

9640A

RF Reference Source

Applicable only to older 9640A & 9640A-LPN units with firmware up to Iss 2.X.

Getting Started Manual

PN 2546604

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Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries, or to any product which, in Fluke's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

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LIMITES DE GARANTIE ET DE RESPONSABILITE

La société Fluke garantit l'absence de vices de matériaux et de fabrication de ses produits dans des conditions normales d'utilisation et d'entretien. La période de garantie est de un an et prend effet à la date d'expédition. Les pièces, les réparations de produit et les services sont garantis pendant une période de 90 jours. Cette garantie ne s'applique qu'à l'acheteur d'origine ou à l'utilisateur final s'il est client d'un distributeur agréé par Fluke, et ne s'applique pas aux fusibles, aux batteries/piles interchangeables ni à aucun produit qui, de l'avis de Fluke, a été malmené, modifié, négligé, contaminé ou endommagé par accident ou soumis à des conditions anormales d'utilisation et de manipulation. Fluke garantit que le logiciel fonctionnera en grande partie conformément à ses spécifications fonctionnelles pendant une période de 90 jours et qu'il a été correctement enregistré sur des supports non défectueux. Fluke ne garantit pas que le logiciel est exempt d'erreurs ou qu'il fonctionnera sans interruption.

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L'obligation de garantie de Fluke est limitée, au choix de Fluke, au remboursement du prix d'achat, ou à la réparation/remplacement gratuit d'un produit défectueux retourné dans le délai de garantie à un centre de service agréé par Fluke.

Pour avoir recours au service de la garantie, mettez-vous en rapport avec le centre de service agréé Fluke le plus proche pour recevoir les références d'autorisation de renvoi, ou envoyez le produit, accompagné d'une description du problème, port et assurance payés (franco lieu de destination), à ce centre de service. Fluke décline toute responsabilité en cas de dégradations survenues au cours du transport. Après la réparation sous garantie, le produit est renvoyé à l'acheteur, frais de port payés d'avance (franco lieu de destination). Si Fluke estime que le problème est le résultat d'une négligence, d'un traitement abusif, d'une contamination, d'une modification, d'un accident ou de conditions de fonctionnement ou de manipulation anormales, notamment de surtensions liées à une utilisation du produit en dehors des spécifications nominales, ou de l'usure normale des composants mécaniques, Fluke fournira un devis des frais de réparation et ne commencera la réparation qu'après en avoir reçu l'autorisation. Après la réparation, le produit est renvoyé à l'acheteur, en port payé (franco point d'expédition) et les frais de réparation et de transport lui sont facturés.

LA PRESENTE GARANTIE EST EXCLUSIVE ET TIENT LIEU DE TOUTES AUTRES GARANTIES, EXPRESSES OU IMPLICITES, Y COMPRIS, MAIS NON EXCLUSIVEMENT, TOUTE GARANTIE IMPLICITE DE VALEUR MARCHANDE OU D'ADEQUATION A UN USAGE PARTICULIER. FLUKE NE POURRA ETRE TENU RESPONSABLE D'AUCUN DOMMAGE PARTICULIER, INDIRECT, ACCIDENTEL OU CONSECUTIF, NI D'AUCUNS DEGATS OU PERTES, DE DONNEES NOTAMMENT, SUR UNE BASE CONTRACTUELLE, EXTRA-CONTRACTUELLE OU AUTRE.

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BESCHRÄNKTE GARANTIE UND HAFTUNGSBEGRENZUNG

Fluke gewährleistet, dass jedes Fluke-Produkt unter normalem Gebrauch und Service frei von Material- und Fertigungsdefekten ist. Die Garantiedauer beträgt 1 Jahr ab Lieferdatum. Ersatzteile, Produktreparaturen und Servicearbeiten haben eine Garantie von 90 Tagen. Diese Garantie wird ausschließlich dem Ersterwerber bzw. dem Endverbraucher, der das betreffende Produkt von einer von Fluke autorisierten Verkaufsstelle erworben hat, geleistet und erstreckt sich nicht auf Sicherungen, Einwegbatterien oder irgendwelche anderen Produkte, die nach dem Ermessen von Fluke unsachgemäß verwendet, verändert, vernachlässigt, verunreinigt, durch Unfälle beschädigt oder abnormalen Betriebsbedingungen oder einer unsachgemäßen Handhabung ausgesetzt wurden. Fluke garantiert für einen Zeitraum von 90 Tagen, dass die Software im Wesentlichen in Übereinstimmung mit den einschlägigen Funktionsbeschreibungen funktioniert und dass diese Software auf fehlerfreien Datenträgern gespeichert wurde. Fluke übernimmt jedoch keine Garantie dafür, dass die Software fehlerfrei ist und störungsfrei arbeitet.

Von Fluke autorisierte Verkaufsstellen dürfen diese Garantie ausschließlich für neue und nicht benutzte, an Endverbraucher verkaufte Produkte leisten. Die Verkaufsstellen sind jedoch nicht dazu berechtigt, diese Garantie im Namen von Fluke zu verlängern, auszudehnen oder in irgendeiner anderen Weise abzuändern. Der Käufer hat nur dann das Recht, aus der Garantie abgeleitete Unterstützungsleistungen in Anspruch zu nehmen, wenn das Produkt bei einer von Fluke autorisierten Vertriebsstelle erworben oder der jeweils geltende internationale Preis gezahlt wurde. Fluke behält sich das Recht vor, dem Käufer Einfuhrgebühren für Ersatzteile in Rechnung zu stellen, falls der Käufer das Produkt nicht in dem Land zur Reparatur einsendet, in dem er das Produkt ursprünglich erworben hat.

Die Garantieverpflichtung von Fluke beschränkt sich darauf, dass Fluke nach eigenem Ermessen den Kaufpreis ersetzt oder aber das defekte Produkt unentgeltlich repariert oder austauscht, wenn dieses Produkt innerhalb der Garantiefrist einem von Fluke autorisierten Servicezentrum zur Reparatur übergeben wird.

Um die Garantieleistung in Anspruch zu nehmen, wenden Sie sich bitte an das nächstgelegene von Fluke autorisierte Servicezentrum, um Rücknahmeinformationen zu erhalten, und senden Sie dann das Produkt mit einer Beschreibung des Problems und unter Vorauszahlung von Fracht- und Versicherungskosten (FOB-Bestimmungsort) an das nächstgelegene von Fluke autorisierte Servicezentrum. Fluke übernimmt keine Haftung für Transportschäden. Im Anschluss an die Reparatur wird das Produkt unter Vorauszahlung der Frachtkosten (Frachtfrei-Bestimmungsort) an den Käufer zurückgesandt. Wenn Fluke feststellt, dass der Defekt auf Vernachlässigung, unsachgemäße Handhabung, Verunreinigung, Veränderungen am Gerät, einen Unfall oder auf anormale Betriebsbedingungen, einschließlich durch außerhalb der für das Produkt spezifizierten Belastbarkeit verursachter Überspannungsfehler oder normaler Abnutzung mechanischer Komponenten, zurückzuführen ist, wird Fluke dem Erwerber einen Voranschlag der Reparaturkosten zukommen lassen und erst die Zustimmung des Erwerbers einholen, bevor die Arbeiten in Angriff genommen werden. Nach der Reparatur wird das Produkt unter Vorauszahlung der Frachtkosten an den Käufer zurückgeschickt, und es werden dem Käufer die Reparaturkosten und die Versandkosten (Frachtfrei-Versandort) in Rechnung gestellt.

DIE VORSTEHENDEN GARANTIEBESTIMMUNGEN STELLEN DEN EINZIGEN UND ALLEINIGEN RECHTSANSPRUCH AUF SCHADENERSATZ DES KÄUFERS DAR UND GELTEN AUSSCHLIESSLICH UND AN STELLE ALLER ANDEREN VERTRAGLICHEN ODER GESETZLICHEN GEWÄHRLEISTUNGSPFLICHTEN, EINSCHLIESSLICH - JEDOCH NICHT DARAUF BESCHRÄNKT - DER GESETZLICHEN GEWÄHRLEISTUNG DER MARKTFÄHIGKEIT UND DER EIGNUNG FÜR EINEN BESTIMMTEN ZWECK. FLUKE ÜBERNIMMT KEINE HAFTUNG FÜR SPEZIELLE, MITTELBARE, NEBEN- ODER FOLGESCHÄDEN ODER ABER VERLUSTE, EINSCHLIESSLICH DES VERLUSTS VON DATEN, UNABHÄNGIG VON DER URSACHE ODER THEORIE.

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Zur Registrierung der Software <http://register.fluke.com> besuchen.

GARANTÍA LIMITADA Y LIMITACIÓN DE RESPONSABILIDAD

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Los revendedores autorizados por Fluke podrán extender esta garantía solamente a los Compradores finales de productos nuevos y sin uso previo, pero carecen de autoridad para extender una garantía mayor o diferente en nombre de Fluke. El soporte técnico en garantía está disponible sólo si el producto se compró a través de un centro de distribución autorizado por Fluke o si el comprador pagó el precio internacional correspondiente. Cuando un producto comprado en un país sea enviado a otro país para su reparación, Fluke se reserva el derecho de facturar al Comprador los gastos de importación de las reparaciones/repuestos.

La obligación de Fluke de acuerdo con la garantía está limitada, a elección de Fluke, al reembolso del precio de compra, la reparación gratuita o el reemplazo de un producto defectuoso que sea devuelto a un centro de servicio autorizado de Fluke dentro del período de garantía.

Para obtener servicio de garantía, póngase en contacto con el centro de servicio autorizado por Fluke más cercano para obtener la información correspondiente a la autorización de la devolución, después envíe el producto a ese centro de servicio, con una descripción del fallo, con los portes y seguro prepagados (FOB destino). Fluke no se hace responsable de los daños ocurridos durante el transporte. Después de la reparación de garantía, el producto se devolverá al Comprador con los fletes ya pagados (FOB destino). Si Fluke determina que el problema fue debido a negligencia, mala utilización, contaminación, modificación, accidente o una condición anormal de funcionamiento o manipulación, incluidas las fallas por sobretensión causadas por el uso fuera de los valores nominales especificados para el producto, o al desgaste normal de los componentes mecánicos, Fluke preparará una estimación de los costes de reparación y obtendrá la debida autorización antes de comenzar el trabajo. Al concluir la reparación, el producto se devolverá al Comprador con los fletes ya pagados, facturándosele la reparación y los gastos de transporte (FOB en el sitio de despacho).

ESTA GARANTÍA CONSTITUYE LA ÚNICA Y EXCLUSIVA COMPENSACIÓN DEL COMPRADOR Y SUBSTITUYE A TODAS LAS DEMÁS GARANTÍAS, EXPRESAS O IMPLÍCITAS, INCLUIDAS, ENTRE OTRAS, TODAS LAS GARANTÍAS IMPLÍCITAS DE COMERCIABILIDAD O IDONEIDAD PARA UN PROPOSITO DETERMINADO. FLUKE NO SE RESPONSABILIZA DE PÉRDIDAS NI DAÑOS ESPECIALES, INDIRECTOS, IMPREVISTOS O CONTINGENTES, INCLUIDA LA PÉRDIDA DE DATOS, QUE SURJAN POR CUALQUIER TIPO DE CAUSA O TEORÍA.

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本保証は購入者の唯一の救済手段であり、ある特定の目的に対する商品性または適合性に関する黙示の保証をすべて含むがそれのみに限定されない、明白なまたは黙示の他のすべての保証の代りになるものです。データの紛失を含む、あらゆる原因に起因する、特殊な、間接的、偶然的または必然的損害または損失に関して、それが保証の不履行、または、契約、不法行為、信用、若しくは他のいかなる理論に基づいて発生したものであっても、Fluke は一切の責任を負いません。

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如需要保修服务，请与您就近的 Fluke 授权服务中心联系，获得退还授权信息；然后将产品寄至服务中心，并附上产品问题描述，同时预付运费和保险费（目的地离岸价格）。Fluke 不承担运送途中发生的损坏。在保修之后，产品将被寄回给买方并提前支付运输费（目的地交货）。如果 Fluke 认定产品故障是由于疏忽、误用、污染、修改、意外或不当操作或处理状况而产生，包括未在产品规定的额定值下使用引起的过压故障；或是由于机件日常使用损耗，则 Fluke 会估算修理费用，在获得买方同意后再进行修理。在修理之后，产品将被寄回给买方并预付运输费；买方将收到修理和返程运输费用（寄发地交货）的帐单。

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Table of Contents

Chapter	Title	Page
1	Introduction and Specifications.....	1-1
	About the Manual	1-1
	Safety Information	1-1
	General Safety Summary.....	1-1
	Symbols	1-4
	Product Description	1-5
	Options and Accessories	1-6
	Specifications.....	1-7
	General specifications	1-7
2	Preparing the Instrument for Operation	2-1
	Introduction.....	2-1
	Contacting Fluke.....	2-1
	Unpacking and Inspection.....	2-1
	Storing and Shipping the Instrument	2-2
	Power Considerations	2-3
	Replacing the Power Cord.....	2-3
	Replacing the Line-Power Fuses	2-4
	Selecting Line Voltage	2-4
	Power-On Sequence.....	2-6
	Power-On Self Test	2-6
	Power-On State.....	2-7
	Leveling Head Connections.....	2-8
	Installing the Instrument in an Equipment Rack.....	2-8
	Cooling Considerations.....	2-8
	Cleaning the Instrument.....	2-8

