

EXHIBIT 1 (pp. 1 - 8)

Ref. 10(a)

DESCRIPTION OF EQUIPMENT AND THEORY

This development program will result in equipment of a new concept in digital microwave radios and antenna.

The first element is the design of miniature millimeter wave antennae (Figure II) used for point-to-point microwave commercial use. This antenna development will result in substantially reduced manufacturing cost and improvement of efficiency over existing antennas available in the industry. Innova Corporation has invested in excess of \$750,000 in test equipment to accomplish this task. The second development effort is shown in Figure III and is labeled the ARU unit. This assembly provides the generation of microwave power for the transmitter and a low-cost downconverter for the receiving system. The technology breakthrough in the ARU units is primarily through the use of MMIC circuitry. The thrust of this effort is to reduce the cost of microwave component parts far below systems that used conventional circuitry.

CIRCUIT DESCRIPTION (ARU)

The ARU unit generates the microwave power for transmission and downconverts the received signal to an IF frequency suitable for transmission over a coaxial cable to the ground based SIU equipment. The transmitter frequency is controlled by a low frequency reference signal which is generated by the computer in the SIU and sent up the coaxial cable to the ARU location. Therefore, temperature effects on the transmitter frequency are minimized because the frequency determining circuits are sheltered by the indoor environment. Transmission data from the SIU via the coaxial cable to the ARU modulates a 6 GHz VTO which then is frequency multiplied by the MMIC and then further amplified by balanced amplifier circuits. Transmission energy is then coupled via a microwave filter to the antenna. This ARU receiver function is a block-down receiver, therefore, channel selection is performed in the SIU which is located in a convenient ground level location.

CIRCUIT DESCRIPTION (SIU)

The SIU unit is composed of three major sub-assemblies: the uplink sub-assembly, downlink sub-assembly, and multiplexer microprocessor digital circuits. The function of the uplink assembly is to generate the referenced frequency to lock the ARU transmitter and to deliver baseband data to the ARU for modulation purposes. Refer to Figure IV for this block diagram. The purpose of the downlink circuits are to convert the receiver IF to clock and data information to be supplied to the network. The multiplexer and microprocessor digital circuitry supervise all of the functions within the SIU and provide operator interface controls and panel indications.

Figure V is an illustration showing the ARU and the antenna as an assembly along with the SIU as used in a protected configuration.

Exhibit 1 - Continued

Figure VI shows two Innova ARU antennas as used in a 100% protected digital microwave system.

Ref. 10 (b)

SPECIFIC OBJECTIVES

- 1) The primary objective of this effort is to provide the industry with substantially reduced equipment cost for digital microwave radios systems and therefore allow implementation of networks which would not be possible with existing pricing.
- 2) Implementation of monolithic microwave integrated circuit (MMIC) technology into commercial applications thereby increasing systems performance with reduced cost.
- 3) By employing conical horn technology, category "A" antennas can be manufactured at a fraction of present day cost with antenna efficiencies greater than 80% resulting in reduced aperture size. This antenna technology has additional attributes of superior sidelobe and front-to-back radio performance.

Ref. 10 (c)

PROMISE OF CONTRIBUTION

This experimental program will result in the development of digital millimeter wave systems at a cost reduction which will allow the implementation of millimeter wave technology previously unattainable. Innova Corporation is sponsoring the development of previously used military MMIC's into the commercial market. It is our wish that the industry in general use this low cost technology therefore resulting in unit price reduction.

