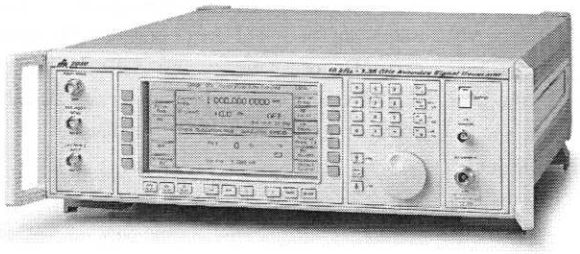
Signal Sources

2030 Series Signal generators

AEROFLEX
A passion for performance.



A high performance signal generator with programmable modulation sources and LF output, wide modulation bandwidths, sweep capability and excellent accuracy.

- Wideband cover:-
  10 kHz to 1.35 GHz (2030)
  10 kHz to 2.7 GHz (2031)
  10 kHz to 5.4 GHz (2032)
- 0.1 Hz frequency resolution
- 0.1 Hz to 500 kHz modulation oscillator
- Wideband FM with 10 MHz bandwidth
- Single, dual, composite and dual composite modulation modes
- GPIB programming (IEEE 488.2 standard)
- Simple operation through menu selection of modes

The 2030 series of signal generators offers increased flexibility with combinations of frequency, phase, amplitude and pulse modulation over the frequency ranges 10 kHz to 1.35 GHz (2030), 10 kHz to 2.7 GHz (2031) and 10 kHz to 5.4 GHz (2032). These instruments are suitable for a wide variety of applications ranging from RF component characterization to radio communications system testing. Set up time is reduced by recalling previously stored instrument settings from the non-volatile memory. Remote programming via the GPIB is provided as a standard feature, allowing the instruments to be included in automatic test systems.

Operation

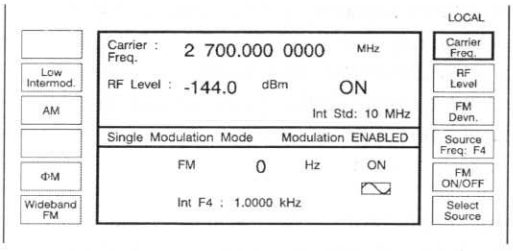
Operation of the instrument is performed by simply selecting the required operating mode and entering parameter values using the numeric keypad. Parameter values may be varied by means of the rotary control knob or by use of the ⇧⇩keys.

The Signal Generator, Sweep, LF, Delta, Memory and Utility displays are selectable at any point of operation using the keys below the screen. Within each display, soft keys are assigned alongside the display to allow parameter entry or to select the relevant functions.

Display

A large screen, dot matrix liquid crystal display, with backlighting, offers excellent clarity and low power consumption. Contrast may be varied using the knob to optimize the viewing angle and differing lighting conditions may be accommodated by adjusting the backlight intensity.

The parameters displayed on the screen depend on the operating mode selected; for example in the Signal Generator mode, carrier frequency, modulation and RF level are shown in separate horizontal regions. Status information is also shown with error messages being displayed in a single line at the top of the screen.



Frequency selection

Carrier frequency entry is selected via a soft key option on the signal generator screen and data is then entered directly via the keyboard. Frequency is resolved to within 0.1 Hz across the complete range of the instrument. Carrier frequencies can be stored in the non-volatile memory for recall at any time. A CARRIER ON-OFF switch is provided to completely disable the output.

RF Output

RF output up to +13 dBm can be set by direct keyboard entry with a resolution of 0.1 dB or better over the entire range. An extended hysterisis facility allows for extended electronic control of RF output level without introducing mechanical attenuator transients when testing squelch systems and an overrange facility allows the generator to produce RF levels above the normal operating range. A high output option is available to extend the maximum calibrated level to +19 dBm on 2030.

A low intermodulation mode can be selected which freezes the RF levelling system and improves the intermodulation performance when combining the outputs of two signal generators.

Calibration Units

A choice of calibration units is available to the operator and provision is made for the simple conversion of units (for example, dBm to mV). For units without Option 8 the output level can be offset by up to ±2 dB by keyboard entry. Offsets from the calibrated value may be used to compensate for cable or switching losses external to the generator. The operator may also use this facility as a means of deliberately offsetting the output level to ensure that all generators in an area give identical measurements. While using the offset facility, the calibration of the signal generator is not lost and may be returned to at any time.

Units with RF profile and complex sweep option (Option 8) have a much more comprehensive profiling and offsetting capability.

50 W Protection

An electronic trip protects the generator output against reverse power of up to 50 W, preventing damage to output circuits when RF or DC power is accidentally applied. This feature contributes to long unit life and low cost of ownership.

MODULATION

Comprehensive amplitude, frequency (plus Wideband FM), phase and optional pulse generation and modulation are provided for testing all types of receivers.

Modulation Oscillator

An internal modulation oscillator is provided with a frequency range of 0.1 Hz to 500 kHz, resolved to 0.1 Hz. In addition to the normal sine wave output, alternative triangular or square waveforms may be selected. A second oscillator may be added as an option. Two independent BNC inputs on the front panel allow external modulation signals to be mixed with the internal signal(s) allowing a maximum of four modulations channels to be active at one time.

Modulation Modes

Four modulation modes are provided – single, dual, composite and dual composite. In the single mode only one type of modulation can be active at any time. Selecting alternative modulation cancels any other active modulation. In the dual mode two types of modulation may be obtained allowing one form of frequency modulation to be combined with one form of amplitude modulation. In the composite mode, only one type of modulation can be active, and is fed by two independent channels. The dual composite mode combines the facilities of the dual mode with the composite mode and provides two types of modulation each fed from two sources.

Frequency and Phase Modulation

The wide range frequency modulation capability provides a 1 dB bandwidth of 300 kHz and provides FM deviation up to a maximum of 1 MHz for frequencies up to 21 MHz and 1% of carrier frequency else-where. Phase modulation is also available with a 10 kHz bandwidth up to a maximum of 10 radians.

Both AC and DC coupled FM are available and in the DC coupled mode a patented offset correction system eliminates the large carrier frequency offsets that occur with normal signal generators. As a result the 2030 series signal generators can be used confidently for testing tone and message paging equipment.

Wideband FM

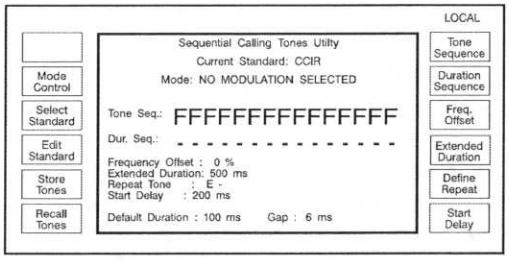
Broadband frequency modulation with a 3 dB bandwidth of 10 MHz is provided via a rear panel BNC socket. This is ideal for tests on equipment using frequency shift keying for high speed digital transmission.

Amplitude and Pulse Modulation

Amplitude modulation with a 1 dB band-width of 30 kHz and with modulation depths of up to 99.9% is available with a resolution of 0.1%. Pulse modulation is available as an option with typical rise and fall times of 5 ns and 70 dB on/off ratio.

Modulation Levelling

An automatic level control facility is provided for both of the external modulation inputs and provides correctly calibrated modulation for input levels varying from 0.7 V to 1.4 V RMS. HI and LO indications show when the input level is outside the range of the ALC system.



Tone Signaling

The signaling facility allows testing of radios with DTMF, sequential and sub-audible tone capability. A wide range of tone system standards are built in and provision is also made for user definable standards to cover special requirements. Tone sequences can be set up with up to 16 tones in length and the complete sequence can be sent from 1 to 9 times or set to repeat on a continuous basis. Sub-audible tones are normally used in the composite modulation mode where the modulation level for the tone and the in-band modulation can be set independently.

INCREMENTING

All major parameters can be incremented or decremented in step sizes entered via the keyboard or the GPIB.

⇧⇩ keys

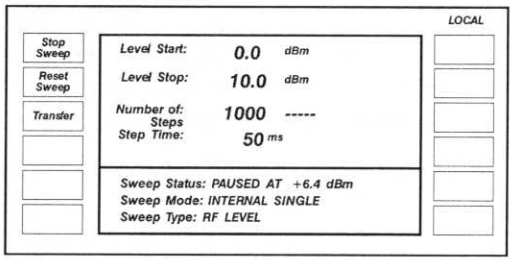
If the knob is disabled, a single touch on either the ⇧ or ⇩ key moves the parameter by a single step and holding the key pressed causes the signal generator to step continuously at a rate of about three steps per second.

Rotary Control

When the rotary control is enabled the parameters can be varied using the knob, whose sensitivity may be altered by factors of ten using the ⇧ and ⇩ keys. The digits affected by the rotary control are indicated on the display by lines above and below the numeric display.

