EXHIBIT 8

OWNER'S MANUAL

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USER MANUAL
FOR
BART AATC RECEIVER-TRANSMITTER

1721375-100

RAYTHEON SYSTEMS COMPANY
EL SEGUNDO, CALIFORNIA

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SCOPE

This User Manual describes the Bay Area Rapid Transit (BART) Advanced Automatic Train Control (AATC) Receiver-Transmitter (RT) portion of the BART AATC Radio Set (RS), its installation, and conditions of usage.

APPLICABLE DOCUMENTS

The following Government regulations form a part of this User Manual to the extent specified herein. In the event of a conflict between the regulations referenced herein and the contents of this manual, the regulations shall be considered a superseding requirement.

Title 29, Code of Federal Regulations, Chapter XVII, Part 1910, Subparts G, I, & L	Occupational Safety and Health Standards
Title 47, Code of Federal Regulations, Part 15, Subpart C	Federal Communication Commission Rules

RECEIVER-TRANSMITTER DESCRIPTION

RT Definition

The RT is a multi-functional digital data transmitter-receiver used in BART AATC system for digital data communication and range measurement. The RT with suitable antenna and mounting/installation kits is a BART AATC RS and can be used in a variety of vehicle and wayside configurations. The RT is identical in all RS configurations. Only the differences in the mounting and installation kit (Antenna, Power Source, and mounting) define a specific RS configuration and its use.

RT Operation

The RT provides for data exchange between RSs, between the RT and a Train Controller, and between the RT and a Station Computer. The RT has serial interface capability to a Global Positioning System (GPS) Receiver and the Radio Test Set (RTS), a specialized test equipment.

The RT operation is controlled by firmware (imbedded software). The RT hardware, in combination with this firmware, is designed for operation in a communications network of similar RTs to perform train control or other similar applications. A network can contain as few as two RTs or as many as several hundred RTs. The firmware is specifically designed to support networks of RTs spread out along railways or tunnels, where multiple radio frequency (RF) links may need to be cascaded to provide communications from a source to a remote destination. Highly reliable communications is provided through a variety of techniques including spread spectrum and redundant RF channels.

Using the RF communications signals, the RTs cooperatively measure the range between pairs of RTs. The range measurements are reported to a Control Station, which is connected to one of the RTs in a network, and the Control Station can use these ranges to establish and track the locations of RT equipped vehicles.

The RT operates in the 2.40 to 2.48 GHz frequency band. Its transmit center frequency can be controlled to be anywhere from 2,424.75 to 2,455.75 MHz in 1 MHz steps. The RTs share the RF band using a combination of time division, frequency division, and code division multiple access techniques. The communications network structure is managed by a control station computer, which assigns time and frequency resources to each of the RTs.

Functional Elements

The RT consists of five major modules of functional elements as shown in Figure 1 and described in the following subparagraphs:

