CHAPTER 2. TECHNICAL CHARACTERISTICS

200. PURPOSE OR FUNCTION.

a. The Air Traffic Control Beacon Interrogator (ATCBI-6/6(M)) equipment interrogates transponder equipped aircraft, receives the coded reply, and provides required beacon information. The coded reply from the aircraft transponder enables aircraft range, azimuth, assigned code, altitude, Mode-S identification, and emergency status to be determined. The ATCBI-6/6(M) equipment can be operated in association with primary radar or used in independent operation. Mode-4 capability will be implemented when the ATCBI-6(M) system is deployed at a Joint Surveillance System (JSS) site utilized by both the FAA and the United States Air Force (USAF). The ATCBI-6(M) will correlate the search and beacon targets then transmit the target messages to the Air Route Traffic Control Center (ARTCC) and the USAF Sector Operations Control Center (SOCC).

b. At the ARTCC, data from the ATCBI-6/6(M) is processed by the National Airspace System (NAS) data processing and display equipment that provides air traffic controllers with position and selective identification information concerning aircraft in the control area.

201. SYSTEM INTRODUCTION. The ATCBI-6/6(M) is a dual-channel Monopulse Secondary Surveillance Radar (MSSR) which is capable of interrogating and decoding modes 2, 3/A, 4, B, C, D and Mode-S. The ATCBI-6(M) is also Mode-4 capable. The ATCBI-6/6(M) coverage volume is 360° to a maximum altitude of 100,000 feet to a range of 125 nautical miles for terminal applications and 250 nautical miles for enroute applications. The ATCBI-6/6(M) system consists of the transmitter, receiver, mode generators/reply decoders, processor, System Interface Unit (SIU), and the Local Maintenance Terminal (LMT).

202. PHYSICAL DESCRIPTION. Figure 2-1 shows a typical ATCBI-6/6(M) system configuration at an FAA site. Figure 2-2 shows the major elements of the ATCBI-6 system. Figure 2-5 shows the major elements of the ATCBI-6(M) system.

203. EQUIPMENT INTERFACES. Figures 2-3 and 2-4 show the ATCBI-6 functional block diagram with the interfaces for the antenna, Primary Surveillance Radar (PSR) data, azimuth data, and modems defined. The ATCBI-6(M) interfaces are shown in Figures 2-6 and 2-7.

a. Modem Interfaces: The FAA modem interface to the ATCBI-6/6(M) is to the Network Universal Input/Output (NUNIO) adapters in the SIU. The channels consist of 3 target channels and a remote monitor subsystem (RMS) channel for the Remote Control Interface Unit (RCIU).

b. Antenna Interfaces: The antenna interface consists of the sum, difference, and omni RF channels via the rotary joint. The azimuth data is routed from the Azimuth Pulse Generator (APG) interface box to the ATCBI-6/6(M) Azimuth Encoder Synchronizers (AES).

c. PSR: The ATCBI-6 receives PSR data from the Common Digitizer (CD-2). The search data is CD-2 formatted search and weather messages utilizing an RS-422 interface.

The ATCBI-6(M) receives two separate PSR data feeds from the ARSR-4, First Function and Second Function search data. First Function data is in the CD-2 MIL format. Second Function data is in the CD-2 CIV format. Both feeds utilize an RS-422 interface.

204. SYSTEM CHARACTERISTICS.

a. Transmitter: Interrogator Modes: 1, 2, 3/A, B, C, D, S (4 – BI-6(M) only)
Output Power: >32 dBW
Center Frequency: 1030+/-.01 MHz

b. Receiver: Tangential Sensitivity: < -90 dBm
Center Frequency: 1090+/-.5 MHz
Detection Performance: better than 98%, (measured as the plot/scan ratio for individual tracks, which are neither garbled nor affected by topographic obscuration features of the site).

c. Control and Reporting: Mode selection, BITE monitoring, status reporting, target reporting.

d. Reply Processing: SSR and Mode-S reply detection, azimuth determination, video processing, decoding, plot and track processing, self test, monitoring, azimuth distribution.

e. Peak Duty Cycle: Constant duty cycle of 4.2% up to 40 degrees C (sum channel); Constant duty cycle of 0.1% up to 40 degrees C (control channel).

f. Parrot: The MSSR Remote Site Monitor (MRSM) is a fixed location transpoder, typically located between 1 to 10 nmi from the site, which serves to verify range and azimuth accuracy of the ATCBI-6/6(M).

