CONFORMANCE TESTING OF SUBSCRIBER CABLES
ADMINISTRATIVE PROCEDURES

CONTENTS PAGE

1. GENERAL

1.01 This section describes the administrative responsibilities and procedures that are required to establish and maintain an effective subscriber cable conformance testing program.

1.02 This section is being reissued to:

(a) Add information concerning the conformance testing of all new VF pairs behind remote terminals.

(b) Add the pretest option of cable complements involved with cable throws or rearrangements in areas of known high defective pair concentrations.

(c) Provide the procedures for the coordination between the Outside Plant Engineer (OPE) and the Maintenance Center Analyzer (MCA) in clearing defective pairs required for service orders.

(d) Change the closing approval Form (E6415) and management level of acceptance.

(e) Provide for the procedures for the clearing of defective pairs by construction or cable maintenance.

1.03 Successful implementation of these procedures demands a firm commitment at the Division Manager level. Construction, maintenance and engineering must accept their responsibilities and adhere to the procedures as outlined below.

1.04 After the splicing work on exchange feeder and/or distribution cable is completed, conformance tests (AC and DC) shall be made on:

- All new, extended, and/or rearranged loaded feeder and distribution cables, five pairs or more. Extensions less than 100 feet should not be tested.
- All new main frame terminated loaded and nonloaded cables, including support pairs for digital carrier.
- All feeder pairs to a new or existing interface (SAI, FDI, RAI, FX, etc.), including activation of alpha counts.

- All newly energized alpha counts, five pairs or more.
- All new derived pairs behind new or existing remote terminals.
- All existing nonloaded cables when 2000 feet or more are added or 25 pairs or more are rearranged.
- All replacements of defective sections (DC only).
- Pre-testing on all existing exchange feeder pairs converted to support pairs for digital carrier. (See Addendum 915-710-110SW, Issue A, March 1981.)

NOTE: Rearranged is defined as any work operation where existing cable pairs are involved in splicing activities. (Cable pair transfers, loading or unloading cable pairs, energizing pairs, etc.)

1.05 It is intended that these tests be performed by a permanently assigned tester for a district, division, or area. The testing force level will depend on the geographic size of the entity, the amount of loaded cable, and the amount of construction activity. All work should be tested in a timely manner. If periodic fluctuations in the testing work load result in more work being on hand than can be tested in the required time frame, the loaded cable pairs and nonloaded support pairs for digital carrier must be tested first. The nonloaded cable pairs can be released for customer service prior to testing, service conditions controlling.

2. RESPONSIBILITIES

2.01 Paragraphs 2.02 through 2.06 outline the responsibilities of the various work groups associated with conformance testing.

2.02 Outside Plant Engineering (OPE) should design the cable facilities in accordance with standard engineering practices and issue construction work orders, construction drawings, plan changes, and Form E6410, Complement Diagram (Figure 1) which is described in detail in Part 4. They also will review the design of the entire facility from the wire center to the farthest distribution point in the complement when making any additions or rearrangements, and incorporate into the current work order any corrections that are necessary to eliminate existing design deviations. Engineering has responsibility for identifying if conformance testing is required, issuing the proper work authorization, and determining whether pre-testing or post-testing is necessary. Pre-testing for cable throws in areas of high known defective pair concentrations will be an engineering option. The OPE makes the final determination as to whether a job should be closed out or further attempts made to clear defects. OPE will issue an Engineering Authorization Change (EAC) within five working days when test results for a work order indicate design or loading irregularities.

2.03 Before the end of each scheduling period, the scheduling OPE along with the conformance testing coordinator will be responsible for reviewing all work authorization completions and service commitments to keep the conformance testing current. At this time key dates may be adjusted to balance the conformance testing work load with available resources.

2.04 Cable facilities will be constructed in accordance with engineering plans, attempting to keep man-made troubles to a minimum. Construction forces will locate and, where possible, clear troubles that are due to construction activity in new plant. Existing defectives (not attributed to construction activity) required for rearrangements, activation of alpha counts and/or service order commitments will be cleared by maintenance to an acceptable level determined by the OPE. Work authorizations with conformance testing involved should not be closed until the proper approval is received on Form E6415 from the OPE. To assist in determining whether defects are in the new cable or existing portion of the cable facilities, the tester and Loop Assignment Center (LAC) will be provided with the results of all preliminary tests performed on respective complements, e.g., test of defective pairs listed on Form SW-6180 or its equivalent and/or construction completion tests E6254. (Note LAC to receive forms within five days.)

NOTE: Consideration should be given to closing overage work authorizations in lieu of testing on a one time basis to get current; however, this requires Division Manager level approval.

2.05 The Conformance testing coordinator reviews work orders, cable prints, and complement diagrams, assigns testing work to be done, receives and reviews test results, and acts as liaison between the tester, the OPE, and the construction forces. The coordinator takes necessary action to ensure the timely processing of test results and approved forms and issues reports as required.

2.06 The Loop Assignment Center forces will ensure that cable pairs identified as defective by conformance testing and/or construction forces are posted to all LAC records (manual and mechanized) and a copy of the test results forwarded to CAPER.

3. PROCEDURES

3.01 Paragraphs 3.02 through 3.17 describe step-by-step administrative procedures for conformance testing of subscriber cables. The flowchart in Figure 18 summarizes these steps.

3.02 The OPE should determine whether conformance testing is required for each routine order and/or estimate, using the criteria in paragraph 1.04. When testing is required, the engineer will:

(a) Prepare a Complement Diagram for each design complement to be conformance tested. (See Part 4.)

(b) Review the design of the facility from the wire center to the farthest distribution point in the complement, incorporating any design corrections on the new work order.

(c) For long loaded cables, more than six load coils, calculate the expected return loss, insertion loss, and resistance to the field test point and post these values on the complement diagram. (See paragraph 4.03.) The preferred method for obtaining these values is by using the Universal Cable Circuit Analysis Program (UNICCAP). When using UNICCAP, specify the type of termination to be used by the tester (115-type network or 4066 precision network) for making return loss measurements. The type of return loss measuring set (54C or KS-20501) also must be specified. The calculated value will vary with the type hardware used.

(d) For nonloaded or short loaded cables, six or less load coils, calculate the total length and cable resistance and post these values on the Complement Diagram.

(e) Indicate on the construction work print "Conformance testing required," identifying the cable and count the number of pairs. Issue the work print with the Complement Diagrams in the normal manner, indicating that copies are to be sent to the coordinator in addition to the copies normally sent to construction and assignment forces.

3.03 Upon issuance of the work authorization, the OPE will provide the proper complement diagram to the Maintenance Center Analyzer (MCA). The scheduling OPE will coordinate the clearing of defective pairs for the completion of work authorization or service requirements by cooperating with the MCA to correlate with TRIM and other routine projects. Defective pairs should be cleared in no more than 30 days. The scheduling OPE, along with the conformance testing coordinator, should adjust the date monthly in order to balance the conformance testing work load.

