DELCO-REMY

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GENERATOR OUTPUT CONTROL AND RELAY SERVICE TEST SPECIFICATIONS

Note: Refer to Bulletin 1R-180 for Numerical Index to Test Specifications.

IMPORTANT

The specifications listed in this bulletin apply only when regulators are tested under service conditions and according to the methods recommended by the Delco-Remy Service Department.

Even though the data in two different specifications are identical, this does not mean that the regulators to which the specifications refer are identical. Never attempt to substitute regulators on the basis of similarity of specifications given in these tables.

Mechanical and electrical values in this bulletin are average values. Unless two values are given, tolerances are permitted for variation in manufacturing.

Because of important differences in wiring circuits, design, and operation, Delco-Remy regulators have been classified into the groups named in the various table headings. The data in each table are preceded by important instructions relating to regulators of that type. These instructions must be followed carefully if accurate results are to be obtained.

Table 1–Two Core Regulator Test Specifications (CIRCUIT A)

Regulators for which specifications are listed in this table must have the voltage regulator setting made on closed circuit.

Voltage Regulator Air Gap ..... .063 in.
Current Regulator Air Gap ..... .075 in.
V. & C. Regulator Point Opening ..... .020 in.
V. & C. Regulator Contact Spring Tension ..... 3.5 oz.
V. & C. Regulator Fiber Bumper Clearance ..... .010 in.
Cutout Relay Air Gap ..... .020 in.
Cutout Relay Point Opening ..... .020 in.

Spec. No.	CURRENT REGULATOR Current Setting (Amps.)	VOLTAGE REGULATOR Voltage Setting (Closed Circuit)* 70° F.	150° F.	CUTOUT RELAY Points Close (Volts) 70° F.
1293	26–28	7.0–7.4	6.95–7.15	6.9–7.6
1294		7.5–7.9	7.4–7.6	6.9–7.6
1300	20–23	7.5–7.95	7.4–7.6	6.9–7.6
1401	20–22	7.0–7.4	6.95–7.15	6.9–7.6
1404	16–18	14.2–15.0	14.1–14.5	12.8–14.4
1406	.....	7.25–7.65	7.2–7.4	6.9–7.6
1409	.....	14.2–15.0	14.1–14.5	12.8–14.2
1411	20–22	7.0–7.4	6.95–7.15	6.9–7.6
1416	24–26	7.0–7.4	6.95–7.15	6.9–7.6
1418	28–30	7.5–7.9	7.4–7.6	6.9–7.6
1419	24–26	7.5–7.95	7.4–7.6	6.7–7.6
1420	16–18	14.2–15.0	14.1–14.5	12.3–13.7
1421	13	7.5–7.95	7.4–7.6	6.4–7.1
1422	26–28	7.0–7.4	6.95–7.15	6.3–6.9
1423	.....	6.95–7.45	6.95–7.15	6.9–7.6
1427	11.5–13.5	14.2–15.0	14.1–14.5	12.8–14.2
1429	19–21	14.2–15.0	14.1–14.5	12.8–14.2
1430	7–9	14.2–15.0	14.1–14.5	12.3–13.7
1431	9–11	14.2–15.0	14.1–14.5	12.3–13.7
1432	26–28	7.5–7.9	7.4–7.6	6.9–7.6
1435	24–26	14.2–15.0	14.1–14.5	12.3–13.7
1436	12–14	14.2–15.0	14.1–14.5	12.3–13.7
1437	24–28	14.2–15.0	14.1–14.5	12.3–13.7
1438	.....	14.2–15.0	14.1–14.5	12.4–13.6
1439	.....	7.25–7.65	7.2–7.4	6.2–6.9
1441	34–36	7.0–7.4	6.95–7.15	6.9–7.6
1442	34–36	7.0–7.4	6.95–7.15	6.3–6.9
1443	29–31	7.0–7.4	6.95–7.15	6.9–7.6
1444	14–16	14.2–15.0	14.1–14.5	12.3–13.7
1445	.....	7.5–7.9	7.4–7.6	6.3–6.9
1449	.....	7.3–7.6	7.25–7.35	6.2–6.8
1455	32–34	7.0–7.4	6.95–7.15	6.3–6.9
1456	32–34	7.0–7.4	6.95–7.15	6.9–7.6
1463	28–30	7.0–7.4	6.95–7.15	6.3–6.9
1482	38–40	7.0–7.4	6.95–7.15	6.3–6.8

*Operate generator at speed 25% above speed at which it first reaches rated output and adjust current to 8-10 amps.

Table 2–DR Standard Regulator Test Specifications (CIRCUIT A)

Regulators for which specifications are listed in this table are discussed in Service Bulletins 1R-115, 1R-116, 1R-116A, 1R-117, 1R-118, 1R-118A, and 1R-217. When checking the electrical settings of these regulators, a battery must be in the circuit and the regulator must be at operating temperature. Operating temperature is assumed to be established after 15 minutes of continuous operation of the voltage regulator unit.

The operating voltage of all regulators covered by specifications in this section must be checked (1) with a battery in the circuit, (2) with the generator operating at a speed which exceeds that required for the generator to produce full output, and (3) with a charge rate which does not exceed 10 amperes (or approximately ½ the rated current output if the current regulator setting is 10 amperes or less).

Any setting of the cutout relay that falls within the allowable limits given in these specifications is satisfactory so long as the setting is at least *0.5 volt below the voltage regulator setting*. Any setting of the current regulator that falls within the allowable limits given in these specifications is satisfactory.

Generally speaking, any voltage regulator setting within the normal range shown in these specifications is satisfactory so long as (1) the battery remains satisfactorily charged without an excessive use of water and (2) there is no evidence of damage to lights or other voltage-sensitive equipment. Voltage regulator settings outside the normal range will seldom be necessary. Lower the voltage regulator setting if water consumption in the battery exceeds one ounce per cell each 1,000 miles. Raise the voltage regulator setting if the battery consistently remains undercharged.

Voltage regulator specifications given in this table apply to checks made with the regulator operating in an ambient temperature (the temperature of the air surrounding the regulator) of 125° F. When the regulator is operating in an ambient temperature above 125° F., the voltage regulator will operate at a *lower* voltage than that at which it will operate when the regulator is in an ambient temperature of 125° F. When the regulator is operating in an ambient temperature below 125° F., the voltage regulator will operate at a *higher* voltage than that at which it will operate when the regulator is in an ambient temperature of 125° F. *For this reason, an allowance for temperature variations must be made before the operating voltage is compared with the specifications given in this table.* The most accurate method of determining this is to measure the regulator ambient temperature and then apply the temperature factor shown in the following tabulation.