Interrogation Modes:	SSR Modes 3/A, B and/or C, plus Mode S.
Range Delay:	User selectable from 0.3 to 250 Nautical Miles(NM) in 0.1 NM increments.
Identification Code:	User selectable. Maximum number of codes is 4096.
Altitude:	User selectable from 0 to 99,000 ft.

205. thru 299. Reserved

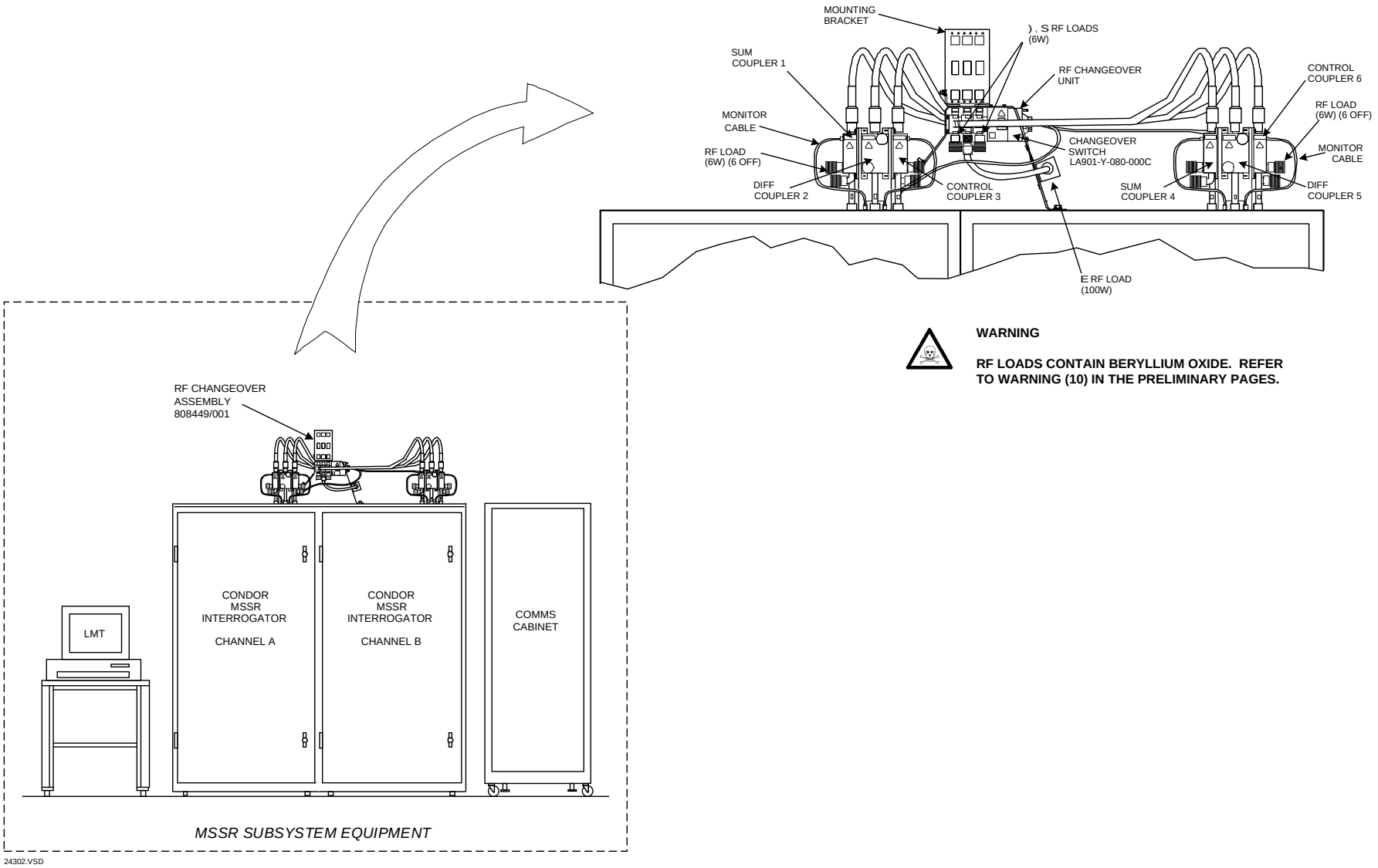

Figure 2-1. ATCBI-6/6(M) Typical Equipment Layout

