

The NAV-402AP is a completely self-contained unit designed for functional testing and calibration of MKR, VOR, LOC, G/S and COMM avionics.



- **Synthesized signal generator for MKR, VOR, LOC, G/S and COMM systems with both FIXED and VAR frequency modes**
- **8.33 & 25 kHz COMM Channel Selection**
- **1 ppm TCXO master oscillator**
- **Simultaneous LOC-G/S output**
- **Sweep LOC DDM to test autopilot capture mode**
- **New low power built-in counter for display of generator frequency, COMM XMTR frequency or 0 dBm external frequencies from 1 MHz to at least 300 MHz**
- **Compact size for flight deck operation**
- **Two year limited warranty**

IFR is a leader in the design, manufacture and marketing of Avionics test systems.

The NAV-402AP Test Set is designed to meet the functional testing requirements of CAT I, CAT II and CAT III ILS systems.

The test set includes a modulated signal generator for MKR, VOR, LOC, G/S and VHF COMM tests and a variable output attenuator.

Maximum output on any band is -7 dBm (0.1 V).

Output range is from -7 dBm to -110 dBm.

The VOR and G/S bands are each supplied with two selectable fixed frequencies and the LOC, MKR and VHF COMM bands are supplied with one fixed frequency each. Variable frequency modes allow all frequencies of all bands to be used. VOR, LOC and MKR bands are frequency phase-locked at 25 kHz intervals.

G/S band is phase-locked at 50 kHz intervals and the VHF COMM band is phase-locked at 8.33 kHz or 25 kHz intervals.

Two independent internal localizer transmitters with outputs of approximately -18 dBm at the generator output jack are provided for simultaneous radiation of LOC and G/S signals in G/S FIXED mode with LOC switch on.

The test set includes a counter to measure the RF frequency of the signal generator in any band, the frequency of any VHF COMM transmitter, any 0 dBm external frequency from 1 MHz to 300 MHz, or display the selected VOR bearing as a check on the VOR BRG.

The counter time base is derived from a 10 MHz TCXO with a stability of  $\pm 1$  ppm from 0 to 50°C.

An RF power meter is included to measure COMM transmitter power 0-10 W or 0-100 W. A peak or average power switch allows COMM XMTR modulation checks and a rear panel jack permits monitoring of the modulation.

A percentage modulation meter accurately indicates modulation levels on any band 0-30% or 0-100%.

The NAV tones for modulation are digitally derived from a 2.16 MHz crystal oscillator. The 90 Hz and 150 Hz tones utilized for LOC and G/S modulation are phased-locked with an accuracy of 0.1°.

By pressing a front panel switch the relative phases between the 90 and 150 Hz tones can be varied in 5° steps, relative to the 30 Hz reference signal, for a 1° selected step on the VOR BRG selector.

LOC and G/S centering may be calibrated from the front panel.

The battery charging system will permit continuous charging without damage to the battery.

### Added Features

- VOR bearing selectable in 0.1° steps, accuracy  $\pm 0.1^\circ$
- Built-in 90° bearing monitor of VOR output
- RF Power meter for COMM XMTR power 0-10 W and 0-100 W
- Built-in battery and charger supply

## Specification

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### Signal Generator

#### Frequency Ranges

72-78 MHz, 107-156 MHz, 327-337 MHz

#### Signal Output

0.7  $\mu$ V to 100,000  $\mu$ V (-7 to -110 dBm)

#### Fixed Mode

75.0 MHz, 108.0 MHz, 108.1 MHz, 112.8 MHz, 126.9 MHz, 329.6 MHz, 334.7 MHz

Frequency accuracy same as master oscillator

\* Note: Any fixed frequency may be chosen at time of test set order, or subsequently programmed at any authorized service center.

#### Variable Mode

Phase Lock Interval MKR, LOC, VOR 25 kHz G/S 50 kHz COMM 8.33 or 25 kHz Frequency accuracy same as master oscillator

#### Modulating Signal

1020, 400, 1300, 3000 Hz Tones,  $\pm 1\%$  accuracy 95% modulation on MKR  $\pm 5\%$ ; VOR Signal, see below; 30% modulation on LOC, VOR, COMM  $\pm 2\%$ ; LOC and G/S signals, see below (These are modulation levels with the Master Mod control in Cal position.)

### Master Oscillator

#### TCXO

#### Stability

$\pm 1.0$  ppm 0 to +50°C

#### Ageing

<1.0 ppm per year at +40°C dynamic

### Test Signal Accuracy

#### VOR

3600 digitally derived courses, selectable in 0.1° increments. Course accuracy better than  $\pm 0.1^\circ$ . 30 Hz  $\pm 0.02\%$ , 9.96 kHz  $\pm 0.02\%$  (Deviation  $\pm 480$  Hz  $\pm 25$  Hz). Modulation % of each signal 30 ( $\pm 2$ )%. TO-FROM switch added for convenience.

