A1 DIGITAL DATA TRANSMISSION SYSTEM
WORD GENERATOR CIRCUIT SD-1G097-01
OUT-OF-SERVICE TESTS

1. GENERAL

1.01 This section describes a method of making out-of-service tests on the word generator circuit, SD-1G097-01, used in the A1 digital data signaling system.

1.02 This section is reissued to revise the method of checking the start and data pulses at the word generator test points. The oscilloscope probes and the jack and connector designations are brought up to date.

1.03 The tests covered are:

*A. **Binary Counters:*** This test checks that the binary counters are operating properly and that the word length is adjustable by means of the S1 switch from 16 bit words to 256 bit words.

*B. **Dipulse Output:*** This test assures that each data switch produces an appropriate dipulse, and sets the output level to the proper value.

*C. **Synchronization:*** This test checks that the word generator can be synchronized to another data source and shall only be applied in locations where two word generators are used; one in conjunction with the matching and error counter circuit, SD-1G006-01.

1.04 Section 314-505-301 covers the analysis and clearance of trouble for this section.

1.05 Word generator is abbreviated W GEN in this section.

2. APPARATUS

2.01 Hewlett-Packard model 400C vacuum tube voltmeter (VTVM), or equivalent.

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

2.03 Volt-ohm-milliammeter, KS-14510, L1 or equivalent.

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

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

2.06 Three patching cords, P3E cords, 4 feet long, equipped with two No. 310 plugs (No. 3P7E cords).

2.07 One cord, 3 feet long, equipped with two Grip-Rite plugs and one No. 310 plug (P2CL cord).

2.08 Matching and error counter circuit, SD-1G006-01.

3. PREPARATION

STEP	ACTION	VERIFICATION
ALL TESTS		
1	Arrange W GEN No. 1 per block diagram, Fig. 101, SD-1G008-01, Issue 3 or higher, on jack and connector circuit.	
2	Set volt-ohm-milliammeter switch to dc volts 300.	

STEP	ACTION	VERIFICATION
3	Connect black volt-ohm-milliammeter cord to volt-ohm-milliammeter (−) terminal, red cord to (+) terminal.	
4	Insert black phone tip of volt-ohm-milliammeter cord into W GEN GRD test point.	
5	Insert red phone tip of volt-ohm-milliammeter cord into W GEN + 130V test point.	Volt-ohm-milliammeter reads between 125 and 135 on the 300-volt scale.
6	Disconnect volt-ohm-milliammeter cords.	
7	Insert red phone tip of volt-ohm-milliammeter cord into W GEN F+ test point.	
8	Insert black phone tip of volt-ohm-milliammeter cord into W GEN −48V test point. *Note:* Adjust FIL potentiometer, if necessary.	Volt-ohm-milliammeter reads 40 volts.
9	Disconnect volt-ohm-milliammeter cords.	
	A. Binary Counters	
10	Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments, setting V INPUT SELECTOR to PANEL.	
→ 11	Using A-14-K cord, connect oscilloscope SYNC input to W GEN SYNC test point.	
12	Set oscilloscope H SEL to LIN SWEEP and SYNC SEL to REP INT.	
13	Adjust oscilloscope SYNC control.	Line appears on oscilloscope.
14	Set V MULT switch of oscilloscope to CAL. Adjust CAL potentiometer.	Oscilloscope voltmeter reads 0.2 volt.
15	Adjust oscilloscope V GAIN knob to obtain 1-inch peak-to-peak deflection.	Oscilloscope shows 1-inch peak-to-peak deflection.
16	Set V MULT switch of oscilloscope to 10, V INPUT SELECTOR to PANEL.	
→ 17	Set oscilloscope probe on A-10-C cord to 10:1. Connect cord to V INP AC jack.	
18	Insert probe into W GEN BCA1 test point.	
→ 19	Set S1 switch on W GEN to position 16.	Oscilloscope shows square wave.
→ 20	On oscilloscope — Set SYNC SEL switch to TRIG EXT HI, COARSE SWEEP to 500.50, H GAIN to zero. Adjust FINE SWEEP and SYNC control.	From six to ten square wave pulses appear on oscilloscope.

STEP	ACTION	VERIFICATION
→ 21	Adjust SYNC control to center range.	Picture on oscilloscope disappears.
→ 22	Turn SYNC control from center range toward the negative side until picture appears. Adjust the H gain.	Square wave appears, one complete pulse (both positive and negative halves) occupies one inch (two major horizontal divisions) on the oscilloscope.
→ 23	Remove probe from BCA1 test point and insert it into W GEN ST test point. Adjust H POS if necessary.	Oscilloscope shows 1/2 inch wide rectangular pulse.
→ 24	Remove probe from ST test point and insert it into DAT test point.	
→ 25	Operate S2 switch to down position, assure that S3 through S12 switches are in up position. Adjust H POS if necessary.	Oscilloscope shows 1/2 inch wide rectangular pulse.
26	Remove probe from DAT test point and insert it into ST test point.	
27	Adjust oscilloscope sweep.	Four pulses appear on oscilloscope.
28	Operate S1 switch to position 32.	Two pulses appear on oscilloscope.
29	Adjust oscilloscope sweep.	Four pulses appear on oscilloscope.
30	Operate S1 switch to position 64.	Two pulses appear on oscilloscope.
31	Adjust oscilloscope sweep.	Four pulses appear on oscilloscope.
32	Operate S1 switch to position 128.	Two pulses appear on oscilloscope.
33	Operate S1 switch to position 256.	One pulse appears on oscilloscope.
34	Set S1 switch to position 16.	