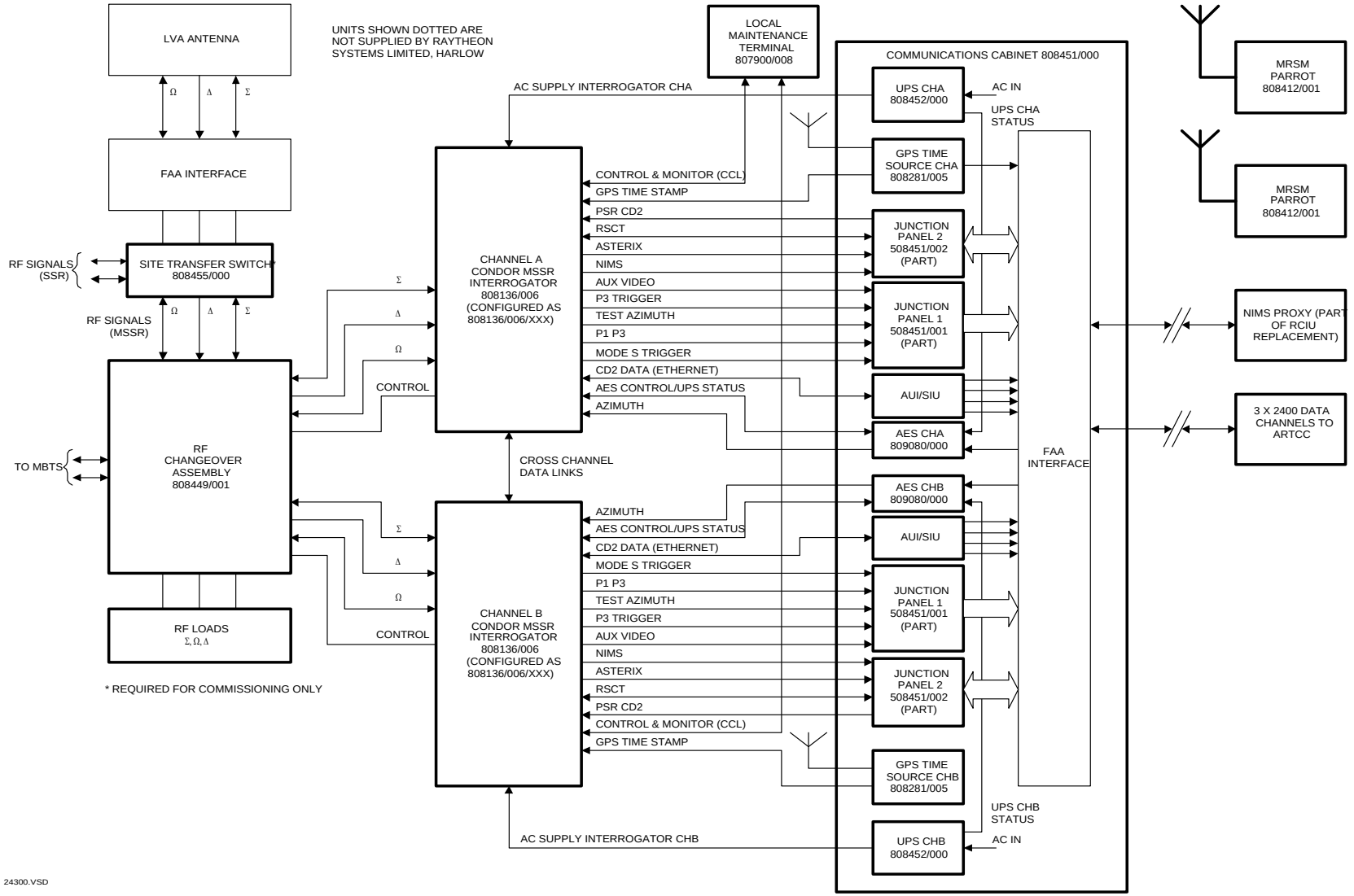

Figure 2-2. ATCBI-6 System Block Diagram

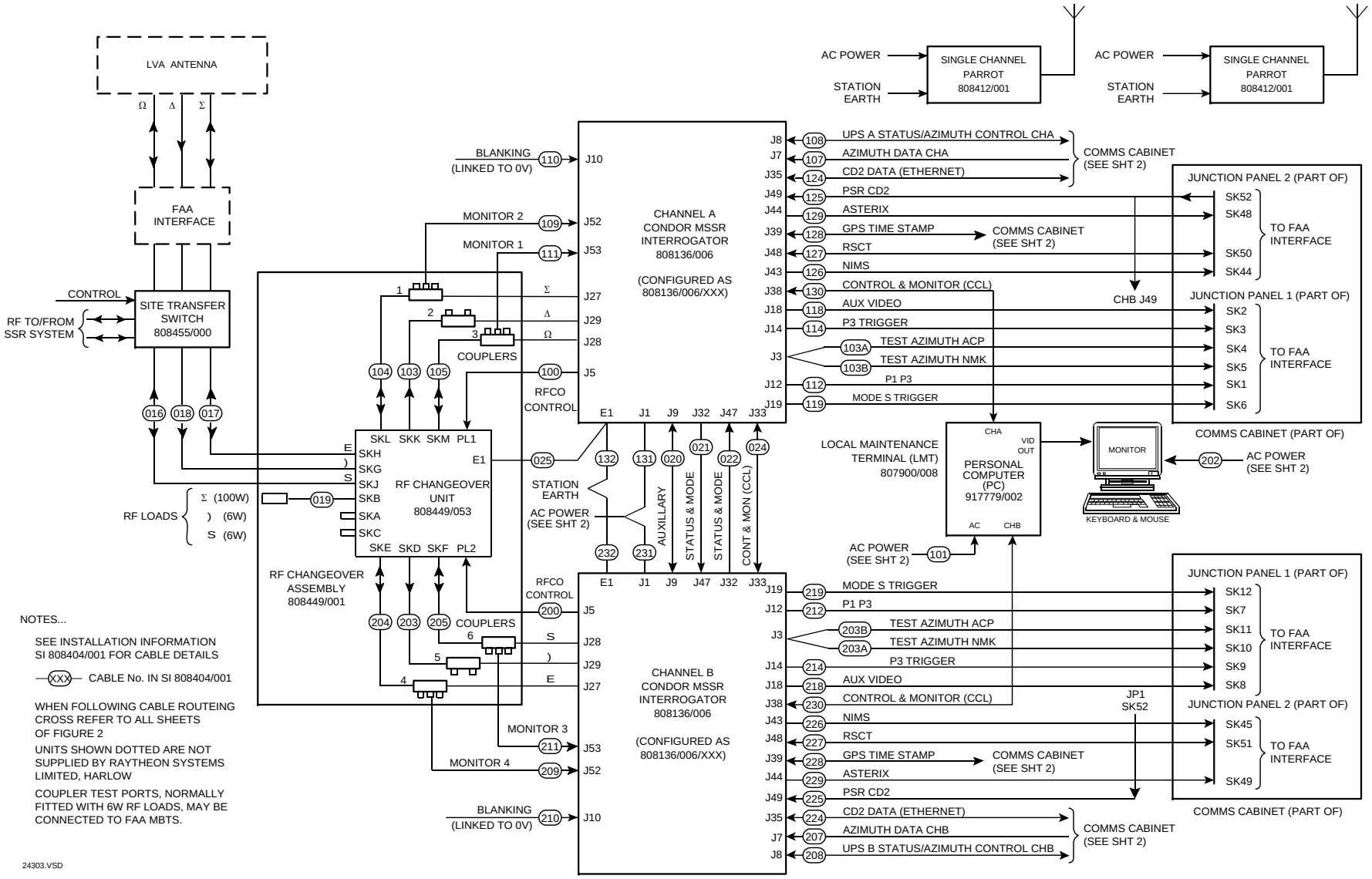

Figure 2-3. ATCBI-6 System Detail (sheet 1)

