

Radio Communications Test Set

2955



- Comprehensive testing facilities for AM/FM/ΦM transceivers to 1000 MHz
- Single key mode selection for transmitter, receiver and duplex testing
- Full duplex facility tests radio telephones and cross-band repeaters
- Comprehensive sequential tones encoder/decoder
- Menu-driven CRT display with store and recall for standard settings
- Precision digital readouts and auto-ranging bar charts for rapid testing
- Built-in self test and operator guide
- System checking of simplex transceivers in less than 3 seconds
- Operation from any standard a.c. supply up to 400 Hz or vehicle supply
- Digital scope with single shot for peak modulation setting
- GPIB option for full instrument control

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telephone networks, service maintenance workshops, commercial and public service organisations, and the military.

The Test Set comprises 11 instrument functions for transceiver testing: RF power meter, RF frequency meter, modulation meter, RF signal generator, AF signal generator, AF frequency meter, AF voltmeter, 1 kHz AF distortion meter, S/N and SINAD meter, digital oscilloscope and tones encoder/decoder. This comprehensive instrument also functions well as a low-cost ATE system, or as a set of general-purpose test equipment for production, service or laboratory use. Operation of the test set is by keys, which configure the instrument functions to test either a transmitter and receiver together in full duplex mode, or independently for simplex or semi-duplex operation. A large CRT display provides the operator with all generated and measured information relating to a particular transceiver test, and a direct indication of controls in use. Setting up the instrument for a particular test involves selection of the appropriate colour identified keys in a logical left-to-right sequence. As the operator selects the required keys, the screen indicates the test mode selected and highlights the function accessed in reverse screen video. This informs the operator which frequency or level parameter is then available for control (fig 1).

Controls and indications

Setting of specific test channel frequencies, modulating levels and output levels etc. is via a numeric key pad. However, for convenience and speed of operation, three variable controls are provided. Programmable incremental keys for frequency and level allow the operator to define any INC/DECrement size, within the range and resolution of the test set. This facility enables rapid channel changing for checking of multi-channel radios, and simplifies receiver bandwidth and AGC testing. For tests requiring fine adjustments of frequency or level, such as squelch threshold measurements or sub-audible tone deviation settings, a rotary variable control is available. This gives an analog feel to adjustments and allows the user to obtain fast change by spinning the knob.

The CRT display in 2955 provides the flexibility for measurements to be presented in digital form for precise

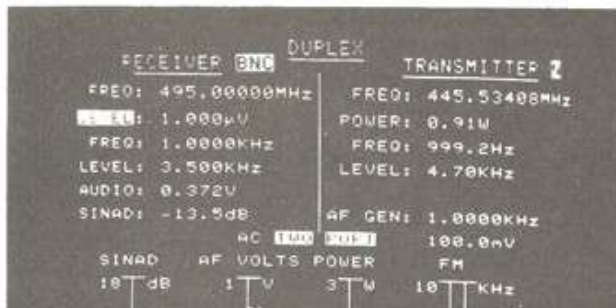
unambiguous readings, from which a hard-copy printout can be obtained. It also allows measured information to be presented in analog bar chart form, which is convenient for providing simple peaking indications for transmitter power setting. Comparative measurements between positive and negative peak deviation are available to check modulation symmetry.

In transmitter, receiver and audio test modes, a dedicated key is provided to select the digital storage scope facility. When testing transmitters, the scope's vertical scale is directly calibrated for modulation measurements: a single shot facility allows the user to measure peak-to-peak modulation. This peak hold function is invaluable for setting the modulation limiter circuits in the radio, and for ensuring that maximum permissible deviation is not exceeded.

Transmitter test

When measuring a transmitter in the frequency range 1.5 MHz to 1000 MHz, the modulation meter automatically tunes to the incoming signal frequency in typically less than 3 seconds, providing the user with analog and digital readouts of all parameters. This avoids the operator having to set up the transmitter frequency. The 2955 indicates on-screen transmitter frequency, power, modulation frequency, modulation level and transmitter distortion. All measurement scales are auto-ranging, thus preventing the likelihood of accidental damage due to excessive input levels. Best instrument measurement accuracy is assured because manual range selection is avoided. These facilities cut service test time dramatically.