Delta Display

The Delta menu allows the increment for all the parameters to be set and also includes a TOTAL SHIFT key to show the variations in the parameters from their last keyed in value, a RETURN key to reset the selected parameter to its start value and a TRANSFER key to update the parameter value to equal the shifted value.



SWEEP

The digital sweep capability of the 2030 series allows dynamic testing of systems and includes capabilities for sweeping carrier frequency, RF level, LF frequency and LF level. Four parameters are entered to specify the sweep – start value, stop value, number of steps and time per step.

Option 8 provides additional sweep capabilities which allow the step size, step time and RF level to be entered.

Markers and Ramp Output

Six markers may be defined and a marker output is provided on a rear panel socket together with a 0-10 V ramp signal for driving the X axis of an oscilloscope or X-Y plotter.

Start/Stop

A single key press starts the sweep and a horizontal bar graph on the display shows the progress of the sweep. The sweep can be stopped at any time and the ⇧⇩ keys used to step forwards or backwards for search purposes. Transfer of the current sweep value into the signal generator or LF modes for more detailed analysis is also possible. The sweep facility can be used in conjunction with a simple X-Y display unit, an oscilloscope or an X-Y plotter.

NON-VOLATILE MEMORY

True non-volatile memory needing no battery back-up is fitted to the 2030 series and is used to store details of instrument settings and calibration information.

Instrument Settings

Details of instrument settings are stored in four areas of memory. One area stores 50 complete instrument settings (including data on parameters which are not currently active), a second area stores 50 partial settings (consisting of details about the currently active parameters), a third area stores details of 100 carrier frequency values and a fourth area stores details of 20 sweep settings. Facilities are provided to prevent the memories from being accidentally overwritten and for recalling a specified memory at switch-on.

Calibration Data

In addition to storage and recall of measurement settings, the non-volatile memory contains data on instrument status and calibration. All calibration data on RF level, FM accuracy, internal frequency standard adjustment and modulation are retained and may be altered from the front panel or via the GPIB after disabling the software protection. Status information stored includes the identity string (type and serial number), choice of internal/external standard, GPIB address, elapsed time and a date alarm for calibration due reminders.

Memory Content Protection

To prevent accidental interference with the contents of status and calibration data, internal data is protected by a secure key sequence. Two levels of protection are offered, appropriate to the function being accessed. The most secure is reserved for features that alter the calibration data, change the time and date setting or blank the displays when memories are recalled. The first level of protection is less severe, enabling the user to access features which are relevant to normal operation, for example, selection of RF level calibration units, RF level offsets, external standard frequency and switch-on status.

Unprotected features provide a range of additional operating features, such as the ability to display status information, elapsed time, time and date, etc.

PROGRAMMING

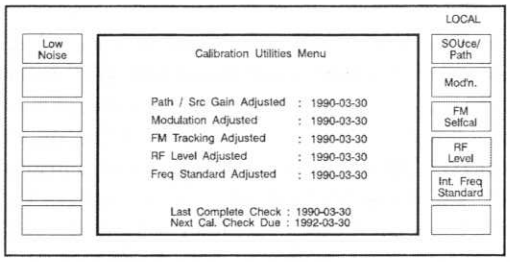
A GPIB interface is fitted as standard so that all functions are controllable over this interface. The instruments function as talkers as well as listeners and the interface has been designed in accordance with the IEEE 488.2 standard.

CALIBRATION

The 2030 series has a two year recommended calibration interval, with the user being able to calibrate some functions. The calibration display is avail-able via soft key selection in the utilities menu.

Software Assisted Calibration

When carrying out calibration manually (via the keyboard), the instrument displays information on the procedure and in the case of FM tracking even carries out the full adjustment process automatically. No internal adjustments are provided, or required, for calibration and even the internal frequency standard can be adjusted from the front panel. Calibration may also be carried out via the GPIB allowing a fully automated recalibration of all parameters to be performed.



Automatic Date Stamping

Having completed a readjustment of a parameter the instrument updates the calibration data and uses the information from the real time clock to record the date of adjustment. The calibration engineer can also set a calibration due date and when this date is reached a message will be displayed advising the operator to return the unit for calibration.

Low Cost of Ownership

In keeping with the IFR philosophy of cost-effectiveness with innovation, the 2030 series has been designed for minimal maintenance and low operating costs. The two year calibration interval combined with the high reliability ensures a low overall cost of ownership.

OPTIONS

The standard features may be supplemented by taking advantage of the various options available. See list below.

Option 1 - Second Modulation Oscillator

An additional modulation oscillator can be fitted to the 2030 series to enable greater flexibility. This second oscillator has the same specification as the first and allows full use of complex modulation modes and is particularly useful where two tone modulation is required.

Option 2 - Pulse Modulation

This optional facility allows radar RF and IF stages to be tested and features rise and fall times of less than 25 ns with an on/off ratio of better than 70 dB.

Option 3 - 19 dBm Output

A high output option is available for 2030 and provides an extra 6 dB of calibrated output level making it ideal for use as a local oscillator or in testing passive components.

Option 9 - Internal Pulse Generator

Provides internal pulses which, when used with pulse modulation, generates pulsed RF outputs to eliminate the need for an external function generator.

Option 5 - GSM PCN Modulation

An option is available for 2030 series which provides GMSK Bt 0.3 modulation at a clock rate of 270.833 kHz in accordance with the GSM specification. The option includes a comprehensive internal data generator.

Option 6 - Avionics & DME

This optional facility provides for the internal generation modulation waveforms suitable for the testing of Instrument Landing Systems (ILS) and VHF Omni Range (VOR) beacons.

Additional modes of operation support the testing of ADF, Marker Beacons and the SELCAL signaling system.

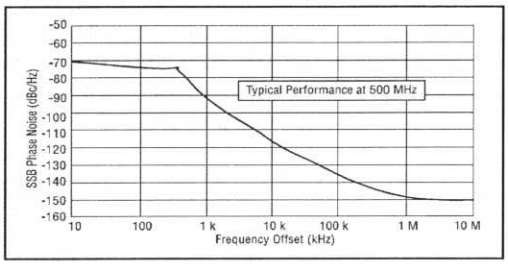
Another additional option creates Gaussian shaped double pulses to produce the correct DME RF signals to test DME receivers.

Option 8 - RF Profiles and Complex Sweep

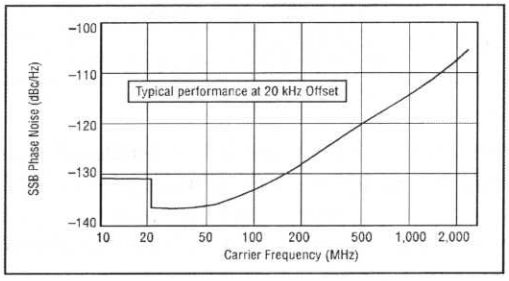
The RF Profile facility allows the signal generator to compensate for frequency dependent level errors introduced by cables, amplifiers and signal combiners. The Complex Sweep facility allows for the generation of sweeps whose step size, step time and RF level change while the sweep is in progress. These features are particularly useful for EMC, Tempest and ATE applications.

Electronic Attenuator

An electronic attenuator option is available to meet demanding extended life requirements for repetitive switching, found in high volume production applications.



Variation of SSB Phase Noise with Offset



Variation of SSB Phase Noise with Frequency

SPECIFICATION

GENERAL DESCRIPTION

2030 series signal generators cover the frequency ranges of 10 kHz to 1.35 GHz, 10 kHz to 2.7 GHz and 10 kHz to 5.4 GHz. A large screen dot matrix display with soft key function selection allows flexibility of operation and ease of use. The output may be amplitude, phase or frequency modulated with pulse generation and modulation available as an option. Modulation is available using a combination of an internal synthesized LF oscillator with up to two external signal inputs.

A second internal source is available as an option.

CARRIER FREQUENCY

Range

10 kHz to 1.35 GHz (2030)

10 kHz to 2.7 GHz (2031)

10 kHz to 5.4 GHz (2032)

Selection

By keyboard entry of data

Variation by ⇧⇩ keys and by rotary control

Indication

11 digits with annunciators

Resolution

0.1 Hz

Accuracy

As frequency standard

Phase incrementing

The carrier phase can be advanced or retarded in steps of 1.5° using the rotary control.

RF OUTPUT

Range

-144 dBm to +13 dBm. When AM is selected the maximum output level reduces linearly with AM depth to +7 dBm at maximum AM depth.

Overrange

Selectable overrange mode allows uncalibrated levels up to +19 dBm to be generated (typically up to +25 dBm for 2030 with Option 003 fitted).

Selectable extended hysterisis provides for uncalibrated RF level control with up to 24 dB range without level interruption.

