DS3/STS-1 Intra-Office Repeater (IOR) and Bridging Office Repeater (BOR) Systems

Technical Reference Standards
ATT-002-316-092

Audience: The primary audience for this document is the AT&T LOCAL EXCHANGE Company personnel in the following disciplines, Switch Capacity Planner/Engineers, Equipment Engineers, Maintenance Engineer, Space Planner, Frame Planner, Long Range Technical Planners, Outside Plant Engineers, Network Operations LFO-IN and Fundamental Network Planning. This document is to be used internally within AT&T LOCAL EXCHANGE companies and their AT&T Authorized Vendors and has a limited Distributing subject to the header/footer information.
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2. Introduction

The primary audience for this document is AT&T LOCAL EXCHANGE companies personnel in the following disciplines; Maintenance Engineer, Equipment Engineer, Space Planner, Frame Planner, Long Range Technical Planners, Fundamental Network Planning, Outside Plant Engineering and NSS organizations. This document is to be used internally and has a limited Distributing subject to the header/footer information. Related standards documents may be found on the internal web site: **http://woodduck, http://ebiz.sbc.com/commonsystems** or **http://apex.sbc.com**

This document has been updated to reflect Network Planning & Engineering (Common Systems Standards) for the following Incumbent Local Exchange Carriers, henceforth referred to as AT&T LOCAL EXCHANGE companies:

AT&T-East (Connecticut)
AT&T-West operating companies (California, Nevada)
AT&T-Southwest (Missouri, Texas, Arkansas, Oklahoma, Kansas)
AT&T-Midwest operating companies (Illinois, Wisconsin, Indiana, Ohio, and Michigan)

3. Technology

AT&T has approved for use select ***non-protected*** products from the ADC Telecommunications Inc. *DS3/STS-1 Intra-Office and Bridging Office Repeater Systems* line of products for deployment within Central Office environments under the ATT-PAN 2004-3341. This technology provides rerouting and distribution of DS3 and STS-1 signals within the Central Office, thus extending the maximum range these signals may travel with acceptable clarity and accuracy.

This technology uses the Zero Level Point (0dBm) in its system design for the testing reference point. However, the actual power level of the signal traffic is not necessarily 0dBm, it is normally below the reference level.

Intra-Office Repeaters (Intra meaning 'within' the CO)

The basic use of a digital Intra-Office repeater is to extend the length of the network media, i.e. the cable by the re-amplification of the signal at key points in its transmission path. Both noise and attenuation, inherent to signal transmission; can distort the signal to the point of incoherence without the use of repeaters within the circuit. Repeaters are used only for digital circuits; analog circuits use simple amplifiers for the same purposes. Optimal performance is achieved by proper placement within the signal path.

These are metallic repeaters specifically designated for coaxial cable facilities. Other types of repeaters include radio repeaters for cellular, microwave and satellite facilities and optical repeaters for fiber-optic facilities.

Bridging Office Repeaters

The basic definition of a bridge circuit is a data communications device that connects two or more network segments and forwards packets of data between them. The ADC Bridging Office Repeater (BOR) provides the means by which a temporary 'patching' of active DS3/STS-1 lines can be accomplished for an in-service transfer from one network element to another with minimum service disruptions. The patching of the signal is done from the monitoring jack (MON) on a DSX-3 module through the repeater to the IN jack on a second DSX-3 module. It also boosts the signal from its monitoring level to its full strength level.

In-service patching at the DSX-3 modules may cause a momentary hit that will cause reframes. This is normally short enough in duration that loss of service should not result. Proper precautions should be taken when in-service patching is required**. Provisioning IOR/BOR units on an existing circuit should be performed during the Maintenance Window 2200-0600 Hours.**

4. Proper Network Application

Design Criteria

As detailed in the ATT-E-00067-E Drawing, a repeater should be applied to the circuit using the following design criteria:

- The cable distance exceeds 415 ft. between the ***Network Element*** and a ***DSX-3***
- The cable distance exceeds 415 ft. between a ***DCS*** and a ***DSX-3***.
- The cable distance exceeds 900ft between the ***Network Element*** and a ***DCS***
- The cable distance exceeds 900 ft. between ***2 DCS*** elements

Note: Repeaters are not necessarily required for cable paths simply because they go vertically between floors. Only when the cable distances are in excess of the stipulated limitations identified above.