RF power measurement range is 0.05 mW to 75 W continuous rating, catering for low-power portables and base station transmitters. High-power transmitters of up to 175 W may be measured for short intervals, typically 2 minutes at room temperature. A thermal sensor warns the operator if the load gets too hot, by flashing a screen message to REMOVE RF INPUT. A short interval later, an additional two-tone audible alarm is given in case the operator's attention has been diverted from the screen. To facilitate a number of maximum power measurements, without having to wait for the power load to cool, a HOLD DISPLAY key is provided. This enables the user to freeze the entire screen display after the readings have been stabilised, allowing all the transmitter measurements and settings to be read off, with the transmitter de-keyed. A hard-copy printout of all the digital information contained in RX, TX, DUPLEX, AF TEST and Directional Power meter screens can be obtained using a GPIB printer with a listen only mode or using the optional 24 column ticket printer. RF frequency counter resolution is selectable as either 1 Hz or 10 Hz, enabling tests of SSB systems. 2955 provides a two-tone modulating signal which may be applied to an SSB transmitter to check for linearity; the carrier waveform may be observed at the IF output socket on the rear of



test mode. The INC/DEC keys may be used to offset the generator frequency for channel-to-channel operation or for semi-duplex tests.

Duplex test

Full duplex testing of radio telephones is possible using the 2955. All necessary parameters for both the transmitter and receiver can be displayed simultaneously on the CRT screen. The frequency and level of the RF and AF signal generators may be independently controlled from the instrument keypad or varied using the rotary control.

A unique feature of 2955 is that the modulation meter is independent of the RF signal generator, so there is no restriction to the total frequency offset between transmitter and receiver test. This means that, in addition to measuring standard duplex systems, 2955 can also be used to check cross-band repeaters. Instruments fitted with issue 12 or later software may also be used to check repeater systems using AM and FM equipment.

Receiver test

In the receiver test mode, standard default settings of the RF and AF signal generators are provided. The RF signal generator level is set to -100 dBm and the AF signal generator frequency for 1 kHz. Modulation is set to a nominal level 1.75 kHz/1 rad for testing FM/PM receivers and 30% mod level for AM receivers. This facility is provided so that the minimum amount of user interaction is required to perform a simple system check. If the RF signal generator frequency has been preset using the RX = TX key and the radio being tested is simplex, then no further instrument settings are required. For a functioning receiver, audio output will be present from the receiver under test. Dedicated keys allow the user to select either signal-to-noise (S/N), SINAD or distortion test. All readings are displayed numerically on the CRT screen and as auto-ranging bar charts for maximum user convenience.

RF output level accuracy is specified to be within ± 2 dB over the attenuator range of 0 dBm to -127 dBm, and includes the effects of temperature, making 2955's signal generator one of the most accurate available in a test set for the maintenance user.

Comprehensive modulation control is provided by using the INC/DECrement keys or rotary control. The generator may be internally or externally modulated to produce AM/FM signals. The external modulation input can be used for dual tone inputs such as DTMF tones, or for FFSK/FSK modulation.

Audio test

The audio test function provides access to the general signal generator, AF voltmeter and digital oscilloscope, for testing and fault-finding uses. The AF input socket has a nominal input impedance of 1 Megohm, making it compatible with standard probes.

Tones encoder/decoder

The Radio Communications Test Set provides a compre-

any standard, either as a single burst, tone step or continuous cycles for receiver testing. Frequencies may be shifted from nominal, up to $\pm 9\%$ in 1% steps for tolerance checking of receiver decoders. The first tone in a five-tone sequence, or the third tone in a seven-tone sequence can be extended to 700 ms for checking base station to mobile access. Sub-audible tones (CTCSS) and two-tone (one frequency fixed) are also available. In tones decode mode the 2955 compares each tone received with standard frequencies held in memory.

If these are within the standard specified limits, the tone number, tone frequency and error percentage are displayed. Sub-audible tone frequencies are measured directly in the transmitter test mode by the audio frequency counter with the 300 Hz low-pass filter selected. For applications requiring encoding and decoding of complex or non-standard tones system, an EXTERNAL MODulation input and AF DEMODulated output are provided.

Non-volatile memory

2955 is provided with 37 non-volatile stores, each capable of retaining indefinitely a complete front panel set-up, with instant recall whenever required. One additional storage location provides power fail back-up so that the last group of front panel settings is restored after an AC power or battery supply failure. A facility is provided to lock the stores to prevent accidental erasure.