3.04 The Conformance testing coordinator will record the order number and date of receipt of the Complement Diagram on Form E6411, or mechanized equivalent, Log Sheet (Figure 2). He/she should review the Complement Diagram in order to make preliminary plans for testing. If, in the course of reviewing the Complement Diagram, design problems are discovered, the coordinator should query the engineer. The coordinator will provide the tester with a copy of the construction work print and Complement Diagram at the time testing is to be performed.

3.05 Construction, upon receipt of the work print, will complete the work as designed and scheduled.

3.06 The Loop Assignment Center on receipt of the construction work print, will perform the normal assignment functions associated with the order and take additional steps to ensure that:

(a) The coordinator is notified when service orders are being delayed pending completion of the test.

(b) Where appropriate, a release is obtained from the OPE to assign in properly tested complements when the final approval is being delayed because of defects in other complements.

3.07 The Construction Management Center (CMC) will notify the coordinator when the splicing work has been completed and the job is ready for testing, using Form E6412, Test Notification and Status Report (Figure 3).

3.08 The coordinator will dispatch the required number of testers to accomplish the tests as specified in Section 330-300-527. Testing must be carried out as soon as possible, with initial testing being completed within ten working days of notification a job is ready for testing. Upon completion of the initial test, a retest (if required) or closing approval must be received within 30 days. (This allows adequate time for corrective action or approval, if required.)

3.09 The testers will prepare Form E6414, Test Report and will forward this form to the coordinator. The DC trouble codes will be limited to:

(a) SHT (show footage to fault)

(b) GND (show footage to fault)

(c) OPN (show footage to fault)

(d) CRS and what pair it is crossed with, if the information is available.

(e) NSY

(f) TMS-Transmission (missing load, bridge tap between loads, load spacing, etc.). (Indicate what load is missing, bridge tap between what load, etc.)

3.10 The coordinator will note the receipt of the Test Notes (E6413) and Test Report (E6414) on the Log Sheet (E6411) or mechanized equivalent, review the test results, and make appropriate notations concerning defects. A copy of the Test Report (E6414) attached to the Test Notification and Status Report (E6412) will be forwarded to the OPE and the LAC by the coordinator, indicating that it is either an initial test, retest, or final test. The coordinator then files copies of the Test Notes and Test Results with the Complement Diagram pending further action. In cases where there are no defects, the report will have the same distribution but will be noted as a final test.

3.11 The OPE, on receipt of the Test Report (E6414) with the attached Test Notification and Status Report (E6412) from the coordinator, will review the defects listed to determine the cause of the defects. (If existing design deviations or record errors are causing defects, the engineer should correct this on the existing work order before the job is closed.) If the engineer concludes that the defects are due to construction activity connected with a current work authorization, the Test Report (E6414) attached to Form 6412 (Test Notification and Status Report), identifying the defective pairs to be corrected, will be forwarded to the Construction Management Center. If there are no defects on the current work order, the OPE will approve the closing of the work order and follow the procedures in paragraph 3.17.

3.12 Existing defective pairs needed to work the routine order should be sent to the MCA and correlated with TRIM and other routine projects. Upon completion of clearing the defective pairs, a retest will be made and data supplied back to engineering and a copy will also be sent to LAC for posting their records. Normal turnaround should be no more than 30 days. Existing defects not needed to work the routine order should be left alone. Time and effort to test/clear these pairs should not be expended until they are needed. The LAC will post all DC defects listed on the initial and/or final copy of the Test Report (E6414) to all LAC records and a copy forwarded to CAPER for updating of the LMOS data base.

3.13 Construction forces will correct all construction defects which are determined to have been caused by work performed on the current order. Construction, upon receipt of the Engineering Authorization Change (EAC) from the engineer, will perform the work necessary to correct design defects determined in the testing process.

3.14 The CMC will notify the coordinator, using the Test Notification and Status Report (E6412), when corrective work has been completed. This work should be done as soon as possible to allow the final testing to be completed and approved 30 days after the initial testing. The form will list the pairs that have been corrected but not necessarily the work that was done to clear the defects.

3.15 Testers will retest the pairs, update the Test Report (E6414), and resubmit to the coordinator, Form E6412, Test Notification and Status Report, as corrected.

3.16 The coordinator will review the report and follow the procedures in paragraph 3.09.

3.17 Upon completion of all splice operations, individual pairs in the new cable will be tested by the conformance tester and results given to Engineering. All pairs should be usable except for factory defects and those should not exceed 1 percent.

There should not be any design defects in the new cable:

NOTE: Existing pair defects will be addressed using TRIM and other programmable routine type tools. Existing design defects will already have been corrected by the OPE on the authorization in question and eliminated in conjunction with the ongoing work on the order.

The first level OPE may approve the closing of a work authorization if he or she feels that a reasonable effort has been made to clear defectives or feels that further action is not economical. Defective pairs in existing cable plant should only be cleared if required for completion of a work order or for service orders. The OPE will have the responsibility for providing the MCA with a defective pair priority list.

3.18 When all defects are cleared or the level of defects caused by the work performed on the current work authorization are less than one percent factory defects, the OPE will forward copies of the closing approval Form (E6415) with the Test Report (E6414) to the test coordinator LAC and MCA.

3.19 The LAC will post all the defects listed on the initial and/or final copy of the test report (E6414) from OPE to all appropriate LAC records and forward a copy to CAPER for updating of the LMOS data base.

3.20 The coordinator on receipt of the Closing Approval Form (E6415) and the final Test Report, completes the entries on the Log Sheet (E6411) or mechanized equivalent and files them with the associated Complement Diagram. Monthly, the coordinator will prepare a report Form E6416, Results-Conformance Testing (Figure 7), which will reflect the testing activity of the previous month. The coordinator will forward the report to the appropriate staff or in accordance with local practice.

4. COMPLEMENT DIAGRAMS

4.01 Complement Diagrams (E6410) are straight-line circuit illustrations of the cable complements that are to be conformance tested. These diagrams provide:

(a) A simple, uncluttered presentation of the cable makeup to be used to evaluate the complement with respect to the rules of the design strategy used.

(b) An aid to the tester in performing instrument tests.

(c) An aid in the analysis of conformance testing results.

A sample Complement Design form is provided in Figure 1.

4.02 A set of Complement Diagrams is required on every construction job that requires testing. See paragraph 1.04 for the selection criteria. A separate diagram is required for each design complement, i.e., one diagram will suffice for all pairs having the same physical makeup. A complement is not to be thought of as any specific number of pairs such as 25, 50, or 100. The Complement Diagram is used for all types of plant design, including Resistance Design, Uniguage, Long Route, and Unified Loop Design. It must show the makeup of the facility from the wire center to the farthest distribution point in the complement plus identify the point of rearrangement. The point of rearrangement is defined as the location where cable pairs are involved in splicing operations such as cable pair transfers, pairs energized, loading or unloading cable pairs, etc.