Intra-Office and Bridging Office Repeater Systems are suitable for use in both large and small offices. The systems are modular in design and serve as signal regeneration, routing and distribution elements with switch selectable data rate capacity for the DS3 and STS-1 signal types. The use of a mounted or portable chassis' with plug-in modules allows for site-specific design to match the unique needs of each location. As stated within ATT-E-01117-E, note 4G, the Rack Mount chassis using BOR modules is only to be used within the East region. When the East region is installing the Rack Mount Chassis for use with BOR modules is to be installed within the maintenance bay. All other areas are to use the portable chassis setup for the BOR applications. The Rack Mount chassis is always to be used with the IOR applications. The IOR/BOR modules may be applied to the circuit in one of two manners:

1) A redundant regenerator connected to one DS3/STS-1 signal circuit
2) Two unique single regenerators connected to (2) separate DS3/STS-1 signal circuits

Power Requirements

Each individual repeater module contains an imbedded power supply eliminating the need for chassis mounted power supplies. The chassis requires (2) redundant –48 V CO power feeds using a screw down terminal block connection located at the left end of the chassis backplane.

The IOR/BOR modules are powered by a 96-pin connector within the chassis using an imbedded DC/DC converter for the necessary voltage for regeneration of the signal. Each IOR/BOR module also contains “non-user replaceable” over-current protection.

5. System Elements

The ADC Telecommunications Inc. *Intra-Office and Bridging Office Repeater Systems* are comprised of two primary elements: (1) The Chassis and (2) The IOR/BOR Repeater Modules themselves. The elements can be configured in numerous combinations of size as well as being permanently rack mounted or applied by portable chassis’.

5A. Chassis

- **RP3-2A0000** Repeater Shelf
  Description: 16-position, Rack Mount Chassis
  Dimensions: (6” high, 23” wide, 11.7” depth)
  Drawing: ADCP-61-061
  CLEI: T3MS2A0BRA
  PID (12 St/East): 260643416 / 3588453

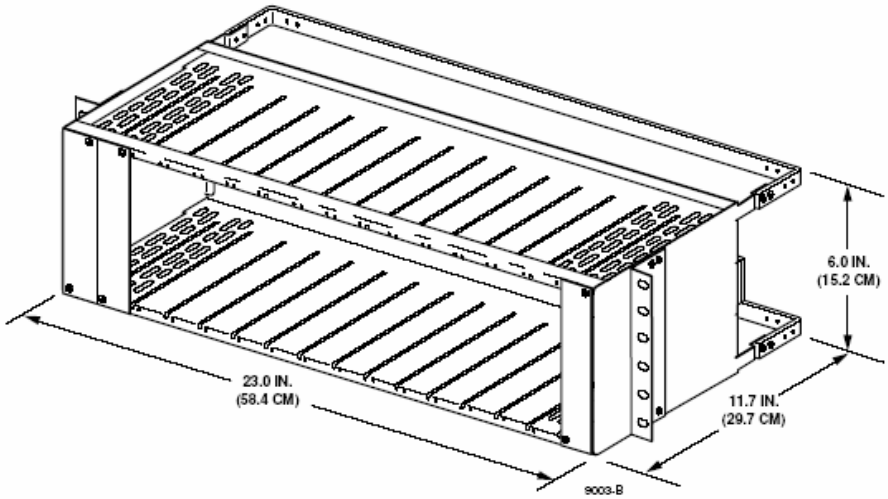
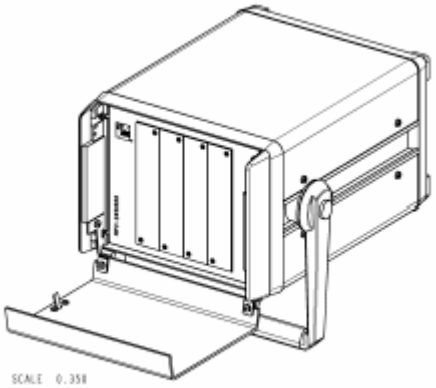
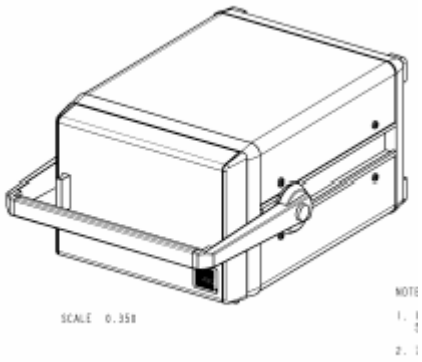
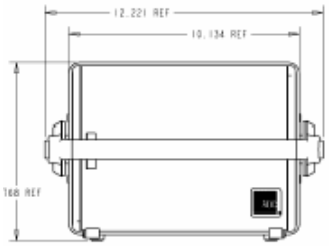


