Keysight UXR-Series and MXR/EXR-Series MultiScope

KEYSIGHT

HARDWARE CONFIGURATION GUIDE

Notices

Manual Part Number

54964-97042

Edition

Seventh edition, July 2023

Available in electronic format only

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

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 particular 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 License

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.

U.S. Government Rights

The Software is "commercial computer software," as defined by Federal Acquisition Regulation ("FAR") 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement ("DFARS") 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at www.keysight.com/find/sweula. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Safety Notices

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

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.

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.

MultiScope Hardware Configuration, UXR-Series—At a Glance

In one equipment rack, you can connect multiple Infiniium UXR-Series oscilloscopes together to create an oscilloscope system with up to 20-channels.

NOTE **The Infiniium UXR-Series oscilloscope software supports up to 40 channels in a MultiScope system. If you are interested in configuring a two-rack, 40-channel UXR-Series MultiScope system, contact Keysight for more information.**

Oscilloscopes Required

Infiniium UXR-Series oscilloscopes:

- Each oscilloscope adds four or two input channels. You can connect up to five oscilloscopes in a rack.
- The MultiScope system is synchronized using the **Cal Out** signal on the second (*follower #1*) oscilloscope, power divider, and a synchronization port (channel 4, for example) on all oscilloscopes.

Expansion Accessories

As you configure MultiScope systems made up of UXR-Series oscilloscopes, expansion accessories containing the necessary cables, adapters, and power dividers are required:

- N2164A UXR-Series Multi-Frame Base Kit (First Two Frames).
- N2170A UXR-Series Multi-Frame Two-To-Three Expansion Kit.
- N2165A UXR-Series Multi-Frame Expansion Kit (Add One Frame).

The N2164A, N2170A, and N2165A rack mount expansion accessories are set up so that you can expand your system one oscilloscope at a time.

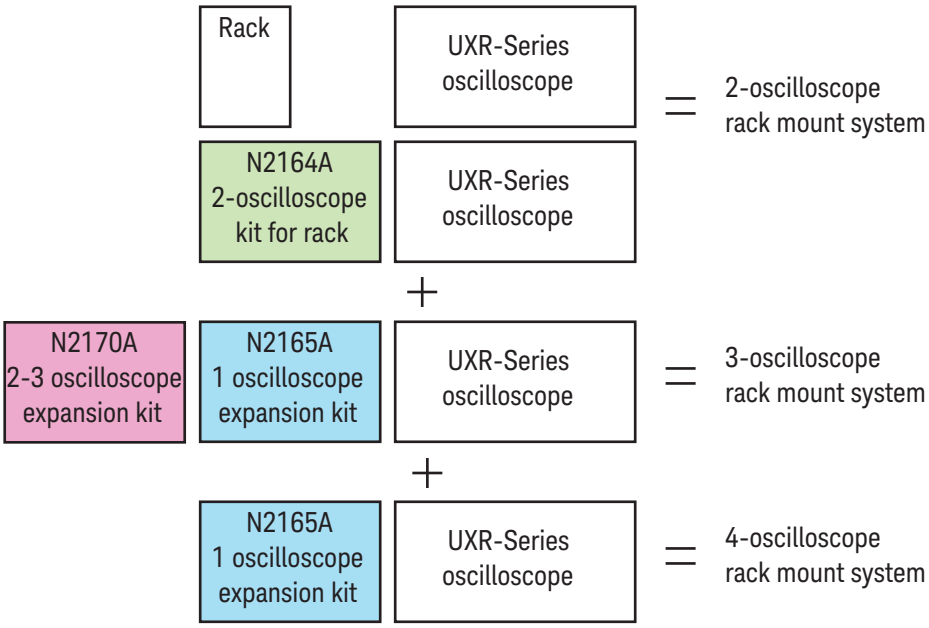


Figure 1 Expansion Accessories Required for Four-Oscilloscope Rack Mount System

For example, to set up a four-oscilloscope system, your configuration would include one N2164A kit (to go from one oscilloscope to two), one N2170A kit (to add a second power divider), and two N2165A kits (to go from two oscilloscopes to three and then from three oscilloscopes to four). See Figure 1.

MultiScope Control Software

To control MultiScope systems and analyze captured data, you can use:

- Infiniium oscilloscope software on the Leader oscilloscope. MultiScope software is included as a standard feature.
- D9010BSEO Infiniium Offline oscilloscope analysis software on an external host computer. MultiScope software is included as a standard feature.

This software allows time-synchronized acquisitions for multiple-oscilloscope systems with very low oscilloscope-to-oscilloscope jitter and drift. This software can be used to configure, capture, and store real-time voltage signals.

Not Included

MultiScope systems also require:

- Equipment rack.
- Rack mount kits (N2156A) for each oscilloscope in the rack.
- Remote interface connection between the system running the MultiScope control software (either the Leader oscilloscope or an external host computer) and each oscilloscope in the system (for controlling the individual oscilloscopes and moving captured data to the host computer).

  Ethernet LAN or instrument USB are the most common interface options used.

MultiScope Hardware Configuration, MXR/EXR-Series—At a Glance

You can connect multiple Infiniium MXR/EXR-Series oscilloscopes together to create an oscilloscope system with greater than 4 channels all the way up to a 40-channel system.

Oscilloscopes Required

Infiniium MXR/EXR-Series oscilloscopes:

- Each oscilloscope adds eight or four input channels. You can connect up to five oscilloscopes in a rack.
- The MultiScope system is synchronized using the **AUX OUT** signal on the second (*follower #1*) oscilloscope, power divider, and a synchronization port (channel 4, for example) on both oscilloscopes.

Expansion Accessories

For MultiScope systems made up of two MXR/EXR-Series oscilloscopes, this multi-frame cable kit is available:

- N2124A Multi-Frame Cable Kit for Two MXR/EXR-Series Oscilloscopes.

For MultiScope systems made up of three to five MXR/EXR-Series oscilloscopes, no multi-frame kits are available; however, the required cables and accessories are described in this manual.

