

## CHAPTER 1

### **DESCRIPTION OF THE NT 20 CHALLENGER**

#### **1.1 GENERAL DESCRIPTION**

The NT 20 challenger is housed in a 2U (2 rack unit spaces), 19" rack-mounting container comprising a number of interconnected modules mounted internally on the bottom of the equipment, facilitating removal and substitution. On the front panel there are: the power output control PWR ADJ, the PWR/DEV selector to select the power or deviation measuring on the analog meter, the switch on selector with its relative led and the analog meter for the measuring of main operating parameters. In the front panel there is also a BNC connector for RF muting marked as "INTERLOCK". On the rear panel there are: the BNC connector for the audio input, the trimmer regulating the audio level, the pin RCA connector for SCA input and the R.F. Output N-type connector.

#### **1.2 ELECTRICAL DESCRIPTION**

The NT 20 challenger is an exciter working in the 87.5 to 108 MHz band, programmable in steps of 10 KHz. Its power output is continuously adjustable from 1 to 20W into a 50 Ohm load. It also accepts one SCA signal through the connectors placed on the rear panel. The specification features low audio distortion and intermodulation figures (typ. 0.05%) and a high signal-to-noise ratio (typ. -72 dB).

#### **1.3 METERS AND INDICATORS**

The operating parameters of the exciter can be monitored using the analog multimeter located on the front panel. The parameter to be measured is selected by the selector. The frequency control is located on the top of the unit and the frequency can be changed through 4 rotary switches as shown in the next pages.

#### **1.4 AUTOMATIC FREQUENCY CONTROL**

The operating frequency is governed by a thermally-compensated, reference oscillator working within a phase-locked loop (PLL). The NT 20 challenger reaches frequency lock within a maximum of 30 seconds.

#### **1.5 CONTROL CIRCUITS**

The control circuits allow automatic control of output power, maintaining the chosen power level across the entire operating band. Furthermore another circuit protects the final stage against excessive VSWR or short circuits.

#### **1.6 RF AMPLIFIER**

The RF amplifier is a wide-band design and guarantees an adjustable power output of 1 to 20-25 watts across the entire band. A low-pass filter enables the NT 20 challenger to be used as a low power transmitter, connected directly to an antenna.

## CHAPTER 2

### ELECTRICAL DESCRIPTION

#### **2.1 INTRODUCTION**

This unit has been subdivided into blocks, each of which is fully described below.

#### **2.2 POWER SUPPLY**

This circuit is a AC/DC power supply type that allows AC inputs from 90 to 240 Volts without any need of change. The power supply generates the various stabilized voltages necessary for each of the various modules . The +24V supplies the mother board inside the unit and the final amplifier. The main mother board provides to generate a +15 V for powering all the remaining boards.

#### **2.3 MAIN MOTHER BOARD**

The main motherboard is located on the right bottom of the unit. The circuit includes a voltage-controlled oscillator (VCO) which generates the selected operating frequency. This signal is amplified to drive the phase-locked loop (PLL) control circuit and also the final stage. The audio signal is amplified and processed in order to compensate for distortion caused by the vari-cap diodes; it is then injected into the VCO to provide modulation. The operating frequency generated by the VCO is divided down before being compared to a reference frequency, generated by a high stability oscillator (standard 5 ppm). The error voltage is filtered and used to compensate the VCO frequency and it guarantees the frequency stability. An LED on the front panel signals the "locked" condition.

#### **2.4 R.F. POWER AMPLIFIER**

The final power stage is mounted on a heat sink to dissipate waste heat and is enclosed in a totally screened, metal container, fixed to the back panel of the unit. The R.F. signal coming from the Main card at a power level of about 2-3 W, reaches the final stage to a level of up to 20-25W. The resultant signal is then filtered by a low-pass filter which removes any harmonic content. A directional coupler allows the direct and reflected power levels to be measured and displayed on the analog multi-meter.

#### **2.6 FREQUENCY SELECTOR (ROTARY SWITCHES)**

This card is fixed to the motherboard and it is visible through the top cover, being illuminated by a pair of blue LED's. The operating frequency can be selected by rotating the switches to form the desired frequency (see other page).