FIGURE I

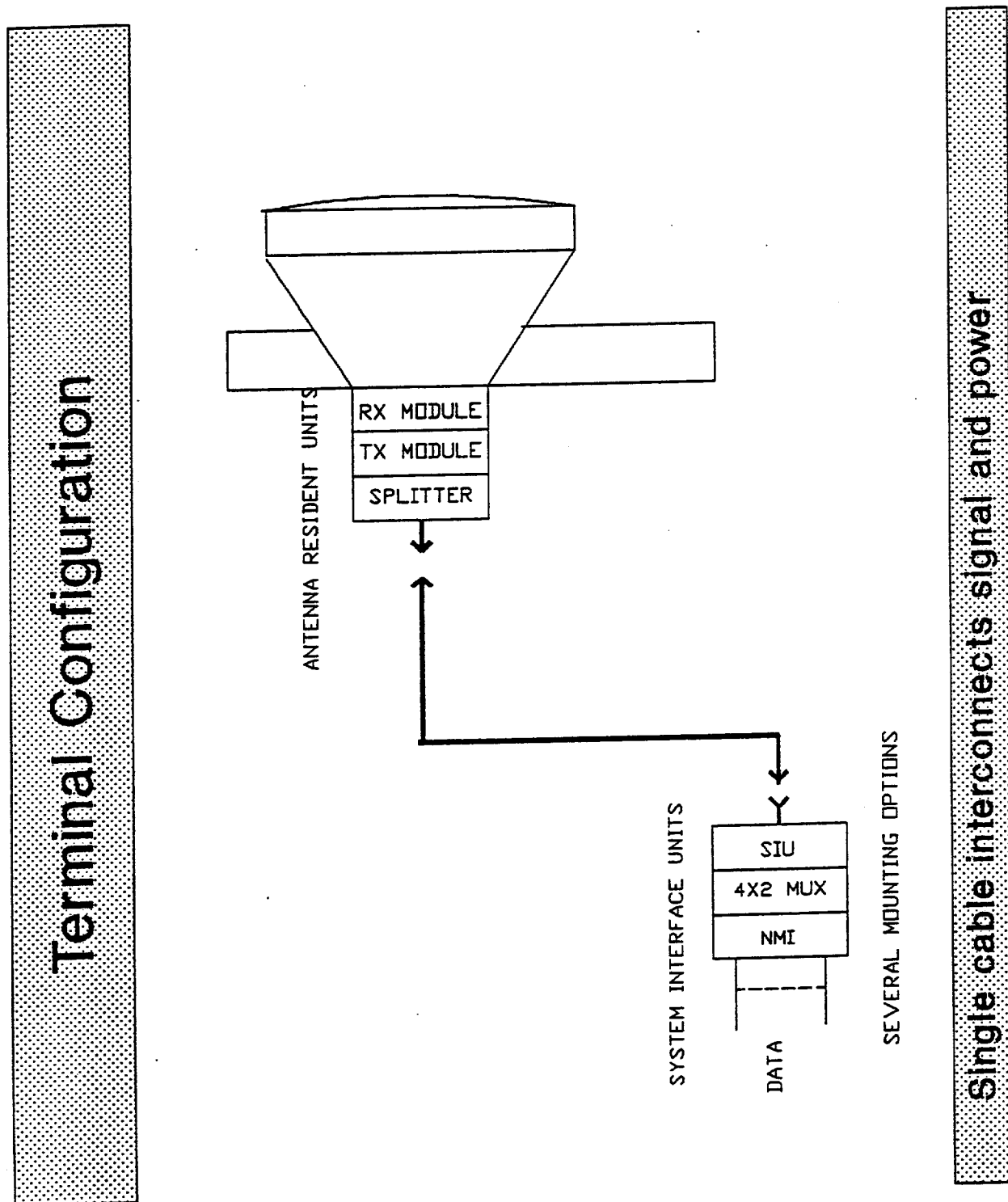
