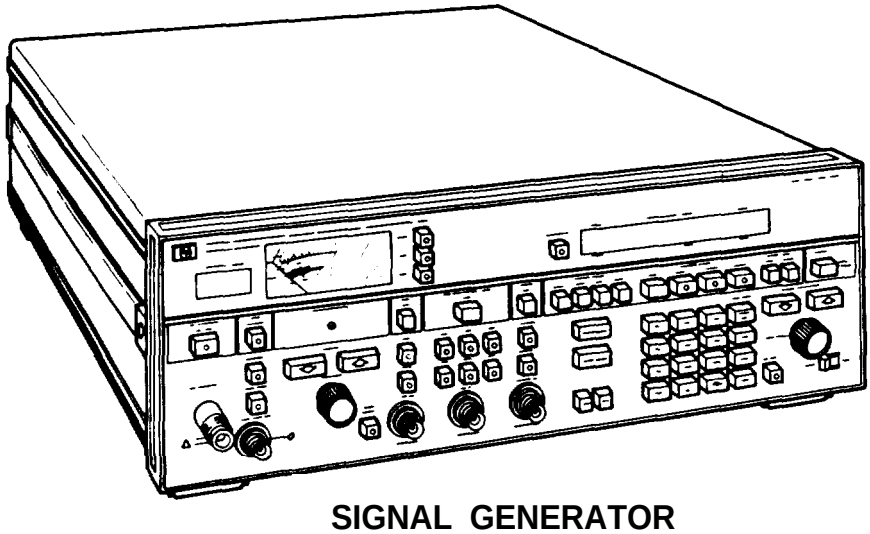
TM 11-6625-3143-12

This copy is a reprint which includes current pages from Change 1.

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE



SIGNAL GENERATOR

SG-1219/U

(NSN 6625-01-188-7441)

HEADQUARTERS, DEPARTMENT OF THE ARMY

1 DECEMBER 1987

TM 11-6625-3143-12
C2

CHANGE
No. 2

Headquarters
Department of the Army
Washington, D.C., 30 September 2005

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

FOR

SIGNAL GENERATOR SG-1219/U
(NSN 6625-01-188-7441) (EIC: N/A)

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2. This change implements Army Maintenance Transformation and changes the Maintenance Allocation Chart (MAC) to support Field and Sustainment Maintenance.

Remove Pages	Insert Pages
None	C/(D blank)
i, ii	i, ii
B-1 thru B-12	B1 thru B-8
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TM 11-6625-3143-12
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Change
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 May 1992

Operator's and Organizational Maintenance Manual

SIGNAL GENERATOR SG-1219/U
(NSN 6625-01-188-7441) (EIC:N/A)

TM 11-6625-3143-12, 1 December 1987, is changed as follows:

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i and ii	i and ii
1–1 through 1-6	1–1 through 1-6
2–1 and 2–2	2–1 and 2–2
2–5 through 2-10	2–5 through 2–10
2–1 5 through 2–24	2–1 5 through 2–24
3–3 through 3-8	3-3 through 3-8
B–1 through B–10	B-1 through B-10
Index-1 through Index-4	Index–1 through Index-4

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5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

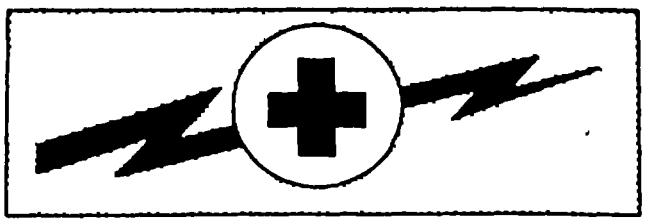
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4. SEND FOR HELP AS SOON AS POSSIBLE

5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESPIRATION

W A R N I N G



H I G H V O L T A G E

is used in the operation of this equipment

D E A T H O N C O N T A C T

may result if personnel fail to observe safety precautions

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When technicians ore aided by operators, they must be warned about dangerous areas.

Be careful not to contact high-voltage connections of 115-volt ac input when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

Do not be misled by the term “LOW VOLTAGE” Potentials as low as 50 volts may cause death under adverse conditions.

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

NOTE

ON CHANGED PAGES, THE PORTION OF THE TEXT AFFECTED BY THE LATEST CHANGE IS INDICATED BY A VERTICAL LINE OR OTHER CHANGE SYMBOLS IN THE OUTER MARGIN OF THE PAGE.

Date of issue for original and changed pages are:

Original	0	1 December 1987
Change	1	15 May 1992
Change	2	30 September 2005

Total number of pages in this publication is 92 consisting of the following:

Page No.	* Change No.
Cover	2
A thru B	0
C / (D blank)	2
i, ii	2
iii	0
1-0	0
1-1	1
1-2	0
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1-5	0
1-6	1
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2-3 thru 2-4	0
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3-7	1
3-8 thru 3-14	0
A-1 / (A-2 blank)	0
B-1 thru B-8	2
C-1 thru C-2	0
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E-1 / (E-2 blank)	0
INDEX-1 thru INDEX-4	1

* Zero in this column indicates an original page.

TECHNICAL MANUAL
NO. 11-6625-3143-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 December 1987

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

FOR

SIGNAL GENERATOR SG-1219/U
(NSN 6625-01-188-7441) (EIC: N/A)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, U. S. Army Aviation and Missile Command, AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via email, fax or the World Wide Web. Our fax number is: DSN 788-6546 or Commercial 256-842-6546. Our email address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hardcopy 2028. For the World Wide Web use: https://amcom2028.redstone.army.mil.

TABLE OF CONTENTS

TABLE OF CONTENTS – Continued

HOW TO USE THIS MANUAL

This manual tells you about your Signal Generator SG-1219/U and contains instructions about how to use it during maintenance on other electronic equipment.

The technical manual for the electronic equipment you are maintaining will tell you where to make certain connections and when to use various accessories which are part of the SG-1219/U.

When you first receive your SG-1219/U, start at the front of the manual and go all the way through to the back. Become familiar with every part of the manual and the SG-1219/U.

This manual has an edge index which will help you find specific information in a hurry. Simply spread the pages on the right edge of the manual until the printed blocks can be seen. Open the manual where the block on the edge of the page lines up with your selected topic printed on the front cover block.

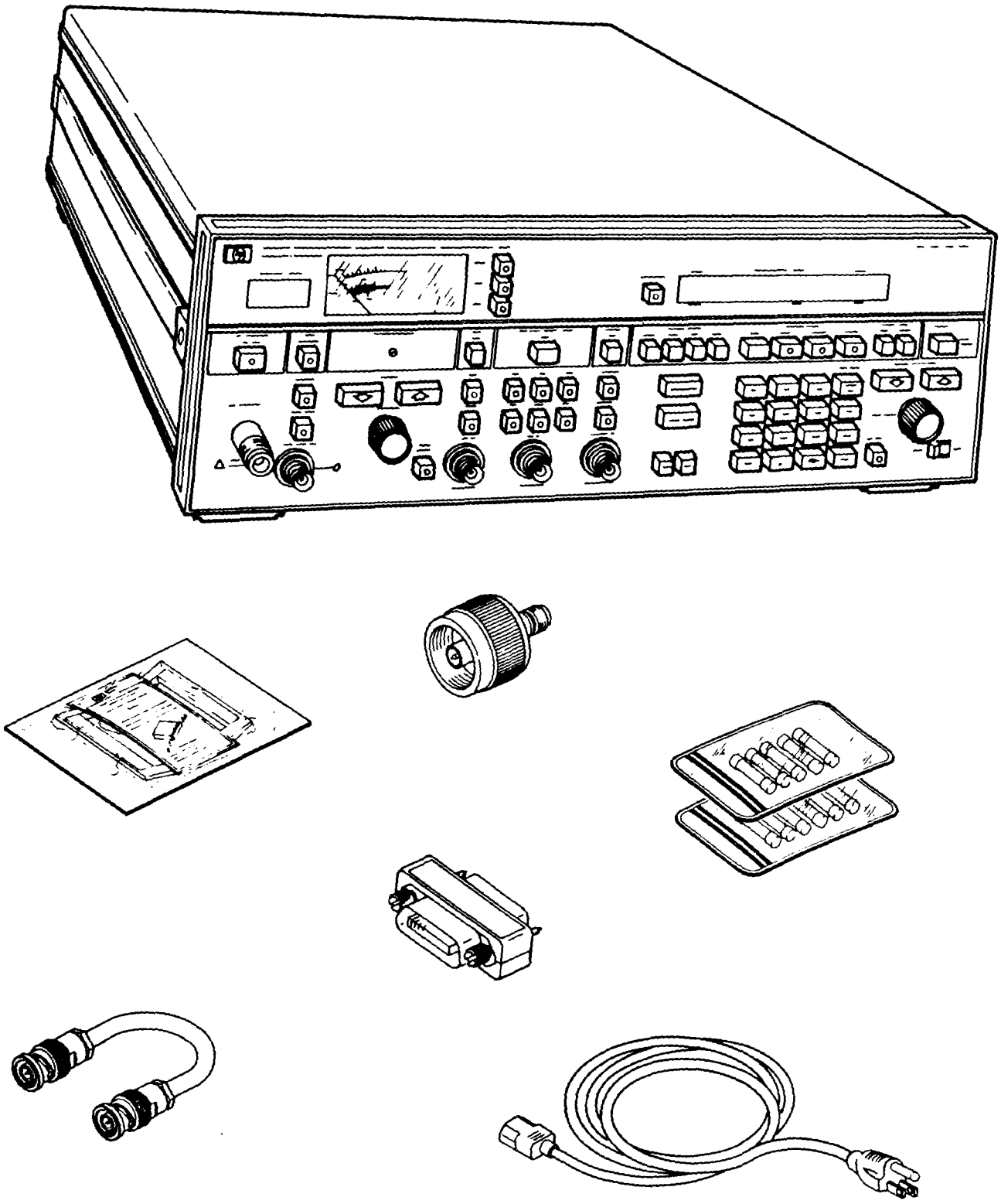

Figure 1-1. Signal Generator SG-1219/U.

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CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual: Operator's and Organizational Maintenance Manual.

b. Equipment Name and Model Number: Signal Generator SG-1219/U.

c. Purpose of Equipment: The Signal Generator is designed to produce a stable CW output signal with AM, FM, or Pulse Modulation.

1-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3. MAINTENANCE FORMS, RECORDS, AND REPORTS.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

b. Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355. 18/AFR 400-54/MCO 4430.3J.

c. Transportation Discrepancy Report (TDR) (SF 361). Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-4. ADMINISTRATIVE STORAGE.

Administrative storage of equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness.

1-5. DESTRUCTION OF ARMY ELECTRONICS MATERIEL,

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your SG–1219/U needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ED-PH, Fort Monmouth, New Jersey 07703-5007. We'll send you a reply.

1-7. WARRANTY INFORMATION.

The SG–1219/U is warranted by Hewlett–Packard Company for one year. Warranty starts on the date of shipment to the original buyer. Report all defects in material or workmanship to your supervisor who will take appropriate action.

1-8. NOMENCLATURE CROSS-REFERENCE LIST.

Common names will be used when major components of Signal Generator SG- 1219/U are mentioned in this manual.

NOTE

Official nomenclature must be used when filling out report forms or looking up Technical Manuals.

Common Name	Official Nomenclature
Signal Generator	Signal Generator SG-1219/U
SG-1219/U	Signal Generator SG-1219/U

1-9. LIST OF ABBREVIATIONS.

This list identifies abbreviations and descriptions that are used in this manual.

COMPL	Complement
HP-IB	Hewlett-Packard Interface Bus
INT	Internal
LSN	Listen
NS	Nanosecond
OVERMOD	Overmodulation
SRQ	Service Request
STO	Store
TLK	Talk
YIG	Yittrium Iron Garnet

Section II. EQUIPMENT DESCRIPTION

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a *CHARATERISTICS.*

- Provides means for design and test of narrow band microwave receivers.
- Allows for:

  Simulation of electromagnetic environments to test ECM receivers and systems.
  Electronic threat simulation for training simulators.
  Simulation of return signals for tangential signal sensitivity.
  Radar receiver IF dynamic range determination.
  Display reading range calibration.
  Ground station and satellite receiver test.
  Testing of high Q components.
  Two-tone intermodulation tests and mixer characterization.

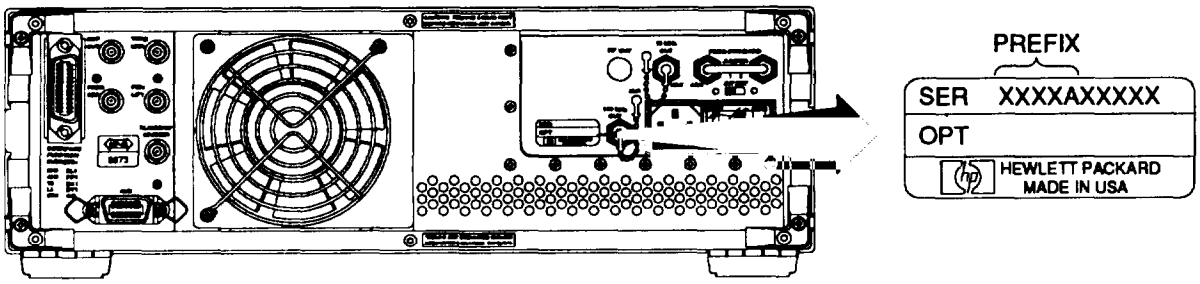
- Designed for bench top use.

b. *CAPABILITIES AND FEATURES.*

- Pushbutton control allows for easy operation of equipment.
- Annunciator lights on front panel for constant equipment status.
- Eleven digit LED for frequency display.
- Three digit LED for amplitude display.
- Output Meter for % of modulation.
- Programmed interface for remote operation.

1-11. DIFFERENCE BETWEEN MODELS.

There are two different SG-1219/U versions fielded at this time. The only operational differences between versions is how Center Frequency is displayed, and how Sweep Frequency is entered. See Chapter 2, Section I for complete operational details. The different versions are identified using the manufacturers five-digit serial number prefix (prefix break is 3100A). Location and form of the manufacturers serial number prefix is shown below.



1-12. EQUIPMENT DATA.

WEIGHTS AND DIMENSIONS

Signal Generator:

Weight	65 lbs (29 kg)
Length	24.4 in. (6250 mm)
Width	16.8 in. (425 mm)
Height	5.7 in. (146 mm)

POWER REQUIREMENTS

Voltage	100/120/220/240 Vac (+5%,-10%)
Frequency	48 to 66Hz or 400Hz
Fuse	4.0 amp, 250 volt for 115 Vac operation
Fuse	2.0 amp, 250 volt for 230 Vac operation

ENVIRONMENTAL

Operating temperature range	0 to +55° C
Storage temperature range	-55 to +75° C
Relative humidity	95% maximum
Operating altitude	15,000 feet
Storage altitude	50,000 feet

PERFORMANCE

Frequency:

Range	2 to 18 GHz
Resolution	3KHz
Display Accuracy	±500 KHz

Output Level:

Range	+8 to -120dBm in 10dB steps
Vernier	+3 to -10dB, continuously variable
Attenuator Resolution	0.1dBm
Output Accuracy	from ±2dBm to ±4.5 dBm

Spectral Purity:

Harmonics	<-40dBc
Subharmonic and multiples	<–35dBc
Spurious Signals	<–5odBc

Spectral Purity - Continued:

Residual FM	<10KHz peak
Residual AM	<–50dBc
SSB Phase Noise	<-60dBc

RF Output:

Type Connector	N female
OutputImpedance	50 Ω
Reverse Power Protection	1 watt average
VSWR	<2.5:1

Pulse Modulation:

Overshoot/Undershoot	<20% of the carrier level
On/Off Ratio	>70dB
Pulse Repetition Frequency	10Hz to 1MHz
Pulse Width	>80 nanoseconds
Rise/Fall Time	<35 nanoseconds
Pulse Level	+5V nominal (>3V on, <0.5V off)
Maximum Input Level	1V peak
Input Connector	Type BNC female
Input Impedance	50 Ω

Amplitude Modulation:

Modulation Depth	0 to 100%
Frequency Response	10Hz to 50KHz, ±3dB
Sensitivity	30%/V, or 100%/V
Maximum Input Level	1V peak
Distortion	<8%
Incidental FM	<10KHz peak-to-peak
Input Connector	Type BNC female
Input Impedance	600 Ω

Frequency Modulation

Deviation	0 to 10MHz peak (20MHz peak-to-peak)
Frequency Response	50Hz to 2MHz, ±3dB
Sensitivity	1V peak (for maximum deviation)
Maximum Input Level	1V peak
Distortion	<5%
Incidental AM	<5%
Input Connector	Type BNC female
Input Impedance	50 Ω

Digital Interface ..... IEEE Standard 488-1978

Sweep:

Configuration	Start-Stop Frequencies or Center Frequency
F(Span) Modes	Automatic, Single, or Manual

