

NATIONAL RADIO ASTRONOMY OBSERVATORY

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FREQUENCY SWEEPER

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1. General Description

The sweeper described in this note has been designed to be suitable for installation in a front-end box for the purpose of checking the bandpass of a complete receiving system. The prototype sweeper was designed to sweep the range 1365-1455 Mc/s and the output is flat to within ± 0.1 dB over this range. Two frequency markers are provided and also a facility for remotely turning the sweeper on.

2. Description of Operation

The VCO used in the sweeper is a Frequency Sources Type FS-6. This unit requires a +24 V supply at 75 mA and a tuning voltage of -14 V to -24 V for the desired frequency range. The circuitry has been designed so that any other Frequency Sources VCO may be used to give different frequency coverage.

A simple unijunction relaxation oscillator is used to generate the ramp for sweeping the VCO. The amplitude and DC level of the sweep may be adjusted independently. The oscillator may free-run or be synchronized to the line frequency.

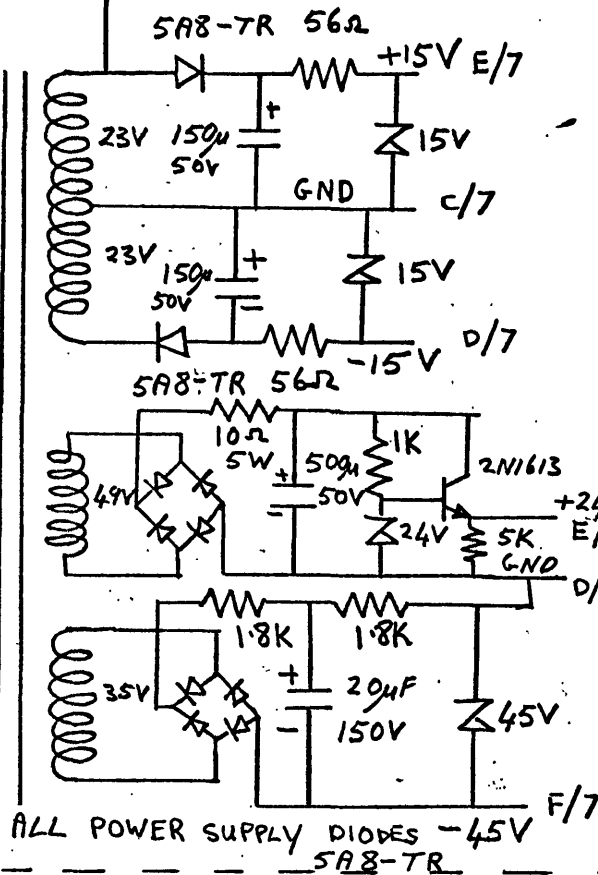
The RF output from the VCO is split with a 3 dB hybrid, one output of which is detected and used for leveling purposes. The leveled output may be adjusted up to a maximum value of 20 mW. The leveling loop is a simple integrating loop, the attenuating element being a HP 3550 diode attenuator.

The markers are generated by comparing the sweep voltage with a fixed voltage and when the two are equal a spike is injected into the leveling loop to give a momentary decrease in power.

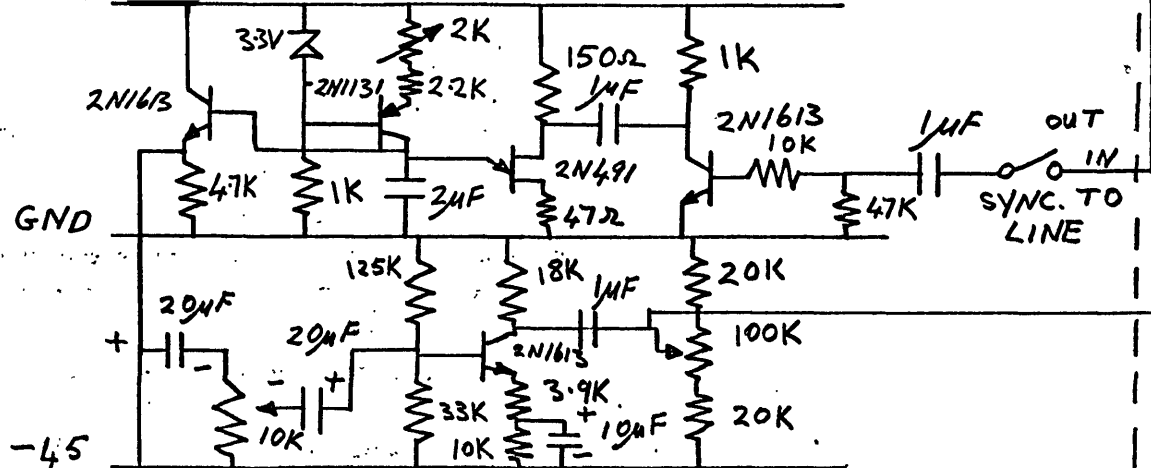
3. Mechanical Construction

The form of construction used is shown in the photographs. A printed circuit board is used for the sweep circuits, the marker generator and leveling loop. The size of the sweeper is 4" x 5" x 10".

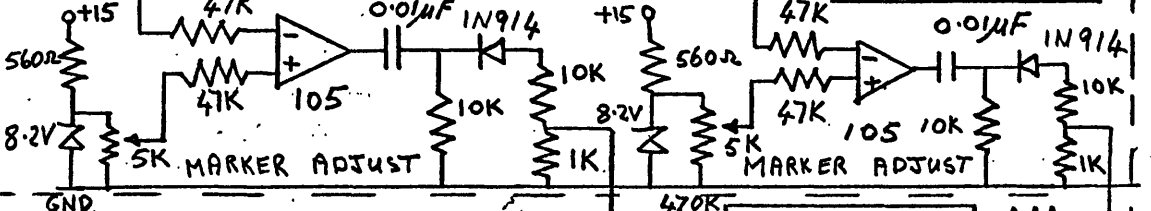
POWER SUPPLY



SWEEP CIRCUITS

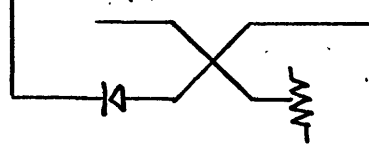


MARKER GENERATOR



RF CIRCUITRY

R.F. O/P



H.P. 3550 SPST

6dB PAD

VCO

POWER LEVEL

LEVELING LOOP

1/4 Gc/s SWEEPER CIRCUIT DIAGRAM

SWEEP VOLTAGE

ALL 105 AMPLIFIERS CONNECTED AS SHOWN