Regulator ambient temperature (°F.)	55	65	75	85	95	105	115	125	135	145	155	165
	Subtract								Add			
6-volt regulators (volts)	.4	.35	.3	.25	.2	.15	.05	0	.07	.15	.3	.4
12-volt regulators (volts)	.8	.7	.6	.5	.4	.3	.2	0	.1	.3	.5	.7
24-volt regulators (volts)	1.6	1.4	1.2	1.0	.8	.6	.4	0	.2	.6	1.0	1.4

On applications where no battery history is available, adjust the voltage regulator setting to a value about the middle of the normal range. Generally speaking, a setting slightly above the middle of the normal range will be satisfactory for most cars. However, a slightly lower setting will be more satisfactory for cars operated at high speeds or in warm climates and a slightly higher setting may be more satisfactory for cars normally operated at low speeds or in the cooler climates.

Voltage regulator air gap is .075" for basic model and model having suffix "B," "C" or "D," and .060" for model having suffix "E" unless otherwise specified in footnote.

Current Regulator Air Gap ..... .075 in. Cutout Relay Point Opening ..... * .020 in.
Cutout Relay Air Gap ..... * .020 in.

	Cutout Relay Closing Voltage Allowable Limits	Voltage Regulator Setting Normal Range	Current Regulator Setting Allowable Limits
1506	5.9–6.7	7.0–7.7	.....
1510	11.8–13.6	13.9–14.9	.....
1516	6.1–7.1	7.2–7.9	11.5–14.5
1523 a	24.0–27.0	27.5–29.5	18–22
1524 a	24.0–27.0	27.5–29.5	8.5–11.5
1530	9.0–11.5	13.5–14.9	.....
1531	5.9–6.7	7.25–7.95	.....
1533	5.9–6.7	6.8–7.5	.....
1543	6.1–7.1	7.3–8.0	16.5–19.5
1546	6.1–7.1	7.3–8.0	18.25–21.5
1568	11.8–13.5	13.8–14.7	27–31 **
1570	5.9–6.7	6.9–7.3	41.0–45.5**
1572	5.9–6.7	6.9–7.3	36.0–40.5**
1573	5.9–6.7	6.9–7.4	53–57
1574	5.9–6.7	6.9–7.3	38–42
1575	5.9–6.7	6.9–7.4	48–52
1576 b	3.8–4.7	6.9–7.4	57–63
1577 b	3.8–4.7	6.9–7.4	.....
1578	11.8–13.5	13.8–14.7	48–52
1579 h	11.8–13.5	13.8–14.5 n	33–37
1580	5.9–6.7	6.9–7.4	34–39 **
1583	5.9–6.7	6.9–7.4	32–37 **
1584	5.9–6.7	6.9–7.3	33–37 **
1585	5.9–6.7	6.9–7.4	30–34
1586	5.9–6.7	6.9–7.3	28–32
1587	5.9–6.7	6.9–7.4	25–29
1588	5.9–6.7	6.9–7.3	23–27
1589	5.9–6.7	6.9–7.3	17.5–20.5
1590	5.9–6.7	6.9–7.3	16.5–19.5
1591	5.9–6.7	6.9–7.4	14–16
1592 a	7.5–9.5	13.8–14.8	57–63
1593 a	7.5–9.5	13.8–14.8	.....
1594	11.8–13.5	13.8–14.8	18.5–21.5
1595	11.8–13.5	13.8–14.7	38–42
1596	11.8–13.5	13.9–14.7	33–37
1597	11.8–13.5	13.8–14.8	29–33
1598	11.8–13.5	13.8–14.8	23–27
1599	11.8–13.5	13.8–14.8	23–27
1600	11.8–13.5	13.8–14.7	18.5–21.5
2098 a	24.0–27.0	27.8–29.4	13.5–16.5
2122 a	24.0–27.0	27.5–29.5	23–27
2130 c	11.8–13.5	13.8–14.8	15.5–18.5
2131	11.8–13.5	13.8–14.7	14–16
2132	11.8–13.5	13.8–14.8	11–13
2133	11.8–13.5	13.8–14.8	9–11
2134	11.8–13.5	13.8–14.7	8–9
2136 de	5.7–6.5	6.8–7.2	52–58 **
2137 a	24.0–27.0	27.5–29.5	16–20
2138	11.8–14.0	13.6–14.5	.....
2139	11.8–13.5	13.8–14.7	53–57
2140	11.8–13.5	13.8–14.7	15.5–18.5
2143	5.9–6.7	6.8–7.4	.....

*—Unless otherwise indicated
a—Cutout Relay Air Gap .017", point opening .032"
b—Cutout Relay Air Gap .013", point opening .027"
c—Reverse current 1.0-3.5 amperes at 12.5 volts
d—Voltage Regulator Air Gap .063"
e—Temperature adjustment discussed above does not apply
f—Paralleling: voltage regulator setting must drop .4-.6v per 30 amp. battery load.
h—With no load on BAT. terminal, add 5 amp. load at P-terminal—voltage regulator to operate 2-3 volts lower.
**—Current regulator must be checked at operating temperature. Operating temperature is assumed to be established after 15 minutes of continuous current regulator operation.
m—With no load on BAT. terminal, add 2.5 amp. load at P-terminal—voltage regulator to operate 2-3 volts lower.
n—Check operating voltage with no current flow at the "p" terminal of the regulator.

	Cutout Relay Closing Voltage Allowable Limits	Voltage Regulator Setting Normal Range	Current Regulator Setting Allowable Limits
2145 am	24.0–27.0	27.8–29.4 n	23–27
2146	11.8–13.5	13.8–14.7	23–27 **
2148	5.9–6.7	6.9–7.4	50–54
2149 de	11.5–13.0	13.6–14.3	37–42 **
2150 am	24.0–27.0	27.5–29.5 n	14–16
2154 a	24.0–27.0	27.5–29.5	5.4–6.6
2155	11.8–13.5	13.8–14.7	31.0–35.5**
2157	5.9–6.7	6.9–7.3	43–47
2158 f	11.8–13.5	13.8–14.7	53–57
2160	11.8–13.5	13.8–14.8	18–22
2161 g	----------	13.8–14.8	----------
2165	11.8–13.5	13.9–14.7	18.5–21.5
2166	11.8–13.5	13.8–14.8	11–13
2167	11.8–13.5	13.8–14.8	23–27
2168	11.8–13.5	13.9–14.7	48–52
2171 h	11.8–13.5	13.9–14.7	18.5–21.5
2172 h	11.8–13.5	13.8–14.8	33–37
2177 jk	----------	13.8–14.8	----------
2193	5.9–6.7	6.9–7.4	17.5–20.5
3256	6.3–6.6	6.6–6.9	43–44**

a, d, e, f and m — refer to bottom of page 2.
g—Indicator lamp relay air gap .022". Relay pts. open 12-13.5 volts
h—With no load on BAT. terminal, add 5 amp. load at P-terminal—voltage regulator to operate 2-3 volts lower.
j—Circuit breaker air gap .013", pt. opening .027". Relay closes 7.5-10.5 v.
k—Control relay air gap .035", pt. opening .025". Relay closes 7.5-10.5 v.
n—Check operating voltage with no current flow at P-terminal of the regulator.
**—Current regulator must be checked at operating temperature. Operating temperature is assumed to be established after 15 minutes of continuous current regulator operation.