Step Size as large as sweep span to as small as:
- 1KHZ -2.0 to 6.6GHZ
- 2KHz -6.6 to 12.3GHz
- 3KHz -12.3 to 18.0GHZ

Number of Steps	1 to 9993
Dwell Time	1 to 255ms per step
Markers	5 Preset Markers

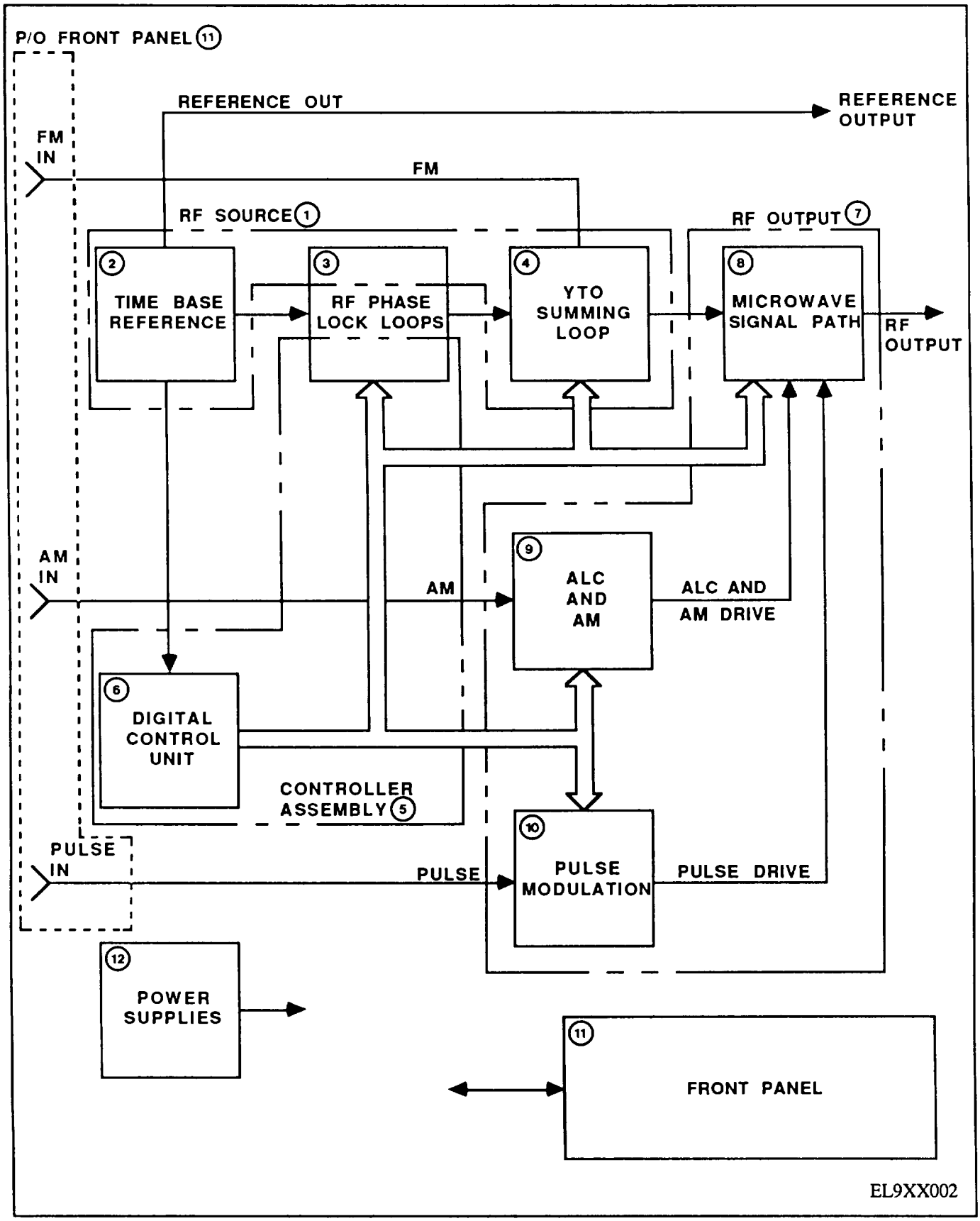


Figure 1-2. Signal Generator SG-1219/U Simplified Block Diagram.

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-13. GENERAL FUNCTIONAL DESCRIPTION.

Signal Generator SG-1219/U (Fig. 1-2) provides a stable output signal from 2GHz to 18GHz. This signal can be amplitude modulated, frequency modulated, or pulse modulated using an external source. Swept frequency output is provided in automatic, manual, or single sweep mode.

Output signal frequency is shown in the FREQUENCY MHz display. Output signal level is shown in the LEVEL dBm display. Modulation level is shown on the OUTPUT LEVEL meter.

(1) The RF Source Assembly generates all of the reference frequencies of 10MHz and 100MHz used in Signal Generator SG-1219/U operation. These reference signals plus control signals are used to produce the baseband signal of from 2GHz to 6.6GHz. This baseband signal is sent to the RF Output Assembly for processing before being supplied to the front panel. Frequency modulation circuits are also contained in this assembly. Further explanation is provided in items 2 through 4 below.

(2) The 10MHz reference frequency is generated by a temperature controlled crystal oscillator or supplied by an external reference signal. The 100MHz reference frequency is generated by a voltage controlled crystalt oscillator. This signal is divided and multiplied, then used by the RF Phase Locked Loops and Digital Control Unit.

(3) The RF Phased Locked Loops contain two separate loops. The Low Frequency Source Loop is controlled by the digital control unit and is used to tune the YIG Tuned Oscillator in 1KHz steps. The M/N Loop is controlled by the digital control unit and is used to tune the YIG Tuned oscillator in 10MHz steps.

(4) The YIG Tuned Oscillator Summing Loop generates the 2GHz to 6.6GHz baseband signal under control of the digital control unit and RF Phased Locked Loops. Frequency modulation also takes place in this subsystem.

(5) The Controller Assembly contains the digital control unit that controls all operations of Signal Generator SG-1219/U. Further explanation is provided in items 3 and 6.

(6) The Digital Control Unit is the brain of the SG-1219/U. It receives data from front panel keys or the HP-IB Interface connector on the rear panel. After receiving data, it is processed and sent to various assemblies to control frequency, power level, modulation levels, and other operating modes. Operation is constantly monitored and, if a problem is detected, proper front panel indicator is turned on to notify the operator.

(7) The RF Output Assembly multiplies the 2GHz to 6.6GHz baseband signal from the RF Source Assembly up to three times to provide the 2GHz to 18GHz output frequency. The signal is amplified then attenuated to the selected amplitude level. Automatic Leveling Control, Amplitude Modulation and Pulse Modulation are provided in this assembly. Further explanation is provided in items 8 through 10 below.

(8) The Microwave Signal Path receives the 2GHz to 6.6GHz baseband signal from the RF Source Assembly and under control of the Digital Control Unit, multiplies this signal to the desired output frequency.

(9) The output from the Microwave Signal Path is sampled in the Automatic Level Control circuits. If this signal level is incorrect, a control signal is sent to adjust the Microwave Signal Path output signal to the proper level. If selected, Amplitude Modulation input is added to the output signal after passing through the correction voltage circuitry.

(10) Pulse Modulation circuits control the Microwave Signal Path output when an input is provided and pulse modulation is selected.

(11) The Front Panel Assembly provides the operator access to Signal Generator SG-1219/U functions. It contains the keys, indicators, and annunciators that are connected to the Digital Control Unit.

(12) The Power Supply uses the 100VAC to 240VAC input power and supplies all operating voltages to the internal circuitry of the SG-1219/U.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS, INDICATORS, AND CONNECTORS

2-1. INTRODUCTION.

This section describes all of the operator controls and indicators for the Signal Generator. Due to the large number of controls and indicators on the front panel, it is necessary to separate the panel into five different portions. Figure 2-1 (views A thru E) shows each portion of the front panel. The rear panel is shown in figure 2-2.

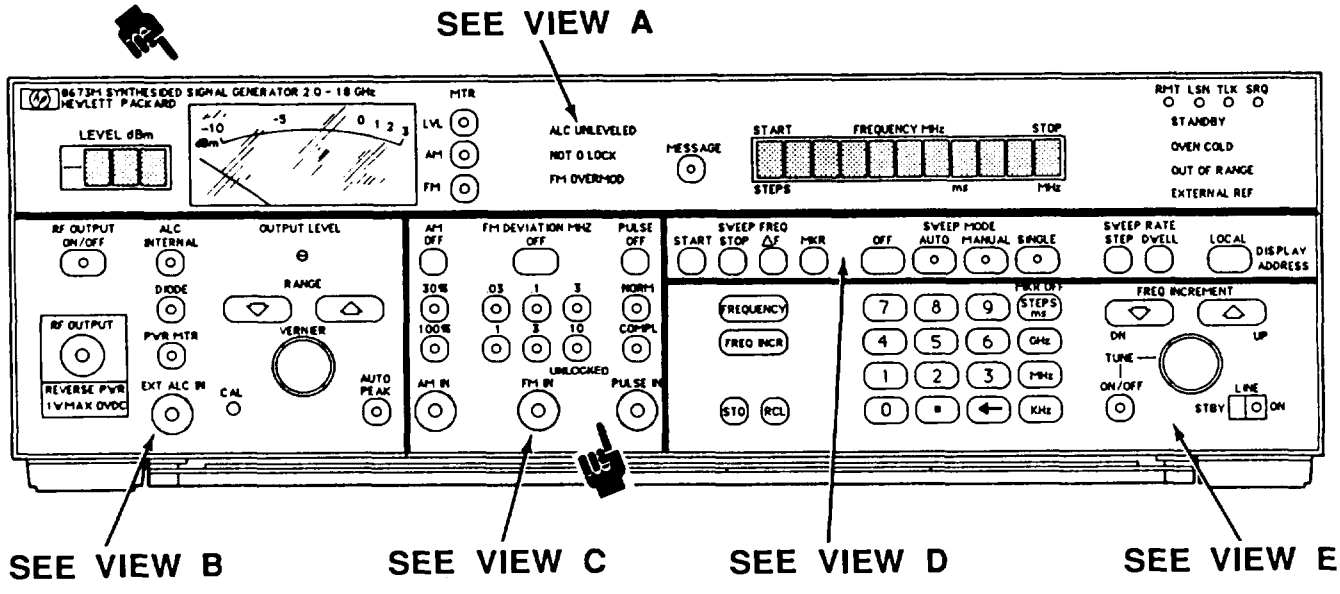


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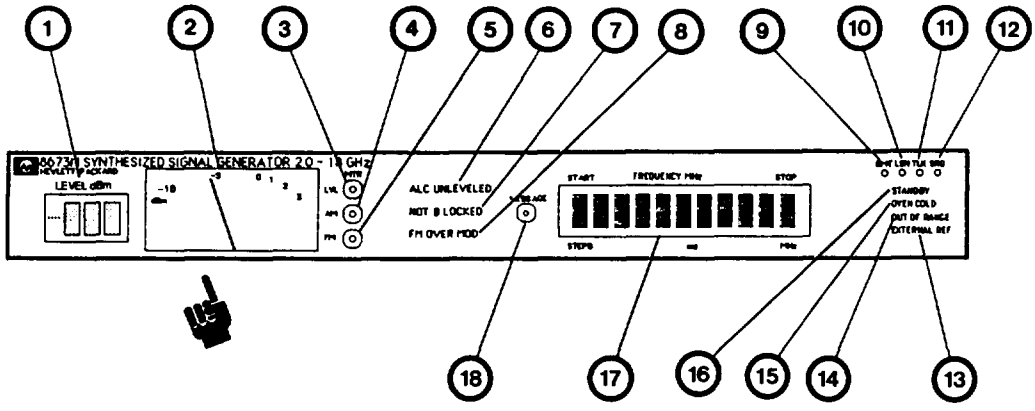
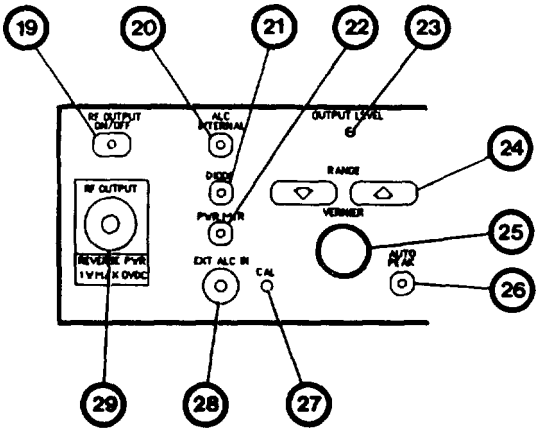
Figure 2-1. Operator's Controls, Indicators, and Connectors,front view.



VIEW A

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
1	LEVEL dBm display	Indicates power level at RF OUTPUT connector. Range is from -120 to +8dBm.
2	OUTPUT LEVEL meter	Indicates power level (two least significant digits of LEVEL dBm display), AM depth, or FM deviation. Meter function is determined by MTR keys. Meter scale is determined by AM keys, FM DEVIATION MHz keys, or MTR LVL key. Top scale is -10 to +3dBm and is used for output level vernier settings; middle scale is 0 to 1 and is used for AM depth of 100% or FM deviation of 0.1, 1.0, or 10.0; and bottom scale is 0 to 3 and is used for AM depth of 30% or FM deviation of 0.03,0.3, or 3.0.
3	MTR LVL key	Used to select OUTPUT LEVEL meter for -10 to +3dBm scale indication. Allows use of OUTPUT LEVEL VERNIER for adjustment. Key lights when in use.
4	MTR AM key	Used to select OUTPUT LEVEL meter for 30% (indicated on bottom 0 to 3 scale) or 100% (indicated on middle 0 to 1 scale) full scale amplitude modulated depth. A 1 volt peak signal applied to AM IN connector develops full scale modulation. Works with 30% or 100% AM key. Key lights when in use.
5	MTR FM key	Used to select OUTPUT LEVEL meter for full scale indication of 30 KHz, 300 KHz, or 3 MHz on bottom 0 to 3 scale and full scale indication of 100 KHz, 1MHz, or 10MHz on middle 0 to 1 scale. A 1 volt peak signal applied to FM IN connector develops full scale modulation. Works with .03, .1, .3, 1,3, or 10 FM DEVIATION MHz keys. Key lights when in use.

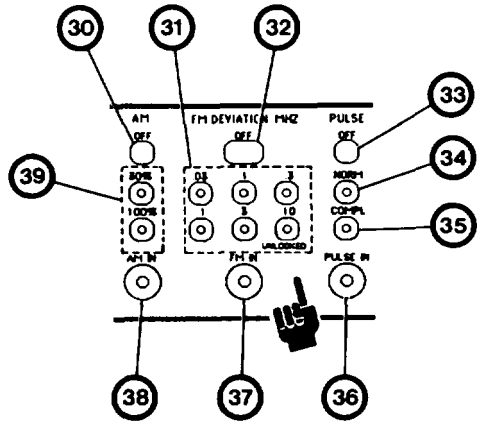
KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
6	ALC UNLEVELED annunciator	Indicates that automatic leveling is not functioning. This occurs when: (1) RF output is turned off, (2) more power is requested than is available, (3) no signal is applied to EXT ALC IN connector when PWR MTR or DIODE lights are on, (4) no signal is applied to PULSE IN connector when NORM light is on, (5) overrnodulation occurs during AM operation, or (6) pulse width is less than 100ns.
7	NOT 0 LOCKED annunciator	Indicates Signal Generator will not phase lock. Occurs when one or more internal phase lock loops is unlocked, RF output is turned off, or INT-EXT switch on rear panel is in EXT position with no external reference connected.
8	FM OVERMOD annunciator	Indicates signal applied to FM IN connector exceeds 1 volt peak or when modulation index exceeds 5 (2.0 to 6.6GHz), 10 (6.6 to 12.3GHz), or 15 (12.3 to 18.0GHZ). Modulation index is equal to maximum peak deviation divided by frequency modulation.
9	RMT annunciator	Indicates external device is connected to Signal Generator. When on, Signal Generator can be controlled from a remote location.
10	LSN annunciator	Indicates external device is connected to Signal Generator. When on, Signal Generator can receive data.
11	TLK annunciator	Indicates external device is connected to Signal Generator. When on, Signal Generator can send data.
12	SRQ annunciator	Indicates external device is connected to Signal Generator. When on, Signal Generator is issuing a required service message.
13	EXTERNAL REF annunciator	Indicates that rear panel INT/EXT switch is in EXT position without an external reference connected.
14	OUT OF RANGE annunciator	Indicates, during sweep mode, that a combination of Δ F and FREQUENCY would cause a sweep frequency to be greater than 18.0GHZ or less than 2. 0GHZ.
15	OVEN COLD annunciator	Indicates that crystal oven is not up to nominal operating temperature. Light should go out approximately 5 minutes after power is applied to Signal Generator.
16	STANDBY annunciator	Indicates that power is applied to Signal Generator but LINE switch is in STBY position.
17	FREQUENCY MHz display	Indicates output frequency. Also displays frequency increment, sweep frequency, sweep rate, and error messages. Functions are displayed for as long as their respective key is pressed.
18	MESSAGE key	Lights to indicate operator errors or flashes to indicate hardware errors. A two-digit code appears in FREQUENCY MHz display when key is pressed. Refer to pull-out card under instrument or error message listing (para 2-8) for explanations of error codes.



