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Southern California Microwave

Operating Manual Rev. A 10-2-01

LCD Display 12 Watt Transmitter

Model # JR9-VT20SALCD

The operation of the transmitter is straightforward. The unit must be properly connected to the antenna before applying power. An adequate heatsink is also required for extended operation. The unit will overheat, and may damage itself, without proper cooling.

DANGER!! DO NOT LOOK DIRECTLY INTO THE APERTURE OF THE TRANSMITTING ANTENNA

After connecting the unit to the transmitting antenna, mate the video and power connections. Check to be sure the transmit antenna is clear, and apply DC power. See operating instructions for selecting the operating channel, audio configuration, and all other functions of the transmitter.

All user controls are through the keypad built into the unit, or through the RS232 port. No user accessible adjustments are available. There are no user adjustments inside the unit, so the covers should never be opened. If repair becomes necessary, return the unit to the factory.

Theory of operation:

VOLTAGE REGULATOR BOARD
The DC power into the transmitter first goes into the voltage regulator board, where the raw DC is filtered and regulated by U1 and U2 to a constant level to satisfy the requirements of the transmitter. The output of U1 is distributed throughout the transmitter as the main power source. The output of U2 provides power only to the power amplifier.

AUDIO BOARD

The board takes in the external audio signal from J2 pins C and E (audio #1) or pins D and F (audio #2), and filters it with a 75 usec pre-emphasis filter, C3/R4- C4/R5 for audio #1, or C13/R18- C14/R19 for audio #2. The filtered audio signal is then amplified by U1. Digital potentiometer U6 allows an electronic adjustment of the audio level for each subcarrier. The audio outputs go to the video board.

VIDEO BOARD

The video board takes in the external video signal from J1 and matches it to 75 ohms with R1-3. It is then filtered with the NTSC 525 line pre-emphasis filter consisting of R35 through 40, C47, and L13. It is then mixed with the audio subcarriers with R42.

The audio subcarrier signals are generated by U2 and U4. They are modulated by the audio inputs from the audio board, coming in through E2 and E7. The subcarrier signals are low pass filtered, then mixed with the video signal.

After mixing together, the composite video and audio subcarrier signal goes U12, where the level is electronically adjustable. The adjusted signal, set to the proper level, outputs to the VCO board.

VCO BOARD

The VCO board generates the output RF signal. It oscillates directly at the transmitters output frequency. It is tunable over the entire output frequency range, and can be FM modulated by the composite video/subcarrier signal. Q1 is the oscillator transistor, and its frequency is tuned by the AC or DC voltage on CR1. The output of Q1 is fed to Q2 which amplifies the signal, and the output of Q2 is sent to both the driver board and the PLL board.

PLL BOARD

The PLL board samples the output of the VCO, and divides it down to a low frequency, where it is compared with a very stable reference. U1 contains the crystal oscillator, reference dividers, and VCO dividers. Its output goes to U2 where it is low pass filtered. The output of U2 is the error or correction voltage that goes to the VCO to set it on the proper frequency. There is also a lock detection output on U1 that is integrated and compared to a reference by U3. If the transmitter looses lock, it sends a signal to the controller board. The PLL will only allow the transmitter to emit a signal in the 1990 (min) to 2110 (max) and 2450 (min) to 2483.5 (max) MHz bands.

DRIVER BOARD

The RF output of the VCO connects to the input of the driver board at C7. Q1 amplifies the RF signal, and its output goes to Q2. Q2 further amplifies the RF signal and its output goes to the input of the power amplifier board. Q1 and Q2 are switched on and off by removing the DC power from +V from their drains. This is done while the transmitter is out of lock to inhibit it from transmitting on the wrong frequency.

POWER AMPLIFIER BOARD

The RF from the driver board goes into the power amplifier board at E1. Q1 amplifies the RF up to the final output power level. The exact output level is set by adjusting the voltage coming in at E3. In addition, the voltage at E3 is removed completely when the transmitter is out of lock to inhibit off frequency emissions. The output of Q1 passes through isolator U1, which protects Q1 from an improperly matched transmitter output. The RF signal then passes through a low pass filter, C4-6 and L3-4, then connects to the transmitter RF output connector, J3.

CONTROLLER BOARD

The controller board is the brains of the transmitter. It takes inputs from the keypad board, or the external RS232 port. It then sends the proper control signals throughout the transmitter. It also monitors the temperature, lock status, and input voltage of the transmitter. If any of these indicates a problem, it takes the proper corrective action, either shutting off the output of the transmitter, or sending a visual warning to the operator via the LCD display.

