

SIGNAL CORPS
REPAIR STANDARD

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REPAIRED EQUIPMENT STANDARD
FOR
SWITCHBOARD BD-74

PROJECT 4422D

26 March 1953

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SIGNAL CORPS ENGINEERING LABORATORIES

FORT MONMOUTH, N. J.

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REP-570

SIGNAL CORPS
REPAIRED EQUIPMENT STANDARD
FOR
SWITCHBOARD BD-74

Page 4, Paragraph IV-D1, change to read as follows: "With 30 volts connected to the proper terminals on the switchboard, connect terminals BAT and T of Test Set I-181 to the R and T terminals respectively of the LINE TERMINAL STRIP on the rear of the switchboard. Relay B1 shall operate at 0.020 amperes- - -."

Page 5, Paragraph IV-D3, change to read as follows: "Connect Signal Generator SG-15/PCM to the T and R punchings of the LINE TERMINAL STRIP on the rear of the section, jumper the coil Relay B1, and strap together the +30V and -30V bus bars. Connect the T1 and R1 punchings of the circuit being tested to the T1 and R1 punchings respectively of another similar circuit. With the signal generator delivering a 0 dbm, 1,000 cps signal, a decibel meter placed between terminals 7 of the two coils involved shall read less than -45 dbm. An off scale indication is desirable."

Page 5, Paragraph IV-F1, change to read as follows: "With 30 volts connected to the proper terminals on the switchboard, connect terminals BAT and T of Test Set I-181 to the R and T terminals respectively of the LINE TERMINAL STRIP on the rear of the switchboard. Relay B-1 shall operate at 0.020 amperes- - -."

Page 6, Paragraph IV-F4, change to read as follows: "Connect Signal Generator SG-15/PCM to the T and R punchings of the LINE TERMINAL STRIP on the rear of the section, jumper the coil of Relay B-1, and strap together the +30V and -30V bus bars. Connect the T1 and R1 punchings of the circuit being tested to the T1 and R1 punchings respectively of another similar circuit. With the signal generator delivering a 0 dbm, 1,000 cps signal, a decibel meter placed between terminals 7 of the two coils involved shall read less than -45 dbm. An off scale indication is desirable."

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REPAIRED EQUIPMENT STANDARD
FOR
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1. Page 2, Paragraph III-A3. Change "Test Set TS-181" to "Test Set I-181".
2. Page 5, Paragraph IV-D3. Change the third sentence to read as follows: "With a 1000 CPS, one milliwatt (0.775V RMS) input at terminals 1 and 4 of the first coil; a decibel meter-----."
3. Page 7, Paragraph IV-K2. Change to read as follows: "The resistance measured across the T1 and TGI, and R1 and TGI punchings of the terminal strip shall-----."
4. Page 7, Paragraph IV-L. Change to read as follows: "There shall be continuity of the BLACK RED wire between the -30 volt battery bus bar and the '-' punching on the terminal strip and-----."

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PREFACE

Signal Corps Repair Standards (formerly Signal Corps Repaired Equipment Requirements) are prepared by the Maintenance Engineering Branch, Procurement-Maintenance Engineering Division, Signal Corps Engineering Laboratories and cover various items of signal equipments which are subject to repair, test and inspection. These repair standards are documents which set forth the specific repair requirements and test standards to be applied to the individual equipments being repaired and tested.

Signal Corps Repair Standards are prepared for the specific use of the fifth echelon Signal Repair Shops in repairing and determining the quality and acceptability of repaired signal equipments covered by these standards. The use of Signal Corps Repair Standards is recommended as a guide and reference for any agency having occasion to repair, test or inspect an item of signal equipment for which a repair standard has been prepared.

Signal Corps Repair Standard No. REP-1001 is a general standard and is subsidiary to any individual standard prepared. No individual standard is to be considered complete in itself, but is to be used in conjunction with Signal Corps Repair Standard No. REP-1001, "General Standards for Repaired Signal Equipment."

Reports of any discrepancies or any other constructive comments bearing upon this repair standard are invited. A series of Comments and/or Notes pages will be found in the back of this standard which are designed to facilitate reporting any inaccuracies noted. All such reports, comments or requests for additional copies should be addressed to:

COMMANDING GENERAL
Signal Corps Engineering Laboratories, SIGEL-PMM-3
Fort Monmouth, New Jersey

REPAIRED EQUIPMENT STANDARD
FOR
SWITCHBOARD BD-74

I. STATEMENT COVERING APPLICABILITY

This repair standard covers inspection requirements to be used in determining the quality and acceptability of repaired Switchboard BD-74. Its use is mandatory in the Maintenance Divisions of Signal Depots and the Signal Sections of General Depots. The use, insofar as limitations of test and calibration equipment permit, is highly recommended for all Signal Repair organizations.