VIEW B

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
19	RF OUTPUT ON/OFF key	Used to turn RF OUTPUT connector on or off. Off causes NOT 0 LOCKED and ALC UNLEVELED lights to come on. When RF output is on, Signal Generator has a normal RF signal at RF OUTPUT connector. Key lights when in use.
20	ALC INTERNAL key	Used to select internal leveling to automatically level output power at RF OUTPUT connector. Key lights when in use.
21	ALC DIODE key	Used to select external leveling to level output power at RF OUTPUT connector when using an external diode detector. Input to diode detector is a sample of load signal. Output of diode detector is connected to EXT ALC IN connector for use in leveling. Key lights when in use.
22	ALC PWR MTR key	Used to select external leveling to level output power at RF OUTPUT connector when using an external power meter. Input to power meter is a sample of load signal. Output of power meter is connected to EXT ALC IN connector for use in leveling. Key lights when in use.
23	Meter Zero adjustment	Used to mechanically set OUTPUT LEVEL meter to indicate zero when power is removed.
24	OUTPUT LEVEL RANGE keys	Used to select RF output level range in 10dB steps from -120 to + 10dBm. Selected range is displayed in LEVEL dBm display. Press Δ to decrease output level by 10dBm or press ∇ to increase output level by 10dBm. Press and hold appropriate key to step through range in direction desired.

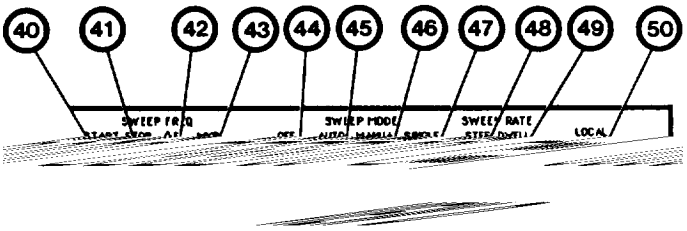
KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
25	OUTPUT LEVEL VERNIER	Used to adjust RF output level over range of -10 to +3dBm. Value is displayed on OUTPUT LEVEL meter and LEVEL dBm display. Press MTR LVL key and turn OUTPUT LEVEL VERNIER knob until top scale (-10 to +3) of OUTPUT LEVEL meter or two least significant digits of LEVEL dBm display indicates desired value. Clockwise rotation increases output level and counterclockwise rotation decreases output level.
26	AUTO PEAK key	Used to set power at RF OUTPUT connector, regardless of frequency, to maximum level specified. Also used to optimize pulse shape in pulse modulation. Key lights when in use.
27	ALC CAL adjustment	Used to adjust load power level when using a diode detector or power meter for external leveling.
28	ALC EXT ALC IN connector	BNC female connector with input impedance of approximately 50K Ω used to connect an external diode detector or power meter for use in external leveling. Accepts positive or negative leveling signals.
29	RF OUTPUT connector	Type N female connector with output impedance of 50 Ω used to connect Signal Generator to a load. Supplies RF output over entire frequency range of 2.0 to 18.0GHZ. Reverse power protection up to 1 W (average).



VIEW C

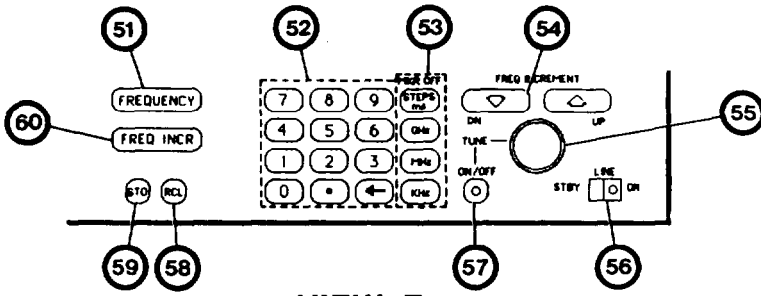
KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
30	AM OFF key	Used to turn AM mode off.
31	FM DEVIATION MHz keys	Used to activate frequency modulation mode and select amount of full scale FM deviation for a 1 volt peak signal applied to FM IN connector. Full scale deviation for 0.03 is 30KHz, 0.1 is 100KHz, 0.3 is 300KHz, 1.0 is 1MHz, 3.0 is 3MHz, and 10.0 is 10MHZ. External signal source is required for frequency modulation mode. Actual FM deviation is controlled by amplitude of input signal and FM deviation selection. OUTPUT LEVEL meter is used to indicate FM deviation. Key lights when on.
32	FM DEVIATION MHz OFF key	Used to turn FM deviation mode off.
33	PULSE OFF key	Used to turn pulse mode off.
34	PULSE NORM key	Used to activate pulse modulation mode. External signal source is required for pulse modulation mode. RF output is turned on when input signal applied to PULSE IN connector is greater than +2.4 volts. RF output will remain on until input signal goes below +2.4 volts. Key lights when in use.
35	PULSE COMPL key	Used to activate pulse modulation mode. External signal source is required for pulse modulation mode. RF output is turned on when input signal applied to PULSE IN connector is less than +0.4 volts. RF output will remain on until input signal goes above +0.4 volts. Key lights when in use.

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
36	PULSE IN connector	BNC female connector with 50 Ω input impedance used to connect an externally supplied 10Hz to 1MHz, +5.0 to -0.5 volt signal for pulse modulation of Signal Generator RF output. Trigger voltage is +2.4 volts or +0.4 volts selectable. Accepts TTL levels.
37	FM IN connector	BNC female connector with 50 Ω input impedance used to connect an externally supplied 50Hz to 1MHz, 1 volt peak signal for frequency modulation of Signal Generator RF output. FM deviation is selectable from 0 to 1MHz peak for a 1 volt peak signal.
38	AM IN connector	BNC female connector with 600 Ω input impedance used to connect an externally supplied 10Hz to 50KHz, 1 volt peak signal for amplitude modulation of Signal Generator RF output. AM depth is 30% or 100% selectable for a 1 volt peak input signal.
39	AM keys	Used to activate amplitude modulation mode and select 30% or 100% full scale modulation for a 1 volt peak signal applied to AM IN connector. External signal source is required for AM mode. Actual AM depth is controlled by amplitude of input signal and AM depth selection. OUTPUT LEVEL meter is used to indicate AM depth. Key lights when in use.



KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
40	SWEEP FREQ START key	Used to enter or display a starring frequency in sweep mode. Press and hold to display present start value in FREQUENCY MHz display. Press and use numeric and unit keys to enter a new start frequency. Start frequency may be less than or greater than stop frequency. For prefixes <3100A: After start and stop frequencies have been entered, press FREQUENCY key to show center frequency in FREQUENCY MHz display.
41	SWEEP FREQ STOP key	Used to enter or display a stopping frequency in sweep mode. Press and hold to display present stop value in FREQUENCY MHz display. Press and use numeric and unit keys to enter a new stop frequency. Stop frequency may be less than or greater than start frequency. For prefixes <3100A: After start and stop frequencies have been entered, press FREQUENCY key to show center frequency in FREQUENCY MHz display.
42	SWEEP FREQ AF key	Used to enter or display a sweep span in sweep mode. Press and hold to display present span value in FREQUENCY MHz display. Press and use numeric and unit keys to enter a new sweep span. New start frequency will be center frequency minus/plus ½ entered sweep span. New stop frequency will be center frequency plus/minus ½ entered sweep span. For prefixes <3100A: Note that center frequency can be viewed by pressing FREQUENCY key. For prefixes >3100A: If present span value in FREQUENCY MHz display is a negative number, start frequency is greater than stop frequency. If a new span is entered, the start frequency will automatically be changed to the lower frequency.
43	SWEEP FREQ MKR key	Used to enter or display marker frequencies in sweep mode. Press MKR key and numeric keys 1 thru 5 alternately to show present frequencies stored. Preset values are: (1) 3.0GHz, (2) 6.0GHz, (3) 9.0GHz, (4) 12.0GHZ, and (5) 15.0GHZ. To change a preset marker frequency, press MKR key and desired numeric key of new marker frequency to be stored. Then enter new frequency using numeric and unit keys. To activate markers, press MKR key and desired numeric key. Marker frequencies must be within sweep range in order to be activated. Press and hold MKR key to display active markers in FREQUENCY MHz display. To deactivate markers, press MKR key, desired numeric key to deactivate, then STEPS ms key. To deactivate all markers, press MKR key then STEPS ms key.

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
44	SWEEP MODE OFF key	Used to turn off sweep mode. Allows for fixed frequency operation.
45	SWEEP MODE AUTO key	Used to start frequency sweep, restarting at end of each sweep. Beginning frequency is controlled by START key, ending frequency is controlled by STOP key, step size is controlled by STEP key, and time of each step is controlled by DWELL key. Key lights when in use.
46	SWEEP MODE MANUAL key	Used to activate sweep circuitry, but does not start a sweep. FREQ INCREMENT TUNE knob (if TUNE ON/OFF key is on) or the FREQ INCREMENT range keys control frequency sweep. Beginning frequency is controlled by START key, ending frequency is controlled by STOP key, and step size is controlled by STEP key. Time of each step is controlled by operator. Key lights when in use.
47	SWEEP MODE SINGLE key	Used to activate sweep circuitry, but does not start a sweep. Press SINGLE key again to start sweep. One complete sweep will be performed. To sweep again, press SINGLE key. Beginning frequency is controlled by START key. Ending frequency is controlled by STOP key. Step size is controlled by STEP key. Time of each step is controlled by DWELL key. Key lights when in use. Pressing SINGLE key during a sweep stops sweep.
48	SWEEP RATE STEP key	Used to set number of steps (up to 9993), or size of each step (frequency) of a sweep. When number of steps is entered, step frequency is calculated. When step frequency is entered, number of steps is calculated. If entry is terminated by STEPS ms key, number of steps is set. If entry is terminated by GHz, MHz, or KHz key, step size is set. Press to show number of steps and step frequency. Number of steps is displayed on left side of FREQUENCY MHz display and step frequency is displayed on right side of FREQUENCY MHz display.
49	SWEEP RATE DWELL key	Used to enter and display time interval between sweep steps. Press and hold to show present dwell time value in FREQUENCY MHz display. To enter a new dwell time, press DWELL key, enter desired dwell time using numeric keys, and press STEPS ms key. Allowable values for dwell time range from 1 to 255ms.
50	LOCAL key	Is used to return Signal Generator to local keyboard control from HP-IB (remote) control provided instrument is not in local lockout. Also displays current HP-IB address in FREQUENCY MHz display for as long as key is depressed.



VIEW E

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
51	FREQUENCY key	Used to enter, raise, lower, or display a continuous wave frequency or center frequency for a ΔF sweep. Push and use numeric keys to enter a new frequency. Frequency is shown in FREQUENCY MHz display. For prefixes <3100A: Note that center frequency can be viewed by pressing and holding key. For prefixes >3100A: If a new frequency is entered, the start and stop frequencies will automatically be changed using the current ΔF value.
52	Numeric keys	Used to enter numeric value with decimal point for FREQUENCY key; FREQ INCR key; SWEEP FREQ START, STOP, ΔF, and MKR keys; and SWEEP RATE STEP and DWELL keys. After data is entered, unit keys (STEPS ms, GHz, MHz, KHz) are pressed to enter value. Keys 1 thru 9 are also used with STO and RCL keys to identify a stored setup. Backspace (←) key clears one digit at a time starting with least significant digit and is used only during data entry and before any unit key is pressed.
53	Unit keys	Used to terminate entries from numeric keys. FREQUENCY; FREQ INCR; SWEEP FREQ START, STOP, ΔF, and MKR (to input other than preselected marker frequencies) and SWEEP RATE STEP (when step frequency is entered) selections are terminated by pressing GHz, MHz, or KHz key as required. Frequency entries can terminate in GHz, MHz, or KHz but are always shown as MHz in FREQUENCY MHz display. STEP (when number of steps is entered) and DWELL entries are terminated with STEPS ms key. STEPS ms key also turns off active markers.
54	FREQ INCREMENT keys	Allows changes in frequency as shown in FREQUENCY MHz display. Amount of change depends on value currently stored as frequency increment. ∇ key decreases frequency and Δ key increases frequency. Holding either key down causes frequency to continuously change. These keys also serve as a manual sweep mode control. Amount of change in manual sweep mode depends on value currently stored in sweep rate step.

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
55	FREQ INCREMENT TUNE knob	When activated by TUNE ON/OFF key, allows changes in frequency as shown in FREQUENCY MHz display. Amount of change depends on value currently stored as frequency increment. Clockwise direction increases frequency and counterclockwise direction decreases frequency. This knob also serves as a manual sweep mode control. Amount of change in manual sweep mode depends on value currently stored in sweep rate step.
56	LINE switch	Used to set Signal Generator to standby or on. When in standby, STANDBY light is on and power is available to crystal oven and battery charging circuit only. When on, STANDBY annunciator is out and Signal Generator operates normally.
57	TUNE ON/OFF key	Used to enable tune knob. Key lights when in use.
58	RCL key	Used to recall a previously stored Signal Generator operational setup. When selected, front panel settings change to recalled settings. Push RCL and setup number (1 thru 9) to recall a stored setup. Press RCL and number 0 keys to reset front panel values.
59	STO key	Used to store a Signal Generator operational setup. All front panel controls and indicators, except OUTPUT LEVEL VERNIER setting, can be stored Push STO and setup number (1 thru 9) to store a setup.
60	FREQ INCR key	Used to enter a new frequency increment value in Signal Generator or display a previously stored frequency increment value. Push and hold to display stored frequency increment. Push and use numeric keys to enter a new frequency increment. Frequency increment value is shown in FREQUENCY MHz display.

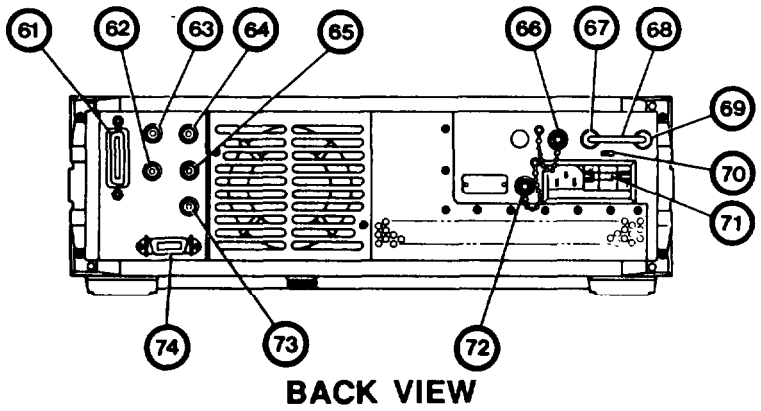


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Figure 2-2. Operator's Controls, Indicators, and Connectors, rear view.

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
61	HPIB Interface connector	Used as input and output connector for external devices during remote opertaion. Connector has 24 pins with metric posts.
62	FREQ REF connector	BNC female connector with 100 Ω output impedance used to provide a 1 V/GHz ramp, from +2 to +18 volts. Signal is always present, even when sweep mode is off.
63	SWP OUT connector	BNC female connector with 100 Ω output impedance available only when Signal Generator is in sweep mode. Provides a 0 to + 10 volt ramp from start frequency to stop frequency.
64	TONE MKR connector	BNC female connector with 600 Ω output impedance available only when Signal Generator is in sweep mode. Provides a 5KHz sinewave output when frequency sweep passes selected markers. Output signal can be connected to AM IN connector to provide AM markers.
65	PEN LIFT connector	BNC female connector available only when Signal Generator is in sweep mode. Provides a TTL high at end of sweep. TTL high lifts pens and TTL low lowers pen. A 100ms delay is encountered in single sweep mode.
66	10MHz OUT connector	BNC female connector provides a 10MHZ, 0dBm (nominal) into 50 Ω signal. This signal can be used as an external timebase and for troubleshooting.
67	FREQ STANDARD output	BNC female connector provides a 10MHz, +7dBm (nominal) into 50 Ω from internal frequency standard. This signal output is supplied to FREQ STANDARD input connector using a jumper (BNC cable). Output signal is available at this connector only when INT/EXT switch is in EXT position.