3	Local Operation	3-1
	Introduction.....	3-1
	Controls, Indicators, and Connectors.....	3-1
	Head I/O Connectors	3-2
	STBY/OPER (Standby/Operate) Keys.....	3-2
	Output Function Keys.....	3-3
	Output Signal Keys	3-3
	UNITS Key	3-3
	SETUP Key.....	3-3
	Display.....	3-5
	Data Fields	3-5
	Soft Labels	3-6
	Status Bar	3-6
	Soft Keys.....	3-6
	Field Editor.....	3-7
	Cursor Keys.....	3-7
	Spin Wheel.....	3-8
	Keypad.....	3-8
	Alphanumeric Keys.....	3-8
	ALPHA Key.....	3-9
	NEXT CHAR Key	3-9
	BKSP Key (Backspace)	3-9
	SPACE Key.....	3-9
	EXP Key (Exponent).....	3-10
	ENTER Key	3-10
	Screen Controls and Indicators	3-11
	Main RF Output Screens	3-11
	Editing Settings – The Vertical Soft Keys.....	3-11
	Expanded Settings – The Horizontal Soft Keys	3-14
	Preferences Soft Key.....	3-14
	Offset Soft Key	3-15
	Toggle Offset Soft Key	3-16
	Offset (As Error) Soft Key	3-16
	Reference Soft Keys.....	3-17
	Reference Off Soft Key.....	3-18
	Frequency and Level Track Main Soft Keys	3-18
	Rear-Panel Controls and Connectors.....	3-19
	Power Block and Switch	3-19
	IEEE 488 Connector.....	3-19
	Reference Frequency Output Connector	3-20
	Reference Frequency Input Connector	3-20
	Modulation, Leveling and Frequency Pull Input Connector	3-21
	Trigger I/O Connector	3-22
	Operating the Instrument	3-24
	Before Starting.....	3-24
	Setting Global Preferences	3-24
	Local or Remote Operation	3-25
	GPIB Command Emulation.....	3-26
	Selecting and Changing the Address of a Command Emulation	3-26
	Licensing a GPIB Emulation Personality.....	3-27
	Connecting a Leveling Head to the Instrument	3-29
	Connecting a Leveling Head to a Unit Under Test.....	3-31
	Creating an RF Output Signal	3-32

List of Tables

Table	Title	Page
2-1.	List of Contents	2-2
2-2.	Dimensions for a Substitute Cushioned Shipping Container	2-2
2-3.	Power Cord for Various Regions	2-3
2-4.	Power Input Fuse.....	2-4
2-5.	Voltage Limits for the 115 and 230 Voltage Switch Settings	2-5
3-1.	Reference Frequency Output Specifications	3-20
3-2.	Reference Frequency Input Specifications.....	3-20
3-3.	External Modulation Input Specification (FM).....	3-21
3-4.	External Modulation Input Specification (AM)	3-22
3-5.	External Leveling Input Specification.....	3-22
3-6.	External Frequency Pull Input Specification.....	3-22
3-7.	Sweep Trigger Input Specification.....	3-23
3-8.	Sweep Trigger Output Specification	3-23
3-9.	Modulation Trigger Output Specifications.....	3-23
3-10.	Global Preferences	3-25

List of Figures

Figure	Title	Page
1-1.	9640A RF Reference Source.....	1-5
1-2.	9640A Dimensions.....	1-7
2-1.	Accessing the Fuse and Changing Line Voltage.....	2-5
3-1.	Front Panel Controls, Indicators, and Connectors.....	3-2
3-2.	Status Bar	3-6
3-3.	Control Screens for the RF Output Signal	3-11
3-4.	Rear Panel Controls and Connectors.....	3-19
3-5.	Connecting the Leveling Head.....	3-30
3-6.	Control Screens for the RF Output Signal	3-32

Chapter 1

Introduction and Specifications

About the Manual

This is the Getting Started Manual for the 9640A RF Reference Source (hereafter referred to as the Instrument). It contains all of the information necessary for a new user to unpack, install, power on, and operate the Instrument at a basic level. The manual is divided into the following chapters:

Chapter 1	Introduction and Specifications
Chapter 2	Preparing the Instrument for Operation
Chapter 3	Local Operation

Safety Information

This section addresses safety considerations and describes symbols that may appear either in this manual or on the Instrument.

A **⚠⚠ Warning** statement identifies conditions or practices that could result in injury or death.

A **⚠ Caution** statement identifies conditions or practices that could result in damage to the Instrument or equipment to which it is connected.

⚠⚠ Warning

To avoid electric shock, personal injury, or death, carefully read the information under *General Safety Summary* before attempting to install, use, or service the Instrument.

General Safety Summary

The Instrument has been designed and tested in accordance with the European standard publication EN 61010-1: 2001 and U.S. / Canadian standard publications UL 61010-1:2004 and CAN/CSA-C22.2 No.61010-1:2004. The Instrument left the factory in a safe condition.

This manual contains information and warnings that must be observed to keep the Instrument in a safe condition and ensure safe operation. Using or servicing the Instrument in conditions other than as specified in the manual set could compromise your safety.

To use the Instrument correctly and safely, read and follow the precautions on the next few pages, as well as, the safety instructions or warnings given throughout this manual. In addition, follow all generally accepted safety practices and procedures when working with and around electricity.

Safety Information

Warning

To avoid electric shock, personal injury, fire, or death, read the following warnings before using the Instrument:

- Use the Instrument only as specified in this manual, or the protection provided by the instrument might be impaired.
- Do not use the Instrument in wet environments.
- Inspect the Instrument before using it. Do not use the Instrument if it appears damaged.
- Do not use the Instrument if it operates abnormally. Protection may be impaired. If in doubt, have the Instrument serviced.
- Have the Instrument serviced only by qualified service personnel.
- Always use the power cord and connector appropriate for the voltage and outlet of the country or location in which you are working.
- Connect the Instrument power cord to a power receptacle with an earth ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.
- Never remove the cover or open the case of an instrument without first disconnecting the Instrument from the power source.
- Never operate the Instrument with the cover removed or the case open.
- Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 42 V dc. These voltages pose a shock hazard.
- Use only the replacement fuse(s) specified by the manual.
- When servicing the Instrument, use only specified replacement parts.

Warning

- To prevent personal injury, use good lifting practices when lifting or moving the Instrument. The Instrument is an unbalanced load and can weigh up to 18 kg (40 pounds).

Warning

To prevent the transmission of an RF signal, never connect the Instrument output (the output from a passive Leveling Head) to a radiating antenna or leaky transmission line of any kind. Such a transmission could be hazardous to personnel and may impair the SAFE operation of equipment, and communication and navigation systems.

The connection of a radiating antenna is an illegal act in many countries. Only connect the Instrument output (the output from a passive Leveling Head) to equipment or transmission lines designed to prevent RF leakage at the level and frequency of the Instrument output.

Avoiding Instrument Damage









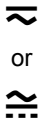







Caution

To avoid damage to the instrument, read the following cautions before using the instrument:

- The front panel connectors on the Instrument are suited only for use with Fluke 9640A-xx Leveling Heads. No other connection is permitted.
- The Leveling Heads are fitted with close tolerance metrology grade N-connectors compliant with MIL-C-39012 and MMC Standards for Precision N-connectors. When used in demanding metrology applications the Leveling Heads are likely to be mated with similar high-quality connectors, thus, minimizing the opportunity for wear and damage. However, in applications that require frequent mating or mating to lower quality connectors, the opportunity for damaging the connectors increases. On these high-risk occasions, consider using a sacrificial adapter to prevent damage to the N connectors.
- Improper mating of 50 Ω and 75 Ω connectors will irreversibly damage the center pin. Although appearance is similar, the dimensions (pin diameter) of 75 Ω differ significantly from those of 50 Ω . Make sure that the 50 Ω Leveling Head is mated only to 50 Ω systems and, likewise, that the 75 Ω Leveling Head is mated only with 75 Ω systems. Otherwise, mechanical damage of metrology-grade connectors and out-of-tolerance performance is likely to occur.
- Very high-grade flexible coaxial transmission line conducts the RF input signal to 9640A-xx Leveling Heads. As with any coaxial line, deformation of sidewalls or abrupt bending can degrade performance. Take care to avoid mechanical stress or tight bend radius < 60 mm (2.4 in).
- Reliable and repeatable interconnections are achieved only at specified torque settings. Performance will be impaired if torque settings are not observed, and permanent connector damage is likely to result from over-tightening.
- Critical connector mating dimensions could be damaged during disassembly of a Leveling Head. **DO NOT TAMPER** with the four mounting screws at the base of the N-Connector. Leveling Head disassembly should only be performed by qualified service personnel at a Fluke Service Center.
- To prevent damage to the instrument, do not use aromatic hydrocarbons or chlorinated solvents for cleaning.

Symbols

The following safety and electrical symbols may appear on the Instrument or in this manual.

	Risk of danger. Important information. See manual.		Earth ground.
	Hazardous voltage. Voltage > 30 V dc or ac peak might be present		Protective conductor terminal
	AC (Alternating Current).		Capacitance.
	DC (Direct Current).		Diode.
 or 	AC or DC (Alternating or Direct Current)		Fuse.
		CAT	IEC 61010 Overvoltage (installation or measurement) Category.
	Potentially hazardous voltage.		Recycle.
	Static awareness. Static discharge can damage part(s).		Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.
	Power ON / OFF		

Product Description

The Instrument is an RF Reference Source designed to create the signals needed for precision RF and microwave applications. See Figure 1-1. Signal delivery via interchangeable Leveling Heads ensures a unique combination of level accuracy, dynamic range, and frequency coverage in both 50 Ohm and 75 Ohm systems.

The following is a list of the features that enable the Instrument to be readily integrated into a typical RF calibration system:

- Accurate level / attenuation over a wide dynamic range
- Precision internal AM/FM modulation, including External Modulation capability
- Frequency Range includes both LF and RF
- High signal purity with no additional filtering
- Passive Leveling Heads to ensure direct and precise signal delivery to the load
- Low Phase Noise – two performance levels in the 9640A and 9640A-LPN products
- IEEE 488 Remote Interface
- Remote command emulation of legacy signal generators (optional)
- Rack Mount Slide Kit (optional)

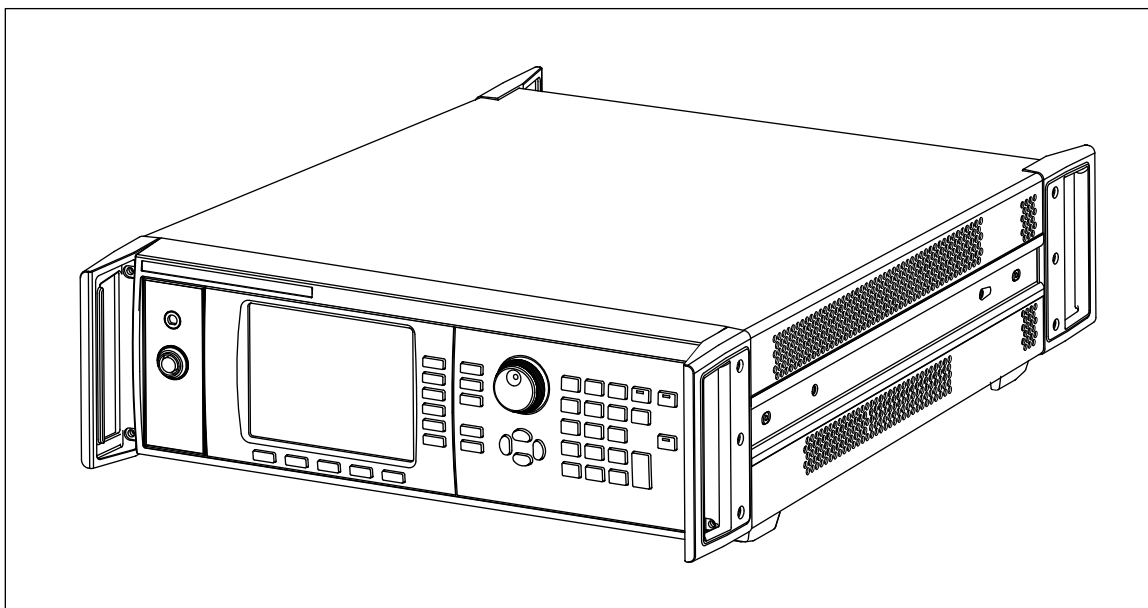


Figure 1-1. 9640A RF Reference Source

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Options and Accessories

Table 1-1 provides a list of the products, options, and accessories available. When ordering an option or accessory after the original purchase, include a reference to the Instrument as well as the description from the following table.

Table 1-1. List of Options and Accessories

Products	
9640A-STD	9640A 4 GHz RF Reference Source with 50 Ω Leveling Head (GPIB Command Emulation of HP3335 included)
9640A-LPN	9640A 4GHz Low Phase Noise RF Reference Source with 50 Ω Leveling Head (GPIB Command Emulation of HP3335 included)
Options	
9640A-xxx/75 9640A/75UPG ^[1]	Above supplied with or upgrade to add a 9640A-75 75 Ω Leveling Head
8662/8663 GPIB ^[2]	HP8662A / HP8663A GPIB command emulation
Accessories	
Y9600	Rack Mount Slide Kit
9600CASE	Rugged Transit Case
9600CONN	RF Interconnect Kit. The kit includes: 1 – Sacrificial N-Connector, Male to Female Adapter, 50 Ω 1 – Precision N-Connector, Female to Female Adapter, 50 Ω 2 – RF Connector Torque Wrenches 1 – N-Connector 1 – PC3.5/SMA Connector
9640A Manual Set	9640A Instruction Manual Package. The package includes: 1 – Printed Getting Started Manual 1 – CD containing the entire manual set (PDF files), including: 1 – 9640A Instruction Manual 2 – 9640A Getting Started Manuals (English and French) 1 – Tables of 9640A Calibration Points to assist automation of 9640A adjustment
<p>[1] This is a factory/service upgrade that requires the return of the main unit and all of the partner Leveling Heads</p> <p>[2] This option is provided for a trial period, thereafter requires the purchase and entry of a licence key</p>	

Specifications

The following table lists only the general specifications. Refer to the 9640A Instruction Manual and the 9640A Manual Supplement (if any) supplied on the CD for the latest complete specifications. The most current versions of these documents are also available on the web as PDF files; visit <http://www.fluke.com> (Support > Manuals).