4.03 The Complement Diagram form will accommodate seven Complement Diagrams per sheet. Figures 8 through 10 show Complement Diagrams prepared for three types of facility -- nonloaded, short loaded, and long loaded cables, respectively. For long loaded cables, the OPE must post expected transmission

values and network building-out capacitor settings to the right-hand side of the form. (See Figure 10.) The preferred method for obtaining this data is via UNICAPP. (See Section 856-100-100, Appendix 3, Tables H, J and K). Based on the computed expected values for loop resistance, insertion loss, and return loss, the OPE will know in advance if the facility meets transmission requirements. If the expected values are marginal or unacceptable, the OPE can modify the design consistent with the prevailing rules and resubmit the circuit to UNICCAP for reappraisal. When accessing UNICCAP for an estimate of return loss, care must be taken to enter the exact length after the last load coil to the test point. The test point must be between 3000 and 6000 feet after the last coil and should be a pedestal, cross box, ready-access terminal, or any other arrangement where the pairs can be accessed and that portion of the loop beyond the test point can be isolated. If a test point (terminal) is not provided by the OPE, return loss measurements cannot be made and the effectiveness of the conformance testing program will be severly reduced. This is illustrated in Figure 10, where a test point is not located between 3 and 6 kilofeet after the last load coil for the 426 through 475 count. For these cases, an additional insertion loss measurement is taken at 3 kHz so the slope can be evaluated. The network settings are for a 4066A-type network and 4066C BOC or a 115-type network.

4.04 After the Complement Diagrams have been prepared, the OPE must evaluate them with respect to the rules for the design strategy. These are to be noted on the form in the column under Design Rule-Limit (Ohm or Zone).

5. FORMS

5.01 The following is a listing of the forms (other than the Complement Diagram, Figure 1) recommended for use in the conformance testing program:

(a) Log Sheet, Form E6411 (Figure 2) - Maintained by the coordinator as an aid in organizing the instrument testing job. It contains data used in preparing the monthly and quarterly results reports. Figure 11 shows a log sheet with typical entries.

(b) Test Notification and Status Report, Form E6412 (Figure 3) - Issued by the construction management center and used by the coordinator and the OPE to note test results. It is designed to eliminate the need for verbal communications. Figure 12 shows a Test Notification and Status Report form with typical entries.

(c) Test Notes, Form E6413 (Fig. 4) - Used by the tester as a work sheet to post test results. Figures 13 through 15 illustrate typical entries on the Test Notes forms for the various types of cables tested.

(d) Test Report, Form E6414 (Figure 5) - This report is issued to summarize the defects from the Test Notes (E6413). It is attached to the Test Notification and Status Report (E6412) to identify the status of the defective pairs. Figure 16 shows a Test Report form with typical entries.

(e) Closing Approval, Form E6415 (Figure 6) - Prepared by an engineer to indicate approval of the final test results. Figure 17 shows a Closing Approval form with typical entries.

(f) Results-Conformance Testing, Form E6416 (Figure 7) - A report issued monthly, quarterly, and annually showing conformance testing results. Figure 18 shows a results form with typical entries.

(g) Construction Cable Completion Test Report Form E6254 prepared by construction indicating defective pairs, and is sent to LAC at the completion of a work authorization.

5.02 All forms can be ordered from the local Copy Bureau Center.

E6410

COMPLEMENT DIAGRAMS				OVER 6 LOAD COILS
WIRE CENTER	ORDER NUMBER	DATE ISSUED	ORIGINATOR	

CABLE NUMBER	PAIR COUNT	TELEPHONE NO.	DESIGN RULE-LIMIT (OHMS OR ZONE)			ALL LOOPS MAKE UP			EXPECTED RETURN LOSS (dB)	EXPECTED INSERTION LOSS (dB) 1 KHZ/3 KHZ	PRECISION AND BOC SETTINGS 4066 or 115	
			RES. ULD	UNIGAUGE	LONG RT.		KFT	RES.			MDF	FIELD
Count						19						
						22						
						24						
						26						
						T						
Count						19						
						22						
						24						
						26						
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Count						19						
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Count						19						
						22						
						24						
						26						
						T						
Count						19						
						22						
						24						
						26						
						T						

LEGEND:

Cable Gauge Change →	Cable Gauge	19	Existing		New	L Loop	R–Rural Wire
		22	———	Cable	———	W–Branch	U–Urban Wire
		24	LC	Load	LC	X Cross-Connect Terminal	
		26	BOC	Capacitor	BOC	O/W Open Wire	Test Point ▲

R – Rearrangement Point

Fig. 1—Complement Diagram

E 6411
8/12/79

LOG SHEET – CONFORMANCE TESTING

Loc. Year

Order Number	Wire Center	No. Pairs To Test	Type Test N.S.L.	Dates Received					Number Of Defects						Total Test Hrs.		No. Of Def. Pairs With Jobs Issued To Recover The Pairs	Remarks
									Initial			Final						
				Complement Diagram	Notification Form	Test Report	Retest Notification Form	Final Test Report	Design	Const.	Existing	Design	Const.	Existing	Initial	Retest		

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Fig. 2—Log Sheet Form

Test Notification And Status Report-Conformance Testing

E-6412 (7/84)

Work Order Number	Date	
Construction Management Center	Tel. No. ( )	
☐ Splicing Work Has Been Completed And The Work Is Ready For Testing	By	Date
Coordinator	Tel. No. ( )	
☐ Testing Has Been Completed. Attached Is A List Of Defects (E-6414).	By	Date
Outside Plant Engineer	Tel. No. ( )	
☐ Defects To Be Corrected By Construction Identified On Attached E-6414.	By	Date
Consturction Management Center	Tel. No. ( )	
☐ Corrective Work Has Been Completed. Attached E-6414.	By	Date
Coordinator	Tel. No. ( )	
☐ Retesting Has Been Completed. Attached Is A List Of Defects (E-6414).	By	Date
Outside Plant Engineer	Tel. No. ( )	
☐ Ready For Approval. Attached E-6414.	By	Date
☐ E-6415 Completed.	By	Date

Remarks:

Fig. 3-Test Notification and Status Report Form

TEST NOTES – CONFORMANCE TESTING

E 6413-1
7/79

Wire Center	Est./Job #	Cable: Count	Initial Test ☐ Retest ☐ Final Test ☐	Testing Hours	Tester	Date

		DC Defects							AC Defects												
		Nonloaded & All Loaded							Loaded	Long Loaded						All Loops					
				Grnd							Loss (dB)					Noise (dBrnC)					
											Freq. (KHz)										
Pair #	V Or W	C.O. Batt.	High Volt	T	R	S/C	Length (KF)	Cap UNB (T) (R)	Level Tracer Analysis	Ret Loss (dB)	1	1.5	2	2.8	3	Ckt	P.I.	Bal	Res °F	Remarks	Line #
1																					1
2																					2
3																					3
4																					4
5																					5
6																					6
7																					7
8																					8
9																					9
10																					10
11																					11
12																					12
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16																					16
17																					17
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19																					19
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21																					21
22																					22
23																					23
24																					24
25																					25

Fig. 4—Test Notes Form (Sheet 1 of 4)

E 6413-2
7/79

TEST NOTES – CONFORMANCE TESTING

Wire Center	Est./Job #	Cable: Count	Initial Test ☐ Retest ☐ Final Test ☐	Testing Hours	Tester	Date

