

A1 DIGITAL DATA TRANSMISSION SYSTEM
WORD GENERATOR CIRCUIT SD-1G005-01
OUT-OF-SERVICE TESTS

1. GENERAL

1.01 This section describes a method of making out-of-service tests on the word generator in A1 digital data signaling systems.

1.02 This section is reissued to revise the title of the section to include identifying schematic SD-1G005-01, to make minor changes, and to incorporate adjustment procedures for the matching and error circuit SD-1G006-01 used in Test C. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests covered are:

A. Adjustments: This test checks that the timing slicer adjustment is proper to insure operation of the binary counters, the start pulse slicer and data slicer are adjusted, the word length is adjustable by means of S14 switch to 256 bit words, and a double-start pulse can be generated.

B. Dipulse Output: This test checks that the ratio potentiometer is adjusted to produce equal amplitude data pulses and timing wave, each data switch produces an appropriate dipulse, the output level is the proper value, and the TMG potentiometer is correctly adjusted to obtain the best possible wave shape of data dipulses.

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 314-505-302 covers the analysis and clearance of trouble for this section.

1.05 Lettered Steps: A letter a, b, c, etc added to a step number in Parts 3 or 4 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 Hewlett-Packard 400C voltmeter (VTVM) or equivalent.

2.02 Oscilloscope, KS-16305, L1 equipped with Waterman Company direct - attenuator probe DFI-029-A01 and attenuator probe DFI-027-A01.

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

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

2.05 One 262B plug (600 ohm).

2.06 Three patching cords, P3E cord, 4 feet long, equipped with two 310 plugs (3P7E cord).

2.07 Patching cord, 3 feet long, equipped with two Grip-Rite plugs and one 310 plug (P2CL cord).

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

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	Arrange word generator under test as word gen. 1, block diagram, Fig. 101, SD-1G008-01, Issue 3 or higher, jack and connector circuit.	
2	Set volt-ohm-milliammeter switch to 300 volts dc.	
3	Connect negative lead of volt-ohm-milliammeter to GRD test point of either DDT or DDR in test fixture.	
4	Connect positive lead of volt-ohm-milliammeter to word generator +130V test point.	Meter indicates between 125 and 135 volts.
5	Disconnect volt-ohm-milliammeter leads.	
6	Set volt-ohm-milliammeter switch to 60 volts dc.	
7	Connect positive lead of volt-ohm-milliammeter to word generator F+ test point.	
8	Connect negative lead of volt-ohm-milliammeter to word generator -48V test point.	Meter indicates 40 volts.
9a	If requirement of Step 8 is not met — Adjust FIL potentiometer for 40-volt indication.	
10	Disconnect volt-ohm-milliammeter leads.	

4. METHOD

STEP	ACTION	VERIFICATION
A. Adjustments		
11	Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments, setting V INPUT SELECTOR to PANEL.	
12	Connect oscilloscope SYNC input into word generator SYNC test point (DFI-029-A01 cord).	
13	Set oscilloscope H-SEL to LIN SWEEP and SYNC SEL to REP-INT-HI.	

STEP	ACTION	VERIFICATION
14	Adjust oscilloscope SYNC control.	Trace appears on oscilloscope.
15	Set V MULT switch of oscilloscope to CAL, adjust CAL potentiometer to obtain reading on oscilloscope voltmeter of 0.2 volt peak to peak.	Oscilloscope voltmeter indicates 0.2 volt.
16	Adjust oscilloscope V GAIN control to obtain 1-inch peak-to-peak deflection.	Oscilloscope displays 1-inch peak-to-peak deflection.
17	Set V MULT switch of oscilloscope to 10, Y INPUT SELECTOR to PANEL.	
18	Set oscilloscope probe on DFI-027-A01 cord to 10:1, connect cord to V-INP-AC jack.	
19	Insert probe into word generator BCA1 test point, adjust TMG potentiometer if necessary.	Oscilloscope displays 10-volt peak-to-peak square wave.
20	Set SYNC SEL switch of oscilloscope to TRIG EXT HI, adjust SWEEP.	Oscilloscope displays positive-going square pulse of 2-inch width.
21	Remove probe, insert it into word generator ST test point.	
22	Adjust ST-SL potentiometer if necessary.	Oscilloscope displays rectangular pulse of 2-inch width.
23	Remove probe from ST test point, insert it into word generator DAT test point.	
24	Operate S2 switch to ON position, assure that S1, S3 through S13 switches are OFF, adjust DAT-SL potentiometer if necessary.	Oscilloscope displays rectangular pulse of 2-inch width.
25	Remove probe, insert it into ST test point, set S14 switch to position 16.	
26	Adjust sweep on oscilloscope.	Oscilloscope displays four pulses.
27	Operate S14 switch to position 32.	Oscilloscope displays two pulses.
28	Adjust oscilloscope sweep.	Oscilloscope displays four pulses.
29	Operate S14 switch to position 64.	Oscilloscope displays two pulses.
30	Remove oscilloscope SYNC input connection from SYNC test point, insert it in word generator DS test point.	

