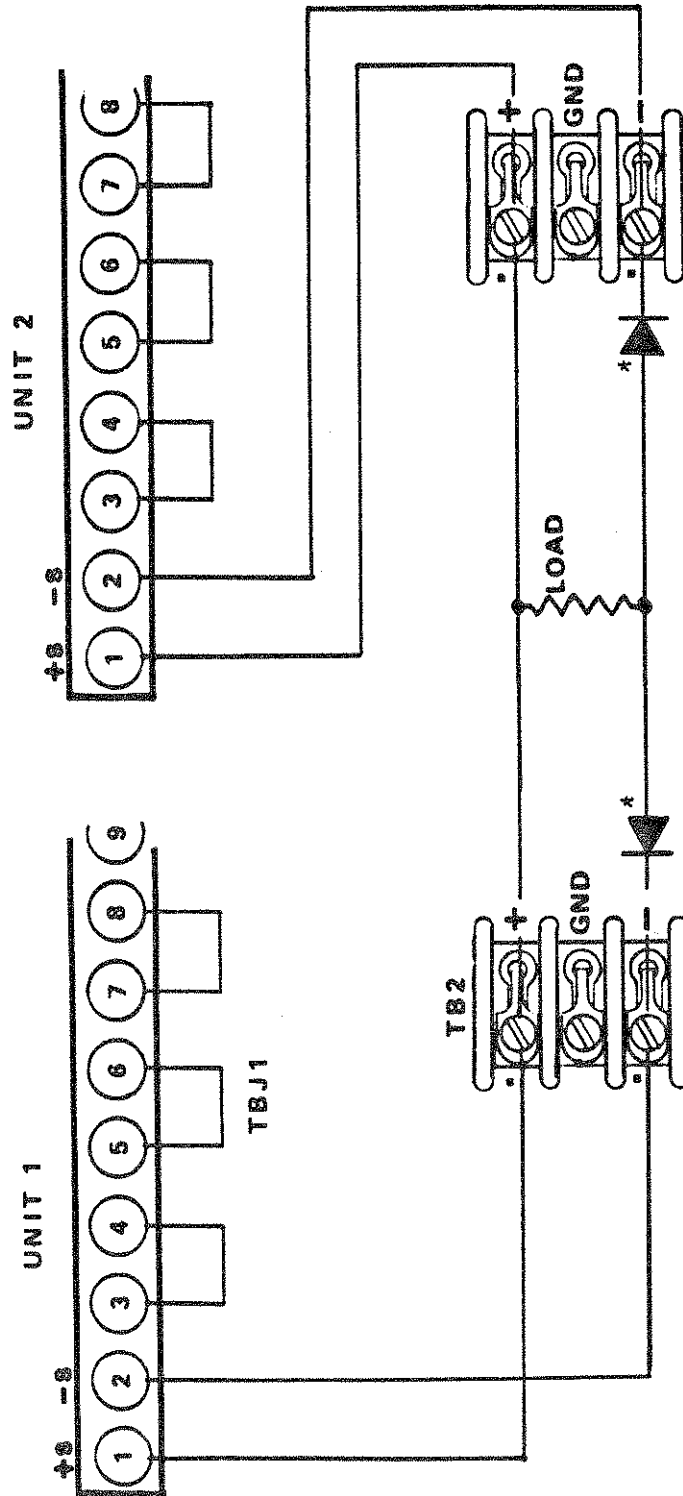
Assuming two supplies with the same output ratings are to be used, (consult factory for connecting dissimilar units), connect as shown in Figure 3-7. R_A and R_B are low-TC, wire-wound resistors of 5 watts rating or greater. Resistance values for two identical units in series have been calculated for all voltage ranges in the DCR-B series, and are summarized in Table 3-2. Recommended types of power rectifier are listed in Table 3-3 for each application.

NOTE

For more than two units (with identical output ratings) connected in series, R_B remains 10K, and R_A is calculated using the formula: $R_A = 10^3 (V_0 - 10)/X$

where V_0 is the voltage of the master supply, and X is the number of units in the system.