General specifications

Performance	All specifications apply to a 1 year calibration interval at an ambient temperature of Tcal ± 5 °C. Nominal factory Tcal calibration temperature 23 °C.
Standard Interfaces	IEEE488.2 (GPIB)
Warmup Time	60 minutes
Temperature	Operating: 0 °C to 50 °C Specified Operation: 5 °C to 40 °C Storage: -20 °C to +70 °C
Relative Humidity	Operating or Storage: Non-condensing, 5 °C to 30 °C <95 %, <40 °C <75 %, <50 °C <45 %
Altitude	Operating: $\leq 2,000$ m Non-operating: $\leq 12,000$ m
Safety	EN 61010-1:2001, CAN/CSA 22.2 No 61010-1:2004 and UL61010-1:2004, indoor use only, pollution degree 2, installation category II.
EMC	EN 61326:2006 Class B.
Line Power	Rating: 115 V / 230 V nominal ^[1]
Power Consumption	≤ 250 VA
Dimensions	433 mm (17.0") wide, 146 mm (5.8") high and 533 mm (21.0") deep. Mounts within industry-standard 19" (483 mm) rack-mount frames when fitted with the Y9600 rack mounting kit.
Weight	18 kg (40 lbs)

[1] Type tested for operation and functionality 90 to 132 V rms and 180 to 264 V rms at 47 to 63 Hz

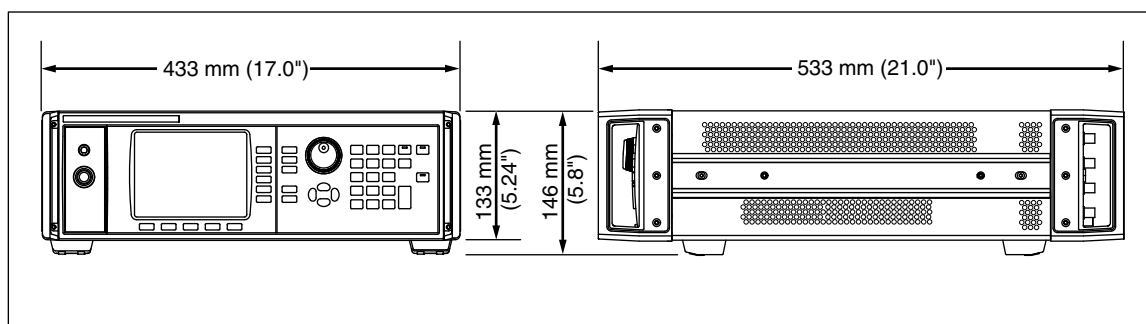


Figure 1-2. 9640A Dimensions

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Chapter 2

Preparing the Instrument for Operation

Introduction

This chapter contains instructions for unpacking the Instrument and preparing it for operation. Many of the procedures are also useful for performing general maintenance on the Instrument. They include the following:

- Changing line voltage (115 V ac to 230 V ac)
- Replacing the line-power fuse
- Connecting and powering the Instrument
- Cleaning and storing the Instrument

Contacting Fluke

To contact Fluke for product information, operating assistance, service, and to get the location of the nearest Fluke distributor or Service Center, call:

1-888-99FLUKE (1-888-993-5853) in U.S.A.

1-800-36-FLUKE (1-800-363-5853) in Canada

+31-402-675-200 in Europe

+81-3-3434-0181 Japan

+65-738-5655 Singapore

+1-425-446-5500 from other countries

Visit Fluke's web site at: <http://www.fluke.com>.

Unpacking and Inspection

Warning

To prevent personal injury, use good lifting practices when lifting or moving the Instrument. The Instrument is an unbalanced load and weighs up to 18 kg (40 pounds).

Fluke has taken great care to ensure that the Instrument arrives in perfect condition. When the Instrument arrives, carefully unpack and inspect for external damage to the case, front panel, and rear panel. If the Instrument has been subject to rough handling in transit, there may be evidence of external damage to the shipping carton. Check also to make sure all standard items listed in Table 2-1 are present.

If the Instrument or the shipping container have been damaged, notify the carrier immediately. Report any shortages to the place of purchase or to the nearest Fluke Technical Service Center.

If the shipping container and the packing material are undamaged, save them for use as a future storage/shipping container for the Instrument.

Table 2-1. List of Contents

Description	Quantity
9640A RF Reference Source	1
9640A-50 Leveling Head	1
9640A-75 Leveling Head	Optional
Carrying/Storage Case (for two Leveling Heads and the 9600CONN RF Interconnect Kit)	1
9640A Getting Started Manual, English	1
CD ROM – Manual Set	1
Line Cord	1
Certificate of Calibration	1

Storing and Shipping the Instrument

Warning

To prevent personal injury, use good lifting practices when lifting or moving the Instrument. The Instrument is an unbalanced load and weighs up to 18 kg (40 pounds).

To store the Instrument, place it inside a sealed plastic bag and then place the bagged unit inside the cushioning material inside the original shipping container. Close and secure the container. This container is the most suitable storage receptacle for the Instrument because it provides the necessary shock isolation during normal handling. Store the boxed Instrument in a location that complies with the storage environment specification. See Chapter 1, *Introduction and Specifications*.

Whenever it is necessary to ship the Instrument, use the original shipping container if possible. Pack and secure the Instrument as described in the previous paragraph. If you must substitute for the original container, choose a substitute that will provide shock isolation comparable to the original container. Recommended dimensions for a substitute cushioned container are given in Table 2-2.

Table 2-2. Dimensions for a Substitute Cushioned Shipping Container

Container	Length	Width	Depth
Box	720 mm (28.5 in)	570 mm (22.5 in)	360 mm (14.2 in)
Corner Cushions	> 60 mm (2.4 in) depth of expanded polyethylene (35 kg/m ³) at the instrument corners.		

Power Considerations

The Instrument ships from the factory configured to match the requirements of your local ac line power. If the Instrument is relocated to another region it may need to be reconfigured to match the ac line power of the new location. Three things affect the configuration:

- Power cord (See Table 2-3.)
- Line-power fuse (See Table 2-4 and Figure 2-1.)
- Rear-panel switch setting (115-230, see Table 2-3 and Figure 2-1.)

The following paragraphs describe how to make the changes for a new voltage configuration. They are also useful to verify that the Instrument's current power configuration is correct.

Replacing the Power Cord

⚠ ⚠ Warning

To avoid shock hazard, connect the instrument power cord to a power receptacle that has an earth ground connection. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

The various power cords available for use with the Instrument are listed and shown in Table 2-3. Use the table to identify your general location and the recommended LC power cord. Match this LC number to one of the plugs in the drawing, and verify that the plug on your power cable mates correctly with the local power outlets. If the plug is incorrect, identify the correct LC number, and order the correct power cable from Fluke using the part number from Table 2-3.

Table 2-3. Power Cord for Various Regions

Description	Location	Voltage/Current	Part Number	
Power Cord	North America	120 V/15 A	LC1	284174
	North America	240 V/15 A	LC2	2198736
	Universal Euro	220 V/16 A	LC3	769422
	United Kingdom	240 V/13A	LC4	769445
	Switzerland	220 V/10 A	LC5	769448
	China/Australia/New Zealand	240 V/10 A	LC6	658641
	India/South Africa	240 V/5 A	LC7	782771

LC1 LC2 LC3 LC4

LC5 LC6 LC7

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Replacing the Line-Power Fuses

⚠ ⚠ Warning

To prevent fire hazard or damage to the instrument, verify that the correct fuses are installed for the selected line-voltage setting. See Table 2-4 for the correct fuse ratings.

The line-power fuses are located on the power block on the rear panel. The selected line-voltage (115 or 230) shows through a small window toward the bottom of the block. See Figure 2-1. This instrument has dual fusing with fuses in both the line and neutral connections. When replacing a blown fuse, replace both fuses to avoid a stressed fuse and subsequent power interruption. Before trying to access and replace the fuses, verify that the replacement fuses are appropriate for the selected voltage.

To check or replace the fuses, refer to Figure 2-1, and proceed as follows:

1. Disconnect the Instrument from line power.
2. Remove the fuse compartment by inserting a screwdriver blade in the tab located at the left side of the fuse compartment. Gently pry until the compartment can be easily removed.
3. Pull the fuses from the compartment for replacement or inspection.
4. Install good fuses with the correct ratings. See Table 2-4.
5. Reinstall the fuse compartment by pushing it back into place until the tab locks.

Table 2-4. Line-Power Fuse

Line Power	Fuse Action	Fuse Rating IEC 127	Fluke Part No.	Manufacturer and Type No.
115 V AC	TH Time Delay HBC	10 A @ 250 V	2650727 (Quantity 2)	Littelfuse 215010
230 V AC	TH Time Delay HBC	5 A @ 250 V	2650730 (Quantity 2)	Littelfuse 215005

Selecting Line Voltage

The line-voltage selector is located on the power block on the rear panel. The selected line-voltage (115 or 230) shows through a small inspection window toward the bottom of the block. See Figure 2-1. Use Table 2-5 to verify the selection before trying to change it.

Use the following procedure to change the line voltage setting:

1. Disconnect the Instrument from line power.
2. Remove the fuse compartment as described earlier. (See *Replacing the Line-Power Fuse*.)
3. Remove the line-voltage selector by gripping its indicator tab with a pair of long-nose pliers and pulling it straight out of its connector.
4. Rotate the line-voltage selector to show the desired voltage, and reinsert into the power block.
5. Before inserting the fuse compartment back into the power block, inspect and verify that both fuses are appropriate for the selected voltage.
6. Insert the fuse compartment into the power block, and press firmly to lock its tab.

Table 2-5. Voltage Limits for the 115 and 230 Voltage-Switch Settings

Switch Setting	Line Voltage Limits
115	90 V AC to 132 V AC
230	180 V AC to 264 V AC

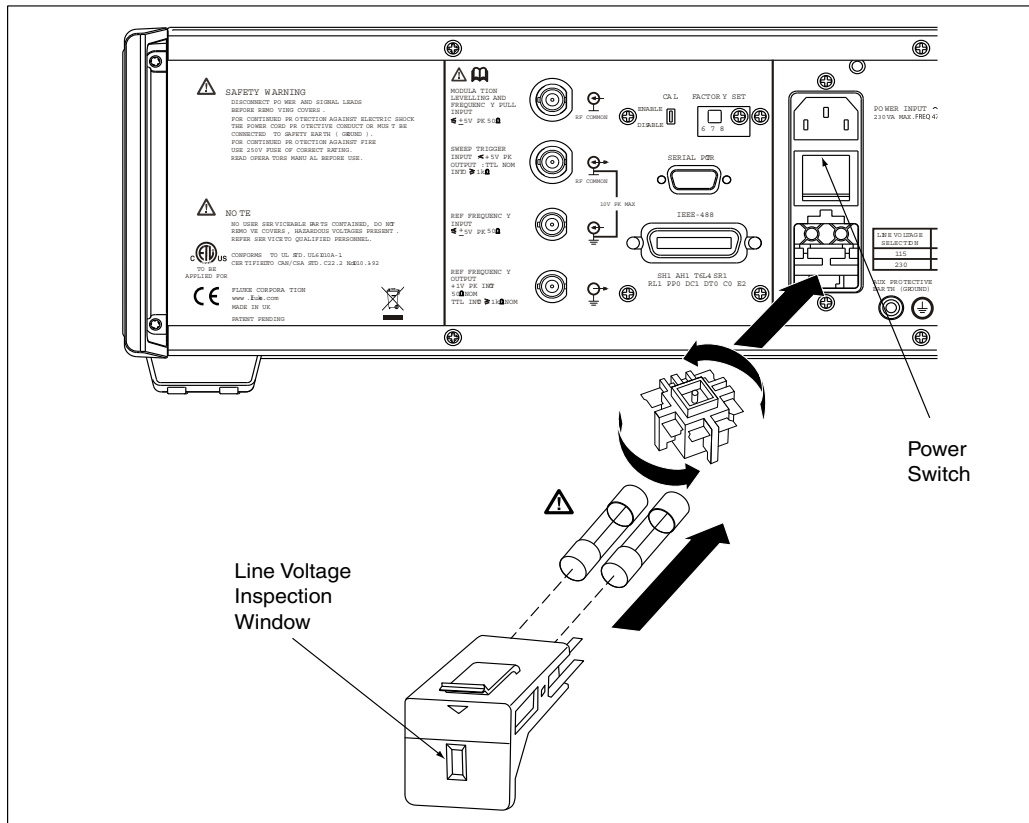


Figure 2-1. Accessing the Fuses and Changing Line Voltage

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Power-On Sequence

Note

The power-on sequence may be run with or without a Leveling Head connected to the Instrument.

After connecting the Instrument to line power, use the power switch on the rear panel to power-on the Instrument. See Figure 2-1.

The Instrument displays an initialization screen for about 4 seconds during the power-on sequence and then runs a power-on self test. If a Leveling Head is connected to the Instrument, the Leveling Head will also be tested.



ead07f.bmp

Initialization Screen


Power-On Self Test


The power-on self test performs a functional test of the source and, if attached, the Leveling Head. The self test is neither an acceptance test, performance test, nor verification test. Self test simply verifies the overall functional operation of the Instrument. The power-on sequence initiates the self test, and the test is run every time a power-on sequence occurs.

A progress bar at the bottom of the display indicates self test is running. Upon successful completion of the test, a Leveled Sine screen, similar to the First Power-On screen, replaces the initialization screen shown earlier. The appearance of the Leveled Sine screen indicates the Instrument is ready for use.




If any test in the self-test sequence fails, another screen will show the number of failures attributed to both the Leveling Head and the Instrument. The user can view any failures by pressing the **View Fail** soft key. For more information regarding self-test failures refer to *Reviewing the Results* and *Interpreting the Results* in Chapter 7 of the 9640A Instruction Manual.