Not Included

MultiScope systems also require:

- Equipment rack(s).
- Rackmount kits for the oscilloscopes (MXR2RACK for MXR-Series or EXR2RACK for EXR-Series).
- MultiScope control software.
- Remote interface connection between host computer and the each oscilloscope in the system (for controlling the individual oscilloscopes and moving captured data to the host computer).

  Ethernet LAN and instrument USB are the most common interface options used.

MultiScope Control Software

To control MultiScope systems and analyze captured data, you can use:

- Infiniium oscilloscope software on the Leader oscilloscope. MultiScope software is now included as a standard feature.
- D9010BSEO Infiniium Offline oscilloscope analysis software on a host computer. MultiScope software is now included as a standard feature.

This software allows time-synchronized acquisitions for multiple-oscilloscope systems with very low oscilloscope-to-oscilloscope jitter and drift. This software can be used to configure, capture, and store real-time voltage signals.

In This Guide

This guide describes the equipment required to configure MultiScope systems and shows you how to set up and connect the equipment:

- Chapter 1, "MultiScope System Requirements," starting on page 9.

Depending on the UXR-Series oscilloscope bandwidths and number of channels required, you will use one of the configurations shown in the following table.

# of channels required (4-ch oscilloscopes)	# of channels required (2-ch oscilloscopes)	Configuration required	See:
5-8	3-4	2-oscilloscope configuration	Chapter 2, "Two-Oscilloscope System, UXR-Series," starting on page 11 (that can be expanded later).
9-20	5-10	3-to-5-oscilloscope configuration (1 rack)	Chapter 3, "Three- to Five-Oscilloscope Systems, UXR-Series," starting on page 17.

Depending on the MXR/EXR-Series oscilloscope bandwidths and number of channels required, you will use one of the configurations shown in the following table.

# of channels required (8-ch oscilloscopes)	# of channels required (4-ch oscilloscopes)	Configuration required	See:
9-16	5-8	2-oscilloscope configuration	Chapter 4, "Two-Oscilloscope System, MXR/EXR-Series," starting on page 25 (that can be expanded later).
17-40	9-20	3-to-5-oscilloscope configuration (1 rack)	Chapter 5, "Three- to Five-Oscilloscope Systems, MXR/EXR-Series," starting on page 29.

After you have set up and connected the MultiScope system, see:

- Chapter 6, "Next Steps," starting on page 43.

See Also

- The Infiniium UXR-Series or MXR/EXR-Series oscilloscope software's online help for information on using the MultiScope Hosted Instruments software.

Contents

1 MultiScope System Requirements

This chapter describes the requirements for MultiScope systems, including oscilloscopes, environmental, and rack.

Oscilloscopes are sensitive measurement instruments, and some environmental conditions must be present to ensure that the oscilloscope delivers the best possible measurement accuracy.

For UXR-Series MultiScope systems, refer to the *Infiniium UXR-Series Real-Time Oscilloscopes User's Guide* for information on power requirements, airflow/cooling requirements, and rack/cabinet requirements.

For MXR/EXR-Series MultiScope systems, refer to the *Infiniium MXR/EXR-Series Real-Time Oscilloscopes User's Guide* for information on power requirements, airflow/cooling requirements, and rack/cabinet requirements.

2 Two-Oscilloscope System, UXR-Series

Expansion Equipment Required

Table 1 Equipment Required for Two-Oscilloscope Rack Mount System

Model	Description	Quantity
N2164A	UXR-Series Multi-Frame Base Kit (First Two Frames)	1
N2156A	Rack mount kit	2

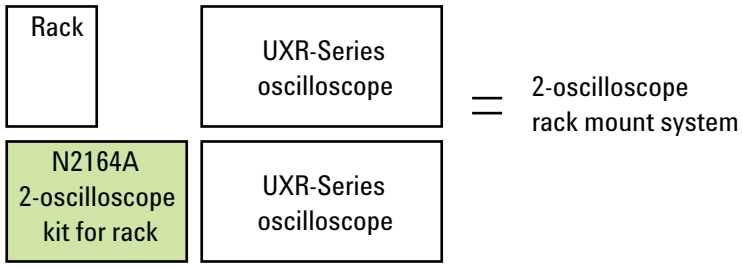


Figure 2 Expansion Accessories Required for Two-Oscilloscope Rack Mount System

Mounting Oscilloscopes in Rack

Oscilloscopes take 7U of rack space and the power divider assembly takes 1U of rack space.

NOTE Locate oscilloscopes in the rack so that the overall rack center of gravity is about half-way up the rack. Because of cable lengths, use the recommended power divider location relative to the Leader and Follower oscilloscope locations.

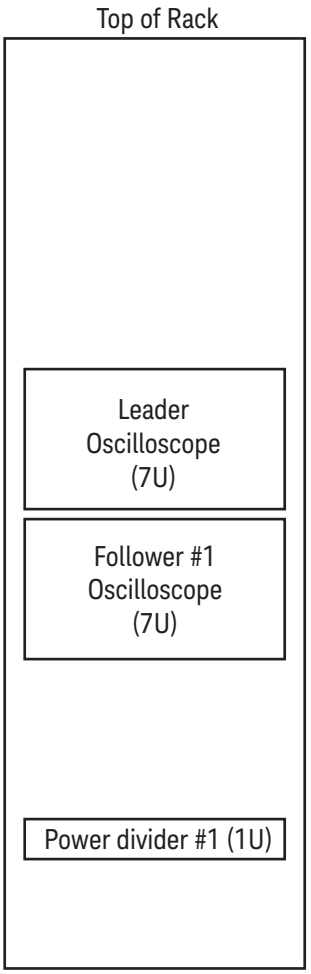


Figure 3 Oscilloscope Locations in Rack

Using the instructions in the *Rack Mount Kit User's Guide*, mount oscilloscopes in their designated rack locations.