KEY	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
68	Jumper	BNC cable used to connect FREQ STANDARD output connector to FREQ STANDARD input connector.
69	FREQ STANDARD input	BNC female connector used to connect a frequency standard to Signal Generator. Normally connected to FREQ STANDARD OUTPUT connector using a jumper with rear panel INT/EXT switch set to INT. Also can be used to connect an external frequent y standard of 5 or 10MHz at 0dBm to Signal Generator. When an external frequency standard is used rear panel INT/EXT switch is set to EXT.
70	INT/EXT switch	Slide switch used to select frequency standard connected to FREQ STANDARD INPUT connector. INT setting activates internal frequency standard. EXT setting deactivates internal frequency standard and an external frequency standard must be used.
71	Line Power Module	Used as power input connector for Signal Generator. Also contains line fuse and voltage selection facilities. Voltage selection provided for operation from 100, 120,220, or 240Vac. Number visible in window displays nominal line voltage for which the Signal Generator is set to operate. Power input connector accepts female end of power cable (supplied). Protective grounding conductor connects to Signal Generator through this connector. Line power fuse is 4 amp, 250 volts for 100/120Vac operation and 2 amp, 250 volts for 220/240Vac operation. Remove power cable, slide plastic window over connector, and pull extractor to remove fuse.
72	100MHz OUT connector	BNC female connector used to provide a 100MHz, 0dBm (nominal) into 50 Ω signal. This signal can be used for an external timebase and for troubleshooting.
73	BLANKING/MARKER CONN	BNC female connector with 100 Ω output impedance available only when Signal Generator is in sweep mode. Provides +5 V at beginning of each frequency change for blanking a swept display (to eliminate display of switching transients). Goes to –5 V when a frequency marker is encountered for Z-Axis intensity marker. Goes to 0 V for all non-marker frequencies.
74	AUX connector	Provides for remote control of FREQUENCY INCREMENT, display blanking, register recall, and START and STOP sweep. Connector has 14 pins with clip-on retainers.

Section II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-2. GENERAL.

To be sure that your equipment is always ready for your mission, you must do scheduled preventive maintenance checks and services (PMCS). When you are doing any PMCS or routine checks, keep in mind the WARNINGS and CAUTIONS about electrical shock and bodily harm.

2-3. PMCS TABLE.

A PMCS table for the Signal Generator appears in table 2-1. There are five categories or intervals of PMCS: B, D, A, W, and M. They head the INTERVAL columns of the PMCS table. A check mark in one or more of the INTERVAL columns indicates the check and/or service that should be performed by the operator at a particular time.

a. B stands for BEFORE. B-PMCS should be performed BEFORE operation to make sure your equipment is ready to go.

b. D stands for DURING. D-PMCS is performed DURING operation. This will help you spot small troubles before they become big problems.

c. A stands for AFTER. A-PMCS should be performed AFTER operation.

d. In general, W-PMCS stands for WEEKLY and M-PMCS stands for MONTHLY important preventive maintenance checks and services you make at those intervals to keep serious problems from suddenly happening.

e. You should perform W-PMCS as well as B-PMCS if:

(1) You are the assigned operator and have not operated the equipment since the last W-PMCS.

(2) You are operating the equipment for the first time.

f. If your equipment fails to operate, notify next higher level of maintenance.

NOTE

If your equipment must be operational at all times, check and service those items that can be checked and serviced without disturbing the operation. Make the complete checks and services when the equipment can be shut down.

g. Whenever an equipment is reinstalled after removal for any reason, perform the necessary B-PMCS to be sure that the equipment meets the readiness reporting criteria.

h. Routine checks are not listed as PMCS checks. They are checks such as the following:

- cleaning,
- dusting,
- wiping,
- checking for frayed cables,
- storing items not in use,
- covering unused receptacles,
- checking for loose nuts, bolts, and screws.

i. Routine checks are things that you should do anytime you see they must be done. If you find a routine check like one of those listed in your PMCS table, it was listed because other personnel have reported problems with this item.

Table 2-1. Operator Preventive Maintenance Checks and Services.

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED	PROCEDURES CHECK AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
1		•			•	Signal Generator	Check for completeness (Appendix C).	Upon completion of PMCS checks, available equipment is insufficient to support mission.
		•			•		Perform turn-on procedure (para 2-6).	Error message appears on front panel display or turn-on incorrect.
		•			•		Perform Memory Check as follows: 1. Press RCL and number 0 pushbutton on front panel. Set frequency to 15GHz and output average range to -20dBm. 2. Set LINE SWITCH to STBY,wait 30 seconds, then set LINE SWITCH to ON. Test passes if; FREQUENCY MHz display shows 15000.000MHz. Level dBm display shows –20dBm.	Failure of test.

Section III. OPERATION UNDER USUAL CONDITIONS

2-4. INTRODUCTION.

This section provides the information required to set up and operate the Signal Generator. The operation of the Signal Generator is divided into seven separate sections. These sections are setting power level, amplitude modulation, frequency modulation, pulse modulation, frequency, frequency increment and sweep frequency.

Perform all sections in (he order given and omit the ones not required for any particular operation. Table 2-2 lists all operator errors along with the probable cause.

2-5. PREPARATION FOR USE.

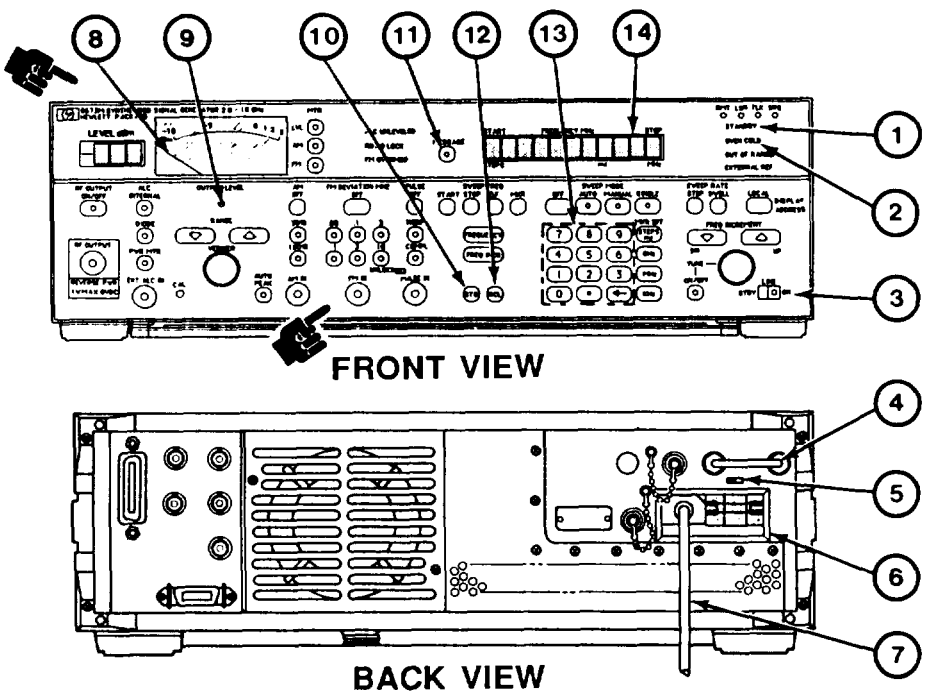
a. If the OUTPUT LEVEL meter pointer is not zeroed, adjust as follows:

(1) Set LINE switch (3) to STBY.

(2) Rotate meter adjusting screw (9) clockwise to move up scale or counterclockwise to move down scale until pointer is at 0 mark (8) on 0 to 1 or 0 to 3 scale. Do not use top dBm scale.

CAUTION

The Signal Generator is equipped with a three-wire power cable. When connected to an appropriate, grounded AC power receptacle, this cable grounds the instrument cabinet. Do not use extension cords or AC adapters without a ground.



b. Verify that LINE switch (3) is set to STBY. Connect power cable (7) to connector on line power module (6) on rear panel. Connect jumper (4) (BNC to BNC cable) to FREQ STANDARD input and output connectors on rear panel. Set INT/EXT switch (5) on rear panel to INT. STANDBY (1) and OVEN COLD (2) lights should come on.

2-6. TURN-ON PROCEDURE.

a. With power cable connected to Signal Generator, verify that STANDBY light (1) is on.

b. Move LINE switch (3) from STBY to ON and check that fan on rear panel is functioning properly.

c. Verify that MESSAGE light (11) is out. If light is on, press and hold MESSAGE key to obtain error message in FREQUENCY MHz display (14). Refer to pull-out card or list of error messages (para 2-8) for probable cause.

NOTE

If the power cable has been disconnected for a period of time, the OVEN COLD light should come on to indicate the Signal Generator requires warm-up. The light should go out within 5 minutes. Do not operate the Signal Generator with the OVEN COLD light on.

d. Press RCL (12) then 0 (13) keys and verify that following front panel condition exists:

RF OUTPUT	ON
ALC INTERNAL	ON
RANGE	-82.0 to -67.0dBm
AUTO PEAK	ON
LVL	ON
AM lights	OFF
FM DEVIATION MHz lights	OFF
PULSE lights	OFF
FREQUENCY	3000.000 MHz
FREQ INCR	1.000 MHz*
START	2000.000 MHz*
STOP	4000.000 MHz*
AF	2000.000 MHz*
MKRS	OFF**
SWEEP MODE lights	OFF
STEP	100 steps (20.000 MHz)*
DWELL	20ms*
TUNE ON/OFF	ON

* Press key to display value.
** press MKR key then number 1-5 alternately to display marker frequencies of 3, 6, 9, 12, and 15 GHz respectively.

e. If all above conditions are correct, Signal Generator is ready for operation. If indication is incorrect, notify next higher level of maintenance.

2-7. STORE/RECALL PROCEDURE.

Up to nine front panel control settings and entry parameters can be stored for recall at a later time. The parameters remain stored even with Signal Generator in standby or with the power cable disconnected.

1. To store a set-up:

- Press STO key (10) and desired number from 1 to 9 using numeric keys (13). If a setup has been stored at location selected (1 thru 9), it will be erased and new setup will be stored in its place.

2. To recall a set-up:

- Press RCL (12), and then number 0 (13) keys.
- Press RCL key (12) and desired number from 1 to 9 using numeric keys (13). Setup stored at that location will display.

3. To reset Signal Generator to the turn-on condition:

- Press RCL (12), and then number 0 (13) keys.

2-8. ERROR MESSAGES.

Some operator actions and Signal Generator failures cause error messages to appear in the FREQUENCY MHz display, See table 2-2 for a list of error messages and probable cause.

NOTE

Error 01 thru 09 are operator errors. The value just entered is ignored and the previous values are retained. Messages 10 thru 16 are errors that result from unusual combinations of sweep entries. A message is displayed and all entered values are stored in anticipation that further entries will resolve the error. If an error appears that is not listed in table 2-2, notify next higher level of maintenance.

Table 2-2. Error Messages.

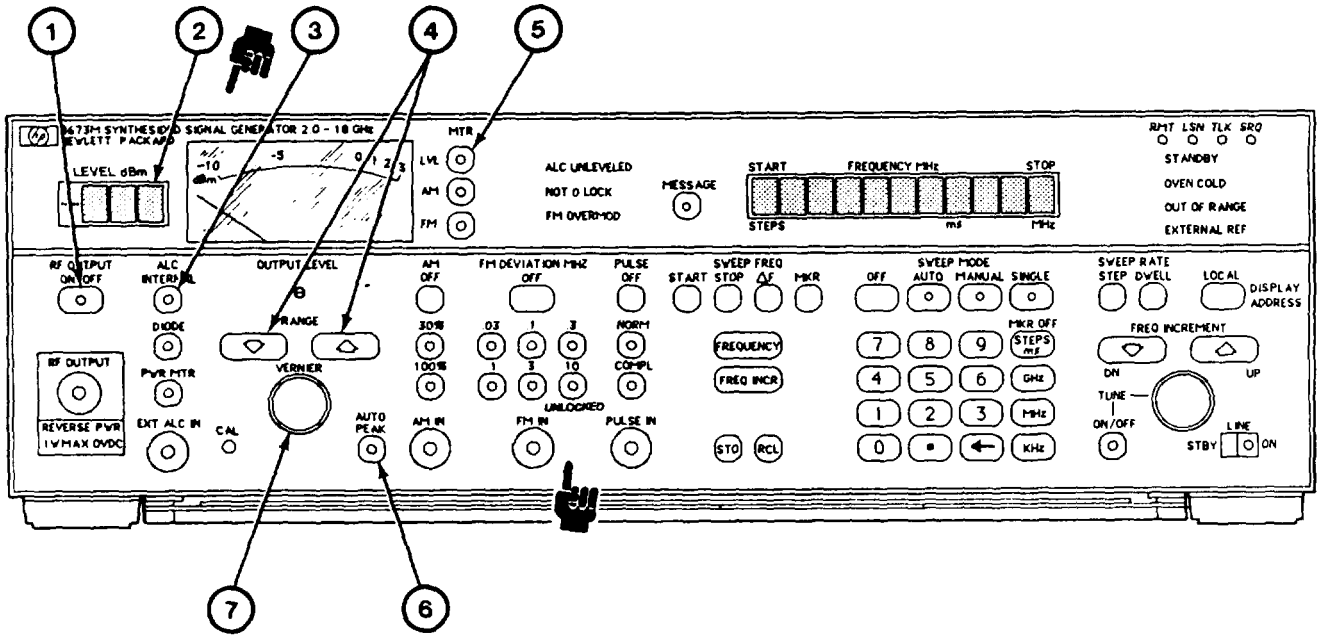
ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
00	NO ERROR	None.
01	FREQUENCY OUT OF RANGE.	Select≥2GHz to ≤18GHz.
02	FREQ INCR OUT OF RANGE.	Select <18GHz.
04	CANNOT STORE 0.	Terminate using numbers 1 thru 9.
05	STEP SIZE OUT OF RANGE.	Select lower step frequency.
07	NUMBER OF STEPS OUT OF RANGE.	Select up to 9993 steps.
08	DWELL OUT OF RANGE.	Select ≤255ms.
09	MARKER NUMBER NOT 1 THRU 5.	Terminate using numbers 1-5.
10	START FREQ=STOP FREQ.	Change start or stop frequency.
11	SWEEP SPAN RESULTS IN START FREQUENCY TOO HIGH.	The start frequency stored is the lowest possible frequency available but higher than requested. Press START to see the adjusted start frequency.
12	SWEEP SPAN RESULTS IN STOP FREQUENCY TOO LOW.	The stop frequency stored is the highest possible frequency available but lower than requested. Press STOP to see the adjusted stop frequency.
13	NUMBER OF STEPS ADJUSTED TO GIVE STEP SIZE IN EVEN KHz.	The entered number of steps has been adjusted to allow the step size (frequency) to be in even KHz. Press STEP to view adjusted number of steps.
14	STEP SIZE TOO SMALL FOR SPAN.	The entered step size (frequency) is too small for the sweep span selected. The step size and number of steps have been adjusted for the smallest allowed. Press STEP to view adjusted step size and number of steps.
15	STEP SIZE GREATER THAN SPAN.	The step size and number of steps have been adjusted to the largest allowed. Press STEP to view the adjusted step size and number of steps.

2-9. OPERATING PROCEDURES.

Operation of Signal Generator is provided in paragraphs 2-10 thru 2-16. Refer to paragraph 2-1 for a further description of the controls and indicator.

2-10. OUTPUT POWER LEVEL.

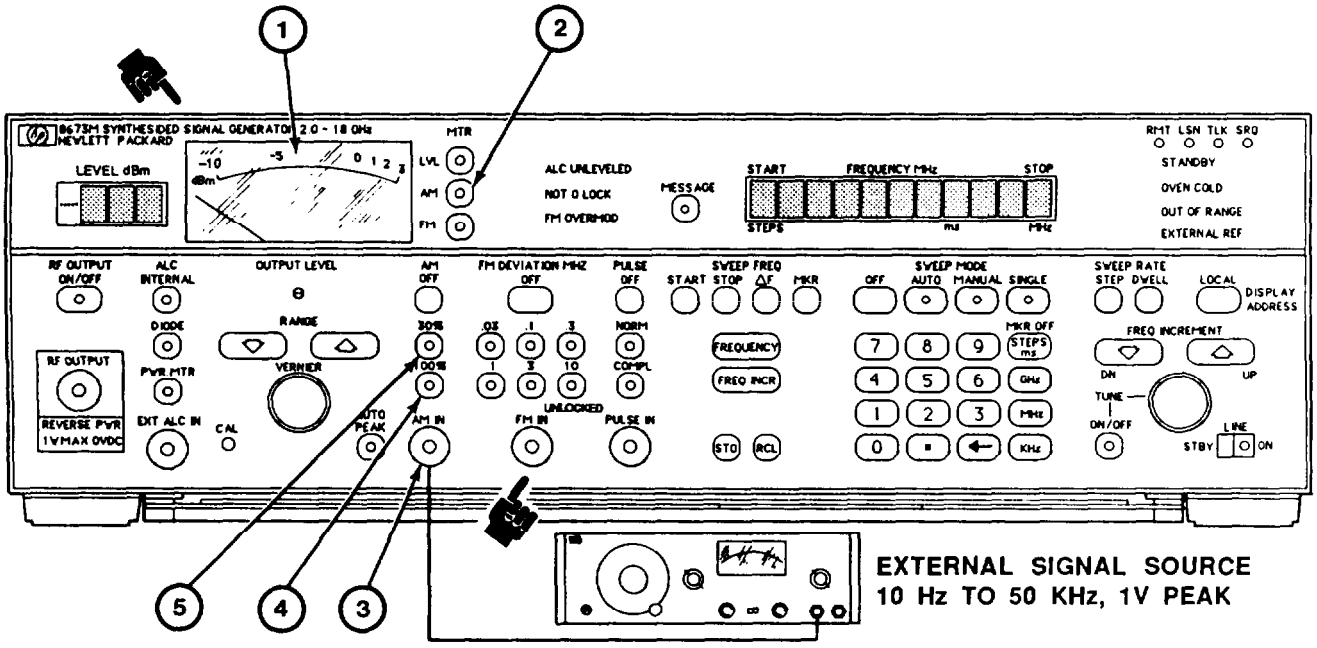
Perform the following steps to set an output power level from +8dBm to –120dBm.