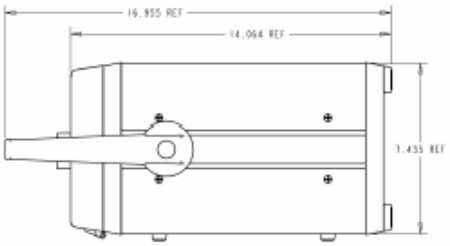
Figure 3-2. 23-Inch Rack Mount Chassis

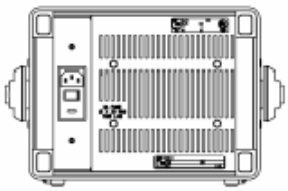
- **RP3-3X0000** Repeater Shelf – Portable Protected BOR Chassis
  Description: 4-position, Portable Chassis
  Dimensions:
  Drawing:
  CLEI:
  PID: 301121265 / 3588456











5B. Non-Protected Repeater Modules

- **RP3-A20000** Non-Protected Repeater Shelf
  Description: DS3/STS-1 Dual IOR w/ Alarm Shutoff
  Dimensions: (6" high, 1.3" wide, 9" depth)
  Drawing: ADCP-61-061
  CLEI: T3RGHBC2AA
  PID (12 St/East): 260645122 / 3588449

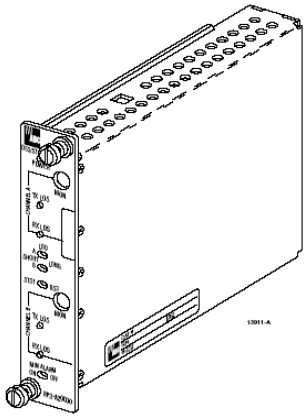


Figure 3-7.61758 DS3/STS-1 IOR Module with Alarm Enable/Disable

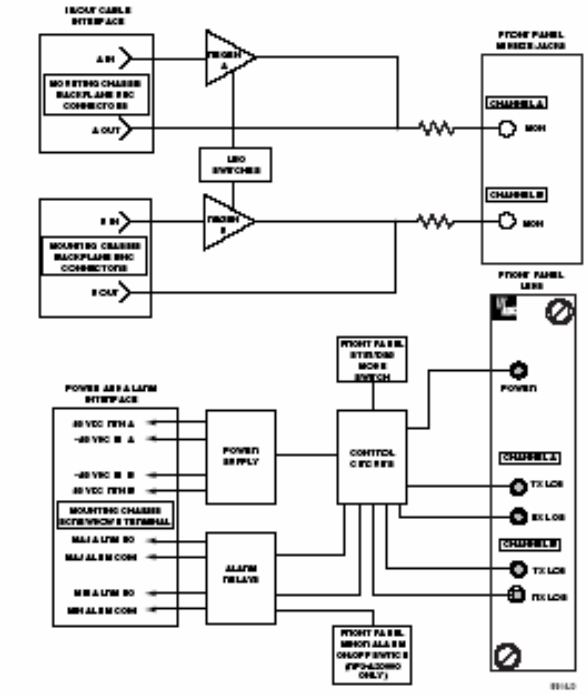


Figure 3-10. DS3/STS-1 IOR Module Block Diagram

- **RP3-B10000** Non-Protected Bridging Repeater Shelf
  Description: DS3/STS-1 Dual BOR (bridging office repeater)
  Dimensions: (6" high, 1.3" wide, 9" depth)
  Drawing: ADCP-61-061
  CLEI: T3RGJB02AA
  PID (12 St/East): 301008777 / 3588451

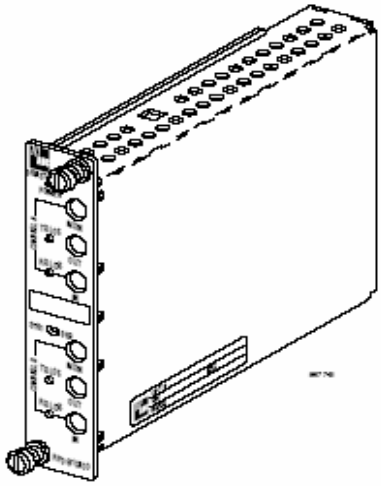


Figure 3-15. DS3/STS-1 BOR Module

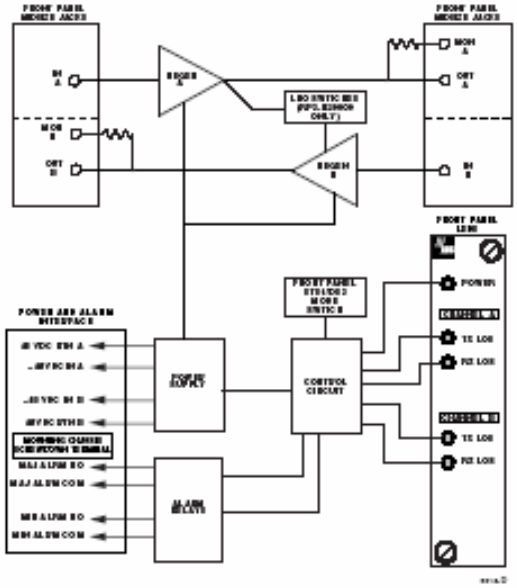


Figure 3-19. DS3/STS-1 BOR Block Diagram

6. Installation

AT&T standards present the portable chassis application as the preferred and first choice application for this equipment. When using the portable equipment installation is naturally not a concern. However, in some situations it is more appropriate and effective to use a rack mount and permanent placement of this equipment. In these instances installation of the Intra-Office and Bridging Office Repeater Systems requires the following:

- Mounting of the Chassis in a Maintenance Bay
- Connection of (2) redundant –48V DC Central Office Power feeds
- Connection of the frame ground
- Connection of the alarm wires
- Connection of the input/output coaxial cables to the BNC connectors per IOR/BOR module to be installed
- Installation of each IOR/BOR module required

7. Planning and Ordering

7A. Planning Guidelines

Use the Transport, Infrastructure Deployment Guidelines (IDG), Section 16, dated June 2004 for DSX-1 and DSX-3 Frames.

7B. Ordering and Building Blocks Data

Reference Product Approval Notice ATT-PAN-2004-3341, IOR/BOR Approval for Use. This PAN replaces the existing grandfathered PAN 20001109, IOR/BOR Approval for Use in its entirety.