Selection

By keyboard entry of data. Variation by UP/DOWN keys and by rotary control. Units may be µV, mV, V EMF or PD; dB relative to 1 µV, 1 mV EMF or PD; dBm. Conversion between dB and voltage units may be achieved by pressing the appropriate units key (dB, or V, µV, mV).

Indication

4 digits with unit annunciators

Resolution

0.1 dB

VSWR

For output levels less than 0 dBm: Less than 1.25:1 to 2.2 GHz, less than 1.4:1 to 2.7 GHz, less than 1.5:1 to 5.4 GHz.

Output Protection

Reverse power of 50 W from a source VSWR of up to 5:1.

Accuracy at 22°C ±5°C

	<1.35 GHz	<2.7 GHz	<5.4 GHz
>0 dBm	±0.5 dB	±0.7 dB	±1 dB
>-100 dBm	±0.85 dB	±1 dB	±1.5 dB
>-127 dBm	±0.85 dB	±1 dB	-

Temperature stability dB/°C	<1.35 GHz	<2.7 GHz	<5.4 GHz
	±0.005	±0.01	±0.02

SPECTRAL PURITY

At RF levels up to +7 dBm:-

Harmonics

2030, 2031: Better than -30 dBc to 1 GHz; better than -27 dBc above 1 GHz.

2032: Better than -30 dB to 1 GHz; better than -27 dBc to 1.35 GHz; better than -25 dBc above 1.35 GHz.

Sub-harmonics

Better than -90 dBc to 1.35 GHz; better than -40 dBc to 2.3 GHz; better than -30 dBc to 5.4 GHz.

Non-Harmonics

Better than -70 dBc at offsets from the carrier frequency of 3 kHz or greater.

Residual FM (FM off)

Less than 7 Hz RMS deviation in a 300 Hz to 3.4 kHz unweighted bandwidth at 470 MHz.

SSB phase noise

Less than -116 dBc/Hz (typically -122 dBc/Hz) at an offset of 20 kHz from a carrier frequency of 470 MHz.

RF Leakage

Less than 0.5 µV PD at the carrier frequency in a two turn 25 mm loop, 25 mm or more from any part of the case.

FM on AM

Typically less than 100 Hz for 30% AM depth at a modulation frequency of 1 kHz and a carrier frequency of 500 MHz.

ΦM on AM

Typically less than 0.1 radians at a carrier frequency of 500 MHz for 30% AM depth for modulation rates up to 10 kHz.

MODULATION MODES

Four modulation modes are available:

Single

FM, Wideband FM, ØM, AM or pulse (optional)

Dual

Two independent channels of differing modulation type (e.g. AM with FM).

Composite

Two independent channels of the same modulation type (e.g. FM1 with FM2).

Dual composite

A combination of Dual and Composite modes providing four independent channels (e.g. AM1 with AM2 and FM1 with FM2).

FREQUENCY MODULATION

Deviation

Peak deviation from 0 to 1 MHz for carrier frequencies up to 21.09375 MHz. Peak deviation from 0 to 1% of carrier frequency above 21.09375 MHz.

Selection

By keyboard entry of data

Variation by ⇧⇩ keys and by rotary control

Indication

3 digits with annunciators

Displayed Resolution

1 Hz or 1 least significant digit, whichever is greater

Accuracy at 1 kHz

±5% of indication ±10 Hz excluding residual FM

Bandwidth (1 dB)

DC to 300 kHz (DC coupled)

10 Hz to 300 kHz (AC coupled)

Input is capable of accepting external sources of FSK signals. Typical 3 dB bandwidth is greater than 1 MHz.

Group delay

Less than 1 µs from 3 kHz to 500 kHz

Carrier Frequency Offset

In DC FM less than ±(1 Hz + 0.1% of set deviation) after using DC FM nulling facility.

Distortion

Using external modulation without ALC: Less than 3% at maximum deviation for modulation frequencies up to 20 kHz. Less than 0.3% at 10% of maximum deviation for modulation frequencies up to 20 kHz.

Modulation source

Internal LF generator or external via front panel sockets.

WIDEBAND FM

Deviation

As FM

Indication

3 digits with annunciators

Selection

By keyboard entry of data. The sensitivity is controlled in 3 dB steps and the display will indicate the value of deviation nearest to the requested value.

Input level

1.414 V peak (1 V RMS sine wave) to achieve indicated deviation.

Accuracy

As FM

3 dB Bandwidth

Typically 10 MHz (DC or AC coupled)

Group Delay

Less than 0.5 µs from 3 kHz to 10 MHz

Modulation Source

External via BNC on rear panel, 50 Ω input impedance

PHASE MODULATION

Deviation

0 to 10 radians

Selection

By keyboard entry of data

Variation by ⇧⇩ keys and by rotary control

Indication

3 digits with annunciators

Resolution

0.01 radians

Accuracy at 1 kHz

±5% of indicated deviation excluding residual phase modulation

3 dB Bandwidth

100 Hz to 10 kHz

Distortion

Less than 3% at maximum deviation at 1 kHz modulation rate

Modulation Source

Internal LF generator or external via front panel sockets

AMPLITUDE MODULATION

For carrier frequencies up to 1 GHz

Range

0 to 99.9%

Selection

By keyboard entry of data

Variation by ⇧⇩ keys and by rotary control

Indication

3 digits with annunciator

Resolution

0.1%

Accuracy

±4% of setting ±1%

1 dB Bandwidth

With modulation ALC off: DC to 30 kHz in DC coupled mode and 10 Hz to 30 kHz in AC coupled mode

Typical modulation bandwidth exceeds 50 kHz

Distortion

For a modulation rate of 1 kHz: Less than 1% total harmonic distortion for depths up to 30%, less than 3% total harmonic distortion for depths up to 80%.

Modulation source

Internal LF generator or external via front panel sockets

MODULATION OSCILLATOR

Frequency range

0.1 Hz to 500 kHz

Selection

By keyboard entry of data

Variation by ⇧⇩ keys and by rotary control

Indication

7 digits with annunciators

Resolution

0.1 Hz

Frequency accuracy

As frequency standard

Distortion

Less than 0.1% THD in sine wave mode at frequencies up to 20 kHz

Alternative waveforms

A triangular wave is available for frequencies up to 100 kHz

A square wave is available for frequencies up to 2 kHz

Signaling tones

The modulation oscillator can be used to generate sequential (up to 16 tones) or sub-audible signaling tones in accordance with EIA, ZVEI, DZVEI, CCIR, EURO 1, EEA, NATAL and DTMF standards.*

Facilities are also available for creating and storing user defined tone systems.

** Requires second modulation oscillator (option 001) to be fitted.*

EXTERNAL MODULATION

Two independent inputs on the front panel with BNC connectors, EXT MOD 1 and EXT MOD 2. The modulation is calibrated with 1.414 V peak (1 V RMS sine wave) applied.

Input impedance 100 kΩ nominal

MODULATION ALC

The EXT MOD 1 and EXT MOD 2 modulation inputs can be levelled by an ALC system

Level Range

1 V to 2 V peak (0.7 V RMS to 1.4 V RMS sine wave)

Distortion

Less than 0.1% additional distortion for frequencies up to 20 kHz (typically less than 0.1% up to 50 kHz)

1 dB Bandwidth

Typically 10 Hz to 500 kHz

LF OUTPUT

Front panel BNC connector. The output may be configured in the LF Generator Mode to give an output from the internal modulation oscillator and in the LF Monitor Mode to give an output from the internal modulation signal paths.

Selection

By keyboard entry of data

Variation by ⇧⇩ keys and by rotary control

Indication

7 digits with unit annunciators for frequency and 3 digits with unit annunciators for level

Level

100 µV to 5 V RMS with a load impedance of greater than 600 Ω.
100 µV to 1.4 V RMS with a load impedance of greater than 50 Ω

Source impedance

5.6 Ω nominal

Level accuracy at 1 kHz

With a load impedance of greater than 10 kΩ: ±5% for levels above 50 mV and ±10% for levels from 500 µV to 50 mV.

Frequency response

Typically better than ±1 dB, 0.1 Hz to 300 kHz

SWEEP

Control modes

Start/stop values of selected parameter. Number of steps. Time per step.

Step time

1 ms to 10 s per step

Sweep ramp

Synchronized analog ramp with a nominal amplitude of 0 to 10 V peak on rear panel BNC connector

Markers

User selectable markers for frequency or level provide an indication when specified parameter values have been reached. Output 0 V to +5 V from 600 Ω on rear panel BNC socket.

Trigger

Rear panel BNC connector. Applying 0 V or a switch closure starts the sweep. Socket is internally connected via 10 kΩ pull-up resistor to +5 V.

FREQUENCY STANDARD (OCXO)

Frequency

10 MHz

Temperature stability

Better than ±5 in 10^8 over the operating range of 0 to 50°C

Warm up time

Within 2 in 10^7 of final frequency within

10 minutes from switch on at 20°C ambient

Ageing rate

Better than 2 in 10^7 per year

Output

Rear panel BNC socket provides an output at frequencies of 1, 5 or 10 MHz with a nominal 2 V pk-pk level into 50 Ω. This output can be disabled.