1. Press RF OUTPUT (1), ALC INTERNAL (3), MTR LVL (5), and OUTPUT LEVEL AUTO PEAK (6) keys to on.
2. Enter desired output level using OUTPUT LEVEL RANGE (4) keys and OUTPUT LEVEL VERNIER knob (7). Output level will be shown in LEVEL dBm display (2).

2-11. AMPLITUDE MODULATION.

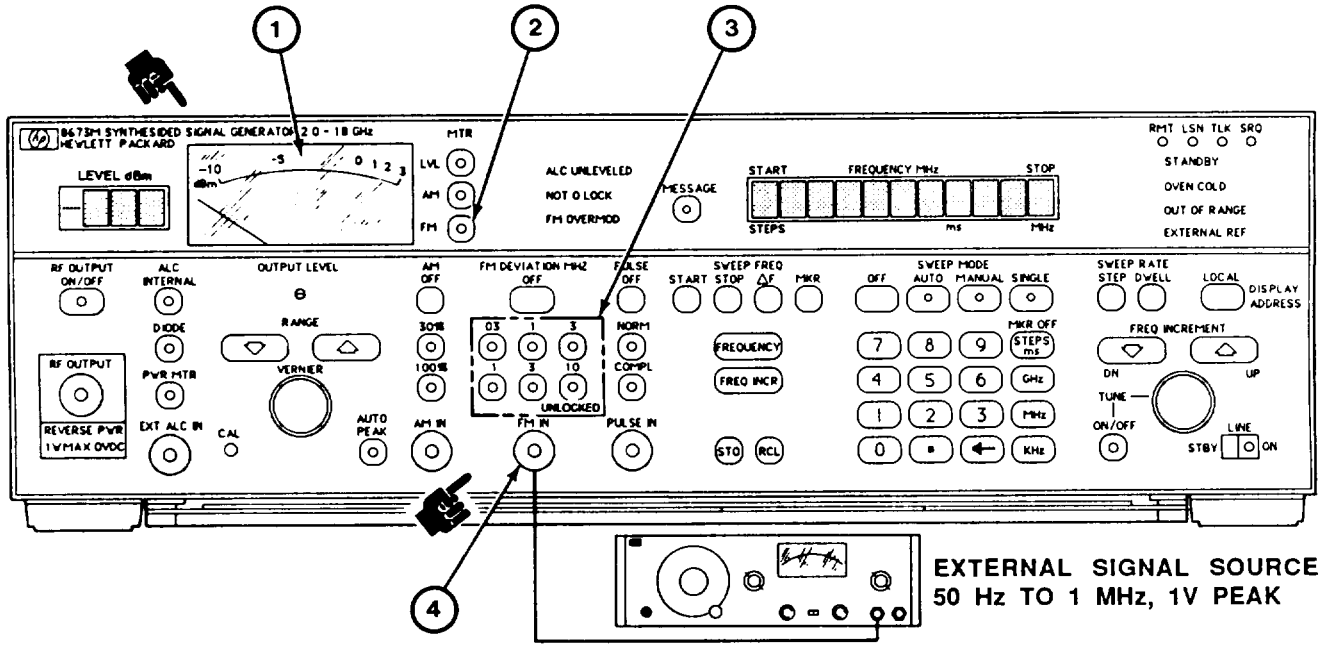
Perform the following steps to set amplitude modulation level.



1. Press MTR AM (2) key to on.
2. Connect external signal source 600 Ω output impedance sinewave to AM IN connector (3).
3. Set external signal source to desired frequency from 10Hz to 50KHz and amplitude to minimum. This frequency is the rate at which Signal Generator will modulate the output signal.
4. Press AM key (4 or 5) that gives desired AM depth (30% or 100%).
5. Increase amplitude of external signal source until desired AM depth is indicated on OUTPUT LEVEL meter (1).

2-12. FREQUENCY MODULATION.

Perform the following stops to set frequency modulation level.



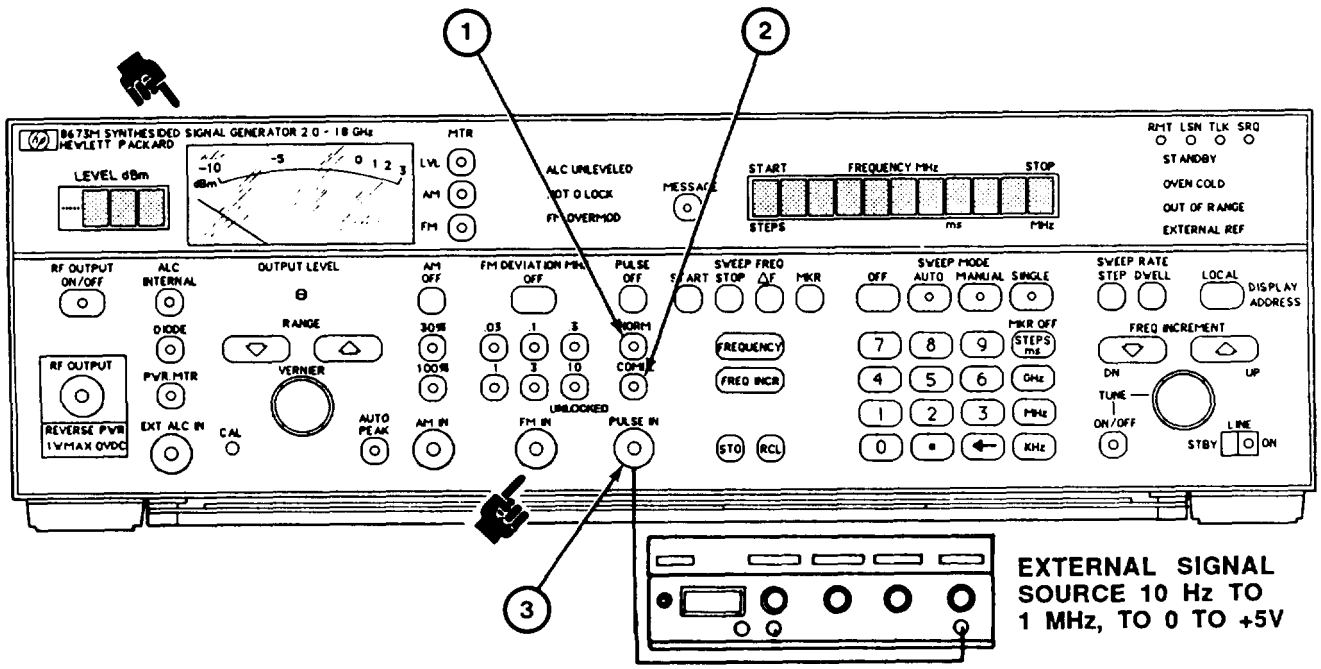
1. Press MTR FM (2) key to on.
2. Connect external signal source 50 Ω output impedance sinewave to FM IN connector (4).
3. Set external signal source to desired frequency from 50Hz to 1MHz and amplitude to minimum. This frequency is the rate at which Signal Generator will modulate the output signal.
4. Press FM DEVIATION key (3) that gives desired frequency deviation.
5. Increase amplitude of external signal source until desired FM deviation is indicated on OUTPUT LEVEL meter (1).

NOTE

NOT Ø LOCKED indicator will light whenever 10 UNLOCKED pushbutton is pressed.

2-13. PULSE MODULATION

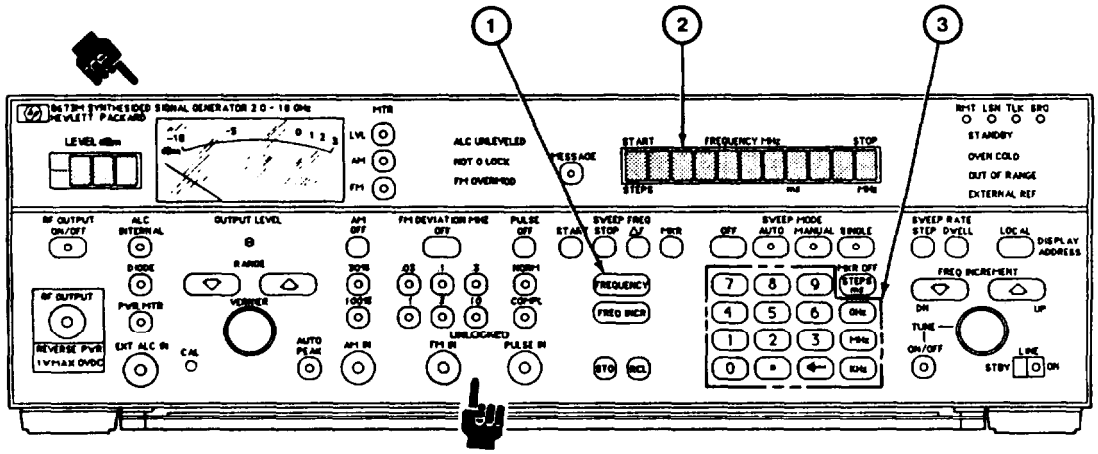
Perform the following steps to set pulse modulation.



1. Connect external signal source 50 W output impedance pulse to PULSE IN connector (3).
2. Set external signal source to desired frequency from 10Hz to 1MHz and amplitude to minimum. This frequency is the pulse repetition frequency.
3. Press PULSE NORM (1) or PULSE COMPL (2) key.
   - PULSE NORM = pulse with input greater than 2.4V.
   - PULSE COMPL = pulse with input less than 0.4V.
4. Set amplitude of external signal source to desired level.

2-14. FREQUENCY (FIXED).

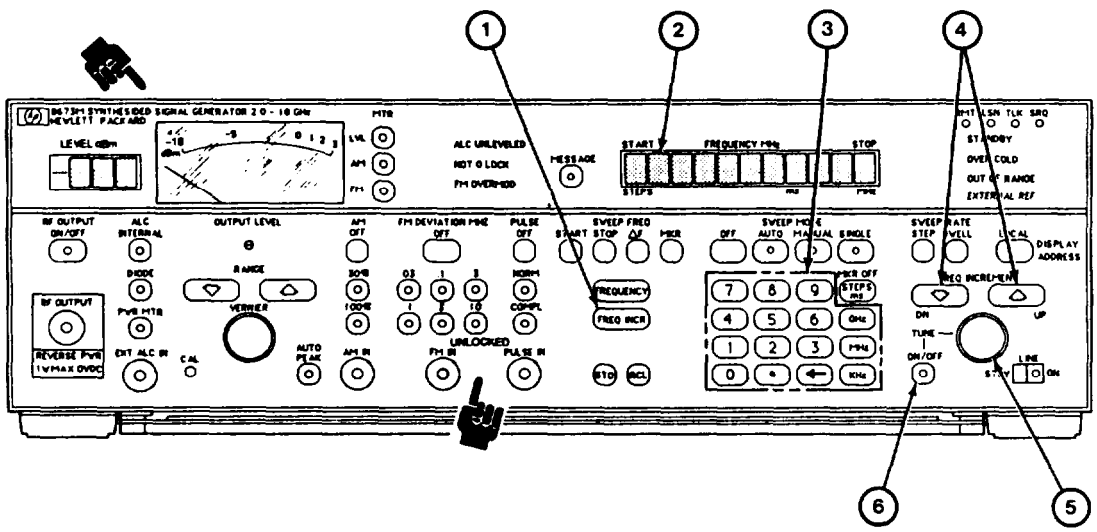
Perform the following steps to set fixed frequency output.



1. Press FREQUENCY key (1).
2. Enter &sired frequency using numeric keys (3) then press GHz, MHz, or KHz key as required. Frequency will appear in FREQUENCY MHz display (2).

2-15. FREQUENCY INCREMENT.

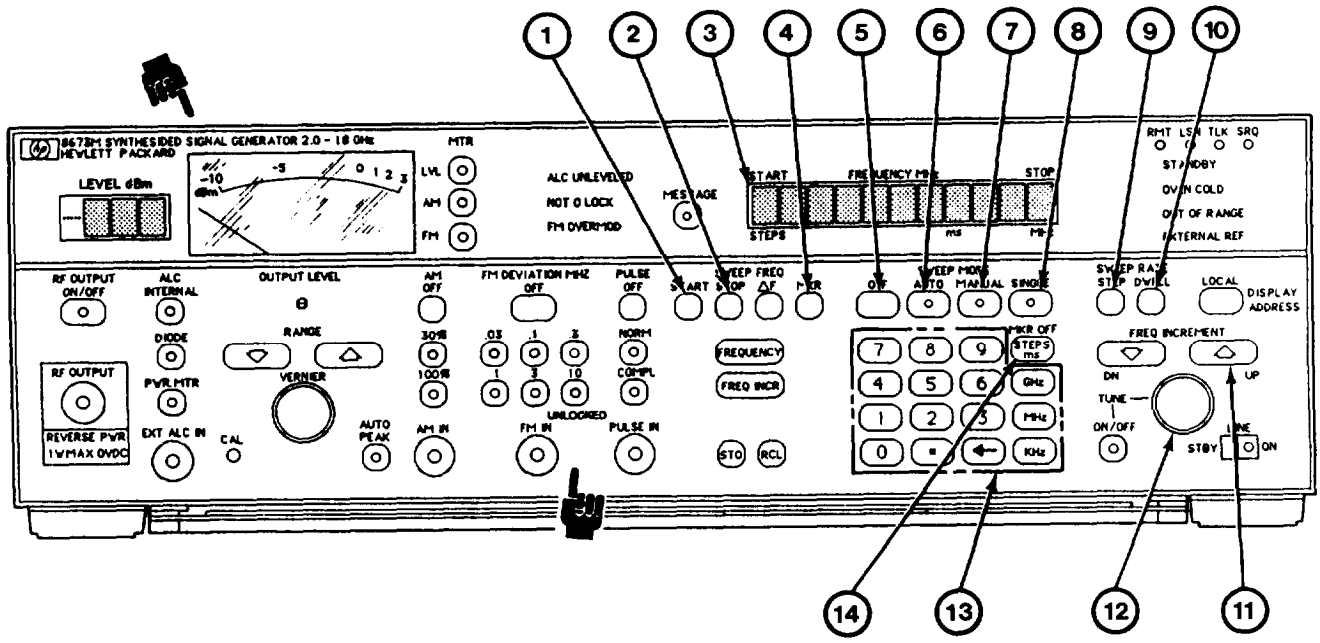
Perform the following steps to set frequency increment.



1. Press FREQ INCR key (1).
2. Enter desired frequency increment using numeric keys (3) then press GHz, MHz, or KHz key as required.
3. Use FREQUENCY INCREMENT keys (4) and VERNIER control (5) to vary displayed frequency by stored frequency increment. TUNE ON/OFF key (6) must be on before VERNIER control (5) can be used.

2-16. SWEEP FREQUENCY.

Perform the following steps to set sweep frequency.



1. Press SWEEP MODE OFF key (5) and verify that SWEEP MODE AUTO (6), SWEEP MODE MANUAL (7) and SWEEP MODE SINGLE (8) keys are not lighted.
2. Press SWEEP FREQ START key (1) and enter desired starting frequency using numeric keys (13) then press GHz, MHz, or KHz as required.
3. Press SWEEP FREQ STOP key (2) and enter desired stopping frequency using numeric keys (13) then press GHz, MHz, or KHz as required.
4. Press SWEEP FREQ START key (1) and verify correct value is shown in FREQUENCY MHz display (3). Press SWEEP FREQ STOP key (2) and verify correct value is shown in FREQUENCY MHz display (3).
5. Press SWEEP RATE STEP key (9) and enter number of steps **OR** step frequency.
   - Enter number of **STEPS** from 2 to 999 using numeric keys (13). Value will appear in FREQUENCY MHz display (3). If value is correct, press STEPS ms key (14). Signal Generator will automatically calculate and enter step frequency.
   - Enter step **FREQUENCY** using numeric keys (13). Value will appear in FREQUENCY MHz display (3). If value is correct, press GHz, MHz or KHz key as required. Signal Generator will automatically calculate and enter number of steps.
6. Press SWEEP RATE STEP key (9) and verify value shown in FREQUENCY MHz display (3) is correct.
7. Press SWEEP RATE DWELL key (10) and enter desired dwell time from 1 to 255 using numeric keys (13). Value will appear in FREQUENCY MHz display (3). If value is correct, press STEPS ms key (14).