Table 2T—Standard Regulator Tractor Type, Test Specifications (CIRCUIT A)

Regulators for which specifications are listed in this table must be checked and adjusted according to the procedures in Bulletin 1R-111. These regulators have an internal wiring circuit which is quite different from standard automotive regulators and require special testing methods.

All electrical checks and adjustments must be made with the regulator at operating temperature and on closed circuit.

If voltage settings are found to be within the ranges given in this table, the regulator is operating satisfactorily and need not be disturbed. When settings are found to be outside the ranges, the regulator should be replaced or, in an emergency, adjusted to the specified values.

Voltage Regulator Air Gap ..... .075 in.
Cutout Relay Air Gap ..... .020 in.

Cutout Relay Point Opening ..... .020 in.

Spec. No.	Cutout Relay Closing Voltage Range	Cutout Relay Closing Voltage Adjust	Voltage Regulator Setting (Volts) Range	Voltage Regulator Setting (Volts) Adjust
1504	5.9–7.0	6.4	6.6–7.2	6.9
1505	11.8–14.0	12.8	13.6–14.5	14.0
1544	23.5–27.0	25.5	27.2–29.0	28.0
2052	11.8–14.0	12.8	13.6–14.5	14.0
2056	5.9–7.0	6.4	6.6–7.2	6.9
2151	5.9–7.0	6.4	6.8–7.4	7.1
2152	11.8–14.0	12.8	14.0–15.0	14.4
2159	11.3–13.5	12.3	13.4–14.3	13.9

TABLE 3—HEAVY-DUTY REGULATOR Truck Type, TEST SPECIFICATIONS (CIRCUIT B)

(See last page for settings with overcharged battery condition)

The following paragraph applies to Tables 3 and 3A: When adjusting regulator, operate it with same type generator with which it is used in service. To check open circuit voltage, operate generator at a speed approximately 50 per cent greater than that at which peak output is reached. Example: Generator rated 55 amperes at 950 r.p.m. Drive at approximately 1425 r.p.m. CAUTION: Do not drive generatcr fast enough to hold voltage regulator points open. Make electrical adjustments at operating temperature.

Regulators for which specifications are listed in this table must have the voltage regulator setting made on open circuit. See Bulletin 1R-120

Voltage Regulator Point Opening ..... .015 in.
Current Regulator Point Opening ..... .015 in.

Cutout Relay Air Gap ..... .057 in.
Cutout Relay Point Opening ..... .020 in.

Spec. No.	CURRENT REGULATOR Current Setting (Amps.)	VOLTAGE REGULATOR Voltage Setting (Open Circuit) 135°-145° F.	CUTOUT RELAY Points Close (Volts)
279	50	14.6	13.5
324	----	14.6	13.5
326	40	14.6	13.5
327	40	15.0	13.5
339	--	8.5	7.0
342	18	14.6	13.5
1288	14	30.0	26.0
1290	25	30.0	26.0
1291	14	40.0	35.0
1292	10	30.0	26.0
1295	40	8.5	7.0
1298*	80	14.6	13.5
1299*	100	14.6	13.5
1402	30	15.0	13.5
1403	----	8.5	7.0
1407	57	14.6	13.5
1412	33	15.0	13.5
1413	10	40.0	35.0
1414	40	40.0	35.0
1415	33	14.6	13.5
1417	50	8.5	7.0
1425	50	15.0	13.5
1426	55	15.0	13.5
1428	25	40.0	35.0
1434	40	14.6	13.5
1447	55	14.6	13.5
1448	40	14.6	13.5
1450*	‡	14.6	13.5
1451	10	37.5	33.0
1452	20	15.0	13.5
1453*	57	14.6	13.5
1454	50	30.0	26.0
1457	20	40.0	35.0
1466	40	37.5	33.0
1470	35	14.6	13.5
1471*	75	14.6	13.5

*On these units set Voltage Regulator Air Gap .018-.020 in. and Point Opening .005-.008 in., Cutout Relay Air Gap .050 in., Field Relay Air Gap .010 in., and Field Relay Open Circuit Voltage 8 volts on 12 volt systems and 20 volts on 24 volt systems. Set Field Relay before Voltage Regulator. See 1R-120 and 1R-133.

Spec. No.	CURRENT REGULATOR Current Setting (Amps.)	VOLTAGE REGULATOR Voltage Setting (Open Circuit) 135°-145° F.	CUTOUT RELAY Points Close (Volts)
2002*	‡	14.6	13.5
2003	25	37.5	33.0
2004	25	7.5	6.5–6.9
2005	25	7.5	6.5–6.9
2006	17	14.6	13.5
2007	25	15.0	13.5
2008	25	15.0	13.5
2009	35	7.5	6.5–6.9
2010	55	15.5	13.5
2011	14	40.0	35.0
2012	15	30.0	26.0
2013*	50	14.6	13.5
2014	14	37.5	33.0
2015	50	15.0	13.5
2016	12	30.0	26.0
2017*	75	28.0	26.0
2018	15	30.0	26.0
2019	40	7.5	6.5–6.9
2020	50	30.0	26.0
2021	---	†	----
2022	50	30.0	26.0
2023	50	30.0	26.0
2026*	55	14.6	13.5
2030‖	---	29.0	----
2034	55	14.6	13.5
2035	50	14.6	13.5

*On these units set Voltage Regulator Air Gap .018-.020 in. and Point Opening .005-.008 in., Cutout Relay Air Gap .050 in., Field Relay Air Gap .010 in., and Field Relay Open Circuit Voltage 8 volts on 12 volt systems and 20 volts on 24 volt systems. Set Field Relay before Voltage Regulator. See 1R-120 and 1R-133.
†Voltage Regulator unit only. Set on closed circuit at 14.7 volts with 10 amperes current and generator operating at 2500 r.p.m.
‡Must be set hot (operating temperature to 57 amperes). See 1 R-120.
‖Set Air Gap .078-.090 in.; Point Opening .018 in. minimum.

TABLE 3A—HEAVY-DUTY REGULATOR TRUCK TYPE TEST SPECIFICATIONS

Read paragraph of Instructions under Table 3.

Regulators for which specifications are listed in this table must be checked and adjusted according to Bulletins 1R-122, 1R-222, 1R-123, 1R-123A (Circuit B Regulators) and 1R-124, 1R-124A (Circuit A Regulators).

