STAR ANT MODULE

DESIGN DOCUMENT

INTERMAP

DOCUMENT HISTORY

Version	Date	Comment/Description of Change	Author(s)
1.00	May 12th, 2003	First Draft Release	TRM, WRT
2.00	June 01, 2006	Updating of design doc with respect to new STAR4 module developments (05535)	PG, ML

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1 INTRODUCTION

1.1 Purpose

This document describes the design of the GTM module as part of the GTM Core Technology. The GTM Core technology provides the basic subsystems required for an interferometric radar system.

1.2 Scope

This document first provides a functional description and the design requirements. It then describes the detailed design in terms of hardware, software, and mechanics. Finally the theory of operation, test procedures, and calibration is included.

The document assumes that the reader has a basic understanding of interferometric radar systems, airborne remote sensing platforms, Intermap products and processes and computer systems technology.

1.3 Definitions, Acronyms, and Abbreviations

MTTR ....Mean Time To Repair
GTM................................Global Terrain Mapper
LRU................................Line Replaceable Units
TCP/IP............................Network Communication protocol
MCC...............................Master Control Computer
ANT ....Antenna Module
RCVEX-RCAS ....Receiver Exciter – Radar Control and Acquisition System Module
PWRDIST ....Power Distribution Module
NAV...............................Navigation Module
WGASS-XTRANS ....Wave Guide Assembly – X-Band Transmitter

1.4 References

1. GTM System Interface Control Document Version 1.0
2. Star-3i Availability Analysis Version 1.0
3. GTM Core Technology SRS Version 1.01

2 FUNCTIONAL DESCRIPTION

The GTM ANT Module controls pedestal positioning in the GTM System.
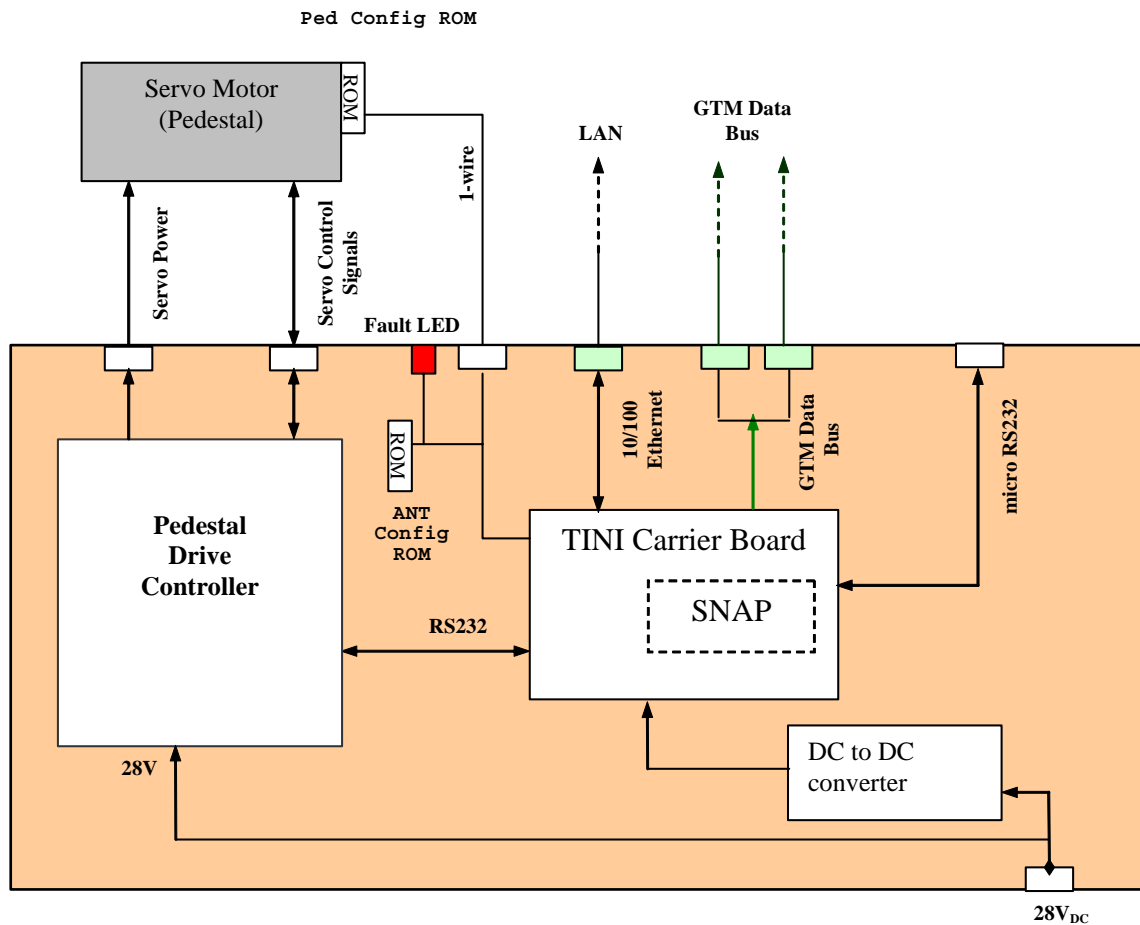
Please refer to the following diagram:

Figure 1 - ANT module block diagram

The Module contains a pedestal drive controller, which is controlled via the embedded SNAP microcontroller over a RS232 connection. The ANT module receives commands over the Ethernet and translates them to drive controller to move the pedestal. The ANT module also retrieves current pedestal information as well as raw Data from the pedestal drive controller and makes it available on the Ethernet. Data sent from the module will be time stamped to GPS time.

