

400041-20 DF Antenna Simulator for 100-200 MHz DF receivers



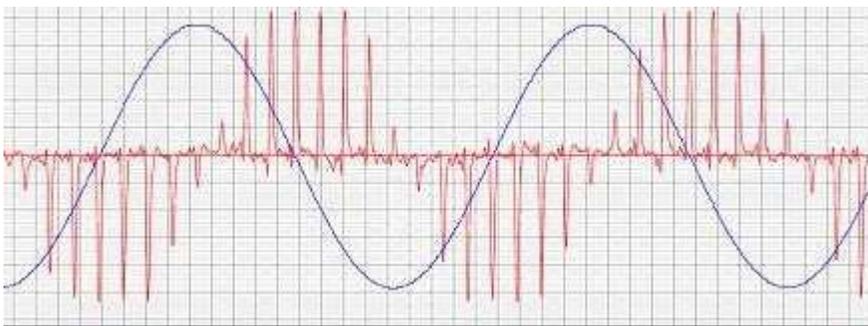
The 400041-20 radio direction finding antenna simulator was designed primarily for testing DF receivers. It operates between 100 and 200 MHz.

The simulator has a 16-position switch allowing the user to select desired phase shift of the commutated signal in 22.5° increments between 0 and 337.5° or 337.5° to 0° depending on the position of the switch placed on the rear panel of the simulator .

The source of 100-200 MHz RF signal is a Signal Generator.

The newer version of the simulator 400041-20SGhas a RF signal source built in.

Both simulators are fully compatible with all direction finding receivers made by Servo Corporation of America.



DF spikes generated by the DF antenna simulator for 90° bearing observed at the DF receiver demodulated output .

1. Antenna Simulator Insertion Loss.

For DF receiver sensitivity measurement and proper Squelch setting it is important to know the Insertion Loss of the Antenna Simulator.

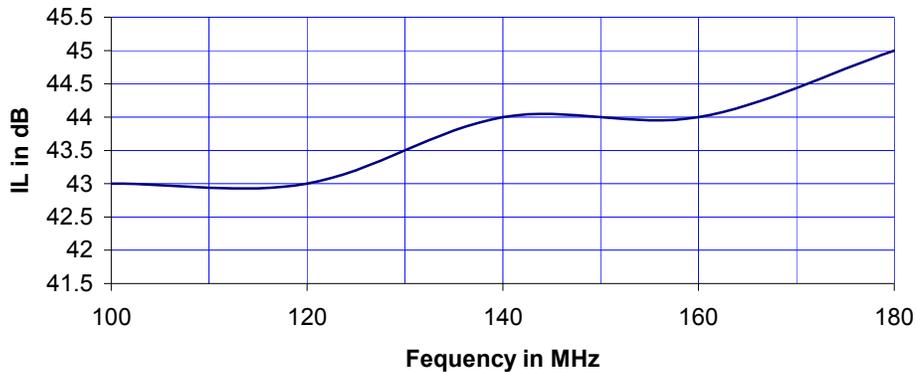
Measuring the Insertion Loss of the Simulator:

- Set the Signal Generator to 150 MHz, +10 dBm and connect it to the Spectrum Analyzer.
- Measure the power of the RF signal coming out of the Generator using the Spectrum Analyzer in dBm.
- Disconnect the Generator from the Analyzer and connect it to the Antenna Simulator.
- Connect the Spectrum Analyzer to the Antenna Simulator receiver input.
- Connect the antenna commutation cable from the DF receiver to the Antenna Simulator.
- Connect the Antenna Simulator to ~ 110 or 230V and press 1 on the ON/OFF switch located on the rear panel of the Antenna Simulator.
- Measure the power of the RF signal coming out of the Antenna Simulator in dBm.
- The Insertion Loss of the Antenna Simulator is the difference between the power of the RF signal going in to the Simulator and the power of the signal coming out of the Simulator.

Note: the Antenna Simulator should be connected to the Spectrum Analyzer only via RC network providing shunt 2k resistance to ground on a Simulator side and series capacitance 100 pF on the Spectrum Analyzer side.

The resistor is needed to complete the DC path for the Antenna Simulator that is normally used to measure the antenna current and the capacitor is needed to block the DC voltage (+/-18V) from the Spectrum Analyzer.

Antenna Simulator IL



In order to test the Squelch setting at 150 MHz (typically set to -105 dBm for Servo DF receivers) the Signal Generator should be set to:

-65 dBm

and varied slightly around that value to see when it actually breaks Squelch.

2. Testing DF receivers with DF antenna simulator.

Test Setup.

