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TS-4317-X
Frequency Agile Communications Test Set

IFR is the leader in Defense Test Systems for Military Tactical Communications with comprehensive solutions for SINCGARS, Have Quick, Special Tactics, Life Support, Airborne and International Military Communication systems



- 250 kHz to 1 GHz frequency coverage
- Single, portable, self-contained communications measurement instrument
- Ruggedized for military applications
- Solutions oriented, configurable platform for communications systems testing

TS-4317-X Overview

The TS-4317-X is a microprocessor controlled, digitally synthesized communication service monitor that combines the operations of many different test instruments into a single, compact unit. The TS-4317-X is capable of performing the following functions:-

RF Generator
RF Receiver
Duplex
AF Generator
Spectrum Analyzer
Oscilloscope
Digital Multi-Meter
Deviation (Peak) Meter
Distortion Meter
SINAD Meter
Audio Frequency Meter
Frequency Error Meter
RF Power Meter
Modulation Meter
Signal Strength Meter
Bit Error Rate Meter
Phase Modulation Meter
Deviation (RMS) Meter
Tracking Generator
Cable Fault Detector

The TS-4317-X utilizes an alphanumeric keypad, dedicated function keys, multi-task Soft Function Keys and a high resolution color CRT to display, enter and edit functions and data. Testing with this instrument can be accomplished via remote control or manually by front panel control. Tests performed with the TS-4317-X can use pre-programmed setups or formats determined at the time of the test. Microprocessor controlled memory allows storage and recall of parameters for each of the testing modes as well as storage and recall of oscilloscope and spectrum analyzer traces for signal comparison.

RF Generator

The RF Generator of the TS-4317-X is capable of generating modulated or unmodulated carrier signals from 250 kHz to 999.9999 MHz (in 100 Hz steps). The output level is variable from -137 dBm to 0 dBm. Modulation types include AM, FM and PM. Modulation can also be applied from an external source. The RF Generator also functions as a tracking generator for swept measurements or as an offset generator in Duplex Mode. Metering functions available for this operation mode include SINAD, Digital Multimeter (DMM), Distortion and Audio Frequency Level meters. The Oscilloscope and Spectrum Analyzer are also available for use with the RF Generator Operation Screen. The TS-4317-X Generator is capable of executing user defined frequency scan and frequency list operations as well as single frequency operations.

RF Receiver

The Receiver of the TS-4317-X is capable of receiving modulated and unmodulated signals from 250 kHz to 999.9999 MHz (in 100 Hz steps). The TS-4317-X receives AM, FM, PM, and SSB modulated signals. Metering functions in the TS-4317-X available with the Receiver include RF Power, Modulation, Deviation, Distortion, Frequency Error, AF Frequency, Signal Strength and SINAD meters and counters. The Oscilloscope and Spectrum Analyzer are also available for use on the Receiver Operation Screen. The TS-4317-X Receiver is capable of executing user defined frequency scan and frequency list operations as well as single frequency operations. The Receiver accesses "off the air" signals through the ANTENNA IN connector, higher-powered signals are accessed through the T/R connector.

Duplex

The TS-4317-X combines the independent RF Generator and Receiver from 250 kHz to 999.9999 MHz for Duplex operation. The operator has the option of monitoring on screen, the transmitter under test, receiver under test or both. All features available with the RF Generator and Receiver are available in Duplex as well as the ability to use an offset frequency from -999.7499 to +999.7499 MHz to test communication equipment capable of generating and receiving simultaneously on different frequencies.

Oscilloscope

The TS-4317-X includes a 1 MHz single trace Oscilloscope as one of its major test capabilities. The Oscilloscope allows input from 1 mV to 50 V per division with a maximum input voltage of 200 Vdc.

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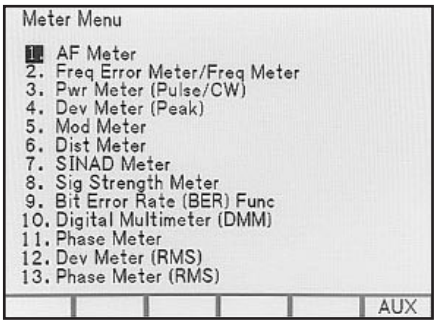
Frequency Agile Communications Test Set

Sweep rates range from 1 us/div. to 100 ms/div. in a 1-2-5 sequence. The TS-4317-X Oscilloscope has a store and recall ability of up to nine signals. The recalled trace can be shown simultaneously with a live trace, giving the operator the opportunity to compare the two traces. Signals available for use include AC, DC, GND, Receiver IF, Demodulated Audio, Function Generators, External Audio, SINAD/BER and RF Power. The Oscilloscope is available as a stand-alone instrument or in combination with all major Operation Modes except where Duplex Transmitter and Receiver are shown simultaneously. Size options for views in other modes are full-size and 1/4-size.

Spectrum Analyzer

The Spectrum Analyzer monitors internal and external signals from 250 kHz to 999.9999 MHz. Scan widths range from 1 kHz to 100 MHz as well as zero scan. Available log scales are 2 and 10 dB/div. with amplitude scale units of dBm, dBmV, dBV, dBmW and dBW. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. External signals can be displayed "off-the-air" through the ANTENNA IN connector or applied through the T/R connector. The Spectrum Analyzer has variable stepped attenuation through both connectors. The Spectrum Analyzer also has a tracking generator function with a variable level from -137 to 0 dBm. The Spectrum Analyzer is available for display alone or in all major operation modes except where the Duplex Transmit and Receive functions are shown simultaneously. Size options for views in other modes are full-size and 1/4-size.

Meters



Meter menu selection screen

The TS-4317-X provides the meters listed above for use as independent test functions as well as synthesizing them into the major mode functions. As independent functions, the meters provide a bar graph display and digital data. On the major operations screens, these meters display as bar graph display and digital data or just as digital data, depending on the Oscilloscope/Spectrum Analyzer display size. The meters are used to monitor both internal and external input.

Audio Function Generator

There are two Audio Function Generators included in the TS-4317-X with a range of 10 Hz through 40 kHz. Available waveforms include sine, square, triangle, ramp, pulse and DC levels. The TS-4317-X is also capable of creating Manchester digital data bit patterns of 100 to 100,000 bits. Data rates include 75, 150, 300, 600, 1200, 2400, 4800 and 16000 bps. Pattern types include random, fixed and user defined.

Data Entry and Display

Unless the TS-4317-X is configured for remote testing, all data received by the operator is in the form of screens and menus. Each major test operation has a dedicated operation screen with subordinate setup menus. The microprocessor edits operation screens to reflect changes in parameters imposed by the operator or reflects changes in data delivered by the Unit Under Test (UUT).

Individual meters also have dedicated operation screens and subordinate setup menus. The meter operation screens can be accessed through the mode operation screen that is being supported by that specific meter operation or through the Meter Menu.

Once a specific mode of operation is selected, the operation screen appears on the CRT. The parameters shown reflect the parameters last entered in that operation. This specific operation screen is accessed with one of six dedicated MODE Keys.

Setup menus on all mode operation screens are accessed from the specific operation screen by pressing the SETUP Key. Operator entry and edit of data is performed on the operation screen or on the setup menu.

The operation screen and menus have active cursors that the operator can use to access a specific parameter. Once the parameter is accessed, data can be selected with DATA SCROLL Spinner or DATA SCROLL Keys or by using the alphanumeric DATA ENTRY Keypad.

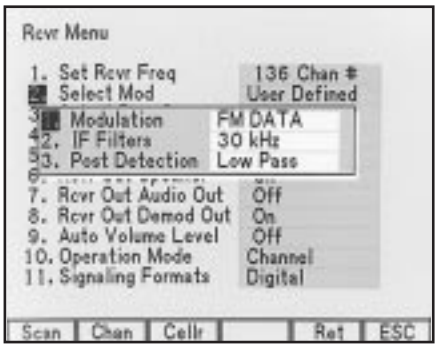
Multitask "Soft" Function Keys are also provided to perform setup, edit and entry. Each operation screen defines Soft Function Keys to fit the specific needs for that operation. These definitions are displayed on the screen above the defined key. Each operation screen may have several definitions for each Soft Function Key or make a definition unavailable depending on the parameters of the operation. Various functions performed by these multitask keys include toggling between two values, selecting connectors for access, entering data or selecting a field for edit.