8. If markers are require press SWEEP FREQ MRK key (4).

l If preset marker frequencies are being used select 1, 2, 3,4, or 5 alternately as required.

l If entering different marker frequency:

(1) Press SWEEP FREQ MKR key (4) and numeric key 1 to 5 (13).

(2) Enter new marker frequency using numeric keys (13) then press GHz, MHz, or KHz as required. This value will be stored under the number selected in (a) above.

9. Select sweep mode as follows:

- AUTO SWEEP press SWEEP MODE AUTO key (6). Sweep is automatic.
- MANUAL SWEEP; press SWEEP MODE MANUAL key (7). Use FREQ INCREMENT keys (11) or VERNIER control (12) to manually adjust sweep.
- SINGLE SWEEP press SWEEP MODE SINGLE key (8). Press SWEEP MODE SINGLE key (8) to start one sweep.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-17. OPERATION IN EXTREME HEAT AND EXTREME COLD.

a. Operate the Signal Generator only in a temperature range of 0 to +55° C (32 to 131° F).

b. Make sure at least one inch of open space exists from the rear and side panels.

2-18. OPERATION IN WET WEATHER.

a. The Signal Generator will operate normally in 95% relative humidity at +40° C.

b. If the Signal Generator has gotten wet allow it to dry completely before using.

2-19. OPERATION IN SANDY OR DUSTY AREAS.

a. Do not operate the Signal Generator in sandy or dusty areas,

2-20. EMERGENCY PROCEDURES.

a. Reduction of power. The Signal Generator will operate with power reduced from 90 to 105Vac, 108 to 126Vac, 198 to 231 Vac or from 216 to 252 Vac. The Signal Generator w ill not operate with any further reduction of power.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-1. COMMON TOOLS AND EQUIPMENT.

Common tools and equipment required for organizational maintenance of Signal Generator SG-1219/U are listed in the Maintenance Allocation Chart (MAC) (AppediX B).

3-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

There are no special tools, TMDE, or support equipment required.

3-3. REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 11-6625-3143-24P.

Section II. SERVICE UPON RECEIPT

3-4. SERVICE UPON RECEIPT OF MATERIAL.

a. Unpacking. Special design reusable packing material inside this shipping carton provides maximum protection for Signal Generator. Avoid damaging carton and packing material during equipment unpacking. Use the following steps for unpacking Signal Generator

- Cut and remove paper sealing tape on carton top and open carton.
- Grasp Signal Generator firmly while restraining shipping carton and lift equipment and packing material vertically.
- Place Signal Generator and end cap packing material on a suitable flat clean and dry surface.
- Remove end cap packing material while firmly supporting Signal Generator.
- Remove protective plastic bag from Signal Generator. Place desiccant bags back inside protective plastic bag.
- Place protective plastic bag and end cap packing material inside shipping carton.
- Return shipping carton to supply system.

b. Checking Unpacked Equipment.

Inspect the equipment foe damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy (ROD).

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

Check to see whether the equipment has been modified.

3~5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

a. Remove fuse (para 3-7). Check that fuse and voltage selection card are correct for the line voltage available in your area (table 3-1).

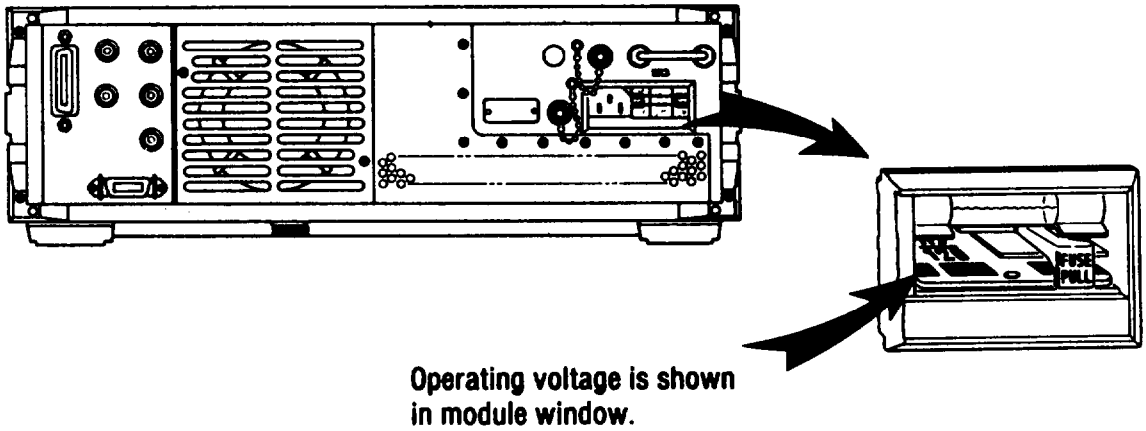


Table 3-1. Voltage Selection Card Position and Fuse Size.

Input Voltage	Voltage Selection Card Position	Fuse
90 to 105	100	4 amp
108 to 126	115/120	4 amp
198 to 231	220	2 amp
216 to 252	230/240	2 amp

b. Perform the turn on procedures (para 2-6).

Section III. TROUBLESHOOTING

SYMPTOM INDEX

3-6. TROUBLESHOOTING TABLE.

Table 3-1 lists common malfunctions which you may find during operation or maintenance of the Signal Generator, You should perform the tests/inspections and corrective actions in the order listed.

NOTE

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify next higher level of maintenance.

Table 3-1. Troubleshooting.

MALFUNCTION / TEST OR INSPECTION / CORRECTIVE ACTION
1. SIGNAL GENERATOR NOT OPERATING.
Step 1. Check to see if fuse is blown or broken.
• Replace fuse (para 3-7).
Step 2. Allow Signal Generator to cool and then try operating again.
• If Signal Generator operates normally, check for proper air flow around rear and side covers.
• If Signal Generator fails to operate, notify next higher level maintenance.

Table 3-1. Troubleshooting-Continued.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. POWER NOT INDICATED ON OUTPUT LEVEL METER.
Step 1. Check that RF OUTPUT light is on.
• Press key.
Step 2. Check that MTR LVL light is on.
• Press key.
Step 3. Check that OUTPUT LEVEL VERNIER knob is turned fully counterclockwise.
• Turn fully counterclockwise.
• Notify next higher level maintenance.
3. AM DEPTH NOT INDICATED ON OUTPUT LEVEL METER.
Step 1. Check that MTR AM light is on. Check that AM 30% or 100% lights are on.
Step 2. Check that external source sinewave from 10Hz to 50KHz at a maximum of 1V peak is connected to AM IN connector.
• If correct, notify next higher level maintenance.
4. FM DEVIATION NOT INDICATED ON OUTPUT LEVEL METER.
Step 1. Check that MTR FM light is on. Check that one of FM Deviation MHz lights is on.
Step 2. Check that external source sinewave from 50Hz to 1MHz at a maximum of 1V peak is connected to FM IN connector.
• If correct, notify next higher level maintenance.
5. RF OUTPUT NOT PULSE MODULATED.
Step 1. Check that PULSE NORM or COMPL keys are on.
Step 2. Check that external source pulse from 10Hz to 1MHz at a maximum of +5V is connected to PULSE IN connector.
• If correct, notify next higher level maintenance.
6. SWEEP WILL NOT START.
Step 1. Check that SWEEP MODE AUTO, MANUAL, or SINGLE light is on.
• Press proper key and review operating procedures for sweep frequency (para 2-16).
Step 2. Check that start and stop frequencies are within frequency range.
• Set to proper frequency.
• If correct, notify next higher level maintenance.

Table 3-1. Troubleshooting-Continued.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

7. ALC UNLEVELED LIGHT ON.

Step 1. Check that RF OUTPUT light is on.

- Press key.

Step 2. Check that LEVEL dBm display is greater than +8 dBm.

- Reduce to a maximum of +8 dBm.

Step 3. Check that ALC INTERNAL light is on.

- Press key. If DIODE or PWR MTR lights are on, diode or power meter must be connected to EXT ALC IN connector.

Step 4. If operating in Pulse Modulation mode.

- Press PULSE OFF key. Review operating procedure for pulse modulation (para 2-13).

Step 5. If operating in Amplitude Modulation mode, check that input signal to AM IN connector is less than 1 V peak and within range of 10Hz to 50KHz.

- If correct, notify next higher level maintenance.

8. NOT Ø LOCKED LIGHT ON.

Step 1. Check that RF OUTPUT light is on.

- Press key.

Step 2. Check that INT/EXT switch on rear panel is in proper position.

- If using an external reference, verify switch set to EXT and external source connected to FREQ STD input connector.
- If using internal reference, verify switch set to INT and jumper installed between FREQ STD input and FREQ STD output connectors.
- If correct, notify next higher level maintenance.

9. FM OVERMOD LIGHT ON.

Step 1. Press FM Deviation MHz 10 UNLOCKED key, enter deviation, and adjust external signal source amplitude to obtain desired FM deviation.

Step 2. Check that signal applied to FM IN connector is less than 1V peak and within 50Hz to 1MHz.

- If correct, notify next higher level maintenance.

10. OVEN COLD LIGHT ON.

Step 1. Set LINE switch to STBY and then to ON. Press RCL and number 0 keys.

- If light on after 15 minutes, notify next higher level maintenance.

Table 3-1. Troubleshooting-Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

11. OUT OF RANGE LIGHT ON.

Check that start and stop frequencies are set proper range (2.0 to 18.0 GHz).

- If correct, notify next higher level maintenance.

12. EXTERNAL REF LIGHT ON.

Check INT/EXT switch on rear panel.

- If using internal reference, set switch to INT.
- If using external reference, condition is normal.
- If correct, notify next higher level maintenance.

13. OUTPUT LEVEL VERNIER KNOB WILL NOT CHANGE OUTPUT LEVEL METER.

Step 1. Check that RF OUTPUT light is on.

Step 2. Check that MTR LVL light is on.

Step 3. Check that ALC INTERNAL light is on.

- If using an external ALC input, check input signal to EXT AK IN connector.
- If signal correct, notify next higher level maintenance.

14. FREQ INCREMENT TUNE KNOB WILL NOT CHANGE FREQUENCY.

Step 1. Check that FREQ INCREMENT TUNE ON/OFF light is on.

Step 2. Set LINE switch to STBY then to ON. Press RCL and number 0 keys.

- If still inoperative, notify next higher level maintenance.

15. NO OUTPUT FROM REAR PANEL BNC CONNECTOR.

Step 1. For FREQ STANDARD output connector.

- Set rear panel INT/EXT switch to INT.
- If correct, notify next higher level maintenance.

Step 2. For all other output connectors.

- Select sweep mode. Verify proper operating procedure (para 2-16).
- For TONE MKR connector, select markers.
- If correct, notify next higher level maintenance.

Section IV. MAINTENANCE PROCEDURES

3-7. REPLACE FUSE.

DESCRIPTION

This procedure covers: Remove. Install.

REMOVE

1. Working from the front panel, set POWER switch (1) to STBY.

2. Working from rear, unplug power cable (2).

3. Slide plastic window (3) over power connector.

4. Pull fuse (4) out of fuseholder (5) using extractor (6).

5. Verify voltage selection card (7) and fuse (4) are related for line voltage being used (para 3-5).

INSTALL

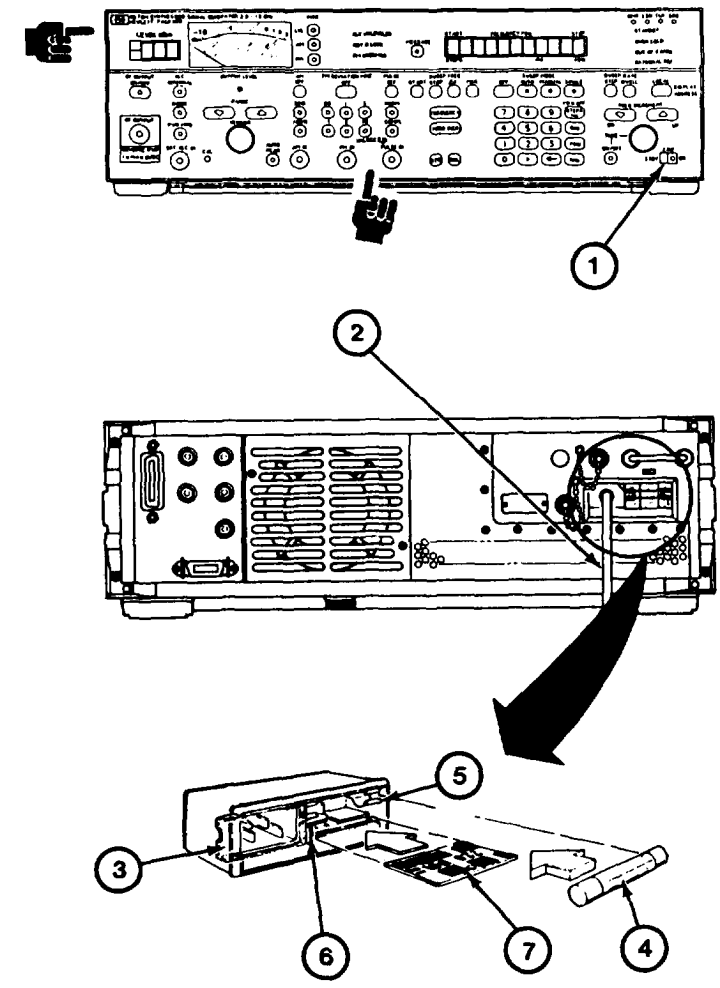
1. Working from rear, insert the fuse (4) into the fuseholder (5) and press into place.

2. Position extractor (6) into place.

3. Slide plastic window (3) over fuseholder (5).

4. Replace power cable (2).

5. Working from front. set POWER switch (1) to ON.



END OF TASK

3-8. REPLACE FRONT PANEL CONTROL KNOBS.

DESCRIPTION

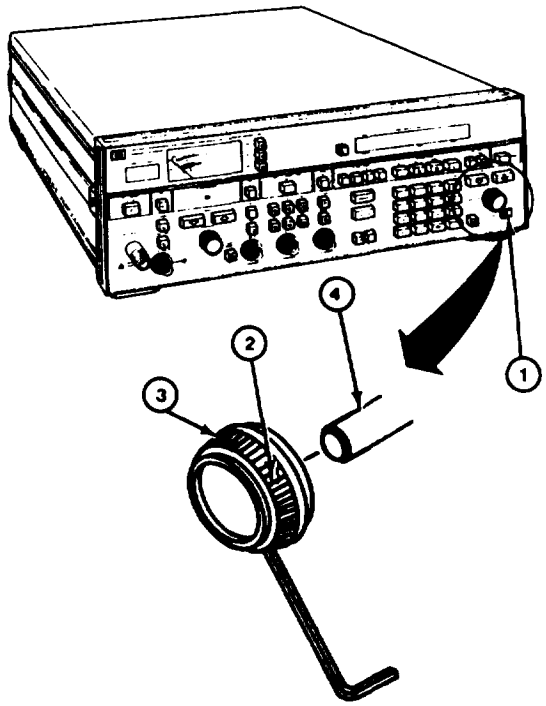
This procedure covers: Remove. Install.

REMOVE

1. Set POWER switch (1) to STBY.
2. Loosen two setscrews (2).
3. Pull knob (3) off shaft (4).

INSTALL

1. Push knob (3) onto shaft (4).
2. Tighten two setscrews (2).
3. Set POWER switch (1) to on.



END OF TASK

3-9. REPLACE FRONT PANEL PUSH BUTTONS.

DESCRIPTION

This procedure covers: Remove. Install.

REMOVE

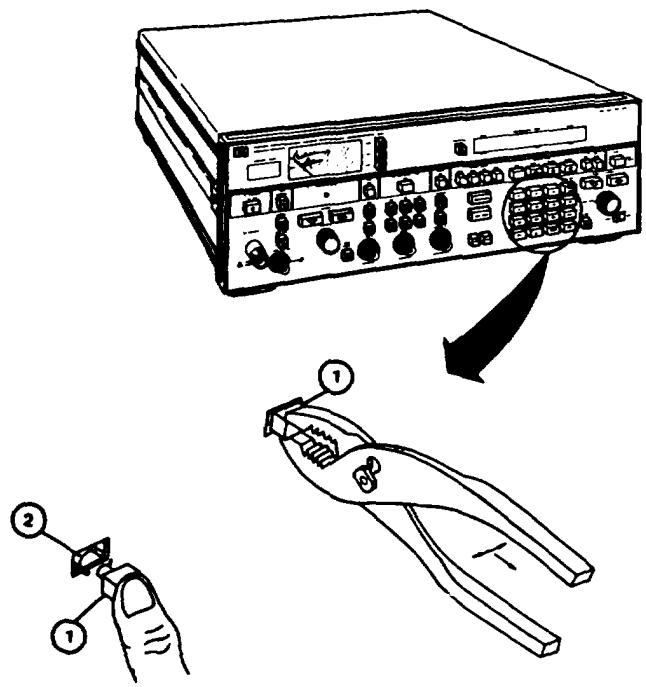
1. CAREFULLY pull pushbutton (1) off actuator (2) using a small pliers.