External input

Rear panel BNC socket accepts an input at 1, 5 or 10 MHz with an input level in the range 220 mV to 1.8 V RMS into 1 kΩ.

GENERAL

GPIB INTERFACE

A GPIB interface is fitted as standard. All functions except the supply switch and display contrast are remotely programmable.

Capabilities

Designed in accordance with IEEE 488.2.

Complies with the following subsets as defined in IEEE Std.488.1. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2.

ELECTROMAGNETIC COMPATIBILITY

Conforms with the protection requirements of the EEC Council Directive 89/336/EEC. Conforms with the limits specified in the following standards: IEC/EN61326-1 : 1997, RF Emission Class B, Immunity Table 1, Performance Criteria B

SAFETY

Conforms with the requirements of EEC Council Directive 73/23 EEC (as amended) and the product safety standard IEC / EN 61010-1 : 2001 + C1 : 2002 + C2 : 2003 for class 1 portable equipment, for use in a Pollution Degree 2 environment. The instrument is designed to be operated from an Installation Category 2 supply.

RATED RANGE OF USE

(Over which full specification is met)

Temperature

0 to 55°C

Humidity

Up to 93% at 40°C

CONDITIONS OF STORAGE AND TRANSPORT

Temperature

-40 to +71°C

Humidity

Up to 93% relative humidity at 40°C

Altitude

Up to 4600 m (15,000 ft)

POWER REQUIREMENTS

AC supply

Four voltage settings covering:

100 V~ (Limit 90 - 115 V~)
120 V~ (Limit 105 - 132 V~)
220 V~ (Limit 188 - 242 V~)
240 V~ (Limit 216 - 264 V~)

Frequency: 50 - 400 Hz (Limit 45 - 440 Hz) 180 VA max

CALIBRATION INTERVAL

2 years

DIMENSIONS AND WEIGHT

(Over projections but excluding front panel handles)

Height	Width	Depth	Weight
152 mm	425 mm	525 mm	16.5 kg
6 in	16.6 in	20.5 in	36 lb

OPTIONS

OPTION 1 - SECOND MODULATION OSCILLATOR OPTION

Specification as Modulation Oscillator

OPTION 2 - PULSE MODULATION OPTION

Modulation Modes

Pulse modulation may be used alone or in conjunction with FM, ØM or Wideband FM

Rise Time

25 ns (Typically 5 ns)

Control

0 V for carrier off, +5 V for carrier on

Threshold level typically +2.5 V

ON/OFF Ratio

Better than 70 dB

Input impedance

50 Ω

OPTION 105 - SLOWRISETIMEPULSEMODULATION

Modifies pulse modulation option for a typical rise and fall time of 2 µs

OPTION 3 - +19 dBm RF OUTPUT LEVEL OPTION

For 2030 model only

RF Output Range

–144 dBm to +19 dBm. When AM is selected the maximum output level reduces linearly with AM depth to +13 dBm at maximum AM depth.

Harmonics

At RF levels up to +7 dBm: better than –27 dBc

OPTION 5 - GSM/PCN/PCS OPTION

See separate sheet

OPTION 6 - AVIONICS OPTION

See separate sheet

OPTION 8 - RF PROFILE AND COMPLEX SWEEP

See separate sheet

OPTION 9 - INTERNAL PULSE GENERATOR OPTION

See separate sheet

OPTION 10 - DME OPTION

See separate sheet

OPTION 12 - ELECTRONIC ATTENUATOR

Carrier Frequency Range

250 kHz to 1.35 GHz (2030),*

250 kHz to 2.7 GHz (2031).*

** Useable to 10 kHz*

RF Output Range

-138 dBm to +10 dBm. When AM is selected the maximum output level reduces linearly with AM depth to +4 dBm at maximum AM depth.

Accuracy

±1.2 dB for output levels >-127 dBm at 22°C ±5°C

Temperature Stability

±0.01 dB/°C

VSWR

<1.5:1 for output levels less than 0 dBm

Reverse Power Handling

1 W from a source VSWR of up to 5:1

Amplitude Modulation

Standard specification applies for carrier frequencies above 50 MHz (Above 100 MHz for Option 6).

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers Versions

2030	10 kHz to 1.35 GHz Signal Generator
2031	10 kHz to 2.7 GHz Signal Generator
2032	10 kHz to 5.4 GHz Signal Generator

Options

Option 001	Second internal modulation oscillator
Option 002	Pulse Modulation
Option 003	+19 dBm Output Level (2030 only).
Option 005	GSM/PCN/PCS (GMSK Bt 0.3 Modulation).
Option 006	Avionics (requires Option 001, cannot be used with Option 003).
Option 008	RF Profiles and Complex Sweep.
Option 009	Internal Pulse Generator. Needs Option 002.
Option 010	DME (requires Option 001 and 006, cannot be used with Option 003 or Option 005).
Option 012	Electronic Attenuator (2030 and 2031 only). Not available with options 003 or 010
Option 105	Modifies the Pulse Modulation option for slower rise and fall time (order with option 002).
Option 112	External modulation inputs (2) 600 Ω impedance

Supplied with

AC supply lead.

Operating Manual.

Optional Accessories

46880/047	Service manual.
43126/012	RF connector cable, 50 Ω, 1.5 m, BNC.
54311/092	Coaxial adapter N male to BNC female.
59999/163	Precision coaxial adapter N male to SMA female.
54311/095	RF connector cable, 1 m, type N connectors.
43129/189	GPIB Lead assembly.
46883/408	IEEE/IEC Adapter block for GPIB socket.
46884/291	Rack mounting kit (with slides) for rack cabinets with depths from 480 mm to 680 mm.
46884/292	Rack mounting kit (with slides) for rack cabinets with depths from 680 mm to 840 mm.
46884/541	Rack mounting kit containing front mounting brackets only.
46884/444	Maintenance kit for 2030 series.
46662/525	Transit case.
54112/164	Soft carry case.
54499/044	DECT Filter.

Signal Sources 2030 Series

Option 5 GSM PCN PCS

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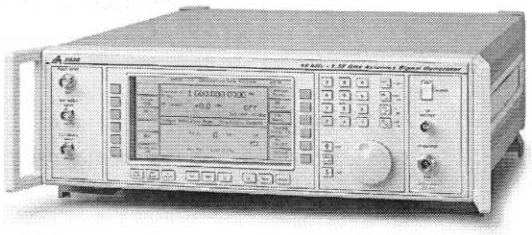


Generates GMSK modulation to the GSM, DCS1800 standards and PCS standards, allowing internal data to be easily entered and edited for mobile phone, base station and component testing.

- Wideband cover:
  10 MHz to 1.35 GHz (2030)
  10 MHz to 2.7 GHz (2031)
  10 MHz to 5.4 GHz (2032)
- GMSK Bt 0.3 Modulation
- Internal data generator
- Data editor
- External data / clock modulation
- Excellent phase accuracy
- Wideband FM

Option 5 GSM PCN PCS for 2030, 2031 and 2032 Signal Generators provide a signal modulated with GMSK Bt 0.3 modulation at a clock rate of 270.833 kHz. The wideband frequency cover enables the generator to be used for testing Global System for Mobile Communications (GSM) and Personal Communications Network/Service (PCN/PCS) receivers. The carrier can be modulated from an internal data generator or from an external data and clock source. Excellent phase accuracy and stability are ensured by the use of a precision modulator.

Internal Modulation

An internal data generator can be used to modulate the carrier. The data can be entered and edited at bit level within a slot and the stored slots assembled into frames, multiframes and superframes either from the keyboard or from an external GPIB controller. Null and pseudo random data slots are also available.

External Modulation

An external source of data and 270.833 kHz clock can be used. The data is internally filtered to provide GMSK Bt 0.3 modulation and the RF envelope can be set to be externally controlled. In this mode the generator frequency standard is phase locked to the external clock signal.

Store and Recall

The availability of non-volatile stores ensures that internal data can be stored for future use and simplifies stand alone operation. The internal data can be edited to bit level within a slot and slots can be assembled into frames, multiframes and superframes.

SPECIFICATION

GENERAL DESCRIPTION

This option adds GMSK (Gaussian Minimum Shift Keying) modulation at a bit rate of 270.833 kHz to the 2030 series. This modulation is used by the GSM and UK PCN systems.

Front panel connectors provide external modulation inputs for Clock, Data and Envelope control.

Facilities are provided for internal modulation by data sequences which can be internally edited and stored. The front panel connectors provide outputs for Clock and Data.

Instruments may be connected using the SYNC connectors to provide multiple RF Outputs with synchronized slot and frame structures.