		DC Defects								AC Defects													
		Nonloaded & All Loaded								Loaded	Long Loaded						All Loops						
												Loss (dB)					Noise (dBrnC)						
					Grnd							Freq. (KHz)											
Pair #	V Or W	C.O. Batt.	High Volt	T	R	S/C	Length (KF)	Cap UNB (T) (R)	Level Tracer Analysis	Ret Loss (dB)	1	1.5	2	2.8	3	Ckt	P.I.	Bal	Res °F	Remarks	Line #
26																					1
27																					2
28																					3
29																					4
30																					5
31																					6
32																					7
33																					8
34																					9
35																					10
36																					11
37																					12
38																					13
39																					14
40																					15
41																					16
42																					17
43																					18
44																					19
45																					20
46																					21
47																					22
48																					23
49																					24
50																					25

Fig. 4—Test Notes Form (Sheet 2 of 4)

TEST NOTES – CONFORMANCE TESTING

Wire Center	Est./Job #	Cable: Count	Initial Test ☐ Retest ☐ Final Test ☐	Testing Hours	Tester	Date

		DC Defects							AC Defects													
		Nonloaded & All Loaded							Loaded	Long Loaded						All Loops						
Pair #	V Or W	C.O. Batt.	High Volt	Grnd T	Grnd R	S/C	Length (KF)	Cap UNB (T) (R)	Level Tracer Analysis	Ret Loss (dB)	Loss (dB) Freq. (KHz) 1	1.5	2	2.8	3	Noise (dBrnC) Ckt	P.I.	Bal	Res °F	Remarks	Line #
51																					1
52																					2
53																					3
54																					4
55																					5
56																					6
57																					7
58																					8
59																					9
60																					10
61																					11
62																					12
63																					13
64																					14
65																					15
66																					16
67																					17
68																					18
69																					19
70																					20
71																					21
72																					22
73																					23
74																					24
75																					25

Fig. 4—Test Notes Form (Sheet 3 of 4)

TEST NOTES – CONFORMANCE TESTING

Wire Center	Est./Job #	Cable: Count	Initial Test ☐ Retest ☐ Final Test ☐	Testing Hours	Tester	Date

		DC Defects							AC Defects												
		Nonloaded & All Loaded							Loaded	Long Loaded						All Loops					
				Grnd							Loss (dB)					Noise (dBrnC)					
Pair #	V Or W	C.O. Batt.	High Volt	T	R	S/C	Length (KF)	Cap UNB (T) (R)	Level Tracer Analysis	Ret Loss (dB)	Freq. (KHz) 1	1.5	2	2.8	3	Ckt	P.I.	Bal	Res °F	Remarks	Line #
76																					1
77																					2
78																					3
79																					4
80																					5
81																					6
82																					7
83																					8
84																					9
85																					10
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93																					18
94																					19
95																					20
96																					21
97																					22
98																					23
99																					24
100																					25

Fig. 4—Test Notes Form (Sheet 4 of 4)

E6414
7/79

TEST REPORT – CONFORMANCE TESTING

Order No.	Wire Center	Cable	Count
Tester Date	Total Pairs Tested Nonloaded Loaded	Test Initial Retest Final	
Note			

PR No.	New		Existing		Description/Location	Cleared By			Date Cleared
	DC	AC	DC	AC		Design	Const.	Maints.	

Fig. 5—Test Report Form

E6415
7/84

CLOSING APPROVAL FORM - CONFORMANCE TESTING

Construction Work On Order Number_____Has Been Completed And Conformance Tests Have Been Performed.

☐ The Initial Tests Indicate That _____% Of The Existing Pairs Are Defective. I Recommend That The Job Be Closed Without Attempting To Clear The Defects.

☐ The Initial Tests Indicate That_____% Of The New Pairs Were Defective. Construction Has Made_____ Attempt(s) To Clear The Faults But_____% Are Still Defective. I Recommend That No Further Attempts Be Made To Clear The Remaining Defects.

A Total Of_____Pairs Were Conformance Tested And_____Pairs Are Classified Defective As Follows:

	Initial Defects	Final Defects	Percent Final Defects
Design	_____	_____	_____
Construction	_____	_____	_____
Existing	_____	_____	_____
Total	_____	_____	_____

The Complements Tested Are Recommended For Acceptance With The Final Remaining Defects As Indicated Above.

Rationale:_____

_____

_____

_____

_____

_____

Approved By_____Signature*

*Approval

1st Level Outside Plant Engineer

Note 1: All Design Defects Must Be Corrected Prior To Closing (See Paragraph 3.17)

Fig. 6-Closing Approval Form

Conformance Testing-Results

Subdistrict _____ District _____ Division _____ Area _____ Month _____ Quarter _____ Year _____

Non-Loaded Cable

Month	Pairs Notified To Test (A) Bal. Forward	Pairs Notified To Test (B) This Month	Pairs Tested This Month (C) Initial	Pairs Tested This Month (D) Retest	Pairs Tested Without Closing Approval (E)	Percent Tested (F) C x 100 / A+B	Initial Test Defect (Pairs) (G) Design	(H) Const.	(I) Exist	Percent Defect (J) G+H+Ix100 / C	Final Defect (Pairs) (K) Design	(L) Const.	(M) Exist	Final Percent Defective (N) K+L+Mx100 / C	Testing Hours (O) Initial	(P) Retest	Pr. Per Tstd. (Q) C+D / O+P	(R) Hr. Per Pair Reclaimed	No. Defects Pair With Job To Recover
Total Qtr.																			

Remarks:

Loaded Cable

Month	Pairs Notified To Test (A) Bal. Forward	Pairs Notified To Test (B) This Month	Pairs Tested This Month (C) Initial	Pairs Tested This Month (D) Retest	Pairs Tested Without Closing Approval (E)	Percent Tested (F) C x 100 / A+B	Initial Test Defects (G) Design	(H) Const.	(I) Exist	Percent Defect (J) G+H+Ix100 / C	Final Defects (K) Design	(L) Const.	(M) Exist	Final Percent Defective (N) K+L+Mx100 / C	Testing Hours (O) Initial	(P) Retest	Pr. Per Hr. Tstd. (Q) C+D / O+P	(R) Hr. Per Pair Reclaimed	No. Defects Pair With Job To Recover
Total Qtr.																			