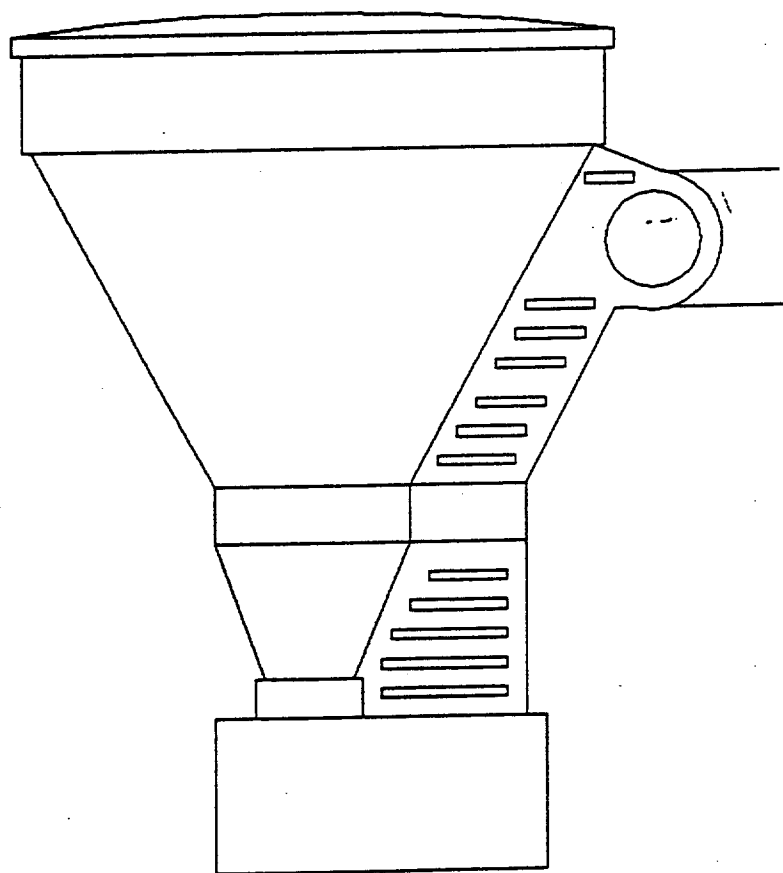