Setup storage and recall functions are available for each of the MODE screens. This allows the user to store up to nine setups in each MODE screen for future recall. Selecting the Auxiliary Function (AUX) menu and selecting the store function may also save the system configuration. This allows the user to store and recall up to nine system configurations.

The Receiver and Generator have a frequency list capability. This allows the user to store up to 100 frequencies into a list for use when performing tasks that require the same instrument setup to be utilized on many different frequencies.

Setup Menus

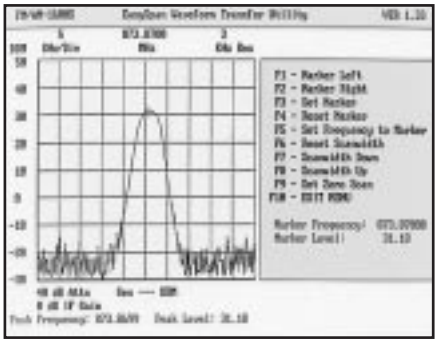
The major modes of operation each provide additional setup and control of functions not available for edit on the operation screen. A typical example setup screen for the receiver is shown below. Functions such as signal routings to the front panel connectors, AGC control, user defined IF and Post Detector bandwidth settings and signal formats are configured via this menu.



Set up menu screen for receiver function

Application Software

The remote language has a screen for access of up to greater than 2 MBytes of optional application software files. Application programs are available for many different measurement applications or the user may develop his/her own routines. Expansion capability exists for addition memory, if required.



Application software example of the EasySpan waveform transfer utility

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Frequency Agile Communications Test Set

Radio Testing Software

The following application programs are available for use on the TS-4317-X family of Frequency Agile Communications Test Sets. These software packages and their associated interconnection groups allow the Test Set to perform semi-automated verification, testing and repair of the following LRUs:

TS-4317-X Radio Testing Software

RADIO SYSTEM	*LRU*	*DESCRIPTION*
VRC-12	RT-246	VHF/FM Vehicular
	RT-524	R/T (Manual)
	R-442	Receiver (Auxiliary)
PRC-77	RT-841	VHF/FM Manpack Transceiver
LST-5	LST-5A	Lightweight
	LST-5B	Satellite Terminal
	LST-5C	
PSC-7	HST-4A	UHF SATCOM
	HST-4B	LOS Transceivers
	HST-4C	
	MST-20	Miniature Satellite Transceiver
PRC-117	PRC-117A	VHF/FM Manpack
	PRC-117B	VHF/FM Manpack
	PRC-117C	VHF/UHF, AM/FM Transceiver
PRC-113	RT-1319	Manpack
	RT-1319B	Transceiver (HQ II)
URC	URC-100	Manpack Tactical
	URC-101	LOS/SATCOM
	URC-104	Tactical Manpack
	URC-110	Tactical Data Transceiver

TS-4317-X Family

The TS-4317-X family is designated by the customer as indicated below, however, no customer restrictions or limitations on availability are implied. The TS-4317-X family of test sets supports and maintains total interchangeability and interoperability with all Radio Personality Modules and Radio Test Applications Programs.

TS-4317	Army/Marine Corp Test Set
TS-4317-1	Air Force Test Set
TS-4317-2	Korean Military Test Set
TS-4317-3	Special Forces Test Set
TS-4317A	2 GHz Digital Test Set

Radio Communications Test Systems

In government communications, IFR provided the first multi-functional, multi-radio integrated test set (AN/GRM-114) fielded for the US Armed Forces. Its successors, the AN/GRM-114A, AN/GRM-114B, AN/GRM-122 and the AN/ARM-204 continued the migration path with increased capabilities designed to meet the growing demands of advanced communications systems.

Our experienced government staff continues to evolve our test equipment to provide "State of the Art" capabilities for semi-automated verification testing and/or fault isolation of military communications systems from a single, portable platform.

Radio Personality Modules (RPMs)

The TS-4317-X family of frequency agile radio communications test sets along with the J-4843A generic appliqué unit and its associated (RPMs) provides our customers a solutions oriented, cost effective, configurable approach to communication systems testing. Our ability to reduce life cycle cost, while assuring the highest degree of confidence in the military communications equipment, has successfully established a migration path with increased capabilities designed to meet the growing demands of advanced communications systems in the digital battlefield.

The Radio Personality Module (RPM) based configurable approach to LRU testing provides a cost-effective method to accomplish complete pin-to-pin functional communications systems testing. This approach is typically utilized for more complex communications systems testing requirements where multiple LRUs (Radios, RF Amplifier, Vehicular Adapter, Fill Device, Battery Box, etc.) are required to be tested in all their operational modes.

Additional information on the Radio Communications Test System (RCTS) family of products and their applications is included in the following pages.

Specification

General Notes

A warm-up time of 20 minutes is permitted for the following performance requirements.
RF measurements are referenced to 50 Ω.
Accuracy and Resolution stated in percent are referenced to measured or selected value unless otherwise stated.
Where specified resolution exceeds specified accuracy, specified resolution takes precedence.

RF Signal Generator - T/R Connector

FREQUENCY

Range
250 kHz thru 999.9999 MHz

Resolution
100 Hz

Accuracy
Same as Master Oscillator

LEVEL

Range
-137 dBm thru 0 dBm, -40 dBm Max with Reverse Power Present

Resolution
0.1 dB

Accuracy
±1.0 dB, 0 dBm to ≥-110 dBm
±2.5 dB <-110 dBm to -127 dBm

Output Impedance
50 Ω (Return Loss > 16 DBRL)

SPECTRAL PURITY

Residual FM
Post Detection BW 0.3 kHz to 3 kHz
<10 Hz RMS from 1.0 MHz to 500.0 MHz
<20 Hz RMS from >500.0 MHz
Post Detection BW 50 Hz thru 15 kHz
<45 Hz RMS from 1.0 MHz thru 100.0 MHz
<140 Hz RMS for <1.0 MHz & >100.0 MHz

S.S.B. Phase Noise
<-80 dBc/Hz at 20 kHz from carrier ≤1 MHz
<-90 dBc/Hz at 20 kHz from carrier <930 MHz
<-85 dBc/Hz at 20 kHz from carrier ≥930 MHz

Harmonics
<-26 dBc

Non-Harmonics
<-50 dBc

Residual AM
Post Detection BW 0.3 kHz to 3 kHz
<0.10% RMS, >1 MHz
Post Detection BW 50 Hz thru 15 kHz
<0.10% RMS, >1 MHz

Input Protection
See Power Meter

Duplex Generator: At Duplex Connector

FREQUENCY (Independent of Receiver Frequency Setting)

Range
250 kHz thru 999.9999 MHz

Resolution
100 Hz

Accuracy
Same as Master Oscillator

LEVEL

Range
-120 dBm thru +7 dBm

Resolution
0.1 dB

Accuracy
±1.0 dB, (Levels ≥ -100 dBm)
±2.5 dB, (Levels < -100 dBm)

Output Impedance
50 Ω Nominal (Return Loss >16 DBRL)

SPECTRAL PURITY

Residual FM
Post Detection BW 0.3 kHz to 3 kHz
<10 Hz RMS from 1.0 MHz to 500.0 MHz
<20 Hz RMS from > 500.0 MHz
Post Detection BW 50 Hz thru 15 kHz
<45 Hz RMS from 1.0 MHz thru 100.0 MHz
<140 Hz RMS for <1.0 MHz & >100.0 MHz

S.S.B. Phase Noise
<-80 dBc/Hz at 20 kHz from carrier ≤1 MHz
<-90 dBc/Hz at 20 kHz from carrier <930 MHz
<-85 dBc/Hz at 20 kHz from carrier ≥930 MHz

Harmonics
<-26 dBc

Non-Harmonics
<-50 dBc

RESIDUAL AM
Post Detection BW 0.3 kHz to 3 kHz
<0.10% rms, >1 MHz
Post Detection BW 50 Hz thru 15 kHz
< 0.10% rms, >1 MHz

