

## CONTROLLER, KS-20522

### HIGH AND LOW LIMIT

### INSTALLATION AND MAINTENANCE

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. DESCRIPTION . . . . .	1
3. APPLICATIONS . . . . .	2
4. INSTALLATION . . . . .	3
5. ADJUSTMENT . . . . .	3
6. MAINTENANCE . . . . .	3
7. ROUTINE CHECKS . . . . .	3
8. TROUBLE CONDITIONS . . . . .	3

#### 1. GENERAL

**1.01** This section covers the installation and maintenance of the KS-20522 controller, a device developed for applique use with ammeter relays which provide various control functions in power plants.

**1.02** Whenever this section is reissued, the reason for reissue will be listed in this paragraph. This issue does not affect the Equipment Test List.

**1.03** The KS-20522 controller is available either as L1, L2, L3, L4, L8, L13, L21, L22, L31, or L32, depending upon the electrical requirements which are shown in Table A.

**1.04** The controller is designed to operate on the dc power available in the power equipment in which it is applied.

#### 2. DESCRIPTION

**2.01** The KS-20522 controller is a packaged electronic circuit. It provides high and low adjustable output transistor switches. The adjustable high- and low-limit switch outputs replace the high and low contacts in the ammeter relays.

**2.02** In all applications the controllers, like the ammeter relays, connect ground to the loads when the input signal is below the low switch set point or above the high switch set point value. The low switch set point is adjusted by potentiometer L CONT, and the high switch set point is adjusted by potentiometer H CONT.

**2.03** Internal components added at the factory convert the basic 12-volt controller for operation on 24-, 48-, or 130-Vdc power. For 48- or 130-volt units, an additional resistor is mounted on the outside of the case.

**2.04** The controller is designed to be mounted in an accessible position for adjustment and wiring on the equipment containing the existing ammeter relay. See Part 4 for information on installation.

**2.05** The controller is approximately 3 by 4 by 6 inches in size.

#### NOTICE

Not for use or disclosure outside the  
Bell System except under written agreement

TABLE A  
POWER DATA

LIST NO.	CONTROLLER INPUT		SUPPLY POWER		HIGH AND LOW SWITCHING OUTPUTS 100 MA MAX	EXTERNAL RESISTOR		HYSTERESIS	
	MV MAX	MA MAX	VOLTS DC	WATTS MAX		OHMS	WATTS	HIGH %	LOW %
1	320	1	-12	2	+12V (GRD) -150V (GRD)	NONE		10	2
2	320	1	-24	5.5	+24V (GRD)	NONE		10	10
3	320	1	-48	7	+48V (GRD)	400	30	10	10
4	320	1	-130	16	+130V (GRD)	1500	30	10	10
8	320	1	+130	16	-130V (GRD)	1500	30	10	10
13	8.66	160	-48	7	+48V (GRD)	400	30	10	10
21	50	0.1	-24	5.5	+24V (GRD)	NONE	—	10	2
22	50	0.1	-24	5.5	+24V (GRD)	NONE	—	10	10
31	50	0.1	-48	7	+48V (GRD)	400	30	10	2
32	50	0.1	-48	7	+48V (GRD)	400	30	10	10

### 3. APPLICATIONS

3.01 This controller is primarily for use with the following circuits:

- |  |  |
|--|--|
| (a) SD-81087-01 — Rectifier Circuit KS-5651-01, 24 and 48 volts, 100 and 200 amperes           | (f) SD-81317-01 — Rectifier Circuit J86273, 48 volts, 200 amperes            |
| (b) SD-81088-01 — Rectifier Circuit J86244A, 12 volts, 200 amperes                             | (g) SD-81333-01 — Generator Start Control and Regulation Circuit, 702C plant |
| (c) SD-81129-01 — Rectifier Circuit J86249A, B, C, and E, 24 and 48 volts, 100 and 200 amperes | (h) SD-81398-01 — Rectifier Circuit J86296, 48 volts, 400 amperes            |
| (d) SD-81242-01 — Rectifier Circuit KS-15689 L1, L2, and L3, 48 volts, 200 amperes             | (i) SD-81410-01 — Rectifier Circuit J86295, 48 volts, 200 amperes            |
| (e) SD-81301-01 — 130-Volt Charge Circuit, 410B plant  | (j) SD-81631-01 — Rectifier Circuit KS-19214, 48 volts, 800 amperes          |
|  | (k) SD-81633-01 — Rectifier Circuit KS-19216, 130 volts, 300 amperes         |

**3.02** The controller can be connected in any circuits containing ammeter relays provided that the rated values of the controller are satisfied and proper polarities are observed.

**3.03** The controller is designed to operate over the voltage range of power supplied by the rectifier or power plant. These limits are:

MINIMUM VOLTS	NOMINAL VOLTS	MAXIMUM VOLTS
10	12	14
20	24	28
40	48	56
116	130	155

**3.04** The rated input of the controller is 320 millivolts full scale at 1 milliampere for operation from a high-voltage shunt and 50 millivolts full scale at 0.1 milliampere for operation from a lower voltage shunt. When operated from a dc magnetic amplifier, the rated input is 160 milliamperes full scale at 8.66 millivolts.

#### 4. INSTALLATION

**4.01** Installation involves mounting the controller inside of the equipment enclosures containing the ammeter relays and wiring the controller to the existing plant circuitry.

**4.02** Adjustment of the set points is then accomplished with manual operation of the plant controls until the required settings are obtained.

**4.03** Power to operate the controller is connected to the positive terminals marked with the correct nominal voltage rating and to the negative terminal marked NEG.

**4.04** Prior to installation of the controller, the rectifier should be disconnected from the commercial ac power and from the battery.

**4.05** The controller is installed and then connected as shown by the drawings for the particular power plant or rectifier involved.

#### 5. ADJUSTMENT

**5.01** Each set point is adjustable over the full scale range of the controller.

**5.02** Positioning of the set points is accomplished by the shaft rotation of the high and low set point potentiometers, designated L CONT and H CONT, respectively. The rectifier output current is adjusted to the desired value and the corresponding potentiometer turned and set to the position where operation takes place.

**5.03** The adjustment procedure should be repeated until the desired high and low set point values are obtained.

**5.04** For both switch set points, clockwise rotation of the controller potentiometer adjustment increases the operating value setting.

#### 6. MAINTENANCE

**6.01** The controller contains no moving parts or heated filaments; consequently, no maintenance should be required after initial installation and adjustment.

**6.02** If a malfunction occurs and no fusing or wiring faults can be discovered, the controller unit should be replaced and the faulty one returned for repair.

#### 7. ROUTINE CHECKS

**7.01** The only check required is visual observation of the installed unit for cleanliness and the condition of the physical installation and wiring.

**7.02** If there is some question about proper operation or adjustment of the controller, the rectifier load current should be adjusted manually and the values at which the controller operates the relays observed. If these do not agree with the required values, the controller should be readjusted.

#### 8. TROUBLE CONDITIONS

**8.01** In general, the only items likely to become defective are the transistors due to external surges or overloads.

**8.02** If no output signal can be obtained after checking fuses and power input, the controller should be replaced.