FIGURE II

Antenna Assembly



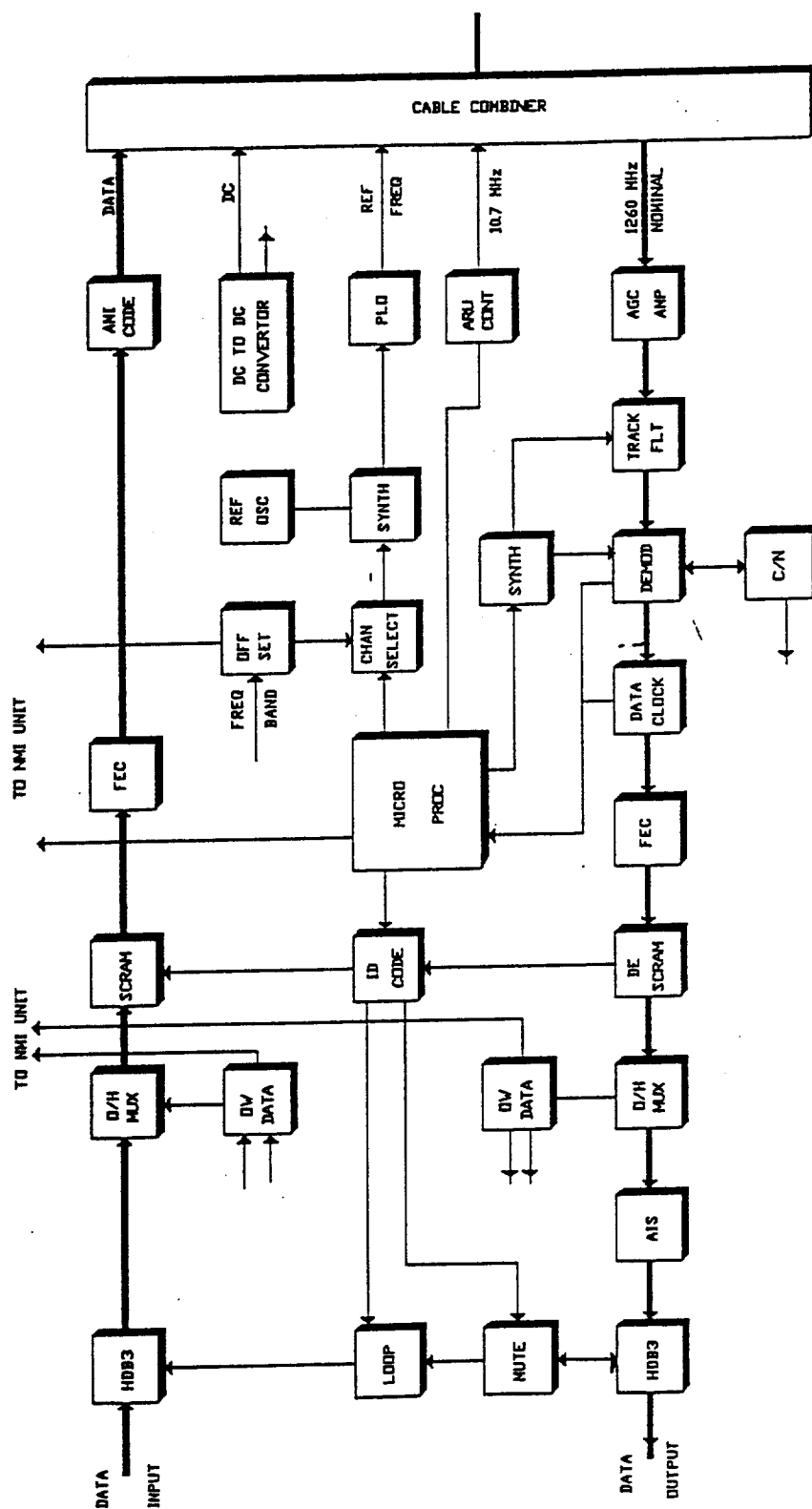
No assembly required during installation



