EQUIPMENT OVERVIEW / DESCRIPTION

MBTA System Wide Radio Tunnel Antenna Distribution System provides extended radio coverage within MBTA rail transit tunnels. The new tunnel antenna system is a two-way communication system consisting of 400 MHz base transceiver stations, 800 MHz base transceiver stations, antennas, radiating cable, fiber optic cable and BDAs. Both the 400 MHz and 800 MHz systems operate independently. The 400 MHz system operate as a conventional analog voice communication system and the 800 MHz system operate as a digital trunked radio system for voice and data communications. Radio signals routed from the base transceiver stations to the BDAs are performed via fiber optic cable. Once the optical signal is received by the BDA, it is converted back into an electrical (RF) signal, amplified and transmitted throughout the tunnel antenna distribution system. For RF signals transmitted within the tunnel, they are received by the BDA, amplified, converted into a optical signal and sent via fiber cable to the base transceiver stations.

Each BDA is designed for a 19" rack mount cabinet and is equipped with interchangeable modules. These modules are field replaceable by removing them from the front chassis of the BDA. The modules consist of a downlink amplifier, uplink amplifier, high isolation duplexer, low isolation duplexer (400 MHz RF fed BDA only), fiber optic transceiver (fiber fed BDA only) and a AC to DC power supply. and alarm module (Optional Equipment). All BDA controls are performed via a RS232 connector located on the front panel of each amplifier module.

Each BDA has 30 dB of gain adjustment for both the uplink and downlink RF path. This adjustment is varied electronically thru the amplifier modules' front panel RS232 connector. Additionally, each of the amplifier modules are equipped with an Automatic Level Control (ALC) circuit which can limit the maximum power level produced by the BDA.

OPTIONAL EQUIPMENT (Not Used By MBTA)

An alarm module is available as an option to serve as a central communication agent to monitor the status of each module and send a summary alarm to remote locations via the fiber optic transceiver module.

SPECIFICATION

Parts Lists

400 MHz Bi-Directional Amplifier

Andrew Part Number	Description	Qty.	Section

AE04A-D1264-001	400 MHz EO Cell Amplifier Module	2	5.1
AE04A-D1442-001	480 MHz High Isolation Duplexer	1	5.2
AE04A-D1443-001	480 MHz Low Isolation Duplexer[1]	1	5.3
AE04A-D1100-009	Fiber Optic Transceiver Module	1	5.6
AE04A-D0803-002	+48V Power Supply Module	1	5.7
AE04A-D0805-007	Alarm Module (Optional Equipment)	1	5.8

1.Used in RF Fed BDA.

800 MHz Bi-Directional Amplifier

Andrew Part Number	Description	Qty.	Section
AE04A-D1265-001	800 MHz EO Cell Amplifier Module	2	5.4
AE04A-D1438-001	800 MHz High Isolation Duplexer[1]	1	5.5
AE04A-D1100-009	Fiber Optic Transceiver Module	1	5.6
AE04A-D0803-002	+48V Power Supply Module	1	5.7
AE04A-D0805-007	Alarm Module (Optional Equipment)	1	5.8

1.Two units required for RF Fed BDA.

Electrical Specifications

400 MHz Bi-Directional Amplifier Downlink Specification

PARAMETER	DOWNLINK SPECIFICATION
Operating Frequency Range	483.1625 – 483.2375 MHz
Pass Bandwidth	75 kHz
Gain Typical	48 dB
Output Gain Adjustment[1]	30 dB
Power Output @ 4 Carriers	+19.0 dBm/C
Composite Output Power	+30 dBm max.
Composite Input Power	-18 dBm max.
Impedance	50 Ohms
VSWR	2:1
OIP3[2]	+44 dBm
Noise Power max. @ 48dB Gain	-64 dBm/Hz (-110 dBm/Hz; RF Fed BDA)
AC Power	120 VAC Single Phase

Notes:

1.Via Front Panel RS232 Connector.