Connecting the Equipment

Parts in the N2164A (Two in Rack) Expansion Kit

In the N2164A expansion kit, these parts are used to connect the oscilloscopes in the MultiScope system:

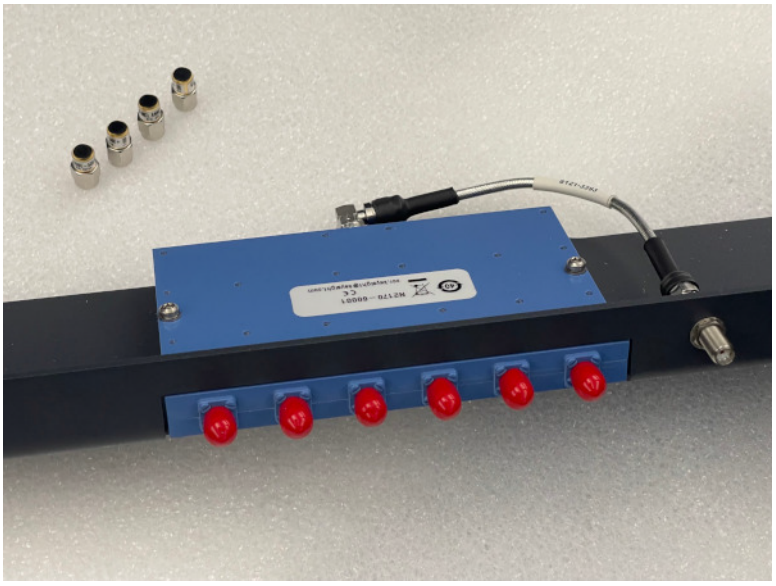
Part number	Qty	Description
54964-61632	5	1 m phase-stable cable
(part of N2164A)	1	6-way splitter assembly with rack mount shelf
1250-3745	7	50 Ω SMA terminator

These parts are used to create a long cable for performing channel deskew:

Part number	Qty	Description
54964-61632	2	1 m phase-stable cable
1250-2818	2	Right-angle male to female SMA adapter
1250-3758	1	Female/female SMA adapter (connector saver) 3.5 mm (f)
1250-3347	1	Push-on male SMA to female SMA adapter

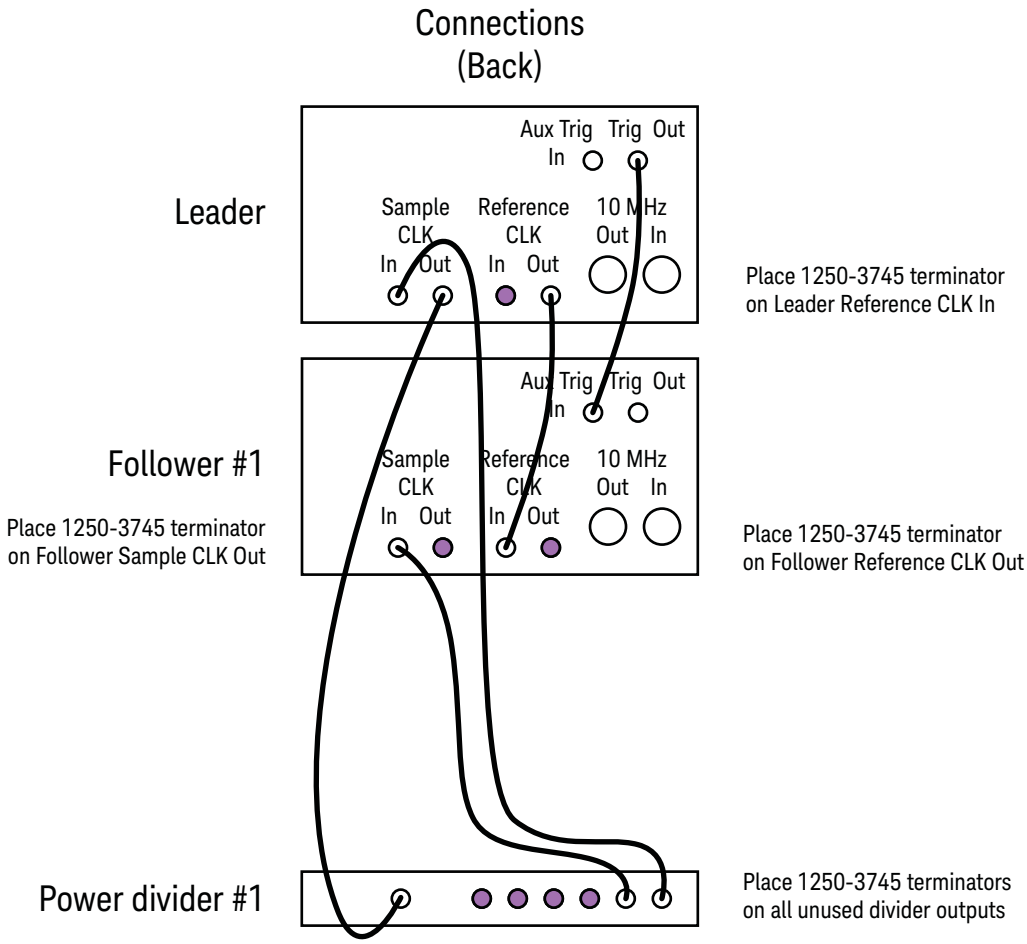
NOTE

The 6-way splitter is shipped with protective caps on its connectors:



When connected, all protective caps must be replaced either by 50 Ω SMA terminators or cables, for example:

Connecting the Oscilloscopes



Using the parts in a N2164A (two in rack) expansion kit, follow these instructions:

1. Mount the power divider #1 assembly in the designated rack location (with connectors facing back). See "Mounting Oscilloscopes in Rack" on page 12.
2. Connect four SMA 50 Ω terminators (1250-3745) to the four unused left-most power divider #1 assembly outputs.
3. Connect one SMA 50 Ω terminator (1250-3745) to the Leader **Reference CLK In** connector.
4. Connect one SMA 50 Ω terminator (1250-3745) to the Follower **Reference CLK Out** connector.
5. Connect one SMA 50 Ω terminator (1250-3745) to the Follower **Sample_CLK_Out** connector.
6. Connect one 54964-61632 cable from the Leader **Sample_CLK_Out** output to the power divider #1 input.