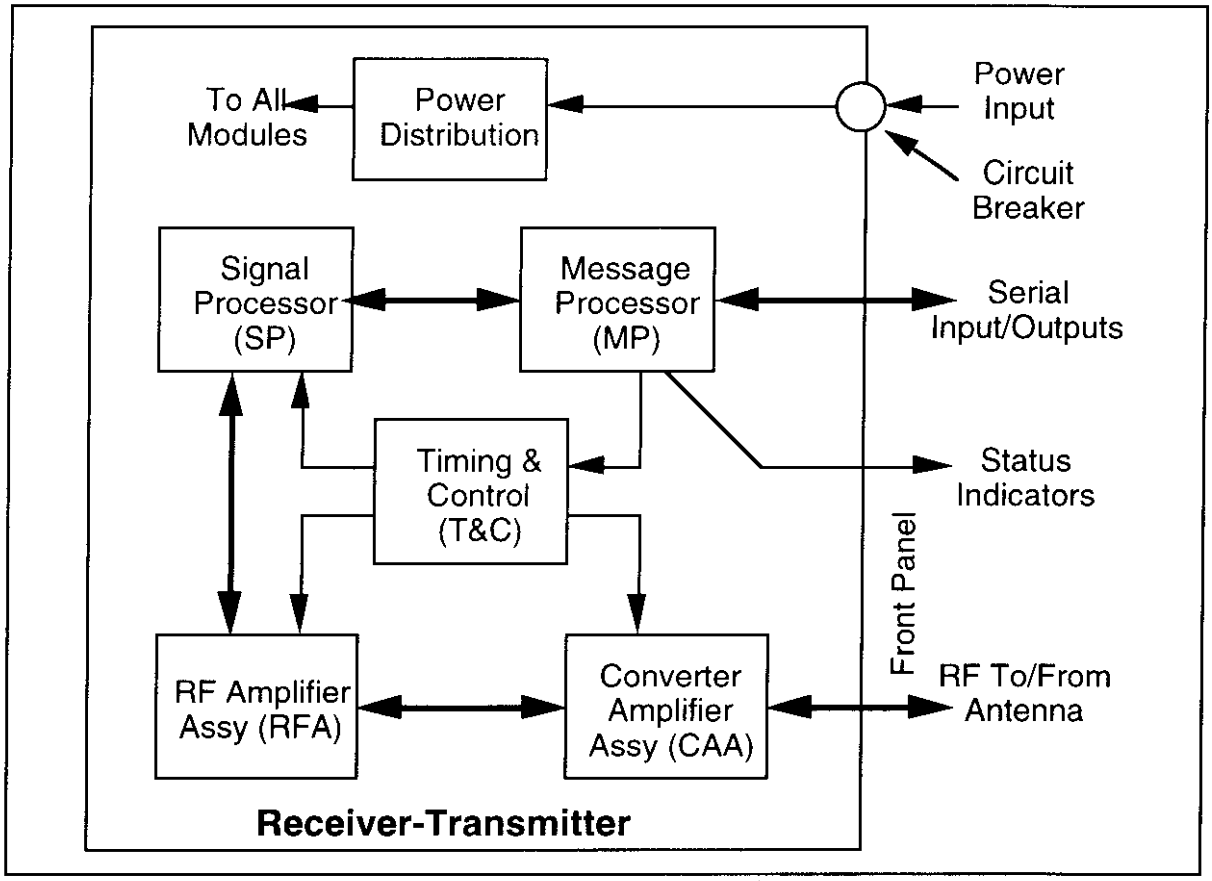

Figure 1 - RT Functional and Interface Diagram

Power Distribution

The Power Distribution module provides power to all electronics within the RT and contains the regulators, power line filters, power switching and protective circuitry required by the RT.

Signal Message Processor (SMP)

The SMP module consists of two circuit card assemblies and provides the following functions: Message Processor (MP), Signal Processor (SP), and Timing and Control (T&C).

MP

The MP generates, decodes, validates, and processes messages. It also time sequences all other processes performed within the RT. All MP processes are under RT firmware (software) control.

SP

For transmitted signals, the SP performs error correction encoding. In addition the SP generates pseudo noise (PN) codes for spectrum spreading. For received signals, the SP performs spread spectrum demodulation, error detection and correction, and range measurements.

T&C

The T&C generates timeslot timing and enable/disable control signals required by the RT.

Radio Frequency Assembly (RFA)

For the transmitted signals, the RFA module performs spread spectrum modulation, RF frequency selection, low level amplification, and filtering. For the received signals, the RFA module performs RF frequency selection, amplification, filtering, and analog-to-digital conversion of the spread spectrum signal.

Converter Amplifier Assembly (CAA)

The CAA module performs frequency conversion, amplification, and filtering of the transmitted and received signals.

External Physical Interfaces

The RT implements the following interfaces, shown in Figure 1. All interfaces are located on the front of the RT. These interfaces allow the operator to control RT power and to monitor operation of the RT. In addition, they support the external connections for the Antenna, GPS Receiver, Train Controller, Station Computer, and Radio Test Set.

Operator Interface

The operator Interface provides the means by which the operator controls and monitors operation of the RT. The following controls and indicators are provided on the front of the RT.

Controls

The only control provided is a circuit breaker for the main power input. The breaker may be used to turn power ON or OFF within the RT.

Caution: If the RT is to be opened power must be removed by means other than the circuit breaker.

