DIGITAL NETWORK ADMINISTRATION CENTERS

T-CARRIER RESTORATION INSTALLATION AND MAINTENANCE RESPONSIBILITIES

Contents Page

1. GENERAL

1.01 This section is issued to describe the organization and operation of Pacific Company's (PAC) Digital Network Administration Centers (DNACs) and outline their responsibilities together with the responsibilities of the groups with which they interface.

1.02 (Reserved for future use)

1.03 The DNAC combines the coordination of all digital restoration, span line turnup and repair and system installation into one organization and provides a framework for the efficient installation and maintenance of T-Carrier Networks. The DNAC interfaces with the central office (CO) forces who maintain the T-Carrier terminals and with other departments such as Network Distribution.

1.04 The DNAC is arranged in three basic operations.

(a) *Restoration*

- Restoration Control (TRCC)
- Technical Assistance

(b) *Augment Control*

- Engineering Liaison
- Terminal Augment
- Span Augment

(c) *Field Operations*

- Span Turnup and Maintenance
- Terminal Installation

Note: Responsibilities of these groups are detailed in Part 3. CO, Engineering and Network Distribution responsibilities are detailed in Part 4.

1.05 The DNAC administrative and geographical boundaries will not be constrained by existing district, division or sector boundaries.

1.06 For additional information refer to the following sections.

002-509-905PT — Restoration of Service Cable Failures — Facilities Used for T1-Carrier Systems

010-300-011 — Equipment Test List — Description and List of Issued ETLs

190-200-025 — Operations Support Systems — T-Carrier Administration System (TCAS) — Organization and Responsibilities

365-001-013 — ETL — T1 Lines — Digital Transmission Systems

365-001-014 — ETL — T1C Lines — Digital Transmission Systems

365-010-007 — Controlled Maintenance Plan

365-020-005 — T-Carrier Service Measurement Plan

365-020-301 — Digital Transmission System — T-Carrier Central Office Restoration and Maintenance Responsibilities

365-226-500 — T1 Carrier Identification Plan and Spare Line Patching

365-227-500 — T1 Carrier — Repeatered Line — Fault Locating Procedures

365-320-100 — T1 Order Wire — Operating Methods

460-110-100 — Special Safeguard Measures (SSM) and Special Service Protection (SSP)

Divisions 620 through 649 — Network Distribution

660-095-912PT — Facility Control Plan — Office Responsibilities

2. DEFINITIONS

2.01 *Span Line:* A series of regenerators extending from one digital system cross connect (DXS) or office repeater bay to the next office repeater bay or DSX.

2.02 *Span:* All of the span lines between two locations that share the same:

- Cables
- Apparatus Case Addresses
- Line Powering
- Digital Transmission Rate
- Office Repeater and Apparatus Case Regenerators

2.03 *Repeatered Line:* All of the span lines connected in series between location A and location Z to form a system or backbone digital line.

2.04 *Maintenance Line:* A span line set aside for restoring service when span line failures occur. One maintenance line per apparatus case is provided.

2.05 *Backbone Line:* A repeatered line set aside for restoring service before CO forces sectionalize the trouble to an individual span line.

2.06 *System Control Office:* The terminal office designated on the circuit order and records as control office.

2.07 *Span Control Office:* The system control, intermediate or terminal office, in areas not covered by DNAC (current DNAC geographical boundaries) that is responsible for the apparatus case regenerators in a span line.

2.08 *Side System:* The system using the other side of a unidirectional regenerator. *EXTREME CAUTION must be used when working on a failed system to avoid disabling the side system.*

2.09 *Intermediate Office:* Any office having an office repeater for a system that does not terminate in that office.

2.10 *Bridging Repeater:* A specially designed CO repeater to be used when patching T lines so that service need not be interrupted when the regular line is returned to service (ie, when the backbone or maintenance line patch is removed).

2.11 *T-Carrier Restoration Control Center (TRCC):* An administrative operations center established to work with COs it serves to control rapid restoration of T-Carrier Systems that have a failure.

2.12 *Service Outage Time:* Outage begins the earliest known time that a system has failed. This reflects the actual outage of customer service.

2.13 *TRCC Restoration Time:* Outage begins when the TRCC learns that a system has failed.