All electrical checks and adjustments must be made with the regulator at operating temperature, and voltage settings must be made on open circuit. If voltage and current settings are found to be within the ranges given in this table, the regulator is operating satisfactorily and need not be disturbed. When settings are found to be outside the ranges, the regulator should be adjusted to the value specified. All mechanical values have an allowable variation of plus or minus 10 per cent unless otherwise stated. (See back page of this bulletin for explanation of air gap variation.)

Voltage Regulator Air Gap	.084 in.	Actuating Relay Air Gap (4 unit reg.)	.037 in.
Current Regulator Air Gap	.084 in.	Actuating Relay Point Opening (4 unit reg.)	.037 in.
Cutout Relay Air Gap (3 unit reg.)	.055 in.	Actuating Relay Back Air Gap (4 unit reg.)	.008 in.
Cutout Relay Point Opening (3 unit reg.)	.040 in.	Overload Circuit Breaker Point Opening	.020 in.
Circuit Breaker Air Gap (4 unit reg.)	.042 in.	Overload C.B. Initial Contact Tension	7-9 oz.
Circuit Breaker Point Opening (4 unit reg.)	.040 in.	Paralleling Relay Air Gap	.013 in.
Circuit Breaker Back Air Gap (4 unit reg.)	.008 in.	Paralleling Relay Point Opening	.025 in.

Spec. No.	Cutout Relay or Actuating Relay Closing Voltage Range	Cutout Relay or Actuating Relay Closing Voltage Adjust	Circuit Breaker Closing Voltage Range	Circuit Breaker Sealing Voltage Range	Setting (Volts) Voltage Regulator Range	Setting (Volts) Voltage Regulator Adjust	Setting (Amps.) Current Regulator Range	Setting (Amps.) Current Regulator Adjust	Overload C. B. Amps. Overload To Open
1488	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	38–42	40	8–24
1538	25–27	26.0	-------	-------	27.5–29.5	28.2	23–27	25	-------
1547 [a]	12.5–13.5	13.0	7.0–8.5	1–3 above closing	13.9–14.9	14.3	98–102	100	-------
1548 [b]	11.8–13.6	12.8	-------	-------	13.9–14.9	14.3	22–27	25	-------
1561 [cd]	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	18–22	20	4–13
1564 [d]	5.9–6.8	6.4	-------	-------	6.9–7.5	7.2	37–43	40	-------
2027	25–28	26.5	14–17	2–5 above closing	28.8–30.3	29.3	48–52	50	-------
2028	5.9–6.8	6.4	-------	-------	7.0–7.7	7.4	38–42	40	-------
2029	12.5–13.5	13.0	7.0–8.5	1–3 above closing	14.3–15.3	14.7	53–57	55	-------
2031	11.8–13.6	12.8	-------	-------	13.9–14.9	14.3	23–27	25	-------
2032	5.9–6.8	6.4	-------	-------	7.0–7.7	7.4	23–27	25	-------
2036	11.8–13.6	12.8	-------	-------	13.9–14.9	14.3	38–42	40	-------
2037	25–27	26.0	14–17	19.5–23	28.0–29.5	28.5	9–11	10	-------
2038	33–36.5	34.5	19–22.5	25–30	37.8–39.7	38.3	9–11	10	-------
2039	11.8–13.6	12.8	-------	-------	13.9–14.9	14.3	18–22	20	-------
2040	33–36.5	34.5	19–22.5	25–30	37.8–39.7	38.3	23–27	25	-------
2041	33–36.5	34.5	19–22.5	25–30	37.8–39.7	38.3	38–42	40	-------
2042	25–27	26.0	14–17	19.5–23	28.0–29.5	28.5	13–15	14	-------
2043	31–34	32.5	18–21	23.5–28.5	35.2–37.0	35.9	9–11	10	-------
2046	25–27	26.0	14–17	19.5–23	28.0–29.5	28.5	48–52	50	-------
2047 [a]	12.5–13.5	13.0	7.0–8.5	1–3 above closing	13.9–14.9	14.3	78–82	80	-------
2048	25–27	26.0	14–17	19.5–23	28.0–29.5	28.5	23–27	25	-------
2049	31–34	32.5	18–21	23.5–28.5	35.2–37.0	35.9	23–27	25	-------
2050	31–34	32.5	18–21	23.5–28.5	35.2–37.0	35.9	38–42	40	-------
2051	12.5–13.5	13.0	7.0–8.5	1–3 above closing	13.9–14.9	14.3	53–57	55	-------

a—Circuit breaker air gap .036"
b—Cutout relay air gap .048", point opening .035"
c—Paralleling relay operating range 15-20 volts, adjust to 17
d—Current regulator air gap .105"