2030, 2031 or 2032 Signal Generators fitted with the GMSK option conform to the 2030 series specification in the GMSK mode except as follows:

CARRIER FREQUENCY RANGE

Range

2030: 10 MHz to 1.34675 GHz

2031: 10 MHz to 2.69675 GHz

*2032: 10 MHz to 5.4 GHz**

**(GMSK modulation limited to 10 MHz - 2.7 GHz)*

RF OUTPUT

Range

0 dBm to –144 dBm

(-3 dBm max with Option 12 Electronic Attenuator)

Accuracy

2 dB

Output VSWR

As for 2030 series for levels below –6 dBm

SPECTRAL PURITY

Non-Harmonic Output

GMSK signals are generated by mixing a local oscillator with a 3.25 MHz IF signal carrying the GMSK signal. Additional signals are present at the local oscillator frequency, image frequency and frequencies equivalent to the harmonics of the IF mixed with the local oscillator.

FREQUENCY STANDARD

In GMSK mode an input or output at 13 MHz, 10 MHz, 5 MHz or 1 MHz is available.

GMSK MODULATION

Modulation Type

GMSK Bt 0.3 to GSM recommendation 0.5.04.

Modulation Accuracy

Phase accuracy as defined by GSM 05.05 – 4.6 is 1° RMS, 3° peak for carrier frequencies up to 1 GHz.

A second Bt is available which gives an RMS phase error of 5°.

DATA CODING

Selectable as uncoded, or differentially coded to GSM rec 05.04 – 2.3 for internal or external modulation.

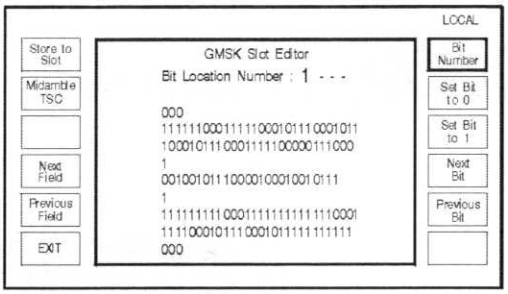
INTERNAL MODULATION

An internal data source provides a Traffic Channel format superframe hierarchy.

Individual slots may be null data, fixed data, or contain (229–1) PRBS data as defined in CCITT rec V.52. Successive slots contain 156, 156, 156, 157 bits. The internal data source provides data and clock output. Internal data can be edited from the front panel and stored or can be entered using the GPIB.

The RF envelope may be ramped up and down to GSM 05.05 annex 2 and GSM 05.05 – 4.2.2.

The internal data generator can be used with an external clock as in 'External Modulation'.



Data Storage

Data in the data generator can be stored and edited from the front panel or via the GPIB.

Store sizes are:

100 slots of which 2 are defined as null (S0) and PRBS (S99).

100 Frames containing any of the stored slots in any order.

100 multiframes containing any of the stored frames in any order.

40 superframes containing any of the stored multiframes in any order.

Internal Modulation Output

Data Output

TTL compatible

Clock Output

TTL compatible

EXTERNAL MODULATION

Clock and Data input at TTL compatible levels. Data must be valid on the falling edge of the clock input.

Data Input level

TTL compatible

Clock Input level

TTL compatible

Clock Input frequency

270.833 kHz ±25 ppm or a clock of the same bit rate but including one clock period of 1¼ bits per slot.

Envelope Input Impedance

15 kΩ nominal

Doppler FM Input Impedance

50 Ω

ENVELOPE CONTROL

Selectable constant level, internal level control, or controlled from the external envelope input: External envelope control voltages are 0 V for off, +1 V for specified RF level. The RF output voltage varies linearly with applied voltage.

External Input risetime

Less than 4 µs.

Off Slot Suppression

Better than –70 dBc.

MODULATION SENSE

Output can be set to use upper or lower sideband. Modulation sense can be inverted.

SYNCHRONIZATION

Instruments may be synchronized by use of the Sync Input/Output. One instrument in MASTER mode sources a bit clock and the SYNC signal. The SYNC signal goes active low for one bit during the transition of the internal data from slot 7, bit 156 to slot 0, bit 0. Instruments in SLAVE mode use Clock and SYNC signals to maintain a synchronized data structure.

Synchronization input/output

Open collector TTL, 2 mA pull-up, active low, bidirectional.

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers

Versions

2030	10 kHz to 1.35 GHz Signal Generator.
2031	10 kHz to 2.7 GHz Signal Generator.
2032	10 kHz to 5.4 GHz Signal Generator.
Option 005	GSM PCN PCS (GMSK Bt 0.3).

Supplied with

AC power lead

Operating Manual

Options

Option 001	Second internal modulation oscillator.
Option 002	Pulse Modulation.
Option 003	19 dBm Output (2030 only).
Option 006	Avionics (requires Option 001, cannot be ordered with Option 003).
Option 008	RF Profiles and complex sweep.
Option 012	Electronic Attenuator (2030 and 2031 only). Not available with options 003 or 010.
Option 105	Modifies the pulse modulation option for slower rise and fall times (order with Option 002).
Option 112	External modulation inputs (2) 600 Ω impedance

Note

Option 5 is not available with option 9 or option 10 or on 2040 and 2050 series

Signal Sources

Option 6 Avionics Signal Generator (2030/40/50 series)

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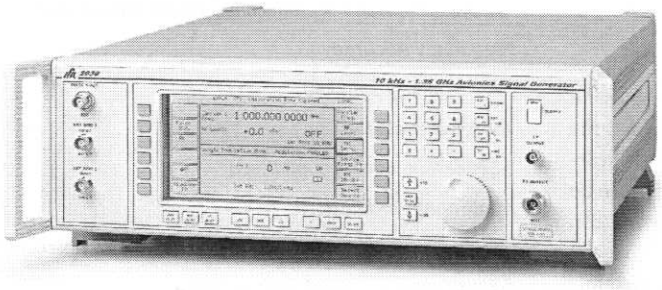

Setting the standard in avionics testing. Option provides accurate ILS, VOR, ADF, marker beacon and SELCAL signals for testing avionics receivers

- Accurate ILS and VOR RF waveforms
- Wide frequency coverage
- SELCAL calling tones
- Internal ILS and VOR waveform generators
- 0.0001 DDM resolution
- 0.01% bearing resolution
- Marker beacon
- Optional pulse modulation
- Automatic direction finder testing
- Comprehensive memory facilities

The Aeroflex family of Avionics Signal Generators provides internal generation of waveforms suitable for testing Instrument Landing Systems (ILS), VHF Omni-directional Radio Range (VOR) systems, Marker Beacons and SELCAL radio receivers. Avionics parameters are presented in the same form as described in the ICAO standards. The family offers an ideal single instrument solution for the testing of avionics receivers and airfield alarm monitors. The use of Direct Digital Synthesis techniques ensures excellent accuracy and stable performance under all operating conditions.

Option 6 is available for all 2030, 2031, 2032, 2040, 2041, 2042, 2050, 2051 and 2052 signal generators have become the solution of choice for testing avionics receivers. It offers a range of high performance signal generators for the testing of ILS, VOR and aircraft communications systems. For bench testing of navigation receivers the 2030 series provides exeptional accuracy, allowing even high performance receivers used for airfield alarm monitors to be tested with confidence. The 2040 series signal generators offer the same high levels of performance with the added advantage of exceptionally low carrier phase noise to allow the rigorous testing of the receiver selectivity and intermodulation, an important factor in today's crowded spectrum for a safety critical industry.

The 2050 series has the same performance as the 2030 series but with the additional benefit of being able to provide digitally modulated carriers.

All models can be supplied with a fast pulse modulator and the 2030 series can be supplied with an internal pulse generator to aid radar testing. A further option for 2030 series is a DME option which allows the signal generator to provide Gaussian shaped double pulse for DME testing.

ILS

In ILS mode, the Sum of Depth of Modulation (SDM) of the 90 Hz and 150 Hz tones can be entered to a resolution of 0.1% AM depth. The Difference in Depth of Modulation (DDM) is entered to a resolution of 0.01% depth for a DDM up to 20% and 0.1% for higher DDM settings. A choice of which tone is dominant is available to the user.

The 30 Hz repetition frequency of the ILS waveform can be adjusted in 0.1 Hz steps. For 0% DDM, additional modulation signals can be added to the ILS waveform.

Changing between localizer and glide-slope operation is accomplished with a single key stroke.

Marker Beacons

In the Marker Beacon mode, signals are generated simulating the outer, middle and inner marker beacons. A single key press selects which marker beacon is simulated. Carrier frequency, modulation depth and modulation frequency can be varied from the default settings. Using the normal calling tones menu enables pulsed marker beacon modulation signals to be generated.