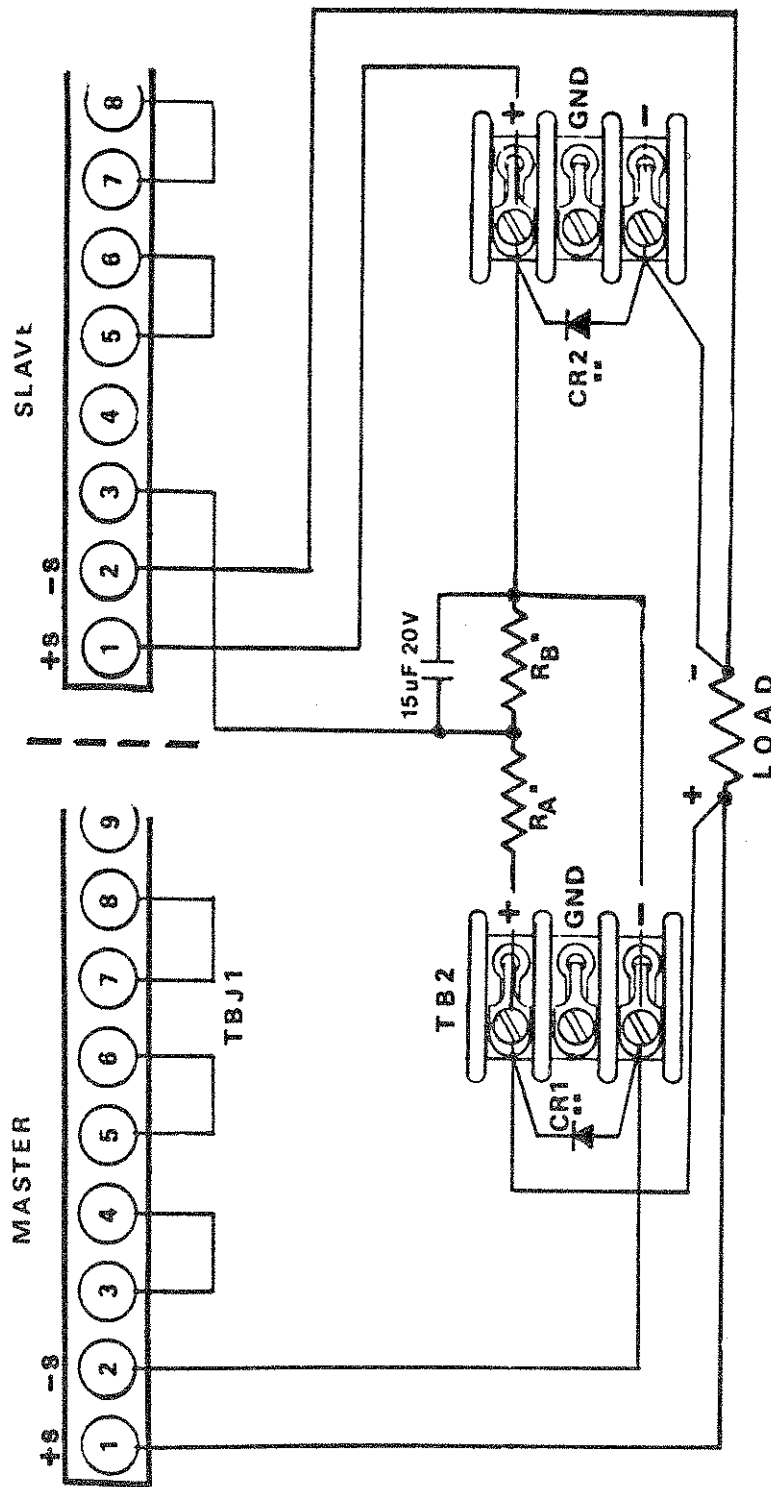




* For remote sensing, connect both unit "+"s and "-"s terminals directly to the load instead of output terminal board. OBSERVE POLARITY.

* Required only when OVP (see section 7) is used on either unit. Forward diode types listed in Table 3-3 for series connection will be adequate. Heatsinking is also necessary.