A. Safety Precautions

1. Exercise Safety Precautions at all times.
2. Select and apply the proper tools.
3. Avoid makeshift methods.
4. Don't do damage to yourself or to the equipment.
5. BE CAREFUL

II. APPLICABLE REFERENCES

A. Repair Standards. Applicable paragraphs of the repair standards listed below form a part of this standard:

Title	Number
General Standards for Repaired Signal Equipment	REP-1001

B. Drawings

Signal Corps Drawing No. SC-A-1179-A
Signal Corps Drawing No. SC-A-1180-A
Signal Corps Drawing No. SC-A-1181-A
Signal Corps Drawing No. SC-A-1182-A

Signal Corps Drawing No. SC-A-1183-C
 Signal Corps Drawing No. SC-A-1184-B
 Signal Corps Drawing No. SC-A-1423-C
 Signal Corps Drawing No. SC-A-1424-C
 Signal Corps Drawing No. SC-A-2983-B
 Signal Corps Drawing No. SC-A-5666-B
 Signal Corps Drawing No. SC-D-659
 Signal Corps Drawing No. SC-D-1172
 Signal Corps Drawing No. SC-D-1416
 Signal Corps Drawing No. SC-D-2980
 Signal Corps Drawing No. SC-D-2994

III. TEST AND ACCESSORY EQUIPMENT

The following equipments, or suitable equivalents of known accuracy, will be employed in determining compliance with the requirements of this Signal Corps Repair Standard and will be capable of conforming to their respective Repair Standards:

A. Test Equipment

	Equipment	Stock Number	Number Used	REP
1.	Multimeter TS-352/U	3F4325-352	1	420
2.	Ohmmeter ZM-17()/U			-
3.	Test Set TS-181	3F4181	1	369
4.	Test Set TS-140/PCM	3F4325-140	1	-

B. Accessories

	Item	Stock Number	Number Used	REP
1.	Plug PJO47B	2Z7228A-47B	3	-
2.	Gauge, Gram WECO #158A	6Q45236-2	1	-
3.	Gauge thickness TL-391/U	6Q45709	1	-

IV. REQUIREMENTS

A. General Test Conditions

1. Input voltage shall be 30 ±2 volt DC.
2. Tests shall be made at normal room temperature.
3. For cross-reference from letter designations to number designations of punchings on terminal strips, refer to drawings under paragraph II,B, above.

B. General. Switchboard BD-74 is manufactured in ten different circuit combinations as shown in the following table. Only the requirements for the circuits contained in a particular combination are applicable to any given switchboard.

CIRCUITS

CIRC NO.	1	2	3	4	5	6
CIRCUIT COMBINATION	SC-D-659 fig 1	SC-D-1172 fig 4	SC-D-1172 fig 3	SC-D-1172 fig 2	SC-D-1416 fig 1	
A	90	0	0	24	0	
B	80	10	0	24	0	
C	70	0	48	8	0	
D	60	10	48	8	0	
E	48	10	72	8	0	
F	0	0	168	0	0	
G	0	0	0	248	48	
H	0	0	0	432	0	
J	80	0	0	76	0	
K	48	0	0	212	0	

CIRCUITS

CIRC NO.	7	8	9	10	11	12
CIRCUIT COMBINATION	SC-D-1172 fig 1	SC-D-1172 fig 6	SC-D-659 fig 3	SC-D-2980 fig 1	SC-D-2980 fig 2	SC-D-2994
A	6	1	1	0	0	0
B	6	1	1	0	0	0
C	2	1	1	0	0	0
D	2	1	1	0	0	0
E	0	0	1	0	0	0
F	0	0	0	0	0	0
G	0	0	1	0	0	0
H	0	0	0	0	0	0
J	0	0	1	16	1	1
K	0	0	1	8	1	1

C. Insulation Resistance Test. The insulation resistance as measured by Multimeter TS-352/U in series with a 90-volt battery shall be not less than 5 megohms between each side of the line circuits and between each side of the line circuits and all other circuits and ground. (When measured with Multimeter TS-352/U connected as a voltmeter, a reading of approximately 4 volts on the 250-volt scale, 1,000 ohms per volt, corresponds to 5 megohms. A lower voltage reading indicates a higher insulation resistance.)