SERVICE BULLETIN

Spec. No.	Cutout Relay or Actuating Relay Closing Voltage Range	Cutout Relay or Actuating Relay Closing Voltage Adjust	Circuit Breaker Closing Voltage Range	Circuit Breaker Sealing Voltage Range	Setting (Volts) Voltage Regulator Range	Setting (Volts) Voltage Regulator Adjust	Setting (Amps.) Current Regulator Range	Setting (Amps.) Current Regulator Adjust	Overload C. B. Amps. Overload To Open
2055 df	25–27	26.0	14–17	2–5 above closing	27.5–29.5	28.2	23–27	25	4–13
2061	31–34	32.5	18–21	23.5–28.5	35.2–37.0	35.9	14–16	15	.....
2062	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	16–19	18	.....
2064	33–36.5	34.5	19.0–22.5	25–30	37.8–39.7	38.3	28–32	30	.....
2067 ae	27.5–30.0	28.9	16–18	16–22	28.0–29.5	28.5	58–62	60	.....
2068 ag	12.5–13.5	13.0	7.0–8.5	1–3 above closing	13.9–14.9	14.3	53–57	55	.....
2071 d	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	23–26	25	.....
2074	31–34.5	33.0	18–21	23.5–28.5	35.2–37.0	35.9	28–32	30	.....
2077	11.8–13.4	12.8	.....	.....	13.6–14.5	14.0	53–57	55	.....
2078	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	9–11	10	2–6
2079	33–36.5	34.5	19–22.5	3–8 above closing	37.8–39.7	38.3	9–11	10	2–6
2080	33–36.5	34.5	19–22.5	3–8 above closing	37.8–39.7	38.3	23–27	25	5–15
2081	33–36.5	34.5	19–22.5	3–8 above closing	37.8–39.7	38.3	38–42	40	7–20
2082	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	13–15	14	2–6
2083 p	31–34	32.5	18–21	3–8 above closing	35.2–37.0	35.9	9–11	10	2–6
2084	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	48–52	50	8–24
2086	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	23–27	25	4–13
2087 p	31–34	32.5	18–21	3–8 above closing	35.2–37.0	35.9	23–27	25	5–15
2088 p	31–34	32.5	18–21	3–8 above closing	35.2–37.0	35.9	38–42	40	7–20
2089 p	31–34	32.5	18–21	3–8 above closing	35.2–37.0	35.9	14–16	15	2–6
2090	33–36.5	34.5	19–22.5	3–8 above closing	37.8–39.7	38.3	28–32	30	5–15
2091 d	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	23–26	25	4–13
2092 p	31–34	32.5	18–21	3–8 above closing	35.2–37.0	35.9	28–32	30	5–15
2095	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	37–43	40	.....
2096	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	45–53	50	.....
2097	5.9–6.8	6.4	.....	.....	6.9–7.5	7.2	53–57	55	.....
2101	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	57–63	60	8–24
2104	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	18–22	20	4–13
2108	12.5–13.5	13.0	7–8.5	1–3 above closing	13.9–14.9	14.3	53–57	55	.....
2111	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	48–52	50	8–24
2112 h	.....	.....	4.7–5.5	6–8	13.9–14.9	14.3	98–102	100	.....
2114 i	12.5–13.5	13.0	7–8.5	1–3 above closing	13.9–14.9	14.3	48–52	50	.....
2116	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	28–32	30	.....
2117 bn	25–27	26.0	.....	.....	27.5–29.5	28.2	16–20	18	.....
2119 i	12.5–13.5	13.0	7–8.5	1–3 above closing	13.9–14.9	14.3	18.5–21.5	20	.....
2120	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	16–20	18	4–13
2121	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	28–32	30	.....
2124	12.5–13.5	13.0	7–8.5	1–3 above closing	13.9–14.9	14.3	48–52	50	.....
2128	11.8–13.4	12.8	.....	.....	13.6–14.5	k	53–57	55	.....
2129	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	5–7	6	2–6
2135 bm	25–27	26.0	.....	.....	27.5–29.5	28.2	23–27	25	.....
2141	25–27	26.0	14–17	2–5 above closing	27.5–29.5	28.0	23–27	25	4–13
2142 h	.....	.....	4.7–5.5	6–8	13.9–14.9	14.3	.....	.....	.....
2147	25–27	26.0	14–17	2–5 above closing	28.0–29.5	28.5	18–22	20	4–13
2153 do	33–36.5	34.5	19–22.5	3–8 above closing	37.8–39.7	38.3	14–16	15	2–6
2156	11.8–13.6	12.8	.....	.....	13.9–14.9	14.3	18–22	20	
2162	.....	35	16.5–20	3–8 above closing	42–44.5	43	14–16	15	2–6
2163	37–41	39	20–26	3–8 above closing	.....	.....	.....	.....	.....
2164	5.9–6.8	6.4	.....	.....	7.0–7.7	7.4	23–27	25	.....
2169	11.8–13.4	12.8	.....	.....	13.9–14.9	14.3	16–20	18	.....
2170 o	33.0–36.5	34.5	19–22.5	3–8 above closing	37.8–39.7	38.3	9–11	10	2–6
2173 b	11.8–13.4	12.8	.....	.....	13.9–14.9	14.3	16–20	18	.....
2178 hp	31–34	32.5	18–21	3–8 above closing	35.2–37	35.9	38–42	40	7–20

a—Circuit breaker air gap .036"
b—Cutout relay air gap .048", point opening .035"
e—Actuating relay air gap .043", point opening .027"
d—Current regulator air gap .105"
f—Circuit breaker relay air gap and point opening .035"
g—Actuating relay air gap .043", point opening .032"
h—Circuit breaker relay air gap .036", point opening .033"
i—Paralleling relay operating range 7.0-10.0 volts, adjust to 8.5
k—If internal adjustment is required, place external adjusting screw in "MED" position and adjust to 14.0 volts.
m—Current regulator air gap .115"
n—Voltage and current regulator air gap .087"
o—Paralleling relay operating range 22-30 volts, adjust to 26
p—Settings given are for 30-volt system. On a 32-volt system, the actuating relay and circuit breaker relay settings should be approximately 2 volts higher and the voltage regulator setting should be approximately 2.5 volts higher.

TABLE 4—STEP-VOLTAGE CONTROL TEST SPECIFICATIONS

The regulators for which specifications are listed in this table must be checked and adjusted according to the procedures in Bulletin 1R-108.

If voltage settings are found to be within the ranges given in this table, the regulator is operating satisfactorily and need not be disturbed. When settings are found to be outside the ranges, the regulator should be adjusted to the value specified.

VOLTAGE CONTROL UNIT									CUTOUT RELAY			
Spec. No.	Air Gap Inches	Point Opening Inches	Contact Spring Tension Oz.	Armature Travel Inches	Satisfactory Opening Range Volts	Adjust to	Satisfactory Closing Range Volts	Minimum Difference Between Open & Close Volts	Air Gap Inches	Point Opening Inches	Satisfactory Closing Range Volts	Adjust to Volts
1242	.035	.010	0.8	.035	7.5–8.3	7.9	6.4–7.2	.9	.015	.020	6.0–7.1	6.6
1289	.030	.010	0.8	.030	14.0–15.5	14.7	12.5–14.0	1.5	015	.020	12.5–14.0	13.3
1296	.035	.010	0.8	.035	7.5–8.3	7.9	6.4–7.2	.9	.020	.022	6.0–7.1	6.6
1297	.035	.010	0.8	.035	7.5–8.3	7.9	6.4–7.2	.9	.015	.020	6.0–7.1	6.6
1405	.035	.010	0.8	.035	7.5–8.3	7.9	6.4–7.2	.9	.020	.022	6.0–7.1	6.6
1408	.040	.015	1.1	.040	7.3–8.1	7.7	6.2–7.1	.9	.015	.020	6.0–7.1	6.6
1410	.035	.010	0.8	.035	7.4–8.2	7.8	6.2–7.1	.8	020	.022	6.0–7.1	6.6
1424	.040	.015	0.8	.040	7.3–8.1	7.7	6.2–7.1	.9	020	.022	6.0–7.1	6.6
1433	.035	.010	0.8	.035	6.9–7.5	7.2	6.2 max.	—	015	.020	6.0–7.1	6.6
1440	.040	.015	1.1	.040	14.0–15.0	14.4	12.5 max.	—	.015	.020	12.6–14.0	13.3
1446	.015	.022	0.8	.060	27.0–29.0	28.0	16.0 max.		020	.030	24.0–27.0	26.0
1462	.030	.010	0.8	.030	13.5–14.7	14.0	12.0–13.5	1.4	.015	.020	12.2–13.8	13.0
1464	.035	.010	0.8	.035	7.1–7.9	7.5	6.1–6.9	.9	.020	022	5.9–6.8	6.3
1483	.030	.010	0.8	.030	13.2–14.2	—	*	(1.6 min.) (2.4 max.)	.015	.020	12.4–13.8	13.0
3636	.055	.015min.	—	—	29–30.5	—	24 max.					

