

# **DESCRIPTION OF BLOCK DIAGRAMS FOR THE BEE III RADAR**

## **I. ANTENNA UNIT**

The antenna unit receives prefiltered power and a transmit on/off control signal from the counting unit. The unregulated voltage passes through a high efficiency 260 KHz (oscillator) switching regulator and powers the 24.1 GHz Gunn oscillator. The unmodulated Gunn oscillator generates the transmitter signal which passes through the turnstile duplexer and out the +24 dBi horn/lens antenna. A small portion of the transmitter power is used to provide LO drive to the quadrature balanced (I/Q) mixers. The transmitted signals bounce off of moving targets, are frequency shifted according to their velocity (speed and direction) and are received by the same antenna that transmitted them. The receive signals are directed to the I/Q mixer by the duplexer where they are mixed with the transmit signal. The output of the mixers are target signals that result from the difference in the local oscillator (transmitted frequency) and Doppler shifted (moving target) frequencies. The design of the mixer is such that both mixers will output a target signal frequency that represents the speed of the targets, and the phase difference (+90 or - 90 deg.) between the target mixer signals will be dependent upon the target direction away from or toward the radar. These target signals are amplified, filtered and passed on to the counting unit.

## **II. COUNTING UNIT**

The counting unit processes the stereo Doppler audio signals from the antenna unit and calculates patrol and target speed information which is sent to the display unit. The Doppler signals are converted to digital information by an A/D converter and are processed by a Digital Signal Processor (DSP) computer chip which executes 96 mega instructions per second. A 12 MHz digital oscillator provides the timing clock for the DSP and the A/D chip.

A microcontroller computer chip communicates with the DSP and passes the speed information on to the display unit and to an external RS-232 port. The microcontroller also receives operator commands from the display unit by way of the IR receiver in the display. The microcontroller is driven by a 4 MHz digital oscillator.

The counting unit also contains the main power supply and filtering circuits for the radar. The radar protection fuse (2A) is located in the cigar plug on the power cord.

## **III. DISPLAY UNIT**

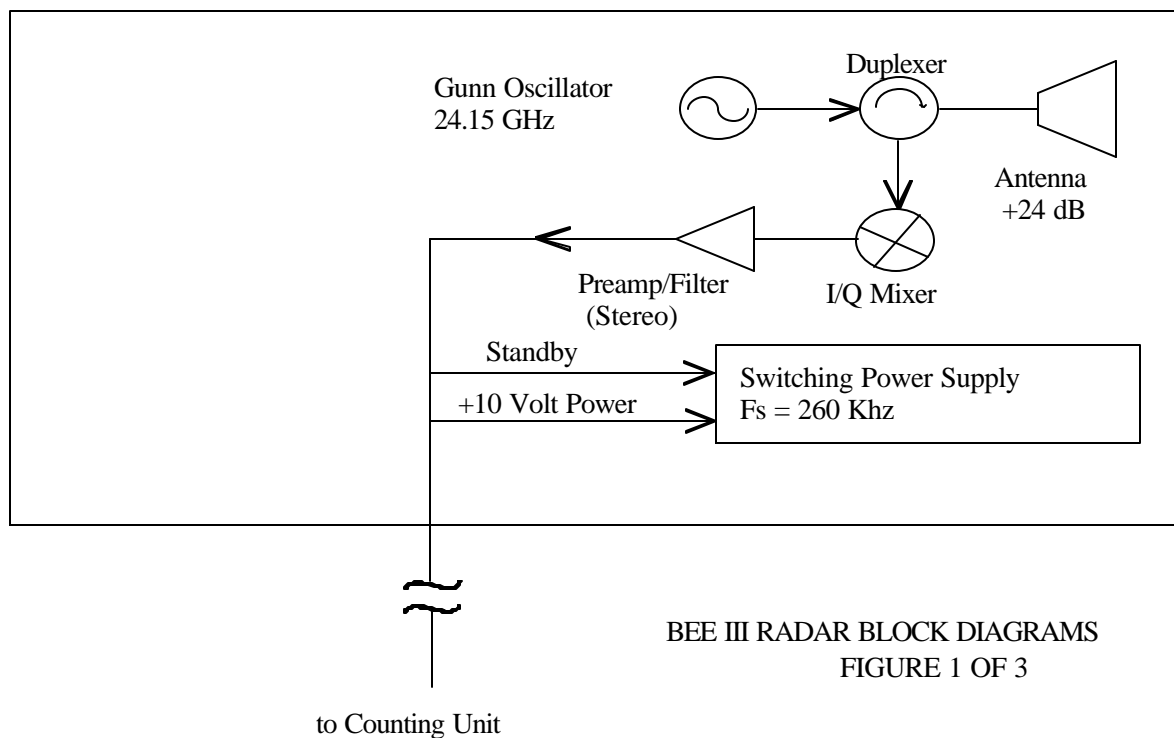
The display unit converts the speed information signals from the counting unit to drive 7-segment LED visual displays. It also contains a power regulator and an IR receiver chip to receive commands from the hand held remote unit.