KEYPAD BOARD

The keypad board is a mechanical interface that allows the user to adjust the controls of the transmitter. It has 4 momentary switches, and the closure of any of these switches sends a signal to the controller board. The keypad board also has 16 miniature LED lamps to illuminate the switches for ease of use in a dark environment.

OTHER TRANSMITTER INFORMATION

An RF gasket is not required on this transmitter due to the thickness of the cover (it does not flex), the close spacing of the screws in the RF area (2-56 screws no more than .86” apart), and the thickness of the walls of the unit. The transmitter contains 13 different compartments, so all signals that need to be shielded from each other are.

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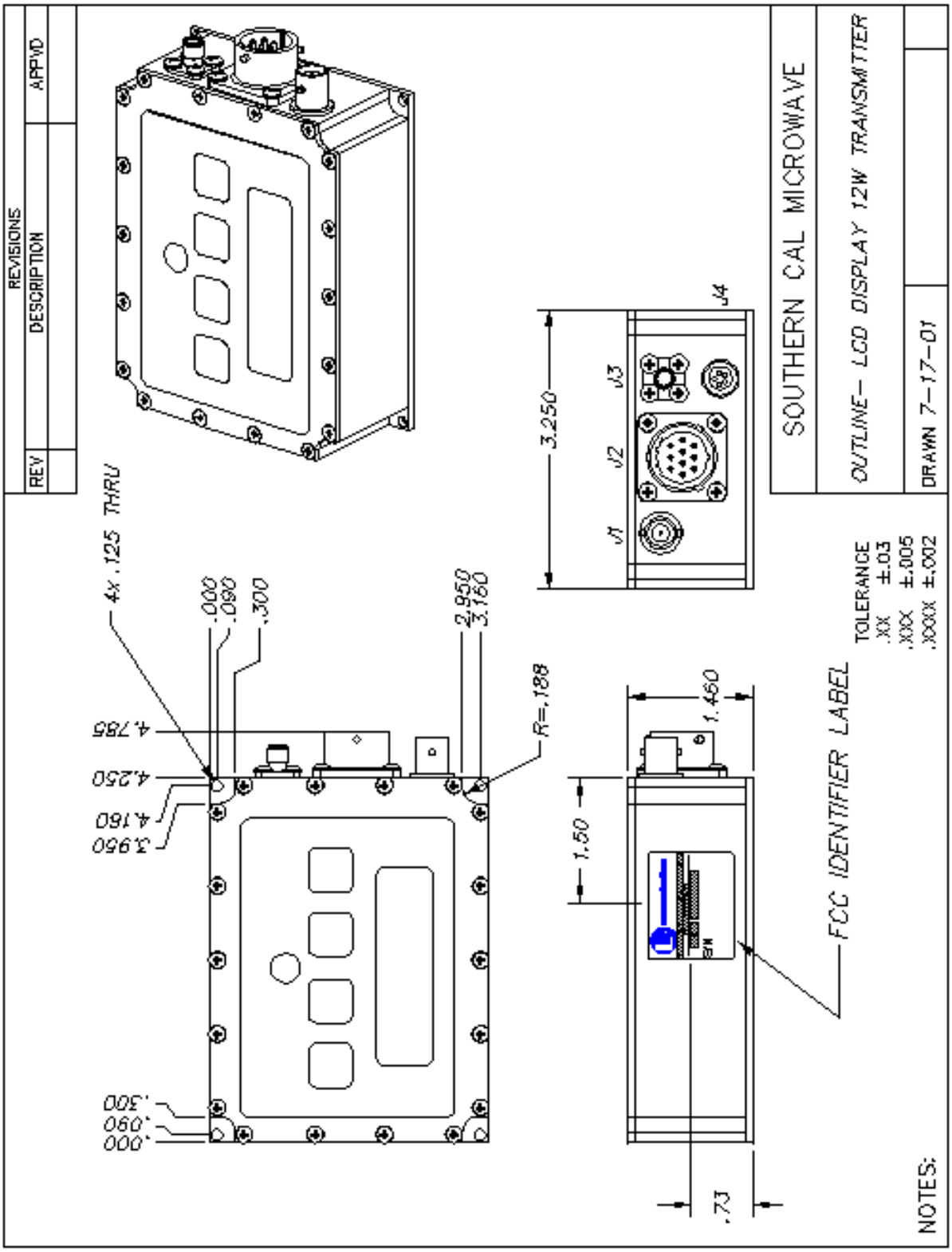
REVISIONS
REV
DESCRIPTION
APPVD
SOUTHERN CAL MICROWAVE
OUTLINE- LCD DISPLAY 12W TRANSMITTER
DRAWN 7-17-01
J1
J2
J3
J4
3.250
4X .125 THRU
.000
.090
.300
2.950
3.160
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