Input Protection
Up to 65 Watts for 15 Seconds with Alarm

RF Signal Modulation (T/R & Duplex Connectors

INTERNAL FM

Deviation
Range
Off, ±l00 Hz thru ±l00.0 kHz (fc => 1 MHz)
Accuracy
±5%, ±1.0 kHz thru ±20.0 kHz
±10%, < ±l.0 kHz and > ±20.0 kHz

Resolution
100 Hz

Modulation
Rate: Off, 30.0 Hz thru 20.0 kHz (1)
Up to 20 KBS Digital
Wave Forms: Sine, Square, Triangle, Ramp, and Pulse

Total Harmonic Distortion
(Sine wave only), >6 kHz Deviation
<0.7%, (700 Hz thru 1.1 kHz)
<1.0%, (30 Hz thru 10.0 kHz)
<2.0%, (>10.0 kHz thru 20.0 kHz)
<3 out of 10^6 BER for Digital

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Frequency Agile Communications Test Set

INTERNAL AM

RF Generator Range
250 kHz thru 999.9999 MHz

AM Range
Off, 1% thru 90%

AM Accuracy
± 5% of setting (30% thru 90% modulation)

AM Resolution
1%

Modulation
AM Rate
100.0 Hz thru 10.0 kHz [1]
Wave Forms
Sine, Square, Triangle, Ramp, and Pulse

Total Harmonic Distortion (Sine Wave Only)
For 30% thru 70% modulation
< 0.7% Hz thru 1.1 kHz (700 Hz thru 1.1 kHz)
<1.5% (100 Hz thru 6.0 kHz)
<2.5%, (>6 kHz thru 10.0 kHz)

NOTE [1]: Reference AF Generator for modulation rate accuracy and resolution.

INTERNAL PHASE MODULATION

Phase Modulation
Range
Off, 0.1 to 10 Radians
Accuracy
± l0% (@ 1 kHz rate, >0.3 Rad)
Resolution
0.1 Radians

Modulation
Rate
Off, 30 Hz to 6 kHz (see Note 1)
Waveforms
Sine, Square, Triangle, Ramp, and Pulse
Distortion
<2% (1 kHz rate, 0.3 kHz to 3 kHz BW, ≥0.5 Rad)

EXTERNAL
External inputs with the same characteristics as the internal modulation sources are supported.
A 10 Vp-p injection level is required to obtain indicated setting ±10%.

Frequency Agility

(For both RF Generator & Receiver)

Settling Time
1.5 ms to within 1.0 kHz of desired freq. from 10.0 MHz thru 900.0 MHz, (25.0 kHz steps), measured from time (UUT) completes outputting the 16 bit frequency word.

AF Generator #1 and #2

FREQUENCY

Range
10.0 Hz thru 40.0 kHz

Resolution
0.1 Hz < 2.0 kHz
1.0 Hz > 2.0 kHz

Accuracy
±0. 1 %

LEVEL

Range
0.7 mV RMS thru 2.5 VRMS (150 Ω), up to 3.0 VRMS (600 Ω)

Resolution
0.1 mV for 1.0 mV thru 200.0 mV
0.8 mV RMS (>200 mV RMS)

Accuracy
(150-ohm load)
±0.1 mV or 3% for ≤10 kHz
5% for >10 kHz to ≤25 kHz

SPECTRAL PURITY

Total Harmonic Distortion
<0.5% (sinewave, 700 Hz to 1.1 kHz, >100 mV RMS)
<1.0% (sinewave, < 700 Hz and > 1.1 kHz, >100 mV RMS)

WAVESHAPE
Sine, Square, Triangle, Ramp, and Pulse

Digital Data Generator

DIGITAL DATA GENERATOR and Pattern Generator for BER
Generates Manchester style data.

Data Rates
75, 150, 300, 600,1200, 2400, 4800 BPS & 16 KBPS

Data Pattern Size
100 to 100,000 bits

Data Pattern Type
Random, Fixed & User Defined

Accuracy
1 x 10^{-8}

LEVEL

Range
Digital 0.1 V to 5.0 V.

Resolution
0.1 V

Accuracy
±3%

Audio Frequency Counter

FREQUENCY

Range
10.0 Hz thru 40.00 kHz (in 4-decade ranges)

Accuracy
Same as Master Oscillator ± 1 count

Resolution
0.1 Hz from 10.0 Hz thru ≤2.0 kHz
1.0 Hz from >2.0 kHz thru ≤20.0 kHz
10.0 Hz from >20.0 kHz to 40.0 kHz

Input Waveform
Sine or Square Wave

EXTERNAL INPUTS

External Level
0.5 VRMS to 30 VRMS (SINAD/BER input)
0.1 VRMS to 3.5 VRMS (EXT MOD input)

Impedance
1 MΩ Nominal (SINAD/BER input)
100 kΩ Nominal (EXT MOD input)

RF Error Meter / RF Counter

RADIO FREQUENCY COUNTER

Range
250 kHz thru 999.9999 MHz

Accuracy
Same as Master Oscillator

Resolution
1 Hz - <20 MHz
10 Hz - ≥20 MHz

Level
-10 dBm thru +50 dBm at the T/R connector
-80 dBm thru +10 dBm at the ANT connector

RADIO FREQUENCY ERROR COUNTER/METER

Frequency Counter Range
0 thru ± 150.000 kHz [2]

Frequency Meter Range
0 thru ± 100.0 kHz [2] (in 4 decade ranges)

Counter/Meter Accuracy
Same as Master Oscillator

Counter/Meter Resolution
1 Hz from ± 1.0 Hz to ≤± 10.0 kHz
10 Hz from >±10 kHz to ± 150.0 kHz

Counter/Meter Level
-10 dBm thru +50 dBm at the T/R connector
-80 dBm thru +10 dBm at the ANT connector

Note [2]: Receiver Bandwidth will determine the upper limits.

RF Power Meter

FREQUENCY

Range
1.5 MHz thru 999.9999 MHz

LEVEL

Input Level
0.2 mW - 200 W

Ranges
20.0 mW, 200.0 W full scale (1-2-5 sequence)

Resolution
1% or 0.1 mW

Accuracy
±10%, ± 1 count

RETURN LOSS
1.5 MHz thru 100.0 MHz, >23.0 DBRL
>100.0 MHz thru 400.0 MHz, >20.0 DBRL
>400.0 MHz thru 999.9999 MHz, >16.0 DBRL

OPERATING CONDITIONS
50 W continuous at 25.0° C ambient
OR 30.0 sec ON, 2.0 minutes OFF at 100 W & 50.0° C ambient
OR 15.0 sec ON, 2.0 minutes OFF at 200 W & 50.0° C ambient
Over temperature alarm provided for all input levels.

Receiver

Frequency Range
250.0 kHz thru 999.9999 MHz

Sensitivity
≤5 µV for 10.0 dB SINAD (fc =>1 MHz) 30 kHz IF Bandwidth (1.0 kHz Tone,6 kHz deviation 10 kHz Audio Bandwidth)

Selectivity

Mode	*Rec. IF BW*	*Audio BW*
FM 4	300 kHz	100 kHz
FM 3	300 kHz	20 kHz
FM 2	30 kHz	10 kHz
FM 1	30 kHz	3 kHz
AM 2	30 kHz	10 kHz
AM 1	2.9 kHz	3.0 kHz
USB (3)	2.9 kHz	3.0 kHz
LSB (3)	2.9 kHz	3.0 kHz
PM	30 kHz	3.0 kHz

Adjacent Channel Rejection

Receiver Nominal 3.0 dB Bandwidth	*Greater Than 30.0 dB Down*
300 kHz	±485 kHz Max
30 kHz	±52 kHz Max
2.9 kHz	+2.5 kHz Max[3]

Note [3]: For USB & LSB Operation: Center frequency shifted +1.825 kHz or -1.825 kHz according to mode of operation.