7 Connect two 54964-61632 cables between the power divider #1 assembly outputs and the oscilloscopes' **Sample_CLK_In** inputs.

8 Connect one 54964-61632 cable between the Leader **Trig Out** and Follower #1 **Aux Trig In** connectors.

9 Connect one 54964-61632 cable between the Leader **Reference CLK Out** and Follower #1 **Reference CLK In** connectors.

10 Connect the oscilloscopes to the Leader oscilloscope (or external host computer) through the desired remote interface connection (LAN, USB, etc.).

11 If these are the last oscilloscopes to be connected, see Chapter 6, “Next Steps,” starting on page 43.

3 Three- to Five-Oscilloscope Systems, UXR-Series

Expansion Equipment Required

Table 2 Equipment Required for 3-to-5-Oscilloscope Rack Mount System

Model	Description	Quantity
N2164A	UXR-Series Multi-Frame Base Kit (First Two Frames)	1
N2170A	UXR-Series Multi-Frame Two-To-Three Expansion Kit	1
N2165A	UXR-Series Multi-Frame Expansion Kit (Add One Frame)	(# of scopes) minus 2
N2156A	Rack mount kit	(# of scopes)

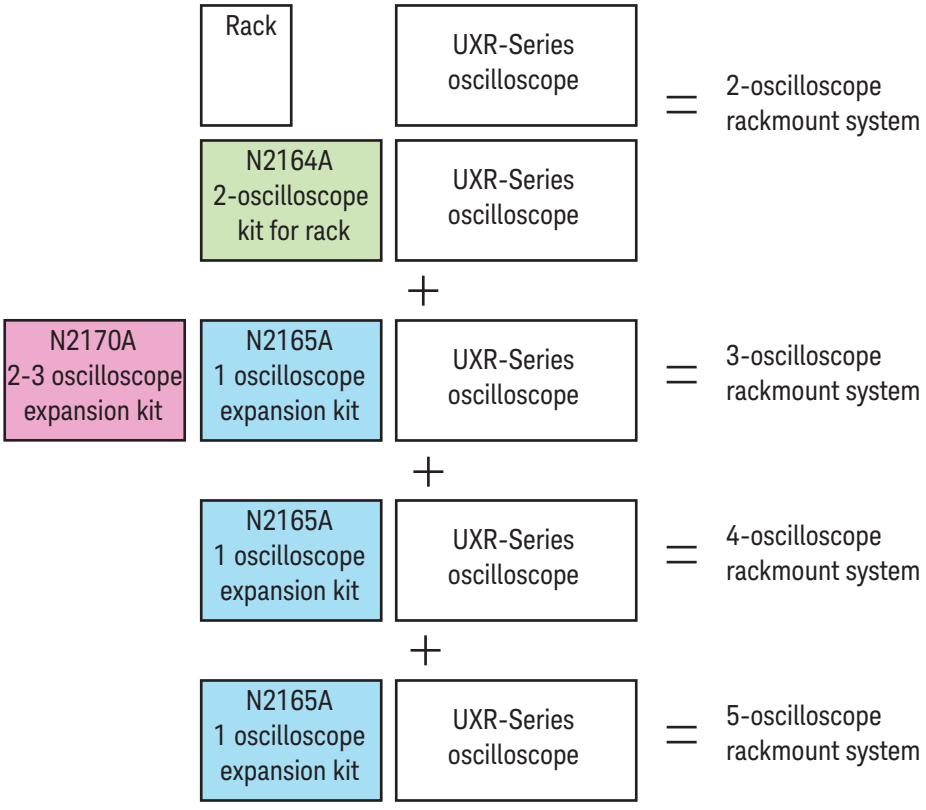


Figure 4 Expansion Accessories Required for Three- to Five-Oscilloscope Rack Mount System

Mounting Oscilloscopes in Rack

Oscilloscopes take 7U of rack space and the power divider assemblies each take 1U of rack space.

NOTE Locate oscilloscopes in the rack so that the overall rack center of gravity is about half-way up the rack. Because of cable lengths, use the recommended power divider locations relative to the Leader and Follower oscilloscope locations.

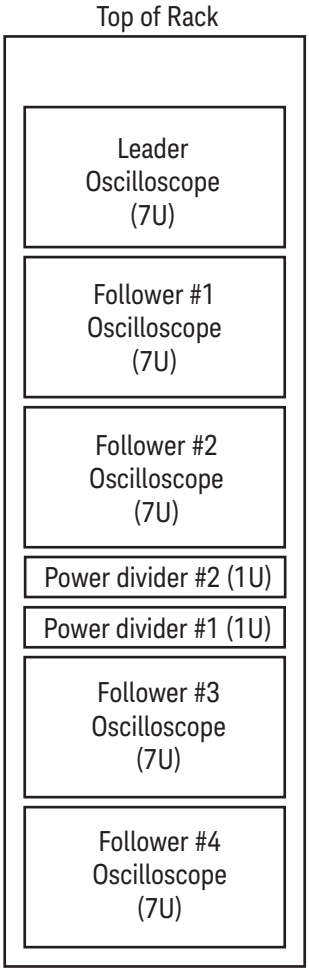


Figure 5 Oscilloscope Locations in Rack

Using the instructions in the *Rack Mount Kit User's Guide*, mount oscilloscopes in their designated rack locations.