VOR

In VOR mode, the AM depth of the subcarrier and 30 Hz tone can be independently set and the relative phase of the 30 Hz tone and the modulation tone on the subcarrier is set by directly entering the bearing information in degrees. The VOR repetition rate of 30 Hz can be adjusted in 0.1 Hz steps. For a fixed bearing, additional modulation can be applied to simulate voice/identity signal. A To/From Beacon key provides a rapid means of reversing a bearing entry and accounting for different bearing conventions.

SELCAL

SELCAL selective calling tone signals are used on the radios providing communication between the aircraft operator and the flight crew. The Avionics Signal Generator provides facilities for generating the SELCAL codes and the modulation signals to test the radio receiver.

Simple Operation

Major parameters can be adjusted by keyboard entry of data, using the UP/DOWN keys or using the rotary control. The use of a large screen dot matrix display ensures clear and unambiguous readout of the avionics parameters.

Instrument settings can be stored in nonvolatile memories. A sequence of test settings can be stored and, using the external trigger facility, the currently recalled memory can be incremented to step through the stored test sequence.

The power up sequence of the generator can be defined such that it always switches on in avionics mode.

SPECIFICATION

Specifications are as 2030, 2031, 2032, 2040, 2041, 2042, 2050, 2051 or 2052 with the following additions

ILS MODE

Tone Frequencies

90 Hz, 150 Hz nominal. Tone frequency may be changed by varying the ILS repetition rate of 30 Hz in 0.1 Hz steps. Tone frequencies maintain 3:1 and 5:1 relationships with the ILS rate.

Frequency Accuracy

As frequency standard

Tone Suppression

Either tone can be suppressed

Additional Modulation

Available for 0% DDM from an internal or external modulation source

Sum of Depth of Modulation (SDM)

SDM Range

0 to 99.9% in 0.1% steps representing the arithmetic sum of each tone depth

SDM Selection

By keyboard entry of data and variation by UP/DOWN keys or rotary control

RF Accuracy of SDM

±2% of SDM setting for carrier frequencies up to 400 MHz (from 100 MHz to 400 MHz with Option 12)

At 40% SDM accuracy is ±0.8% depth

At 80% SDM accuracy is ±1.6% depth

Difference in Depth of Modulation (DDM)

DDM Range

0 to 20% in 0.01% steps

20 to 99.9% in 0.1% steps

DDM Selection

By keyboard entry of depth in %, mA or index and variation by UP/DOWN keys or rotary control

RF Accuracy of DDM

±0.02 of DDM setting ±0.0003 DDM (0.03% depth)

At 0 DDM (on course) accuracy is ±0.0003 DDM (0.03% depth)

At 0.155 DDM accuracy is ±0.0034 DDM (0.34% depth)

LF Output

Available from the LF Output connector

LF Accuracy of DDM

Equivalent to ±0.0003 DDM ±0.005 of setting

At 0 DDM (on course) accuracy is ±0.0003 DDM

MARKER BEACON MODE

Provides default carrier of 75 MHz, 95% AM depth and a modulation frequency of 400 Hz, 1.3 kHz or 3 kHz corresponding to Outer, Middle and Inner Markers. Carrier frequencies, AM depth and modulation frequency can be adjusted from the default values.

VOR MODE

Selection

By keyboard entry of depth and variable by UP/DOWN keys and rotary control

Bearing Control

Relative phase of 30 Hz tone and subcarrier modulation adjustable from 0° to 359.9° in 0.01° steps by entering VOR bearing. Bearing can be entered as TO or FROM the beacon.

Bearing Accuracy

±0.05°

Additional modulation

Available on 0° bearing from an internal or external modulation source

AM Depth Accuracy

±3% of setting ±0.5% for carrier frequencies up to 400 MHz (from 100 MHz to 400 MHz with Option 12)

Frequency

The VOR repetition frequency of 30 Hz may be varied in 0.1 Hz steps. The subcarrier frequency and deviation maintain a fixed relationship with the VOR repetition rate

Frequency Accuracy

As frequency standard

9.96 kHz subcarrier

AM Range

0 to 49.9% depth in 0.1% steps

Modulation

Frequency modulated by a 30 Hz tone with settable

deviations of 420 Hz, 450 Hz, 480 Hz, 510 Hz and 540 Hz

30 Hz Tone

AM Range

0 to 49.9% depth in 0.1% steps

Arithmetic sum of 30 Hz tone and sub carrier limited to 99.8%

ADF MODE

(Does not apply with Option 12 fitted)

Provides default carrier of 190 kHz with 30% AM depth at 1 kHz rate. Carrier frequency, AM depth, modulation rate and RF level can be varied from the default values.

SELCAL MODE

Provides a facility for modulating the RF carrier with sequential calling tones defined by the SELCAL protocol. Allows the entry of two character pairs to define the SELCAL code generated to open the audio path of aircraft radios. Default tone duration and gap are 1 s and 250 ms respectively and can be varied from nominal values.

VERSIONS AND ACCESSORIES

For the full Signal Generator performance specifications please refer to the 2030/40/50 signal generator datasheets. When ordering please quote the full ordering number information.

The NAV-750C is functionally identical to 2030 1.35 GHz Signal Generator fitted with Option 1 and 6.

Option 6 Avionics Signal Generator

Ordering Numbers

To order an avionics signal generator specify which model is required and order with Option 1 and Option 6 fitted.

Versions

2030	10 kHz to 1.35 GHz Signal Generator
2031	10 kHz to 2.7 GHz Signal Generator
2032	10 kHz to 5.4 GHz Signal Generator
2040	10 kHz to 1.35 GHz Low Noise Signal Generator
2041	10 kHz to 2.7 GHz Low Noise Signal Generator
2042	10 kHz to 5.4 GHz Low Noise Signal Generator
2050	10 kHz to 1.35 GHz Digital and Vector Signal Generator
2051	10 kHz to 2.7 GHz Digital and Vector Signal Generator
2052	10 kHz to 5.4 GHz Digital and Vector Signal Generator
Option 001	Second Internal Modulation Oscillator
Option 006	Avionics (must be ordered with Option 001)

Supplied with

AC Power Lead and Operating Manual

Other Options

Option 002	Pulse Modulation
Option 008	RF Profile and complex sweep
Option 009	Internal Pulse Generator (cannot be used with Option 005) only available on 2030, 2031, 2032
Option 010	DME avionics (only available on 2030, 2031, 2032)
Option 012	Electronic Attenuator (not available on 2032, 2042, 2052, 2052T, not available with Options 03 or 010)
Option 105	Modifies the pulse modulation Option for slower rise time (order with Option 002)
Option 112	External modulation inputs (2) 600 Ω impedance
NAV-750C	VOR/LOC/GS/COMM/MKR Bench Test Equipment

Signal Sources 2030/40/50 Series

Option 8 RF Profile & Complex Sweep

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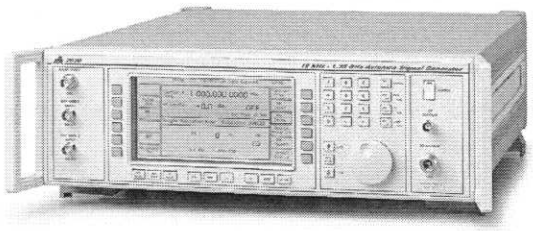

Ability to offset for insertion loss or gain of external devices, and provides complex carrier sweeps. Particularly useful for EMC testing and for ATE applications.

- Calibration of RF power at a remote connector
- Frequency dependent RF output power
- Complex sweep capability
- 20 ms to 20 s step time
- Sine, triangle and square wave modulation

Option 8 RF Profile and Complex Sweep provides additional software features which are particularly well suited for Electromagnetic Immunity, Tempest testing and other applications using signal generators with external devices which introduce frequency dependent RF level errors.

Careful attention to transient states ensures that positive overshoots that could damage power amplifiers are not generated.

RF Profile and Offset

The RF Profile and Offset facility allows the user to reduce RF level errors introduced by using external amplifiers, attenuators or signal combiners. The signal generator accepts and displays RF level requests for the power referred to the output of the external device. The facility reduces the calibration effort required in ATE systems and minimizes the probability of operator induced errors when performing manual tests. The RF Profile facility allows the entry of 10 profiles containing up to 100 correction points with linear interpolation to minimize the RF level frequency response errors introduced by the external device.

The use of a large LCD panel and a flexible menu driven user interface provides a simple means of rapidly generating, selecting and editing profiles in an intuitive way whilst minimizing any ambiguity in the setting of the generator.

Segmented Sweep

The Segmented Sweep facility allows the generation of sweeps with up to 10 segments, each of which can have independent sweep parameter settings. The ability of each segment to have a different RF level permits swept immunity tests to be undertaken which follow the frequency dependent immunity limits specified in EMC standards. The independent frequency step size allows the sweep speed to be increased at higher carrier frequencies to minimize the test time.