Figure 3-6
Direct Parallel Connections



* See Table 3-2
 ** See Table 3-3

Figure 3-7
 Master-Slave Connections
 Series Operation

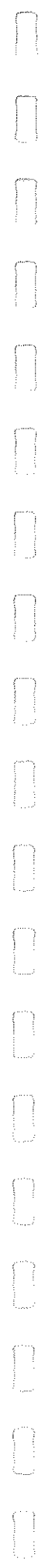


Table 3-2
RA /RB Values--Two Identical
DCR-B Units Series-Connected

(V) Rated	RA	RB
10*	Open	Open
20	5K	10K
40	15K	10K
60	25K	10K
80	35K	10K
150	70K	10K
300	145K	10K
600	295K	10K

NOTE

*For 10-volt units, terminal 3 of the slave unit is connected directly to the (+) sense terminal of the master unit.

Table 3-3
Recommended Rectifiers, Series Operation

DCR Model	Mfr.-Type	Sorensen Part No.	Heatsink [▪] Dim. inches (mm)
10-120B	IR-1N4587 1N4587R*	587571-1 587571-3	10 x 10 x 1/8 (254) x (254) x (3)
20-80B	IR-1N4587 1N4587R*	587571-1 587571-3	8 x 8 x 1/8 (203) x (203) x (3)
40-40B	IR-1N4587 1N4587R*	587571-1 587571-3	5 x 5 x 1/8 (127) x (127) x (3)
60-30B	GE-1N1184A 1N1184AR*	587382-2 587382-7	4 x 4 x 1/8 (102) x (102) x (3)
80-20B	GE-1N1184A 1N1184AR*	587382-2 587382-7	3-1/2 x 3-1/2 x 1/8 (89) x (89) x (3)
150-12B	GE-1N1202A 1N1202AR*	587393-2 587393-6	3 x 3 x 1/32 (76) x (76) x (.8)
300-6B	GE-1N1204A 1N1204AR*	587393-3 587393-7	1-3/4 x 1-3/4 x 1/32 (44) x (44) x (.8)
600-3B	Semtech-3A 400V	587566-3	None Required

*Reverse-polarity rectifiers

▪Flat aluminum plate



With unit power switches OFF, connect each unit to appropriate input power source (115/208/220/230Vac). All units in the system may be connected through a common ac line OFF/ON switch. Proceed as follows:

1. Set the COARSE and FINE CURRENT controls of each unit fully clockwise.
2. Set the slave-unit POWER switch to ON.
3. Set the master-unit COARSE and FINE VOLTAGE controls fully counter-clockwise, and set its POWER switch to ON.
4. Adjust master-unit controls for desired system output level, which, in the case of two identical units, will be twice that indicated on its panel meter.

NOTES

(a) System output for series-connected units of different power ratings will be the sum of the individual unit voltages, at a maximum current level equal to that of the lowest unit current rating.

(b) In multiple-unit operation, a greater time lag must be anticipated to reach full system output at each power turn-on.

3.5.2 Direct Series Connections (Figure 3-8)

DCR-B supplies may be directly series-connected up to a total output of 200Vdc (150/300/600-volt models, two in series). System regulation is the sum of the regulations of all units.

The procedure is outlined for connecting two units in series. Additional units may be connected by repeating the procedure for each.

NOTE

Series-connected units may be adapted to resistance or signal programming.

1. With no load connected, set each unit to its desired output voltage level, and appropriate current-limiting value.
2. Set power to each unit to OFF.
3. Interconnect units as shown in Figure 3-8.