STEP	ACTION	VERIFICATION
31	Adjust oscilloscope sweep.	Oscilloscope displays four pulses.
32	Operate S14 switch to position 128.	Oscilloscope displays two pulses.
33	Operate S14 switch to position 256.	Oscilloscope displays one pulse.
34	Operate, release S15 switch.	Pulse width doubles while S15 switch is operated.
35	Set S14 switch to position 16.	

B. Dipulse Output

11	Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments, setting V INPUT SELECTOR to PANEL.	
12	Set S14 switch to position 16, S1 through S13, S15 switches to OFF position.	
13	Connect word generator SYNC test point to oscilloscope SYNC input using DFI-029-A01 cord.	
14	Set V MULT switch of oscilloscope to CAL, adjust CAL potentiometer to obtain reading on oscilloscope voltmeter of 0.1 volt peak to peak.	Oscilloscope indicates 0.1 volt peak to peak.
15	Adjust oscilloscope V GAIN control to obtain 1-inch peak-to-peak deflection.	Oscilloscope displays 1-inch peak-to-peak deflection.
16	Connect oscilloscope probe to V-INP-AC jack of oscilloscope (DFI-027-A01 cord).	
17	Insert oscilloscope probe into word generator ST test point, adjust sweep of oscilloscope.	One start pulse displayed on oscilloscope.
18	Remove oscilloscope probe.	
19	Patch W-GEN-1 ST or S jack of jack and connector circuit to one of MULT TST jacks (P3E cord).	
20	Insert a 262B plug into another MULT TST jack, patch third MULT TST jack to V2 jack (P3E cord).	

Note: Keep start data and timing IN jacks and connector circuit terminated in 600 ohms for remainder of test.

STEP	ACTION	VERIFICATION
21	Set oscilloscope V INPUT SELECTOR to BAL AC and V MULT switch to 10, adjust word generator LEVEL potentiometer.	Start dipulse displayed on oscilloscope with 1/2-inch peak-to-peak deflection.
22	Remove cord from W-GEN-1 ST or S jack, connect to W-GEN-1 DAT or D jack.	No dipulses displayed on oscilloscope.
23	Operate in succession S1, S3, S5, S7, S9, S11, S13 switches to ON position.	One dipulse displayed corresponding to each operated switch.
24b	If verification of Step 23 is not met — Adjust DAT-SL potentiometer until one dipulse appears, corresponding to each operated switch.	
25	After verification of Step 23, restore all data switches to OFF position.	No dipulses displayed.
26	Operate in succession S2, S4, S6, S8, S10, S12 switches to ON position.	One dipulse displayed corresponding to each operated switch.
27c	If verification of Step 26 is not met — Adjust DAT-SL potentiometer until one dipulse appears, corresponding to each operated switch.	
28	Operate all data switches to OFF position.	
29	Operate S1 through S13 switches to ON position.	One dipulse displayed corresponding to each operated switch.
30d	If verification of Step 29 is not met — Adjust DAT-SL potentiometer until one dipulse appears, corresponding to each operated switch, then repeat Steps 23 through 29.	
31	After verification of Step 29, remove cord from W-GEN-1 DAT or D jack and insert it into W-GEN-1 ST or S jack.	Start dipulse of 1/2-inch peak-to-peak amplitude displayed on oscilloscope.
32	Operate S1 through S13 switches to ON position.	No change in oscilloscope pattern.
33	Operate S1, S3, S4, S5, S9, S10, S11, S13 switches to OFF position.	
34	Remove cord from W-GEN-1 ST or S jack, insert it into W-GEN-1 T jack, adjust word generator RATIO potentiometer.	Sine wave of 1/2-inch peak-to-peak amplitude displayed on oscilloscope.
35	Remove cord from W-GEN-1 T jack, insert it into W-GEN-1 DAT or D jack.	Data dipulses displayed on oscilloscope.