D. Transmitter Battery Supply Test. (Dwg SC-D-659, Fig 1)

1. With the T and R terminals of the Line Terminal Strip on the rear of the section shorted and the line fuse removed, connect the BAT and T binding posts of Test Set I-181 to

the fuse post and the -30 V bus bar respectively. Relay B-1 shall operate at 0.020 amperes and line lamp shall light. Lamp shall be extinguished when a plug PJ-047B is inserted in turn into both the LINE and the SWBD jacks. The lamp shall light in each case when the plug PJ-047B is removed from the jack. The relay shall release at 0.005 amperes.

2. With battery removed, the resistance measured across T1 and R1 of the cross connecting terminal strip at the rear of the section shall be 100 ohms \pm 6 ohms, and shall not be less than 5 megohms when a plug PJ-047B is inserted into the TIE C.C. jack.

3. Remove battery and the short between the R and T punchings of the Line Terminal Strip on the rear of the section and strap together terminals 2 and 3 of Coil C-111. Connect terminals 5 and 8 of Coil C-111 to terminals 5 and 8 respectively of a second Coil C-111. With one milliwatt (0.775 v rms) input at terminals 1 and 4 of the first coil, a decibel meter placed between terminals 7 of the first and second coil shall read less than -45 db. An off scale indication is desirable.

E. Fuse Alarm Circuit Test. (Dwg SC-D-659, Fig 3).
Connect the BAT and T binding posts of Test Set I-131 between the Alarm Bus Bar and the -30 V bus bar. The relay shall operate when the current is adjusted to 0.022 amperes; the alarm bell shall sound when the relay operates. When the current is readjusted to 0.002 amperes, the relay shall release and the alarm bell shall cease sounding. Remove Test Set I-131 and short the Alarm Bus Bar to the -30 V bus bar. The alarm lamp and alarm bell shall both operate.

F. Transmitter Battery Supply (Dwg SC-D-1416, Fig 1)

1. With the T and R terminals of the Line Terminal Strip on the rear of the section shorted and the line fuse removed, connect the BAT and T binding posts of Test Set I-131 to the fuse post and the -30 V bus bar respectively. Relay B-1 shall operate at 0.020 amperes and the line lamp shall light. The lamp shall be extinguished when a plug PJ-047B is inserted into the LINE jack and shall relight when the plug is removed. The relay shall release at 0.005 amperes.

2. With battery removed, the resistance measured across T1 and R1 of the cross-connecting terminal strip at the rear of the section shall be 100 ohms \pm 6 ohms and shall not be less than 5 megohms when a plug PJ-047B is inserted into the TIE C.O. jack.

3. With battery removed, the resistance measured across T1 and TGI of the cross-connecting terminal strip at the rear of the section shall be 50 ohms \pm 5 ohms and shall not be less than 5 megohms when a plug PJ-047B is inserted into the SX jack.

4. Remove battery and the short between the T and R punchings of the Line Terminal Strip on the rear of the section, and strap together terminals 2 and 3 of Coil C-111. Connect terminals 5 and 3 of Coil C-111 to terminals 5 and 8 respectively of a second Coil C-111. With a 1,000 cps one milliwatt (0.775 $\sqrt{\text{rms}}$) input at terminals 1 and 4 of the first coil, a decibel meter placed between terminals 7 of the first and second coils shall read less than -45 db. An off scale indication is desirable.

G. Ring Down and Night Alarm Circuit (SC-D-2980, Figs 1 and 2). Short-circuit the 139-A capacitor and connect the BAT and T binding posts of Test Set I-181, in series with a 30 volt DC supply, to the T1 and R1 punchings of the cross-connecting terminal strip on the rear of the section. The relay shall operate at 0.0042 amperes and cause the pilot lamp and night alarm buzzer to operate. The relay shall remain operated when the 30-volt source is removed from the T1 and R1 punchings, and shall release when a plug PJ-047B is inserted into the ANS jack.

H. Lamp Circuit (Dwg SC-D-1172, Fig 1). With 30 volts applied across punchings L and L1 of the terminal strip, the associated lamp shall light.

I. Jack Circuit (Dwg SC-D-1172, Fig 2). The resistance measured across the T and T1 and the R and R1 punchings of the terminal strip shall be less than 2 ohms, and shall not be less than 5 megohms when a plug PJ-047B is inserted into the associated jack.