FIGURE III

FIGURE IV

System Interface Unit (SIU)



Controls all functions in the Outdoor Unit

FIGURE V - (EXHIBIT 1-Continued)

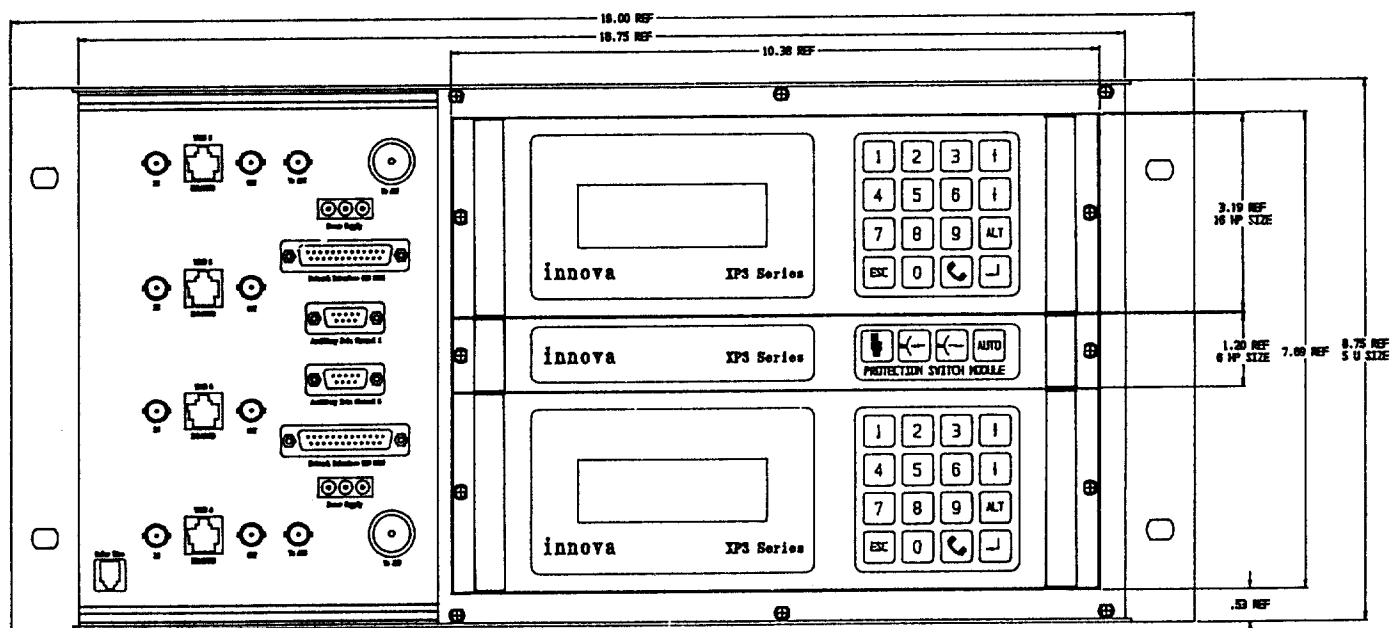
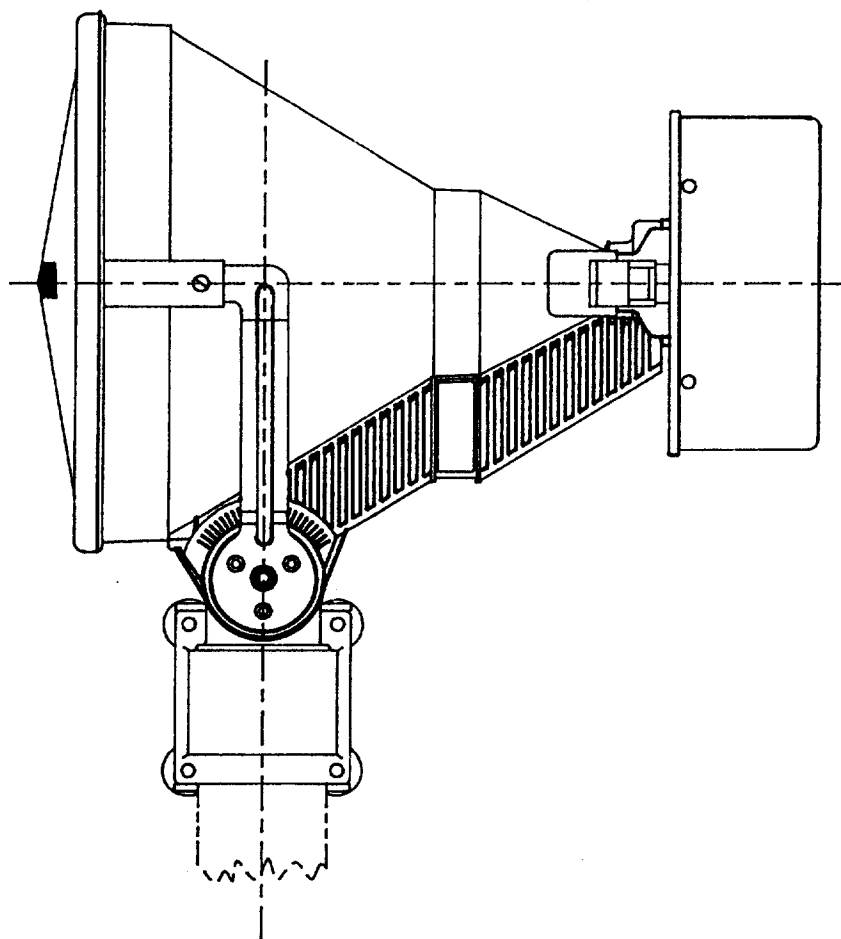


FIGURE VI
(Exhibit 1-Continued)

Innova Installation Diagram