3. DIGITAL NETWORK ADMINISTRATION CENTER RESPONSIBILITIES

3.01 *T-Carrier Restoration Control Center (TRCC)*

(a) Coordinate the restoration of failed T-Carrier Systems.

(b) Assign and control the use of all backbone and maintenance lines.

(c) Receive T-Carrier failure reports from the control offices, log on the TRCC Log P 2984 (Exhibit 1) and assign a case number. On span line troubles, prepare a Span Line Trouble Report E-6880PAC (Exhibit 2), and code troubles per Section 365-010-007.

(d) Coordinate the restoration of all major T-Carrier failures including initiation of Abnormal Condition Reports per System Instruction (SI) 131.

(e) Perform analysis and tracking for the T-Carrier Network in the area it serves. Prepare Form E 10246, Equipment Control Record (Exhibit 3) and forward it to Headquarters each month with the TRCC monthly report (Exhibit 4).

(f) Control span line routines listed in the ETLs.

(g) Maintain a complete file of all system Circuit Layout Record (CLR) cards, Trouble History Records E 10214 (Exhibit 5) and span line records.

(h) Maintain a library of technical information on digital carrier.

(i) Maintain adequate and flexible communication system.

(j) Maintain a wall map or diagram showing all spans and backbone line routes together with a backbone line and maintenance line status board.

(k) Maintain 24 hour 7 day a week coverage.

(l) Set time goals for service restoration. Recommended goals are:

(1) Restore all failed systems within 15 minutes.

(2) Restore all backbone lines within 4 hours by using a maintenance line in the failed span. If this time is to be extended, it will be at the discretion of the TRCC.

(3) Restore all systems to their regular facilities by the followig working day. The TRCC will determine if the time shall be extended.

(4) When limits are exceeded, escalation will be initiated at the discretion of the TRCC supervisor.

(m) Track all splicing activity in T-Carrier cables.

(n) Act as control office on all digital facilities that do not have a D bank which terminate in switching machines and also T1CUs.

3.02 *DNAC — Technical Assistance*

Note: Technical assistance is *not* a substitute for adequate manpower. Each CO should maintain an adequate level of trained personnel to meet the T-Carrier responsibilities under its control.

(a) Provide assistance to CO work forces when knowledge or test equipment is inadequate to resolve the problem.

(b) Escalate problems to Technical Support when all BSP methods have failed to resolve the problem.

3.03 *Augment Control*

(a) Engineering Liaison

(1) Review and coordinate with Western Electric (WE) Engineering and Network Distribution (Construction) on equipment and construction jobs.

(2) Review and coordinate with the TRCC and field operations all methods of procedure on cable activity which might affect T-Carrier pairs.

(3) Coordinate the BSP acceptance of all new T-Carrier piece-parts.

(4) Provide jeopardy and completion reports on T-Carrier *jobs.*

(5) Ensure that test equipment is available or has been ordered by Engineering.

(6) Ensure that span line designs are accurate and complete.

(7) Coordinate with Maintenance Engineering and the field on modification projects such as (CCNs [Customer Change Notices]) on plug-ins, DSX retrofits and section throws.

(b) Terminal Augment

(1) Coordinate with Engineering on T-Carrier order activity.

(2) Perform control office functions on all T-Carrier System establishments, disconnects, and rearrangements.

(3) Assist in work load planning and control for field operations.

(4) Provide jeopardy reports on facility orders.

(5) Verify that terminal plug-ins are on hand for the turn-up of new systems.

(6) Represent DNAC at project coordination meetings that involve T-Carrier as required.

(7) Receive all field completions from field forces and report completions to Engineering.

(8) Notify terminal offices of system completions.

(c) Span Augment

(1) Coordinate with Engineering on T-Carrier order activity.

(2) Perform control office functions on all T-Carrier Span establishments, disconnects, and rearrangements.

(3) Assist in work load planning and control for field operations.

(4) Provide jeopardy reports on facility orders.

(5) Verify that office and span line plug-ins are on hand for new span lines.

(6) Represent DNAC at project coordination meetings that involve T-Carrier as required.

(7) Receive all field completions from field forces and report completions to Engineering.

(8) Notify span offices of span completions.

(9) Provide work unit inventory update.

(10) Initiate M 1065s for T-Carrier order wires through the Traffic and Plant Operational Circuits (TAPOC) coordinator.