INSTALL

1. Align the pushbutton (1) on the switch actuator (2).

2. Press the new pushbutton (1) until it seats fully on the switch actuator (2).

3. Check the pushbutton for free movement and proper operation.



END OF TASK

3-10. REPLACE BOTTOM BUMPERS AND TILT STANDS.

DESCRIPTION

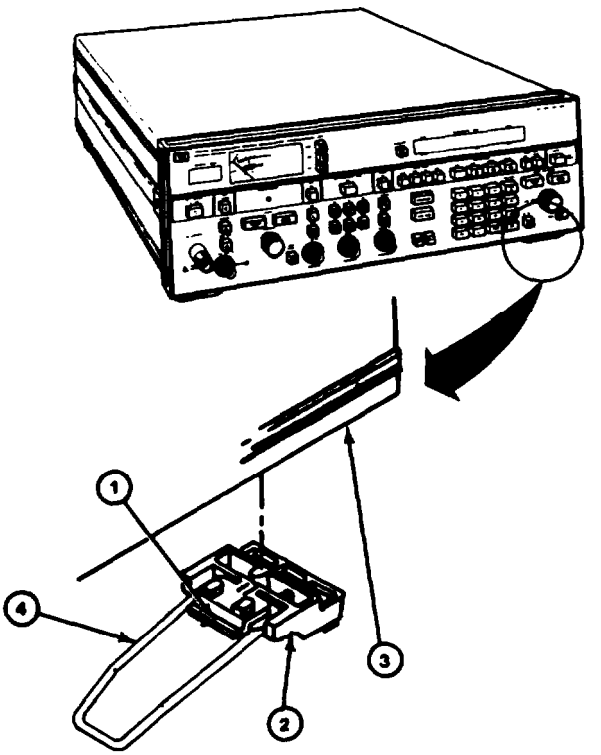
This procedure covers: Remove. Install.

REMOVE

1. Place equipment on side.
2. Lift tab (1) and slide bumper (2) inward.
3. Pull bumper (2) out of bottom cover (3).
4. Remove stand (4) from bumper (2).

INSTALL

1. Replace stand (4) with bend facing away from bottom cover into bumper (2).
2. Align three studs on bumper (2) with three holes on bottom cover (3).
3. Slide bumper (2) outward until it locks.



END OF TASK

3-11. REPLACE INSTRUCTION CARD.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

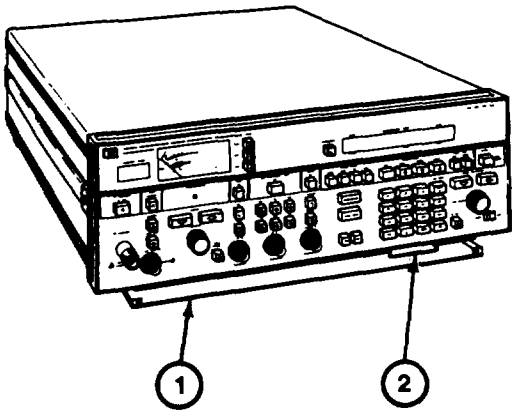
PRELIMINARY PROCEDURES:
Remove bottom bumpers (para 3-10).

REMOVE

1. Remove instruction card holder (1).
2. Remove instruction card (2).

INSTALL

1. Replace instruction card (2) in holder (1).
2. Place holder (1) on bottom cover.



NOTE

FOLLOW-ON MAINTENANCE:
Install bottom bumpers (para 3-10).

END OF TASK

3-12. REPLACE REAR BUMPERS.

DESCRIPTION

This procedure covers: Remove. Install.

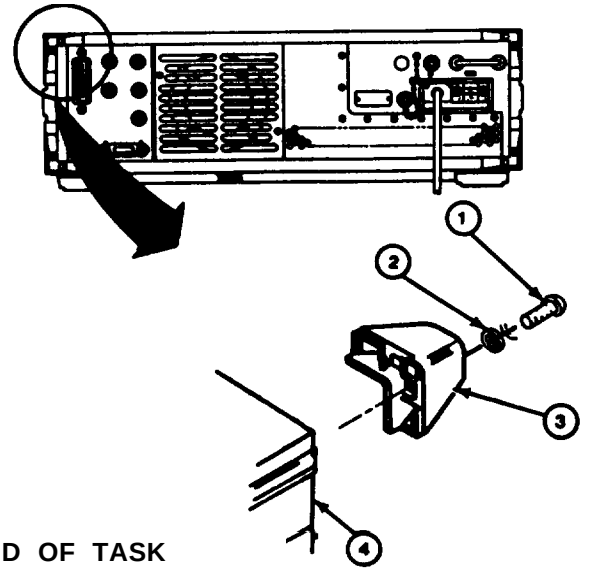
REMOVE

1. Working from rear, remove screw (1) and lockwasher (2).

2. Pull bumper (3) from rear frame (4).

INSTALL

1. Working from rear, position bumper (3) on rear frame (4).



END OF TASK

3-13. REPLACE SIDE HANDLES

DESCRIPTION

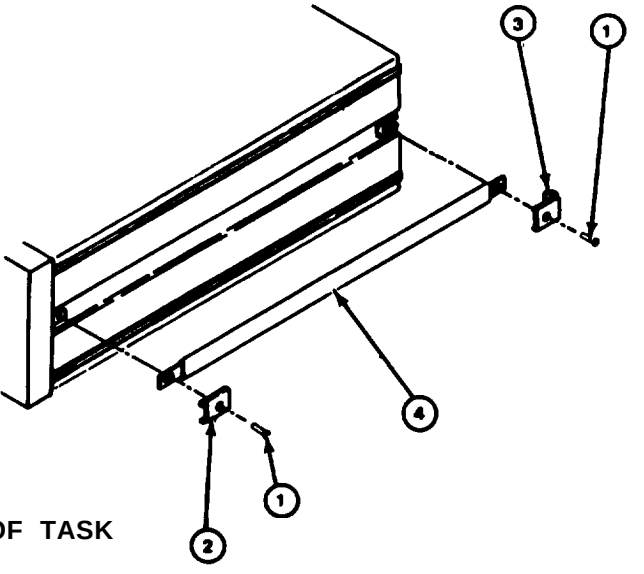
This procedure covers: Remove. Install.

REMOVE

1. Working from side, remove screws (1).
2. Remove front (2) and rear (3) retainers.
3. Remove side handle (4).

INSTALL

1. Working from side, position side handle (4), front (2) and rear (3) retainers.
2. Install screws (1).



END OF TASK

3-14. REPLACE TOP TRIM.

DESCRIPTION

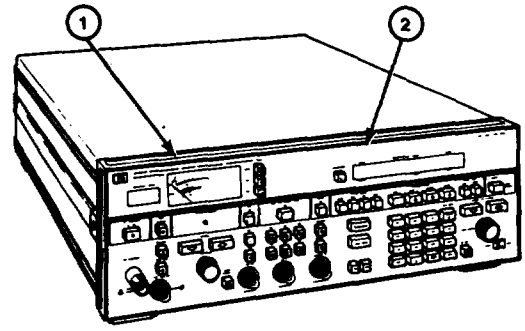
This procedure covers: Remove. Install.

REMOVE

Working from top, pull up and remove trim (1).

INSTALL

Working from top, position trim (1) on front frame (2). Press into place.



END OF TASK

3-15. REPLACE FRONT HANDLES.

DESCRIPTION

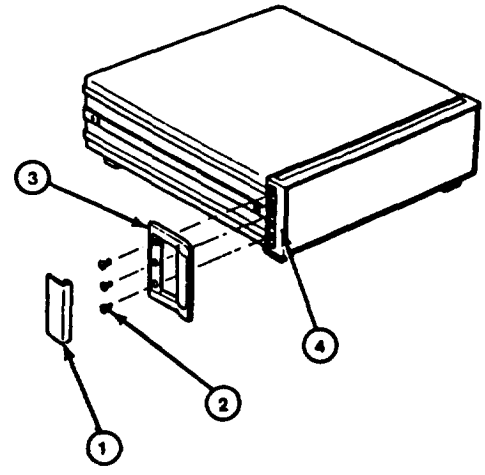
This procedure covers: Remove. Install.

REMOVE

1. Working from side, remove trim (1).
2. Remove screws (2).
3. Remove front handle (3).

INSTALL

1. Working from side, position side handle (3) on tint frame (4).
2. Install screws (2).
3. Install trim (1).



END OF TASK

Section V. PREPARATION FOR STORAGE OR SHIPMENT

3-16. PACKAGING.

Package Signal Generator in original shipping container. When using packing materials other than the original, use the following guidelines:

Wrap Wrap Signal Generator in plastic packing material.

- Use double-wall cardboard shipping container.
- Protect all sides with shock-absorbing material to prevent Signal Generator from movement within the container.
- Seal the shipping container with approved sealing tape.
- Mark “FRAGILE” on all sides, top, and bottom of shipping container.

3-17. TYPES OF STORAGE.

- Short-Term (administrative)= 1 to 45 days. Refer to TM 740-90-1 for administrative storage procedures.
- Intermediate=46 to 180 days.
- Long term=over 180 days. After long term storage, perform memory check (Table 2-1). If this check fails, notify next higher level maintenance.

3-18. ENVIRONMENT.

The Signal Generator should be stored in a clean, dry environment. In high humidity environments, protect the Signal Generator from temperature variations that could cause internal condensation. The following environmental conditions apply to both shipping and storage:

Temperature	-55° C to +75° C (-66° F to +158° F)
Relative Humidity	less than 95%
Altitude	less than 15,300 meters (50,000 feet)

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS.

Recommended Changes to Publications and Blank Forms. . . . . DA Form 2028

Recornmended Changes to Equipment Technical Manuals . . . . . DA Form 2028-2

Equipment Inspection and Maintenance Worksheet . . . . . DA Form 2404

Discrepancy in Shipment Report (DISREP) . . . . . Form SF 361

ReportofDiscrepancy (ROD). . . . . Form SF364

Quality DeficiencyReport . . . . . Form SF 368

A-3. TECHNICAL MANUALS.

The Army Maintenance Management System (TAMMS) . . . . . DA Pam 738-750

Procedures for Destruction of Electronics Materiel to Prevent Enemy Use. . . . . TM 750-244-2

Organizational, Direct Support and General Support Repair Parts and Special Tools List, for Signal Generator SG-1219/U. . . . . 11-6625-3143 -24P

Administrative Storage Procedures. . . . . TM 740-90-1

A-4. MISCELLANEOUS.

Common Table of Allowances. . . . . CTA 50-970

Consolidated Index of Army Publications and Blank Forms . . . . . DA Pam 25-30

First Aid for Soldiers . . . . . FM 21-11

Safety Precautions for Maintenance of Electrical/Electronic Equipment . . . . . TB 385-4

Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents MIL-STD-12

APPENDIX B
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General.

a. This appendix provides a general explanation of all maintenance and repair function authorized at the two maintenance levels under the Two-Level Maintenance System concept for the Signal Generator SG-1219/U.

b. The Maintenance Allocation Chart (MAC) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component levels, which are shown on the MAC in column (4) as:

1. Field – includes two columns, Unit maintenance and Direct Support maintenance. The Unit maintenance column is divided again into two more subcolumns, C for Operator or Crew and O for Unit maintenance.
2. Sustainment – includes two subcolumns, general support (H) and depot (D).

c. Section III lists the tools and test equipment requirements (both special tools and common tool sets) required for each maintenance function as referenced from the Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. Maintenance Functions

Maintenance functions are limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g. by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.

c. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms.

The following are examples of service functions:

1. Unpack. To remove from packing box for service or when required for the performance of maintenance operations.
2. Repack. To return item to packing box after service and other maintenance operations.
3. Clean. To rid the item of contamination.
4. Touch up. To spot paint scratched or blistered surfaces.
5. Mark. To restore obliterated identification.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Paint. To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.

i. Replace. To remove an unserviceable item and install a serviceable counterpart in its place "Repair" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.

j. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

1. Services. Inspect, test, service adjust, align, calibrate, and/or replace.
2. Fault location/troubleshooting. The process of investigating and detecting the case of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).
3. Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).
4. Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

k. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

l. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying army equipment/components.

B-3. Explanation of Columns in the MAC, SECTION II.

a. Column (1) Group Number. Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

b. Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions, refer to "Maintenance Functions" outlined above.)

d. Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as man hours in whole hours or decimals) in the appropriate subcolumn. The work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

1. Field:
   - C Operator or Crew maintenance
   - O Unit maintenance
   - F Direct Support maintenance

2. Sustainment:
   - L Specialized Repair Activity
   - H General Support maintenance
   - D Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

e. Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

f. Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

B.4 Explanation of Columns in the Tools and Test Equipment Requirements, SECTION III.

a. Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

b. Column (2) Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column (3) Nomenclature. Name or identification of the tool or test equipment.

d. Column (4) National Stock Number (NSN). The NSN of the tool or test equipment.

e. Column (5) Tool Number. The manufacturer's part number, model number, or type number.

B.5 Explanation of Columns in the Remarks, SECTION IV.

a. Column (1) Remarks Code. The code recorded in column (6) of the MAC.

b. Column (2) Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC."

Section II. MAINTENANCE ALLOCATION CHART FOR SIGNAL GENERATOR, SG-1219/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
00	SIGNAL GENERATOR SG-1219/U	INSPECT		0.5					A
		INSPECT			0.5			2	
		TEST		0.5					B
		TEST			5.0			2,4-11,13,14,16-25,31-44	C
		CALIBRATE			8.0			2-44	D
		REPLACE		0.1					E
		REPAIR		1.0				1	F
		REPAIR			4.0			2-44	D
		OVERHAUL					90.0	2-44	D
01	RF OUTPUT ASSEMBLY A1	TEST			1.0			2,3,9-11,13 , 14,16, 18,19, 24,25,41	
		REPLACE		0.1					E
		REPAIR			3.0			2,3,8-11,13-16,18,19,21-25,27,41	G
0101	PREAMPLIFIER ASSEMBLY A1A9	INSPECT			0.2			2	
		REPLACE			0.5			2.9,10,15,16,18,19,21-24,41	D,G
		REPAIR					8.0		G,H
0102	YTM ASSEMBLY A1A10	TEST			1.0			2,3,13,16,41	I
		REPLACE			0.5			2,8-11,13, 15, 16,18,19,21-25,27,41	D,G
		REPAIR			1.0			2,3,8-11,13, 16,18,19,21-25,27,41	D,J
		REPAIR					7.0		G,H
0103	AMPLIFIER ASSEMBLY A1A11	INSPECT			0.2			2	
		REPLACE			0.5			2,11,13,16,18, 19,25,41	G,K
		REPAIR					4.0		G,K
0104	CIRCUIT CARD ASSEMBLY (MOTHERBOARD) A1A12	TEST			0.5			2,13,16	
		REPLACE		0.1					E
		REPAIR			2.5			2,13,16	
0105	PROGRAMMABLE ATTENUATOR A1AT1	INSPECT			0.2			2	
		REPLACE			0.5			2	G,L
		REPAIR					4.0		G,L
02	CONTROLLER ASSEMBLY A2	TEST			2.0			2,3,13,14,16, 20,41	
		REPLACE		0.1					E
		REPAIR			2.0			2-5,13,14,17,20, 23,24,30,41-44	G
0201	CIRCUIT CARD ASSEMBLY	TEST			0.5			2,13,16	
		REPLACE		0.1					E
		REPAIR			2.0			2,13,16	G
03	RF SOURCE ASSEMBLY A3	TEST			2.0			2,3,13,14,16, 20,24,41	
		REPLACE		0.1					E
		REPAIR			4.0			2,3,9,10,12-16,18-24,26,41	D,G
0301	CIRCUIT CARD ASSEMBLY RECTIFIER A3A1	TEST			0.2			2,3,13,16,41	
		REPLACE			0.3			2,16	
		REPAIR			0.3			2,3,13,16,41	M
0302	M/N VCO ASSY A3A1A4 (INCLUDES A3A1A5)	TEST			1.0			2,3,13,16,41	N
		REPLACE			0.5			2	G
		REPAIR			1.0			2,3,13,14,16, 20,26,41	G,O
0303	CIRCUIT CARD ASSEMBLY (MOTHERBOARD) A3A1A6	TEST			0.4			2,13,16	
		REPLACE		0.1					E
		REPAIR			1.0			2,13,16	
0304	CIRCUIT CARD ASSEMBLY (POSITIVE REGULATOR) A3A3	TEST			0.4			2,3,13,16,41	
		REPLACE			0.3			2,16	G
		REPAIR			0.4			2,3,13,16,41	G,M

Section II. MAINTENANCE ALLOCATION CHART FOR SIGNAL GENERATOR, SG-1219/U-Continued