The independent stop and start frequencies for adjacent segments also allows the generation of sweeps which deliberately omit sections of the RF spectrum to test systems with on-line signals or to speed up tests on multiband systems.

The sweep can be halted at any time if a device response is obtained and the signal generator settings can then be varied to explore the

device response before then continuing with the sweep from the point where the sweep was halted.

Programmable frequency step times between 20 ms and 10 s combined with frequency step sizes down to 0.1 Hz allow the generation of fast swept signals or the slow sweeps associated with EMC testing.

Complex Sweeps

The segmented sweep can be combined with the RF Offset and RF Profile facility to produce complex sweeps which manipulate the RF output level of the signal generator to correct for the frequency response of amplifiers, cables, combiners and antenna characteristics. The ability to include correction factors in sweep mode allows the signal generator to be used in computer controlled test system which allow for manual intervention of the test without losing the system calibration information.

The use of the extended hysterisis facility with the sweep facility to minimize the number of attenuator level transients during a swept test is particularly useful for testing devices which are susceptible to large rapid changes in RF level.

Options

The Option 8 software is available on all versions of the 2030/40/50/50T series signal generators and can be combined with the second modulation oscillator, pulse modulation and generation, GSM PCN and Avionics options to provide a flexible signal generator capable of undertaking tests on most RF and receiver systems.

SPECIFICATION

GENERAL DESCRIPTION

Option 8 software provides additional sweep, RF offset and RF level profiling facilities to support the use of 2030, 2040A 2050 and 2050T series Signal Generators with external amplifiers and attenuators. The RF output from the external device can be calibrated and displayed on the front panel of the signal generator using the RF Offset and RF Profile facilities.

RF OFFSETS

Displayed signal generator output level can be offset by +80 dB to –40 dB from the actual RF output level.

RF Offsets may be used in normal signal generator modes or combined with segmented sweeps.

RF PROFILE

RF output level can be adjusted by ±40 dB from its nominal value without changing the displayed RF output level. Ten profiles can be created each containing up to 100 correction points and the RF output level is linearly interpolated between correction points.

RF Profiles can be used in normal signal generator modes or combined with the segmented sweep.

SEGMENTED SWEEP

Carrier frequency sweeps can be generated which contain defined segments each of which can have a different step size, start and stop frequency, step time and RF level.

Sweep facility is available for 2030 and 2050(T) series in analog modes and for 2040 series in Normal Noise mode.

Start and Stop

Start and stop frequency for each segment can be freely defined within the frequency capability of the signal generator.

Step Size

Minimum step size is 0.1 Hz.

Number of steps is implied by the step size and the start and stop frequencies.

Step Time

20 ms to 20 seconds per step.

Segments

Up to 10 segments may be freely combined together in any order.

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers

Versions

2030	10 kHz to 1.35 GHz Signal Generator
2031	10 kHz to 2.7 GHz Signal Generator
2032	10 kHz to 5.4 GHz Signal Generator
2040	10 kHz to 1.35 GHz Low Noise Signal Generator
2041	10 kHz to 2.7 GHz Low Noise Signal Generator
2042	10 kHz to 5.4 GHz Low Noise Signal Generator
2050	10 kHz to 1.35 GHz Digital and Vector Signal Generator
2051	10 kHz to 2.7 GHz Digital and Vector Signal Generator
2052	10 kHz to 5.4 GHz Digital and Vector Signal Generator
2050T	10 kHz to 1.35 GHz Digital and Vector Signal Generator.
2051T	10 kHz to 2.7 GHz Digital and Vector Signal Generator.
2052T	10 kHz to 5.4 GHz Digital and Vector Signal Generator.
Option 008	RF Profile and Complex Sweep

Supplied with

AC power lead

Operating manual

Options

Option 001	Second internal modulation oscillator
Option 002	Pulse Modulation
Option 003	+19 dBm Output (2030 and 2040 only)
Option 005	GSM PCN PCS (GMSK Bt 0.3) (2030 series only)
Option 006	Avionics Option (must be ordered with Option 001)
Option 009	Internal Pulse Generator (cannot be used with Option 005) only available on 2030 series
Option 010	DME (requires Option 001 and 006, only available on 2030 series, cannot be fitted with Option 005)
Option 105	Modifies the pulse modulation for slower rise and fall time (order with Option 002)

Signal Sources 2030 Series

Option 9 Internal Pulse Generator

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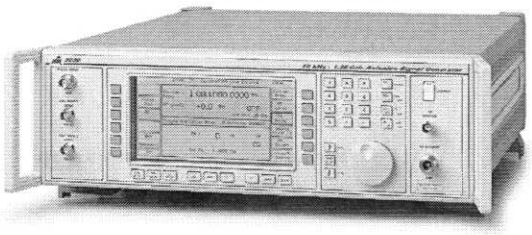

Internal pulse generator producing single or double pulse RF carriers for testing radar RF and IF stages

- Programmable pulse parameters
- External trigger function
- Single and double pulse
- Variable pulse repetition frequency
- Variable pulse delay
- Variable pulse pair spacing
- Variable pulse width
- Wide carrier frequency range
- On/Off ratio of 80 dB
- Eliminates need for external pulse generator

Option 9 Pulse Generator provides the user with internally generated single or double pulses. When combined with Option 2, Pulse Modulation, a solution is provided to aid the testing of radars, EMC or TDMA systems.

The pulse generator can be used with FM, PM and wideband FM or with unmodulated carriers.

With the Pulse Generator allowing variable control of the pulse parameters, many different types of systems can be efficiently and easily evaluated.

Simple Interface

Parameters can be adjusted by keyboard entry of data or by using the ⇧⇩ keys. The use of a large screen dot matrix display ensures clear and unambiguous readout. Within each display, soft keys are assigned alongside the display to allow parameter entry or to select the relevant functions.

Pulse Generator

With Options 2 and 9 combined, single and double pulsed RF carrier outputs can be generated. Pulse width can be varied from 50 ns to 100 ms. Pulse delays can be set from 1 μs to 100 ms in single trigger mode and pulse pair spacing can varied from 100 ns to 100 ms. Triggering can be continuous or via an external source. See Figures 1 and 2 for more details.

The pulse generator with Option 2 can be used over the entire frequency range of the 2030 series, with the level range of -144 dBm to +13 dBm.

Output Control

Synchronization and video outputs are available on rear panel BNC connectors. SYNC provides a 400 ns pulse indicating the start of the pulse. VIDEO provides square waves with fixed rise and fall times and variable parameters such as pulse delay, width and repetition rate.

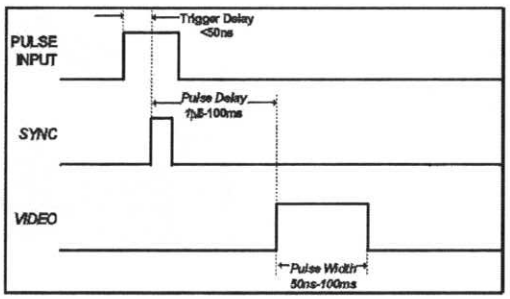

Figure 1 - single pulse, external trigger

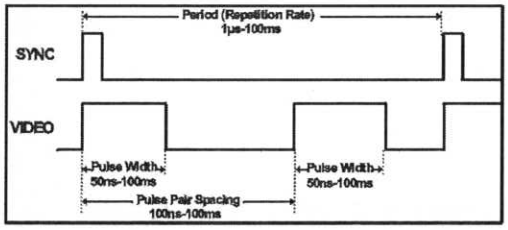

Figure 2 - double pulse, internal trigger

SPECIFICATION

Specifications remain as standard 2030 series with the following additions.

OPTION 9 INTERNAL PULSE GENERATOR

VIDEO OUTPUT (REAR PANEL BNC)

Pulse Width(s)

50 ns to 100 ms, resolution 50 ns

Repetition Rate/ Period (internal trigger)

1 µs to 100 ms, resolution 50 ns

Pulse Delay (Single or Double pulse)

1 µs to 100 ms, resolution 50 ns

Double Pulse Pair Spacing

100 ns to 100 ms, resolution 50 ns

Level

Pseudo TTL (Typ. 0 to 4.5 V, 0 to 2.5 V into 50 Ω)

Rise/Fall Time

Less than 5 ns

SYNC OUTPUT (REAR PANEL BNC)

Pulse Width

Typically 400 ns

Level

Pseudo TTL (Typ. 0 to 4.5 V, 0 to 2.5 V into 50 Ω)

Rise/Fall Time

Less than 5 ns

EXTERNAL TRIGGER ('PULSE INPUT')

Characteristics

Rising edge, TTL level into 50 Ω

Min. Pulse Width 10 ns

Trigger to SYNC Delay

Less than 50 ns

Trigger to SYNC Jitter

Typically 25 ns

RF OUTPUT (WITH OPTION 2 FITTED)

Level Range

-144 dBm to +13 dBm overrange to +19 dBm uncalibrated

Accuracy

Additional level error of ±0.5 dB

Modulation Modes

Pulse modulation may be used at the same time as FM, PM or wide-band FM.