DEMODULATION OUTPUT

Impedance
600 Ω

Output Level
(FM): 5 Vp-p ±10% (at full scale, into 600 Ω)
(PM): 40 mV RMS ±10% (5 Rad, into 600 Ω)
(AM): 1 VRMS ±10% (80% modulation, into 600 Ω)
(SSB): 1.15 VRMS ±1 0% (Beat tone, into 600 Ω)

Receiver, Antenna Connector:
Input Protection: 65 W for 15 sec. with alarm

FM Deviation Meter

Range
±1 kHz to ±100 kHz

Resolution
10 Hz, ≤20 kHz Ranges 1 kHz, >20 kHz Ranges

Accuracy
±4.0% ±2 counts + source residual
(for 300 kHz IF, <20 kHz Rate, FM-ZEROED)

Modulation Rate
100 Hz to < 40 kHz (300 kHz IF)
100 Hz to < 3 kHz (30 kHz IF)

Carrier Range
500 kHz thru 999.9999 MHz

Carrier Level
-10 dBm thru +50 dBm at the T/R connector
-80 dBm thru +10 dBm at the ANT connector

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AM Modulation Meter

Range
1% thru 95%

Resolution
1%

Accuracy
5% full scale, ± 1 count + source residual from 30% thru 90%

Modulation Rate
100.0 Hz thru 10.0 kHz

Carrier Range
1 MHz thru 999.9999 MHz

Carrier Level
-10 dBm thru +47 dBm on the T/R connector
-80 dBm thru +10 dBm on the ANT connector

PM Deviation Meter

Range
0 Rad to 10 Rad (Peak)

Resolution
0.01 Rad (≤5 Rad)
0.1 Rad (>5 Rad)

Accuracy
±3% full scale ± 1 count + source residual (@ 1 kHz rate > 0.3 Rad)

Modulation Rate
300 Hz to 4 kHz

Carrier Range
500 kHz to 999.9999 MHz

Carrier Level
-10 dBm to +50 dBm (T/R connector)
-60 dBm to +10 dBm (ANT connector)

Distortion Meter

Range
0.1 % thru 20.0%

Resolution
0.1%

Accuracy
± 20.7% Distortion, ± 1 count from 1.0% thru ≤10.0%,
±2.0% Distortion, ± 1 count from >10.0% thru 20.0%

Signal Frequency
600 Hz thru 1400 Hz

Signal Level
0.1 VRMS thru 30.0 VRMS, SINAD/BER input

SINAD Meter

Range
3.0 dB thru 30.0 dB

Resolution
0.1 dB

Accuracy
± 1.0 dB, ± 1 count

Signal Frequency
600 Hz thru 1400 Hz

Signal Level
0.1 VRMS thru 30.0 VRMS, SINAD/BER input

Digital Multimeter

VOLTMETER (DC/AC)

Ranges
200.0 mV, 2.000V, 20.00 V, 200.0 V, 2000 V[4], full scale, (1 MΩ)

Note [4]: 1000.0 V max DC OR 500.0 V max AC (true RMS)

Resolution
3.5-digit display,
Max. resolution 0.1 mV on 200 mV Scale.

Accuracy
± 5%, full scale (AC)[5], ± 1 count
± 1%, full scale (DC), ± 1 count,

Note [5]: AC accuracy applies for AC Volts times kHz product <140.

Frequency
DC, AC mode 50 Hz thru 20 kHz

Input Impedance
Selectable ± 5%
150 Ω (speaker load)
600 Ω (line load)
1 MΩ NOMINAL (shunted by <150 pf)

OHMMETER

Ranges
200.0 Ω, 2.000 kΩ, 20.00 kΩ, 200.0 kΩ, 2.000 MΩ, 20.00 MΩ (full scale)

Resolution
3.5-digit display, Max. resolution
0.1 Ω on 200.0 Ω Scale.

Accuracy
±5% full scale, or 0.1 Ω, ±1 count

CURRENT METER (DC/AC)

Ranges
20.00 mA, 200.0 mA, 2.000 A full scale
(20.0 A[6]) OUT - Via an External Shunt, using the Voltmeter on the 0.2 V scale)

Note [6]: 10 A max DC or 5 A max AC (True RMS)

Resolution
3.5-digit display, Max. resolution
0.01 mA on 20.0 mA Scale.

Accuracy
±5% full scale, or 0.1 mA, ± 1 count

Oscilloscope

Display Size
8.64 cm (3.4 in) X 9.65 cm (3.8 in)

VERTICAL

Bandwidth
1.0 MHz (-3 dB)

Input Ranges
2 mV/Div to 50 V/Div
(1-2-5 sequence, 8 divisions)

Max Input Voltage
200 V

Accuracy
± 5% of full scale
(± 10% with x 10 probe)
± 10% of full scale in 2mV range
(± 10% with x 10 probe)

Resolution
1.25% of full scale, (digital scope data range 0 to 255, in 8 divisions)

Coupling
DC, AC, and GND

HORIZONTAL

Rate
1 µs/Div to 100 ms/Div
(1-2-5 sequence, 10 divisions)

Accuracy
±3% of full scale

Resolution
1 %, (digital scope data sweep 400 points displayed per sweep)

External Input Impedance
1.0 MΩ, (NOMINAL), shunted by 27 pF

Spectrum Analyzer

Display Size
86.4 mm (3.4 in) X 96.5 mm (3.8 in)

Range
500 kHz thru 999.9999 MHz

FREQUENCY SPAN

Range
1 kHz/Div to 100 MHz/Div plus zero scan
(10 divisions in a 1-2-5 sequence)

Accuracy
± 5% of Span Width

Reference Accuracy
See Master Oscillator

LEVEL

Vertical Range
Log, 10 dB/Div and 2 dB/Div

Vertical Resolution
1 dB (10 dB/Div)
0.4 dB (2 dB/Div)

Range (Dynamic)
60 dB (@ 0 dB atten, <1 MHz/Div)

Bandwidth Switching Error
<2 dB (5 kHz/Div thru 1 MHz/Div)
<3 dB (<5 kHz/Div, >1 MHz/Div)

Overall Accuracy
± 4 dB (1 MHz to 400.0 MHz, NORMALIZED)
± 5 dB (>400.0 MHz to 999.9999 MHz, NORMALIZED)

Attenuator
0, 20, 40 dB at ANT connector
40 dB, 60 dB, 80 dB
(User selectable, Pwr < 2 W, T/R)
60 dB, 80 dB, 100 dB
(User selectable, Pwr > 2 W, T/R)

MODES

Resolution Scan Width[7]	*Bandwidth*
100 MHz/Div	3 MHz
50 MHz/Div	3 MHz
20 MHz/Div	300 kHz
10 MHz/Div	300 kHz
5 MHz/Div	300 kHz
2 MHz/Div	300 kHz
1 MHz/Div	300 kHz
500 kHz/Div	30 kHz
200 kHz/Div	30 kHz
100 kHz/Div	30 kHz
50 kHz/Div	30 kHz
20 kHz/Div	3 kHz
10 kHz/Div	3 kHz
5 kHz/Div	3 kHz
2 kHz/Div	300 Hz
1 kHz/Div	300 Hz
0 kHz/Div	30 kHz

NOTE [7]: The receiver is fixed on the center frequency for monitoring while the analyzer scans as specified.

Bit Error Rate Meter (BER)

Data generated by Digital Data Generator. Inputs to BER meter from received RF or from front panel connector. Decodes Manchester style data.

Range
1 x 10-1 to 1 x 10-5

DATA

Rates
75, 150, 300, 600, 1200, 2400, 4800 BPS & 16 KBPS

Data Pattern Size
100 to 100,000 bits

Data Pattern Type
Random, Fixed, and User Definable

Accuracy
1 x 10^{-6}

EXTERNAL INPUT LEVEL

Signal Level
300 mVp-p to 5 Vp-p (SINAD/BER input)

Input/Output (I/O) Connectors

IEEE-488.1-1987 CONNECTOR
(24 pin IEEE connector)
The hardware interface is in accordance with IEEE-488.1-1987. All of the functions in the set (including the analyzer, scope and DMM) can be controlled through this interface. No manual intervention shall be required except for power on/off. The interface provides talker/listener modes for all the functions in this specification.