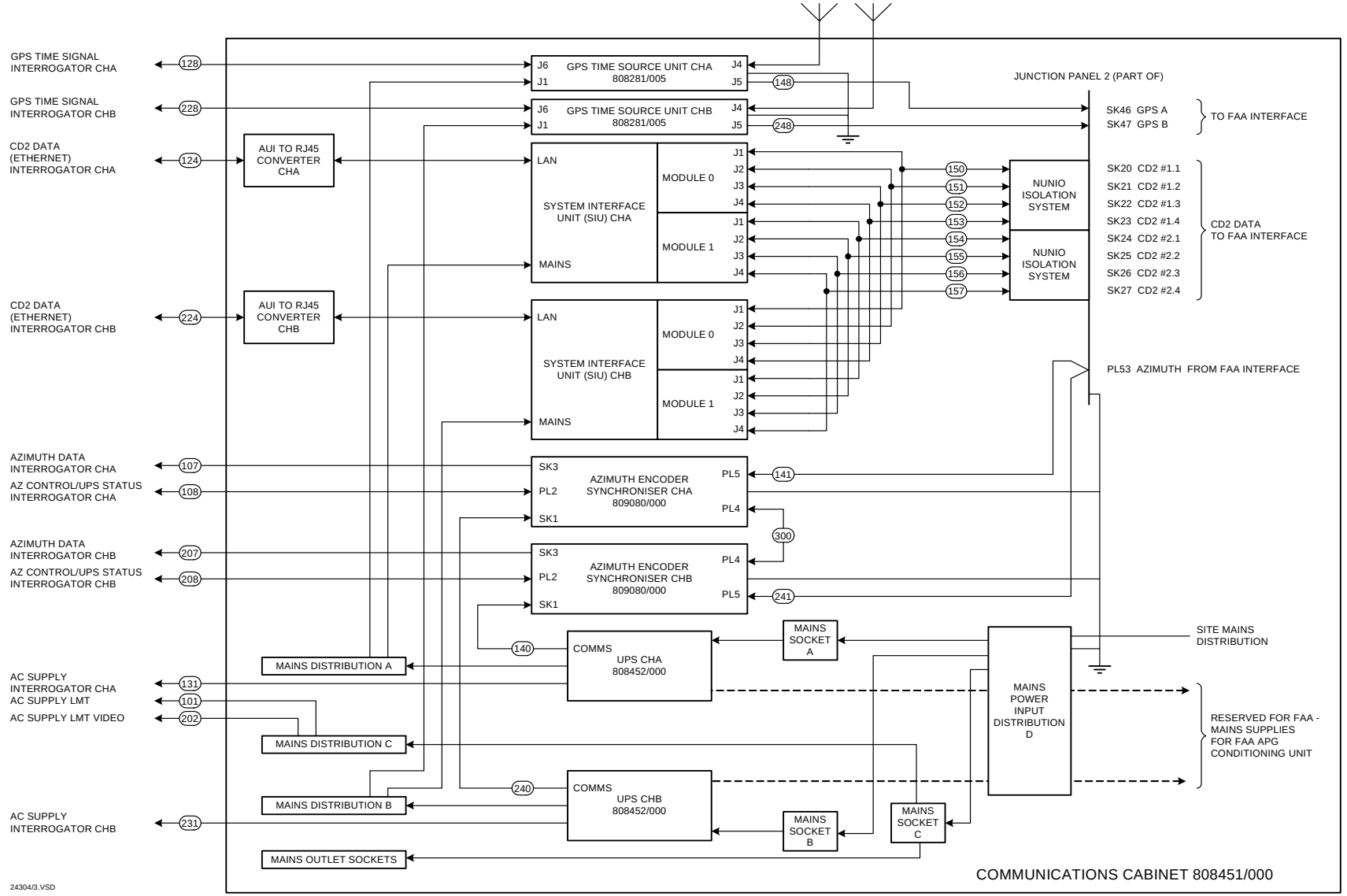

Figure 2-4. ATCBI-6 System Detail (sheet 2)

