Theory of Operation
Eko-Mini 1.9

The Eko-Mini 1.9A is a radio frequency repeater for use in the 1.9 GHz PCS spectrum. It is capable of operating in all PCS bands (A through F) and is not dependent on the over the air protocol selected by the user.

The downlink frequency band is from 1930 MHz to 1990 MHz. The uplink frequency band is from 1850 MHz to 1910 MHz. In the IF, the downlink and uplink bandwidths are set by selecting the appropriate SAW filter, either 15 MHz for A, B, and C bands or 5 MHz for D, E, and F bands. Both down conversion to the 140 MHz IF and up conversion to the original carrier frequency are referenced to the same local oscillator. Therefore the frequency stability of the Eko-Mini 1.9A is the same as that received from the base station and the connected mobile. Overall system gain is 70 dB. The maximum output is limited to +20 dBm composite.

Radio frequency input first passes through the downlink portion of the duplexer and a bandpass filter. It is then amplified by a Low Noise Amplifier with approximately 15dB of gain. The signal then passes through two stages each consisting of a bandpass filter and a 10dB amplifier. These stages provide one input to the downlink mixer. The local oscillator provides the other input. This input is 140 MHz below the received frequency. The 140 MHz intermediate frequency is then fed through a low pass filter to limit unwanted carrier products. The signal is then amplified and passes through the appropriate SAW Filter to assure the proper bandwidth. It is then amplified and applied to software selectable attenuators for output level limiting. The signal is then amplified and upconverted to the carrier frequency. It is then input to the driver, power amplifier, isolator, and duplexer.

The output power limit is user selectable in two dB steps from a maximum of +20 dBm down to +6 dBm on the downlink. The user can select up to six dB of additional attenuation, in two dB steps, in the uplink.

The uplink path is identical to the downlink path with carrier frequency offset by the PCS standard 80 MHz. The same L. O. is used for both down conversion and up conversion. Therefore the frequency stability of the path will be the same as that of the interfering mobile.

Remote alarms are provided through a previously certified Cermatek dial up modem. Alarms include both uplink and downlink synthesizer unlock conditions, PA overdrive, loss of the downlink source, and internal voltage failure. Essential alarms will result in the unit inhibiting both the uplink and downlink power amplifiers. Visual alarm indications are also provided locally.