Remarks:

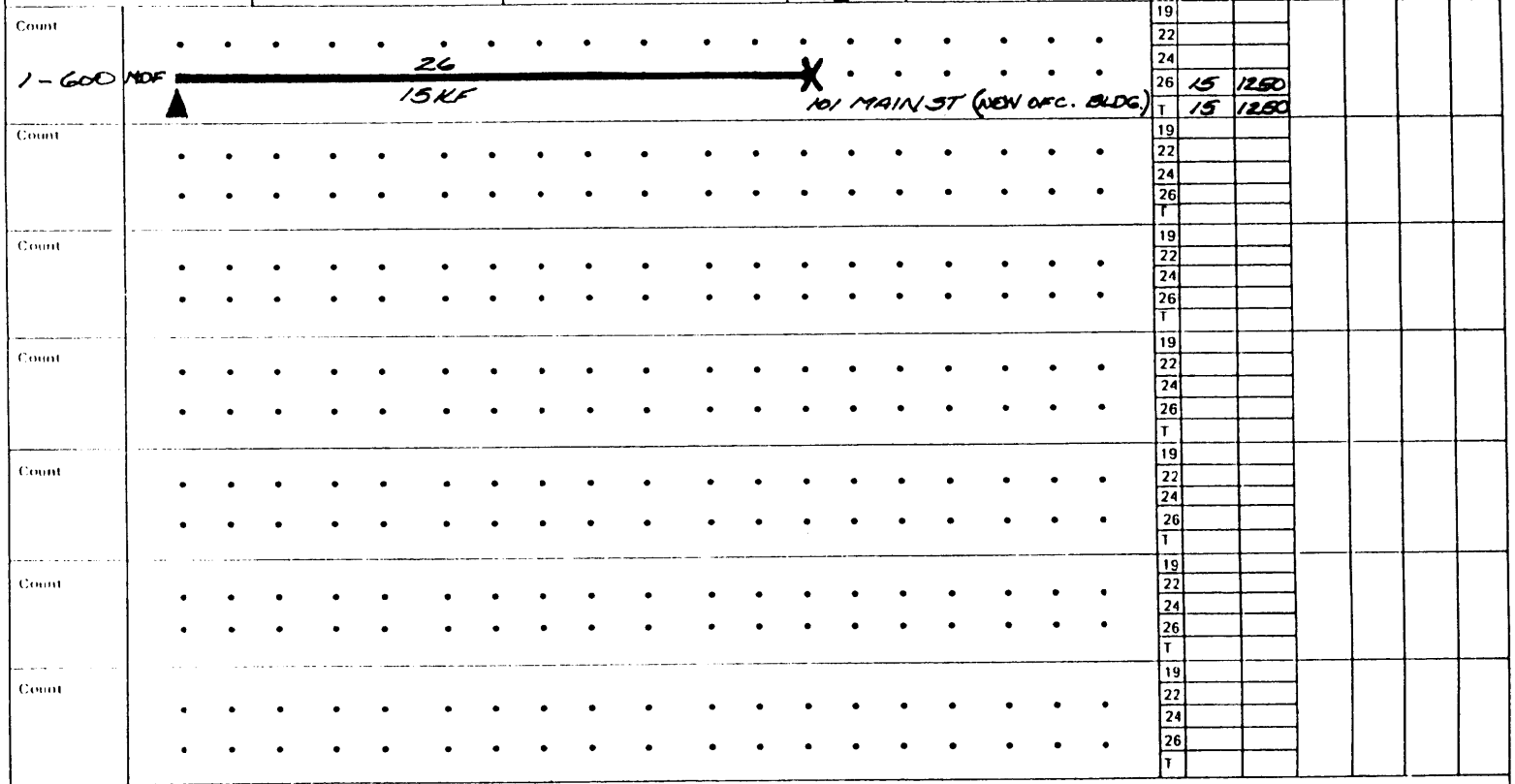
Fig. 7-Conformance Testing Results Form

E6410

COMPLEMENT DIAGRAMS

WIRE CENTER	ORDER NUMBER	DATE ISSUED	ORIGINATOR
MADISON	53728	10-21-84	R. BAILEY

CABLE NUMBER	PAIR COUNT	TELEPHONE NO.	DESIGN RULE-LIMIT (OHMS OR ZONE)		
			RES. ULD 1300Ω	UNIGAUGE	LONG RT.
14	1-600	555-2121			



	ALL LOOPS MAKE UP		OVER 6 LOAD COILS			
	KFT	RES.	EXPECTED RETURN LOSS (dB)	EXPECTED INSERTION LOSS (dB) 1 KHZ/3 KHZ	PRECISION AND BOC SETTINGS 4066 or 115 MDF	FIELD
19						
22						
24						
26	15	1250				
T	15	1250				

LEGEND

Cable Gauge Change

Cable Gauge: 19, 22, 24, 26

Existing Cable ——— New Cable ———

LC Load LC

BOC Capacitor BOC

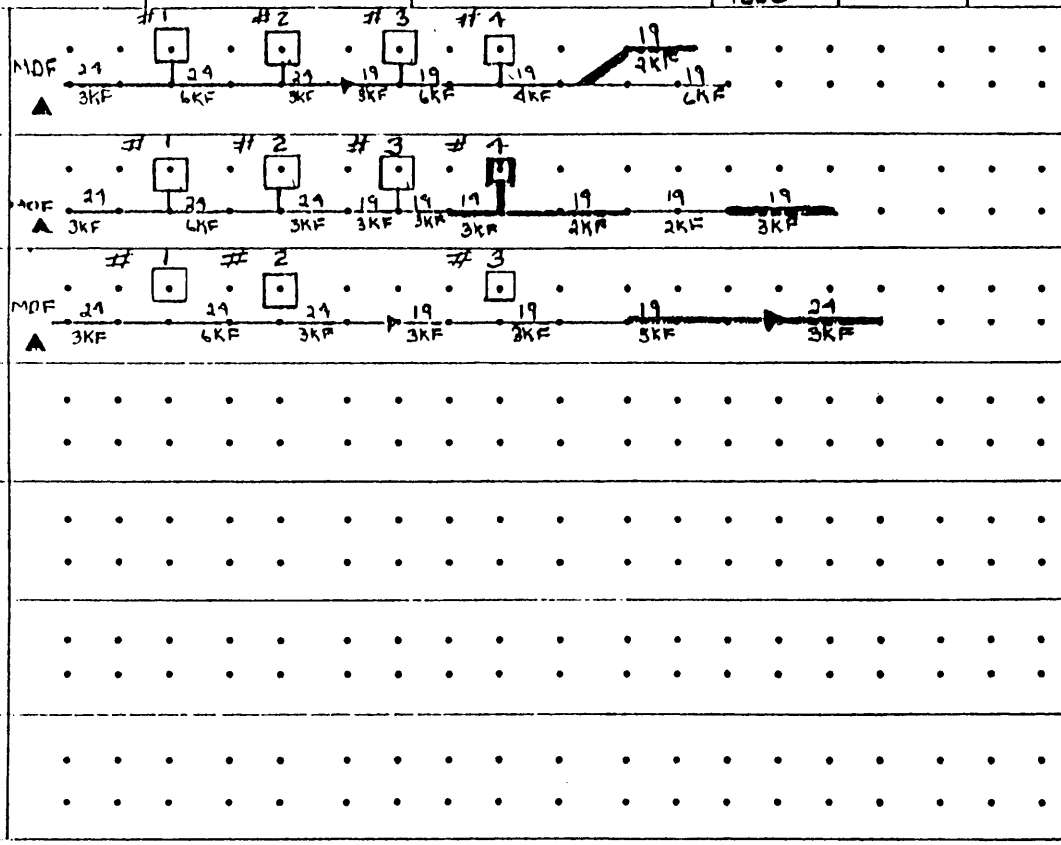
L - Loop
W - Branch
X - Cross-Connect Terminal
O/W Open Wire
R - Rural Wire
U - Urban Wire
Test Point ▲
A – Rearrangement Point