The following are provided:
SH1, AH1, TI, T2, TE0, L2, LE0, SR1, RL2
PP0, DC1, DT1, (C0, 1, 2, 3, 4)*
*USER SELECTABLE

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Frequency Agile Communications Test Set

RS-232 CONNECTOR - (ASYNCHRONOUS)
(9 PIN SUB-MINIATURE D, MALE CONNECTOR)

Operations Mode
Off, PC (Input/Output), Printer (Output)

Baud Rates
300, 600, 1200, 2400, 4800, 9600, 19200

Stop Bits
1, 2

Parity
Odd, Even, Mark, Space, None

AUXILIARY BOX INTERFACE (SCSI)
(50 PIN IEEE CONNECTOR)
Interface connector for auxiliary box interface per the ANSI X3.131- 1986 standard.

EXTERNAL VIDEO
(9 pin sub-miniature D, female connector)
EGA (Enhanced Graphic Adapter) interface for external EGA computer monitor.

Master Oscillator

TCXO Temperature Stability
±0.15 ppm (0-50 °C)

Ageing
± 0.3 ppm per year

Accuracy
± 0.5 ppm

Adjustment Resolution
Approximately 0.005 ppm over 4.0 ppm adjustment range

General Characteristics

Dimensions
432 mm (17 in) wide, 187 mm (7.4 in) high,
559 mm (22 in) deep
(without bail handle, front panel cover in place)

477 mm (18.8 in) wide, 187 mm (7.4 in) high,
635 mm (25 in) deep
(with bail handle, front panel cover in place)

Weight
21.8 kg (48 lb)

Operating Temperature Range
0 to 50° C

Power Requirements

Line
95 to 130 VAC 50 to 400 Hz
190 to 260 VAC 50 to 400 Hz
180 Watts typical (TS-4317-X)

External DC
22 thru 30 VDC

Display

Type
Color, 70 degrees deflection, in-line

Size
132 mm (5.2 in) wide, 142 mm (5.6 in) high,
173 mm (6.8 in) diagonal

Resolution
640 pixel x 350 Lines

Environmental

Design	Per MIL-T-28800
Safety	Per MIL-STD-882B
EMI/RFI	Per MIL-STD-461/462
Reliability	Per MIL-HDBK-781
Storage Temperature	-40 to +70 °C
Operating Temperature	0 to 50 °C
Humidity	0 to 95%
Vibration	2g
Shock	40g

Self Test

Built-in in the form of user accessible Self-Operational Check (SOC).
Appliqué units have Built In Test (BIT) with > 90% coverage.

Accessories

Microphone
Antenna (flexible)
DC Shunt
20 dB Pad
10 dB Pad
DC Power Cord
AC Power Cord
DMM Probes
Scope Probe
Extra Fuses

Versions and Accessories

When ordering please quote full ordering number information.

AAT012	Microphone
AAT013	ANT-2 Telescoping Antenna
AAT015	1600 Soft Padded Carrying Case
AAT016	1600/J160x Soft Padded Carrying Case
AAT014	Hardside Case (Cetacea)
AAT017	Hardside Case (Siltion)
AATS11	AMPS Cellular System Analyzer
AATS12	AMPS Mobile Station Test
AATS13	SINAD/Distortion Meter (Special for –2)
AATS14	NT400 Cellular Test
AATS15	NAMPS Encode/Decode
AATS16	NAMPS Cellular Monitor
AATS17	NAMPS Cellular Mobile
AATS18	Flash Memory File System (Standard in all TS units)
AAT020	+20 dB Generate Amplifier
AAT024	Rebidium Frequency Standard (0.001 ppm)
AAJ105	Calibration Key for TS-4317 Family
AAT023	TS-4317-x Maintenance/Service Kit
AAT001	EasySpan (Wave Form Transfer Software)
AAT002	EasySpan for Windows (Wave Form Transfer Software)
AAT003	EasyCom-FM (Land Mobile Test Software)
AAT004	EasyScan (Spectral Usage Software)
AAT005	VRC-12/PRC-77 Radio Test Software
AAT006	EasySweep (Swept Antenna Measurements)
AAT007	LST-5 Series Radio Test
AAT008	PRC-113 Series Radio Test Software
AAT009	HST-4 & AN/PSC-7 Series Radio Test Software
AAT010	AN/PRC-117 Series Radio Test Software
AAT011	AN/URC Series Radio Test Software
AAT019	Return Loss Bridge (5 MHz to 1 GHz)
AAT018	Rack Mount Kit - (Test Set Only)
AAPS02	Rack Mount Kit – (RCTS)
AAT021	Auxillary Box Development Kit
AAT022	Auxillary Box Cable Kit

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Defense Test Systems
Radio Communication Test Systems (RCTS)

- Easily expandable platform
- Semi-unattended testing
- Portable
- More complete testing in less time.
- Operator skill level requirement Reduced
- Less test equipment required
- Reduced calibration cost
- Less setup and operation test time required
- Reduced chance of human error occurrence
- Automated data logging and recording
- No "Gold" LRU equipment required
- Test & troubleshooting procedures are significantly simplified
- Semi-automated test environment for multiple LRU's
- Guided probing for troubleshooting
- Supports all levels of maintenance
  - Forward "Mobile" installations
  - Forward "Fixed" installations
  - Rear depot installations
- Support all test requirement applications
  - Factory final acceptance of LRUs
  - Functional verification on delivery
  - Preventive maintenance
  - Verification testing prior to fielding
  - Fault detection and reporting
  - Fault isolation to defective SRU
  - Verification of repair and return to service



IFR Americas, Inc. Aerospace & Defense Group continues to use advanced communications test techniques to successfully support the Military's Tactical Communications requirements in the following areas; conventional ground radio systems, SINCGARS, Have Quick, Special Tactics, Life Support, Airborne Communications and Foreign Military requirements.

In the current conditions experienced in a tactical battlefield environment, frequency-hopping communications, beacons and position location have become a necessity. With the need to transmit not only voice but also data and position information, a reliable communications link is of paramount importance. In hostile conditions, enemy jamming has become a primary tool to disrupt or disable Communications, Command, Control and Computer (C4). The new frequency hopping and multi-mission transceiver systems, with their ability to encode, interleave, error correct and act as a beacon/transponder capable of supplying ranging and personnel identification information provide effective countermeasures with low probability of intercept.

With this philosophy in place, IFR Americas, Inc. Aerospace & Defense Group has provided the military with the proper test equipment to verify the reliability and functionality of all aspects of these communications devices. The frequency agile AN/GRM-122 and its next generation derivatives have proven to be the only test solution capable of providing this level of operational verification and maintainability assurance. By its acceptance in the US Army, US Marine Corps, US Navy and US Air Force, these test systems have proven their ability to provide our customers with reliable field communications.

The Radio Communications Test System (RCTS-XXX) is made up of the TS-4317-X Frequency Agile Communications Test Set and the J-4843A Appliqué Unit with the PL-XXXX Radio Personality Module (RPM-00X). The TS-4317-X has been designed to work with an appliqué unit as a natural extension of its operation. The division of functions between the two units is based on the

TS-4317-X providing all basic measurement and stimulus functions associated with the testing and servicing of communications equipment. The appliqué unit is responsible for any special UUT input and output signal routing or conditioning and handles all unique controls and measurements that a specific UUT may require.

By utilizing the general purpose, frequency agile, radio communications Test Set (TS-4317-X) as the host platform, two possible approaches may be utilized to support the maintenance of Line Repairable Units (LRUs). Approach one (1) utilizes custom Radio Test Applications Programs stored in the Test Sets flash memory for verification testing and/or fault detection and repair of the military communications systems. These Test Programs are typically utilized for less complex transceivers (single channel, non-frequency hopping) or when minimal performance testing (RF only) is all that is required. Approach two (2) utilizes the J-4843A generic appliqué housing with its associated Radio Personality Modules (RPMs) to provide a cost effective, configurable approach to complete pin-to-pin functional communications systems testing. This approach is typically utilized for more complex systems test requirements where multiple LRUs (Radios, RF Amplifier, Vehicular Adapter, Fill Device, Battery Box, etc.) are required to be tested in all modes of operation. This approach utilizes custom hardware (contained in the RPM) to provide the necessary stimulus

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Defense Test Systems

and response routing for complete pin-to-pin functional testing. This approach is also utilized for complex modulation schemes (TDMA, CDMA, Spread Spectrum, Frequency Hopping, etc.) and where complex baseband processing is required.