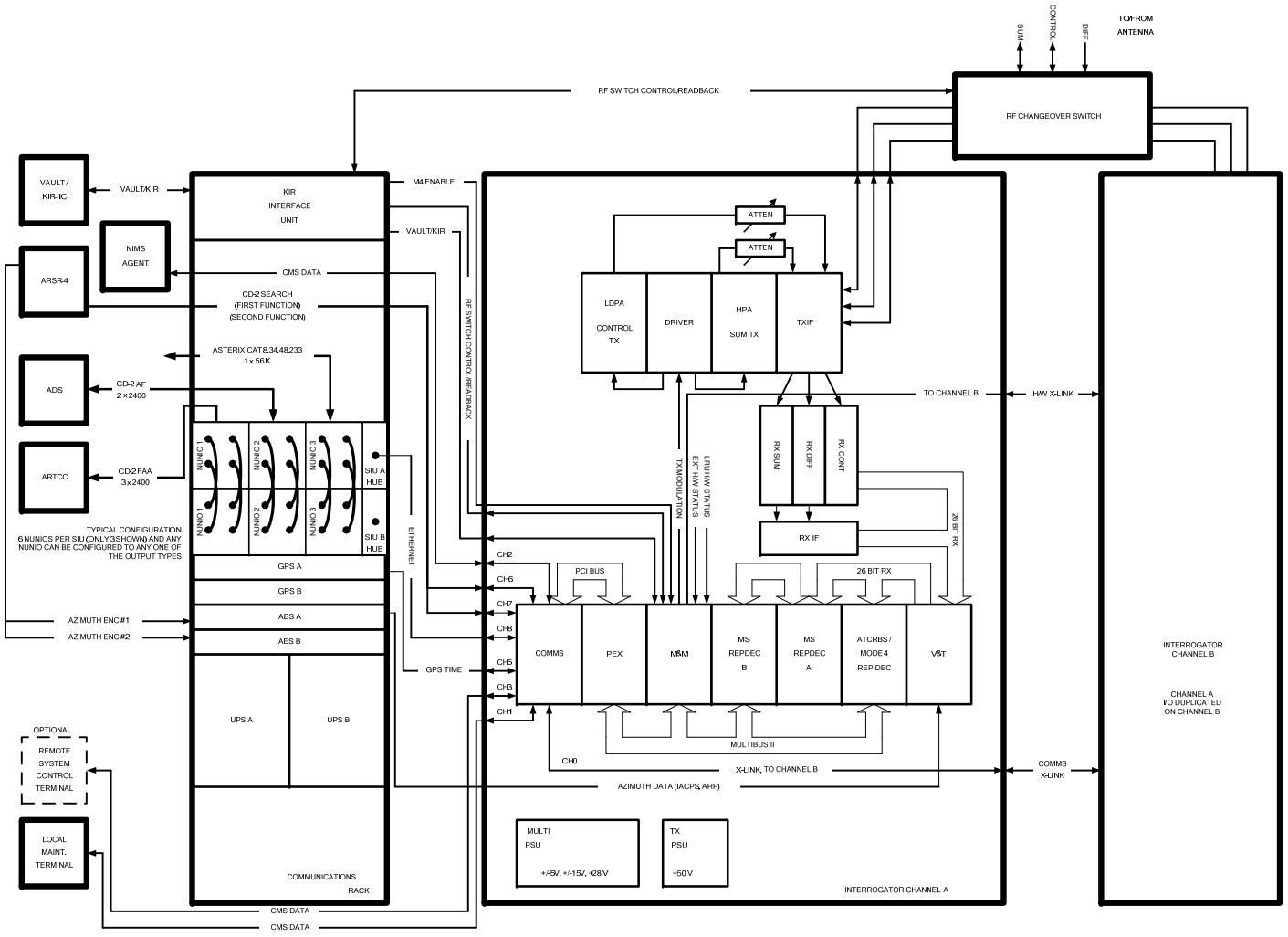

Figure 2-5. ATCBI-6(M) System Block Diagram