Power-On State

After completing the power-on self test, the Instrument enters the Standby state (output off) as indicated by the illuminated  key on the far-right of the front panel.

At first power-on, the Instrument displays the following screen. Press  to obtain an RF output. If no Leveling Head is connected, the Instrument remains in the standby state (output off) and displays an error message.




Note that some Instrument settings are stored for recall at power down. If this is not the first power-on sequence for the Instrument, the power-on screen may not match the one shown here.

Levelled Sine	Ref Clk Int 	Leveling Int 	Frq Pull 
Frequency = 1.000000000 MHz			Frequency (Step edit)
Level = -10.000 dBm			Level
Go to Reference	Set as Reference		Frequency Offset Lev. Sine Preferences

First Power-On Screen

ead09f.bmp

In particular, the Instrument may be found in a special GPIB command emulation mode of operation. This mode, identifiable at the top left corner of the display, would prevent normal GPIB operation. Instructions for selecting or deselecting the emulation mode are given in Chapter 3, see *GPIB Command Emulation*. Instructions for the trial and purchase of these options and entering of licence keys are also given.

3335 Sine	Ref Clk Int 	Leveling Int 	Frq Pull 
Frequency = 1.000000000 MHz			Frequency (Step edit)
Level = -10.000 dBm			Level
Go to Reference	Set as Reference		Frequency Offset Lev. Sine Preferences

First Power-On Screen (GPIB emulation mode)

ead14f.bmp

Leveling Head Connections

Warning

To prevent hazardous RF transmissions and equipment damage, read and follow the instructions in Chapter 3 before connecting a Leveling Head to the Instrument or to a UUT.

Instructions for connecting a Leveling Head to the Instrument and to a unit under test (UUT) are given in Chapter 3, *Local Operation*. Do not attempt to connect a Leveling Head before reading all of the Cautions and Warnings, contained in these instructions.

Installing the Instrument in an Equipment Rack

The Instrument is suitable for both bench-top and rack-mounted operation. A Rack Mount Slide Kit is available as an accessory. Instructions for installing the kit are supplied with the kit.

Cooling Considerations

Two internal fans maintain the operating temperature of the Instrument at a safe level. For bench-top operation, these fans do a good job of temperature control without any attention other than routine cleaning of the filter as described in Chapter 7, *Maintenance*, of the 9640A Instruction Manual. However, when mounting and using the Instrument in other situations (for example, in an equipment rack) additional attention may be required to ensure that the instrument is able to maintain a normal operating temperature and does not overheat.

Warning

To avoid fire hazard and to ensure that the instrument does not exceed its normal operating temperature observe the following warnings:

- **During normal operation, keep the Instrument covers securely in place. Excessive air leaks can interrupt and redirect the flow of cooling air from internal components.**
- **When mounting the Instrument in an enclosed equipment rack, provide adequate ventilation and airflow within the rack. Pay particular attention to ensure adequate and proper use of exhaust fans, louvers, equipment spacing, free-flowing and isolated intake and exhaust ports.**

Use baffles, if necessary, to isolate intake air from exhaust air. Baffles can help draw and direct cooling air through the equipment rack. The best placement of the baffles depends on the airflow patterns within the rack. If baffles are necessary, experiment with different arrangements.

Cleaning the Instrument

For general cleaning, wipe the Instrument with a soft cloth dampened with water or a non-abrasive mild cleaning solution that does not harm plastics.

Caution

To prevent damage to the Instrument, do not use aromatic hydrocarbons or chlorinated solvents for cleaning. They can damage the materials used in the Instrument.

Chapter 3

Local Operation

Introduction

This chapter provides a comprehensive introduction of all of the external features and functions on the Instrument, followed by instructions for operating the Instrument. The introduction identifies each of the front- and rear-panel controls, connectors, and indicators (including screens), and describes the intended use for each. Each feature description is complete enough to allow the user to begin interacting with the controls and to perform basic but practical operations on the **Leveled Sine** screen.

Refer to Chapter 3 of the 9640A Instruction Manual for additional procedures for creating sine, modulated, and swept output signals. Procedures for expanded features, such as offset, are also provided in the 9640A Instruction Manual.

Controls, Indicators, and Connectors

The front panel of the Instrument is shown in Figure 3-1. Each feature is identified with a name and graphical grouping. The same name and graphic introduce the section and paragraph(s) containing the description of the feature.

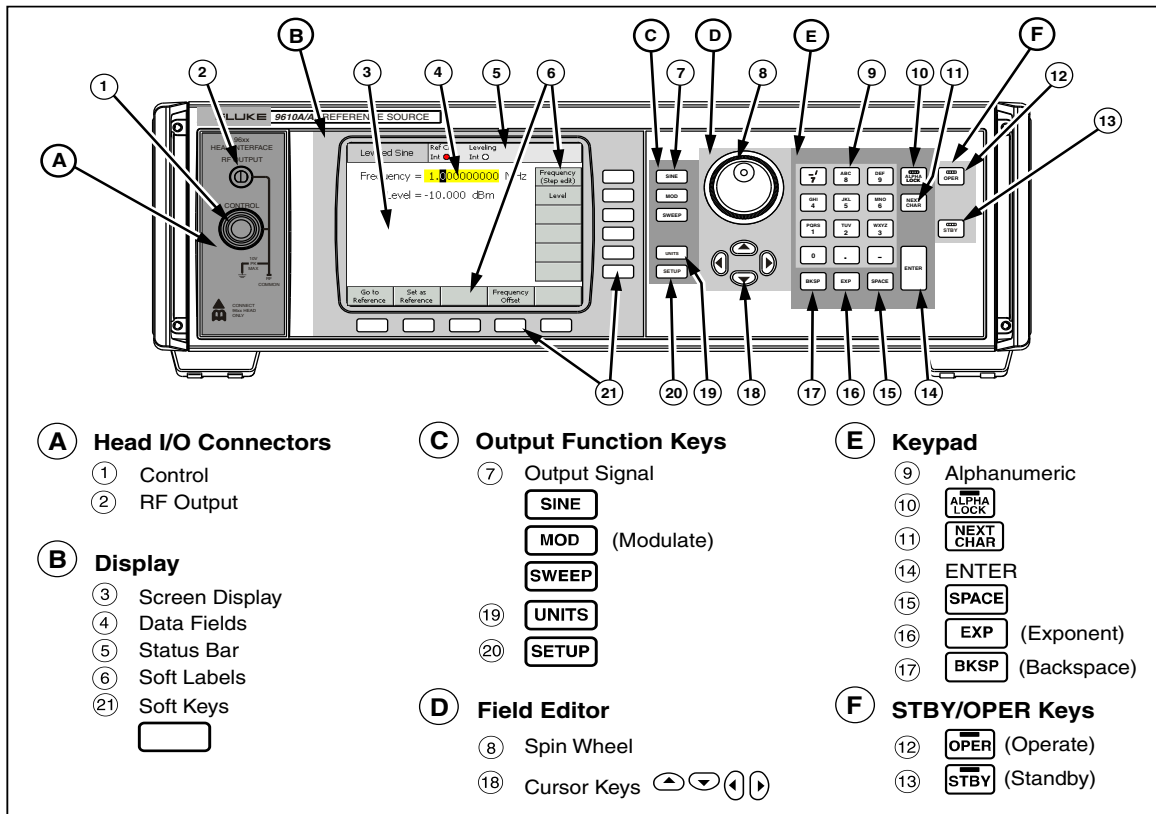


Figure 3-1. Front Panel Controls, Indicators, and Connectors

ead10f.eps

Head I/O Connectors

The output of the Instrument is a proprietary interface to either a 9640A-50 or a 9640A-75 Leveling Head. The interface consists of two connectors: an SMA RF signal output connector, and beneath, a multi-way locking connector for sensing and control of the Leveling Head.

⚠ Caution

The 9640A front-panel connector interface is suited only for use with Fluke 9640A-xx Leveling Heads. To avoid damage to the Instrument no other connection is permitted.

The function of a Leveling Head is to deliver the Instrument output to the input of another instrument (UUT) while maintaining the integrity of the signal. Using a Leveling Head with the Instrument is the equivalent of connecting the UUT directly to the Instrument output without using cables. The Leveling Head not only maintains the overall quality of the signal, it also maintains an accurate level for the signal over the frequency and amplitude range of the Instrument.

STBY/OPER (Standby/Operate) Keys

The **STBY** and **OPER** keys control signal availability at the Leveling Head Output connector. Pressing **OPER** turns the green indicator on and places the Instrument in the Operate mode (enables the signal at the RF Output connector). Pressing **STBY** turns the yellow indicator on and places the Instrument in the Standby mode (removes the output signal at the RF Output connector).



Standby/Operate Keys

ead11f.eps

Output Function Keys

There are five output function keys: three for selecting the output signal, one for defining the preferences, and one for displaying units associated with each signal.

Output Signal Keys

Three hard keys define the main characteristics of the output signal. They are **SINE**, **MOD** (modulation), and **SWEEP**. Pressing any one of these keys brings up the initial screen for that function and displays the current value for each of the previously defined parameters. If, when any of these keys are pressed, the Instrument is in the operate mode (Green light on the **OPER** key is lit), the RF Output is switched to standby.



Output Signal Keys

ead12f.eps

UNITS Key

Use the **UNITS** key to display a list of the measurement units available for use with the selected data field. The list is context sensitive and appears on the vertical soft labels. Pressing a blue soft key adjacent to one of the displayed measurement units selects and applies that unit to the value in the selected field. The value in the field is recalculated to match the selected measurement unit, and the text is removed from the soft labels.



Measurement Units Key

ead13f.eps

SETUP Key

The **SETUP** key provides access to a Setup screen.



Setup Key

ead14f.eps

The **Setup** screen provides instrument configuration information, including the following:

- Options Fitted (installed)
- Firmware Version
- Base (mainframe) model number and serial number
- Model number and serial number of the connected Leveling Head at the time the **SETUP** is pressed

Instrument Setup		Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>
Model: RF Reference Source			Global Preferences
Options: None Fitted.			Lev. Sine Preferences
Firmware: v1.15, Build 010606			Mod. Preferences
Base Unit: 9640A			Sweep Preferences
Base Serial #: 234567			GPIB Preferences
Head Unit: 9640A-50			
Head Serial #: 123456			
Copyright © 2006 Fluke corporation. All rights reserved.			
Master Reset	Calibration	Self Test	Save/Recall
Exit			

Setup Screen

ead05f.bmp

The vertical soft keys on this screen allow the user to enter personal preferential settings for **Global Preferences** and each of the major configuration screens. These settings take effect immediately upon editing. They include the following:

- Global Preferences
- Sine Preferences
- Mod Preferences
- Sweep Preferences
- GPIB Preferences (IEEE 488)

Pressing the **Calibration** soft key brings up a Calibration screen which allows users to correctly associate the Base Unit and Leveling Heads that have been calibrated together. The **Calibration** screen shows the serial numbers of the 50 Ω and 75 Ω Leveling Heads with which the Base Unit is calibrated. For the Leveling Head connected at the time the soft key is pressed, the calibration screen also shows the serial number of the Base Unit with which that head is calibrated.

Calibration		Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>
Head and Base Associations			
Calibration certified for:			
50 Ω Head #: 234567			
75 Ω Head #: 234567			
Head Fitted: 9640A-50			
Head Serial #: 123456			
Adjusted by: Base #234567			
To adjust press 'Calibrate Instrument'.			
Calibrate Instrument			Previous Menu

Calibration Screen

ead06f.bmp

Display

The display is a visual line-editor/menu for configuring the output of the Instrument, and also a monitor for verifying the configuration and output settings for the Instrument. The screen portion of the display consists of the following three major sections:

- Data fields
- Soft labels
- Status bar

Pressing any one of the main function keys on the front panel, **SINE**, **MOD**, **SWEEP**, brings up the appropriate main screen on the display (see the following **Leveled Sine** screen). Editable data fields occupy the central portion of the screen; the status bar is at the top of the screen. The soft labels run down the right side and across the bottom of the screen.

Leveled Sine		Ref Clk Int ●	Leveling Int ○	Frq Pull ○
Frequency = 1.000000000 MHz Level = -10.000 dBm		Frequency (Step edit)		
		Level		
Go to Reference		Set as Reference		Frequency Offset
				Lev. Sine Preferences

Leveled Sine Screen

ead15f.bmp

Data Fields

Data fields contain numeric values that effectively describe the present output parameters of the Instrument. Following power-on, these fields all contain default values. To change or edit these values the user must do the following:

1. Bring up an appropriate screen, for example, the previous **Leveled Sine** screen.
2. Select the field that requires editing (use a soft key).
3. Select an edit mode, **Cursor** or **Step** (press the soft key again).
4. Edit the data in the field using the appropriate controls.

When selected, the field is said to have the *focus* and is easily identified by the shading of its data. In the **Leveled Sine** screen, for example, the **Frequency** field has the *focus*, and the edit mode is **Cursor**, as identified by the black cursor (marker) that can move from digit to digit (left-right, ⬅➡). In this case, the user can easily make minor edits to the selected digit using the spin wheel or the up-down (⤴⤵) keys. If several characters in the field need to change, using the alphanumeric keypad to edit the field (**Keypad edit**) is a better choice.

A data field that has all of the characters in the field selected (highlighted black) is in the **Step edit** mode. When this mode is available to a field, an indicator shows in the soft labels to the right of each field, (**Step edit**) or (**Cursor edit**). A toggle effect performed by the soft key next to the *focus* field allows the user to switch between edit modes.

A more detailed description of the *Editing Settings* is available later in this chapter under *Screen Controls and Indicators*.