J. Through-line Circuit Test (Dwg SC-D-1172, Fig 3)

1. The resistance measured across the T and T1 and the R and R1 punchings of the terminal strip shall be less than 4 ohms, and shall not be less than 5 megohms when a plug PJ-047B is inserted into the EAST and WEST jacks, one at a time.

2. With a short-circuited plug PJ-047B inserted in the MONITOR jack, the resistance measured across the T1 and R1 punchings of the EAST terminal strip shall be 2 ohms or less.

K. Simplex Circuit Test (Dwg SC-D-1172, Fig 4)

1. The resistance measured across the T and TG and R and TG punchings of the terminal strip shall be between 48 and 56 ohms and shall not be less than 5 megohms when a plug PJ-047B is inserted into the EAST LINE and TELEG jacks; one at a time.

2. The resistance measured across the T1 and TG2 and R1 and TGI punchings of the terminal strip shall be between 48 and 56 ohms and shall not be less than 5 megohms when a plug PJ-047B is inserted into the WEST LINE and TELEG jacks one at a time.

3. Connect terminals 5 and 8 of Coil C-III to terminals 5 and 8 respectively of a second Coil C-III. With a 1000 cps one milliwatt (0.775v rms) input at terminals 1 and 4 of the first coil, a decibel meter placed between terminals 7 of the first and second coils shall read less than -45 db. An off-scale indication is desirable.

L. Lamp Battery Circuit Test (Dwg SC-D-1172, Fig 6).
There shall be continuity of the BLACK RED wire between the 30-volt battery bus bar and "-" punching on the terminal strip and continuity of the BLACK wire between the +30 volt battery bus bar and the "+" punching on the terminal strip.

M. Operator's Jacks and Key Test (Dwg SC-D-2994B)

1. With a short-circuited plug PJ-047B inserted in the LINE PATCHING JACK and the switch plunger pulled all the

way out, there shall be continuity between the L₁ and L₂ punchings of the terminal strip. Continuity shall be broken when plunger is pushed half-way in.

2. With a short-circuited plug PJ-047B inserted in the LINE PATCHING JACK and the switch plunger inserted all the way into the key, there shall be continuity between the GRD and the \pm punchings of the terminal strip. Continuity shall be broken when the plunger is pulled half-way out.

3. Insert a short-circuited plug PJ-047B in each of the Operator's Jacks. There shall be continuity between the T and C and the T and R punchings of the terminal strip.

N. Transmission Requirements

1. Transmitter Battery Supply (Dwg SC-D-659, Fig 1, and SC-D-1416, Fig 1). Remove the 30 volt source, strap terminals 2 and 3 of Coil C-111, and jumper the coil of the B-1 relay. With the input connected to the T1 and R1 punchings of the cross-connecting terminal strip on the rear of the section, the transmission loss as measured across the T and R punchings of the line terminal strip on the rear of the section shall not exceed 2 decibels at 1000 cycles.

2. Simplex Circuit (Dwg. SC-D-1172, Fig 4). With the 30 volt source removed and the signal generator connected across the T1 and R1 punchings of the WEST terminal strip, the transmission loss measured across the T and R punchings of the EAST terminal strip shall not exceed 2 decibels at 1000 cycles.

O. Apparatus Adjustments. Adjustable apparatus which fails to meet the operational tests shall be readjusted as follows:

1. Jack 223A. With a plug PJ-047B fully inserted into the jack, the pressure of the tip spring on the tip of the gauge shall be from a minimum of 500 grams to a maximum of 1200 grams.

2. Jack 220A. With a plug PJ-047B fully inserted into the jack, the pressure of the tip spring on the tip of

the gauge shall be from a minimum of 500 grams to a maximum of 1200 grams. There shall be a separation of .016 inches between the contacts of the tip spring and a separation of .005 inches between the contacts of the follower.

3. Adjustments of Relays B-1, B-10 and J-54

WECO CODE NO.	MAX ARM TRAVEL	FRONT CONTACT MAKE	OPERATE DC AMPERES
B-1	.030"	.005"	.020
B-10	.030"	.005"	.022
		CONTACT <u>A</u> FOLLOW	CONTACT <u>B</u> FOLLOW
J-54	.030	.012" MIN .018" MAX	.003" MIN .003" MAX

WECO CODE NO.	RELEASE DC AMPERES	PRIMARY OPERATE DC AMP	SECONDARY OPERATE DC AMP	SECONDARY NON-OPERATE DC AMPERES
B-1	.005			
B-10	.002			
J-54	.0147		.0042	.0034

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