3.04 *Field Operations — Span Turn-Up and Maintenance*

Note: Span turn-up and maintenance forces have installation and maintenance responsibility from repeater DSX to repeater DSX. These responsibilities include the following:

(a) Perform WE observing and BSP acceptance of newly installed T-Carrier repeater bays, DSX bays, multiplex bays, and associated equipment. Place SSM/SSP red protection per Section 460-110-100.

(b) Install all T-Carrier pairs and other high frequency frame cross-connects including fault locate lines and order wires.

(c) Place options and install all CO repeaters.

(d) Place power options and turn up all repeater bays per latest BSPs.

(e) Turn up all new maintenance and backbone lines and protect with plugs or plastic designation covers at all line access jacks.

(f) Test all new span lines from DSX to DSX including fault locate lines.

(g) Install standard repeater bay designations.

(h) Patch side systems and fault locate all failed T-Carrier span lines.

(i) Coordinate the repair of all span line troubles with Network Distribution.

(j) Perform T1 line mandatory work routines listed in Section 365-001-013.

(k) Do special project work such as DSX retrofits, section throws, and other modifications.

(l) Sectionalize trouble and assist outside forces during major failure situations such as cable cuts or storms.

(m) Administer Plug-In Inventory Control System (PICS) like-for-like exchange of all defective repeater plug-ins.

(n) With system control office on the telephone, remove maintenance line patches when span line troubles have been repaired.

(o) Perform quality survey on span lines per Section 010-300-001.

(p) Assist TRCC with technical advice as required.

(q) Assist terminal installation and system turn-up crew to install intermediate office cross-connects where practical.

(r) Report all field completions to augment control through immediate supervisor.

3.05 *Field Operations — Terminal Installation and System Line-Up*

(a) Perform BSP acceptance tests on newly installed T-Carrier terminals.

(b) Install common equipment plug-ins in T-Carrier terminal and perform looped terminal tests per BSP requirements.

(c) Install all DSX cross-connects including intermediate offices.

(d) Perform end to end alignment tests per BSP requirements.

(e) Administer PICS like-for-like exchange of any defective common equipment plug-ins discovered during testing.

(f) Inform the TRCC of defective spans discovered during system turnup.

(g) Perform quality survey on terminals per Section 010-300-001.

4. INTERFACING GROUPS — RESPONSIBILITIES

Network Distribution

4.01 *Network Distribution — Apparatus Case Repeater Locations*

(a) Perform cable pair acceptance tests on all T-Carrier pairs including fault locate and order wire pairs.

(b) Install apparatus case repeaters on new span lines.

(c) Replace all failed apparatus case repeaters at the direction of the TRCC Dispatcher.

(d) Maintain cable gas pressure at apparatus cases.

(e) Inspect cable and apparatus case condition and report to the TRCC.

(f) Ensure that order wire lines are working.

(g) Install fault locate filters.

(h) Test and turn-up all new apparatus cases per the latest BSPs.

(i) Maintain express office repeater bays (EORBs).

Central Office

4.02 *Central Office — System Control Office*

(a) When a T-Carrier failure occurs for any reason that is identifiable, the System Control Office must notify the TRCC and obtain a case number and notify when the system is restored.

(b) The System Control Office will then identify whether the failure is a span failure or a terminal failure.

(c) If the problem is a span failure, the office will obtain a backbone line assignment. No patches will be made without a case number.

(d) The System Control Office will be responsible for sectionalizing the trouble to a bad span line and working with forces in the intermediate offices to patch to a maintenance line on an "in-service" basis. In offices without D anks such as 4 ESS with digroup terminals or SS with direct carrier trunks, DNAC will take sponsibility for sectionalizing with assistance from the local T-Carrier forces.

(e) The System Control Office will then remove the patch on the backbone line and notify the TRCC that the patch has been shortened. his should be accomplished within the four (4) ur objective for backbone usage.

(f) For purposes of the T-Carrier Service Results Measurement Plan, the System Control Office will be charged for outage from the time the system fails until it is restored onto a backbone line.

(g) If the problem is caused by a terminal failure, the office where the terminal failure occurs will be responsible for restoring the bank.

(h) When the failure is in the terminal, the DNAC forces will only become involved when the CO supervisor requests technical ssistance through the TRCC Supervisor.