Connecting the Equipment

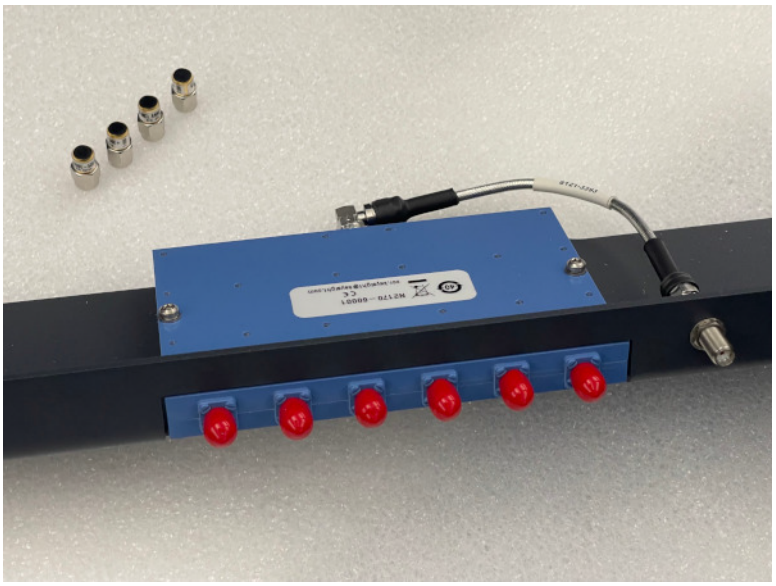
Parts in the N2170A (Two-To-Three) Expansion Kit

In the N2170A two-to-three expansion kit, these parts are used to split the Trig Out signal from the Leader oscilloscope to the follower oscilloscopes:

Part number	Qty	Description
54964-61632	1	1 m phase-stable cable
(part of N2170A)	1	6-way splitter assembly with rack mount shelf
1250-3745	4	50 Ω SMA terminator

NOTE

The 6-way splitter is shipped with protective caps on its connectors:

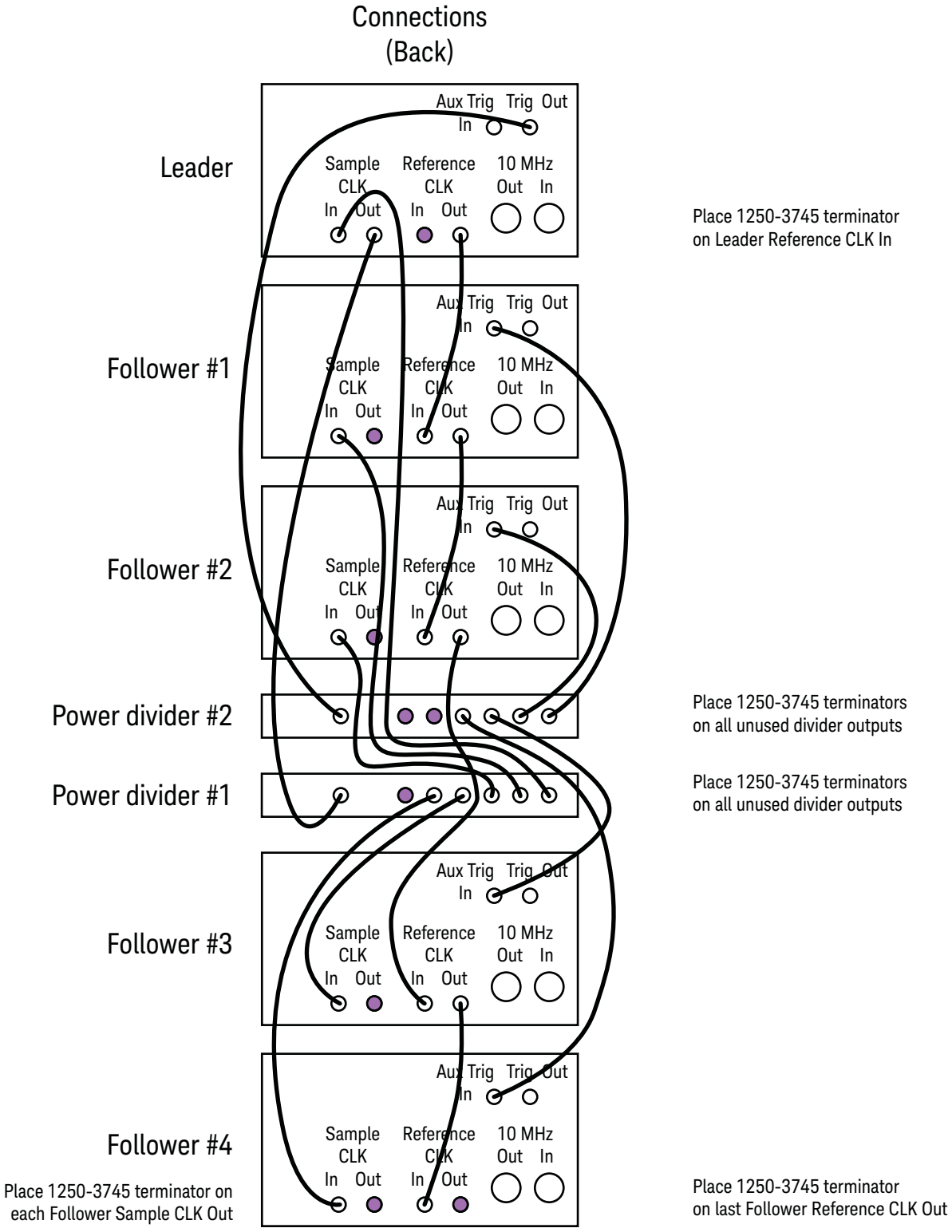


When connected, all protective caps must be replaced either by 50 Ω SMA terminators or cables, for example:

Parts in the N2165A (Add One) Expansion Kit

Part number	Qty	Description
54964-61632	3	1 m phase-stable cable

Connecting the Follower #2 Through Follower #4 Oscilloscopes



Before connecting the follower #2 through follower #4 oscilloscopes, first follow the instructions for connecting a two-oscilloscope rack mount system in "Connecting the Oscilloscopes" on page 15.