Programmable operation

The 2955's GPIB option provides full instrument control and adds further versatility for automatic testing, and computer-assisted manual testing. A write-to-screen capability enables the CRT to be used as a VDU for operator instructions and for simple straight line graphics. Specification tests can be carried out using the upper half of the screen, whilst the lower half is used for drawing limit bar charts and writing text.

Low cost-of-ownership

Instrument lifetime is a significant factor in cost-of-ownership, and the 2955 includes a number of features to reduce calibration costs, reduce down-time and help eliminate expensive repairs. Visual and audible warnings are given when excess power is dissipated in the power load, and if a transmitter with an output power of up to 50 W is accidentally connected to the signal generator output. A relay then opens the signal path if the input power exceeds 1.0 W thus protecting the instrument.

A built-in self test facility identifies faulty sections either to major module level or group of components, so reducing the mean time to repair. Instrument down-time is further reduced by 2955's modular construction, which simplifies the service of faulty modules. The Test Set has only six PCBs plugging into a mother board, a plug-in RF tray, attenuator block and power load. These are easily removed for replacement or further test

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Versions and Accessories

Versions of the 2955 are available which provide comprehensive cellular radio test facilities for the 450/900 MHz Nordic Mobile Telephone (NMT) systems, Advanced Mobile Phone Service (AMPS) and the Total Access Communication System (TACS). French and Spanish language versions are also available with complete front panel and software translations.

A further version of 2955 is available fitted with a GPIB interface for automatic testing applications.

An export licence-free version of 2955 is also available.

Accessories available for use with 2955 include two directional power heads, covering the frequency ranges 1-50 MHz and 25-1000 MHz, a sophisticated battery pack with built-in fast charge circuit, a 600 ohm balanced input/output interface, CCITT and CMES filters, 24 column ticket printer, GPIB interface, IF injector probes, 20 dB AF attenuator and rugged transit case.

RF SIGNAL GENERATOR

FREQUENCY	
Range	0.4 MHz to 1000 MHz. 0.4 MHz to 520 MHz (302D version).
Resolution	50 Hz up to 530 MHz. 100 Hz up to 1000 MHz.
Indication	8 digit display
Setting	Via keyboard entry. Step change variation by INC/DEC keys and rotary control.
Accuracy	As internal standard.
OUTPUT LEVEL	
Range	Rx Mode: -140 dBm to -20 dBm (0.0224 µV to 22.4 mV), N-type socket selected. -120 to 0 dBm (0.224 µV to 224 mV), BNC socket selected. One Port Duplex Mode: -140 dBm to -80 dBm (0.0224 µV to 0.0224 mV). Two Port Duplex Mode: -120 to -40 dBm (0.224 µV to 2.24 mV).
Resolution	0.1 dB.
Indication	4 digits with units dBm/µV & p.d./m.t. selection.
Setting	Via keyboard entry. Step change variation by INC/DEC keys and rotary control.
Accuracy	± 2 dB for levels above -127 dBm.
SPECTRAL PURITY	
Residual FM	Less than 30 Hz up to 520 MHz, typ. 15 Hz, less than 60 Hz up to 1000 MHz, typ. 30 Hz. Measured in 300 Hz to 3.4 kHz bandwidth.
Residual AM	< 0.5%, 0.3-3.4 kHz B.W.
Harmonics	Less than -20 dBc up to 1.5 MHz, -25 dBc up to 250 MHz, -20 dBc up to 1000 MHz.
Sub-harmonics	None up to 530 MHz, less than -25 dB to 1000 MHz.
Spurious signals	For carrier frequencies up to 58 MHz, less than -45 dB up to 110 MHz, less than -35 dB above 110 MHz. For carrier frequencies up to 1000 MHz, less than -60 dB.
Signal-to-noise at 20 MHz	Less than -100 dB/Hz to 500 MHz, less

Protection	50 W reverse power trip, automatically resets on removal of power input (BNC socket). Visual alarm warning (REMOVE RF INPUT) and audible alarm provided for added protection.
OUTPUT IMPEDANCE	50 Ω nominal.
VSWR	Less than 1.2 to 500 MHz, less than 1.35 to 1000 MHz (N-type). Less than 2.2 to 1000 MHz (BNC).