2.1 Power diagram
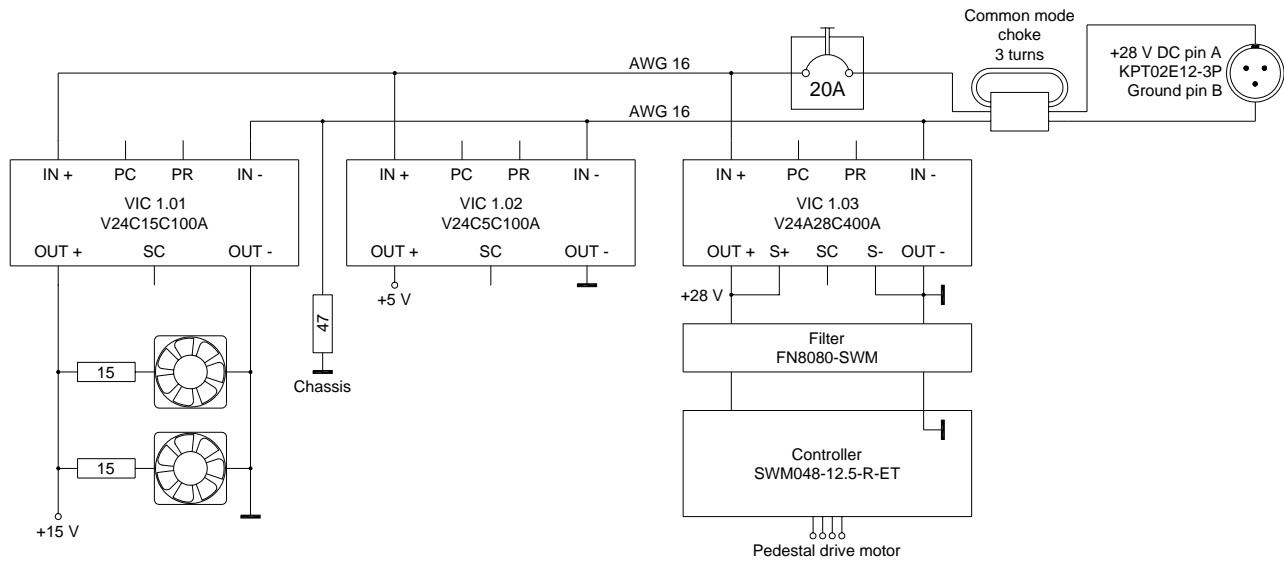
3 DESIGN REQUIREMENTS

3.1 Servo Interface

The ANT module will include a servo controller to the servo motor for pedestal rotation.   The pedestal drive controller is interfaced directly to the SNAP microcontroller through a RS232 connection.

3.1.1 Absolute Positioning

The servomotor must be able to accurately position the pedestal in 2.5º increments with a maximum error of 0.1º.

3.1.2 Limit Antenna Swing

The maximum antenna rotation must have a limit detection (Hard Stop). When the maximum rotation angle is reached, the servo amplifier must not continue to move the pedestal in that direction.

3.2 GTM Software Interface

The embedded software will provide a complete Antenna controller raw data stream. The ANT module will also provide a software command interface and a broadcasted ANT status stream. This Status stream needs to be tagged with the GPS Time from the GTM System and will include current antenna orientation and module status.

The ANT Status packet must be broadcast to all radar modules and the MCC at least 1 per second.

3.2.1 Servo Controller raw Data

The module must provide a Servo Controller data stream over the Ethernet. The Servo data stream size and frequency varies depending on make and model of the Servo Controller. The Servo Controller data will be time tagged and sent the MCC.

3.3 Fault Indicator

The red chassis fault light will illuminate under any of the following circumstances:

- The maximum temperature of the unit is exceeded.
- There is an error communicating to the servo amplifier
- The servo amplifier reports an error
- The embedded software reports an error

3.4 Configuration / Calibration Tracking

The ANT module will contain the ANT configuration file (EEPROM) via an external connection.

The ANT module will be connected to the Pedestal configuration file (EEPROM) via an external connection. The Pedestal ID will contain all Pedestal configuration information. Refer to the GTM Core Technology ICD document

4   INTERFACE

What connectors are available on this module?

5   HARDWARE DESIGN

5.1   PCBs

5.2   FPGA core

- register maps?

6 SOFTWARE DESIGN

6.1 Firmware

1-wire

config

data handling

interrupts

command implementation

7 MECHANICAL DESIGN

Physical design (chassis)

Electrical characteristics

8 THEORY OF OPERATION

What happens in the system when a command is sent??

How is it connected?

How does it control?

9 MAINTANANCE

9.1   Test Procedures

See Module Test Sheet in documentation (\\ASD\documentation\System modules)

9.2   Calibration

How to calibrate??

9.2.1   Diagnostic Baselines

Screenshot of each diag port after calibration

APPENDIX 1: DRAWINGS

APPENDIX 2: SCHEMATICS

APPENDIX 3: NOTES