

915 WIDEBAND DATA TEST BAY
TEST PROCEDURES FOR 303-TYPE DATA STATION
RESTORED POLAR LINE SIGNAL OPERATION

1. GENERAL

1.01 This section is one of a series of Bell System Practices which give specific remote tests to be performed from the 915 Wideband Data Test Bay (WDTB).

1.02 This section is reissued to add information on 2-wire switched service and to revise the format. Due to extensive revision, change arrows have been omitted.

1.03 Operating and self-test procedures for the 915 WDTB are described in Section 314-602-100. The 314-602-5ZZ sections are designed for specific data set station arrangements.

1.04 These tests should be performed after a wideband data station (WDS) installation and may also be used in clearing trouble conditions. The tests are arranged to form a diagnostic approach when isolating trouble.

1.05 The tests in this section apply to both 4-wire point-to-point private line and 2-wire switched network equipped with Data Auxiliary Set (DAS) 804-type.

1.06 An effort should be made to remember the mode of operation, ie, normal, RT1, or RT2. A wideband indication is not provided to identify the remote test mode. If the remote test mode is not known, it can be determined by the following procedure provided that the T1 carrier facility is not being used to connect the 915 and Data Set (DS) 303.

Note: The handset of DAS 804 must remain on-hook during the remote tests.

- (a) Make preparations necessary to observe the eye pattern. Refer to Section 314-602-100.

- (b) Rotate the 0-10 dB attenuator rapidly from 6 to 10 dB.

- (c) If the amplitude of the eye pattern decreases and then returns to its original amplitude, the system is in the RT1 mode.

- (d) If the amplitude of the eye pattern stays the same and/or the eye pattern momentarily disappears, the system is in the RT2 mode.

- (e) Reset attenuator to 6 dB.

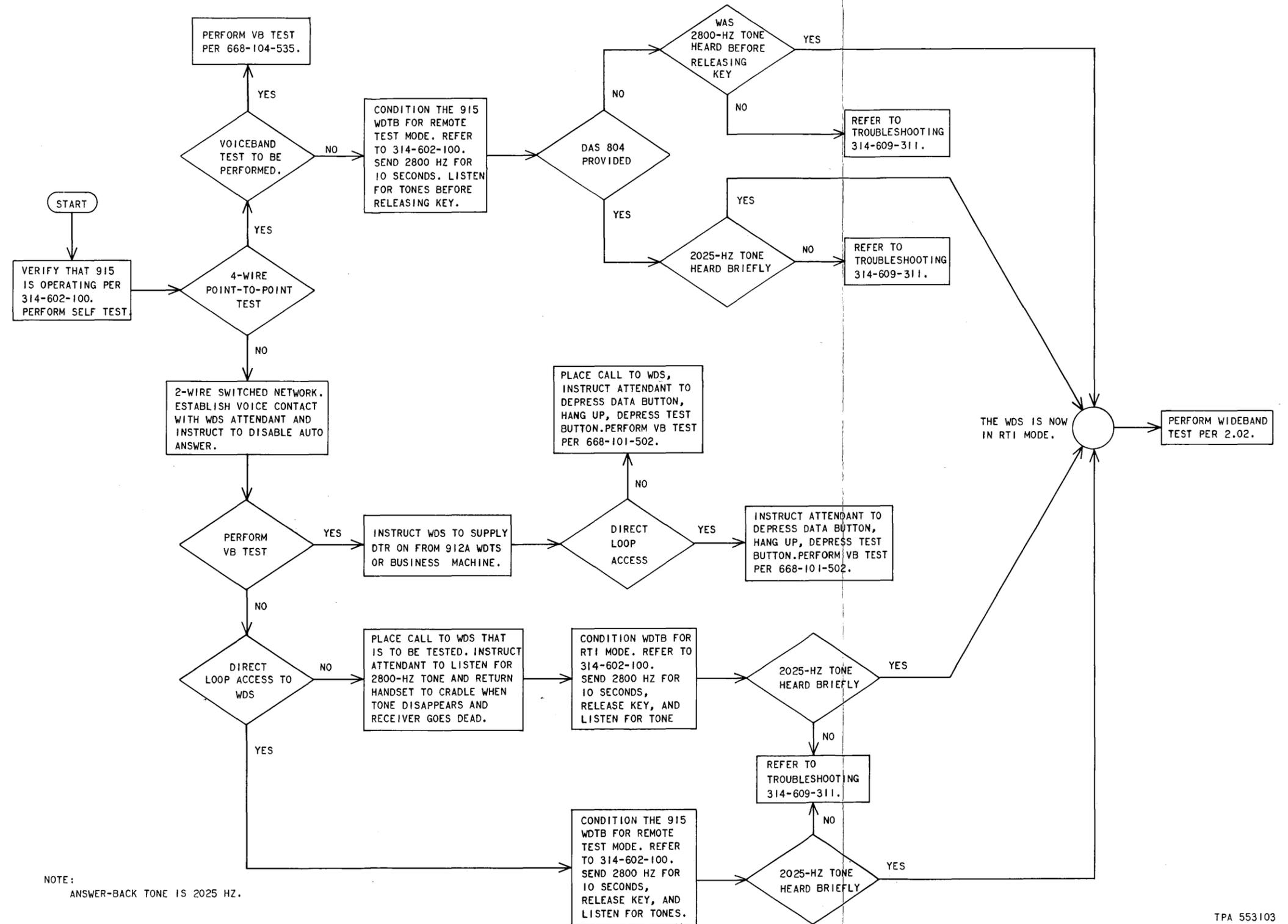
1.07 If T1 carrier is used, the mode of operation may be determined by an attendant at the data station observing the lamps on Data Auxiliary Set 806B-type. If the RT1 lamp is lighted, the system is in the RT1 mode. If both the LT and RT1 lamps are lighted, the system is in the RT2 mode. Both lamps extinguished indicate a normal mode.

