SD Series Single Transmitter Block Diagram (SDB10001 Rev A) Discussion

Peripherals attached to the Transmitter

The Transmitters controller / monitor section interfaces with either an optional LOCAL OP PANEL (OP) or a Personal Computer (PC) .
The OP basically takes the place of front panel controls offered on legacy beacon transmitters offering monitoring and limited control over the transmitter as desired by Users who don't want to have to carry a computer to the site for simple functional testing.
The PC shown modem connected to imply distant control can also be connected locally via the same RS232 port to monitor , setup and /or test the system.

The Transmitters "RF Output" is fed through 50m ohm coax to the COUPLER which is a separate unit. The Coupler automatically tunes any reactance out of the antenna feed point and transforms the typically low antenna impedance to 50 Ohms to match the Transmitters output impedance

The SD series Transmitter

The basic SD series transmitter functional block diagram is shown within the dashed lines. For the sake of simplicity and clarity of operation the blocks shown may involve more than one PCB or may be a subpart of one PCB.

The Controller / Monitor resides totally on PCB SLP10007 and basically contains the Direct Digital Synthesizer (DDS), the Microprocessor and the main I/O. It receives +5, +12 and -12 VDC from the LVPS .

Under program control the Controller / Monitor section **outputs** the following signals:

CF HV CONTROL: an analog level which controls the HV output of the PA Power supply. This HV controls the average power output from the RF Power Amplifier.
DDS TONE: Morse Code Modulation, a 400Hz,1020Hz or User specified sine-wave keyed on/off to provide ID
DDS RF: selectable square or sine-wave RF frequency of operation
USER I/O controls the automatic battery disconnect relay. In a dual transmitter configuration controls TX1,TX2 antenna relay switching.

Under program control the Controller / Monitor section **inputs** the following signals:

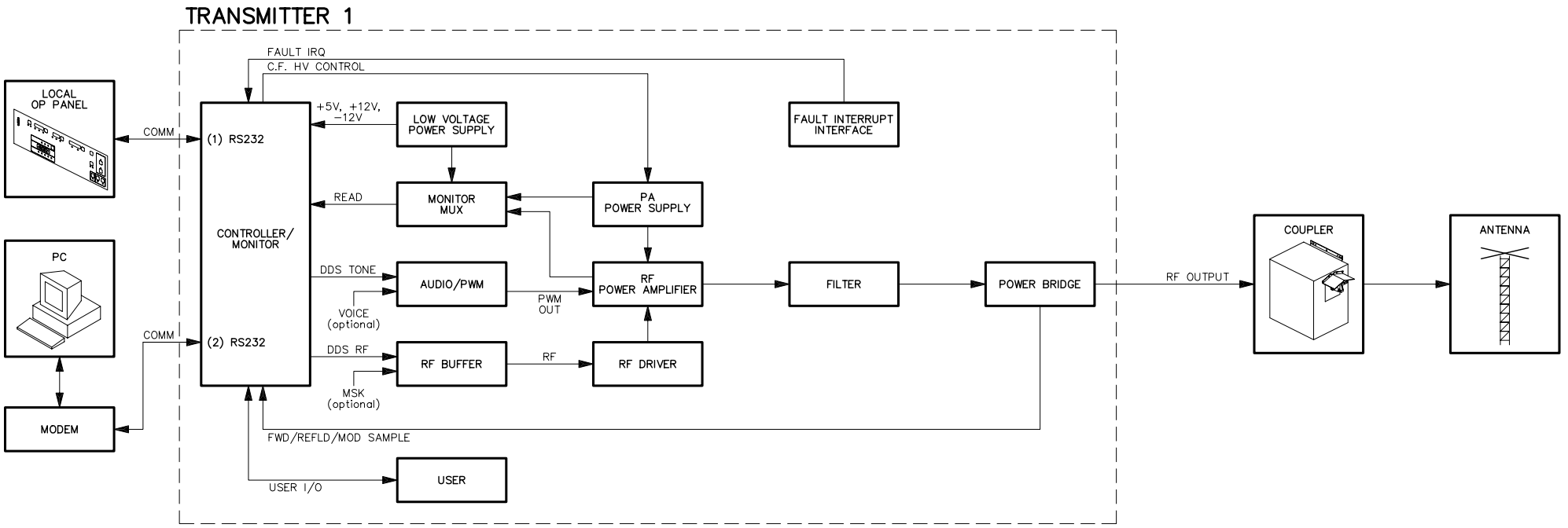
READ: a multiplexed reading of all the digital and analog values carrying data concerning transmitter operation. The line labeled READ represents an analog and a digital bus, which is expanded by the **Monitor Mux** block.
FAULT IRQ: Faults generated throughout the system are combined to generate this single interrupt request for rapid handling.
USER I/O: a multi-line input conveying information from the user section
FWD/RFL/MOD SAMPLE: RF measurements of forward and reflected power from the power bridge and a detected modulation sample.

The RF path starts with the DDS RF signal which proceeds to the RF BUFFER where, if a sine-wave, it is converted to a square-wave, normalized and buffered. A separate user supplied RF input called MSK can supply the basic RF signal in DGPS systems and is conditioned the same way.
The buffered RF is applied to the RF driver where it is amplified to sufficient strength to drive the power FETs in The RF PA Amplifier.
The RF PA Amplifier is a class D amplifier. It boosts the RF signal applied to the final power level desired and applied to the input broadband toroidal RF transformer in the filter section.
The Filter section Transforms the impedance of the path to 50ohms and applies the RF square wave it to a 7 pole Butterworth band filter to remove harmonic energy. The Clean RF is applied to the power bridge.

The Power Bridge is a balanced RF power bridge which extracts an accurate reading for the forward and reflected power. Also a detected sample of the RF envelope is created. These readings are sent back to the Controller/Monitor.
Finally the RF output is sent to the coupler and antenna.

The Modulation Path starts with the DDS TONE being applied to the AUDIO/PWM stage. Note that an optional VOICE signal can be summed with the DDS TONE. The composite audio signal is used to pulse width modulate a 75kHz signal. This signal is sent to the RF Power Amplifier where it is used to control the voltage applied to the finals and accomplishes modulation.

The FAULT INTERRUPT INTERFACE combines system faults into a single yet differentiated interrupt. The differentiation is accomplished in the MONITOR MUX block where all activity as relates to faults is passed on to the Controller/Monitor. The Monitor Mux also relays sensory samples of current and voltage from the RF Amplifier and the RF Amplifier Power supply


TRANSMITTER 1
FAULT IRQ
C.F. HV CONTROL
LOCAL OP PANEL
COMM
(1) RS232
CONTROLLER/ MONITOR
(2) RS232
COMM
PC
MODEM
+5V, +12V, −12V
LOW VOLTAGE POWER SUPPLY
FAULT INTERRUPT INTERFACE
READ
MONITOR MUX
PA POWER SUPPLY
DDS TONE
AUDIO/PWM
PWM OUT
RF POWER AMPLIFIER
FILTER
POWER BRIDGE
RF OUTPUT
COUPLER
ANTENNA
VOICE (optional)
DDS RF
RF BUFFER
RF
RF DRIVER
MSK (optional)
FWD/REFLD/MOD SAMPLE
USER I/O
USER