Indicators

The RT provides the operator with the externally visible indications described below.

Power

The POWER indicator is a green LED which provides the operator with an indication that proper power is applied to the RT.

Fault

The FAULT indicator is a red LED which provides the operator with an indication that the RT's firmware has encountered a failure and is not ready for operation. This indicator is momentarily turned on during power-up.

Mode

The MODE indicator is a yellow light emitting diode (LED). The indicator provides the following indications:

a. In Power Up mode, during the operational checks, the indicator will be on. Otherwise, the indicator will, under firmware control, blink on and off in accordance with the following ratios:

Net Acquisition:	7 ON/ 1 OFF
Time Synchronized	3 ON/ 1 OFF
Time Stabilized	1 ON/ 1 OFF
A Assignment Received	1 ON/ 3 OFF
B Assignment Received	1 ON/ 7 OFF
Both Assignments Received	1 ON/ 15 OFF

The minimum on or off period is 0.5 seconds.

Serial Interface

The Serial interface allows the RT to communicate with one of several types of devices. An RT may have no serial devices connected, or it may have from one to three such devices connected. The Serial interface consists of three types of interface:

a. A full duplex link for interfacing to a vehicle controller or a host computer, such a at a control station. This is the primary data communications interface for the RT.

b. A signal interface for a Product Identification Module (PIM). The PIM is located in the installation cabling and can be used to provide site specific and radio network initialization data.

c. A full duplex link for interfacing to a GPS Receiver. This interface also includes the 1 pulse per second (PPS) timing signal from the GPS receiver. When used, this interface allows a RT to synchronize its timing, and that of an RF connected RT network, to the timing of the GPS.

Serial Interface Connectors J1 and J2 are located on the Front of the RT and are part number D38999/24WD35SN. For detailed connection information see schematic drawing 1721375-200

Antenna Interface

The Antenna Interface allows the connection of the required external antenna. The Antenna connector (ANTENNA) is located on the front of the RT and is a 50 ohm, type N connector.

Power Interface.

The RT requires external direct current (DC) power for operation. The RT converts the input DC power to those voltages required by the RT electronics. The physical interface consists of an externally accessible power connector.

Power Input.

The RT operates with a power input having the following characteristics:

Input Voltage: +21.0 VDC to +40.0 VDC

Input Current: <1.5 Amperes peak during normal operation

Normal Power Consumption.

The total RT power consumption is less than 20 watts average.

Peak Current Demand

Under all operating conditions, the peak current consumed by a RT is be less than one ampere averaged over 1.0 second or longer.

Overvoltage Protection.

The RT does not sustain permanent damage when subjected to a voltage magnitude of up to 1500 VDC on the power line inputs. The voltage may be of either positive or negative polarity.

Power Connections

The input power connector, INPUT POWER, is located on the front of the RT, and is an CA3102E10S1-3PB type. The pin connections are as follows:

Pin A: $+V_{IN}$
Pin B: $-V_{IN}$
Pin C: Tied to chassis ground inside the RT

Pins A and B are totally isolated from chassis ground.

INSTALLATION

Physical

Install the RT to the mounting plate using the captive screws attached to the legs of the RT, taking precaution to mount the RT such that the front panel is accessible and cables may be connected to the RT. For detailed dimensions see drawing 1721375-100.

Cable Connections

Attach the cables to the RT making sure to connect the antenna RF cable to the ANTENNA connector, the input power cable to the INPUT POWER connector, and the data cable to J1 (if two data cables exist at the site, connect to J2 also).

CAUTION

MAKE SURE THE CIRCUIT BREAKER IS IN THE OFF POSITION PRIOR TO CONNECTING OR REMOVING ANY CABLES.

THIS EQUIPMENT MUST BE OPERATED WITH SHIELDED CABLES. THE ANTENNA, INPUT POWER AND DATA CABLES MUST ALL BE SHIELDED TYPE CABLES, WITH THE SHIELD PROPERLY CONNECTED TO THE CONNECTOR AT EACH END.

CONDITIONS OF USE

Potential RF Interference

INSTRUCTION TO THE USER

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and radiates radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Consult the manufacturer for help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. ***In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception***. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.