# 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 $S 1$ 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 400 C vacuum tube voltmeter (VTVM), or equivalent.
2.02 Oscilloscope, KS-16305, L1 equipped with Waterman Company A-10-C combination 7 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

ALL TESTS
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 .

ACTION
Connect black volt-ohm-milliammeter cord to volt-ohm-milliammeter ( - ) terminal, red cord to $(+)$ terminal.

Insert black phone tip of volt-ohm-milliammeter cord into W GEN GRD test point.

Insert red phone tip of volt-ohm-milliammeter cord into W GEN +130 V test point.

Disconnect volt-ohm-milliammeter cords.
Insert red phone tip of volt-ohm-milliammeter cord into W GEN F + test point.

Insert black phone tip of volt-ohm-milliammeter cord into W GEN - 48V test point.
Note: Adjust FIL potentiometer, if necessary.
Disconnect volt-ohm-milliammeter cords.

## VERIFICATION

Volt-ohm-milliammeter reads between 125 and 135 on the 300 -volt scale.

Volt-ohm-milliammeter reads 40 volts.

Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments, setting V INPUT SELECTOR to PANEL.

Using A-14-K cord, connect oscilloscope SYNC input to W GEN SYNC test point.

Set oscilloscope H SEL to LIN SWEEP and SYNC SEL to REP INT.

Adjust oscilloscope SYNC control.
Set V MULT switch of oscilloscope to CAL. Adjust CAL potentiometer.

Adjust oscilloscope V GAIN knob to obtain 1 -inch peak-to-peak deflection.

Set V MULT switch of oscilloscope to 10 , V INPUT SELECTOR to PANEL.

Set oscilloscope probe on A-10-C cord to 10:1. Connect cord to V INP AC jack.

Insert probe into W GEN BCA1 test point.
Set S1 switch on W GEN to position 16.
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.

## Line appears on oscilloscope.

Oscilloscope voltmeter reads 0.2 volt.

Oscilloscope shows 1-inch peak-to-peak deflection.

Oscilloscope shows square wave.
From six to ten square wave pulses appear on oscilloscope.

Adjust SYNC control to center range.

## ACTION

Turn SYNC control from center range toward the negative side until picture appears. Adjust the H gain.

Remove probe from BCA1 test point and insert it into W GEN ST test point. Adjust H POS if necessary.

Remove probe from ST test point and insert it into DAT test point.

Operate S 2 switch to down position, assure that S3 through S12 switches are in up position. Adjust H POS if necessary.

Remove probe from DAT test point and insert it into ST test point.

Adjust oscilloscope sweep.
Operate S1 switch to position 32.
Adjust oscilloscope sweep.
Operate S1 switch to position 64.
Adjust oscilloscope sweep.
Operate S1 switch to position 128.
Operate S1 switch to position 256.
Set S1 switch to position 16.

Prepare KS-16305 oscilloscope per Section 100-658-100, Preliminary Installation and Adjustments, setting V INPUT SELECTOR to PANEL.

On W GEN -
Set switch S1 to position 16, switches S2 through S12 to up position.

Using A-14-K cord, connect W GEN SYNC test point to oscilloscope SYNC input.

Set V MULT switch of oscilloscope to CAL. Adjust CAL potentiometer to obtain reading on oscilloscope voltmeter of 0.1 volt peak to peak.

Adjust oscilloscope V GAINT knot to obtain

## VERIFICATION

Picture on oscilloscope disappears.
Square wave appears, one complete pulse (both positive and negative halves) occupies one inch (two major horizontal divisions) on the oscilloscope.

Oscilloscope shows $1 / 2$ inch wide rectangular pulse.

Oscilloscope shows $1 / 2$ inch wide rectangular pulse.

Four pulses appear on oscilloscope.
Two pulses appear on oscilloscope.
Four pulses appear on oscilloscope.
Two pulses appear on oscilloscope.
Four pulses appear on oscilloscope.
Two pulses appear on oscilloscope.
One pulse appears on oscilloscope.

## B. Dipulse Output

 1-inch peak-to-peak deflection.
## ACTION

Set V MULT switch of oscilloscope to 10 . Connect A-10-C probe, set at 10:1, to V INP AC jack of oscilloscope.

17 Remove oscilloscope probe.
$\rightarrow 18$ Patch W GEN S jack of jack and connector circuit to one of MULT TST jacks.

Insert a No. 262B plug into another of MULT TST jacks, patch third MULT TST jack to V2 jack.
Set oscilloscope V INPUT SELECTOR to BAL AC, V MULT switch to 10. Adjust W GEN LEVEL potentiometer.
Insert oscilloscope probe into ST test point. Adjust oscilloscope sweep.

Patch VTVM to MULT TST jack. Adjust LEVEL potentiometer.

Remove all cord connections.

## VERIFICATION

One start pulse appears on oscilloscope.

Start dipulse appears on oscilloscope with $1 / 2$-inch peak-to-peak deflection.

No dipulses appear on oscilloscope.

One dipulse appears, corresponding to each operated switch.

All dipulses disappear.

One dipulse appears, corresponding to each operated switch.

All dipulses disappear.

One dipulse appears, corresponding to each operated switch.

Start dipulse of $1 / 2$-inch peak-to-peak amplitude appears on oscilloscope.

No change in oscilloscope pattern occurs.

Sine wave of $1 / 2$-inch peak-to-peak amplitude appears on oscilloscope.

Voltmeter reads -12 dbm .

ACTION
VERIFICATION

## C. Synchronization

Arrange W GEN No. 1 per Fig. 101 block diagram, SD-1G008-01, Issue 3 or higher, on jack and connector circuit.

Arrange W GEN No. 2 per Fig. 101 block diagram, SD-1G008-01, Issue 3 or higher, on jack and connector circuit.

Prepare matching and error circuit in accordance with Section 314-506-501.

Insert No. 262B plug into one of MULT TST jacks on jack and connector circuit.

Patch from W GEN 1 T jack to second MULT TST jack on jack and connector circuit using No. 3P7E cord.

With P2CL cord -
Patch VTVM to third MULT TST jack. Adjust W GEN 1 LEVEL potentiometer to obtain 0 dbm reading.

Operate switches S2, S6, S7, S8 of both word generators down, all other S - switches up.

Remove No. 3P7E cord from MULT TST jack, insert it into M CKT T jack on jack and connector circuit.

Using two No. 3P7E cords, patch W GEN 1 D and $S$ jacks to $M$ CKT D and $S$ jacks, respectively.

Operate S3 switch of W GEN 1 down.
Operate S3 switch of W GEN 2 down.
Remove patch cord from M CKT T jack, insert it into MULT TST jack.

Adjust LEVEL potentiometer of W GEN 1 for -12 dbm .

Remove all patch cords and plugs.

Voltmeter reads 0 dbm .

Matching circuit counter counts steadily.
Matching circuit counter ceases to count.