Fig. 8—Complement Diagram for Nonloaded Facility

COMPLEMENT DIAGRAMS

WIRE CENTER	ORDER NUMBER	DATE ISSUED	ORIGINATOR
Remote	57525	7/20/89	R. Elmore

CABLE NUMBER	PAIR COUNT	TELEPHONE NO.	DESIGN RULE-LIMIT (OHMS OR ZONE) RES.	ULD	UNIGAUGE	LONG RT.
15	1-100 401-600	555-2121	1300Ω			



ALL LOOPS MAKE UP	KFT	RES.	EXPECTED RETURN LOSS (dB)	EXPECTED INSERTION LOSS (dB) 1 KHZ 3 KHZ	PRECISION AND BOC SETTINGS 4066 or 115 MDF	FIELD
19	21	350				
22						
24	12	625	-16	#1		
26						
T	33	1011				
19	16	260				
22						
24	12	921				
26						
T	28	1217				
19	11	100				
22						
24	15	775				
26						
T	26	982				
19						
22						
24						
26						
T						
19						
22						
24						
26						
T						
19						
22						
24						
26						
T						
19						
22						
24						
26						
T						

OVER 6 LOAD COILS

LEGEND:
Cable Gauge Change
Cable Gauge 19 22 24 26
Existing Cable — New
LC Load LC
DOC Capacitor DOC
L Loop W-Branch X Cross-Connect Terminal O/W Open Wire
R-Rural Wire U-Urban Wire
A – Rearrangement Point
Test Point ▲

Note #1, 36 ohms included for L.C. #5

Fig. 9-Complement Diagram for Short Loaded Facility

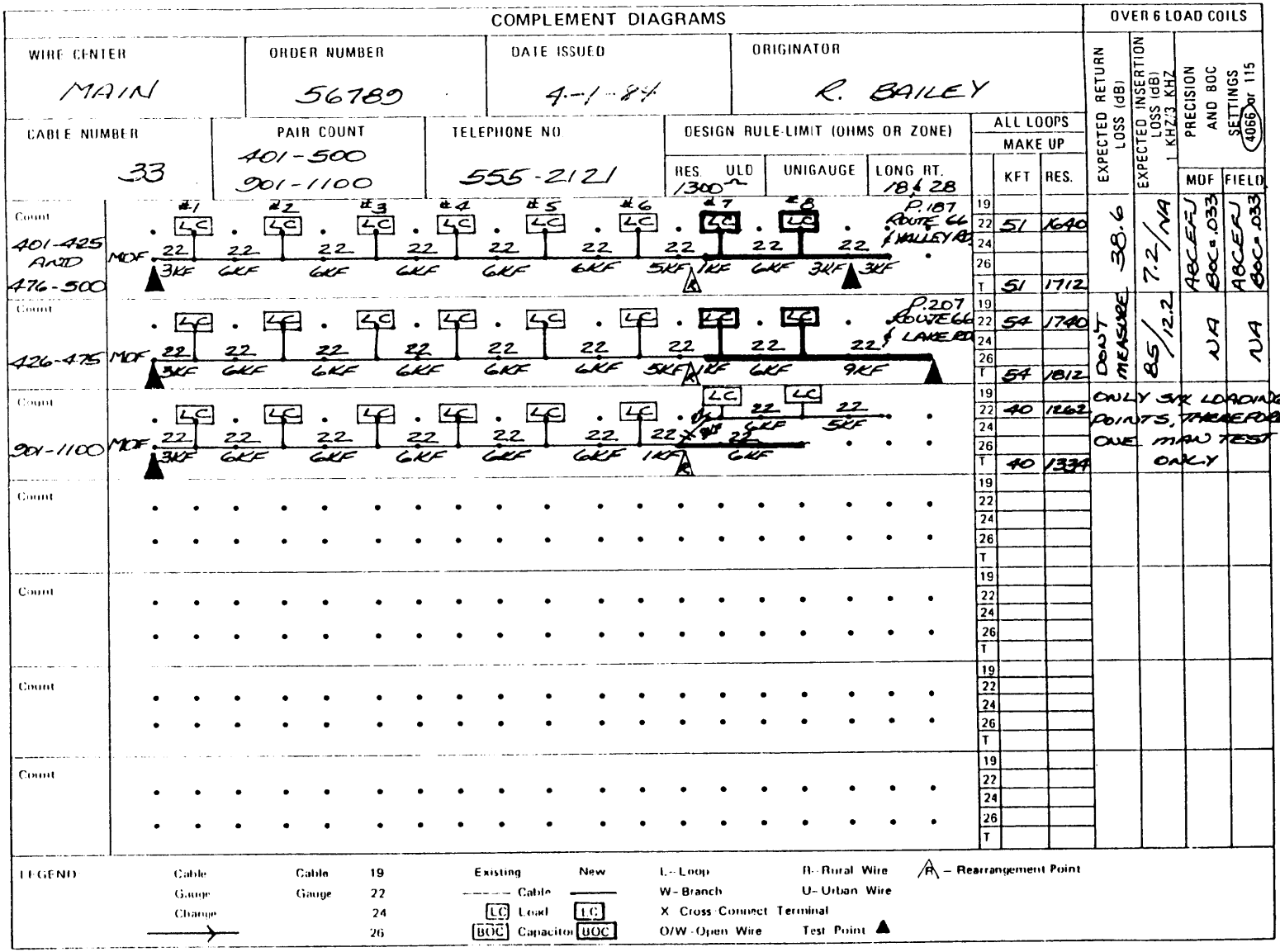


Fig. 10—Complement Diagram for Long Loaded Facility

E-6411
8/12/79

LOG SHEET – CONFORMANCE TESTING

Loc. MADISON Year 1984

Order Number	Wire Center	No. Pairs To Test	Type Test N.S.L.	Dates Received: Complement Diagram	Notification Form	Test Report	Retest Notification Form	Final Test Report	Number Of Defects: Initial: Design	Const.	Existing	Final: Design	Const.	Existing	Total Test Hrs.: Initial	Retest	No. Of Def. Pairs With Jobs Issued To Recover The Pairs	Remarks
53728	MAD.	600	N	5/23	7/1	7/5	—	—	0	4	2	0	4	2	6	—	0	no attempt to clear
51662	MAIN	200	S	5/27	7/5	7/8	7/15	7/16	0	34	2	0	0	2	12	3	0	
55208	REMOTE	300	S	6/3	7/8	7/10	7/18	7/19	0	37	10	0	3	10	15	3	0	made 3rd level appt
50111	MAD.	500	S	5/15	7/10	7/12	7/16	7/17	0	60	2	0	3	2	24	5	0	
52217	MAIN	100	L	6/6	7/15	7/17	7/23	7/24	0	12	2	0	0	2	9	1	0	made 2nd level appt
58812	MAIN	400	S	6/7	7/17	7/18	7/23	7/24	75	57	4	75	2	4	28	3	75	
53613	MAD.	100	L	5/7	7/19	7/22	7/26	7/29	0	31	0	0	2	0	6	2	0	
56689	REMOTE	100	L	6/18	7/19	7/22	7/26	7/29	0	25	1	0	0	1	8	2	0	
58303	MAIN	200	S	6/14	7/22	7/23	—	—	0	0	3	0	0	3	9	0	0	no attempt to clear
57525	REMOTE	300	S	6/17	7/24	7/25	7/29	7/30	0	83	3	0	3	3	14	7	0	
56789	MAIN	300	L	6/11	7/29													
56454	MAD.	200	S	7/2	7/31		TOTAL FOR EGAIG IN MONTH OF JULY											
56425	REMOTE	800	S	7/3														