Soft Labels

Six soft labels run vertically along the right side of the screen and five run horizontally along the bottom of the screen. Each of the labels corresponds to an adjacent soft key. When a soft label contains text, pressing its adjacent soft key directs the display to respond accordingly.

The horizontal soft labels across the bottom of the screen provide prompts to expand the current definition, add/remove fields, or call another screen (menu selection).

Pressing **UNITS** while in either of two field edit modes (cursor or step edit) causes the soft labels to present a selection of measurement units for use with the selected field. During alphanumeric (keypad) edit, the soft labels present a selection of scientific multipliers for use with the selected field. These multipliers are shown in terms of the previously selected units (watts, dB, volts).

If a soft label contains no text, pressing its adjacent soft key has no effect. However, when a labeled soft key is pressed the effect is immediate and obvious on the display.

Status Bar

The status bar consists of two regions across the top of the display (see Figure 3-2). There are no keys associated with the status bar as its only function is to provide information. Typically, the left-most label defines the RF Output signal: sine, modulated, or swept. It also indicates a GPIB command emulation mode. The right-most region contains status indications (virtual LEDs) pertinent to the current output signal. Operator error messages, such as *value too low*, are also displayed in this region.

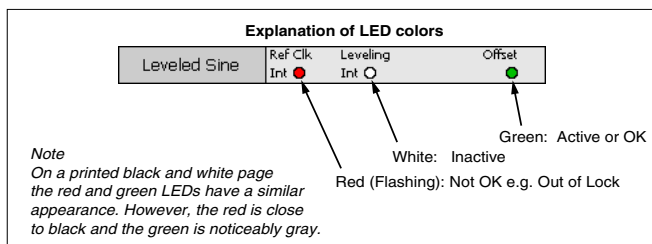


Figure 3-2. Status Bar

ead23f.eps

Soft Keys

The Instrument has two sets of soft keys. One vertical set running down the right side of the display and one horizontal set running across the bottom of the display. Each of these soft keys has an adjacent soft label on the screen.

The primary function of the vertical soft keys is for selection of the *focus* field, and in some cases the edit mode (**Cursor edit** or **Step edit**) for the *focus* field. These keys are also used to temporarily present scientific multipliers during alphanumeric entry using the keypad and unit selections, if **UNITS** is pressed.

The horizontal soft keys are associated with the soft labels across the bottom of the display. These labels provide prompts to expand the current definition, add/remove fields, or call another screen (menu selection).



Soft Keys

ead16f.eps

Field Editor

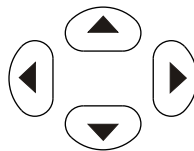
There are two control sets for incrementally editing field data. They are the cursor keys and the spin wheel.

Cursor Keys

The cursor keys are a group of four keys marked with right, left, up and down arrows: (⏮, ⏭, ⏴, ⏵). These are the main editing keys for making minor changes in a field's numeric data. Each press of ⏮ or ⏭ moves the cursor one decade to the left or right. Each press of ⏴ or ⏵ increments or decrements the digit under the cursor by one. Using these cursor keys in combination allows the user to edit/select any data in a *focus* field.

The data in the *focus* field reacts to the ⏴ and ⏵ keys like a counter. That is, as the value under the cursor increases past nine (9), the number in the next higher decade increases by one (1). Similarly, as the value under the cursor decreases past zero (0), the number in the next higher decade decreases by one (1).



When the Instrument is in the operate mode (⏻ light on), the RF Output responds immediately to changes to its field values.

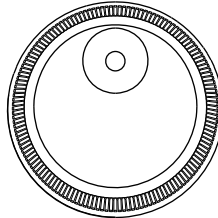


Cursor Keys

ead25f.eps

Spin Wheel

The Spin Wheel performs the same editing function as the  and  keys described in the previous paragraph. However, as the wheel is spun, it continues to decrement (ccw) or increment (cw) the digit under the cursor. This continuous spin-action is useful for making larger changes to field values and for making real-time changes to the RF Output.

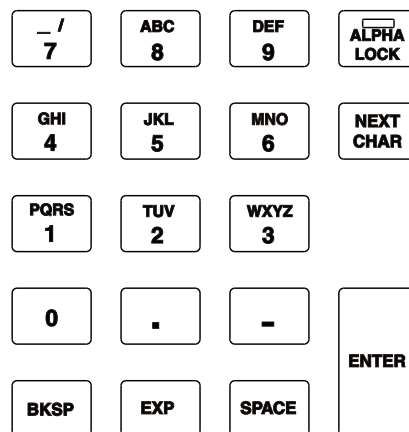


Spin Wheel

ead26f.eps

Keypad


The alphanumeric keypad supports direct keypad edit of a numeric field. Alpha entry is also supported, but only to allow the naming of user Saved Set-ups.

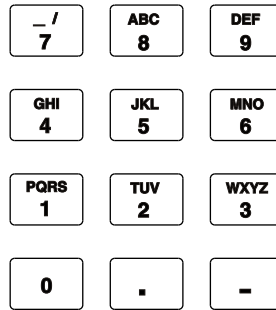


Keypad

ead27f.eps

Alphanumeric Keys



The alphanumeric keys are similar to those found on a calculator. They include two levels of characters. The default level includes the digits 0 through 9. The shifted or second level includes the alpha characters A through Z, _ and /. The decimal point (.) and minus (–) characters work with both levels. Notice that the alpha characters are grouped so that three or four characters appear on a single key, much like the telephone keypad. When entering an alpha character, press the key containing the desired character. The first character in the alpha grouping appears in the field. Press  one or more times to advance to the desired character in the group. When the character is correct, press key containing the next alphanumeric character.



Alphanumeric Keys

ead28f.eps

ALPHA Key





The  key controls access to the numeric (default level 1) and alpha (level 2) characters. The key operates in a toggle mode. When the light is off, the numeric characters are accessible. Pressing  to light the key enables access to the alpha characters.



Alpha Key

ead29f.eps

NEXT CHAR Key



The  key is functional when the light on the  key is lit. After pressing an alpha character key, use  to select the desired letter from the alpha grouping shown on that key. When the desired character appears in the selected field, stop pressing . Instead, press the alpha key containing the next character to be added to the field, or, if the field data is complete, press the ENTER key.



Next Character Key

ead30f.eps

BKSP Key (Backspace)



The  key permits editing of characters during a keypad data-entry session. After entering the first character in a field, pressing  deletes the last available character and allows another character to be entered in its place. This backspace action is available as long as characters are present in the field.



Backspace Key

ead35f.eps

SPACE Key

The  key functions exactly like the space key on a PC keyboard. Pressing  inserts



a space character to separate any combination of alphanumeric characters.



Space Key

ead36f.eps

EXP Key (Exponent)

The  key allows the user to enter numeric data using an exponent. While entering a number, pressing  ends the numeric sequence by inserting a capital letter E to indicate that the following number is an exponent.



Exponent Key

ead37f.eps

ENTER Key

The ENTER key ends the keypad data-entry process and allows the user to move to another task. Pressing the ENTER key causes the Instrument to inspect the data just keyed into the field, and, if it is valid, to accept and retain the data. The Instrument rejects invalid data and displays the reason for rejection on the Status Bar.



Enter Key

ead38f.eps

Screen Controls and Indicators

Many of the front panel controls and indicators discussed earlier in this chapter are used exclusively for editing screen fields that appear on the Display. That is, they enable the data entry/editing process regardless of the selected screen. The following examples concentrate on the controls and indicators associated with the **Leveled-Sine** screen. They offer an excellent opportunity for applying information learned about the editing process.

Main RF Output Screens

The Instrument provides three kinds of output signals: sine, modulated, and swept. User selectable screens, as shown in Figure 3-3, provide the controls for each of these outputs.

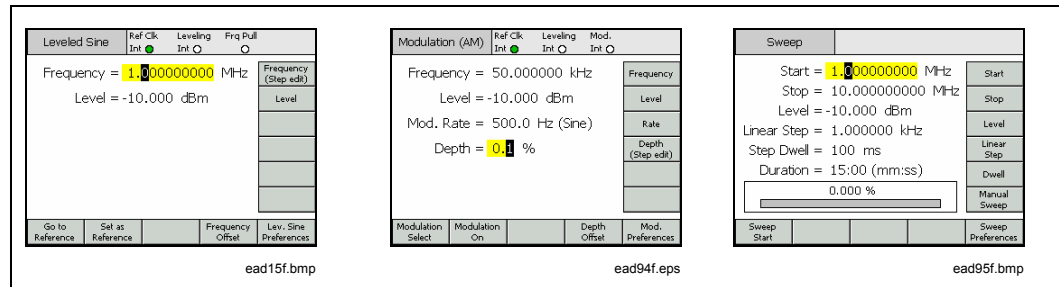


Figure 3-3. Control Screens for the RF Output Signal

Pressing **SINE** sets the Instrument to standby and brings up the **Leveled-Sine** screen, establishing the sine wave as the selected RF output signal. The same is true of the **MOD** and **SWEEP** keys. As each key is pressed, the instrument enters standby and brings up the corresponding modulation or sweep screens. Pressing **OPER** sets the Instrument to operate and adjusts the RF output signal to match the screen.

Data fields within each screen contain values, typically numeric data, which define the parameters of the RF Output signal. By editing these values, the user can precisely control the RF output signal.

Editing Settings – The Vertical Soft Keys

Each numeric data field supports up to three edit modes:

- Cursor edit
- Step edit
- Keypad edit

Any time a field has the *focus* it is in one of the three edit modes. A unique look (or pattern) identifies each of the modes. The **Cursor edit** mode displays a shaded field with a black cursor placed over a single digit in the field. The **Step edit** mode displays the entire field shaded black with white characters. The **Keypad edit** mode displays a shaded box for entering characters. The user may choose any one of these edit modes when entering numeric field data.

The following paragraphs use the **Leveled-Sine** screen to discuss the edit modes. The edit modes and the techniques discussed here also apply to the **Modulation** and **Sweep** screens. The **Modulation** and **Sweep** screens are not, therefore, discussed separately.

Note

Step edit does not apply to the sweep screen; only Cursor edit and Keypad edit are available in the sweep function.

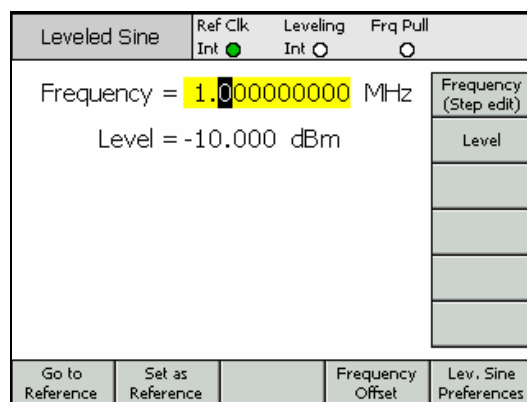
Before proceeding, refer to the *Data Fields* descriptions earlier in this section under *Controls, Indicators, and Connectors (Display)* as a refresher on how to select data fields.

To follow the discussion on the Instrument, switch on power to the Instrument and then press **SINE** to bring up the **Leveled-Sine** screen. Press **STBY** to set the source to standby. Also, remove any connections from the front panel Leveling Head I/O Connectors. The screen on the I/O Display will closely resemble the following **Leveled-Sine** screen.

Cursor Edit

When in the **Step edit** mode, if the soft label for the focus field includes a **(Cursor edit)** marking, press the **Frequency (Cursor edit)** soft key; the focus field changes the edit mode to **Cursor edit**.

In **Cursor edit** mode, the *focus* field pattern is shaded with a black cursor placed over a single digit. In addition, the soft label for the field includes a **(Step edit)** marking, when appropriate, as shown in the following **Leveled-Sine** screen. The cursor keys provide for right and left cursor movement within the field. To adjust the value of the selected digit, the user may choose between the Δ ∇ keys or the spin wheel. To ensure access to the full dynamic range and resolution of the instrument, notice that the cursor will move beyond the left- and right-most digits in the field.



Leveled Sine

ead15f.bmp

Step Edit

If, when in the **Cursor edit** mode, the soft label includes a **(Step edit)** marking, pressing the soft key for the *focus* field changes the edit mode to **Step edit**. Notice that **Step edit** is not available for inappropriate fields.

In **Step edit** mode, the *focus* field pattern is fully highlighted (all black) with white characters. In addition, the soft label for the field includes a **(Cursor edit)** marking. See the following **Step Edit** screen. Effectively, the whole field is selected for edit, making cursor movement within the field unnecessary. Instead of allowing the edit of a single character, **Step edit** allows for updating of the focus field in increments of a preset step size. The step size is defined (preset) in a **Step Size** field at the bottom of the display. With the step size set to a value other than zero, both the up-down cursor keys (Δ ∇) and the spin wheel allow for increasing or decreasing the *focus* field value in steps.

Note that the soft label for the *focus* field now indicates **Cursor edit**, allowing the operator to return to this edit mode. This soft key, therefore, has the following three-step operation:

Select New *Focus* Field → Select **Step edit** → Select **Cursor edit** →

The operator can rapidly access **Step edit** in a new *focus* field by pressing the appropriate soft key twice.

Pressing the **Step Size** soft key, moves the *focus* field to allow step size to be adjusted

using the Cursor edit or Keypad edit modes. Unit selections are available for Step Size, these can be ratios %, ppm, dB or the same unit as the parent field.

Leveled Sine		Ref Clk Int ●	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>
Frequency = 287.000 Hz		<div style="border: 1px solid black; padding: 2px;">Frequency (Cursor edit)</div> <div style="border: 1px solid black; padding: 2px;">Level</div> <div style="border: 1px solid black; padding: 2px; height: 20px;"></div> <div style="border: 1px solid black; padding: 2px; height: 20px;"></div> <div style="border: 1px solid black; padding: 2px; height: 20px;"></div> <div style="border: 1px solid black; padding: 2px;">Step Size</div>		
Level = -10.000 dBm				
Freq. Step = 0.1 Hz				
Go to Reference	Set as Reference		Frequency Offset	Lev. Sine Preferences

Step Edit

ead17f.bmp

Keypad Edit

At any time, a new value may be entered directly in a numeric *focus* field via the Keypad. The first press of a numeric key will open an edit box in place of the current field and present scientific multiplier options on the vertical soft keys. See the following **Keypad edit** screen. Pressing the ENTER key or a multiplier soft key will transfer the new value into the *focus* field. Note also the presence of an Undo soft key and that an invalid entry will cause an error message and return the *focus* field to its previous value.