CAUTION

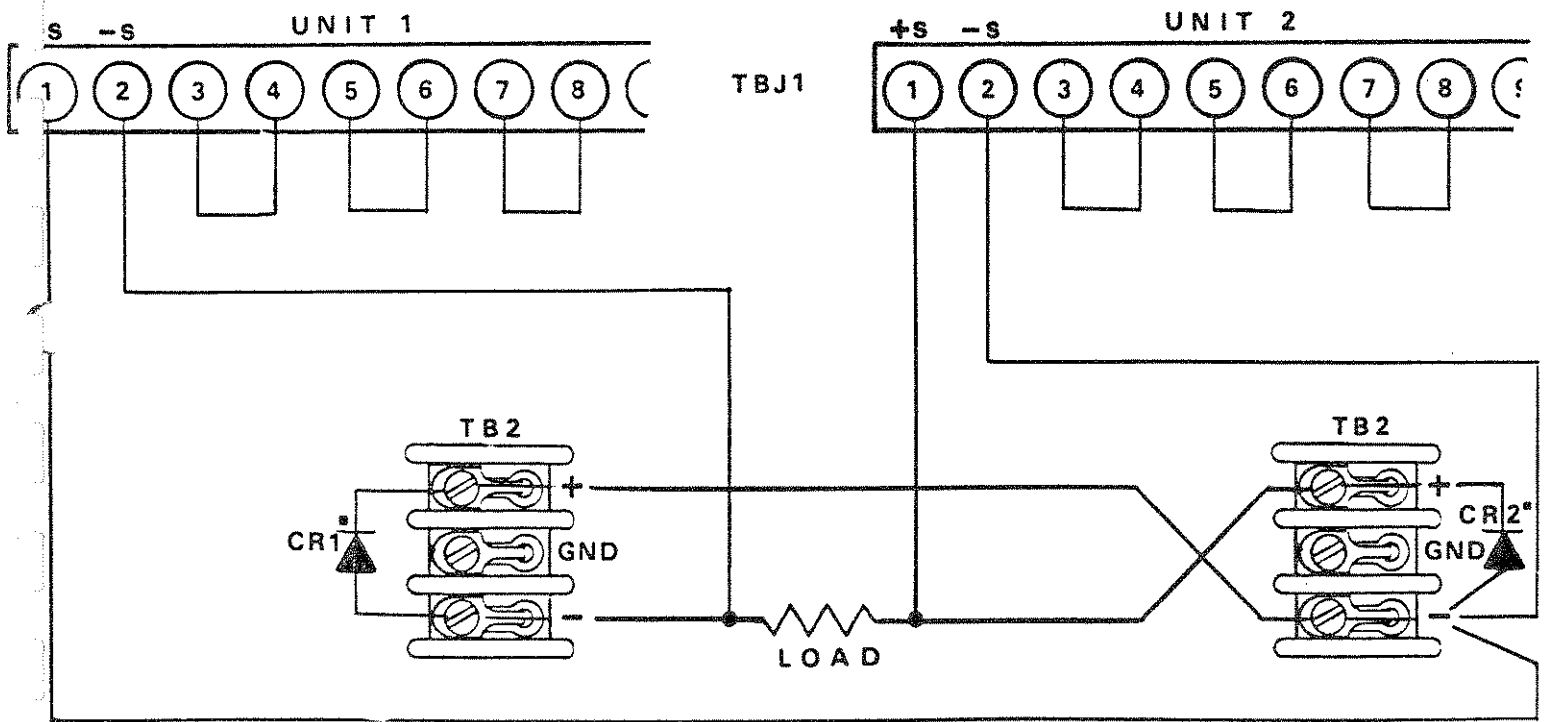
Rectifiers (and heatsinks where required) must be connected across the output terminals of each unit as shown in the figure. This will prevent damage to the output capacitors. Specific rectifier types are listed in Table 3-3.

4. Set unit power switches to ON. Units operate with independently adjustable outputs, and the power to each may be set ON or OFF separately.



3.6 UNIT SHUTDOWN CIRCUIT

In the DCR-B line, application of the (+) sense (terminal 1) to terminal 11 of terminal board J1 instantly shuts down the supply. This function can provide unit protection by connecting a temperature-or voltage-sensitive switch (or transistor) in this line to shut the system down under specified conditions. An example is in the master-slave connection of two DCR-B power supplies. If the shutdown function is adapted to the master unit, the system output goes to zero; applied to the slave unit, only that unit is affected and the system output is reduced accordingly.



See Table 3-3

Figure 3-8
Direct Series Connections
(Remote Sensing)