B. Dipulse Output

10	Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments, setting V INPUT SELECTOR to PANEL.	
11	On W GEN — Set switch S1 to position 16, switches S2 through S12 to up position.	
→ 12	Using A-14-K cord, connect W GEN SYNC test point to oscilloscope SYNC input.	
13	Set V MULT switch of oscilloscope to CAL. Adjust CAL potentiometer to obtain reading on oscilloscope voltmeter of 0.1 volt peak to peak.	
14	Adjust oscilloscope V GAIN knob to obtain 1-inch peak-to-peak deflection.	

STEP	ACTION	VERIFICATION
→ 15	Set V MULT switch of oscilloscope to 10. Connect A-10-C probe, set at 10:1, to V INP AC jack of oscilloscope.	
16	Insert oscilloscope probe into ST test point. Adjust oscilloscope sweep.	One start pulse appears on oscilloscope.
17	Remove oscilloscope probe.	
→ 18	Patch W GEN S jack of jack and connector circuit to one of MULT TST jacks.	
19	Insert a No. 262B plug into another of MULT TST jacks, patch third MULT TST jack to V2 jack.	
20	Set oscilloscope V INPUT SELECTOR to BAL AC, V MULT switch to 10. Adjust W GEN LEVEL potentiometer.	Start dipulse appears on oscilloscope with 1/2-inch peak-to-peak deflection.
→ 21	Remove cord from W GEN S jack, insert it into W GEN D jack.	No dipulses appear on oscilloscope.
22	Operate in succession S3, S5, S7, S9, S11 switches to down position.	One dipulse appears, corresponding to each operated switch.
23	After verification of Step 22 — Restore all data switches to up position.	All dipulses disappear.
24	Operate in succession S2, S4, S6, S8, S10, S12 switches to down position.	One dipulse appears, corresponding to each operated switch.
25	After verification of Step 24 — Operate all data switches to up position.	All dipulses disappear.
26	Operate S2 through S12 switches to down position.	One dipulse appears, corresponding to each operated switch.
→ 27	After verification of Step 26 — Remove cord from W GEN D jack and insert it into W GEN S jack.	Start dipulse of 1/2-inch peak-to-peak amplitude appears on oscilloscope.
28	Operate S2 through S12 switches to up position.	No change in oscilloscope pattern occurs.
29	Operate S2, S6, S7, S8, S12 switches to down position.	
→ 30	Remove cord from W GEN S jack, insert it into W GEN T jack.	Sine wave of 1/2-inch peak-to-peak amplitude appears on oscilloscope.
31	Remove cord connecting V2 jack, MULT TST jack.	
32	With P2CL cord — Patch VTVM to MULT TST jack. Adjust LEVEL potentiometer.	Voltmeter reads −12 dbm.
33	Remove all cord connections.	

STEP	ACTION	VERIFICATION
	C. Synchronization	
10	Arrange W GEN No. 1 per Fig. 101 block diagram, SD-1G008-01, Issue 3 or higher, on jack and connector circuit.	
11	Arrange W GEN No. 2 per Fig. 101 block diagram, SD-1G008-01, Issue 3 or higher, on jack and connector circuit.	
12	Prepare matching and error circuit in accordance with Section 314-506-501.	
13	Insert No. 262B plug into one of MULT TST jacks on jack and connector circuit.	
14	Patch from W GEN 1 T jack to second MULT TST jack on jack and connector circuit using No. 3P7E cord.	
15	With P2CL cord — Patch VTVM to third MULT TST jack. Adjust W GEN 1 LEVEL potentiometer to obtain 0 dbm reading.	Voltmeter reads 0 dbm.
16	Operate switches S2, S6, S7, S8 of both word generators down, all other S- switches up.	
17	Remove No. 3P7E cord from MULT TST jack, insert it into M CKT T jack on jack and connector circuit.	
→ 18	Using two No. 3P7E cords, patch W GEN 1 D and S jacks to M CKT D and S jacks, respectively.	
19	Operate S3 switch of W GEN 1 down.	Matching circuit counter counts steadily.
20	Operate S3 switch of W GEN 2 down.	Matching circuit counter ceases to count.
21	Remove patch cord from M CKT T jack, insert it into MULT TST jack.	
22	Adjust LEVEL potentiometer of W GEN 1 for −12 dbm.	VTVM reads −12 dbm.
23	Remove all patch cords and plugs.	