When adding the follower #2 oscilloscope only, using the parts in the N2170A (two-to-three) expansion kit, follow these instructions:

1. Mount the power divider #2 assembly in the designated rack location (with connectors facing back). See "Mounting Oscilloscopes in Rack" on page 19.
2. Connect four SMA 50 Ω terminators (1250-3745) to the four unused left-most power divider #2 assembly outputs.
3. Disconnect the cable from the follower #1 oscilloscope's **Aux Trig In** connector, and connect it to the power divider #2 input.
4. Connect one 54964-61632 cable between the first power divider #2 output to the follower #1 oscilloscope's **Aux Trig In** input.

Then, for each of the oscilloscopes from follower #2 to follower #4, using the parts in the N2165A (add one) expansion kit, follow these instructions:

1. Remove one SMA 50 Ω terminator (1250-3745) from the power divider #1 output that will be used for this oscilloscope and move it to this oscilloscope's **Sample_CLK_Out** connector.
2. Connect one 54964-61632 cable between the power divider #1 output and the oscilloscope's **Sample_CLK_In** input.
3. Remove the SMA 50 Ω terminator (1250-3745) from the power divider #2 output that will be used for the oscilloscope.
4. Connect one 54964-61632 cable between the power divider #2 output to the oscilloscope's **Aux Trig In** input.
5. Remove the SMA 50 Ω terminator (1250-3745) from the previous oscilloscope's **Reference CLK Out** connector and move it to this oscilloscope's **Reference CLK Out** connector.
6. Connect one 54964-61632 cable between the previous oscilloscope's **Reference CLK Out** connector to this oscilloscope's **Reference CLK In** connector.
7. Connect the oscilloscope to the Leader oscilloscope (or external host computer) through the desired remote interface connection (LAN, USB, etc.).
8. If this is the last oscilloscope to be connected, see Chapter 6, "Next Steps," starting on page 43.

4 Two-Oscilloscope System, MXR/EXR-Series

This chapter describes how to configure two-oscilloscope MultiScope systems made up of MXR/EXR-Series oscilloscopes.

MXR/EXR-Series Oscilloscope Requirements

For two-oscilloscope MultiScope systems made up of MXR/EXR-Series oscilloscopes, you can use the N2124A multi-frame cable kit.

Refer to your analysis software documentation for additional Infiniium application software version requirements.

Parts in the N2124A Multi-Frame Cable Kit

8120-1840 (qty 3), BNC cable, 48 in. length

8120-1839 (qty 3), BNC cable, 24 in. length

0955-2638, power divider

Connections

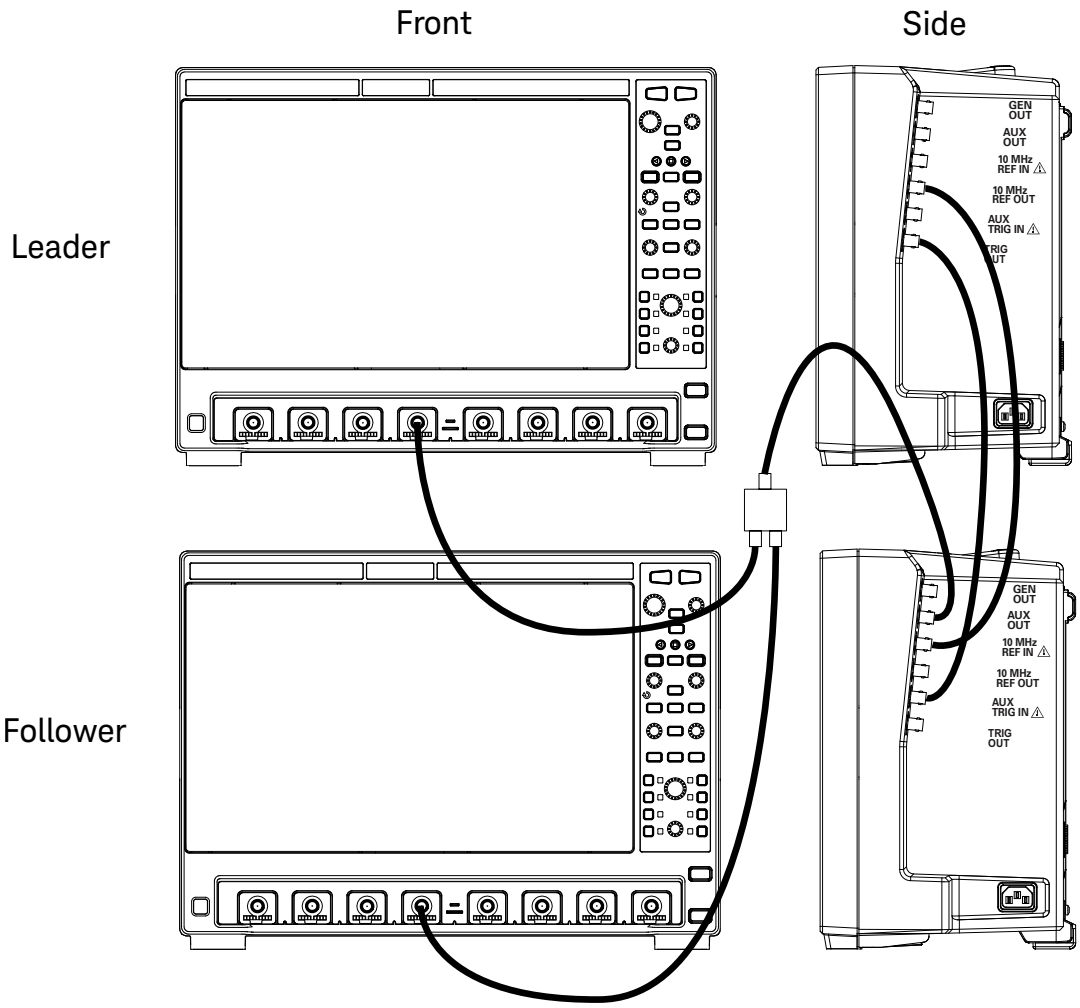


Figure 6 Connections for synchronization and reference clock skew calibration

Connections for Synchronization

The following two connections are required for synchronization.