2. Two-Tone Intermodulation: Measured two-output carriers at +20.0 dBm/C (+19.0 dBm/C for RF Fed BDA) at 483.1625 MHz and 483.2375 MHz with a BDA gain setting of 48 dB.

400 MHz Bi-Directional Amplifier Uplink Specification

PARAMETER	UPLINK SPECIFICATION
Operating Frequency Range	486.1625 – 486.2375 MHz
Pass Bandwidth	75 kHz
Gain Typical	48 dB
Output Gain Adjustment[1]	30 dB
Composite Output Power	+5 dBm max.
Composite Input Power (With ALC Activated)	-14 dBm max.
Impedance	50 Ohms
VSWR	2:1
OIP3[2]	+ 26 dBm (+44 dBm; RF Fed BDA)
Noise Power max. @ 48 dB Gain	-110 dBm/Hz
AC Power	120 VAC Single Phase

Notes:

1.Via Front Panel RS232 Connector.
2. Two-Tone Intermodulation: Measured two-input carriers at – 48 dBm/C (-30 dBm/C for RF Fed BDA) at 486.1625 MHz and 486.2375 MHz with a BDA gain setting of 48 dB.

800 MHz Bi-Directional Amplifier Downlink Specification

PARAMETER	DOWNLINK SPECIFICATION
Operating Frequency Range	866 – 869 MHz
Pass Bandwidth	3 MHz
Gain Typical	48 dB
Output Gain Adjustment[1]	30 dB
Power Output @ 16 Carriers	+11.1 dBm/C
Power Output @ 8 Carriers	+16.8 dBm/C
Composite Output Power	+30 dBm max.
Composite Input Power	-18 dBm max.
Impedance	50 Ohms
VSWR	2:1
OIP3[2]	+44 dBm
Noise Power max. @ 48dB Gain	-64 dBm/Hz (-110 dBm/Hz; RF Fed BDA)
AC Power	120 VAC Single Phase

Notes:

1.Via Front Panel RS232 Connector.
2. Two-Tone Intermodulation: Measured two-output carriers at +23.5 dBm/C (+16.8 dBm/C for RF Fed BDA) in the 866 – 869 MHz band, with a BDA gain setting of 48 dB.

800 MHz Bi-directional Amplifier Uplink Specification

PARAMETER	UPLINK SPECIFICATION
Operating Frequency Range	821 – 824 MHz
Pass Bandwidth	3 MHz
Gain Typical	48 dB
Output Gain Adjustment[1]	30 dB
Composite Output Power	+5 dBm max.
Composite Input Power (With ALC Activated)	-14 dBm max.
Impedance	50 Ohms
VSWR	2:1
OIP3[2]	+ 26 dBm (+44 dBm; RF Fed BDA)
Noise Power max. @ 48 dB Gain	-110 dBm/Hz
AC Power	120 VAC Single Phase

Notes:

1.Via Front Panel RS232 Connector.
2. Two-Tone Intermodulation: Measure at two-input carriers of -48 dBm/C (-30 dBm/C for RF Fed BDA) in the 821 – 824 MHz band, with a BDA gain setting of 48 dB.

Mechanical Specifications

PARAMETERS	SPECIFICATION
RF Connectors	Type-N Female
RS232 Connector	D-Sub, 9 pin
Mounting Configuration	19.0 inch Rack Mount
Dimensions Typical (HxWxD)	6.4 in. x 19.0 in. x 15.8 in.
Cooling	Convection, External Heatsink
Chassis Stud	Ground

Environmental Specifications

PARAMETERS	SPECIFICATION
Operating Temperature	-20°C to +60°C
Operating Relative Humidity	5% to 95% (Non-Condensing)

Dry Storage Temperature	-25°C to +60°C
ESD & EMI[1]	IEC 65 (Secretariat) 129 Draft Pub. 801-2
Shock, Vibration and Moisture Resistance[2]	MIL-STD810(E)

Notes:

1. Electromagnetic Compatibility (ESD) Part 2.
2. Shock-Method 516.4 Procedure I (20g's), Vibration-Method 514.4 Category 1, Moisture Resistance-Method 506.3 Procedure II.