(i) The System Control Office is responsible for closing out the assigned case number with the TRCC when they are called by the span crew.

(j) Complete circuit disconnects on schedule so that system disconnects can be completed on schedule.

Central Office — Not Under DNAC (Span Control)

Note: When the T-Carrier operations are not part of the DNAC organization, (independent companies and other geographical areas), the following responsibilities lie with the Span Control Central Office:

(a) Use backbone or maintenance lines only after receiving a TRCC case number from the appropriate TRCC.

(b) Use bridging repeaters and tag all patches.

(c) Immediately fault locate the trouble in the span line. See section 365-227-500.

(d) Make certain the trouble is outside the CO before referring it to construction and/or cable maintenance forces.

(e) Initiate trouble clearing procedures and follow-up to ensure that the system is returned to its regular facilities within the time limit. If this is not done, refer the problem to the appropriate TRCC.

(f) Test backbone and maintenance lines daily for errors, continuity, and noise, and report results to the appropriate TRCC.

(g) Supply a digital signal on all idle lines in the transmit direction and a termination in the receive direction, per Section 365-227-500.

(h) Make certain that order wires, fault locating lines, bridging repeaters, and test sets are available and working properly.

4.04 *Central Office — Intermediate*

(a) Notify System Control Office on all system alarms that have been identified.

(b) Respond promptly to System Control Office requests for assistance in isolating span line trouble or placing maintenance line patches.

(c) Use backbone and maintenance lines only after receiving the TRCC case number from the System Control Office.

(d) Work closely with the System Control Office and TRCC to make the best use of backbone and maintenance lines for the rapid restoration of failed systems.

(e) Use bridging repeaters and tag all patches so that circuits or trunks are not disconnected when the failed system is returned to regular facilities.

(f) Remove maintenance line patches when directed to do so by the TRCC.

(g) Share WE observing with DNAC field operations.

Engineering

4.05 *Engineering Planning*

(a) Provide long range forecasts for T-Carrier span line and system growth to DNAC for determining force requirements.

(b) Provide copies of all facility orders for new span lines and systems to DNAC Augment.

(c) Provide adequate maintenance lines in each span for each digital transmission rate.

(d) Coordinate equipment and cable jobs.

4.06 *Engineering Design*

(a) Provide accurate designs that will produce span lines that will meet the requirements of the services using them.

(b) Designate order wire control on all span line designs and note whether blocking capacitors or other items are required for order wire operation.

(c) Provide designs for fault locate systems, including expected MEASURE 1 levels. Prepare form E 6988 (Fig. 6).

4.07 *Program (Equipment Engineering)*

(a) Ensure that DSX and other equipment installations meet the requirements for T-Carrier Maintenance Centers as indicated by the Maintenance Engineer.

(b) Provide order wire equipment in the office designated as order wire control on span line designs and as determined by the Maintenance Engineer.

4.08 *Maintenance Engineering*

(a) Ensure that engineering complaints are handled promptly.

(b) Provide that test equipment required to install and maintain the network.

(c) Initiate action to correct discrepancies that cause awkward maintenance arrangements.

(d) Initiate programs for applying Class A CCNs on plug-ins.

(e) Provide test and analysis on all digital network jobs.

(f) Review methods of procedure on DSX retrofit jobs and other equipment rearrangements.

(g) Provide direction to Equipment Engineering in providing for T-Carrier Maintenance Centers.

(h) Provide for the installation of order wire equipment on new span line jobs.

4.09 *Cable Engineering*

(a) Provide apparatus case holes arranged for growth.

(b) Provide outside plant jobs that meet engineering design requirements.

4.10 *Plug-In Administrator (PIA)*

(a) Maintain plug-in levels to meet the requirement for new systems and maintenance.

(b) Respond to Maintenance Engineering requests to modify pool stocks per CCNs.

(c) Avoid substitution of plug-ins that alter circuit designs.