Fig. 11—Typical Log Sheet

Test Notification And Status Report-Conformance Testing

E-6412 7/84

Work Order Number: 56789	Date: 7/19/84	
Construction Management Center ☑ Splicing Work Has Been Completed And The Work Is Ready For Testing	Tel. No. ( ) 555-2120 By: J.D.A	Date: 7-19-84
Coordinator ☑ Testing Has Been Completed. Attached Is A List Of Defects (E-6414).	Tel. No. ( ) 555-2119 By: K. M.	Date: 7-22-84
Outside Plant Engineer ☑ Defects To Be Corrected By Construction Identified On Attached E-6414.	Tel. No. ( ) 555-2121 By: J.L.	Date: 7-23-84
Consturction Management Center ☑ Corrective Work Has Been Completed. Attached E-6414.	Tel. No. ( ) 555-2120 By: J m	Date: 7-26-84
Coordinator ☑ Retesting Has Been Completed. Attached Is A List Of Defects (E-6414).	Tel. No. ( ) 555-2119 By: J.N.A	Date: 7-30-84
Outside Plant Engineer ☑ Ready For Approval. Attached E-6414.	Tel. No. ( ) 555-2121 By: J.L	Date: 7-30-84
☑ E-6415 Completed.	By: J.L.	Date: 7-31-84

Remarks: less than 1% defects, Verbal okay John Hillrich OPE Manager.

Fig. 12-Typical Test Notification and Status Report Form

E-6413-4
7/79

TEST NOTES – CONFORMANCE TESTING

Wire Center	Est./Job #	Cable: Count	Initial Test ☑ / Retest ☐ / Final Test ☐	Testing Hours	Tester	Date
MADISON	55321	15, 1-400 SHT 4 OF 16		4	T. EDWARDS	5/21/84

	DC Defects								AC Defects													
	Nonloaded & All Loaded								Loaded	Long Loaded						All Loops						
				Grnd							Loss (dB)					Noise (dBrnC)						
Pair #	V Or W	C.O. Batt.	High Volt	T	R	S/C	Length (KF)	Cap UNB (T) (R)	Level Tracer Analysis	Ret Loss (dB)	Freq. (KHz) 1	1.5	2	2.8	3	Ckt	P.I.	Bal	Res °F	Remarks	Line #
76																					1
77																					2
78																					3
79																					4
80																					5
81																					6
82																					7
83																					8
84				X																(10K OHMS)	9
85																					10
86																					11
87																					12
88																					13
89						X														15,000~	14
90																					15
91																					16
92																					17
93																					18
94							19													ENGR DIAGRAM (16 KF)	19
95																					20
96																					21
97																					22
98																					23
99																					24
100																					25

Fig. 13—Typical Test Notes for Nonloaded Cable

E-6413-2
7/79

TEST NOTES – CONFORMANCE TESTING

Wire Center	Est./Job #	Cable: Count	Initial Test ☑ / Retest ☐ / Final Test ☐	Testing Hours	Tester	Date
MADISON	53821	19, 1-300 SHT. 2 OF 12		12	T. EDWARDS	5/28/84

	DC Defects							AC Defects											
	Nonloaded & All Loaded							Loaded	Long Loaded						All Loops				
Pair #	V Or W	C.O. Batt.	High Volt	Grnd T	Grnd R	S/C	Length (KF)	Cap UNB (T) (R)	MODEL 77 Level Tracer Analysis	Ret Loss (dB)	Loss (dB) Freq. (KHz) 1	1.5	2	2.8	3	Noise (dBrnC) Ckt.	P.I.	Bal	Res °F	Remarks	Line
26									OK												1
27																					2
28																					3
29																					4
30					X															12,000~	5
31																					6
32																					7
33																					8
34																					9
35									OK												10
36									2ND LOAD MISSING											12.2 KF SPACING	11
37									OK												12
38																					13
39																					14
40																					15
41																					16
42																					17
43																					18
44																					19
45																					20
46																					21
47									OK												22
48							15													ENGR. DIAGRAM 36KF	23
49									OK												24
50									OK												25

Fig. 14—Typical Test Notes for Short Loaded Cable

E-6413-1
7/79

TEST NOTES – CONFORMANCE TESTING

Wire Center	Est./Job #	Cable: Count	Initial Test ☑ / Retest ☐ / Final Test ☐	Testing Hours	Tester	Date
MADISON	52728	22, 1-100 SHT. 1 OF 4		12	T. EDWARDS	5/24/84

	DC Defects								AC Defects													
	Nonloaded & All Loaded								Loaded	Long Loaded						All Loops						
Pair #	V Or W	C.O. Batt.	High Volt	Grnd T	Grnd R	S/C	Length (KF)	Cap UNB (T) (R)	MODEL 77 Level Tracer Analysis	Ret Loss (dB)	Loss (dB) Freq. (KHz) 1	1.5	2	2.8	3	Noise (dBrnC) Ckt	P.I.	Bal	Res 78°F	Remarks	Line
1										29.1	6.5	6.5	6.8	8.0	8.4	18	76	58	1210		1
2									6TH LC MISSING	22.3	6.0	6.0	7.5	8.9	8.8	17	75	58	1200		2
3								X		30.0	6.5	6.5	6.8	7.8	8.3	32	75	43	1195		3
4										27.9	6.5	6.5	6.9	7.8	8.0	17	74	57	1200	LOOKS OK W/TRACER	4
5										30.1	6.5	6.5	6.8	7.9	8.1	17	75	58	1195		5
6										30.8	6.4	6.4	6.8	8.0	8.2	17	75	58	1200		6
7									6TH LC MISSING	21.3	6.4	6.5	7.8	9.4	9.0	16	73	57	1190		7
8										31.0	6.3	6.4	6.9	7.8	8.4	17	75	58	1200		8
9										28.2	6.3	6.3	6.7	7.8	8.4	18	74	56	1205	LOOKS OK W/TRACER	9
10										27.0	6.4	6.5	7.0	8.0	8.5	16	73	57	1210	LOOKS OK W/TRACER	10
11										29.3	6.4	6.5	7.2	8.0	8.5	16	73	57	1210		11
12										31.1	6.2	6.4	7.2	8.0	8.5	16	73	57	1210		12
13										31.2	6.3	6.5	7.0	8.0	8.2	17	76	59	1200		13
14										32.0	6.2	6.3	6.8	7.8	8.0	17	75	58	1200		14
15										34.0	6.2	6.4	6.9	7.4	7.9	16	74	58	1205		15
16										28.8	6.3	6.5	7.2	7.6	8.2	18	75	57	1195		16
17										33.0	6.4	6.8	7.0	7.8	8.4	18	76	58	1206		17
18										30.3	6.3	6.5	6.9	7.4	7.9	17	75	58	1210		18
19									6TH LC MISSING	22.0	6.4	6.3	7.0	8.4	9.0	17	75	58	1200		19
20										32.1	6.3	6.4	6.8	7.4	8.0	16	75	59	1190		20
21									6TH LC MISSING	21.1	6.4	6.5	7.1	9.0	8.8	16	74	58	1200		21
22										33.1	6.2	6.4	6.8	7.4	7.9	16	73	57	1190		22
23										32.1	6.4	6.6	7.0	7.5	8.2	17	73	56	1210		23
24										29.9	6.4	6.7	7.2	7.6	8.0	17	73	56	1200		24
25									6TH LC MISSING	22.1	6.3	6.8	7.8	8.9	8.8	17	75	58	1180		25