The backspace (BKSP) and exponent (EXP) keys are also active in the Keypad edit mode.

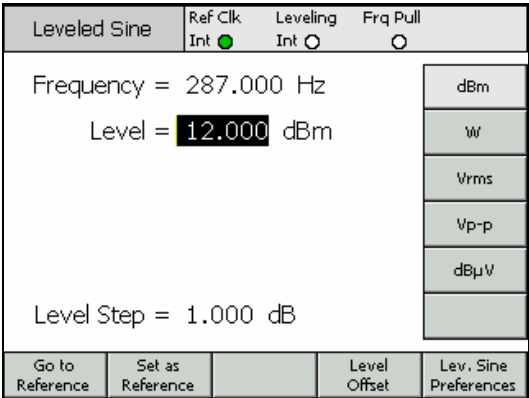
Leveled Sine		Ref Clk Int ●	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>
Frequency = 2.65_		<div style="border: 1px solid black; padding: 2px; text-align: center;">Hz</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">kHz</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">MHz</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">GHz</div> <div style="border: 1px solid black; padding: 2px; height: 20px;"></div> <div style="border: 1px solid black; padding: 2px; height: 20px;"></div>		
Level = -10.000 dBm				
				Undo

Keypad Edit

ead18f.bmp

Changing Displayed Units

Measurement Units are usually associated with digital values. In the case of the Instrument, the units are typically associated with frequency and level. Pressing **UNITS** while a field is selected provides a list of measurements units that apply to the value. See the following measurement units screen. Selecting one of these units causes the Instrument to recalculate and display the value in the specified unit. Typical measurement unit selections for Level include the following: dBm, W, Vrms, Vp-p and dBμV.



ead19f.bmp

Measurement Units

Note

The Instrument supports multiple unit scales for display and editing. Each scale has finite resolution, and the finite steps of each scale will not necessarily align. It is therefore possible that conversion of a setting to a different unit followed by conversion back to the original unit could cause a one-step shift in the setting.

The Instrument User Interface specifically avoids this potential problem. That is, it allows the user to view a setting in an alternative unit and then return without disturbance.

Expanded Settings – The Horizontal Soft Keys

The horizontal soft labels across the bottom of the screen provide prompts to expand the current definition, add/remove fields, or call another screen (menu selection).

Preferences Soft Key

All of the screens for settings preferences are listed on and accessible from the Instrument Setup screen which can be called by pressing **SETUP**. However, settings preferences relevant to the current mode of operation are more readily accessible via the bottom-right soft key on the Leveled Sine, Modulation and Sweep screens. Modulation Preferences are shown in the following screen

Instrument Setup		Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>
Modulation Preferences		AM Waveform Ext. AM Coupling AM Trigger Out FM Waveform Ext. FM Coupling FM/PM Trigger Out	
AM Waveform = Sine Ext. AM Coupling = AC AM Trigger Out = Disable FM Waveform = Sine Ext. FM Coupling = AC FM/PM Trigger Out = Disable			
Sine	Triangle	External	Exit

Modulation Preferences

ead10f.bmp

The principle of the *focus* field and its selection by way of the vertical soft keys also apply to preferences screens. The cursor, indicated by two parallel bars highlights a scrolling list of possible entries. The spin wheel or all four cursor keys can be used to scroll the list, and the **Exit** soft key completes the update, returning the display to the previous screen. Where the scroll list is short (as in the preferences screens), the horizontal soft keys give more convenient direct access to the preferences.

Offset Soft Key

The Offset key allows the operator to adjust the Instrument output via an offset from the main setting. The soft label tracks the *focus* field, allowing control of either Frequency Offset or Level Offset.

For example, assuming **Level** to be the current *focus* field, pressing the **Offset** soft key will add and select the **Level Offset** field as the new *focus* field. In the following **Leveled Sine** screen, a new indicator appears on the Status Bar indicating that **Offset** is on.

Leveled Sine	Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>	Offset <input checked="" type="radio"/>
Frequency = 1.000000000 MHz Level = -10.000 dBm Lvl. Offset = 0.000 dB				Frequency Level Offset (As Error)
Go to Reference	Set as Reference	Toggle Offset	Offset Disable	Lev. Sine Preferences

Leveled Sine – No Offset

ead02f.bmp

This new **Offset** field supports **Cursor** or **Numeric** edit and its value will be added to the current output to give a new output level. See the following **Leveled Sine – Offset Applied** screen. The display indicates the current output level and the offset value that achieves it.

Leveled Sine	Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>	Offset <input checked="" type="radio"/>
Frequency = 1.000000000 MHz		Frequency		
Level = -8.800 dBm		Level		
Lvl. Offset = 1.200 dB		Offset (As Error)		
Go to Reference	Set as Reference	Toggle Offset	Offset Disable	Lev. Sine Preferences

Leveled Sine – Offset Applied

ead03f.bmp

Note that editing the main Level field with Level Offset enabled causes the current Offset value to reset to zero. In addition, pressing the Offset Disable soft key clears the Level Offset field and its related status bar indicator and soft labels.

Toggle Offset Soft Key

Note that while the Offset field is present, a Toggle Offset soft key is also present. In the following Leveled-Sine – Toggle Offset screen, the Toggle Offset soft key may be pressed at any time to remove the offset from the output. The initial (Offset = 0) value is restored and the Offset indicator on the Status Bar turns off.

Leveled Sine	Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>	Offset <input checked="" type="radio"/>
Frequency = 1.000000000 MHz		Frequency		
Level = -10.000 dBm		Level (Step edit)		
UUT Error = -1.200 dB		Offset		
Go to Reference	Set as Reference	Toggle Offset	Offset Disable	Lev. Sine Preferences

Leveled Sine - Toggle Offset

ead04f.bmp

An additional press of the Toggle Offset soft key reapplies the offset, allowing convenient toggling of the output between its initial and its offset values.

Offset (As Error) Soft Key

In a typical calibration application in which the Instrument has been set to a target Level (or Frequency), an offset may be applied until the UUT reads exactly the target value. The offset setting is now related to the UUT error.

When the Offset field is the *focus* field, both its display and edit format may be switched from an expression of offset of Instrument output to an expression of Error in the UUT. This results in a convenient and accurate readout of UUT error for which display units may be selected independently.

Note

If a UUT reads high (and has an Error of +Err,) it is clear that the Instrument will have to be adjusted down by an Offset -Off to achieve the target reading.

It is often thought that Offset and Error will merely be of opposing signs, i.e. +Err = -Off. This is only true if Offset and Error are both expressed in ratio units of dB. To express Error and Offset in % (or ppm), however, while the same is approximately true for small errors, a more substantial Error of, say, +10 % will require an Instrument Offset of only -9.091 % to achieve the target reading. The two are non-linearly related. This calculation and display feature is frequently of great benefit.

Reference Soft Keys

For the Leveled Sine function, the Instrument user interface also supports a Reference Frequency, a Reference Level or a Reference Point (Frequency and Level).

References may be an output setting that the user might need to return to frequently during a calibration application, perhaps to check or adjust for stability.

Two soft keys, **Go to Reference** and **Set as Reference**, give immediate access to the reference and can be pressed at any time. The **Go to Reference** soft key sets the output of the Instrument to the existing reference settings. The **Set as Reference** soft key transfers the current settings to establish a new reference setting. Both soft keys result in the display of Reference Settings and their application to the output, unchanged or updated dependent upon which key was pressed. See the following screen, Monitoring the References.

Leveled Sine	Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>
Ref. Freq. = 1.000000000 MHz		Frequency Track Main	
Ref. Level = -10.000 dBm		Level Track Main	
Reference Frequency and Level Active			
Reference Off			Reference Preferences

Monitoring the References

ead21f.bmp

Notice that the message Reference Frequency and Level Active appear when the Go to Reference soft key is pressed.

⚠ Caution

The reference settings could be a substantially different than the previous Level and/or Frequency output settings, and, if inadvertently applied, the resulting change in output signal may damage the load. To protect against this, the user may elect to switch to Standby as a Reference Preference prior to confirming the switch to the reference settings. Setting Reference Switching Preferences is described later in this chapter.

Switching of the Output signal to match the reference settings is otherwise immediate, and a Reference Active message is displayed.

Reference settings are not editable on this screen, no adjustment of output level or frequency can be made. New reference settings are established via the Set as Reference soft key only.

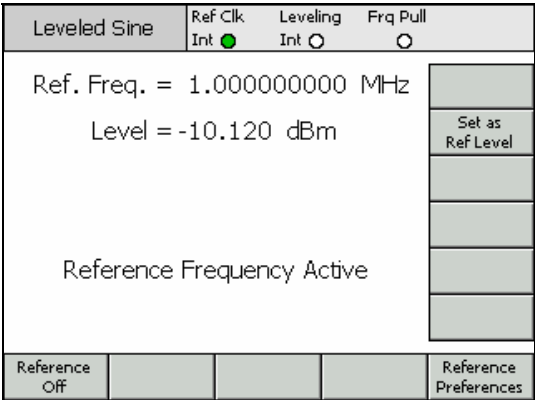
Reference Off Soft Key

The Reference Off soft key returns the Instrument to the Leveled-Sine screen and its output settings. The message Switch from Reference – Confirm with Operate may appear if switching confirmation has been selected as a Reference Preference.

Frequency and Level Track Main Soft Keys

The Set as Reference soft key always transfers the current Level and Frequency settings into the reference settings. If only a Ref Freq is required, the Level Track Main soft key should be pressed. This releases the Ref Level field to track the main Level setting. See the following Frequency and Level Tracking screen. Only the Ref Freq remains fixed.

The soft key beside the Level field can be used at any time to re-establish the current Level as a Ref level.



Frequency and Level Tracking

ead22f.bmp

Rear-Panel Controls and Connectors

Figure 3-4 shows the rear panel of the Instrument and identifies each of its controls and connectors. Functional and operational descriptions for each of the controls and connectors are given in the following paragraphs.

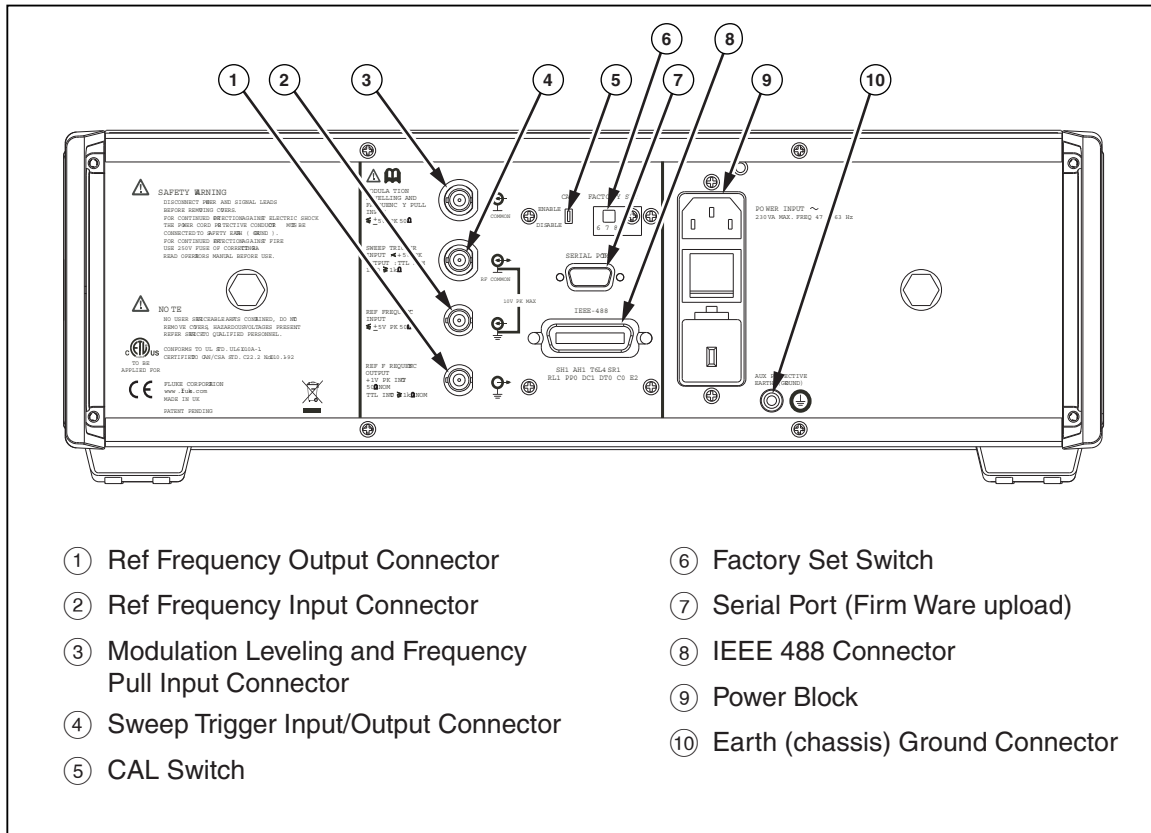


Figure 3-4. Rear Panel Controls and Connectors

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Power Block and Switch

The Power Block includes the power switch and a dual fused line-power input connector for the Instrument. Its universal design accommodates a variety of regional power cords, line-power (90 V to 132 V and 180 V to 264 V ac), and power fuses. These various line-power configurations and the procedures to establish them are described earlier in Chapter 2.