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0305	CIRCUIT CARD ASSEMBLY (NEGATIVE REGULATOR) A3A4	TEST REPLACE REPAIR			0.4 0.3 0.4			2,3,13,16,41 2,16, 2,3,13,16,41	 G G,M
0306	OSCILLATOR ASSEMBLY A3A8	TEST REPLACE REPAIR			0.2 0.5		 4.0	2 2	 G G,H
0307	YTO LOOP ASSEMBLY A3A9	TEST REPLACE REPAIR		0.1	0.1 3.0		 	2,3,12,13,16 2,3,9,10,12-16,20-24,41	G E D,G
0308	CIRCUIT CARD ASSEMBLY (SAMPLER) A3A9A5	TEST REPLACE REPAIR			1.0 0.8 1.0		 0.6 	2,13,16 2 2,13,15,16,20,21	P Q R
0309	PIM ASSEMBLY A3A9A8	INSPECT REPLACE REPAIR			0.2 0.5 		 8.0	2 2,9,10,15,16,18,19,21-24,41 	 D,G G,H
0310	CIRCUIT CARD ASSEMBLY (MOTHERBOARD) A3A10	INSPECT TEST REPLACE REPAIR			0.2 0.5 3.0 3.0		 	2 2,13,16 2 2,13,16	 G,S
0311	CIRCUIT CARD ASSEMBLY ((100MHz VCOX) A3A1A2	REPLACE REPAIR			0.5 1.0		0.6 1.0	2 2,13,15,16,18-20,28	 T
04	FRONT PANEL ASSEMBLY A4	TEST REPLACE REPAIR		0.1	0.5 1.0		 	2,13,16	 E G
0401	CIRCUIT CARD ASSEMBLY (FRONT PANEL) A4A1	TEST REPLACE REPAIR		0.1	1.0 1.5		 	2,13,16 2,13,16	 E D,G

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR SIGNAL GENERATOR, SG-1219/U

(1) TOOLS OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER	(5) TOOL NUMBER
1	O	Tool Kit, Electronic	5180-00-064-5178	TK-101/G
2	F,D	Tool Kit, Electronic	4931-01-073-3845	JTK-17
3	F,D	Semiconductor Test Set	6625-01-095-9344	520B
4	F,D	Attenuator, Fixed 3dB	6695-01-109-9119	9918-3dB
5	F,D	Attenuator, Fixed 6dB (with adapters)	6695-01-109-9118	9918-6dB
6	F,D	Attenuator, Fixed 10dB (with adapters) (2 each)	6695-01-109-9117	9918-10dB
7	F,D	Attenuator, Fixed 20dB (with adapters) (2 each)	6695-01-109-9116	9918-20dB
8	F,D	Attenuator, Variable	6625-01-063-9297	AF117A-69-34
9	F,D	Preamp/Power Amp DC to 1MHz	6695-01-081-9053	RK-519
10	F,D	Preamp/Power Amp 10 to 500 MHz	4931-00-128-1444	RF815
11	F,D	Crystal Detector	6695-01-361-8674	8470B/012
12	F,D	Current Probe	6625-00-172-6612	P6021 (or equivalent)
13	F,D	Oscilloscope	6625-01-4707541	OS-303/G
14	F,D	Spectrum Analyzer	6625-01-079-9495	AN/USM-489
15	D,D	Low Frequency Spectrum Analyzer	4931-01-238-2002	MIS-35951
16	F,D	Digital Multimeter	6625-00-557-8305	3490A/060
17	F,D	AC Voltmeter	6625-01-255-4547	ME-545-G
18	F,D	Power Meter	6625-00-148-8069	432A-E12
19	F,D	Thermistor Mount	6625-01-067-0413	8478B
20	F,D	Counter	4931-01-095-5457	351D
21	F,D	Microwave Measurement Set	6625-01-067-6018	4312M16P
22	F,D	Mixer (15286)	5985-01-218-5276	DM1-18 (or equivalent)
23	F,D	Signal Generator Workstation consisting of a Distortion Analyzer, Modulation Analyzer, and Signal Generator	6695-01-257-2990	MIS-35954
24	F,D	Oscillator, Test	4931-00-054-3483	652A
25	F,D	Generator Pulse	6625-01-103-9550	214B/909
26	F,D	Voltage, DC Source	6625-00-150-6994	332BAF
27	F,D	Multimeter	6625-01-112-7153	DM501A
28	F,D	Power Supply	6130-00-195-1635	6218A
29	F,D	High Impedance Probe	6625-00-516-8387	P6201
30	F,D	Digital Circuit Tester	6625-01-068-8641	TS-3791/U
31	F,D	SMA Cable (to 18GHz)	5995-01-082-5403	1585-1003
32	F,D	Adapter, SMA (m) to BNC (f)	5935-00-024-0612	1250-1200
33	F,D	Adapter, BNC (f) to SMB (f) (2 each)	5935-00-414-0960	1250-1236
34	F,D	Adapter, SMB (m) to BNC (f)	5935-00-988-5646	1250-1237
35	F,D	Ohmite Kit		
36	F,D	Filter	4931-00-178-1051	MIS-10329 TYPE 1
37	F,D	Adapter, SMC (m) to BNC (m)	4931-00-865-0679	1250-0831
38	F,D	Adapter, SMA (m) to SMA (m)	5935-00-460-0781	1250-1159
39	F,D	50 ohm Feedthru	5985-00-087-4954	0110049-01
40	F,D	50 ohm termination	5935-00-422-3620	0151010-00
41	F,D	Circuit Card Extender Kit	5998-01-298-0386	08673-60123
42	F,D	Test Connector	6625-01-319-9632	08673-60123
43	F,D	MPU Test Connector	5935-01-294-7706	11726-60001
44	F,D	Extender Cable	5995-01-296-9696	86730-60051

Section IV. REMARKS FOR SIGNAL GENERATOR, SG-1219/U

REMARKS CODE	REMARKS
A	External visual inspection only.
B	Operational tests and observation of error messages.
C	Completion of performance tests.
D	Interconnect Cable, Pulse Shunt Adapter, or Heat Staking Tip must be manufactured using the instructions provided in TM 11-6625-3142-40.
E	Time indicated is for provisioning purposes only.
F	Repair by replacement of fuses, knobs, handles, feet, rear panel standoffs, and power cord which are nonrepairable items.
G	Configuration of assembly installed in each instrument is dependent on the serial number prefix. See TM-11-6625-3143-24P for changes in instrument configuration.
H	Contractor repair.
I	Fault isolate to sealed YTM module or YTM heater circuit card assembly (A1A10A1) level.
J	Repair limited to replacement of nonrepairable circuit card assembly A1A10A1.
K	Repair of instruments with HP P/N 08673-67011 assemblies installed is limited to replacement of the amplifier assembly A1A11 (which is a nonrepairable item) with the retrofit kit. All other A1A11 assemblies (other than HP P/N 08673-67011) are returned to the contractor for repair.
L	Repair of instruments with HP P/N 08672-60146 assemblies installed is limited to replacement of the attenuator assembly A1AT1 which is a nonrepairable item. All other A1AT1 assemblies (other than HP P/N 08672-60146) are returned to the contractor for repair.
M	Repair limited to replacement of fuses.
N	Fault isolate for unserviceable M/N VCO circuit card assembly A3A1A4A2 only.
O	Repair limited to the replacement of circuit card assembly A3A1A4A2 which is a nonrepairable item.
P	Fault isolate to circuit card assembly A3A9A5 or sampler microcircuit A3A9U1 level only.
Q	If circuit card assembly A3A9A5 is unserviceable and sampler microcircuit A3A9U1 is serviceable, then sampler microcircuit A3A9U1 shall be retained and reinstalled on the replacement circuit board assembly.
R	Repair limited to replacement of sampler microcircuit A3A9U1 which is a nonrepairable item; and selection of A3A9A5C22.
S	Repair includes replacement of relay K1, filter capacitors and regulator transistors which are nonrepairable items.
T	Repair limited to selection of new values for A3A1A2L4, R67, R68, R69, and C6.

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists components of the end item and basic issue items for the SG-1219/U to help you inventory items required for safe and efficient operation.

C-2. GENERAL.

The components of End Item and Basic Issue Items List (BII are divided into the following sections:

a. Section II-Components of End Item. This listing is for information purposes only and is not authority to requisition replacements. These are part of the end item, but are removed and/or separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III--Basic Issue Items. These are the minimum essential items required to place the SG-1219/U in operation, to operate it and to perform emergency repairs. Although shipped separately packaged BII must be with the SG-1219/U during operation and whenever it is transferred between property accounts. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS.

a. Column (1)-Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

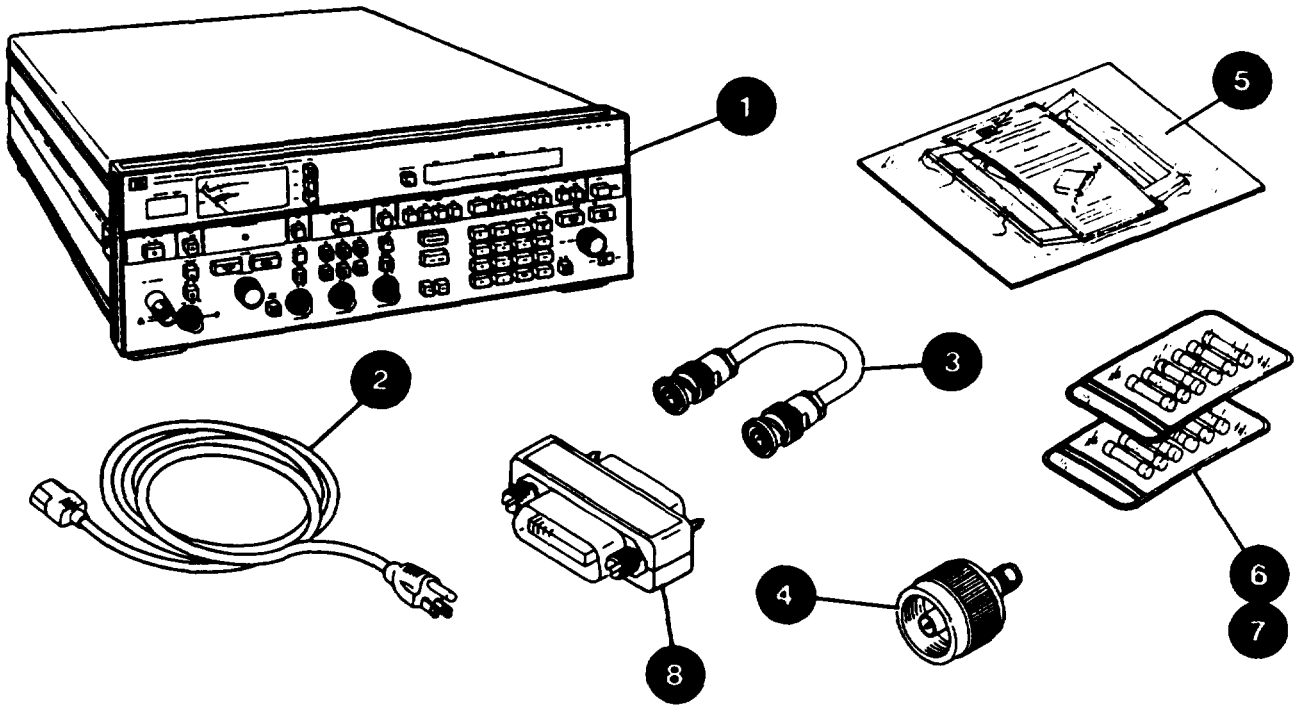
b. Column (2)-Nafional Stock Number. This column indicates the national stock number assigned to the item and will be used for requisitioning purposes.

c Column (3)-Description. This column indicates the federal item name and if required, a minimum description to identify and locate the itern. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d Column (4)--Unit of Measure (U/M). This column indicates the measure used in performing the actual operation/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5)-Quantify Required (Qfy Rqr). This column indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
1		SIGNAL GENERATOR (28480) 8673M	EA	1
2	6150-01-111-1717	CABLE ASSEMBLY, POWER (16428) 17743	EA	1
3	5995-01-148-7020	CABLE ASSEMBLY, RADIO FREQ (28480) 86701-60063	EA	1
4		ADAPTER. ELECTRICAL CONN (98291) 050-674-6700-89	EA	1
5	6625-01-220-3003	FRONT HANDLE KIT (28480) 5061-9689	EA	1
6	5920-00-557-2647	FUSE, CARTRIDGE (81349) F02A250V4A	EA	5
7	5920-00-280-4960	FUSE, CARTRIDGE (81349) F02A250V2A	EA	6
8	5935-01-197-4707	ADAPTER, ELECTRICAL CONN (28480) 5060-9462	EA	1

APPENDIX D
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. SCOPE.

This appendix lists additional items you are authorized for the support of the SG-1219/U.

D-2. GENERAL.

This list identifies items that do not have to accompany the SG-1219/U and that do not have to be turned in with it. These items are all authorized to you by (CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING.

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TD, or JTA) which authorized the item(s) to you.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM and PART NUMBER USABLE ON CODE	(3) U/M	(4) QTY AUTH
5920-00-557-2647	FUSE, CARTRIDGE (81349) F02A250V4A	EA	5
5920-00-280-4960	FUSE, CARTRIDGE (81349) F02A250V2A	EA	6

APPENDIX E
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE.

This appendix lists expendable supplies you will need for organizational maintenance on Signal GeneratorS G-1219/U. These items are authorized to you by CTA 50-970, Expendable items (Except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. EXPLANATION OF COLUMNS.

a Column (1)-Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound item 5, App. D).

b. Column (2)-Level. This column identifies the lowest level of maintenance that requires the listed item.

O - organizational Maintenance.

c. Column (3)-National Stock Number. This column indicates the national stock number assigned to the item and will be used fcr requisitioning purposes.

d Column (4)-Description. This column indicates the federal item name and if required a minimum description to identify the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

e. Column (5)-Unit of Measure (U/M). This column indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	6810-00-753-4993	Alcohol, Isopropyl, 8OZ Can, MIL -A-10428, Grade A (81349)	CN
2	C	8305-00-267-3015	Cloth, Cheesecloth, Cotton, Lintless, CCC-C-440, Type II, Class 2 (81349)	YD
3	C		Detergent, Mild, Liquid	OZ

INDEX

Subject

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By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R.L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
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These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@wherever.army.mil>
To: 2028@redstone.army.mil

Subject: DA Form 2028

1. **From: Joe Smith**
2. **Unit: home**
3. **Address: 4300 Park**
4. **City: Hometown**
5. **St: MO**
6. **Zip: 77777**
7. **Date Sent: 19–OCT–93**
8. **Pub no: 55–2840–229–23**
9. **Pub Title: TM**
10. **Publication Date: 04–JUL–85**
11. **Change Number: 7**
12. **Submitter Rank: MSG**
13. **Submitter FName: Joe**
14. **Submitter MName: T**
15. **Submitter LName: Smith**
16. **Submitter Phone: 123–123–1234**
17. **Problem: 1**
18. **Page: 2**
19. **Paragraph: 3**
20. **Line: 4**
21. **NSN: 5**
22. **Reference: 6**
23. **Figure: 7**
24. **Table: 8**
25. **Item: 9**
26. **Total: 123**
27. **Text:**

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25–30; the proponent agency is ODISC4.	Use Part II (*reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)	DATE 8/30/02
TO: (*Forward to proponent of publication or form)(Include ZIP Code)* Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM–MMC–MA–NP Redstone Arsenal, AL 35898	FROM: (*Activity and location)(Include ZIP Code)* MSG, Jane Q. Doe 1234 Any Street Nowhere Town, AL 34565	

PART 1 – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 9–1005–433–24	16 Sep 2002	Organizational, Direct Support, And General Support Maintenance Manual for Machine Gun, .50 Caliber M3P and M3P Machine Gun Electrical Test Set Used On Avenger Air Defense Weapon System

ITEM NO.	PAGE NO.	PARA–GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON
1	WP0005 PG 3		2			Test or Corrective Action column should identify a different WP number.

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE
MSG, Jane Q. Doe, SFC	788–1234	

TO: (*Forward direct to addressee listed in publication)*	**FROM:** (*Activity and location) (Include ZIP Code)*	**DATE**
Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM–MMC–MA–NP Redstone Arsenal, AL 35898	MSG, Jane Q. Doe 1234 Any Street Nowhere Town, AL 34565	8/30/02

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
MSG, Jane Q. Doe, SFC	788–1234	

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25–30; the proponent agency is ODISC4.	Use Part II (*reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)	DATE
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PUBLICATION/FORM NUMBER	DATE	TITLE

ITEM NO.	PAGE NO.	PARA–GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON

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TO: (*Forward direct to addressee listed in publication)* Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM-MMC-MA-NP Redstone Arsenal, AL 35898	**FROM:** (*Activity and location) (Include ZIP Code)*	**DATE**

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

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PART III – REMARKS (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 063040-000