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A1 DIGITAL DATA TRANSMISSION SYSTEM
USING 4-PHASE DATA SETS
TROUBLE TESTING AND LOCATION

1. GENERAL

1.001 This addendum supplements Section 314-500-505, Issue 3.

1.002 This addendum is issued to include a locally constructed control tone filter (Fig. 2.1) in the trouble testing and location procedures.

2. IN-SERVICE TESTING

The following changes apply to Part 2 of the section:

(a) 2.01 — Revised

(b) 2.02 (Steps 1 and 2) — Revised

(c) Fig. 2.1 — Added

(d) 2.05 (Combined with 2.06) — Revised

(e) 2.06 — Deleted

(f) 2.06 (New) — Revised

Attached:

Page 3 dated January 1971 — Revised
Page 4 dated January 1971 — Revised
Page 7.1 dated January 1971 — Added
Page 9 dated January 1971 — Revised
Page 10 dated January 1971 — Revised

bay and lamp indications at the customer data equipment and at a DRP, when provided. At the test and patch bay, the lamps that indicate the condition of the transfer and control circuit switching are labeled STA, STB, SWA, and SWB. The alarm and guard lamps associated with each DDR are labeled ALM and GUARD. At the customer data equipment, the status of each DDR is indicated separately. Data equipment A associated with DDR A has lamps designated STA, STB, SWA, and SWB. Data equipment B associated with DDR B also has lamps marked STA, STB, SWA, and SWB. Table A summarizes the lamp indications for various combinations of trouble conditions and the positions of the manual transfer key under normal conditions. Each time the STA or STB lamp at DDR A or DDR B is lighted, the alarm lamp associated with that location is lighted, and the office audible and visual alarm is activated. If the alarm cutoff (ACO) key is operated, the alarm light is extinguished, the guard lamp is lighted, and the office audible and visual alarm is deactivated.

1.10 Status information equivalent to that contained in Table A, but applicable to the one-shot configuration, is listed in Table B. In this configuration, manual switching may be required when, upon receiving an alarm over one path (path A), an attempt is made to switch automatically to an alternate path (path B) and the attempt fails because the path is busy. In the one-shot configuration, the dipulse outputs are muted for a period of 5 to 30 seconds when an alarm is received. Only one DDR is used. When the DDR goes into the muting condition after an alarm is received and the manual switch at the customer's location is in the normal (AUTO) position, the transfer and control device switches the alternate route into the DDR. If the alternate route is busy and fails, the transfer and control device will not switch back to the original path automatically but must be forced back manually.

2. IN-SERVICE TESTING

A. General

2.01 On receiving a trouble report on a data circuit, it is necessary to determine that the signal fed into the DDT at the data terminal from the customer equipment is error free and is of the proper level and polarity. The in-service check described below can be used to check DDT input levels. However, since the data signal on an operating system provides words having random codes, careful interpretation of the waveforms that appear on the oscilloscope is required. For operating and test levels at locations with and without a DRP, refer to Fig. 1 and 2, ◗respectively. In conjunction with SAGE data signals, a 390- and 460-Hz control tone is superimposed on the data information, making the oscilloscope display difficult to interpret. A control tone filter should be constructed locally in accordance with Section 314-500-100, Issue 2, and Fig. 2.1, and used for in-service testing.◖

TABLE A

LAMP INDICATIONS AT TEST AND PATCH PANEL AND CUSTOMER LOCATION — ONE-SHOT CONFIGURATION

TROUBLE LOCATION	POSITION OF MANUAL SWITCH	DATA EQPT AT CUSTOMER LOCATION				DATA TEST AND PATCH BAY						AFFECTED BY MUTING
		STA	STB	SWA	SWB	STA	STB	SWA	SWB	A L	B AL	
None (normally on Path A)	Normal	O	NC	L	O	O	O	L	O	O	O	No
Route A fails (route A being used)	Normal	L*	NC	O	L	O	L*	O	L	L†	L*	Yes
Route B fails (route A being used)	Normal	O	NC	L	O	O	O	L	O	O	O	No
‡ Route B fails (route B being used)	Normal	L	NC	O	L	O	L	O	L	O	L	Yes

TABLE B (Cont)

TROUBLE LOCATION	POSITION OF MANUAL SWITCH	DATA EQPT AT CUSTOMER LOCATION STA	STB	SWA	SWB	DATA TEST AND PATCH BAY STA	STB	SWA	SWB	A L	B AL	AFFECTED BY MUTING
None	Position A	O	NC	L	O	O	O	L	O	O	O	No
Route A fails	Position A	L*	NC	L	O	L*	O	L	O	L	O	Yes
None	Position B	O	NC	O	L	O	O	O	L	O	O	No
Route A fails	Position B	O	NC	O	L	O	O	O	L	O	O	No
Route B fails	Position B	L*	NC	O	L	O	L*	O	L	O	L*	Yes

L — Lamp lighted O — Lamp out NC — Lamp not connected

* The lamp is extinguished if the trouble is cleared. The AL lamps are extinguished by operation of the ACO key.

† The lamp is extinguished upon transfer from Route B.

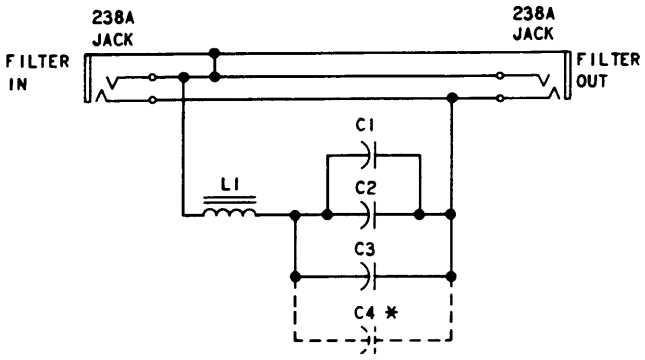
‡ Previously transferred from Route A to Route B.