The Radio Communications Test System (RCTS-XXX) provides "State of the Art" capabilities for semi-automated testing of multiple LRUs from a single, portable platform. This results in more complete testing of the LRUs which can now be accomplished in less time than in the past. Typical field results demonstrate test time reductions on complex LRUs from 4-6 hours to less than 25 minutes and for simpler radios this time is reduced to less than 10 minutes. In addition, with the testing being performed in a semi-automated environment there has been a significant reduction in problems associated with human error. With these enhanced capabilities technicians are able to fully test any remote interfaces (2-wire, 6-wire, RS-232, RS-422, MIL-STD-1553, etc.) and then utilize this same interface to remotely control the Unit Under Test (UUT). Electronic recording of test results is available, providing permanent records of LRU performance. Hardcopy printouts may be supplied with the faulty LRU being evacuated to a higher maintenance level.

Defense Product Configurations

Commercial Model	*Military Model*	*Military NSN #*
Systems		
1600/1601	AN/GRM-114B	6625-01-309-2824
RCTS-001	AN/GRM-122	6625-01-432-8369
RCTS-002	AN/ARM-204	6625-01-454-4611BY
RCTS-003	TS-4317-3/J-1603	6625-01-457-1265
RCTS-004	TBD	N/A
RCTS-005	TBD	N/A
Communications Test Sets		
FM/AM-1600	TS-4317/GRM	6625-01-309-2825
FM/AM-1600-1	TS-4317-1	6625-01-389-3546
FM/AM-1600-2	TS-4317-2	N/A
FM/AM-1600-3	TS-4317-3	6625-01-422-2485
FM/AM-1900-M	TS-4317ATBD	
Appliqué Units		
J-1601	J-4843/GRM-114B	6625-01-309-2827
J-1601A	J-4843A/GRM	6625-01-432-8368
J-1603	J-1603	6625-01-421-8180
Radio Personality Modules		
RPM-001	PL-1536/GRM	6625-01-432-3819
RPM-002	PL-1538/ARM-204	6625-01-454-4273BY
RPM-003	TBD	TBD
RPM-004	TBD	TBD
RPM-005	TBD	TBD
Accessories		
PS-001	PP-8468/ARM-204	6625-01-454-4265BY

Radio Personality Modules (Current and Planned)

RPM	*Status*	*Application*	*Radio Systems Supported*	
RPM-001	Available Now	SINCGARS (Army/Marines/ITT)	PRC-119 VRC-87 VRC-88 VRC-89 VRC-90 VRC-91 VRC-92 ARC-201	Manpack Vehicular Short Range Vehicular Short Range Dismountable Vehicular Long/Short Range Vehicular Long Range Vehicular Long Range Dismountable Vehicular Dual Long Range Airborne SINCGARS
RPM-002	Available Now	RSC Tactical (Air Force/RSC)	ARC-164 ARC-186 ARC-187 ARC-222 ARS (Air Force) PRC-113 VRC-83 MXF-4xx MXF-6xx	UHF/Have Quick VHF/UHF SATCOM SINCG Manpack Have Quick PRC-113 HQ Vehicular Adapter (PSC-5, 430, 440, 483, 484, 460) (626E, 626F)
RPM-003	Available Now	Life Support (Special Forces)	PRC-112 PRC-90 PRC-90-2 URT-33 CSEL (Future)	Transceiver w/DME Transceiver/Beacon Transceiver/Beacon Beacon Combat Survivor Evasion Locator
RPM-004	Available in 1998	IRIS Canada (CDC/DND)	CNR(P) LAR UDR A/G/A CNR(HF)	(BCC 68 Jaguar Type) (PRC-521 Type) (Supported by RPM-002) (Supported by TS Application Program)
RPM-005	Planned for 1999	BOWMAN UK (Archer Comm.)	HF Vehicular HF Manpack Personal Radio VHF Radio System Tactical Gnd/Air	 (Handheld UHF Portable) (Supported by RPM-001) (Supported by RPM-002)
RPM-006	Available in 1999	EPLRS	RT-1719 RT-1720 VECP Radio URO EPA	MIL-STD-1553 Air Force only ADZI X.25 Interface Production Model Remote Control EPLRS Power Adapter
RPM-007	Planned for 1999	Racal Tactical (US) (Racal Comm Inc.)	MBITR PRC-139 PRC-6725E MSHR Leprechaun LWSR	Multiband Inter-Team Radio Scope Shield II Enhanced Tactical Handheld Radio Miniature Secure Handheld Radio Secure, Anti-Jam Handheld Land Warrior Squad Radio
RPM-008	Planned for 1999	Racal Tactical (UK) (Racal Comm Ltd.)	Jaguar Panther Cougar PRM4700	Frequency Hopping Radio Family Frequency Hopping Radio Family Frequency Hopping Radio Family Tactical VHF FM Transceiver
RPM-009	Requirement Under Review	R/C Tactical (Rockwell/Collins)	ARC-182 ARC-186 ARC-210 ARC-217 ARC-220	VHF/UHF AM/FM VHF Transceiver VHF/UHF AM/FM Airborne HF HF NOE Airborne Comm Sys
RPM-010	Available in 1999	IRIS Canada - SHF (CDC/DND)	MH-344 BCU	SHF Band IV Radio Band V Converter Unit
RPM-011	Requirement Under Review	Harris Tactical(Harris)	PRC-117 PRC-138 VRC-94 RF-5000 Falcon II	VHF/UHF Manpack HF/SSB Manpack VHF/FM Vehicular Falcon HF/SSB Next Generation

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RCTS-001 Radio Test System



RCTS-001 Radio Test System

The RCTS-001 (AN/GRM-122) is the new radio test system that is currently being fielded for use by the military to verify, test and repair the SINCGARS radios and there associated LRUs. The RCTS-001 (AN/GRM-122) SINCGARS Test System is made up of the general purpose FM/AM-1600S (TS-4317-X) Frequency Agile Communication Test Set in association with the J-1601A (J-4843A/GRM) Generic Applique Housing with RPM-001 (PL-1536/GRM) SINCGARS appliqué in support of SINCGARS Ground and Airborne radio system verification, testing and repair. RPM-001 provides the interface functions necessary for level translation, signal conditioning, data communication and data processing between the FM/AM-1600S and the SINCGARS radios. Through this interface, the radio's receiver and transmitter functions can be fully exercised and tested in both single channel mode and frequency hopping mode per pre-defined test criteria. All SINCGARS LRUs listed below (Reference detailed list on following page) can be verified, tested and repaired when used in conjunction with the ON-373A (Cables, Repair Manuals, Special Tools, etc).

- Ground Radios
- Airborne Radios
- Remote Controls
- Fill Devices
- Control Monitors
- RF Amplifiers
- Battery Box
- Battery Tray
- Loudspeaker
- Dual RF PA
- Single Radio Mount
- Amplifier Adapters
- Remote Control Unit
- Y Cable
- FH Mux

RPM-001 (PL-1536) SINCGARS RPM Accessories

IFR Accessory Number	*Equivalent Military Model No*	*Description*
J-1601AR	(J-4843AR)	J-4843 to J-4843A/PL-1536 upgrade Kit
AC8340		Antenna Matching Network for RPM-001
TF-119A	(TF-119A)	BIT Test Adapter for RPM-001
LK-122		Lockout Key for RPM-001
ON-373A	(ON-373A)	SINCGARS Maintenance Group - SIP
ON-373UG		SINCGARS Maintenance Group Upgrade (ON-373 to ON-373A)
ON-AVIM		SINCGARS Maintenance Group - Airborne

RPM-001 (PL-1536) SINCGARS (SIP) LRUs Supported

The RPM-001 (PL1536) SINCGARS (SIP) Radio Personality Module modelled after the J-4843/GRM-114B and is used with the general purpose TS-4317-X to support all current and future SINCGARS Airbourne and Ground radio system verification, testing and repair. The J-1601A and RPM-001 are the first unit to use the "Plug and Play approach to LRU verification, testing and repair. This approach uses the front panel removable/replaceable Radio Personality Module (RPM) to allow ease of system verification, testing and repair if the LRU configurations listed below.

