

**TD-45A DIGITAL RADIO SYSTEM
OVERALL SYSTEM DESCRIPTION
COMMON MICROWAVE RADIO**

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1. INTRODUCTION

1.01 The TD-45A Digital Radio System provides long-haul 45-megabits per second (Mb/s) data transmission capability between DSX3 cross-connect points using the TD radio network. The system architecture for the TD-45A system includes a frequency diversity protection channel shared between analog FM and 45-Mb/s digital service, and uses nonregenerative TD radio repeaters conditioned for 45-Mb/s digital transmission. The TD-45A system channels may coexist with analog FM channels on the same TD radio route if the TD-45A interference requirements are met.

1.02 Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.

1.03 The TD-45A system is realized by the addition of a 45A Line Terminating System (45A LTS) and 45-Mb/s modulator-demodulator (MODEM) to solid state TD-2 or TD-3D radio bays and to 100A or 400A Frequency Diversity Protection Switching Systems which have been modified for 45-Mb/s digital transmission. Switching sections of up to 12 radio hops in length may be used with the TD-45A system. The 45A LTS is designed for a maximum of 6 TD radio channels carrying 45-Mb/s, that is, a 1 X 6 protection switching configuration for the TD-45A system.

1.04 Digital performance on the TD-45A system during normal unfaded conditions will be essentially error free. Outage performance of both the 45-Mb/s digital and the analog FM channels will be consistent with long-haul objectives through the use of amplitude slope equalization and RF space diversity combining. The frequency diversity protection channel will be available to both the 45-Mb/s digital and the analog FM channels for equipment outages and for maintenance activities.

2. TD-45A SYSTEM DESCRIPTION

2.01 The TD-45A Digital Radio System provides 45-Mb/s digital transmission capability over a radio switching section using digitally-conditioned TD-2 or TD-3D radio hops without individual repeater regeneration. A block diagram of the TD-45A system using the switching section as the basic building block is shown in Fig. 1. Terminal equipment at the switching section stations includes the 45-Mb/s digital MODEM, the 45A LTS, and a 100A or 400A Protection Switching System modified for the TD-45A system.

2.02 The DS3 (44.736 Mb/s) digital data baseband signals are connected from the DSX3 cross-connect panel to the transmitting end of the 45 LTS. Each TD-45A regular channel DS3 signal is split into two paths by a hybrid-splitter in the input section of

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the 45A LTS. One DS3 path for each TD-45A channel is connected to the modulator (MOD) section of a regular channel 45-Mb/s MODEM. The 45-Mb/s modulators convert the DS3 baseband signal into an IF 45-Mb/s digital signal centered at 70-MHz. The 45-Mb/s IF signal for each regular TD-45A channel is cabled directly to the input of its assigned TD radio transmitter.

2.03 The second DS3 path is directed through the 45A LTS transmitting end switching to the protection channel MODEM. The IF output from the protection channel MODEM is cabled into the transmitting bay of the 100A or 400A Protection Switching System. The 45-Mb/s digital IF signal is used as the protection channel idle signal to allow for hitless switching of TD-45A channels.

2.04 At the receiving end of the switch section, the 45-Mb/s digital IF signal from each TD-45A channel is connected to a 45-Mb/s demodulator (DEMOM). The demodulator reconverts the 45-Mb/s digital IF signal back into the DS3 baseband format. The receiving section of the 45A LTS decodes the DS3 signal to allow for performance monitoring and then recodes the digital signal into the DS3 format for the interconnect to the DSX3 cross-connect panel. Since the TD protection channel may carry either a digital or analog signal, the IF output from the protection channel receiver is split into two signal paths. One IF signal path is connected to the protection channel demodulator and the second IF signal path is connected to the protection channel input to the frequency diversity protection switching receiving bay. The former path is for the 45-Mb/s digital signal, when it is present; and the latter path is for an analog FM signal, when it occupies the protection channel.

2.05 Analog FM signals are connected through the transmitting protection switching bay in the standard manner to the TD radio channels assigned for their transmission. Control of the protection channel is combined between the 45 LTS and 100A or 400A switch control. The receive paths of the analog FM channels are the same as in a radio system which is not equipped for 45-Mb/s operation. Additional TD-45A system details may be found in the Application Engineering Section 422-501-103.

3. SYSTEM ELEMENTS MODEM

3.01 The MODEM equipment used with the TD-45A system is supplied by an outside vendor.

The MODEM converts a standard DS3 signal into a 45-Mb/s IF signal in the modulator section, and reconverts the 45-Mb/s IF signal into the standard DS3 signal in the demodulator section. The modulator (transmit) and demodulator (receive) sections are separately alarmed as they are in separate directions of transmission. Description and maintenance information on the 45-Mb/s MODEM is supplied by the vendor.

A. TD Radio

3.02 The TD-2 and TD-3D radio bays must be modified when equipped to carry a 45-Mb/s digital signal. These modifications include the addition of an adaptive amplitude slope equalizer and a reduction of the signal levels within the radio bay. One of the more significant modifications is the reduction of RF output power to +25 dBm (or lower). These modifications are described in more detail in Sections 410-410-100 and 415-200-100. The TD radio channels adjacent to 45-Mb/s channels may need to be modified to reduce interferences. The adjacent channel modifications are described in the Application Engineering Section 422-501-103.

B. 45A Line Terminating System

3.03 The 45A LTS provides the frequency diversity protection switching and performance monitoring for the TD-45A channels. The 45A LTS description, operation, and maintenance procedures are covered in Section 422-501-104.