B. Specific Tests

Input Level and Polarity Test

2.02 Input level and polarity can be checked on an in-service basis by the following procedure.

STEP	PROCEDURE
1	◗Patch an oscilloscope, calibrated for voltage measurement, into the "460-Hz Filter" OUT jack, located on the rear of the ED-1G008-90-G3 data testboard.
2	Patch the "460-Hz Filter" IN jack to the MON DATA jacks S, D, and T. *Note:* If the data testboard is not equipped with the control tone filter, patch the oscilloscope to the MON DATA jacks S, D, and T.◖ *Requirement:* Peak-to-peak voltage of start, timing, and data pulses should be 1.4 ±0.1 volts for the dual and nondual transmitting terminals located in the same security area as the data source. Peak-to-peak voltage when located in a security area different from the data source should be 0.7 ±0.05 volts.
3	Monitor the start pulse input and adjust the horizontal sweep control on the oscilloscope to show two start pulses on the screen. Synchronize the horizontal sweep on the start pulses. Observe the position of the positive half of the second start pulse on the screen.
4	Monitor the timing signal and check that a positive swing of the timing wave is at the same position on the screen as the start pulse.
5	Monitor the data signal and check that a positive swing of the marking dipulse is at the same position on the screen as the start pulse. *Requirement:* The start dipulses, marking dipulses, and timing signal should all be of the same polarity. If the check does not indicate identical polarity, look for a T and R turnover on the conductors. *Note:* If available, the use of a dual-trace oscilloscope, an electronic switch, or a comparator circuit will simplify the above polarity check.



*
ADD C4 WHEN FILTER IS USED AT ACTIVE NORAD CONTROL CENTERS TO CHANGE RESONANT FREQUENCY TO 390 HZ.

L1-1558C INDUCTOR

C1-KS-16456-L1 0.0598 UF

C2,C3,C4- 535N 0.212 UF

Fig. 2.1 — Control Tone Filter

Parity Check

2.03 A parity check can be made on an in-service basis by the following procedure. ***HOWEVER, THIS CHECK SHOULD NOT BE CONDUCTED ON GAP-FILLER CIRCUITS.***

STEP	PROCEDURE
1	Adjust the switch on parity check circuit for ODD or EVEN, depending on the type of parity being checked.
2	Patch parity check circuit MON S and D jacks to MON DATA S and D jacks, respectively.
3	Observe for indications of parity errors. ***Requirement:*** No errors. ***Note:*** If it is desired to check parity of the DDT, refer to 5.04.

DDT Output and DDR Input

2.04 Once it has been determined that the data signals received from the customer are correct, the line signal levels at the output of the DDT and the input of the DDR should be checked. The random nature of the data signal may make the oscilloscope patterns difficult to interpret.

2.05 ◗ The DDT output and DDR input line level may be checked on an in-service basis by the following procedure. ◖

STEP	PROCEDURE
1	◗ Patch an oscilloscope, calibrated for voltage measurement, to the "460-Hz Filter" OUT jack, located on the rear of the ED-1G008-90-G3 data testboard.
2	Patch the "460-Hz Filter" IN jack to the associated MON line jack. ◖ ***DDT Requirement:*** The output should be −2 ±2.0 dBm. ***DDR Requirement:*** On 8-dB point-to-point circuits with or without a DRP, the measured level should not differ from the computed level by more than ±4 dB and, except for circuits with long terminal loop facilities, in most cases should be within ±2 dB. For an 8-dB circuit and an operating signal 10 dB below the circuit 0 TLP, the result is a nominal level of −18 dBm at the input of the DDR. ***Requirement:*** On 4-wire subscriber lines of the AUTOVON switched network, the permissible loss deviation is ±1.5 dB for circuit lengths of less than 500 miles and ±2.0 dB for circuit lengths of over 500 miles. As in the case of point-to-point circuits, the received signal level at the DDR is a nominal −18 dBm. ◗ ***Note:*** The required input level to the DDR depends on the loss of facilities and equipment (including pads) between this point and the distant DDT. These losses should appear on the circuit layout card. ◖

DDR Output Level and Parity Check

2.06 DDR output and parity can be checked on an in-service basis by the following procedure.

STEP	PROCEDURE
1	◗ Patch an oscilloscope, calibrated for voltage measurement, into the "460-Hz Filter" OUT jack, located on the rear of the ED-1G008-90-G3 data testboard.
2	Patch the "460-Hz Filter" IN jack to the MON SW IN jacks S, D, and T associated with transfer and control circuit. *Requirement:* Peak-to-peak voltage of start, data, and timing pulses should be 2.2 volts ±20 percent measured with the circuit terminated in 600 ohms.
3	Patch from the PAR MON S jack (parity check circuit) to the MON SW IN S jack and from the PAR MON D jack (parity check circuit) to the MON SW IN D jack. *Requirement:* The parity check indicates the number of words in error. If errors are indicated, it is necessary to investigate further as to the source. (Proceed with matching and error counting and other out-of-service tests in accordance with Part 3.) ◖

Peak-to- Peak Voltages

2.07 Table C lists the peak-to-peak voltages that correspond to various power levels of a sinusoidal waveform.

3. OUT-OF-SERVICE TESTING

A. General

3.01 When the circuit has been turned down and this fact reported to the customer MCC or MCS, more elaborate tests may be made to isolate and clear the trouble condition. The order in which various tests should be made depends to some extent on the following:

(a) The nature of the trouble report (no data received, excessive errors, no start pulses, etc)

(b) A knowledge of other trouble reports on voice or data circuits on the same outside plant route.