AT&T - Region	OEM	Part Number	New PID	*East* PID	Description	BB Reference
West, Midwest, Southwest & East	ADC	RP3-A20000	260645122	3588449	DS3/STS-1 (Sonet) Intra-office Repeater Module.	F03, F04, F04X
West, Midwest, Southwest & East	ADC	RP3-B10000	301008777	3588451	DS3/STS-1 (Sonet) Dual Bridging Office Repeater (BOR)	N/A
West, Midwest, Southwest & East	ADC	RP3-2A0000	260643416	3588453	16-Position, Rack Mounted Chassis	F03, F04, F04X
West, Midwest, Southwest & East	ADC	RP3-3X0000	301121265	3588456	4-Position, Portable Chassis	N/A

8. Records Assignments

8A. Reporting Codes

All products listed in this Infrastructure Deployment Guideline (IDG) are baseline funded at this time. This product line is classified as Major Materials and should be charged to the appropriate Field Report Code (FRC) in accordance with the Accounting Handbook Telephone Plant. Check

with your Equipment or Outside Plant Engineer funding Manager for the correct Account Classification Coding before ordering of IOR/BOR products.

8B. TAB/db

The Tabular Database (TAB/db) is the inventory management tool for all DSX, panel and port assignments by type for AT&T Central Offices. The orientation is to provide support to the Equipment Engineer (NP&E) groups for provisioning of bays and panels. The TAB/db inventory system is being enhanced to cover the dedication of cable assignments on IOR panels and cards. TAB/db will not provide circuit level assignment reference points or jumper cross-connect routes. TAB/db offers numerous training sessions on the use of the system, refer to the AT&T LOCAL EXCHANGE company's web site: http://woodduck/tab_training.htm

The Equipment Engineer may begin in 2 ways after creating spec to work in:

- Locate panel which requires connector type changes (if list of panels is available)
- Query the system for fiber assignments and check each panel returned by the query for updates.

Tab/dB Steps

1. Create a Record Only spec by using A7x if the internal to AT&T or V7x if a vendor performs (where x = the next available number from 0-9).
2. Once the assignment chart is located select the 1st line to be changed.
3. Click in the "Connector Type" field to activate the drop-down menu and select the appropriate connector type (should be BNC normally).
4. Once the changes are complete click "Save".
5. Once the changes are saved select "Copy Special" from the Edit menu.
6. Select the next position that needs to be changed and select "Remove" from the Status menu.
7. Select the number of assignments to remove by using the shift key for contiguous positions and the control key for noncontiguous positions. (Note: be sure they are all assigned to the same network element.)
8. Then click "OK " to remove them.
9. Select "Paste Multiple" from the Edit menu.
10. Select the number of assignments to paste by using the shift key for contiguous positions and the control key for noncontiguous positions. (Note: be sure they are all assigned to the same network element.)
11. Then click "OK" to paste them with the new connector type.

8C. TIRKS

TIRKS assignments will be made based upon the serving location or the network equipment chosen for the network feed through the use of Cross-Connect Point Codes. The assignments are made through the use of CLLI®, CLFI® and CLEI® codes established by Telcordia Technologies Inc.

The link below will provide you with the TIRKS M&P for the deployment of Optical Splitters within the AT&T Network. Please refer to the most current version of the linked TIRKS M&P for Optical Splitters for clarification of the TIRKS process.

http://saasl03.sbc.com/tirks/Mp-docs/OPTICAL_SPLITTER_Iss_3.doc

9. References

For further information or electronic copies of this document and related information, visit the internal AT&T LOCAL EXCHANGE companies web site: **http://ebiz.sbc.com/commonsystems** or **http://apex.sbc.com**. Drawings may be viewed on the AT&T LOCAL EXCHANGE companies' web site: **http://woodduck/standarddrawings/sbc/cbc-index.htm**

Document	Description	Issue & Date
Transport IDG, Section 16	IDG, DSX-1 and DSX-3 for the Central Office	Current Issue (2004)
ATT-E-01150-W	Drawing – ADC DS3/STS-1 Bridging Repeaters	Issue 2, Feb. 2002
ATT-E-01150-E	Drawing – ADC DS3/STS-1 Bridging Repeaters	Issue 4, Feb 2002
ADCP-61-061	DS3/STS-1 Protected Repeater System User Manual	Issue 3, Aug 2000
ATT PAN-2004-3341	AT&T PAN for ADC IOR/BOR Repeater Systems	Issue 1, Aug 2004

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