Fig. 15—Typical Test Notes for Long Loaded Cable

E6414
7/79

TEST REPORT – CONFORMANCE TESTING

Order No.	Wire Center	Cable	Count
52725	MADISON	22	1-200

Tester	Date	Total Pairs Tested		Test		
KWE	5/20/84	Nonloaded (Loaded)	200	(Initial)	Retest	Final

Note: Defective Pairs needed to work Routine order

PR No.	New DC	New AC	Existing DC	Existing AC	Description/Location	Cleared By * Design	Const.	Maints.	Date Cleared
5				✓	MISSING 1ST LOAD COIL		✓		
11			✓		SHT 133~			✓	
21				✓	MISSING 1ST LOAD COIL		✓		
46			✓		OPN TIP & RING @ 500'			✓	
49			✓		G T/S 450~			✓	
88			✓		SHT 100,000~			✓	
126			✓		O R/S 12,500'			✓	
177			✓		SHT 455~			✓	
151					Missing 3rd Load Coil		✓		
↓					printz, operation 4		✓		
							✓		
200							✓		

* = To be completed by engineer.

Fig. 16—Typical Test Report

E6415
7/84

CLOSING APPROVAL FORM - CONFORMANCE TESTING

Construction Work On Order Number 55208 Has Been Completed And Conformance Tests Have Been Performed.

☑ The Initial Tests Indicate That 5 % Of The Existing Pairs Are Defective. I Recommend That The Job Be Closed Without Attempting To Clear The Defects.

☑ The Initial Tests Indicate That 2 % Of The New Pairs Were Defective. Construction Has Made 1 Attempt(s) To Clear The Faults But 1 % Are Still Defective. I Recommend That No Further Attempts Be Made To Clear The Remaining Defects.

A Total Of 1100 Pairs Were Conformance Tested And 19 Pairs Are Classified Defective As Follows:

	Initial Defects	Final Defects	Percent Final Defects
Design	0	0	0
Construction	18	9	1
Existing	10	10	5
Total	28	19	1.7

The Complements Tested Are Recommended For Acceptance With The Final Remaining Defects As Indicated Above.

Rationale: Defective pair locate to M.H 165 this Manhole is very congested and wet, 2-4" pomps are required to keep water down. The Splice is located at the bottom of the Manhole and there is risk of getting the splice wet.

Approved By R. Coincourt Signature*

*Approval

1st Level Outside Plant Engineer

Note 1: All Design Defects Must Be Corrected Prior To Closing (See Paragraph 3.17)

Fig. 17-Typical Closing Approval

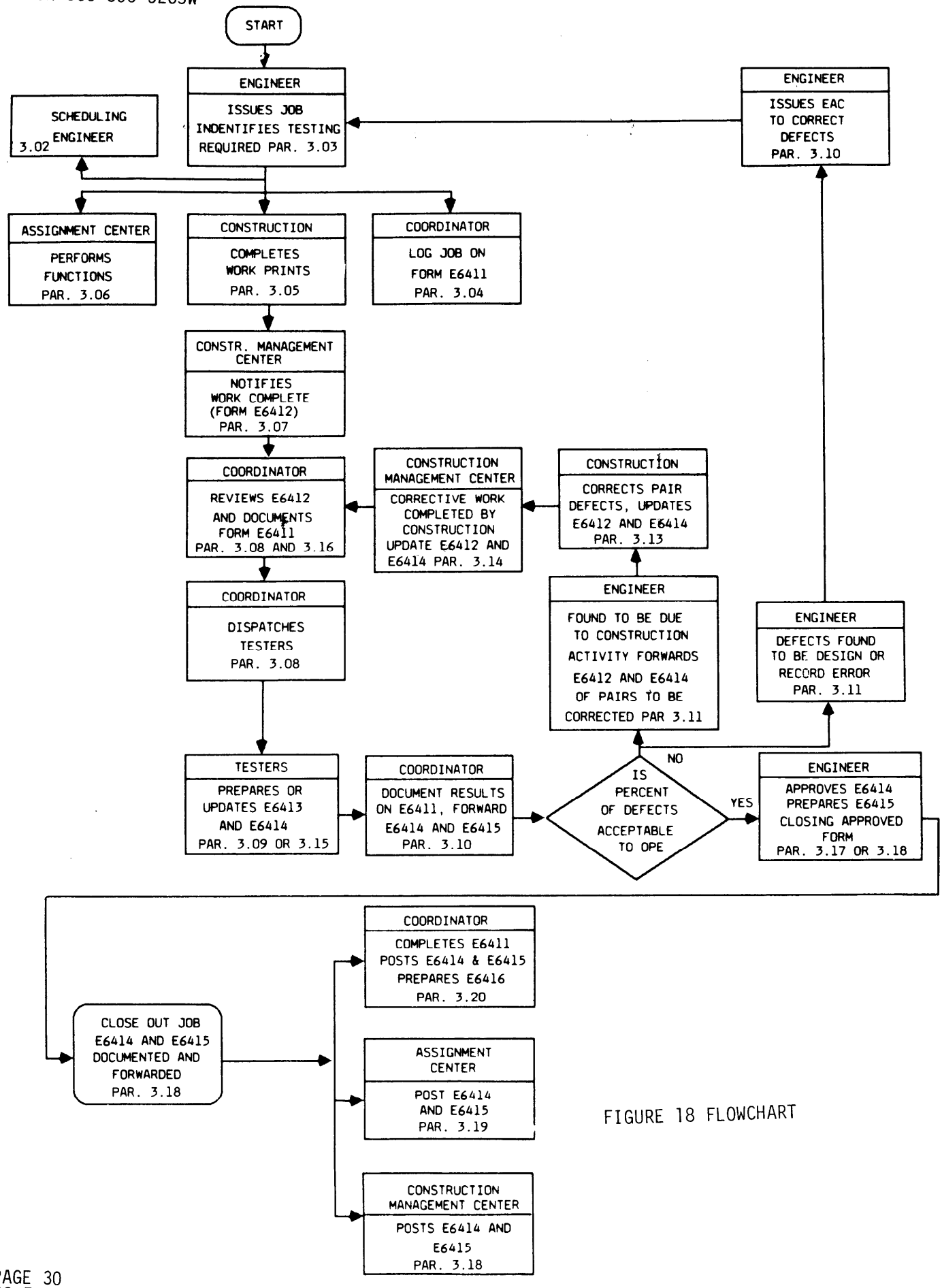


FIGURE 18 FLOWCHART