RPM-001 (PL-1536) SINCGARS (SIP) LRUS Supported

LRU	*G/A 1*	*DESCRIPTION*	*VERSION*	*MANUFACTURER*
RT-1439	G	RT	Non-ICOM	ITT
RT-1523	G	RT	ICOM	ITT
RT-1523A	G	RT	ICOM	GDLS
RT-1523B	G	RT	ICOM PI/Cosite	ITT
RT-1523C	G	RT	ICOM SIP	ITT
RT-1523D	G	RT	ICOM SIP	GDLS
RT-1476	A	RT		ITT
RT-1476A	A	RT	ICOM Capable	ITT
RT-1476C	A	RT	PI	ITT
RT-1477	A	RT Remote		ITT
RT-1477A	A	RT Remote	ICOM Capable	ITT
RT-1477C	A	RT Remote	PI	ITT
RT-1478	A	RT 1553		ITT
RT-1478A	A	RT 1553	ICOM Capable	ITT
RT-1478C	A	RT 1553	PI	ITT
RT-1478D	A	RT 1553	SIP	ITT
C-11466	A	Remote control		ITT
C-11466A	A	Remote control	ICOM	ITT
MX-10579	G	Fill Device	Non-ICOM	ITT
MX-18290	G	Fill Device	ICOM	ITT
C-11291	G	Control-Monitor		ITT
C-11291A	G	Control-Monitor		GDLS
AM-7238	G	RF Amplifier		ITT
AM-7238A	G	RF Amplifier		GDLS
AM-7238B	G	RF Amplifier	"Bathtub"	ITT
CY-8664	G	Battery Tray		ITT
CY-8523A	G	Battery Box		ITT
CY-8523B	G	Battery Box		GDLS
CY-8523C	G	Battery Box		(TBD)
LS-671	G	Loudspeaker		ITT
MT-6353	G	Dual RF PA		ITT
MX-10862	G	Single Radio Mount		ITT
AM-7239	G	Amplifier Adapter		ITT
AM-7239A	G	Amplifier Adapter		GDLS
AM-7239B	G	Amplifier Adapter	Dual Xmit	ITT
AM-7239C	G	Amplifier Adapter	SIP	ITT
AM-7239D	G	Amplifier Adapter	SIP	GDLS
C-11561	G	Remote Control Unit		ITT
CX-13417	G	Y Cable		ITT
TD-1456	G	FH Mux		XETRON

Note 1: G/A Denotes Aircraft (A) or Ground (G) LRU Type.

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RCTS-002 Radio Test System

RCTS-002 Radio Test System



TS-4317-1 & RSC/Air Force SINCGARS Appliqué (J-4843A/RPM-002/PS-001) (AN/ARM-204)

The RCTS-002 Radio Test System is made up of the general purpose TS-4317-1 and the J-4843A with the PL-1538 and PP-8468. The RCTS-002 is a self-contained, transportable, semi-automated Test System that may be used for a "go/no-go" evaluation, full functional testing, and troubleshooting. The basic Test System provides the capability to test in the VHF, UHF, and HF frequency bands; AM, FM, and FSK modulation types; Have Quick II and SINCGARS waveforms; MIL-STD-1553 interfaces; and SATCOM operation. Testing of additional radio sets in the VHF, UHF, and HF bands may be added to the RCTS-002 by simple replacement of the "plug and play" module. Future expansions may include SATURN and frequency agile HF. All LRUs (Reference detailed list on following page) listed below can be verified, tested and repaired when used in conjunction with the maintenance group (Cables, Repair Manuals, Special Tools, etc. supplied by Hughes).

Ground Radios
Airborne Radios
Handheld Radios
Remote Controls
RF Amplifiers
Signal Distribution Unit

RPM-002 (PL-1538) RSC/AIRFORCE RPM Accessories

IFR Accesory Number	*Corresponding Military No*	*Description*
TF-204A	(TF-204A)	BIT Test Adapter for RPM-002
LK-204		Lockout Key for RPM-002
ON-RSC		Maintenance Group for RPM-002 (Custom Configured)

The RPM-002 Radio Personality Module is currently used with the generic appliqué unit J-1601A. The J-1601A and RPM-002 utilizes the "Plug & Play" approach to LRU verification, testing and repair.

RPM-002 (PL-1538) RSC/Air Force LRUs Supported

RADIO SYSTEM	*LRU*	*G/A 1*	*DESCRIPTION*	*VERSION*	*MANUFACTURER*
ARC-222	RT-1704	A	RT SINCGARS	Remote (1553 capable)	Raytheon Systems
	C-12319	A	Control Set		Raytheon Systems
	MXF-258B	A	Control Set		Raytheon Systems
	MXF-258C	A	Control Set		Raytheon Systems
ARC-164	RT-1145B	A	RT UHF-AM	Remote	Raytheon Systems
	RT-1145C	A	RT UHF-AM	Remote HQ I	Raytheon Systems
	RT-1145F	A	RT UHF-AM	Remote HQ I (1553)	Raytheon Systems
	RT-1167B	A	RT UHF-AM	Panel (ARMY)	Raytheon Systems
	RT-1167C	A	RT UHF-AM	Panel (ARMY) HQ I	Raytheon Systems
	RT-1168B	A	RT UHF-AM	Panel (USAF)	Raytheon Systems
	RT-1168C	A	RT UHF-AM	Panel (USAF) HQ I	Raytheon Systems
	RT-1504	A	RT UHF-AM	Remote HQ II	Raytheon Systems
	RT-1505	A	RT UHF-AM	Panel (USAF) HQ II	Raytheon Systems
	RT-1505A	A	RT UHF-AM	Panel (USAF) HQ II (LCD)	Raytheon Systems
	RT-1518	A	RT UHF-AM	Panel (Army) HQ II	Raytheon Systems
	RT-1518C	A	RT UHF-AM	Panel (Army) HQ II (LCD)	Raytheon Systems
	RT-1614	A	RT UHF-AM	Remote Mount - 1553	Raytheon Systems
	C-9533	A	Control Set	Non-HQ	Raytheon Systems
	C-9533A	A	Control Set	HQ (Fill Port)	Raytheon Systems
	C-9680	A	Control Set	Non-HQ	Raytheon Systems
	C-9680A	A	Control Set	HQ	Raytheon Systems
	C-9682	A	Control Set	Non-HQ	Raytheon Systems
	C-9682A	A	Control Set	HQ	Raytheon Systems
	C-11718	A	Control Set	HQ (LCD Front Panel)	Raytheon Systems
	C-11719	A	Control Set	HQ (LCD Front Panel)	Raytheon Systems
	C-11721	A	Control Set	HQ (LCD Front Panel)	Raytheon Systems
	C-11815	A	Control Set	HQ (LCD Front Panel)	Raytheon Systems
	C-12046	A	Control Set	HQ (LCD Front Panel)	Raytheon Systems
	ID-1961B	A	Indicator		Raytheon Systems
	ID-1961C	A	Indicator		Raytheon Systems
	ID-2244	A	Indicator		Raytheon Systems
ARC-187	RT-1571	A	RT UHF	SATCOM/LOS	Raytheon Systems
	C-11950	A	Control Set	25 kHz Channels	Raytheon Systems
	C-12391	A	Control Set	5 & 25 kHz Channels	Raytheon Systems
	AM-7373	A	Audio Amp	LINK 11 Interface	Raytheon Systems
PRC-113	RT-1319	G	RT	Manpack	Raytheon Systems
	RT-1319B	G	RT	Manpack HQ	Raytheon Systems
VRC-83	VRC-83	G	RT VHF/UHF	Vehicular Transceiver	Raytheon Systems
	AM-7176	G	RF Amp	Non-HQ	Raytheon Systems
	AM-7176A	G	RF Amp	HQ	Raytheon Systems
MXF-4XX	PSC-5	G	RT UHF/VHF	LOS/SATCOM (EMUT)	Raytheon Systems
	MXF-430 (T)	A	RT UHF/VHF	LOS/HQII/GPS	Raytheon Systems
	MXF-440	A	RT UHF/VHF	ARC-187 Replacement	Raytheon Systems
	MXF-483	A	RT UHF/VHF	ARC-164 Replacement	Raytheon Systems
	MXF-484	A	RT UHF/VHF	ARC-164 Replacement	Raytheon Systems
	MXF-460	A	RT UHF/VHF	LOS/SATCOM	Raytheon Systems
	TAC G/A (UK)	A	RT UHF/VHF	Stripped down 430	Raytheon Systems
MXF-6XX	MXF-626E	A	ARC-222 type	Guard Receiver	Raytheon Systems
	MXF-626F	A	ARC-222 type	High VHF/ Maritime band	Raytheon Systems
GRC	GRC RSC	G	Control Set	Remote Control	Raytheon Systems
	GRC SDU	G		Signal Distribution Unit	Raytheon Systems
General	MXF-243	A	Remote Control	HQ Capable	Raytheon Systems
	MXF-243A	A	Remote Control	HQ Capable	Raytheon Systems
	MXF-266	A	Remote Control		Raytheon Systems
	C-12435	A	Control Set	ARC-187 1553 Capable	Raytheon Systems
ARC-186	RT-1299	A	RT	Airborne VHF Transceiver	Rockwell/Collins
	RT-1300	A	RT		Rockwell/Collins
	RT-1300A	A	RT		Rockwell/Collins
	RT-1300B	A	RT		Rockwell/Collins
	RT-1300C	A	RT		Rockwell/Collins
	RT-1354	A	RT		Rockwell/Collins
	C-11029	A	Remote Control		Rockwell/Collins
	C-10604	A	Remote Control		Rockwell/Collins
	C-10605	A	Remote Control		Rockwell/Collins
	C-10606	A	Remote Control		Rockwell/Collins
	MT-6050	A	Mounting Base		Rockwell/Collins