MODULATION

AMPLITUDE MODULATION INTERNAL	
CW range	1.5 to 400 MHz, usable to 400 kHz.
Mod. depth range	0 to 70%, usable to 85%.
Mod. frequency range	50 Hz to 15 kHz.
Resolution	1%.
Indication	2 digits.
Setting	Via keyboard entry. Step change variation by INC/DEC keys and rotary control.
Accuracy	± 7% of reading ± 1 digit at 1 kHz, ± 10% of reading ± 1 digit, 50 Hz to 5 kHz up to 60% AM, ± 15% of reading ± 1 digit, 50 Hz to 5 kHz up to 80% AM.
EXTERNAL	
Input impedance	As internal plus: 1 MΩ in parallel with approximately 40 pF.
Sensitivity	1.5 V p-p for 30% AM at 1 kHz ± 15% reading ± 1% AM.
AM distortion	Less than 2% at 1 kHz with 30% AM (300 Hz to 3.4 kHz bandwidth).
FREQUENCY MODULATION INTERNAL	
CW range	0.4 to 1000 MHz.
Modulation range	0 to 25 kHz.
Mod. frequency range	50 Hz to 15 kHz.
Resolution	25 Hz (< 5.25 kHz dev.) 100 Hz (< 25 kHz dev.)
Indication	4 digits.
Setting	Via keyboard entry. Step change variation by INC/DEC keys and rotary control.
Accuracy	± 7% ± 10 Hz (at 1 kHz). ± 10% (50 Hz to 15 kHz).
EXTERNAL	
Input impedance	As internal plus: 1 MΩ in parallel with approximately 40 pF.
Modulation range	0 to 30 kHz.
Mod. frequency range	1 Hz to 50 kHz.
Sensitivity	1 V p-p for 5 kHz deviation; ± 10% at 1 kHz.
FM distortion	Less than 1% at 1 kHz with 5 kHz deviation (300 Hz to 3.4 kHz bandwidth).
PHASE MODULATION INTERNAL	
CW range	0.4 to 1000 MHz.
Modulation range	0 to 10 rads.
Mod. frequency range	300 Hz to 3.4 kHz.

EXTERNAL	
As internal plus:	
Input impedance	1 M Ω in parallel with approximately 40 pF.
Sensitivity	1 V p-p for 5 rads.
THD distortion	Less than 2% at 1 kHz with 5 rads (measured in a 300 Hz to 3.4 kHz bandwidth)

AUDIO GENERATOR, 1 kHz OSCILLATOR

OUTPUT IMPEDANCE	Less than 5 Ω nominal
FREQUENCY	
Range	50 Hz to 15 kHz (Usable 20 Hz to 20 kHz)
Resolution	0.1 Hz (20 Hz to 3.25 kHz), 1 Hz (3.25 kHz to 20 kHz)
Indication	5 digits
Setting	Via keyboard, and with rotary control for step change variation
Accuracy	± 0.01 Hz from 50 Hz to 3.25 kHz, ± 0.1 Hz from 3.25 kHz to 15 kHz
Distortion	Less than 2%
Spurious signals	Less than -26 dBc (at 9370 ± 20 Hz only)
Residual noise	Less than 0.2 mV r.m.s. in a psophometric bandwidth
DC offset	Less than 100 mV DC
FIXED FREQUENCY	1 kHz
Distortion	Less than 1%
Residual noise	Less than 0.4 mV r.m.s. in a psophometric bandwidth
DC offset	Less than 100 mV DC
Accuracy	As internal standard
TWO TONE SETTING	Two tones are available, 1 kHz and the AF Generator setting frequency, both at the same level.
OUTPUT LEVEL (e.m.f.)	
Range	1 mV to 2.55 V (to 5 kHz), 1 mV to 2 V (to 15 kHz)
Accuracy	$\pm 5\%$ ± 1 digit
Setting	1 mV steps (1 mV to 255 mV), 2.5 mV steps (255 to 635 mV), 10 mV steps (640 mV to 2.55 V)