2. PROCEDURE

2.01 Voiceband Test Access and RT1 Mode:

The purpose of this procedure is to determine if the reported trouble is being caused by the wideband or voiceband transmission facilities or the data station. To test the voiceband facilities, refer to Section 668-101-502 for 2-wire switch network and Section 668-104-535 for 4-wire, point-to-point private line.

2.02 The wideband tests performed in the RT1 mode will determine if the reported trouble is being caused by the transmission facilities. Refer to Fig. 1 when establishing RT1 mode. After the wideband tests have been satisfactorily completed in RT1, proceed to RT2 mode.



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Fig. 1—Establishing Voiceband Test Access and RTI Mode

Wideband Test

STEP	PROCEDURE
1	Make the necessary preparations to observe the eye pattern, check errors, and make margin test. Refer to 314-602-100 for procedure.
2	<p>Error Count: Make error runs indicated in Table A.</p> <p>Note: These test requirements should not be confused with overall or end-to-end requirements which should provide not more than one error in a million bits. If the number of registered errors is so small that the confidence factor is low, several error tests should be run to increase the confidence factor. If the error count averages greater than that specified in Table A, refer to Section 314-609-311 for procedure for troubleshooting the facilities. If testing in RT2 mode and error count averages are greater than that specified in Table A, observe the eye pattern and refer to Table B for circuit analysis as an aid in clearing trouble.</p>

TABLE A
ERROR RATE/WORD

SPEED	WIDEBAND SUBSCRIBER LINE* OR STATION LINE†	WIDEBAND SUBSCRIBER LINE PLUS ONE NETWORK TRUNK	WIDEBAND SUBSCRIBER LINE PLUS TWO NETWORK TRUNKS* OR STATION LINE PLUS INTEREXCHANGE FACILITY†
18.75 } 19.2 }	5/10 Minutes	10/10 Minutes	15/10 Minutes
40.8	5/5 Minutes	10/5 Minutes	15/5 Minutes
50	6/5 Minutes	12/5 Minutes	18/5 Minutes
200	24/5 Minutes	48/5 Minutes	72/5 Minutes
230.4	28/5 Minutes	56/5 Minutes	84/5 Minutes

