

A1 DIGITAL DATA TRANSMISSION SYSTEM MATCHING AND ERROR COUNTING CIRCUIT OUT-OF-SERVICE TEST

1. GENERAL

1.01 This section describes a method of making out-of-service tests on the matching and error counter circuit used in the A1 digital data signaling system.

1.02 This section is reissued to revise the test procedure.

1.03 This test verifies that any differences in the data received from the DDR and from the output of the local word generator will produce a pulse that will be counted as an error.

1.04 The following abbreviations are employed:

W GEN word generator circuit
M & EC matching and error counter circuit

1.05 Lettered Steps: A letter a, b, c, etc, added to a step number of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the

same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

2.01 Two word generators adjusted for 1600 bit per second operation.

2.02 Oscilloscope, KS-16305, L1 equipped with Waterman Company combination probe A-10-C (formerly called DF1-027-A01) and test lead A-14-K (formerly called DF1-029-A01).

2.03 Volt-ohm-milliammeter, KS-14510, L1 or equivalent, referred to in the section as the voltmeter.

2.04 Jack and connector circuit, SD-1G008-01.

2.05 Four patching cords, P3E cords, equipped with two No. 310 plugs (3P7E cords).

2.06 One No. 262B plug (600 ohms).

STEP	ACTION	VERIFICATION
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3. PREPARATION

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| 1 | Arrange word generators per block diagram, Fig. 101, SD-1G008, Issue 3 or higher, "Jack and Connector Circuit." | |
| 2 | Energize the equipment. | |
| 3 | Set voltmeter switch to 300-volt dc scale. | |

STEP	ACTION	VERIFICATION
4	Ground negative cord of voltmeter.	
	<i>Note:</i> Use W GEN No. 1 GRD test jack if W GEN SD-1G097-01 is used.	
5	Insert positive cord of voltmeter into W GEN No. 1 +130V test point.	Voltmeter reads between 125 and 135 on 300V scale.
6	Disconnect voltmeter cords and repeat Steps 3, 4, and 5 on W GEN No. 2.	
7	Set voltmeter switch to 60-volt scale.	
8	Insert positive cord of voltmeter into F+ test point of M & EC.	
9	Insert negative cord of voltmeter into -48V test point of M & EC.	Voltmeter reads 40 on 60-volt scale.
	<i>Note:</i> Adjust FIL potentiometer, if necessary to meet this requirement.	
10	Disconnect voltmeter cords.	
11	Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments. Set V MULT switch to CAL, H-SEL to LIN SWEEP and SYNC SEL to REP-INT.	
12	Adjust CAL potentiometer.	Oscilloscope voltmeter reads 0.1 volt.
13	Adjust oscilloscope V GAIN knob.	Oscilloscope shows 1 inch peak-to-peak deflection.
14	Set SYNC SEL switch of oscilloscope to TRIG EXT HI. Using A-14-K cord, connect W GEN No. 1 SYNC test point to oscilloscope SYNC input.	
15a	If W GEN SD-1G005-01 is used — Operate S1, S13, and S15 switches to OFF (down) position.	
16	Set W GEN No. 1 DDR-DDT switch to DDT. Set W GEN No. 2 DDR-DDT switch to DDR.	
17	Operate WG and DP switches of M & EC to ON position.	
18	On jack and connector circuit — Using P3E cords, patch from W GEN No. 1 T and D jacks to M & EC T and D jacks respectively.	
	<i>Note:</i> Wiring between W GEN No. 2 and M & EC is provided internally by jack and connector circuit.	

STEP	ACTION	VERIFICATION
19	Patch W GEN No. 1 S jack of jack and connector to first MULT TST jack.	
20	Insert a No. 262B plug into second MULT TST jack.	
21	Using 3PE cord, patch third MULT TST jack to V2 jack of jack and connector circuit.	
→ 22b	If W GEN SD-1G097-01 is used — Operate S1 switch to position 16.	
→ 23a	If W GEN SD-1G005-01 is used — Operate S14 switch to position 16.	
24	Set oscilloscope V INPUT SELECTOR to BAL AC, set V MULT switch to 10. Adjust sweep, if necessary.	Start dipulse appears.
25	Adjust word generator LEVEL potentiometer for 1.1 volts peak to peak. <i>Note:</i> Adjust oscilloscope sweep, if necessary.	Start dipulse on oscilloscope has 1.1 inch peak-to-peak deflection.
26	At jack and connector circuit — Remove 262B plug from MULT TST jack. Remove cords between MULT TST jacks and jack and connector circuit.	
27	Using 3PE cord, patch from W GEN No. 1 S jack to W GEN No. 2 S jack.	
28	On oscilloscope — Set V INPUT SELECTOR to PANEL.	
29	Connect oscilloscope A-10-C, adjusted to 10:1, to V INP-AC jack of oscilloscope.	