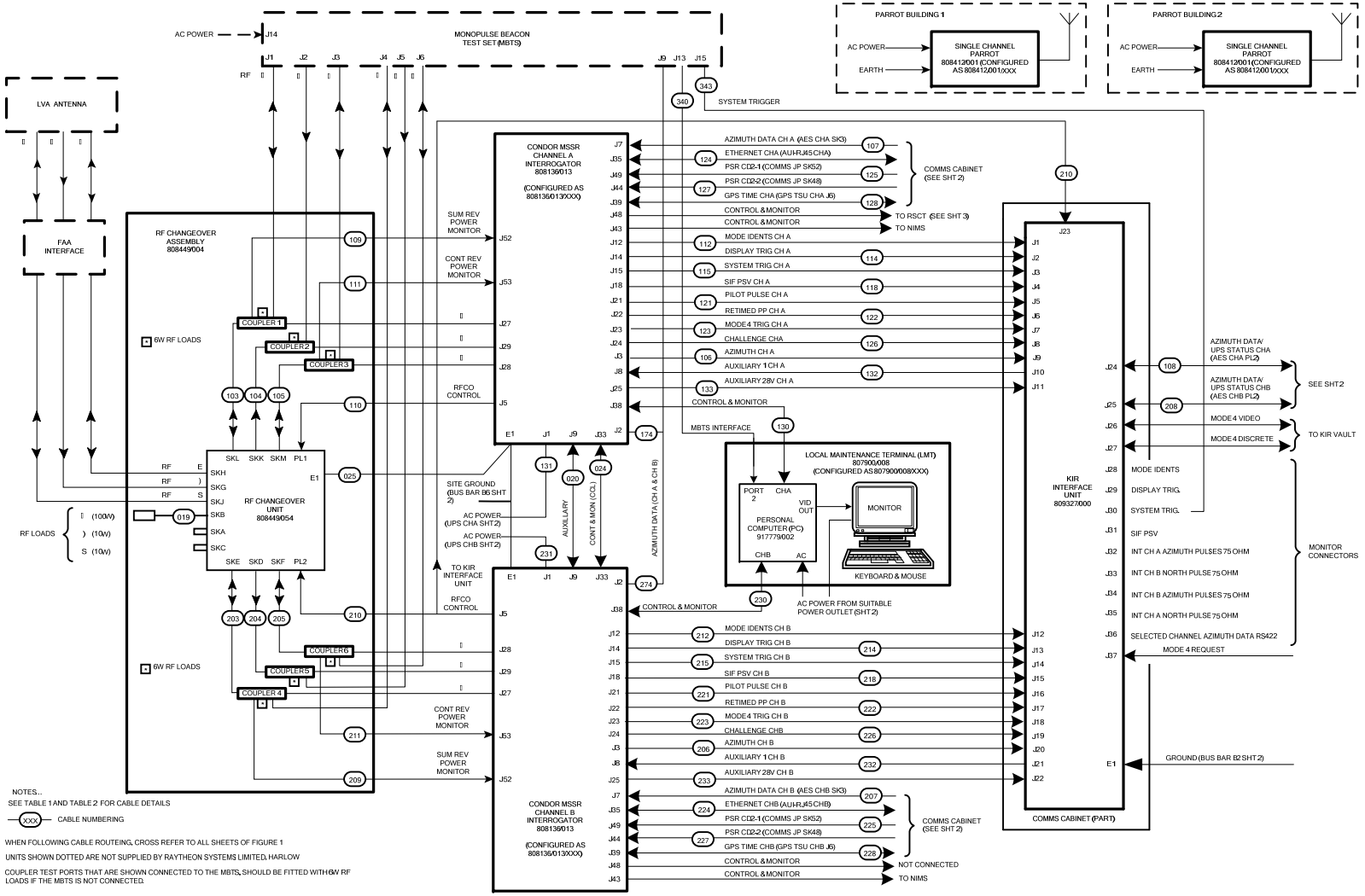

Figure 2-6. ATCBI-6(M) System Detail (sheet 1)