* Switched network installation

† Private line installation

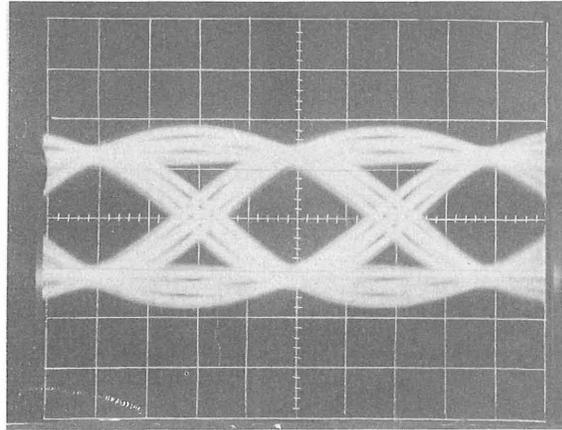
TABLE B
ANALYSIS

ERROR COUNT	EYE PATTERN	PROBABLE CAUSE
Complete Overflow	Acceptable	303 (CP AR133, 135, or 136)
Complete Overflow	Not In Sync	303 (Receiver Section — Especially Sync Recovery)
Complete Overflow	No Eye	10A Data Unit or CP AR135 or 136
High	Poor	303 or Facility
High	Acceptable	303 (Receiver Part or Outgoing Line)
Within Tolerance	Poor	303 (Transmitter or Return Line)
Within Tolerance	Acceptable	This is the desired condition.

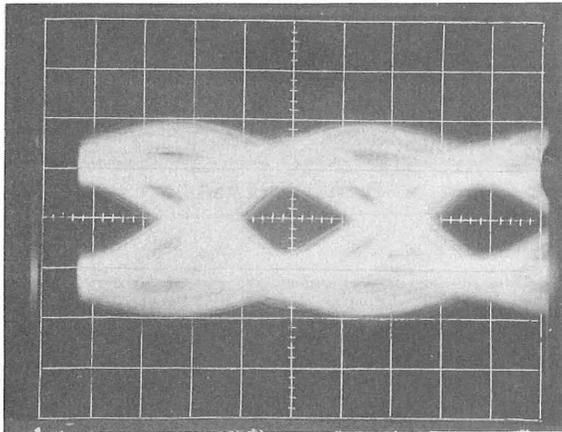
STEP	PROCEDURE
3	<p>Eye Pattern: Observe the eye pattern.</p> <p>Note 1: Figures 2 and 3 depict the differences between 50 percent and 100 percent roll-off filtering. However, the 50 percent roll-off filters have been Manufacture Discontinued but will remain in this practice for the existing sets in the field. Photograph A of either figure shows an ideal eye picture for a back-to-back connection for a repeatered loop without N carrier. Photograph B shows a limiting case caused by facilities consisting of L carrier trunks plus looped station lines or wideband subscriber lines. An eye picture over N carrier should be somewhere between A and B. The photographs other than A or B show cases where the data is unacceptable because of the presence of too many errors. The occasional error-causing trace may be inconspicuous in the eye picture, and the eye picture may appear to be better than an acceptable data eye pattern in these photographs.</p> <p>Note 2: The eye pattern method of circuit evaluation is not an absolute means of testing for circuit malfunction but rather is intended to be an additional aid in trouble detection and circuit analysis. Usually, transmission impairments, such as gain or delay impairments, cause regular closing of the eye. Noise or phase hits cause occasional wild traces through the eye proper. If the wideband facility utilizes a T1 carrier, this test checks only the T1 carrier from the T1 modem or bank to the DS 303 in the 915 WDTB.</p> <p> The data set in the 915 WDTB must be operating nonsynchronously for the Margin Test.</p>
4	<p>Margin Test: Shift sampling pulse by ± 10 percent, ± 20 percent, and ± 30 percent, and count errors per word. If the error rate increases by a factor of two at ± 10 percent, the system is at best marginal. If error rate requirements of Table A are met at ± 20 percent, the facility is good. If the error rate requirements of Table A are met at ± 30 percent, the facility is excellent. If error count is high, refer to Section 314-609-311 for troubleshooting procedures.</p>

