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Antenna Test Set

Model 12-602-3



**Techtest
Limited**

Advanced
test and
measuring
equipment



Antenna Test Set

Model 12-602-3

Features

- Tests aircraft antenna systems in situ
- Measures VSWR and Line Loss
- Frequency range 60-400MHz and 850-1250MHz
- Battery operated with built-in charger
- Portable shower proof metal case

General Description

The Antenna Test Set Model 12-602-3 has been designed to simplify the testing of aircraft antennas and their feeders thereby reducing maintenance costs and ensuring a far higher standard of reliability.

Since the Test Set has the ability to measure both VSWR (Voltage Standing Wave Ratio) and feeder loss it provides a convenient means of checking the complete antenna system both on installation and subsequently on routine checks to ensure maintenance of system integrity.

The unit operates over the

frequency range 60 to 400MHz in three overlapping bands and 850 to 1250MHz in one band. It incorporates a digital frequency counter. The low level signal from the test port may also be used as a source of modulated RF for other applications such as receiver checking.

Power for the unit is provided by a set of internal lead acid gel batteries and a built in battery charger allows the batteries to be charged from 100 to 240V AC supplies of any frequency from 50 to 400Hz. The tester is housed in a rugged shower-proof metal case which is completely portable, the accessories and leads supplied being housed in the case lid.

Description of operation

Antenna Voltage Standing Wave Ratio (VSWR)

Of all antenna parameters VSWR is probably one of the most useful. Indicating the ratio of the antenna impedance to characteristic impedance of the co-axial feeder, the VSWR figure can be used to calculate the percentage transfer of power to the antenna i.e., its efficiency. Table 1 shows how the power to the antenna is reduced for increasing values

of VSWR, the power loss in dB, the percentage loss in potential operating range for a one-way system such as communications, and also the loss in potential operating range of a two-way system such as an altimeter.

It will be seen that the measured VSWR provides an extremely useful guide to the efficiency of the antenna system both on installation and subsequently throughout the life of the aircraft.

Cable attenuation

One other factor effecting the efficiency of an antenna system is the loss associated with the feeder cable employed. In a properly designed system this is not likely to be excessive unless the cable develops a fault.

This condition will of course be immediately detected by the use of the Test Set.

Testing to maintain system performance

Since the Antenna Test Set Model 12-602-3 will measure both VSWR and cable loss, it can be employed to check complete aircraft antenna systems on installation and subsequently throughout the lifetime of the aircraft. Any incipient weakness will be detected by these routine checks and the source of the trouble located quickly and reliably. Unnecessary replacement of radio and radar equipments when a fault is suspected can be avoided since only after the antenna system has been tested and found correct, will

Table 1: Effect of VSWR on Power Transfer and Range

VSWR	% Power to Antenna	Power Loss in dB	% Loss in One-way Potential Range	% Loss in Two-way Potential Range
1.00	100	0.00	0.00	0.00
1.50	96	0.18	2.02	4.00
2.00	89	0.51	5.72	11.11
2.50	82	0.88	9.65	18.37
3.00	75	1.25	13.40	25.00
3.50	69	1.60	16.85	30.86
4.00	64	1.94	20.00	36.00
4.50	60	2.25	22.86	40.50
5.00	56	2.55	25.46	44.44

it be necessary to check the associated hardware.

Test set versatility

Apart from the straightforward measurement of VSWR and line loss there are a number of ways in which the 12-602-3 can be used to solve problems associated with antenna systems. Some examples are as follows:

- 1 Tracing the correct connection of feeders in a system with more than one antenna can be easily achieved by connecting the tester to one feeder and then touching the antennas in turn until an obvious change in VSWR is noted.
- 2 Tunable antennas, like some airborne marker antennas, can be tuned to the correct frequency by simply adjusting for minimum VSWR at the frequency as indicated on the 12-602-3.
- 3 The tuning of antennas by physical adjustment of length, as in some mobile installations, can also be carried out by the same method which will give a positive indication of the effect of each length change.
- 4 Acceptance testing of antenna on receipt from the

manufacturers can be carried out on the Test Set after mounting the antennas on a suitable ground plane.

Operation of the instrument is simple and an unskilled operator can easily be trained to use it for this purpose.

5 Apart from antenna testing the Model 12-602-3 can be used in the laboratory or workshop for measuring VSWR of many other 50ohm devices or systems within its operating frequency range.

Simplicity of operation

Measurement of VSWR with the Antenna Test Set 12-602-3 is simplicity itself. There are only three basic steps:

- 1 Tune to the frequency required.
- 2 Set the meter calibration with the Precision Short Circuit supplied.
- 3 Connect to the antenna and read the VSWR directly on the meter.

Line loss is measured with equal ease by connecting the cable involved, terminated with the short circuit, in place of the antenna in step 3 above. The line loss is indicated directly on the meter.

Technical Specification

Frequency Range

60-400MHz in three overlapping bands and 850-1250MHz in one band. The frequency is displayed digitally.

Digital Frequency Readout Resolution

60-400MHz $\pm 0.75\text{MHz} \pm \text{LSD}$
850-1250MHz $\pm 2\text{MHz} \pm \text{LSD}$

Readout Accuracy

VSWR below 3:1 - ± 0.5 VSWR
VSWR between 3:1 and 5:1 - ± 1.0 VSWR

Impedance

50 Ohms

RF Level at Measurement Connector

-10dBm nominal

Measurement Connector

N type socket

Current Consumption (Batteries)

375mA nominal

Battery Life

8 hours nominal

Measurement Connector

N type socket

Battery Charger Characteristics

110-240V AC 50-400Hz

Size

203 x 305 x 212mm (8 x 12 x 8 1/2 inches) with provision for cable storage in removable weatherproof cover

Weight

6.2kgs

Accessories Supplied

1 off 1.5m Test Cable	KA-00-007
1 off Mains Charging Lead	KA-00-009
1 off Whip Antenna	JA-00-031
1 off Shorting Plug (attached)	JA-00-012
1 off Shorting Plug (free)	JA-00-011
1 off Coupler	JA-00-013
1 off Adaptor BNC male	JA-00-015
1 off Adaptor BNC female	JA-00-017
1 off Adaptor C male	JA-00-019
1 off Adaptor C female	JA-00-021
1 off Adaptor N male	JA-00-023
1 off Adaptor N female	JA-00-025
1 off Adaptor HN male	JA-00-027
2 off Spanners	JA-00-029
1 off Instruction Manual	