Pacific Telephone
Nevada Bell

P 2984 (7-79)
190-200-00 1 PT

T Carrier Restoration Control Center Log

Case No.	System No.	Control Office	Noncontrol Office	System Failure		Backbone Line		Patched To Mtc. Line				Mtc. Line Restored		Total Outage		Trouble Location & Code			Remarks
				Time	Date	No.	Time	No.	BB	Other	Time	Date	Time	Bank	Span	Span	Code	Office	

TRCC Log
Exhibit 1

Pacific Telephone
Nevada Bell

E 6880 PAC (6-79)
BSP 365-001-010

T Carrier Span Line Trouble Report

Serial No.	Equipment Identification Span Name	Bay

System Identity ☐ New ☐ Existing

Reported From By	Ref. Serial No.	Received By Date Time

Trouble Reported

Fault Locate Information

System and Power-Mate Patched ☐ Yes ☐ No	Test Passed Yes	Test Passed No	Location of Trouble
Power Loop Test — Near End / Far End	☐	☐	Inside Central Office ☐ Near ☐ Far
T Line Current ____ ____			
Reg Voltage ____ ____			
Line Voltage ____ ____			☐ Fault Line Problem
Preparation	☐	☐	Serial No. ____
Fault Line Resistance or Current ____			☐ Trouble in Span Line Outside Central Office
Fault Line Noise ____			
Transmission Test (Record on Reverse)	☐	☐	☐ No Trouble Found
Obscure Trouble Test (Record on Reverse)	☐	☐	
Other	☐	☐	

Tested By Date Time	Referred To Date Time	Ref. Serial No.

Outside Plant Information

☐ 1 Cable ☐ 2 Cable ☐ Bidirectional ☐ Unidirectional

Cable No.	Case No.	Slot No.	Pair No. Side 1	Pair No. Side 2

Direction in Trouble
☐ Both ☐ From To

Trouble Location	Filter Code
☐ Problem With App. Case Filter At:	

Not Fault Located Due To:
☐ Fault Line Problem ☐ Power Loop Problem ☐ Other

Start Fault Isolation:
☐ At ☐ Where Convenient

Trouble Found and Location	Trouble Code

System Made Regular By Date Time	Notified To Date Time

Form E-6880, T-Carrier Span Line Trouble Report (Front)
Exhibit 2A

BSP 365-200-410 BSP 365-227-500 BSP 365-271-000

Fault Locating Record

Test Set Used _____

Filter Code	Rptr. Code	Transmission Test						Obscure Trouble Test-Pulse Period								
		Measure			BIPOLAR	* Test Passed										
		1	2	3		Yes	No	10	9	8	7	6	5	4	Max Shift	Remarks

*Stop If "No" Recorded For 2 Consecutive Readings. Trouble At Location Associated With First "No."

LOG

Form E-6880, PAC T-Carrier Span Line Trouble Report (Back)
Exhibit 2B

EQUIPMENT CONTROL RECORD

OFFICE _____ PERIOD _____

DATE	T-CARRIER SPAN LINE TROUBLE CODES																
	SLPI	SLRO	SLCS	SLCM	SLCB	SLCC	SLWE	SLBF	SLCX	SLREF	SLOR	SLRNT	SLADJ	SLMP	SLEP	SLPS	SLMIS
5																	
10																	
15																	
20																	
25																	
30																	
31																	
	TOTAL																

TROUBLES																		
EXPECTANCY	ACTUAL																	
		10 DAY																
		20 DAY																
		AVG. MONTH																
		NO. OF TROUBLES																

Form E-10246, Equipment Control Record
Exhibit 3A

EQUIPMENT CONTROL RECORD

OFFICE _____ PERIOD _____

DATE	T-CARRIER SYSTEM TROUBLE CODES										SYSTEM CONTROL OFFICE CODES					
	6TTE	6TD1	6TD2	6TD3	6TD4	6TPS	6TBF	6TCX	6TADJ	6TWE	6TREF	6TRNT	6TCC	6TNT	6TMS	NO. CONTROLLED SYSTEM FAILURES
5																
10																
15																
20																
25																
30																
31																
TOTAL																

TROUBLES																	
EXPECTANCY	10 DAY																
	20 DAY																
	AVG. MONTH																
ACTUAL	NO. OF TROUBLES																

Form E-10246, Equipment Control Record
Exhibit 3B

T CARRIER RESTORATION CONTROL CENTER (TRCC)

