

Keysight N2877A Deluxe Accessory Kit

User's Guide



Contents

N2877A Deluxe Accessory Kit 3

Safety Information 5

Accessory Details 6

N2877A Deluxe Accessory Kit

The N2877A Deluxe Accessory Kit is to be used with the Keysight N2870A Series passive probe family.

Kit Contents

The following table shows the accessories supplied in the N2877A kit. Some of these accessories are discussed in greater detail starting on page 6.

Accessory	Quantity
Spring-loaded probe tips, gold-plated 0.5 mm	5
Rigid probe tips, CuBe 0.5 mm	5
Ground blade, 2.5 mm	3
Ground spring, 2.5 mm	3
Dual adapter, 2.5 to 0.8 mm sockets	2
Adapter, 2.5 to 2 mm banana plug	1
Adapter, 2.5 to 0.8 mm socket	1
Sprung hook, 2.5 mm	1
Short sprung hook, 2.5 mm	1
Pico hook, black	2
Pico hook, red	2
IC cap, 2.5 - 0.5 mm green	3
IC cap, 2.5 - 0.65 mm blue	3
IC cap, 2.5 - 0.8 mm gray	3
IC cap, 2.5 - 1.0 mm brown	3
IC cap, 2.5 - 1.27 mm black	3
PCB adapter kit 2.5	1
Insulating cap, 2.5 mm	1
Protection cap, 2.5 mm	1
QFP IC clips, 13 mm long down to 0.5 mm pitch (yellow/green)	2
QFP IC clips, short down to 0.5 mm pitch (yellow/green)	2
Bernstein Adjustment Tool	1
HF compensated ground lead, 22cm	1

N2877A Deluxe Accessory Kit

Accessory	Quantity
Ground lead, 22 cm to 4 mm banana plug	1
Ground lead, 22 cm to 2 mm banana plug	1
Ground lead, 11 cm to miniclip	1
Ground lead, 11 cm to 0.8 mm socket	1
Ground lead, 2.5 to mini alligator clip	1
Ground lead, 2.5 to 0.8 mm socket	1
Ground lead, 15 cm	1
BNC adapter, 2.5 mm	1
Self-adhesive Cu-pads (2x2 cm)	10
Color coded rings	3x4 colors
Micro SMD clip	1
2 leg probe positioner	1

Safety Information

Warning



To avoid personal injury and to prevent fire or damage to this product or products connected to it, review and comply with the following safety precautions (these apply to the accessories in the N2877A kit and the N2870A Series probes). Be aware that if you use this probe assembly in a manner not specified, the protection this product provides may be impaired.

Handle Probe Tips / Accessories Carefully

Some of the probe tips / accessories are very sharp (the spring tips and ground spring, for example). You should handle these with care to avoid personal injury.

Use Only Grounded Instruments

Do not connect the probe's ground lead to a potential other than earth ground. Always make sure the probe and the oscilloscope are grounded properly.

Connect and Disconnect Properly

Connect the probe to the oscilloscope and connect the ground lead to earth ground before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground lead from the circuit under test before disconnecting the probe from the oscilloscope.

Observe Probe Ratings

Do not apply any electrical potential to the probe input which exceeds the maximum rating of the probe. Make sure to comply with the voltage versus frequency derating curve in the N2870A Series User's Guide.

Keep Away From Live Circuits

Avoid open circuitry. Do not touch connections or components when power is present.

Indoor Use Only

Do not operate in wet/damp environments. Keep product surfaces dry and clean.

Do Not Operate With Suspected Failures

Refer to qualified service personnel.

Do Not Operate in an Explosive Environment

Accessory Details

Below is information regarding some of the accessories in the N2877A Deluxe Accessory Kit.