RF FREQUENCY METER

FREQUENCY	
Range	1.5 MHz to 1000 MHz
Resolution	1 Hz or 10 Hz to 200 MHz, 10 Hz from 200 MHz to 1000 MHz
Typ. acquisition	Up to 200 MHz, 100 ms, with 10 Hz resolution; 1 s with 1 Hz resolution Up to 1000 MHz, 400 ms, 10 Hz resolution only

RF POWER METER

INPUT	
Range	0.5 mW to 100W Input to type-N socket: 50 mW to 75 W continuous, Tx mode selected. 100 mW to 75 W continuous in single port duplex mode. 1125 W max. ind., 175 W for more than 5 minutes at 25 C continuous. End of safe working is indicated by screen warning "REMOVE RF INPUT" and audible alarm. Input to BNC socket Usable 0.05 mW to 0.5 W
Frequency range	As RF Frequency Meter
Resolution	1% full-scale
Indication	2/3 digits and analog display
Setting	Automatic ranging on scales 0 to 30, 0 to 100, 0 to 300 mW, 0 to 1, 0 to 3, 0 to 10, 0 to 30 and 0 to 100 W
Accuracy	$\pm 10\%$ ± 1 digit up to 500 MHz, $\pm 15\%$ ± 1 digit up to 960 MHz, $\pm 20\%$ ± 1 digit up to 1000 MHz, $\pm 20\%$ typ. BNC socket
VSWR	Less than 1.2 to 500 MHz, less than 1.35 to 1000 MHz (N-type) Less than 2.2 to 1000 MHz (BNC)

MODULATION METER

Manual-tune	Provides frequency offset indication from carrier. 3 Digits and decimal point indicate most significant positive or negative error.
Auto-tune	Provides Measurement and simultaneous display of RF frequency, power, modulation frequency and level, and 1 kHz demod. distortion.
Acquisition	Less than 3 seconds at 10 Hz resolution
INPUT	
Frequency range	As RF Frequency Meter
Sensitivity	As RF Frequency Meter
AF filters	The following filters are available: Band-pass — 300 Hz to 3.4 kHz Low-pass — 300 Hz Low-pass — 15 kHz
AMPLITUDE MODULATION	
CW range	1.5 MHz to 400 MHz
Modulation range	0 to 90% up to 100 MHz, 0 to 80% up to 400 MHz, in auto-tune mode. 0 to 100% up to 400 MHz in manual-tune mode. Automatic ranging (bar chart), 0 to 10, 0 to 30, 0 to 100% depth.
Mod. frequency range	50 Hz to 10 kHz (typically 10 Hz to 15 kHz)
Resolution	1% AM
Indication	2 digits and + / - peak analog display
Accuracy	$\pm 6\%$ ± 1 digit at 1 kHz, $\pm 8.5\%$ ± 1 digit

FREQUENCY MODULATION

Modulation range	0 to 25 kHz. Automatic ranging (bar chart): 0 to 1, 0 to 3, 0 to 10, 0 to 30 kHz.
Mod. frequency range	50 Hz to 10 kHz (typically 10 Hz to 15 kHz).
Resolution	20 Hz to 5 kHz deviation. 1% up to 25 kHz deviation.
Indication	3 digits and +/– peak analog display.
Accuracy	±6% ±1 digit at 1 kHz; ±8.5% over range 50 Hz to 10 kHz.
Demod. distortion	Less than 2% at 5 kHz deviation and 1 kHz modulation frequency in a 300 Hz to 3.4 kHz bandwidth.
Residual FM	Less than 30 Hz r.m.s. up to 500 MHz, typ. 15 Hz. Less than 60 Hz r.m.s. up to 1000 MHz, typ. 30 Hz. For inputs above 20 mW/0.2 mW (N/BNC), measured in a 300 Hz to 3.4 kHz bandwidth.

PHASE MODULATION

Modulation range	0 to 10 radians. Automatic ranging (bar chart): 0 to 1, 0 to 3 and 0 to 10 radians.
Mod. frequency range	300 Hz to 3.4 kHz. Phase de-modulation is obtained using 750 µs de-emphasis.
Resolution	1% or 0.01 radians.
Indication	3 digits and +/– peak analog display.
Accuracy	±6% ±1 digit at 1 kHz. ±8.5% ±1 digit from 0.3 to 3.4 kHz w.r.t. 750 µs de-emphasis.
Demod. distortion	Less than 2% at 5 rads. modulated by 1 kHz measured in 300 Hz to 3.4 kHz bandwidth.