2.03 RT2 Mode: The RT2 mode should be established only after satisfactory completion of wideband test in RT1 mode. Refer to Fig. 4 when establishing RT2 mode. The wideband test performed while the station is in the RT2 mode

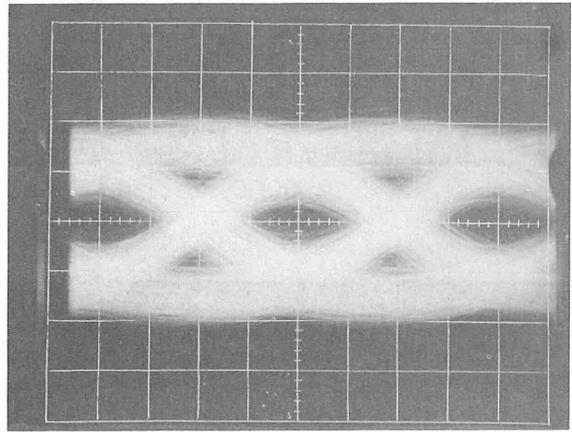
will determine if the reported trouble is being caused by the station. When the wideband tests have been completed satisfactorily, the facility and station can be considered satisfactory and should be returned to the normal mode.



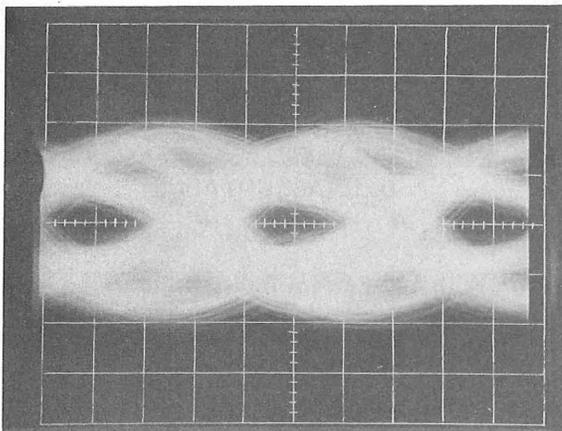
A. GOOD



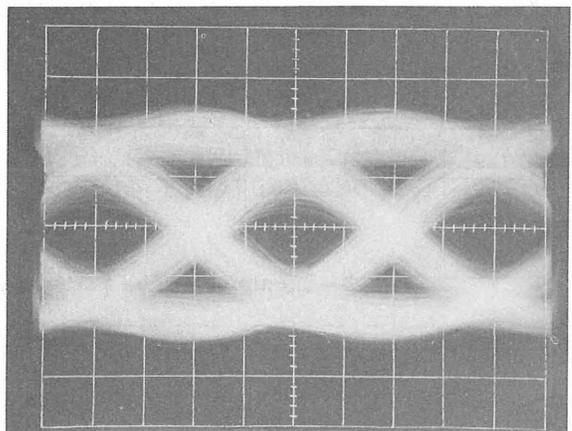
B. ACCEPTABLE



D. UNACCEPTABLE

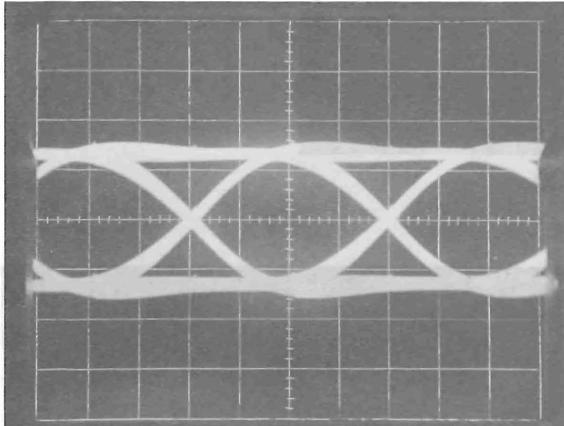


C. UNACCEPTABLE

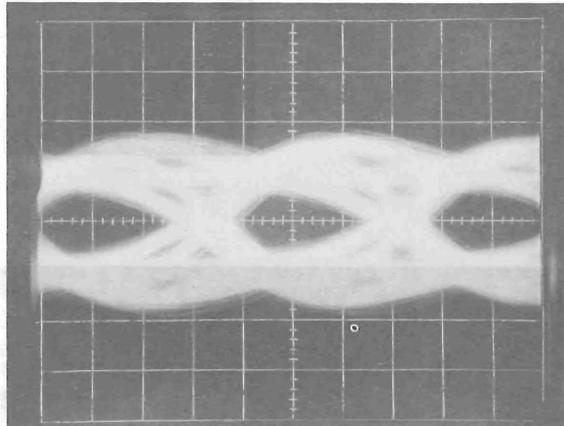


E. UNACCEPTABLE

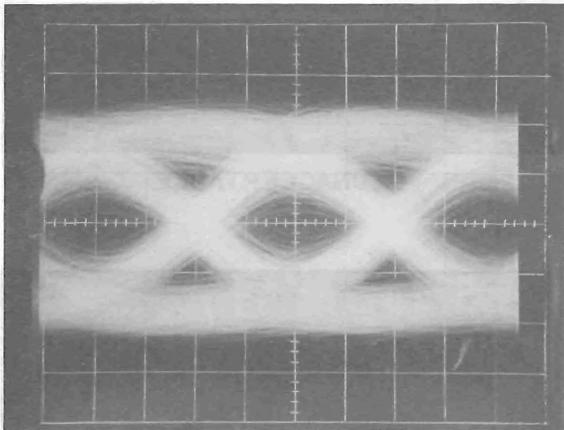
Fig. 2—Examples of Eye Patterns of System With 50-Percent Roll-Off Filters