IEEE 488 Connector

The Instrument includes an IEEE 488.2, SCPI (1999) Remote Interface for connecting and controlling the Instrument remotely in a system environment. The IEEE 488 Connector provides the means for connecting a controlling system to the Instrument. The controlling system may be as simple as a PC or as complex as an automated calibration system.

Reference Frequency Output Connector

The Reference Frequency Output Connector is a rear-panel BNC connection that provides access to an internally generated reference frequency. See Table 3-1 for the output specifications.

Table 3-1. Reference Frequency Output Specifications

Parameter	Specification	Comments
Connector Type	BNC	Out Referenced to Ground
Frequency	1 MHz or 10 MHz	User selectable
Amplitude into 50 Ω	1.5 V pk-pk nom	-0.4 V to 1.1 V nominal
Amplitude into 1 k Ω	3.0 V pk-pk nom	-0.4 V to 2.6 V TTL or 3 V compatible

Reference Frequency Input Connector

The Reference Frequency Input Connector is a BNC input connection for applying an external reference frequency. See Table 3-2 for the input specifications.

Table 3-2. Reference Frequency Input Specifications

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to Ground
Nominal Frequency	1 to 20 MHz	In user selectable 1 MHz steps. Phase Noise specification holds only for 10 MHz or 20 MHz external clocks.
Lock Range 9640A 9640A-LPN	± 30 ppm ± 1 ppm	On-screen lock indicator
Amplitude	1 V pk nominal	± 5 V pk max
Input Impedance	50 Ω	Will accept TTL drive via a series 1 k Ω resistor - not provided
Phase Lock Bandwidth	1 kHz nominal	Phase Noise of output is determined by the incoming clock approaching or below this offset.

Note

External Reference I/O's are used to lock frequency synthesizers of two or more instruments (daisy chain). This eliminates offset and drift of frequency between instruments, allowing, for instance, a Spectrum Analyzer to accurately tune with respect to the Instrument. If they were not locked, the Analyzer and Instrument would be likely to drift off tune and the Analyzer could lose or not see the Instrument signal.

Instruments locked to the same Reference Frequency in this way can still exhibit very slight frequency offsets due to synthesizer / divider errors, and the two output frequencies will not be phase locked. (See description under Modulation Leveling and Frequency Pull Input Connector.)

Modulation, Leveling and Frequency Pull Input Connector

The Modulation, Leveling and Frequency Pull Input Connector is a BNC connection for applying a multifunction external control signal to the Instrument. Depending upon the operating settings of the Instrument, the signal may be tailored for modulation control, frequency control, or leveling control.

If AM or FM modulation is in use, this input can be used to connect an external modulation source. In this case, the input is enabled via the **Modulation Preferences** screen and AC or DC coupling can be selected. See Table 3-3 and Table 3-4 for the input specifications.

If Leveled Sine is in use, this input will accept a dc feedback voltage from either of the following:

1. An external power meter – for external leveling of the signal at the power meter input. The feedback is compared with an internal adjustable reference voltage at the input of an error amplifier. The Instrument output level adjusts to minimize the difference. See Table 3-5 for the input specifications.
2. An external phase detector and error amplifier – for phase locking the output of the Instrument to that of another Instrument. In this case, this input is a voltage for controlling Instrument output frequency. Output frequency can be pulled by up to ± 5 ppm, depending on sensitivity setting. See Table 3-6 for the input specifications.

⚠ Caution

To avoid damage to the load when using External Leveling, ensure that the maximum output level is suitably limited via the Leveled-Sine Preferences screen.

⚠ Caution

Connections to the External Modulation, Frequency Pull and Leveling Input Connector will often be from a grounded source (e.g. Audio Signal generator or Power Meter). Such connection will ground the RF Common and hence the RF Output of the Instrument. In this circumstance, common-mode noise or ground loops may degrade performance at very low output levels.

Table 3-3. External Modulation Input Specifications (FM)

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Frequency Range	DC – 300 kHz 10 Hz – 300 kHz	-3 dB Bandwidth, DC coupled -3 dB Bandwidth, AC coupled
Sensitivity	500 Hz – 19.2 MHz/V	Continuously adjustable
Input Voltage	± 2.0 V pk max.	Optimum input range ± 0.25 to ± 2.0 V pk, ± 5 V pk absolute max.
Input Impedance	10 k Ω	Nominal

Table 3-4. External Modulation Input Specifications (AM)

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Frequency Range	DC – 220 kHz 10 Hz – 220 kHz 100kHz max. for Carrier >125.75MHz	-3 dB Bandwidth, DC coupled -3 dB Bandwidth, AC coupled
Sensitivity	0.5 - 400 %/V	Continuously adjustable
Input Voltage	±2.0 V pk max.	Optimum input range ±0.25 to ±2.0 V pk, ±5 V pk absolute max.
Input Impedance	10 kΩ	Nominal

Table 3-5. External Leveling Input Specifications

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Full Scale Voltage	1V – 5 V dc	Adjustable for different power meter types, ±5 V pk absolute max.
Input Impedance	10 kΩ	Nominal

Table 3-6. External Frequency Pull Input Specifications

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Input Voltage	± 5 V dc.	±5 V pk absolute max.
Frequency Pull	±0.0001 ppm/V to ±1.0000 ppm/V	Polarity & Sensitivity adjustable.
Input Impedance	10 kΩ	Nominal

Note

When using External Frequency Pull to phase lock two signal sources over a wide range of carrier frequencies it may be necessary to adjust Frequency Pull sensitivity. This parameter contributes to system loop gain and in some cases may need to be adjusted to maintain fixed Hz/V rather than ppm/V

Trigger I/O Connector

The Trigger I/O (input/output) connector is a rear-panel BNC connection that is configurable as either an input or an output for sweep trigger signals, and as an output for modulation trigger signals. In either case, this port is TTL compatible. Sweep trigger input and output specifications for the port are shown in Tables 3-7 and 3-8, respectively. Modulation trigger output specifications are shown in Table 3-9.

Note

I/O connections to the Trigger I/O connector will often be grounded (e.g. Oscilloscope or Spectrum Analyzer). Such connection will ground the RF Common and hence the RF Output of the Instrument. In this circumstance, common-mode noise or ground loops may degrade performance at very low output levels.

Table 3-7. Sweep Trigger Input Specifications

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Trigger Amplitude	TTL , +5 V pk max	Selectable as rising or falling edge
Input Impedance	10 k Ω	Nominal
Time alignment	≤ 1 ms Typical	To start of sweep

Table 3-8. Sweep Trigger Output Specifications

Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Output Pulse	TTL (3 V)	Selectable as rising or falling. Typical duration 250 μ s
Time alignment	+14 to +16 ms Typical	From start of sweep (delay ensures settled signal level at the trigger point)

Table 3-9. Modulation Trigger Output Specifications


Parameter	Specification	Comments
Connector Type	BNC	Input Referenced to RF Common (floating)
Output Pulse	TTL (3 V)	Selectable as rising or falling edge
Time alignment	± 500 ns Typical	From modulation waveform zero crossing (Sine) or positive peak (Triangle)

Operating the Instrument

This section of the manual contains operating instructions for the Instrument. Before using these instructions, read the descriptions of the controls, indicators, and connectors provided earlier in this chapter. These descriptions are sufficient to familiarize the user with most of the general processes for operating the Instrument. These earlier descriptions provide all of the information necessary to access, edit, and interpret general screen information.

Before Starting

Before proceeding with the instructions in this section, complete the following procedure:

- 1. Prepare the Instrument for operation. See Chapter 2.
- 2. Learn the function of and how to use each of the controls, indicators, and connectors described earlier in this chapter.
- 3. Account for any rear-panel connections that may be required.
- 4. Set the power switch to on and set the Instrument to Standby (press ).

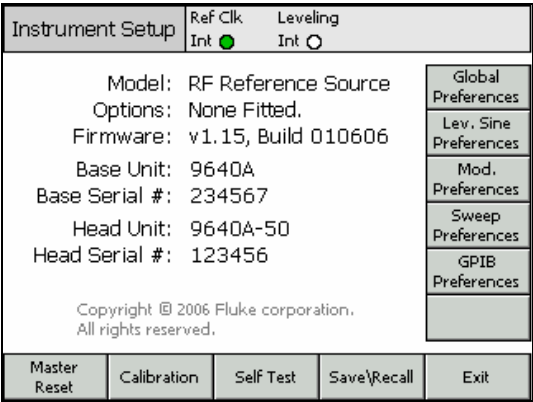
Approximately 4 seconds after switching on power, the Instrument runs a self-test. Details of the power-on self test are given earlier in Chapter 2.

Setting Global Preferences

The Instrument setup screen describes the basic instrument configuration and gives the user access to all user preference setup screens.

Use the following procedure to set the global preferences:

- 1. Press ; the Instrument Setup screen appears.



Instrument setup

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- 2. Press the Global Prefs soft key to the right of the display. The Global Preferences screen appears.
- 3. Select each of the fields, and enter the desired preference in each.

See Table 3-10 for a list of the available global preferences.

Table 3-10. Global Preferences

Instrument Setup		Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>
Global Preferences			
Display Brightness = 50 %		Display Brightness	
Display Appearance = Default		Display Appearance	
Ref. Frequency Output = Disable		Ref. Frq Output	
Ref. Frequency Input = Disable		Ref. Frq Input	
Ext. Ref. Frequency = 1 MHz		Ext. Ref. Frequency	
Default	Scheme1	Scheme2	Exit

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Field	Preference
Display Brightness	10 to 100 % (1 % steps)
Display Appearance	Default, Scheme 1, Scheme 2
Reference Frequency Output	Disable, 1 MHz, 10 MHz
Reference Frequency Input	Disable, Enable
External Reference Frequency	1 MHz to 20 MHz (1 MHz steps)

Local or Remote Operation

Manual user interaction at the front panel of the Instrument is considered local operation. Remote operation requires the use of remote data supplied to the Instrument by way of an IEEE 488 connection at the rear panel. Chapter 4 of the 9640A Instruction Manual provides all of the information required to remotely operate the Instrument.

There is no physical switch for selecting remote operation. In fact, the Instrument switches to remote operation when it receives a remote instruction and remains there until it is recalled to local operation. This recall may occur because of sending a remote instruction or because of manually pressing the **Go to Local** soft key at the bottom of the display.

While the Instrument is set to remote operation, all of the front panel (local) controls are locked out (inoperable) with the exception of the **Go to Local** soft key. See the following **Leveled Sine** screen.

If the **Go to Local** soft key appears at the bottom of the display, press it to return to local operation.

Leveled Sine	Ref Clk Int <input checked="" type="radio"/>	Leveling Int <input type="radio"/>	Frq Pull <input type="radio"/>
Frequency = 1.000000000 MHz			
Level = -10.000 dBm			
Go to Local			

Leveled Sine – Remote Operation

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GPIB Command Emulation

The Instrument has the capability of responding to the GPIB remote commands of certain legacy signal generators. To achieve this, the Instrument must be switched to an alternative Emulation Personality, each of which will have its own GPIB bus address. An emulation personality for the HP3335 signal generator is provided as standard with the Instrument. Other emulation personalities are available as purchased options and are enabled by entering a License Key. However, when available, time limited emulation personalities are fitted as standard, allowing the user to evaluate their effectiveness on a try-before-buy basis.

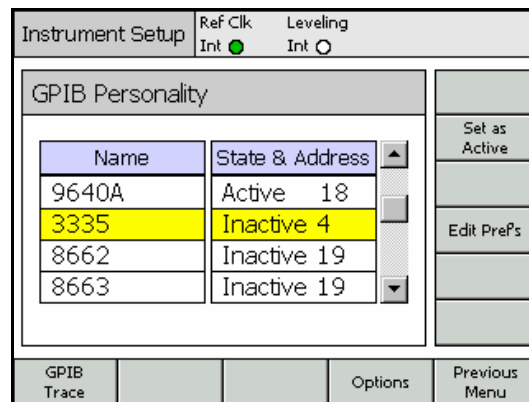
Note

The Instrument will not respond to the 9640 GPIB commands when an emulation personality is selected.

Selecting and Changing the Address of a Command Emulation

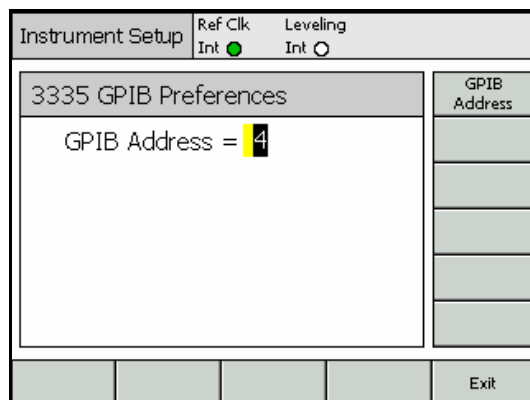
Use the following procedure to select or deselect a GPIB personality or to change the GPIB Address of the Instrument or of an emulation personality:

1. From the Setup screen, press the **GPIB Preferences** soft key to display the **GPIB Personality** screen. This screen displays the available GPIB personalities, their status, Active or Inactive, and their current GPIB address. Only one personality can be Active.
2. Use the scroll wheel or the $\odot \oslash$ keys to highlight a GPIB personality.
3. Press the **Set as Active** soft key to change the current GPIB Personality.



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4. For any highlighted GPIB personality, the current GPIB address may be updated by pressing the **Edit Pref's** soft key. This action causes the relevant GPIB Preferences screen to display.
5. If necessary, use the **GPIB Address** soft key to highlight the Address field.
6. Use the scroll wheel, $\odot \oslash$ keys, or the keypad to enter a new address. This can be the same address as another personality as only one will be Active.