1. Connect **TRIG OUT** from the Leader to **AUX TRIG IN** on the Follower through a BNC cable.
2. Connect **10 MHz REF OUT** from the Leader to **10 MHz REF IN** on the Follower through a BNC cable.

From the N2124A multi-frame cable kit, use these cables:

Connection	Use Cable/Adapters
Trig	8120-1840 BNC cable, 48 in. length
Ref Clk	8120-1840 BNC cable, 48 in. length

Connections for Reference Clock Skew Calibration

The following connections are required for reference clock skew calibration. These same connections are also required for the optional drift correction.

1 Connect the Follower's **AUX OUT** signal to the channel 4 inputs on both oscilloscopes using BNC cables and a passive power splitter or divider.

From the N2124A multi-frame cable kit, use these power dividers and cables:

Use Cable/Adapters/Power Divider	Notes
0955-2638, power divider 8120-1839 (qty 3) BNC cable, 24 in. length	

Next Steps

Once connections are made, see Chapter 6, “Next Steps,” starting on page 43.

5 Three- to Five-Oscilloscope Systems, MXR/EXR-Series

Expansion Equipment Required

Table 3 Equipment Required for 3-to-5 MXR/EXR-Series Oscilloscope Rackmount System

Model	Description	Quantity
33600A-Series waveform generator	Waveform generator (for 10 MHz clock)	1
3INRACK	Three Infiniium MXR/EXR-Series expansion accessory set (Rackmount)	1
PLUS1	Infiniium MXR/EXR-Series expansion accessory set (Expand One Frame)	(# of scopes) minus 3
MXR2RACK or EXR2RACK	Rackmount kit, 8U	(# of scopes)

NOTE

The 3INRACK and PLUS1 accessory sets are not actual kit model numbers that can be ordered from Keysight. Instead, they are simply used to describe the accessories (cables, adapters, and other equipment) needed to connect three oscilloscopes or add one oscilloscope.

Orderable kit model numbers for the 3INRACK and PLUS1 accessory sets are currently being set up.

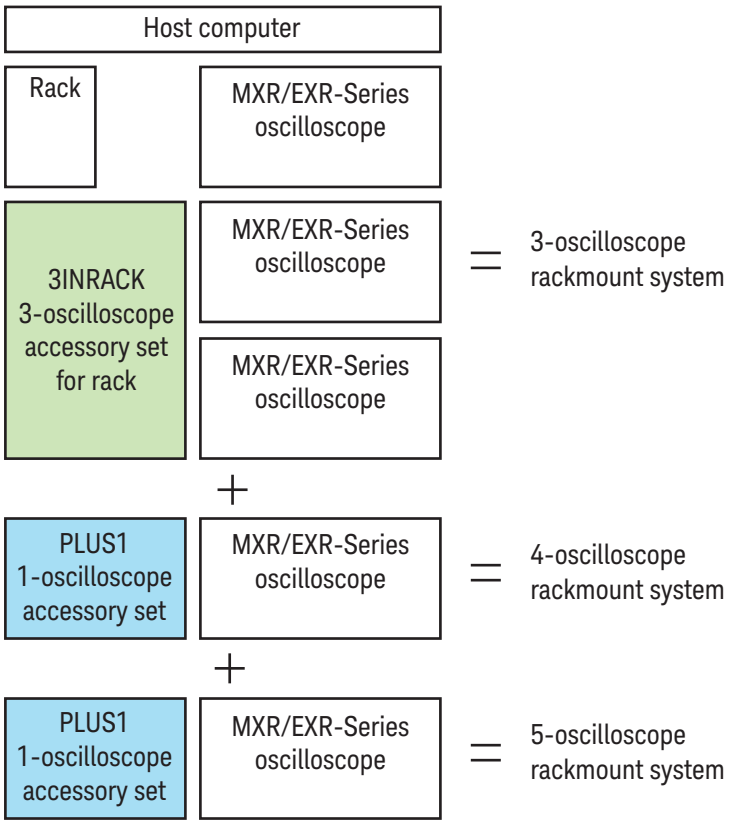


Figure 7 Expansion Accessories Required for Three- to Five-Oscilloscope (MXR/EXR-Series) Rackmount System

Mounting Oscilloscopes in Rack

Oscilloscopes take 8U of rack space and the power divider assembly takes 1U of rack space.

NOTE **Because of cable lengths, and to ease further oscilloscope expansion, it is recommended to place the oscilloscopes in the specified relative rack locations.**

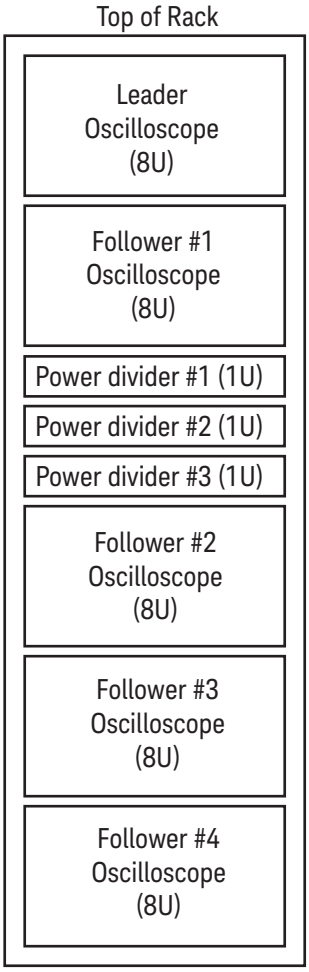


Figure 8 Oscilloscope Locations in Rack

Using the instructions in the *Rackmount Kit User's Guide*, mount oscilloscopes in their designated rack locations.

Connecting the Equipment

NOTE

The 3INRACK and PLUS1 accessory sets are not actual kit model numbers that can be ordered from Keysight. Instead, they are simply used to describe the accessories (cables, adapters, and other equipment) needed to connect three oscilloscopes or add one oscilloscope.

Orderable kit model numbers for the 3INRACK and PLUS1 accessory sets are currently being set up.