Replacing Rigid/Solid Probe Tips and Spring-Loaded Probe Tips

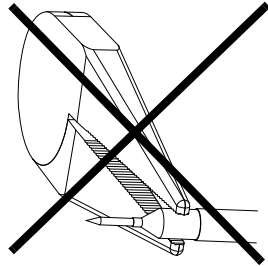
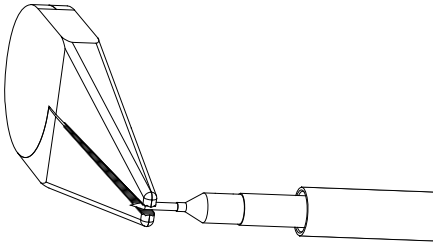


These solid tips and spring-loaded tips are replaceable. To change the probe tip, use pliers to grip the tip and pull it straight out of its contact socket along the axis of the probe. Do not grip the plastic insulator or the housing with the pliers because the tip could be crushed (see images below). This could result in being unable to remove the tip and/or damaging the probe. Once the probe tip is removed, the new tip can be inserted with pliers into the contact socket along the axis of the probe. In order to insert the probe tip completely into the housing, carefully press the probe tip against a hard surface.

Warning

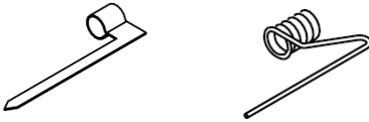


Exercise caution when using these sharp probe tips to avoid personal injury.

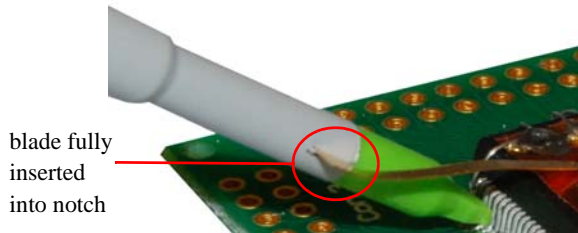


Spring loaded probe tips offer a method of probing signals that is less susceptible to vibration or movement than traditional rigid tips. Many users find it easier to use this type of tip. The spring loaded tips work when they are either partially or fully compressed and are protected against over compression damage.

Short Ground Blade / Ground Spring



The short ground blade is the best performing ground connection available with the N2870A Series due to its low inductance. To attach the ground blade, simply push it over the probe tip and continue pushing until the blade is inserted into the notch located on the probe barrel (as shown in the picture below - Note that the ground blade was placed over the tip and then an IC cap was placed over it as well in the picture).



This will keep it from spinning around on the probe while in use. You can also bend and form the blade to reach your grounding location.

The ground spring offers similar performance as the ground blade and depending on the probing situation, may offer greater flexibility when making a ground connection. The ground spring is also inserted over the probe tip in a similar manner. It is mainly used for browsing as it is flexible and snaps back to original orientation (unlike the ground blade that you can form) which allows you to connect it to your grounding location and then move the probe tip around. It does have a slightly larger inductance than the ground blade which may result in some decrease in performance depending on the application.

Dual Adapter and Adapters



The dual lead adapter offers a convenient and reliable method to connect both the probe signal and ground to probe points on the board or other probe accessories. For example, this can be used to connect to connector headers or to other accessories like the QFP clips or pico hooks (see the picture in the Pico Hook section of this manual).

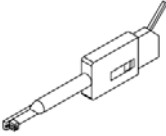
The sockets accept 0.56-0.86 mm round and 0.64 mm square (0.022 - 0.034 inch round and 0.025 inch square) diameter pins. The maximum insertion depth is 7.5 mm (0.295 inch) and the outer insulation of the socket is 2.2 mm maximum (0.87 inch). You can use it for 2.54 mm pitch (0.1 inch) terminals.



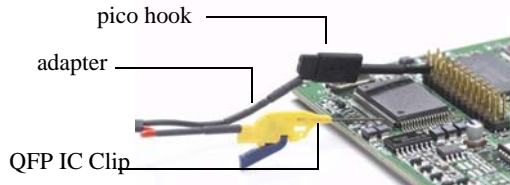
The 2.5 to 2 mm banana plug adapter provides a way to easily connect the probe signal input to a standard 2 mm banana jack. All outer surfaces are non-conducting to minimize shorting hazards.

The 2.5 to 0.8 mm socket adapter provides a way to easily connect the probe signal input to a square or round pin. The socket accepts pin sizes of 0.56-0.86 mm round and 0.64 mm square (0.022 - 0.034 inches round and 0.025 inches square)

Pico Hooks / QFP IC Clips



You can use pico hooks or QFP IC clips to make connections to components or wires with leads that are 1.01 mm (0.04 inches) in diameter or smaller. With today's miniature IC- and component-packaging techniques, the pico hooks or QFP IC clips can make probing challenging devices much easier. Most users prefer to attach the clips/hooks to the probe via the dual lead adapter as shown in the picture below. Press the back of the pico hooks to extend the grasping hook and then release to tighten the hook around the component you are testing. Press the lever on the QFP IC clip to extend the grasping jaws.