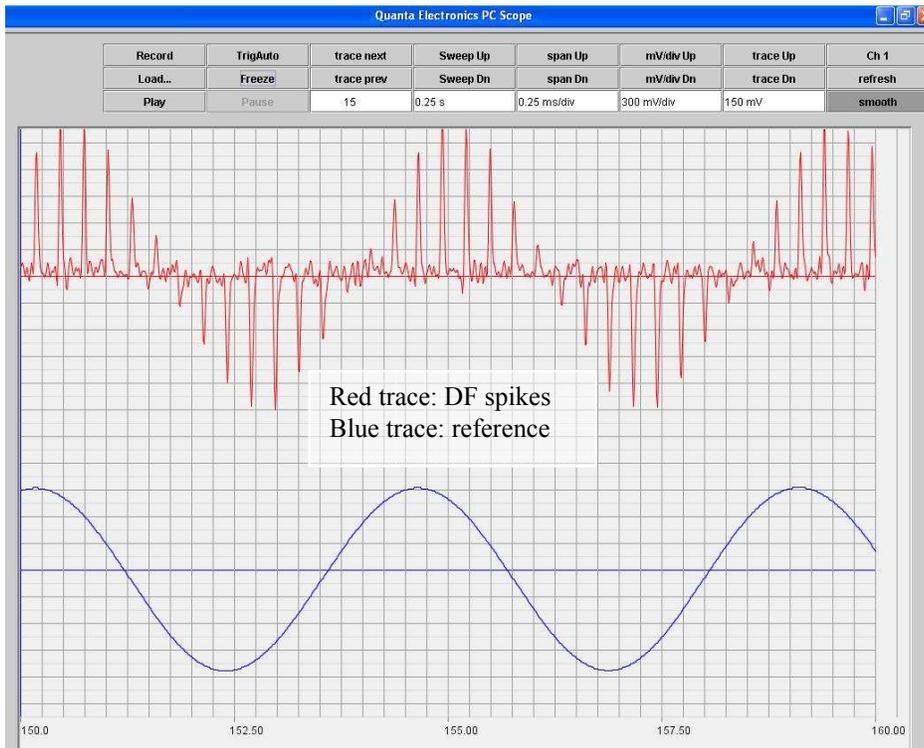
- Connect the Antenna Commutation cable from the DF receiver to the Antenna Simulator.
- Connect the DF receiver antenna input to the Antenna Simulator using 50 Ω coax cable.
- Connect the RF Signal Generator to the Antenna Simulator and set it to -15 dBm.
- Connect the Antenna Simulator to ~ 110 or 230V and press 1 on the ON/OFF switch located on the rear panel of the Antenna Simulator.
- Set the desired direction of the antenna rotation using the toggle switch placed on the rear panel of the Antenna Simulator.

If desired rotation is 0 to 337.5° set the Antenna Rotation switch placed on the front panel to position 1 and reset the DF receiver to 0° or if desired rotation is 337.5° to 0° change the position of the toggle switch on the back of the Antenna Simulator then set the Antenna Rotation switch placed on the front panel to position 16 and reset the DF receiver to 0°.

The receiver calibration is described in DF2120 and DF2140 manuals.

It worth to note here that the calibration of the DF receiver to 0° in position 1 or 16 is not absolutely necessary.

The only important thing during the test is that the change between the positions 1 thru 16 is always 22.5°.



Demodulated DF signal generated by 400041-20 Antenna Simulator at 150 MHz

3. Test Results

Antenna Rotation Switch Position	Antenna Simulator P/N AS-41-20 bearing [°]	Theoretical Bearing [°]
1	0.0	0.0
2	22.2	22.5
3	44.9	45.0
4	67.3	67.5
5	90.0	90.0
6	112.5	112.5
7	134.7	135.0
8	157.4	157.5
9	180.0	180.0
10	202.3	202.5
11	225.0	225.0
12	247.5	247.5
13	269.8	270.0
14	292.5	292.5
15	315.1	315.0
16	337.5	337.5

4. Electrical Specifications for VHF Antenna Simulator 400041-20

PARAMETER	LIMIT
AC Supply Voltage	110/240V AC
Current Consumption	100 mA max
RF Power Input	max: +10 dBm
RF Input/Output Impedance	50 ohms VSWR <2:1 within operating range
Frequency Range	100-200 MHz
Operating Temperature	-40 to +75 deg C
Storage Temperature	-55 to +85 deg C
Receiver Antenna	N-type female
Signal Generator	BNC female
Weight	<1.5 kg
Enclosure dimensions	10.0" x 8.0" x 10.0"
Finish	Industrial gray
Vibration	EIA RS-152-B part 14.3
Bench Handling	MIL-STD-810E method 516.4 proc VI
Manufacturing and Design	MIL-STD-2000
Burn-in	40 hrs under power
Thermal Cycling	min 10 cycles prior to testing -40 to 70 deg C dwell time 5 min. Rate of temperature change 20 ° C/min
Weight	<1.5 kg
Enclosure dimensions	10.0" x 8.0" x 10.0"