*Points close at 1.6 to 2.4 volts less than opening voltage

Table 5—Current Regulator Test Specifications

Regulator Air Gap	.057 in.
Regulator Point Opening	.020 in.
Regulator Contact Spring Tension	2.25 oz.
Regulator Fiber Bumper Clearance	.007 in.
Cutout Relay Air Gap	.015 in.
Cutout Relay Point Opening	.020 in.

CUTOUT RELAY			REGULATOR UNIT		
Spec. No.	Closing Voltage Range	Adjust	Operating Current Range	Adjust	Light Load (Amps.)
1281	6.4–7.6	7.0	14–18*	16	11
1286	6.4–7.6	7.0	11–15¶	13	7
1287	6.4–7.6	7.0	12–16¶	14	7

*Satisfactory operating range with lights off, approximately 5 amperes less.

¶Satisfactory operating range with lights off, approximately 4 amperes less.

Current Limit Relay Test Specifications

Air Gap	.020 in.
Contact Point Opening	.020 in.

Minimum spring tension at brass button 5 ounces.

Spec. No.	Starts Vibrating (Amps.)	Vibrates with Dead Short (Amps.)	Lockout Holds Open (Amps.)
620	25–30	2–15	.....
620-A	25–30	2–15 both units	.....
620-B	30–35	5–22	.....
620-C	20–23	2–15	
620-D	35–40	5–22	.....
620-E	22–26	2–15	.....
620-F	35–40	5–22	25–30
620-G	35–40	5–22	28–33

TABLE 6–SPECIAL REGULATORS

NOTE: When checking regulator, operate it with the same type generator with which it is used in service. Electrical adjustments must be made with the regulator at operating temperature.

Carbon Pile Regulators

Regulators for which specifications are listed in this table must be checked and adjusted according to Bulletins 1R-140 (D.C. units) or 1R-240 (A.C. units).

Voltage settings must be made on open circuit.

Voltage and Current Regulator Back Air Gap with armature loaded ..... .015–.019 in.
Voltage and Current Regulator Front Air Gap with armature loaded ..... .021 in. on one side
.021–.029 in. on other side
Circuit Breaker Air Gap ..... .029–.036 in.
Circuit Breaker Back Air Gap ..... .008–.017 in.
Circuit Breaker Point Opening ..... .038–.052 in.
Field Relay Point Opening ..... .020–.030 in.
Actuating Relay Air Gap ..... .035–.042 in.
Actuating Relay Back Air Gap ..... .016–.024 in.
Actuating Relay Point Opening ..... .024–.031 in.
Field Relay Air Gap ..... .015 in. minimum

Spec. No.	Actuating Relay Closing Voltage Range	Actuating Relay Closing Voltage Adjust	Circuit Breaker Closing Voltage	Circuit Breaker Sealing Voltage*	Voltage Regulator Setting (Volts) Range	Voltage Regulator Setting (Volts) Adjust	Current Regulator Setting (Amps.) Range	Current Regulator Setting (Amps.) Adjust	Overload Relay Setting (Amps.) Range	Overload Relay Setting (Amps.) Adjust
1562 [a]	12.2–13.3	12.8	6.5–8.5	11.0 max.	13.9–14.7	14.3	135–145	140	170–210	190
1563 [b]	12.2–13.3	12.8	6.5–8.5	11.0 max.	13.9–14.7	14.3	135–145	140	170–210	190
2070 [c]	30.0–33.0	32.0	16.0–20.0	28.0 max.	34.5–37.0	35.5	47–53	50	95–115	105
	(32.0–35.0)	(34.0)	(17.0–21.5)	(30.0 max.)	(37.0–39.5)	(38.0)	(47–53)	(50)	(95–115)	(105)
2105 [d]	.....	.....	6.0–7.0	.....	13.9–14.9	14.3	.....	.....	.....	.....
2118 [e]	12.2–13.3	12.8	6.5–8.5	11.0 max.	13.9–14.7	14.3	150–165	160	180–235	200
2127 [f]	24.5–26.5	25.5	18.0 max.	.....	26.9–28.1	27.5	.....	.....	.....	.....

* Must be at least 1 volt above closing voltage on 12-volt systems, 2 volts on 30-32 volt systems.

a—Actuating relay back air gap .013"-.018"; circuit breaker back air gap .004"-.011". Overload relay point opening .024"-.032"; overload relay setting checked at 10-12 volts.

b—Overload relay point opening .024"-.032"; overload relay setting checked at 10-12 volts.

c—Actuating relay point opening .034"-.041"; circuit breaker point opening .048"-.062". Overload relay air gap .034"-.042", 32 volt settings shown in parentheses.

d—Field relay closing voltage 7.0-10.0, adjust to 8.0 volts; circuit breaker air gap .045".

e—Circuit breaker air gap .034"-.041", overload relay point opening .013"-.021". Overload relay setting checked at 10-12 volts.

f—Circuit breaker relay opening voltage 7-1.5 volts. Actuating relay: back air gap .008"-.017" (with armature down); top air gap .040"-.050"; point opening .035"-.045"; reverse current 15-35 amperes at 25 volts. Paralleling relay: point opening .020"-.030"; air gap .010"-.018"; closing voltage 19.5"-21.5", adjust to 20.5 volts. Starting relay: point opening .015"-.024"; opening voltage 15-19 volts.

Model 5620 Regulator

NOTE: This regulator must be checked and adjusted according to Bulletin 1R-133, except that the actuating relay air gap is to be measured between the core and the brass residual pin of the armature. To check voltage and current regulator units, operate generator at a speed approximately 50 per cent greater than that at which peak output is reached or at its maximum operating speed, whichever is less.

Spec. Number 2001—Actuating relay air gap between residual pin and core .038"–.052"; point opening .019"–.023"; closing range 12.5–13.5 volts, adjust to 13.0 volts. Cutout solenoid point opening .044"–.055"; air gap .024"–.032"; closing range 8.0–10.0 volts, opening range 3.0–5.0 volts. Voltage regulator air gap between armature and core .041"–.045"; point opening .005"–.010"; operating range 14.0–14.8 volts, adjust to 14.5. Field relay air gap between residual pin and core .010"–.013"; operating range 7.0–10.0 volts, adjust to 8.0. Current regulator point opening with armature against core .011"–.016"; operating range 115–125 amperes, adjust to 120.

TABLE 6A—HEAVY-DUTY REGULATOR SPLIT FIELD TYPE

NOTE: When checking regulator, operate it with the same type generator with which it is used in service. To check voltage and current regulators, operate generator at a speed of approximately 2,000 r.p.m. Check regulators in accordance with Bulletin 1R-139. Make electrical adjustments at operating temperature.