#### LOC-G/S

90, 150 Hz  $\pm 0.02\%$

Modulation LOC - 20 ( $\pm 2$ )% each tone G/S - 40 ( $\pm 2$ )% each tone

#### DDM-LOC

0.093, 0.155, 0.200 DDM and tone delete for flag tests

#### Accuracy

$\pm 0.0013$  DDM ( $\pm 3$   $\mu$ A)

#### Variable Control

$\pm 0.4$  DDM

Sweep Control from 0 to  $\pm 30$   $\mu$ A

#### DDM-G/S

0.091, 0.175, 0.400 DDM and tone delete for flag tests

#### Accuracy

$\pm 0.0024$  DDM ( $\pm 2.0$   $\mu$ A)

#### Variable Control

$\pm 0.8$  DDM

#### Auxiliary LOC Signal

108.1 MHz Paired with G/S 334.7 MHz

110.5 MHz Paired with G/S 329.6 MHz

#### Frequency Accuracy

$\pm 0.005\%$

#### Fixed RF output

Typically -18 dBm

0.093, 0.155, 0.200 DDM and tone delete for flag tests

#### Accuracy

$\pm 0.0013$  DDM ( $\pm 3$   $\mu$ A)

#### Variable Control

$\pm 0.4$  DDM

#### Sweep Control

From 0 to  $\pm 30$   $\mu$ A

### Power Meter and Counter

#### POWER METER

##### Range

0 to 100 W

##### Scales

0 to 10 W, 0 to 100 W

##### Accuracy

$\pm 3\%$  of full scale +  $\pm 5\%$  of meter indication

##### Input Power

$\leq 20$  W CW Continuous Duty

#### COUNTER

##### Accuracy

$\pm 0.002\%$

### Resolution

Four selections 1 Hz, 10 Hz, 100 kHz, 1 kHz

### External Input Range

1 to 300 MHz

### Impedance

50  $\Omega$  AC terminated

### Sensitivity

-9 dBm at 10 MHz, -3 dBm at 200 MHz, 0 dBm at 300 MHz

### Maximum Input Power

+24 dBm (250 mW)

### General

#### Battery Operation

Type 2.0 AH NICAD

Duration 1.5 hours before recharge

#### AC Supply

102 to 120 VAC, 220 to 240 VAC, 50 to 400 Hz,

$\leq \pm 10\%$  of the nominal voltage, 38 W maximum

#### Environmental

Temperature -20 to +55°C (Functional)

Relative humidity  $\leq 80\%$  for temperatures up to 31°C decreasing linearly to 50% at 40°C (Non-condensing)

Altitude  $\leq 4000$  m (13,124 ft)

#### Dimensions and Weight

Housed in a portable case 289 mm wide, 130 mm high, 410 mm deep

11.375 in. wide, 5.125 in. high, 16.125 in. deep

#### Weight

7.7 kg (17 lbs)

#### NATO Stock Numbers

NAV-402AP-3 TBA

## Versions and Accessories

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When ordering please quote full ordering number information.

### Ordering Numbers

#### Versions

402-110 NAV-402AP VOR/LOC/GS/COMM/MKR Ramp Test Equipment, 110 VAC operation

402-220 NAV-402AP, 220 VAC operation

#### Accessories

AC100 20 dB RF Amplifier

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All IFR Avionics products delivered with Factory Certificate Of Calibration



IFR - "Working together to create solutions for the world of communications."

IFR is a world leader in developing leading edge test and measurement equipment. The priority at IFR is to understand your communications test needs and respond to them. IFR has the flexibility and expertise to create just the right test solution for you. We understand that just as you are the expert in designing wireless products, we are expert in wireless test.

Combining the quality of our test products with their reliability, excellent price/performance ratio and minimal requirements for maintenance, every IFR test system represents an outstanding lifetime value.

IFR - "Working together with our customers to be flexible and innovative in providing effective test solutions for the rapid design, manufacture and maintenance of communications systems."

The added value IFR includes with each and every test set we sell will make you more productive. We offer a two-year standard warranty on all products and we will continue to support your product for five years beyond its final production. Our outstanding Customer Service Department offers calibration, out-of warranty repairs and consulting. Our Sales and Training Departments offer clear and concise product information with realistic performance specifications, technology training and application training. Our experienced engineers will help you develop application software and through continuous improvement programs, upgrades are always available.

IFR will continue to build upon our technology resources with an aggressive commitment that will enable you to excel in some of the world's most dynamic, high growth markets.

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