Tricom Research, Inc.

TCR-MBA-75

Interface Control Document

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Revision History

Date	Name	Description	Version
2-8-09	twc	Initial Release	REV A

1. Introduction

1.1 Purpose

The purpose of this specification is to document the remote control communications link for the TCR-MBA-75 multiband amplifier system designed and manufactured by Tricom Research, Inc. (also sold under the model name RAMP-75 ^{TM}). This document describes the protocol used on the serial interface between a DTE device, such as a personal computer running a terminal emulation program, and the Bias-Tee.

1.2 Document Conventions

All printing ascii characters contained in messages sent to and received from the Bias-Tee will be enclosed in double quotation marks. (The quotation marks are not part of the message string). Any ascii control characters such as carriage return and line feed will be enclosed in angle brackets (<>). For clarity ascii carriage return (0x0d) will be denoted as **<CR>,** ascii line feed (0x0a) as **<LF>** and ascii space (0x20) as **<SP>**.

1.3 Intended Audience

This document is intended to assist engineers developing software to facilitate the remote control of the amplifier via the Bias-Tee serial link.
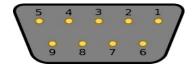
2. Overall Description

2.1 Communication Protocol Basics

The Bias-Tee serial protocol consists of ascii encoded messages. Each message sent to the Bias-Tee is terminated with an ascii carriage return character. All characters sent to the Bias-Tee are echoed back to the sender. A positive acknowledgment that a command has been received by the Bias-Tee is indicated by the Bias-Tee sending an ascii line feed character followed by an optional prompt character (**">"**). If an invalid command is sent the Bias-Tee will respond with an error message. In addition, the Bias-Tee can send out asynchronous alarm messages should the amplifier have an alarm condition.

2.2 Physical Interface and Bias-Tee Connector Pin-Out

The Bias-Tee serial communications port consists of a standard RS-232C serial interface. The RS-232 interface is supported via a female DB-9 connector on the Bias-Tee. The connector pin out is such that the Bias-Tee can be connected to a standard PC serial port with a straight through serial cable (DO NOT USE A NULL MODEM). The pin-out of the Bias-Tee DB-9 connector is as follows.

Pin Number	Description
2	TXD (Bias-Tee Output, Serial transmit data from Bias-Tee to Host)
3	RXD (Bias-Tee Input, Serial receive data from Host to Bias-Tee)
4	DTR (Bias-Tee input, Control signal from Host to Bias-Tee)
5	Ground
7	CTS (Bias-Tee output to host)
8	RTS (Bias-Tee input, Internally connected to pin 4)

The RS-232 DTR signal controls whether the Bias-Tee responds to serial commands from the RS-232 interface or to switch positions on the Bias-Tee front panel. When DTR is asserted (RS-232 space condition of +12V on the Bias-Tee input) the Bias-Tee will ignore it's front panel switches and respond to RS-232 serial commands. When DTR is de-asserted (RS-232 mark condition of -12V on the Bias-Tee input) the Bias-Tee will ignore serial commands and will set the amplifier operating mode, power, etc. based upon the Bias-Tee front panel switch settings.

On initial power up the amplifier settings will be determined by the Bias-Tee switch settings.

2.3 Serial Communication Parameters

The following serial port parameter settings are required to communicate with the Bias-Tee:

Baud Rate: 19.2K
Start Bit(s): 1
Stop Bit(s): 1
Data Bits: 8
Parity: None
Flow Contol: None

3. Amplifier Commands

All commands to the amplifier consist of an ascii character string terminated by a carriage return character. Each character will be echoed back to the host. Successful reception of the message by the Bias-Tee will be indicated by the Bias-Tee sending a line feed character to the host. If prompting is turned on the Bias-Tee will also send the prompt character.

Prompt on response: **<LF>">"**
Prompt off response : **<LF>**

3.1 Mode Change Commands

The following commands will command the amplifier to change operating modes:

"sat"<CR> - Commands the amplifier to enter satellite mode.

"los"<CR> - Commands the amplifier to enter line of sight mode.

"fh"<CR> - Commands the amplifier to enter frequency hop mode.

"lna_on"<CR> - Commands the amplifier to bypass the LNA (note: the command is inverted).

"lna_off"<CR> - Commands the amplifier to turn on the LNA (note: the command is inverted).

3.2 Power Change Commands

The following commands will command the amplifier to change output power levels:

"35w"<CR> - Commands the amplifier power level to 35 watts.