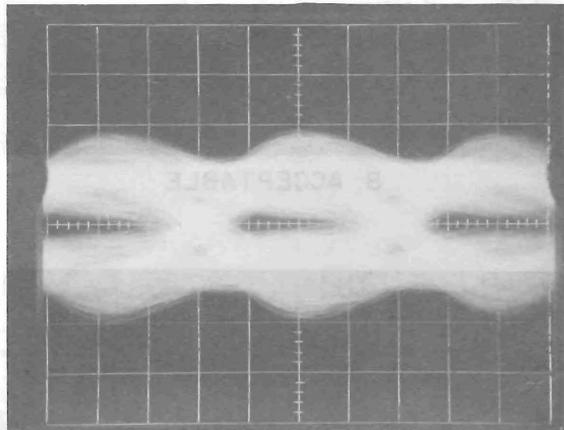
A. GOOD



B. ACCEPTABLE



C. UNACCEPTABLE



D. UNACCEPTABLE

Fig. 3—Examples of Eye Patterns of System With 100-Percent Roll-Off Filters

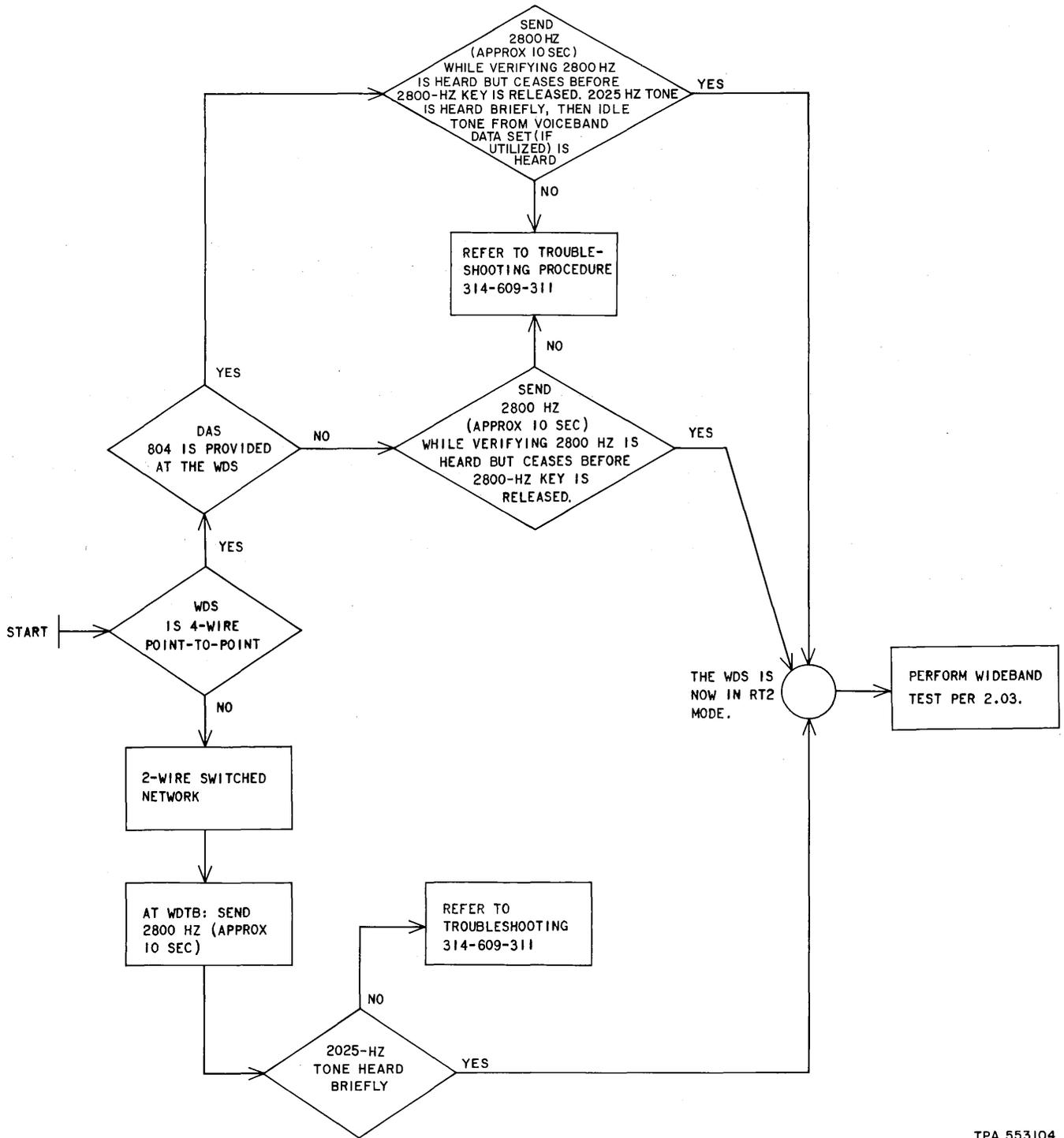


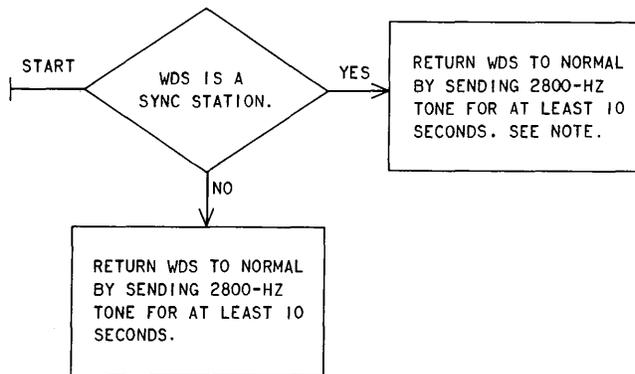
Fig. 4—Establishing RT2 Mode

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Wideband Test

STEP	PROCEDURE
1	<p>Perform Steps 1 through 4 in 2.02.</p>
2	<p><i>Note:</i> If the error count averages greater than specified in Table A, the error count data and eye pattern should be compared with information in Table B to determine if the condition is acceptable or, if not, the probable cause of trouble.</p> <p>Perform the AGC test for Data Set 303 as follows:</p> <p><i>Note:</i> If the wideband facility contains T1 carrier, this test will check only the carrier and not the AGC circuits of the data set.</p> <ul style="list-style-type: none">(a) On wideband repeatered loop <i>only</i>, set attenuator to 0 dB then 12 dB and observe no increase in error count for each setting.(b) On any loop including carrier facilities, set attenuator to 12 dB and observe no increase in error count.