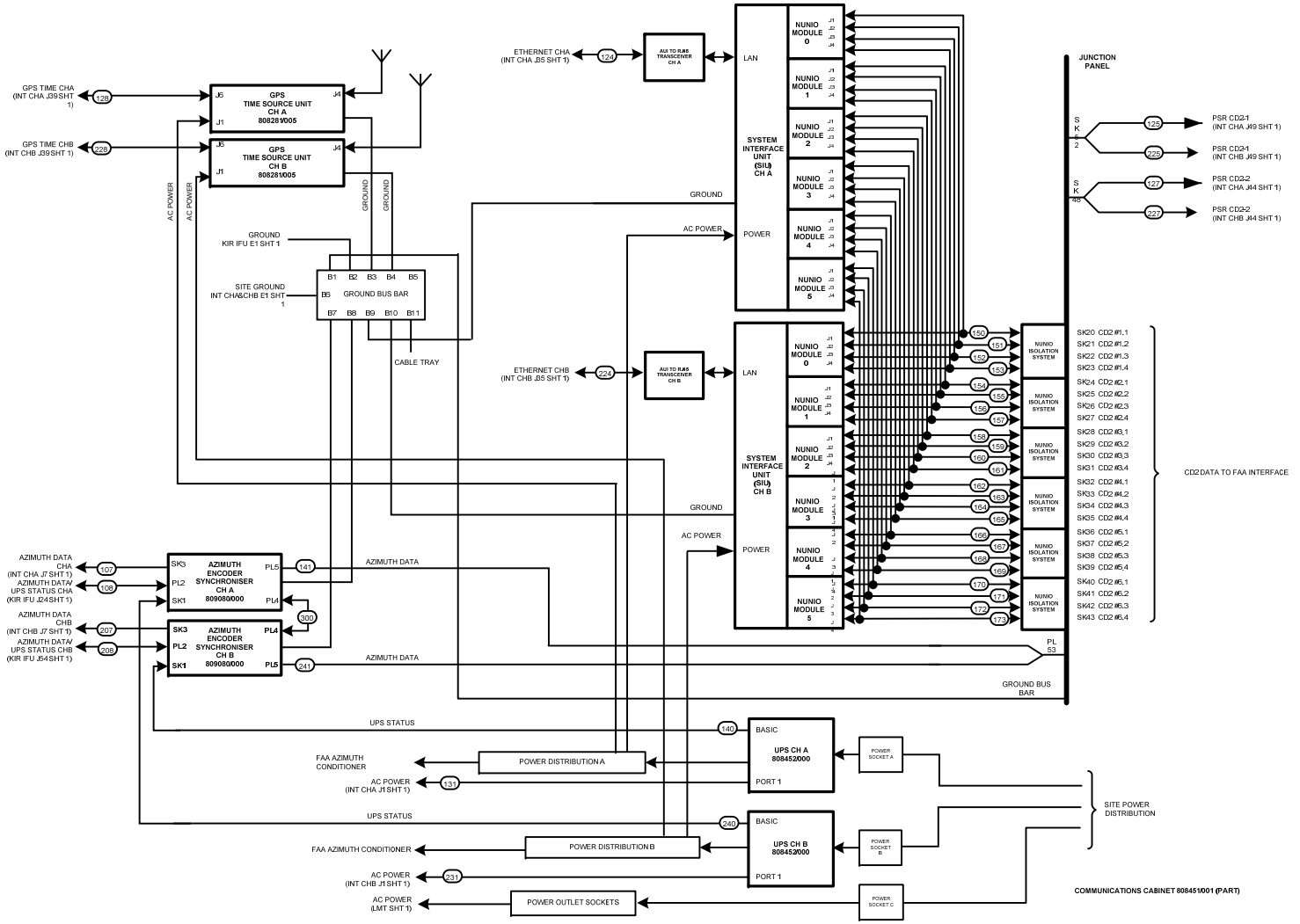

Figure 2-7. ATCBI-6(M) System Detail (sheet 2)