"50w"<CR> - Commands the amplifier power level to 50 watts.

"75w"<CR> - Commands the amplifier power level to 75 watts.
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3.3 LNA Control Commands

The following commands control the state of the LNA*:*

"**lna_on**"**<CR> -** Commands the amplifier to bypass the LNA (note: the command is inverted).

"**lna_off**"**<CR> -** Commands the amplifier to turn on the LNA (note: the command is inverted).

3.4 Status Reporting and Miscellaneous Commands

"prompt on"<CR> - This command turns on the carat prompt ("**>**") from the Bias-Tee.

"prompt off"<CR> - This command turns off the carat prompt ("**>**") from the Bias-Tee.

"tx_notify on"<CR> - This command turns on transmit notification. When transmit notification is turned on the Bias-Tee will send the *pa_rx* and *pa_tx* messages when the amplifier is in receive and transmit, respectively.

"tx_notify off"<CR> - This command turns off transmit notification. When transmit notification is turned off no *pa_rx* or *pa_tx* messages will be sent out by the Bias-Tee.

"?"<CR> - This command causes the Bias-Tee to send out a listing of implemented serial commands. The output will be as follows:

"PA Commands:"<CR><LF>
"rom2r"<CR><LF>
"tx_notify [on|off] "<CR><LF>
"prompt [on|off] "<CR><LF>
"sat"<CR><LF>
"los"<CR><LF>
"fh"<CR><LF>
"lna [on|off]" <CR><LF>
"35w"<CR><LF>
"50w"<CR><LF>
"75w"<CR><LF>

All of these commands are explained in this document with the exception of the rom2r command which is for factory use only.

4. Amplifier Status Messages

4.1 Alarm Messages

There are two types of amplifier alarm messages that can be sent out from the Bias-Tee; Temperature alarm and VSWR alarm.

4.1.1 Temperature Alarm

"*alarm_temp_high*" *<CR><LF>* – Indicates that the amplifier is in an over temperature alarm condition.

"*alarm_temp_low*" *<CR><LF>* – Indicates that the amplifier is in a low temperature alarm condition.

"*alarm_temp_off*" *<CR><LF>* – Indicates that the amplifier is not in a high or low temperature alarm condition.

4.1.2 VSWR Alarm

"*alarm_vswr_on*" *<CR><LF>* – Indicates that the amplifier is in a vswr alarm condition.

"*alarm_vswr_off*" *<CR><LF>* – Indicates that the amplifier is no longer in a vswr alarm condition.

4.2 Transmit/Receive Notify Messages

"*pa_tx*" *counter frequency* "MHZ"<SP>"band:" *filter selection*

Example: **"pa_tx 1144 300MHZ band:5"<CR><LF>**

This command is sent out from the Bias-Tee when the amplifier enters transmit mode AND transmit notify is on. The variables *counter*, *frequency* and *filter selection* are defined as follows:

counter – This is a 3 or 4 digit decimal integer number and indicates the value of the 12 bit frequency counter. The range of this number is from 107 to 1981.

frequency – This is a number representing the current transmit frequency.

filter selection – This is a single digit decimal integer that indicates which output filter has been selected. The filter selection and corresponding frequency range values are shown below:

Filter Selection	Frequency Range
0	30 (-2) – 48 MHZ
1	48 – 72 MHZ
2	72 – 107 MHZ
3	100 -160 MHZ
4	160 – 240 MHZ
5	255 – 362 MHZ
6	340 – 512 (+8) MHZ
7	290 (-1) – 320 (+1) MHZ

"*pa_rx*" <CR><LF> **-** This message is sent out by the Bias-Tee when the amplifier switches into receive mode AND transmit notification is on**.**

4.3 Miscellaneous Messages

"unknown request" <CR><LF>

This message indicates that the Bias-Tee does not recognize the command that was just sent to it.

"no PA DC" <CR><LF>

This message indicates that there is no DC power applied to the amplifier.

"start"<CR><LF>

This message is sent out by the Bias-Tee when power is first applied to the Bias-Tee.

"trf rx bad length"\<CR>\<LF>

This message is sent out by the Bias-Tee when the Bias-Tee RF link has a momentary perturbation. Note that this message sometimes comes out spuriously and can be ignored.

5. Software Development Support

Please contact Tricom Research, Inc. to schedule time in our laboratory to fully exercise software in our development environment prior to fielding a remote control software application.

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