C. 100A Protection Switching System

3.04 The 100A Protection Switching System is modified to share the TD protection channel between analog FM and TD-45A channels. The 100A-45A application information is covered in Section 422-501-105.

D. 400A Protection Switching System

3.05 The 400A Protection Switching System is modified to share the TD protection channel between analog FM and TD-45A channels. The X protection channel output line amplifier gain is reduced to +4 dBm. The 400A-45A application information is covered in Section 422-501-106.

4. TD-45A SYSTEM SECTIONS

4.01 A complete list of BSPs associated with the TD-45A system are provided in the following

list. The list includes BSPs affecting the 45 LTS, TD-2 radio, TD-3D radio, 100A Protection Switching System, and 400A Protection Switching System.

SECTION	TITLE	SECTION	TITLE
410-410-100	TD-2, Description	420-620-100	400A Protection Switching System, Overall System, Description
410-410-500	TD-2, Tests	420-620-116	400A Protection Switching System, Receiving Logic, Description
410-410-506	TD-2, IF Main Amplifier and Carrier Resupply	420-620-135	400A Protection Switching System, Transmitting Logic, Description
410-410-508	TD-2, Transmitter Amplifier	420-620-300	400A Protection Switching System, System Operation
410-410-509	TD-2, Transmitter Control Panel and Output Monitor and Power and Metering Panel	420-620-501	400A Protection Switching System, Overall System Routines, System Tests
415-200-100	TD-3D, Description	420-620-502	400A Protection Switching System, J68429A Transmitting IF Switch and Control Bay, System Tests
415-301-500	TD-3D, Overall Receiver Tests Using J68345A Test Set	420-620-503	400A Protection Switching System, J68429B Receiving IF Switch and Control Bay, System Tests
415-301-501	TD-3D, Overall Transmitter Tests Using J68345A Test Set	420-620-504	400A Protection Switching System, J68429A Supplementary IF Switch and Control Bay, System Tests
415-301-502	TD-3D, Overall Repeater Tests Using J68345A Test Set	420-626-500	400A Protection Switching System, Troubleshooting
415-401-500	TD-3D, Overall Receiver Tests Using J68392A Test Set	422-501-100	TD-45A Digital Radio System, Overall System Description
415-501-500	TD-3D, Overall Receiver Tests Using J68428A Test Set	422-501-101	TD-45A Digital Radio System, Maintenance Plan
415-501-501	TD-3D, Overall Transmitter Tests Using J68428A Test Set	422-501-102	TD-45A Digital Radio System, Preservice Implementation
420-610-100	100A Protection Switching System, Overall System, Description	422-501-103	TD-45A Digital Radio System, Application Engineering
420-610-300	100A Protection Switching System, System Operation	422-501-104	45A Line Terminating System, Description, Operation, and Maintenance
420-610-502	100A Protection Switching System, J68381B Receiving IF Switch Bay, System Tests	422-501-105	100A-45A Interface Circuits, Application
420-610-504	100A Protection Switching System, J68381A Transmitting IF Switch and Control Bay, System Test		
420-610-506	100A Protection Switching System, Overall System, System Tests		

SECTION 422-501-100

SECTION	TITLE	SECTION	TITLE
422-501-106	400A-45A Interface Circuits, Application		Set, Tests
422-501-107	TD-45A Digital Radio System, Trouble Clearing	422-501-110	45A Line Terminating System, Performance Requirements
422-501-109	TD-45A Digital Radio System, ME645A Anritsu Microwave Test	422-300-500	Overall TD System Test, Envelope Delay Distortion
		422-300-512	Overall TD and TH Systems, Fade Margin Test

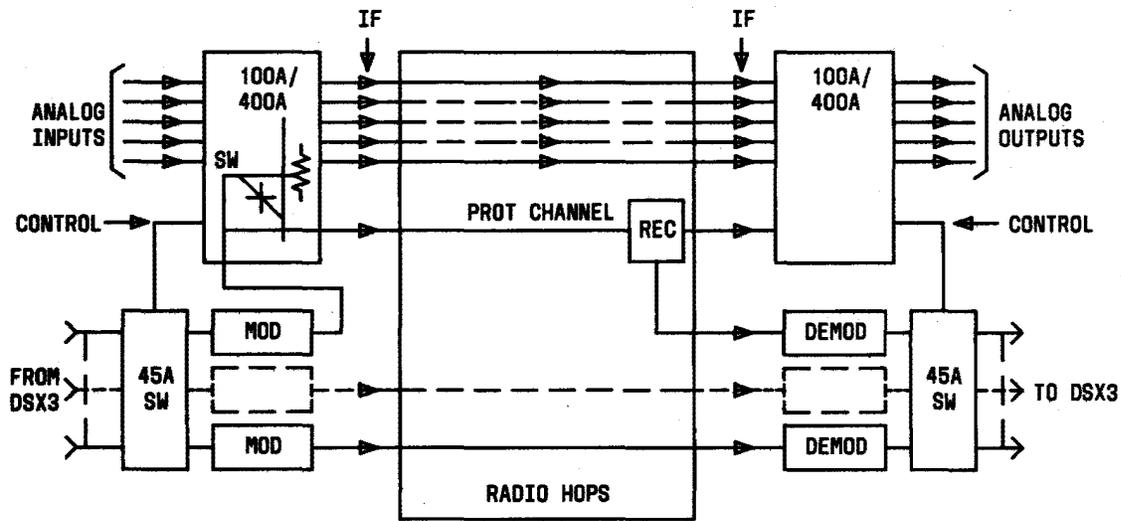


Fig. 1 — TD-45A System Block Diagram