SINAD METER / S/N METER

Frequency	1 kHz.
Range	0 to 18, 0 to 50 dB (SINAD). 0 to 30, 0 to 100 dB (S/N).
Resolution	0.1 dB.
Indication	3 digits plus analog display.
Accuracy	±1 dB.
Sensitivity	50 mV (100 mV for 40 dB SINAD/S/N).

DISTORTION METER

Frequency	1 kHz.
Range	0 to 10%, 0 to 30% distortion.
Resolution	0.1% distortion.
Indication	3 digits plus analog display.
Accuracy	±5% of reading ±0.5% distortion.
Sensitivity	50 mV (100 mV for 1% distortion).

AF LEVEL METER

Features	AC – DC, or AC measurements.
Input impedance	1 MΩ in parallel with approximately 40 pF.
Frequency range	50 Hz to 20 kHz (or d.c.), usable to 50 kHz.
Level range	0 to 100 mV, 0 to 300 mV, 0 to 1, 0 to 3,

AF FREQUENCY METER

Range	20 Hz to 20 kHz.
Resolution	0.1 Hz/1 Hz.
Indication	3, 4 or 5 digits.
Accuracy	As internal standard ±1 digit ±0.1 Hz or 0.02% (whichever is greater).
Sensitivity	50 mV.

INTERNAL FREQUENCY STANDARDS

OCXO	Oven controlled crystal oscillator, nominal frequency 10 MHz.
Temperature coefficient	Less than ±5 parts in 10 ⁸ from 0 to 50°C. Less than 4 parts in 10 ⁹ /deg C from 50 to 70°C.
Ageing rate	Less than ±1 part in 10 ⁷ /month, ±1 part in 10 ⁸ /year after 1 month's continuous use.
Short-term stability	Less than ±1 part in 10 ⁸ , r.m.s. frequency error over a 1 s period.
Retrace error	Less than ±2 parts in 10 ⁷ over 24 hours, at constant temperature and after 25 minutes warm-up.

EXTERNAL FREQUENCY STANDARD INPUT

Frequency	1 MHz.
Level	100 mV to 3 V r.m.s.
Impedance	10 kΩ in parallel with 100 pF approximately.

DIGITAL STORAGE OSCILLOSCOPE

Features	Single or repetitive sweep, available in TX, RX and Audio Test modes, calibrated for AM, FM and ΦM.
Frequency range	DC to 50 kHz (from 3 Hz on AC).
Voltage range	10 mV/div to 20 V/div in a 1-2-5 sequence.
Accuracy	±5%.
FM ranges	±30, 15, 6, 1.5 kHz deviation at ±10% accuracy.
ΦM ranges	±15, 7.5, 3, 1.5 rad at ±10% accuracy.
AM ranges	20, 10, 5%/div. at ±10% accuracy.
Sweep rates	100 µs/div. to 5 s/div. in 1-2-5 sequence, accuracy locked to internal standard.
Trigger	Repetitive or single-shot storage.

SELCALL ENCODER/DECODER

Functions	Encodes 11 tones, decodes up to 12 tones in a CCIR, ZVEI, DZVEI, EEA, EIA or USER DEFINED tone sequence.
Tone encoder facilities	Send continuous, burst, single step, extend tone, either (1st of 5, 3rd of 7, 5th of 9) null, repeat or frequency shift up to ±9% in 1% steps.
Tone decoder facilities	Displays tone number, frequency and percentage error. Screen indicates null tones (using CRT) and annotates out of limit frequencies with * for ease of identification.
User define	Allows definition for encode or decode of up to 15 tones between 20 Hz and 20 kHz.