Pulse Characteristics

As above, except;

Rise/Fall Time

Typically <25 ns

ON/OFF Ratio

Better than 70 dB, typically better than 80 dB

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers

Versions

2030	10 kHz to 1.35 GHz Signal Generator
2031	10 kHz to 2.7 GHz Signal Generator
2032	10 kHz to 5.4 GHz Signal Generator
Option 009	Pulse generator (cannot be used with Option 005)

Options

Option 001	Second internal modulation oscillator
Option 002	Pulse modulation
Option 003	19 dBm Output (2030 only)
Option 006	Avionics (requires Option 001, cannot be used with Option 003)
Option 008	RF Profiles and complex sweep
Option 010	DME (requires Option 001 & 006, cannot be used with Option 005)
Option 112	External modulation inputs (2) 600 Ω impedance

Note

Option 9 is not available with Option 5 or on 2040 and 2050 series.

Signal Sources

Option 10 DME Avionics

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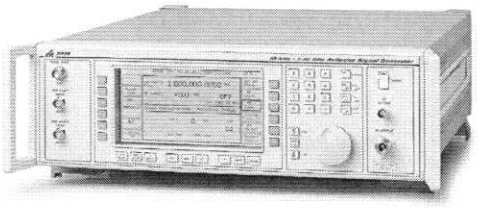
A passion for performance.



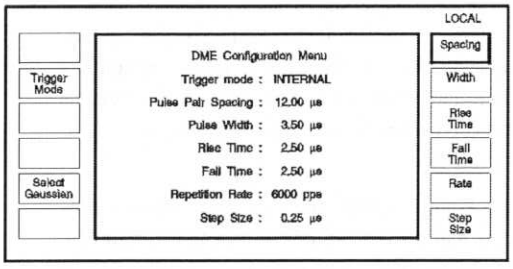
Ideal for testing the receiver stages of DME transponders using Gaussian shaped pulses used under operational conditions

- Generates DME Gaussian shaped double pulses
- Variable pulse parameters
- Gaussian pulse spectrum
- Sync and Video outputs
- External trigger input
- Simple user interface with large screen
- GPIB programmable
- VOR/ILS/Marker Beacons with option 6

DME (Distance Measuring Equipment) provides aircraft with accurate and continuous information of their slant range distance from a ground reference point. Option 10 on the 2030 series signal generators produce the necessary signals required to test DME transponders. The option consists of two parts - an internal pulse generator to produce double pulses, and a linear RF modulator which produces the required Gaussian shaping with 90% of the transmitted energy within a bandwidth of 0.5 MHz in accordance with EUROCAE ED57. Front and rear panel connectors provide External Trigger input and Synchronization and Video outputs.

Simple Interface

Major parameters can be adjusted by keyboard entry of data, using the UP/DOWN keys or the rotary control. The use of a large screen dot matrix display ensures clear and unambiguous readout of the avionics and DME parameters.



DME Pulse Generator

This provides Gaussian shaped double pulses with variable control of pulse width, rise and fall times, pulse pair spacing and pulse repetition rate thus giving complete flexibility when defining the pulse profile. Continuous internally or externally triggered modes of operation are available with all parameters adjustable in both cases.

DME Pulse Modulator

The Gaussian shaped double pulses from the generator can be used to modulate an RF carrier over the DME transmitter range of 960 MHz to 1215 MHz. Unlike a standard pulse modulator where the carrier is enabled or disabled by the modulating signal, the DME modulator is able to control the level of the RF signal at any particular time and thus produces a constrained spectrum corresponding to various standards including EUROCAE ED57 for DME. The Gaussian shaped pulses are identical in amplitude and shape with

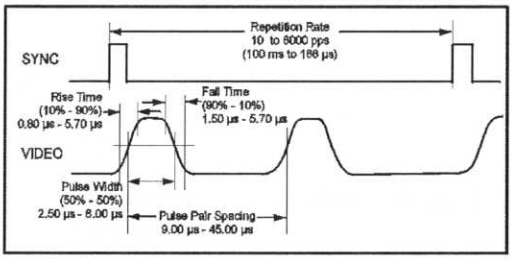
level accuracy of ±0.5 dB over the range -110 dBm to +10 dBm.

Memory

All the instrument configuration settings can be stored within non-volatile memory locations. These memories can be triggered via an external input or manually from the front panel in order that a test sequence may be quickly recalled.

Output Control

There are two additional outputs provided, SYNC and VIDEO. The SYNC output is available either with internally generated pulses or external trigger. The VIDEO output is the same Gaussian shaped signal that is applied to the RF modulator.



GPIB Programmable

All functions can be controlled over the interface bus and are GPIB IEEE 488.2 compatible.

Option 6 - Avionics

DME Option 10 is a natural complement to existing Avionics option 06 which includes VOR, ILS, Marker Beacons, ADF and SELCAL.

The Avionics option offers a complete test solution for the maintenance of avionics radio receivers by providing modes of operations suitable for testing ILS and VOR systems. In addition, it provides efficient testing of marker beacons, SELCAL receivers and ADF (Automatic Direction Finders).

In conjunction with the Avionics option, the 2030 series offers a simple solution which is particularly well suited for testing the complete avionics system - surveillance, alarm monitors and receivers. Direct digital synthesis techniques ensure excellent precision and stability.

SPECIFICATION

Specifications remain as standard 2030 series with the following additions.

RF OUTPUT

Frequency Range

960 MHz to 1215 MHz

Level Range

-110 dBm to +10 dBm

Absolute Level Accuracy

Standard level error ±0.5 dB

Pulse Pair level Accuracy

±0.5 dB

ON-OFF Ratio

>80 dB

VIDEO OUTPUT (REAR PANEL BNC)

Pulse Characteristics

Double pulses, Gaussian shaped

Pulse Width

2.50 µs to 8.00 µs, resolution 50 ns

Rise Time

0.80 µs to 5.75 µs, resolution 50 ns

Fall Time

1.50 µs to 5.75 µs, resolution 50 ns

Pulse Pair Spacing

9.00 µs to 45.00 µs, resolution 50 ns

Repetition Rate

10 pp/s to 6000 pp/s

Level

Pseudo TTL (Typically 0 to 4.5 V, 0 to 2.5 V into 50 Ω)

SYNC OUTPUT (REAR PANEL BNC)

Pulse Width

Typically 400 ns

Level

TTL (Typically 0 to 4.5 V, 0 to 2.5 V into 50 Ω)

Rise/Fall Time

Typically 5 ns

EXTERNAL TRIGGER ('PULSE INPUT')

Characteristics

Rising-edge, TTL level into 50 Ω

Min. pulse width 2 ns

Trigger to SYNC Delay

Typically 60 ns

Jitter

Typically 25 ns

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers

To order select which model is required and order with Option 1, 6 and 10 fitted.

Versions

2030	10 kHz to 1.35 GHz Signal Generator
2031	10 kHz to 2.7 GHz Signal Generator
2032	10 kHz to 5.4 GHz Signal Generator
Option 001	Second internal modulation oscillator
Option 006	Avionics, requires option 001, cannot use with 003
Option 010	DME requires option 001 & 006, cannot be used with option 005

Supplied with

AC Power Lead

Operating Manual

Options

Option 002	Pulse Modulation
Option 003	19 dBm output (2030 only)
Option 008	RF Profiles and Complex Sweep
Option 009	Internal Pulse Generator cannot be used with option 005
Option 112	External modulation inputs (2) 600 Ω impedance

Please note that Option 5 is not available with DME. DME is not available on 2040 or 2050 series signal generators.

CHINA
Tel: [+86] (21) 6282 8001
Fax: [+86] (21) 6282 8002

EUROPE
Tel: [+44] (0) 1438 742200
Fax: [+44] (0) 1438 727601

FRANCE
Tel: [+33] 1 60 79 96 00
Fax: [+33] 1 60 77 69 22

HONG KONG
Tel: [+852] 2832 7988
Fax: [+852] 2834 5364

SCANDINAVIA
Tel: [+45] 9614 0045
Fax: [+45] 9614 0047

SPAIN
Tel: [+34] (91) 640 11 34
Fax: [+34] (91) 640 06 40

UNITED KINGDOM
Tel: [+44] (0) 1438 742200
Toll Free: [+44] (0800) 282 388 (UK only)
Fax: [+44] (0) 1438 727601

USA
Tel: [+1] (316) 522 4981
Toll Free: [+1] (800) 835 2352 (US only)
Fax: [+1] (316) 522 1360

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A passion for performance.

www.aeroflex.com

info-test@aeroflex.com

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