#### IV. HAND HELD REMOTE UNIT

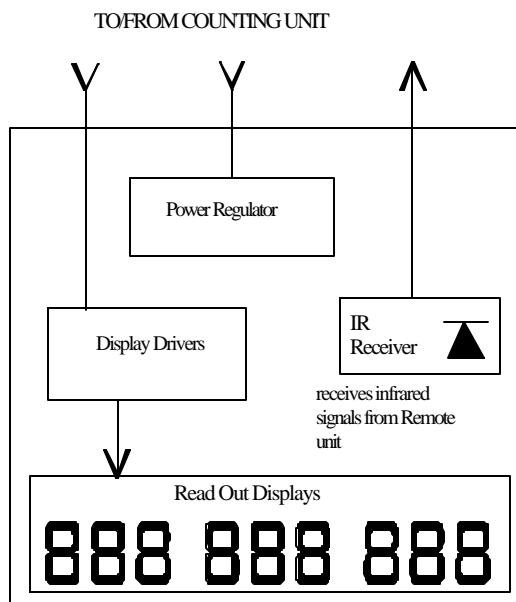
The operator controls the radar by pressing buttons on the keypad of the hand held control unit. An internal microcontroller running at 4 MHz encodes the operator commands into a serial data stream which modulates an IR transmitter LED. The remote unit is powered by 2 AA alkaline batteries.

#### ANTENNA UNIT BLOCK DIAGRAM

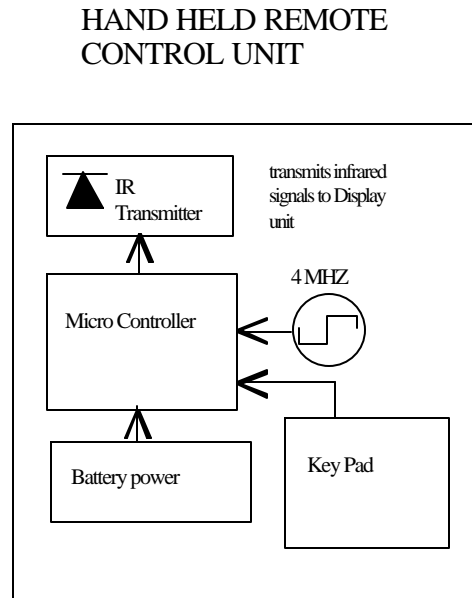
(FRONT OR REAR ANTENNA)



BEE III RADAR BLOCK DIAGRAMS  
FIGURE 1 OF 3



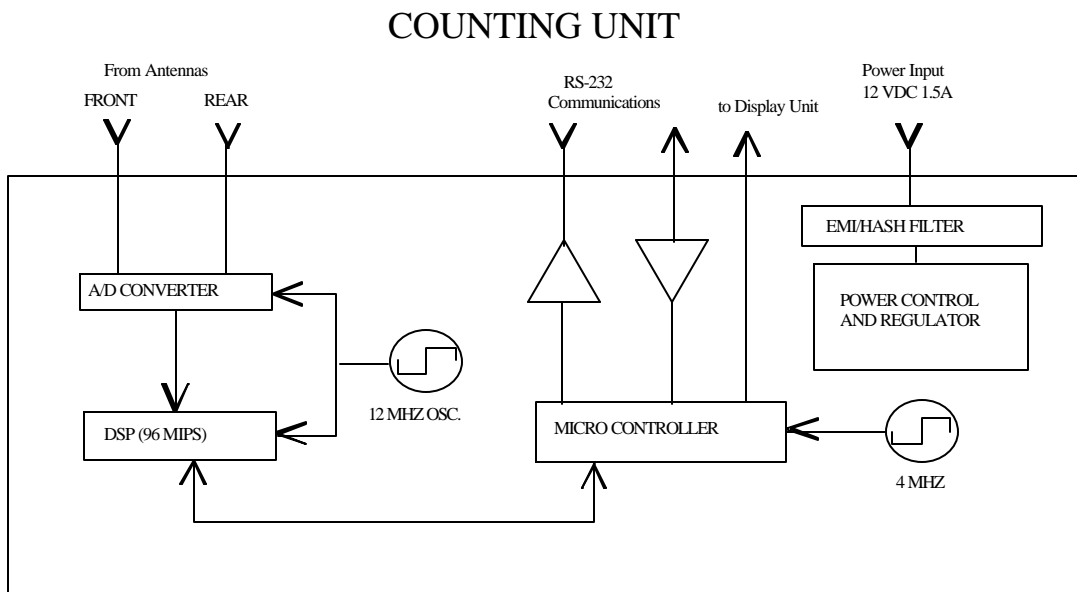
DISPLAY UNIT



BEE III RADAR BLOCK DIAGRAMS

FIGURE 3 OF 3

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BEE III RADAR BLOCK DIAGRAMS

FIGURE 2 OF 3

antblk2.tcw