IC Caps

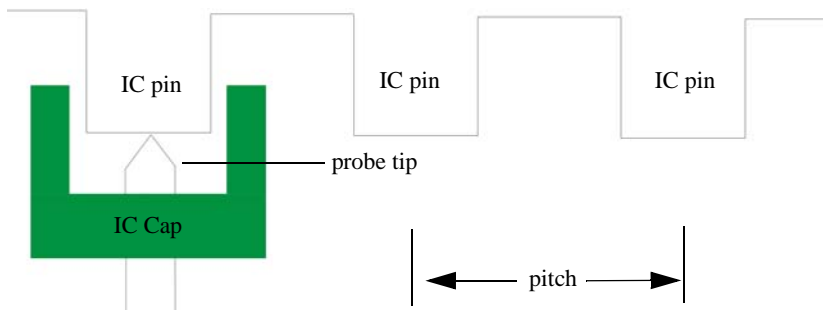


The IC caps fit over the probe tip and provide a convenient self-aligning connection to IC pins. This helps maintain contact on small fine pitch legs and prevents shorting adjacent pins by preventing the probe tip from sliding between the legs of the component.

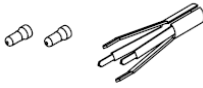
Accessory Details



The different colored IC caps correspond to different pitches (see diagram below to see how pitch is measured and refer to the table on pages 3-4 to see what pitch each color corresponds to). The IC caps are compatible with both the rigid and spring loaded tips. Below is a simplified drawing showing how the caps fit around the IC pins and where the probe tip comes through the cap.



PCB Adapter Kit



The PCB Adapter sockets are designed to solder into a printed circuit board (PCB) as test points to minimize ground inductance and maximize signal fidelity. Below is a picture showing one of these PCB sockets attached to a PCB.



The recommended PCB layout is shown in the manual that accompanied your N2870A Series probe. The PCB socket is compatible with hand soldering and reflow processes. After soldering the socket - both the signal contact and ground contact - to the board, simply insert the probe. The PCB adapter is compatible with either the rigid or spring-loaded probe tip.

Insulator Cap



This cap is meant to fit over the probe tip and cover the ground barrel of the probe, covering any potential shorting locations near the tip. This enables you to probe in hot environments without having to worry about shorts.

Micro-SMD Clip

The micro-SMD clip is a spring loaded, two-pole test clip specially designed for SMD components. It features a gold-plated, hardened tip for testing circuits and has flat-nosed grips for individual components. Its balanced spring force enables you to test both large and small components. Its pin connection is 0.64 mm (0.025 inches) and the spring is electrically insulating. The clip's clamping range is 0 - 8 mm (0 - 0.3 inches)

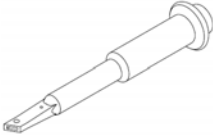


2-Leg Probe Positioner

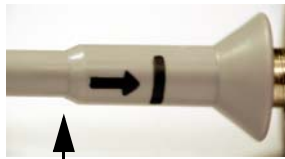


The 2-leg probe positioner can be used for quick and stable hands-free browsing. The positioner has three different sized apertures into which various sized probes can be placed. To use, first determine the appropriate aperture for your probe. Then insert your probe and arrange the positioner/probe at the measuring point. The front of the positioner (the side with the Keysight logo) must be pointing up during use.

Sprung Hooks



You will see a gray line (shown as black in the picture below) with an arrow pointing towards it on the barrel of your N2870A Series probe.

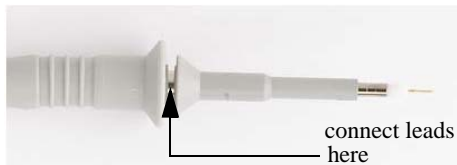


ridge

This is used as a marker to tell you when you have pushed the sprung hook completely onto the probe. When inserting the sprung hook onto the probe barrel, push until you feel it lock onto the ridge (see picture above). If you do not push the sprung hook to this point so it can engage and “lock on” to the probe, the accessory may fall off or suffer a decrease in performance. If the sprung hook is correctly attached then the gray marking line should be covered when the hook is fully extended.