2.04 Returning to Normal Mode: When wideband tests have been successfully completed in the RT1 and RT2 modes, the station should be returned to normal. When returning to the normal mode, refer to Fig. 5.



NOTE:

THE TRANSMIT CLOCK CARD IN SYNCHRONOUS DATA SETS HAS NOT BEEN CHECKED. THE CLOCK MUST BE CHECKED IN THE NORMAL MODE. IT IS NOT USED IN RT2.

- (A) IF SCRAMBLER AND EITHER OPTION T OR Q ARE PRESENT IN THE REMOTE DS 303, THE REMOTE 303 WILL SEND THE SCRAMBLER IDLE CODE WHEN THE CUSTOMER IS NOT SENDING DATA. WHEN THE SCRAMBLER IDLE CODE IS MEASURED (0 DBM ±6 DB) ON A 3400A VOLTMETER IN THE WIDEBAND SERVICE BAY, THE STATION IS IN RT2. IF NEITHER OPTION T NOR Q IS PRESENT, THE CUSTOMER MUST APPLY THE SEND REQUEST SIGNAL TO ENABLE THE SCRAMBLER OUTPUT. THE 912 WIDEBAND DATA TEST SET (WDTS) RECOVERS SYNC FROM THE SCRAMBLER IDLE CODE. THE FREQUENCY OF THE RECOVERED CLOCK SIGNAL IN THE 912 WDTS MUST BE WITHIN ±.01 PERCENT OF NORMAL. IF THE SIGNAL IS OUT OF TOLERANCE, THE TRANSMIT CLOCK IN THE REMOTE DS 303 IS BAD.
- (B) IF THE REMOTE DS 303 IS NOT EQUIPPED WITH A SCRAMBLER, THE CUSTOMER MUST SEND DATA TO CHECK THE CLOCK. THE 912 WDTS MONITORS THE CUSTOMER'S DATA RATHER THAN THE SCRAMBLER IDLE CODE. IF THE SIGNAL IS OUT OF TOLERANCE, THE TRANSMIT CLOCK IN THE REMOTE DS 303 IS BAD.

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Fig. 5—Returning to Normal Mode

3. REFERENCES

3.01 The CDs and SDs used are as follows:

CD- and SD-1D033-01—Data Set 301-Type

CD- and SD-1D097-01—Line, Test, and Auxiliary Circuits

CD- and SD-1D099-01—Data Set 303-Type, Application

CD- and SD-1D100-01—Data Set 303-Type

CD- and SD-73052-01—915 Wideband Data Test Bay.

3.02 Bell System Practices used are as follows:

SECTION	TITLE
314-602-100	Data System Central Office, 915A and 915B Wideband Data Test Bay
314-609-311	Groupband Data Systems Switched Network and 2-Point Private Line Trouble Location
591-019-100	Data Set 103F-Type, Transmitter-Receiver, Description and Operation
593-800-500	Wideband Data Station Using Data Set 303, Four-Wire, Point-to-Point Private Line (Commercial Service), Test Procedures
593-800-510	Wideband Data Station Using Data Set 303-Type, Two-Wire Switched Service, (DATA-PHONE® 50 Service), Test Procedures
594-024-100	Data Set 404B1, Identification
668-101-502	Data Test Center—904A and 904C-Types Test Procedure—Data Set 103F-Type Loop-Back Test
668-104-535	Data Test Center—904A and 904C-Types Test Procedures—Data Set 404B1 Loop-Back Test.