

**Siemens Milltronics IQ 300 Radar****Technical Description, 3 January, 2001*****Introduction***

Siemens Milltronics IQ 300 Radar is intended for use in process industries for the determination of material level in tanks and other process vessels. The principle used is pulse radar. The equipment is mounted at the top of the tank or vessel. A short pulse of microwave energy is transmitted towards the surface of the material to be measured. This pulse is reflected from the material surface, and re-transmitted back towards the antenna. The time of flight of the pulse is measured, and hence the distance of the material surface from the antenna is determined (radar principle). This is then used to calculate the level and/or volume of material in the tank or vessel.

***Technical Description***

Referring to the block diagram, the device may be divided into three sections, namely antenna, microwave section and signal processing.

The signal processing consists of a microprocessor and suitable analog circuitry and digital logic to perform the following functions:

- Timing
- Digital signal processing
- Local display
- Digital communications
- 4 to 20 mA signal output

The antenna consists of either a dielectric rod antenna, a horn antenna or a waveguide.

The microwave section performs the following functions:

- Under control of the signal processing section, a short (1.5 ns) pulse at 6.3 GHz is generated every 2  $\mu$ s
- After a short delay a local oscillator generates a similar 6.3 GHz pulse which is mixed with the received echo
- By continuously varying the above delay in a suitable manner, and sampling the returned echo once per transmit pulse with variable delay, the returned echo is transformed to an equivalent 22 kHz signal
- This is processed using standard radar echo processing techniques to determine the position of the true echo

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**Microwave Transmitter – Description of Operation**

Refer to the schematic diagram RAD09-EK-01-V06. This schematic shows the microwave portion of the IQ 300 electronics.

The microwave pulse is generated using a standard transistor oscillator in the following way:

The transmitter burst is initiated by the rising edge of a logic signal on pin 2 of CON1. This pulse is coupled to a transistor oscillator circuit (T9) which produces a short high frequency burst at 6.3 GHz. The 6.3 GHz pulse is transmitted as a wave along the microstrip line, which acts as a waveguide, passes through an isolating coupler (between C17 and R32), then through a Wilkinson divider which directs the energy to the antenna cable via CON2.

The antenna cable is directed to the waveguide transition (through encapsulant in the housing). The antenna cable is terminated into the waveguide transition, at which point the 6.3 GHz electromagnetic wave is directed to the antenna.