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Note

The Instrument cannot emulate two emulation personalities simultaneously. Therefore, in theory, it would not be possible to replace two legacy signal generators within a Calibration System and hope to emulate them both. However, Fluke has found that many Calibration Software and Procedures do not address two instruments simultaneously. In these cases, it is possible to switch 9640A emulation personality via the Keyboard Interface at the procedure lead-change points.

Note

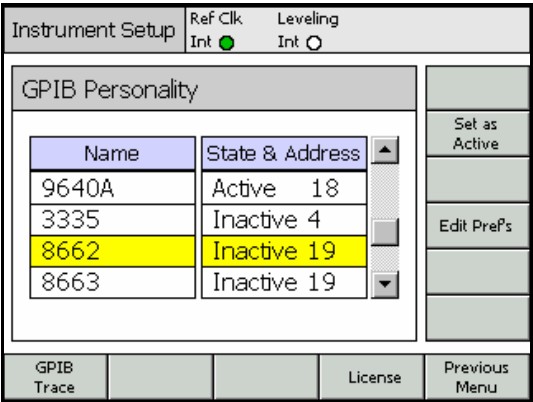
Fluke has extensively tested the Instrument's GPIB command and its functional emulation of legacy signal generators, and will support Customers in resolving any unforeseen difficulty. However, Fluke does not guarantee that complete and accurate emulation will be possible for all Systems, Software, and Procedures that may be encountered.

Licensing a GPIB Emulation Personality

A license for the HP3335 Emulation Personality is included as standard on the Instrument. Other GPIB personalities require a License Key, which may be purchased with the instrument or as a later upgrade. A Temporary License is factory installed to allow evaluation of the command emulation prior to its purchase. This Temporary License allows a set number of hours of Remote operation. The clock starts when the instrument is using the relevant emulation personality and then switched to remote control by the GPIB. The clock stops when Local Operation is restored either by the GPIB or by pressing the Go to Local soft key.

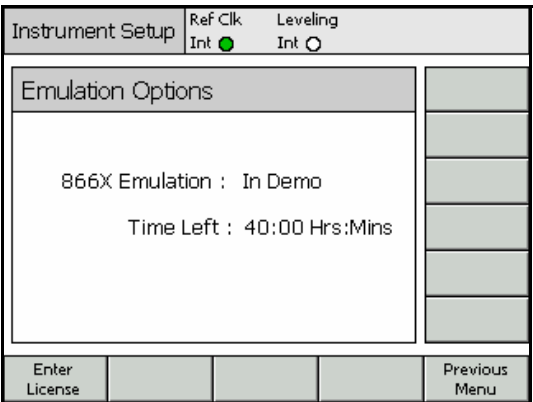
Use the following procedure to install a GPIB personality License Key or to view a license status:

1. From the Setup screen, press the **GPIB Preferences** soft key to display the **GPIB Personality** screen. This action causes the display to show the available GPIB personalities, their status (Active or Inactive), and their current GPIB address. Only one personality can be Active.
2. Use the Spin Wheel or the \odot \ominus keys to highlight a GPIB personality.



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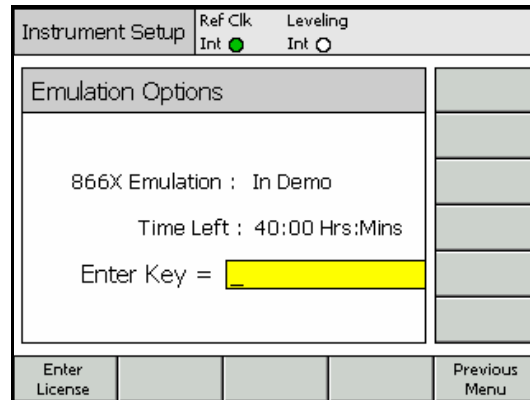
3. To show the current License screen (status) for the highlighted GPIB personality, press the License soft key.



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A GPIB personality License and Key can be purchased through a Fluke Sales Representative or Customer Service channel. Enter the License Key as follows:

1. On the relevant License screen press the **License Key** soft key to display the License Key Entry screen.



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2. Using the alpha/numeric keypad, enter the License Key provided. The *Keypad* section (provided earlier in this chapter) explains the use of the alpha/numeric keypad. If the entered License Key is rejected, an error message appears in the status bar.

Full details of operation and programming via the 9640A GPIB and emulation personalities are given in Chapter 4 of the Operators Manual.

Connecting a Leveling Head to the Instrument

⚠ Caution

The 9640A front-panel connector interface is suited only for use with Fluke 9640A-xx Leveling Heads. To avoid equipment damage, no other connection is permitted.

Note

Background: The 9640A-xx Leveling Head contains a small EEPROM device in which the head type, serial number, and calibration data is stored. When a Leveling Head is fitted, it is automatically detected and the stored data is read. The head type, 9640A-50 (50 Ohm) or 9640A-75 (75 Ohm), will be used to re-scale User Interface values in accordance with the capabilities of the Leveling Head and may, therefore, cause displayed level values to change.

Hot (power on) swapping of Leveling Heads is fully supported and will not cause damage or RF leakage. The Hot removal of a Leveling Head will, however, force the Instrument output into Standby.

The Base Unit and Leveling Heads are calibrated together, and details of the association are stored in both the Base Unit and Leveling Heads. Connecting a Head not associated with the Base will result in a warning message being displayed, but normal operation will not be prevented. Details of the Base/Head associations can be displayed by pressing the Setup key, followed by the Calibration softkey.

Use the following procedure to connect the cable end of the Leveling Head to the RF Output connector on the Instrument:

1. Remove the plastic connector protection caps from the cable-end connectors and save them for future use.
2. Refer to Figure 3-5, and connect the multiway connector to the Leveling Head Control connector on the Instrument. Press firmly on the multiway connector until it latches.
3. Refer to Figure 3-5, and connect the SMA connector with the RF Output connector on the Instrument.
4. Torque the connector to 0.45 Nm (4 in-lb) using an SMA connector torque wrench.

The torque wrench is available as an accessory; see Chapter 1, *Options and Accessories*.

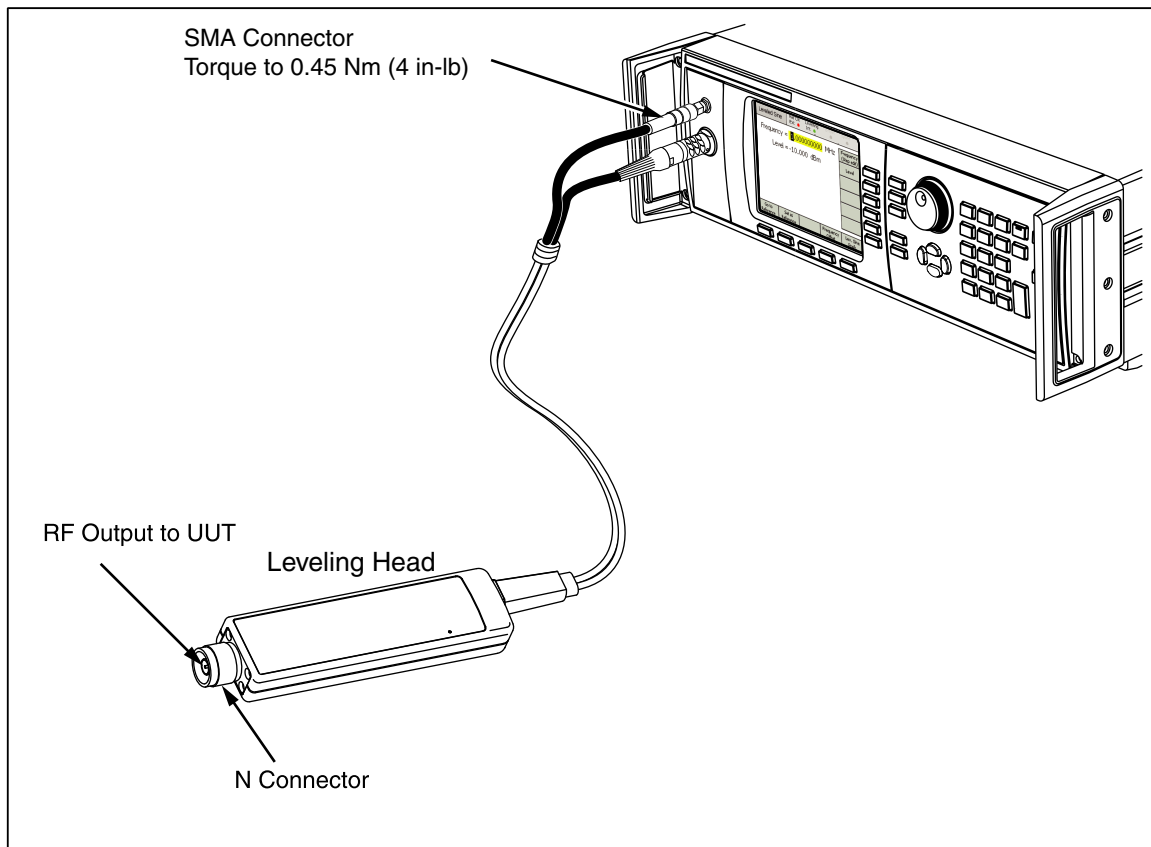


Figure 3-5. Connecting the Leveling Head

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Connecting a Leveling Head to a Unit Under Test

The Instrument relies on either a 50 Ω or a 75 Ω Leveling Head to maintain the integrity of the output signal. Both Leveling Heads use N connectors to connect to the input of the UUT.

Connecting the Leveling Head to a UUT is a straightforward, but critical, process. Before making the connection, to avoid damage to the instruments involved and to ensure measurement integrity read and observe the following cautions and warnings,.

⚠ Caution

To prevent damage to the N connector on the Fluke 9640A-xx Leveling Heads, use a sacrificial adapter when making frequent connections or connections to low-quality N connectors.

⚠ Caution

Reliable and repeatable interconnections are only achieved at the specified torque setting of 1.00 Nm (9 in-lb). Performance will be impaired if torque settings are not observed, and permanent connector damage is likely to result from over-tightening.

⚠ Warning

To prevent the leakage or transmission of an RF signal, never connect the Instrument output (the output from a Leveling Head) to a radiating antenna of any kind. Such a transmission would be hazardous to personnel and may impair the SAFE operation of equipment, and communication and navigation systems.

The connection of a radiating antenna is an illegal act in many countries. Only connect the Instrument output (the output from a Leveling Head) to equipment or transmission lines designed to prevent RF leakage at the level and frequency of the Instrument output.

⚠ Caution

The Leveling Heads are fitted with close tolerance metrology-grade N-connectors compliant with MIL-C-39012 and MMC Standards for Precision N-connectors. Used in demanding metrology applications, the Leveling Heads are likely to be mated with similar high-quality connectors, minimizing the opportunity for wear and damage. However, in applications that require frequent mating or mating to lower quality connectors, the opportunity for damaging the connectors increases. On these high-risk occasions, consider using a sacrificial adapter to prevent damage to the N-connectors.

⚠ Caution

Irreversible damage of RF connectors is likely if 50 Ω and 75 Ω connectors are accidentally mated to each other. Although appearance is similar, the dimensions (pin diameter) of 75 Ω connectors differ significantly from those of 50 Ω. Improper mating of 50 Ω and 75 Ω connectors will damage the center pin. Great care must be taken to ensure that the 9640A-50 is mated only to 50 Ω systems and likewise that the 9640A-75 mates only with 75 Ω systems. Otherwise, mechanical damage to the connectors and out-of-tolerance performance is likely.

⚠ Caution

The 9640A-xx Heads are fed via very high-grade flexible coaxial transmission line. As with any coaxial line, deformation of sidewalls or abrupt bending can degrade performance. Take care to avoid mechanical stress or tight bend radius < 60 mm (2.4 in).

⚠ Caution

The maximum output level of the 9640A is unusually high (+24 dBm into 50 Ω and +18 dBm into 75 Ω). Many RF loads, active and passive, could be damaged by this power level. Be careful not to exceed the maximum ratings of the any connected load.

Additional notes regarding good practice when sourcing and measuring high- and low-level signals are given at the end of Chapter 3 of the 9640A Instruction Manual.

Use the following procedure to connect a Leveling Head to a UUT:

- 1. Read and observe all of the preceding Cautions and Warnings.
- 2. Remove the plastic connector protection caps form the cable-end connectors and save them for future use.
- 3. Connect the N-connector on the Leveling Head to the input of the UUT.
- 4. Torque the N-connector to 1.00 Nm (9 in-lb) using an N-connector torque wrench.

The torque wrench is available as an accessory; see Chapter 1, *Options and Accessories*.

Creating an RF Output Signal

The Instrument provides three kinds of output signals: sine, modulated, and swept. User selectable screens, as shown in Figure 3-6, provide control for each of these outputs.

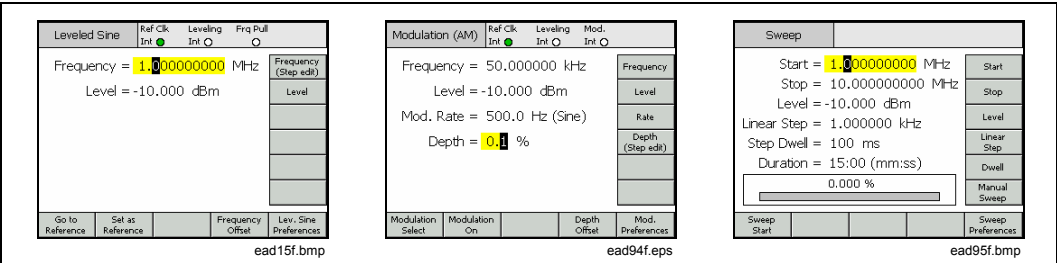


Figure 3-6. Control Screens for the RF Output Signal

Chapter 3 of the 9640A Instruction Manual provides detailed procedures for creating sine, modulated, and swept output signals. Procedures for expanded features, such as offset, are also provided in the 9640A Instruction Manual.