NATIONAL BUREAU OF STANDARDS REPORT
4473

SUPPLEMENTARY REPORT ON RESISTANCE OF CONNECTORS USED IN CABLE SPLICES OF NBS REPORT 4369

by

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to

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CIVIL AERONAUTICS ADMINISTRATION

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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1. SCOPE

This report presents the results of additional resistance measurements which have been made in the hope of obtaining some explanation of the large variations in resistance from conductor to conductor which was found during the cable splicing investigation covered by NBS Report 4369. Cable splices Nos. 8 and 11 were selected for these measurements because they showed some of the largest variations in resistance. The additional measurements include both a repetition of the bridge measurements and values determined by the ammeter-voltmeter method. Three observers participated.

2. PROCEDURE

The conductors of cable splices 8 and 11 have been identified by attaching a number to each wire. The resistances of these conductors have been remeasured by the same observer (A) who made the original measurements using the same bridge and method used for these measurements. These resistances have also been determined by measuring the voltage drop across the conductors with a current of 1.000±.005 amperes flowing through the conductor in each instance. The current was derived from a storage battery and the measurements were made with a suitable ammeter and voltmeter by observer B. Both types of measurements were repeated on cable splice No. 11 by observer C.

Since the individual conductors were not identified at the time of the original measurements, it is possible to compare those results with the present values only statistically. To do this, the new bridge measurements made by observer A, who made the original ones, have been processed as those values were; that is, an allowance of 45 milliohms has been made for the resistance of the wire, and the residual resistances have been allotted to groups according to their size.

3. RESULTS

The results are presented in two tables. Table I contains the new values arranged to compare the values obtained for the same conductors by the two methods and three observers. Table II compares the original values with the most comparable values of the present measurements as indicated in the previous paragraph.

4. DISCUSSION

In general, the new measurements confirm the original findings that there is considerable variation in the resistance of the splice from wire to wire. The new measurements also show that the splices having the larger values of resistance are unstable. This was confirmed by remeasuring each of two conductors several times. Variations of more than 2 to 1 were found in one case. At least 8 of the 52 conductors in cable slice No. 11 were noted as unstable on the ammeter-voltmeter test by both observers B and C. These characteristics are undesirable in control circuits.

Table I

Resistances of Conductors

	Splice No. 8		Splice No. 11			
Method	E/I	Bridge	E/I	E/I	Bridge	Bridge
Observer	B	A	B	C	A	C
Wire No.	Resistance in milliohms					
1	48	45	47	46	45	45
2	54	51	54	56	49	49
3	62	60	52	48	46	45
4	255	1552	50	48	46	47
5	47	46	196#	175	182	178
6	83	82	162#	138	132	134
7	75	70	144#	136#	131	126
8	67	60	51	49	47	48
9	49	48	50	47	46	46
10	79	78	51	48	46	47
11	288	296	180#	160	137	138
12	213	334	170#	165#	143	141
13	172	175	50	48	47	47
14	47	45	52	47	46	46
15	98	96	51	47	46	46
16	78	80	57	55	54	53
17	207	720	51	47	45	46
18	211	736	168	158	135	134
19	48	46	178	170	144	147
20	265	600	50	48	47	47
21	114	210	50	47	46	46
22	48	48	49	46	45	45
23	195	112	53	48	47	47
24	386	2367	52	48	45	45
25	68	67	55	50	50	49
26	47	45	112	105	104	103
27	89	83	65	60	58	59
28	50	48	51	47	45	45
29	49	47	49	46	44	45
30	46	45	69	61	59	60
31	44	44	211#	181#	965	742
32	188	180	52	47	46	45
33	49	47	73	69	67	67
34	95	94	225#	188#	171	174
35	46	44	57	52	51	50
36	135	131	160#	178#	216	222
37	178	454	190#	210#	151	154
38	58	54	56	46	44	45
39	415	1747	54	47	46	46
40	162	307	48	46	44	45
41	45	44	50	46	44	45
42	68	65	215#	168#	156	155
43	450	1790	51	48	47	47
44	54	52	63	46	45	46
45	468	2075	64	64	60	57
46	425	1590	97	94	89	92
47	48	45	134#	106#	94	65
48	51	49	75	68	67	67
49	288	980	55	49	48	48
50	193	170	56	49	47	46
51	46	46	52	47	46	45
52	235	710	56	48	47	46

Unstable

Table II

Distribution of Splice Resistances

Number in Each Interval Between Resistances Indicated *

Splice No.	Test	.000 ohms	.001	.002	.005	.010	.022	.047	.100	.215	.465	1.000	2.150	Means ohms
8	First	0	1	1	12	15	13	3	3	1	3	0	0	.071
8	Second	8	5	4	3	3	6	4	4	4	5	5	1	.366
11	First	0	8	16	5	2	4	2	2	5	8	0	0	.136
11	Second	10	17	2	3	3	3	8	5	0	1	0	0	.091

* All values for both tests are bridge measurements by observer A

THE NATIONAL BUREAU OF STANDARDS

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Information on the Bureau's publications can be found in NBS Circular 460, Publications of the National Bureau of Standards ($1.25) and its Supplement ($0.75), available from the Superintendent of Documents, Government Printing Office. Inquiries regarding the Bureau's reports and publications should be addressed to the Office of Scientific Publications, National Bureau of Standards, Washington 25, D. C.


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