4. METHOD

STEP	ACTION	VERIFICATION
30	On W GEN No. 1 and W GEN No. 2 — Operate S2 switch to ON position (up for SD-1G005-01, down for SD-1G097-01), and S3 through S12 to OFF position.	
31	Connect oscilloscope probe to DP test point of M & EC. Adjust DP potentiometer of M & EC, if necessary, to get a positive pulse of 35 to 40 volts at the DP test point.	A positive pulse of deflection 1.75 to 2 inches appears on the oscilloscope.

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STEP	ACTION	VERIFICATION
→ 32	On W GEN No. 1 — Operate S3, S4, S5, and S6 switches to ON position.	Square waves with positive peaks of 1.75 to 2 inches deflection appear on oscilloscope. Width of sliced dipulse is 30 to 40% of one square wave period.
	<i>Note:</i> Adjust DP potentiometer, if necessary.	
33	On W GEN No. 1 — Operate S2, S3, S4, S5, and S6 switches to OFF position.	
34	Remove oscilloscope probe from DP test point of M & EC and insert in WG test point. Adjust WG potentiometer, if necessary, to obtain a positive pulse of 38 to 40 volts at WG test point.	A positive pulse of deflection 1.9 to 2 inches appears on the oscilloscope.
→ 35	On W GEN No. 2 — Operate S4, S6, and S8 switches to ON position.	Square wave with positive peaks of 1.9 to 2 inch deflection appears. Width of sliced dipulse is approximately equal to width of space between dipulses.
	<i>Note:</i> Adjust WG potentiometer, if necessary.	
36	On W GEN No. 2 — Operate S2, S4, S6 and S8 switches to OFF position.	
37	On M & EC counter — Operate WG switch to OFF position.	
38	On W GEN No. 1 — Operate S2 switch to ON position.	
39	Connect oscilloscope probe to TMG test point of M & EC. Adjust H gain of oscilloscope to zero.	
40	Adjust PH potentiometer of M & EC and H GAIN of oscilloscope, if necessary.	A timing spike and a positive pedestal, or a timing spike and positive notch next to a negative notch, appears on the oscilloscope.
		<i>Note:</i> Small timing spikes may also be visible.
41	Adjust TMG potentiometer and if necessary, operate phase switch to opposite direction.	The spike is centered on the pedestal or centered between two notches.
42	Operate V Mult switch to 100, remove oscilloscope probe from V INP-AC jack of oscilloscope and connect to V INPUT-DC jack of oscilloscope. Connect probe to TMG test point of M & EC.	

STEP	ACTION	VERIFICATION
43	Adjust PH potentiometer of M & EC so that DC voltage at TMG test point of M & EC is at maximum.	Horizontal line appears on oscilloscope in its highest position.
44	Remove oscilloscope probe from V INPUT-DC jack of oscilloscope and connect to V INPUT-AC jack of oscilloscope.	
45	Reinsert oscilloscope probe in TMG test point of M & EC.	
46	Adjust V MULT to 10.	
47	On M & EC — Slowly turn PH potentiometer of M & EC until a single spike of 25 ± 5 volts appears on the oscilloscope. <i>Note:</i> Do not keep turning the PH potentiometer so that the spike voltage exceeds 30 volts, for it may be possible to keep turning the potentiometer in this direction until the spike voltage starts to decrease, finally coming to within 25 ± 5 volts again. This would result in an incorrect adjustment.	A positive spike of deflection 1 to 1.5 inches appears on the screen.
48	Operate WG switch of M & EC to ON position, switch S2 of W GEN No. 1 to OFF position, and switch S2 of W GEN No. 2 to ON position. Spike of 25 ± 5 volts appears on oscilloscope. <i>Note:</i> If this condition cannot be met it may be due to adjustments of Steps 30 to 35 not being within limits.	A positive spike of deflection 1 to 1.5 inches appears on the oscilloscope.
49	Remove oscilloscope probe from TMG test point of M & EC.	
50	On W GEN No. 2 — Operate S2 switch to OFF position.	
51	Push reset button of M & EC and set message register to zero.	
52	Operate one toggle switch of W GEN No. 2; restore this switch to normal after a one minute interval.	A total of 6000 ± 60 errors recorded in one minute.
→ 53	Operate any one of the switches S2 through S12 at random in W GEN No. 1 and the same number switch in W GEN No. 2 until all 11 switches have been operated.	No errors are recorded after same number switch has been operated in both word generators.
54	On W GEN No. 1 and W GEN No. 2 — Operate S2 to S12 switches to OFF position.	

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STEP	ACTION	VERIFICATION
55	On W GEN No. 1— Operate, in succession, S2 to S12 switches to ON position.	M & EC records errors, message register increases speed as each switch is operated.
56	On W GEN No. 2— Operate, in succession, S2 to S12 switches to ON position.	Message register decreases speed as each switch is operated.
57	On W GEN No. 1 and W GEN No. 2— Remove cords and operate S2 to S12 switches to OFF position.	