Note 1: G/A Denotes Aircraft (A) or Ground (G) LRU Type

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RCTS-003/004 Radio Test Systems & Accessories

RCTS-003 Radio Test Systems

The RCTS-003 Test System is the current generation self-contained, transportable, semi-automated Radio Test System that is currently fielded for use by the US Armed Forces. The instrument is used for operational verification testing and/or repairs of Life Support radio systems. Full functional testing of all operational modes are available: single channel voice, beacon and DME transponder testing. The RCTS-003 Test System consists of the FM/AM-1600-3 (TS-4317-3) Frequency Agile Communications Test Set and the J-1601A (J-4843A) Generic Appliqué Housing with the RPM-003 (PL-xxxx) Life Support Radio Personality Module (RPM). All Life Support LRUs listed below can be verified, tested and repaired when used in conjunction with the maintenance group (Cables, Repair Manuals, Special Tools, etc. supplied by IFR).

PRC-112	PRC-90
PRC-112A	PRC-90-1
PRC-112B	URT-33

Future expansion may include an upgrade to support for the new Combat Survivor Evader Locator (CSEL) radio.

PM-003 LIFE SUPPORT RPM ACCESSORIES

RPM-003 Kit	Life Support Kit (PRC-112, PRC-90, URT-33)
PRC-112 Kit	Life Support Kit (PRC-112 Only)
PRC-90 Kit	Life Support Kit (PRC-90 Family Only)
URT-33 Kit	Life Support Kit (URT-33 Only)
Accessory Bag	Accessory Bag for Cables and Adapters

RPM-003 LIFE SUPPORT LRUs SUPPORTED

The RPM-003 Life Support application unit is used with the general purpose TS-4317-3 and the generic appliqué unit J-1601A. The J-1601A and RPM-003 utilizes the "Plug & Play" approach to LRU verification, testing and repair.

LRU	*G/A 1*	*DESCRIPTION*	*MANUFACTURER*
PRC-112	G/A	Multimission Transceiver w/DME Transponder	Motorola Inc.
PRC-90	G/A	Emergency Locator Transceiver	Oklahoma Aerotronics
PRC-90-2	G/A	Aircrew Survival Radio	Dowty Avionics
URT-33	G/A	VHF Beacon	

Note 1: G/A Denotes Aircraft (A) or Ground (G) LRU Type.

RCTS-004 Radio Test Systems

The RCTS-004 is the radio test system that is currently used by the Canadian military to verify, test and repair the Canadian IRIS family of radios. The RCTS-004 Communications Test System is made up of the general purpose TS-4317-3 Frequency Agile Communications Test Set and the J-4843A Generic Applique Housing with RPM-004 and the PS-001 LRU Power Supply. The RCTS-004 is a self-contained, transportable, semi-automated Test System that may be used for a "go/no-go" evaluation, full functional testing, and troubleshooting. All LRUs listed below can be verified, tested and repaired when used in conjunction with the maintenance group (Cables, Repair Manuals, Special Tools, etc. supplied by IFR).

CNR(P) Radio
CNR(P) VIU
LAR
UDR

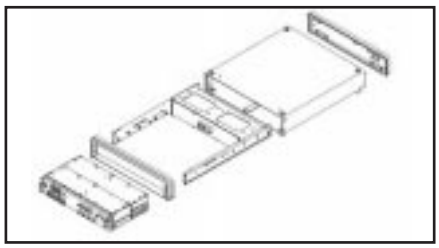
RPM-004 CANADA IRIS RPM ACCESSORIES

TF-400	BIT Test Adapter for RPM-004
LK-400	Lockout Key for RPM-004

RCTS Radio Test System Accessories

J-1601A (J-4843A) Generic Appliqué Unit

The J-1601A is a generic appliqué housing, configurable via different Radio Personality Modules (RPMs) for testing Military Communications devices. The J-1601A, when used in conjunction with a RPM, expands on the features and functions of the TS-4317-X. The J-1601A generic housing will support all current and future RPMs. This includes support for all Military Tactical Communications requirements in the following areas; Conventional Ground Radio Systems, SINCGARS, Have Quick, Special Tactics, Life Support, Airborne Communications and Foreign Military requirements. IFR Americas, Inc. works very closely with the major radio manufacturers and the military to assure support for communications systems concurrently with fielding plans.



Exploded View of the Applique Housing With RPM in Front

PS-001 Generic LRU Power Supply

The PS-001 is capable of connecting to the bottom of an RCTS configuration to supply primary power for the Units Under Test (UUT) and in some cases to the J-Box and RPM. The PS-001 iscapable of supplying programmable voltage levels from 3 to 30 volts at up to 20 Amps. Additional voltages are provided for secondary needs.

PS-001 Power Supply Configurations

Supply Output	*Output Voltage (VDC)*	*Line Regulation %*	*Total Regulation %*	*Peak Ripple (mV)*	*Minimum Load(A)*	*Typical Load(A)*	*Maximum Load(A)*
Switched Outputs:							
1	3.00 - 14.99	± 2.0 (NL--FL)	± 7 (NL--FL)	<220	0.8	N/A	10
1	15.00 - 33.00	± 2.0 (NL--FL)	± 7 (NL--FL)	<220	0.8	N/A	22
2	2.50 - 5.00	± 8.0 (NL--FL)	± 12 (NL--FL)	<70	0.8	N/A	2
3	2.00 - 28.00	± 8.0 (NL--FL)	± 12 (NL--FL)	<70	0.8	N/A	1
4	6	± 2.0 (NL--FL)	± 4 (NL--FL)	<70	0.5	0.5	1
5	12	± 2.0 (NL--FL)	± 10 (NL--FL)	<70	0.2	0.35	1
Continuous Outputs:							
6	24	± 2.0 (10%FL--FL)	±8(10%FL--FL)	<70	0.1	1.5	1.8
7	5	± 2.0 (10%FL--FL)	±4(10%FL--FL)	<70	2.2	3	4
8	15	± 2.0 (10%FL--FL)	±4(10%FL--FL)	<70	0.75	1	2
9	15	± 2.0 (10%FL--FL)	±4(10%FL--FL)	<70	0.075	0.1	0.5

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