CITY	STATE	MONTH	YEAR

1.	Number of systems served by TRCC		1.
2.	Number of backbone lines working		2.
3.	Number of TCXR line outages reported to TRCC during month		3.
4.	Number of line outages TRCC patched on backbones		4.
5.	Total line outage time (in minutes) of systems that TRCC patched on backbones		5.
6.	Average line outage time (in minutes) of systems that TRCC patched on backbones (line 5 ÷ line 4)		6.
7.	Number of TCXR line outages TRCC did not patch on backbones (line 3 - line 4)		7.
	Reason (give number for each)		
	7a. Restored before patch was made		7a.
	7b. Maintenance line patch used		7b.
	7c. Other		7c.
8.	Total line outage time (in minutes) of sytems that TRCC did not patch on backbones (line 8 ÷ line 7)		8.
9.	Average line outage (in minutes) of systems that TRCC did not patch on backbones (line 8 ÷ line 7)		9.
10.	Number of TCXR bank failures		10.
11.	Total bank outage time (in minutes)		11.
12.	Average bank outage time (in minutes) (line 8 ÷ line 7)		12.
	Reason (give number for each)		
	12a. Power unit defective		12a.
	12b. Other		12b.

NAME	DATE	TELEPHONE NUMBER

TRCC Monthly Summary
Exhibit 4

System Control ☐

T-CARRIER SYSTEM AND SPAN TROUBLE HISTORY RECORD

E-10214
(11-76)

System or Span ID _____ Frame ID _____ Date in Service _____

Date	Trouble Tkt No.	Reported		Restored		Trouble Reported Or Test Made	Trouble Found	System Service Outage	Trouble Code
		Date	Time	Date	Time				

Trouble History Record
Exhibit 5

INITIAL FAULT LINE TESTS

E6988

1.

ORDER NO.	T _____ SPAN	OFC A	OFC Z
ENGINEERED BY	TELEPHONE NO.	DATE ISSUED	NEW ☐ CHANGE ☐
BAY NO.	FL LINE NO.	ACTIVE SW POS / CASE NO.	FAMILY PAIR ASSIGNMENT CABLE PAIR
TESTER _____ SUPV. _____	TELEPHONE NO.	DATE TESTED	INITIAL ☐ RETEST ☐

PAIR MAKEUP

2.

GA	kFT	LOOP RES
17		
19		
20		
22		
24		
25		
26		
TOTAL UNTERM		

DC TESTS FOR ACTIVE AND PASSIVE FL LINE

3.

FOREIGN VOLTAGE	T-R	V
	T-GRD	V
	R-GRD	V
LEAKAGE RES	T-R	MΩ
	T-GRD	MΩ
	R-GRD	MΩ
	ENGR	MEAS
TERM LOOP RES		
LOOP RES ① 386B ② STRAP		

① PASSIVE LINE

② ACTIVE LINE

DC TESTS FOR ACTIVE FL LINE

4.

FAULT LINE CURRENT (NO FRONT I_L PINS)			
POLARITY 1		POLARITY 2	
ENGR mA	MEAS mA	ENGR mA	MEAS mA

5.

VOLTAGE (PINS I_L +TO−)			
V1, NO PLUG IN FL LINE OUT JACK			mV
V2 POLARITY 1		V2 POLARITY 2	
ENGR mV	MEAS mV	ENGR mV	MEAS mV
V1+		V1+	

TRANSMISSION LOSS TESTS

6.

FREQ Hz	POLARITY 1		POLARITY 2	
	ENGR dB	MEAS dB	ENGR dB	MEAS dB
832				
2413				
3017				

NOISE AND TONE LEVEL TESTS

7.

MEASUREMENT AT OFC _____					
NOISE		TONE LEVEL			
BROAD BAND	NARROW BAND				
	POLARITY 1 OR 2	POLARITY 1	POLARITY 1	POLARITY 2	POLARITY 2
FL FILTER SEQ	MEAS	ENGR	MEAS	ENGR	MEAS
	dBm ☐ dBrn* ☐	dBm ☐ dBrn* ☐	dBm ☐ dBrn* ☐	dBm ☐ dBrn* ☐	dBm ☐ dBrn* ☐

* 10F +3A/3C READ 4dB HIGHER THAN TRUE dBrn, SUBTRACT 4dB FROM 3A/3C READING AND RECORD.

8.

OUTSIDE TEMPERATURE

°F

APPROVAL

9.

CRAFT TESTS RESULTS

☐ PASS

☐ FAIL

ENGR. _____

Initial Fault-Line Test Form E-6988
Exhibit 6