STEP	ACTION	VERIFICATION
36	Adjust word generator TMG potentiometer.	Overshoot at ends of dipulses is minimized.
37	Remove cord connecting V2 jack, MULT TST jack.	
38	Patch VTVM to MULT TST jack, adjust LEVEL potentiometer (P2CL cord).	VTVM indicates -12 db.
39e	If requirement of Step 38 is not met — Adjust LEVEL potentiometer to obtain reading of -12 db.	
40	Remove all cord connections.	

C. Synchronization

11	Arrange another word generator as word gen. 2, block diagram, Fig. 101, SD-1G008, Issue 3, or higher, jack and connector circuit.	
12	At matching and error circuit SD-1G006-01 — Set voltmeter switch to 60-volt scale.	
13	Connect positive lead of volt-ohm-milliammeter to F+ test point.	
14	Connect negative lead of volt-ohm-milliammeter to -48V test point.	
15	Adjust FIL potentiometer for reading of 40 volts.	Meter reads 40 volts.
16	Disconnect volt-ohm-milliammeter leads.	
17	Using DFI-027-A01 cord, connect oscilloscope probe to DP test point.	Oscilloscope displays positive pulse.
18	Adjust DP potentiometer for proper pulse amplitude.	Oscilloscope displays 35- to 40-volt peak-to-peak positive pulse.
19	Remove probe, insert it into WG test point.	Oscilloscope displays positive pulse.
20	Adjust WG potentiometer for proper amplitude.	Oscilloscope displays 38- to 40-volt peak-to-peak positive pulse.
21	Remove probe, insert it into TMG test point.	
22	At word gen. 1 — Operate SW2 switch to ON.	
23	At matching and error circuit — Insure WG switch is OFF.	

STEP	ACTION	VERIFICATION
24	Adjust TMG potentiometer to center spike.	Oscilloscope displays spike portion of waveform centered between two notches on pedestal.
25b	If a phase reversal is displayed — Operate PHASE switch to opposite position.	
26	Adjust PHASE potentiometer for proper spike amplitude.	Oscilloscope displays positive portion of spike with 25 ± 5 volt peak-to-peak amplitude.
27	Insert 262B plug into one of the MULT TST jacks on jack and connector circuit.	
28	Patch from W-GEN-1 T jack to a second of the MULT TST jacks on jack and connector circuits (P3E cord).	
29	Patch VTVM to third MULT TST jack (P2CL cord).	VTVM indicates 0 db.
30c	If requirement of Step 29 is not met — Adjust word gen. 1 LEVEL potentiometer to obtain 0 db reading.	
31	Operate switches S2, S6, S7, S8 of both word generators to ON position, all other S- switches to OFF position.	
32	Remove 310 plug from MULT TST jack, insert in M CKT T jack on jack and connector circuit (P3E cord).	
33	Patch W-GEN-1 DAT or D, ST or S jacks to M CKT DAT or D, ST or S jacks, respectively (two P3E cords).	
34	Operate S3 switch of word gen. 1 to ON position.	Matching circuit counter counts steadily.
35	Operate S3 switch of word gen. 2 to ON position.	Matching circuit counter ceases to count.
36	Remove 310 plug from M CKT T jack, insert into MULT TST jack (P3E cord).	VTVM indicates -12 db.
37d	If requirement of Step 36 is not met — Adjust LEVEL potentiometer of word generator for -12 db.	
38	Remove all patching cords and plugs.	