ADDITIONAL FEATURES

IF OUTPUT SOCKET	
Frequency	110 kHz nominal
Level	Minimum 180 mV.
Impedance	50Ω, minimum load 5kΩ.
Bandwidth	50 kHz to 350 kHz.
DEMODULATION OUTPUT SOCKET	
Level	400 mV p-p for ± 1 kHz deviation $\pm 10\%$.
Impedance	10kΩ nominal.
Bandwidth	Either 300-3.4 kHz, 15 kHz LP or 300 Hz LP set via front panel filter switch.
ACCESSORY SOCKET	
Pins 1, 3, 5, 6 designated for future options.	
Pin 2, +12 V, at least 100 mA.	
Pin 7, AF output, 1 W into 8Ω.	
Pin 1, Pulse output available under GPIB control, approx. 600 ns.	
SPECIAL KEY FUNCTIONS	
RX → TX FREQ	Presets the RF signal generator frequency for receiver test mode to that shown in TX mode.
Hold Display	Freezes instrument settings and readings, facilitating high RF power measurements and hard copy printout of TX, RX, Duplex or AF test screens.
INC/DEC	Available in TX, RX, Duplex and AF test modes for defining frequency or level increments of the AF and RF signal generators. Any step size setting within the range and resolution of the test set is permissible.
Store/Recall	37 non-volatile stores (01 to 37) are provided, each capable of retaining all front panel settings for up to 10 years. An additional store (00) is provided to retain the last test set-up, in the event of a power fail.
Help key	Provides access to SELF TEST, stores lock, RF counter resolution, default settings for SINAD or S/N and USER instruction guide for TX, RX, Duplex and Audio Test modes.
Audible output	For listening to demod output and received audio.
Two tone modulation	In transmit mode, two tones available under tones menu, generates 1 kHz fixed + AF synthesizer. In receiver mode, external modulation inputs add to internal modulation.

GENERAL

POWER REQUIREMENTS	
Rated supply voltage	105–120 V AC, 210–240 V AC, all $\pm 10\%$.
Supply frequency range	45 Hz–440 Hz.
Maximum consumption	100 VA.
DC supply voltage	11–32 V DC.
DC supply consumption	Less than 60 W.
GPIB INTERFACE	
A GPIB interface is fitted as an option. All functions except the supply switch are	

RADIO FREQUENCY INTERFERENCE	Conforms with the requirements of EEC Directive 76/889 as to limits of r.f. interference.		
SAFETY	Complies with IEC 348.		
RATED RANGE OF USE	0 to 50°C.		
LIMIT RANGE OF OPERATION	0 to 55°C.		
CONDITIONS OF STORAGE AND TRANSPORT			
Temperature	–40 to +70°C.		
Humidity	Up to 90% humidity.		
Altitude	Up to 2500 m (pressurized freight at 27 kPa differential, i.e. 3.9 lbf/in ²).		
DIMENSIONS AND WEIGHT			
Height	197 mm	Width	389 mm
	7.75 in	Depth	584 mm
			23.0 in
		Weight	15.5 kg
			34 lb
Includes dimensions of handle, feet and front cover.			

VERSIONS AND ACCESSORIES

When ordering please quote eight digit code numbers

Ordering numbers	Versions
52955-900A	Radio Communications Test Set with OCXO.
52955-301W	Radio Communications Test Set with GPIB Interface Fitted.
52955-302D	Radio Communications Test Set Export Licence-free Version.
52955-307C	Radio Communications Test Set French Language Version.
52955-312B	Radio Communications Test Set Spanish Version.
	Supplied accessories: AC Supply Lead, Operating Manual, Front Cover (Stowage), DC Supply Lead.
54415-004H	Optional accessories: Cellular Adapter NMT with 450 MHz + COUNTRY VARIANTS + 900 MHz Software.
54415-006U	Cellular Adapter NMT with 450 MHz + COUNTRY VARIANT Software.
54415-002A	Cellular Adapter AMPS.
54415-003Z	Cellular Adapter TACS.
54421-003J	Directional Power Head 25 MHz–1000 MHz.
54421-002L	Directional Power Head 1 MHz–50 MHz.
54462-023W	Battery Pack with built-in D.C. Input Fast Charger.
54211-001D	Printer 24 Column with Paper & Ribbon.
46883-877P	Printer Paper & Ribbon Kit.
54411-052M	600 Ohm Balanced Interface with 20 dB AF Attenuator.
54499-042L	CCITT filter.
54499-043S	CMESS filter.
54433-002Y	GPIB Interface Module.
43129-189U	GPIB Lead used with 24 Column Printer.
54451-163Y	IF Injector Probe 470 kHz.
54451-164N	IF Injector Probe 10.7 MHz.
54451-165L	IF Injector Probe 455 kHz.
54127-304C	Rack Mounting Kit (19").