Actuating Relay Air Gap	.035–.044 in.	Circuit Breaker Point Opening	.038–.052 in.
Actuating Relay Back Air Gap	.008–.017 in.	Voltage Regulator Air Gap	.076–.092 in.
Actuating Relay Point Opening	.023–.032 in.	Current Regulator Air Gap	.088–.102 in.
Circuit Breaker Relay Air Gap	.033–.042 in.	Current and Voltage Regulator Minimum Point Opening	.018 in.
Circuit Breaker Back Air Gap	.008–.017 in.		

Spec. No.	Actuating Relay Closing Voltage Range	Actuating Relay Closing Voltage Adjust	Circuit Breaker Closing Voltage	Circuit Breaker Sealing Voltage*	Voltage Regulator Setting (Volts) Range†	Voltage Regulator Setting (Volts) Adjust	Current Regulator Setting (Amps.) Range	Current Regulator Setting (Amps.) Adjust
2057	12.2–13.5	13.0	6.5–8.5	11.0 max.	13.9–14.5	14.1	115–125	120
2059	12.2–13.5	13.0	6.5–8.5	11.0 max.	13.9–14.5	14.1	135–145	140
2075‡	12.2–13.3	12.8	6.5–8.5	11.0 max.	13.9–14.5	14.1	115–125	120
2076‡	12.2–13.3	12.8	6.5–8.5	11.0 max.	13.9–14.5	14.1	135–145	140

*Must be 1-3 volts above closing voltage.
†.3 volt maximum difference between regulators.
‡5 amperes maximum difference between regulators and No. 2 current regulator must never be lower than No. 1.

Relay Test Specifications

Spec. No.		Nominal Air Gap at Core With Points Closed (Inches)	Nominal Point Opening (Inches)	Closing Voltage Range (Volts)	Opening Voltage Range (Volts)	Sealing Voltage Range (Volts)	Closing Current Range (Amps.)	Opening Current Range (Amps.)	Reverse Current (Amps.)
602		.020	.022	6.4–7.8					
603		.009	[a]	7.5 min.	3.3 max.				
604		.043	.043	27–30					
605		.015	.020	13.0–14.5					
606		.017	.020	5.8–6.8					
608		.012	.020				.70–.95		
609		.020 [j]	.020				2.35 max.	1.5 min.	
610		.015	.020	2.5–3.5					
611		.057	.022	12.5–14.5					3 max. at 12.5 volts
612		.011	.020	4.0–5.0					
613	Cutout Relay	.015	.020	6.7–7.7	1.5–2.1				
	Control Relay	.013	.038	3.4 max.	1.5–2.1				
614		.009	.020				1.1–1.3		
615		.015	.020				6–8		
616		.013	.038	8.5 max.	3.0–4.2				
618		.020	.014	7.2–8.0					1 max. at 6.3 volts
619		.010	.018				6.5–8.5		
621		.024	.016 [b]	7.1–8.0					1.5 max. at 6.4 volts
622		.022	.020	2.0–2.7					2 max. at 1.75 volts
624		.021	.020				4.25 max.	3.0 min.	
625	Small	.015	.035	15–18					
	Large	.024	.023	37–39					1.5 max. at 34 volts
628		.014	.027	2.75–4.5					
629		.020	.018	1.5–9.5					
630		.012	.020	7.0–9.0					
631		.025	.022	14–15					2 max. at 12.5 volts
632		.022 [b]	.020 [b]		5.0–6.0 [c]				
633		.015 [b]	.020 [d]		6.5–7.0 [c]				
634		.012 [b]	.020 [b]		10.0–13.0 [c]				
635		.030 [b]			8.0–10.0 [c]				
636		.021	.018	13.5–15.25					1.5 max. at 12.5 volts
637		.012	.020				.65–.75		
638		.020 [b]	.030	33.5–38.5					

a—Adjust contact opening to obtain proper opening voltage.
b—Armature down
c—Top contacts
d—Bottom contacts
j—Models prior to 1964—air gap .020"

SERVICE BULLETIN

Spec. No.		Nominal Air Gap at Core With Points Closed (Inches)	Nominal Point Opening (Inches)	Closing Voltage Range (Volts)	Opening Voltage Range (Volts)	Sealing Voltage Range (Volts)	Closing Current Range (Amps.)	Opening Current Range (Amps.)	Reverse Current (Amps.)
639		.020 [j]	.020	----------	----------	----------	1.7 max.	----------	----------
640		.015	.020	8.0–10.0	----------	----------	----------	----------	----------
705		.045	.025	12.5–14.0	----------	----------	----------	----------	----------
1351		.047	.047	4.5 approx.	----------	----------	----------	----------	----------
1352		.020	.020	3.0–4.0	----------	----------	----------	----------	----------
1353		.012	.020	6.5–8.0	----------	----------	----------	----------	----------
1354		.015	.020	12.5–14.3	----------	----------	----------	----------	----------
1355		.055	.025	38–42	----------	----------	----------	----------	1 max. at 36 volts
1357		.012	.020	3.0–4.0	----------	----------	----------	----------	----------
1358		.025	.020	14.5–15.5	----------	----------	----------	----------	1.1 max. at 12.8 volts
1359		.015	.020	6.0–7.1	----------	----------	----------	----------	----------
1360		.020	.030	27–31	----------	----------	----------	----------	----------
1361		.012	.027	19–25	----------	----------	----------	----------	----------
	Series Relay	.030 [b]	-----	----------	----------	----------	6.0 min.	13–16	----------
1362	Shunt Relay	.012	.025	3.0–4.0	----------	----------	----------	----------	----------
	Tim. Relay	.031 [e]	.022	.6–1.1	----------	----------	----------	----------	----------
1363	Con. Relay	.012 [f]	.022	3.4–4.0	----------	0–1.2 above close	----------	----------	----------
1364	Tim. Relay	.031 [e]	.022	1.2–2.2	----------	----------	----------	----------	----------
	Con. Relay	.012 [f]	.022	6.8–8.0	----------	0–1.2 above close	----------	----------	----------
1365		.022	.030	6.0–8.0	----------	11.0 max.	----------	----------	----------
1366		.017 [b]	.020 [b]	9.5 min.	12.0 max.	----------	----------	----------	----------
1367		.010 [b]	.020 [b]	----------	3.0–4.0	----------	----------	----------	----------
1368		-----	.030 [b]	----------	----------	3.5–4.5	----------	----------	----------
1369		-----	.020 [b]	----------	----------	7.0–9.0	----------	----------	----------
1370		.015	.025	1.3–1.6	0.7–1.5	----------	----------	----------	----------
1371		-----	.030 [b]	----------	5.5–6.0	----------	----------	----------	----------
1372		.014	.027	1.8–2.3	----------	----------	----------	----------	----------
1373		.014	.020	7.0–8.0	----------	12.0 max.	----------	----------	----------
1374		.014 [d]	.020 [d]	----------	8.0–10.0	0–1.2 above close	----------	----------	----------
1377		.012	.020	----------	----------	----------	.8–.95	----------	----------
1378	Top Relay	-----	.030 [b]	----------	3.0–4.0	----------	----------	----------	----------
	Bottom Relay	.012	.020	3.0–4.0	----------	----------	----------	----------	----------
1381		.018	.030	5.5–7.25	5.5 max.	2–9.5 above close	----------	----------	----------
1382		.022 [d]	.020	7.0–8.0 [d]	----------	----------	----------	----------	----------
1384		.015 [d]	.035	13–15	----------	20.0 max.	----------	----------	----------
1385		.012	.032	15–18 [d]	----------	----------	----------	----------	----------
1388		.011	.040	3.5–4.5	3.0 max.	----------	----------	----------	----------
1389		.014	.035	10–12	4–10	18.0 max.	----------	----------	----------
1393		.012 [b]	.020 [b]	6.0 min.	9–10.6	----------	----------	----------	----------
1394 [g]		.032	.10	0–4.5 below seal	----------	19–21.5	----------	----------	----------
1395		.012	.020	----------	----------	----------	2.0–2.3	1.4 min.	----------
1396 [g]		.032	.10	0–9 below seal	----------	38–43	----------	----------	----------
1397		.018	.020	----------	----------	----------	2.0 max.	1.4 max.	----------
1398		.012	.020	----------	----------	----------	.15–.18	----------	----------
1399		.011	.020	----------	----------	----------	1.0 min.	----------	----------
1400		.022	.030	7.0 min.	----------	9.0 max.	----------	----------	----------
1493		.015	.020	6.2–7.3	----------	----------	----------	----------	----------
1494		.015	.020	12.5–14.5	----------	----------	----------	----------	----------
2072		.020	.030	24–27	----------	----------	----------	----------	----------
2501		.012	.035	2.65 min.	3.2 max.	4.2 max.	----------	----------	----------
2502		.015	.020	6.7–7.7	----------	----------	----------	----------	----------
2503		.018	.020	----------	----------	----------	2.4 max.	1.5 max.	----------
2504		.009	.020	7.0–9.0	----------	----------	----------	----------	----------
2505		.014	.027	17–21	----------	----------	----------	----------	----------
2506		.015	.025	----------	----------	4.5 max. [h]	1.8–2.5	.4 min.	----------
2507		.014	...	22–25	----------	----------	----------	----------	----------
2508		.011 min.	.025	1.5–2.1	.3 min.	----------	----------	----------	----------
2509		.021	.020	----------	----------	----------	4.5–5.0	3 min.	----------
2510		.011 min.	.025	3.8–5.0	.6 min.	----------	----------	----------	----------
2511		.011	.025	5.7–8.3	----------	0–2.3 above close	----------	1.7 min.	----------
2515		.011	.025	2.8–4.2	8 min.	0–1.2 above close	----------	----------	----------