Ground Leads

Unless the directions below tell you that a particular ground lead slips over the probe tip, these leads clip onto the following location on the N2870A Series probes.

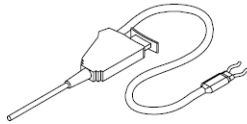


Accessory Details

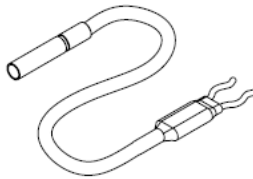
Ground Lead to Banana Plug – This ground lead provides a way to easily connect the probe ground to a standard 4 mm banana jack (4 mm version) or a 2 mm banana jack (2 mm version). Its long length offers probing flexibility without having to reconnect the ground. This long length also limits the signal integrity of the measurement because of the large inductive loop in the ground return path.



Ground Lead, 11 cm to Miniclip – This ground lead provides an easy way to connect the probe ground to small pins or component legs. The insulated tip minimizes any shorting hazards.



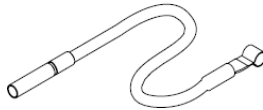
Ground Lead, 11 cm to 0.8 mm Socket – This ground accessory provides a means for connecting the probe ground to a square or round pin. The socket accepts pin sizes of 0.56-0.86 mm round and 0.64 mm square (0.022 - 0.034 inches round and 0.025 inches square). The socket body is insulated to minimize any shorting hazards.



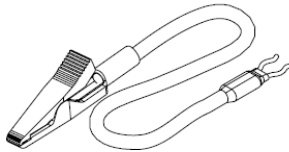
Ground Lead, 2.5 to Mini Alligator Clip – This ground lead supports many different options for connecting the probe ground via the alligator clip. It attaches to the barrel of the probe (slips over the probe tip) and has a fairly short length. This combination reduces the inductance in the ground path when compared to some of the other options. This may make it a better choice in certain applications.



Ground Lead, 2.5 to 0.8 mm Socket - This ground accessory provides a means for connecting the probe ground to a square or round pin. The socket accepts pin sizes of 0.56–0.86 mm round and 0.64 mm square (0.022 - 0.034 inches round and 0.025 inches square). The socket body is insulated to minimize any shorting hazards. It attaches to the barrel of the probe (slips over the probe tip) and has a fairly short length. This combination reduces the inductance in the ground path when compared to some of the other options. This may make it a better choice in certain applications.



HF Compensated Ground Lead - When probing fast edges, long ground connections usually cause problems as they bring additional inductance into your measurement. This additional inductance can distort your measurements and your oscilloscope will display these resonances (called “ringing effects”). Use the HF Compensated Ground Lead to clean and flatten your measurement and optimize it for ringing effects.



BNC Adapter



Both the rigid and spring-loaded probe tips are compatible with this adapter.

Bernstein Adjustment Tool

This tool is functionally equivalent to the trimmer tool shipped with your N2870A Series probe. However, this tool is fully insulated (there is no exposed metal).

Color Coded Rings



The color coding rings can be used to keep track of which probe is connected to which channel input on your oscilloscope. Place one ring on the probe cable near the oscilloscope input and place another ring of the same color near the probe head. This ensures that you can pick up a probe and immediately know which channel it is connected to without having to track the cable back to the oscilloscope channel input.

Safety Notices

This apparatus has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

Warnings

- Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.
- Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- Do not install substitute parts or perform any unauthorized modification to the instrument.
- Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.
- Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
- Do not use the instrument in a manner not specified by the manufacturer.

Safety Symbols



Instruction manual symbol: the product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product or personal injury.



Hazardous voltage symbol.



Earth terminal symbol: Used to indicate a circuit common connected to grounded chassis.

Notices

© Keysight Technologies, Inc. 2009
No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number
N2877-97000, April 2009

Print History
N2877-97000, April 2009

Keysight Technologies, Inc.
1900 Garden of the Gods Road
Colorado Springs, CO 80907 USA

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Keysight Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Document Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Keysight disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particu-

lar purpose. Keysight shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Keysight and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

Keysight Technologies
Printed in Germany, April 2009

Manual Part Number
N2877-97000