[b]—Armature down
[d]—Bottom contacts
[e]—Measured with points open
[j]—Models prior to 1964—air gap .020"
[g]—Back air gap .010"
[h]—Amperes
[f]—Air gap with lower contacts open .032"

S E R V I C E B U L L E T I N

Spec. No.	Nominal Air Gap at Core With Points Closed (Inches)	Nominal Point Opening (Inches)	Closing Voltage Range (Volts)	Opening Voltage Range (Volts)	Sealing Voltage Range (Volts)	Closing Current Range (Amps.)	Opening Current Range (Amps.)	Reverse Current (Amps.)
2516	.....	.017	Adjust to buzz at .35–.50 amps. at 6.8–7.2 volts				.....	.....
2517	.....	.017	Adjust to buzz at .25–.35 amps. at 13.5–14.5 volts				.....	.....
2519	.020	.028	8.5–10.5	4.3 min.	.....	.....	.....	.....
2520	.018	.025	2.2–3.0	.....	.....	.....	.....	.....
2522	.010	.013	8–10	.....	.....	.....	.....	.....
2524	.....	.015	Adjust to buzz at .30–.35 amps. at 13.5–14.5 volts				.....	.....
2525	.010 min.	.020	7–9	.....	0–2 above close	.....	.....	.....
2526	.....	.025	.....	5.7–7.2	.....	.....	.....	.....
2527	.10 min.	.020	3.5–4.5	.....	0–1 above close	.....	.....	.....
2528	....	.015	Adjust to buzz at .30–.35 amps. at 6.8–7.2 volts				.....	.....
2529 [i]	.037	.037	6.3–7.7	.....	1–3 above close	.....	.....	.....
2530	.012	.012	12.3–13.2	10.0–10.8	.....	.....	.....	.....
2531	.022	.028	21–24.6	16 min.	.....	.....	.....	.....
2532	.011 min.	.025	8.3–10.2	.....	10.7 max.	.....	.....	.....
2533	.015	.025	2.5–3.5	.....	0–1 above close	.....	.....	.....
2534	.....	.020	1.0 min.	8.7–10.3	.....	.....	.....	.....
2535 [i]	.037	.037	6.3–7.7	8 min.	.....	.....	.....	.....
2536	.....	.020–.025	20–25	.....	.....	.....	.....	.....
2537	.022	.028	10.5–12.3	8 min.	.....	.....	.....	.....
2538	.011	.025	9–10.5	.5 min.	11.2	.....	.....	.....
2539	....	.015	Adjust to buzz at .30–.35 amps. at 13.5–14.5 volts				.....	.....

i—Back air gap .012"

VOLTAGE SETTING FOR HIGH TEMPERATURE CONDITIONS WHERE CONTINUOUS BATTERY OVERCHARGE IS EXPERIENCED

Where high battery temperatures are obtained, battery overcharge may be experienced even though the voltage regulator setting is within specifications and correct for all normal operating conditions. This overcharging condition may be relieved by reducing the voltage setting slightly. HOWEVER, THE VOLTAGE REGULATOR SETTING MUST NOT BE REDUCED UNLESS IT IS ACTUALLY NECESSARY. The cutout relay likewise must be reduced so the voltage regulator setting is still safely above the setting of the cutout relay.

If such voltage reductions are made during hot weather, the voltage settings should again be increased to the standard specified settings at the onset of cold weather since the reduced settings, combined with low temperatures, may result in undercharged batteries.

AIR GAP VARIATION

Most regulators operate properly with the air gap set at the mean value given in the specifications. However, in some, a small change in air gap setting may be required to obtain satisfactory operation.

On circuit breaker relays, air gap changes may be required if the spread between closing voltage and sealing voltage is not within limits. Decreasing the air gap decreases the spread and increasing the air gap increases the spread.

A change in air gap settings will change the variation between cold and hot operating values of all voltage regulators and most current regulators (current regulators not affected are those not using a bi-metal hinge armature). Decreasing the air gap decreases the variation and increasing the air gap increases the variation. As an example, too large an air gap setting will lower operating values when the regulator is hot. Another effect is caused by too small an air gap setting which may result in noisy or rough regulator operation.