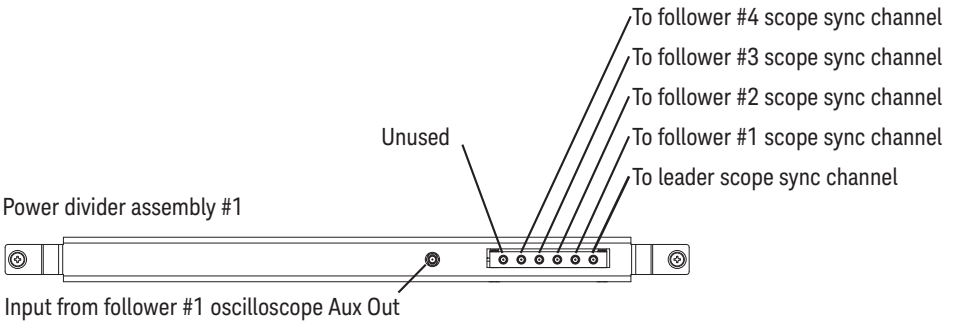
Parts in the 3INRACK (Three in Rack) Expansion Accessory Set

Part number	Qty	Description
N2759-60002	3	Power divider assembly (1-6)
1250-2818	11	Right-angle male to female SMA adapter
1250-3745	13	50 Ω SMA terminator
54932-61632	11	SMA cable
1250-2015	14	BNC (m) to SMA (f) adapter, 50 Ω

Parts in the PLUS1 (Add One) Expansion Accessory Set

Part number	Qty	Description
1250-2818	3	Right-angle male to female SMA adapter
54932-61632	3	SMA cable
1250-2015	3	BNC (m) to SMA (f) adapter, 50 Ω

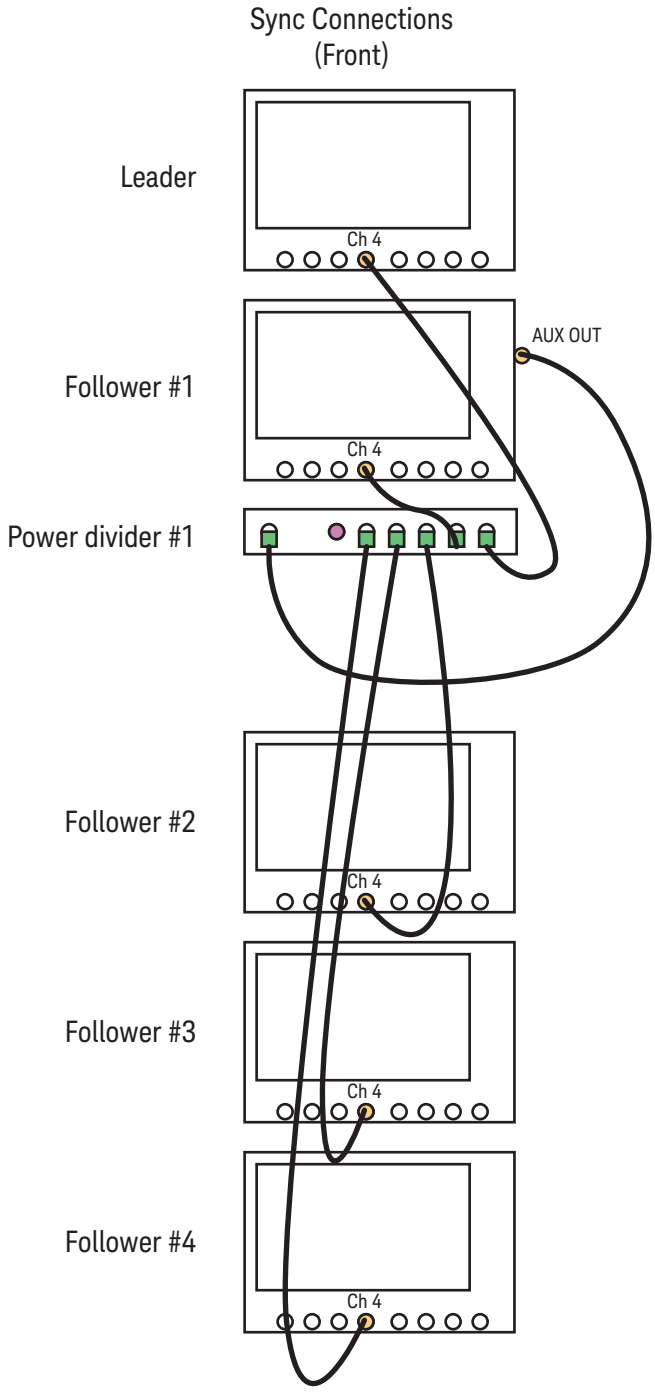
Sync Signal Connections



Place 1250-2818 adapters on all used power divider outputs

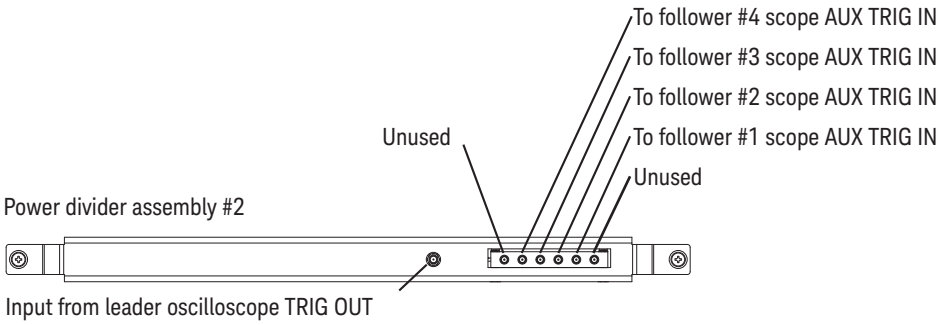
Place 1250-3745 terminators on all unused power divider outputs

Place 1250-2015 adapters on all oscilloscope synchronization channel inputs



NOTE With the MXR/EXR-Series oscilloscopes, the Sync signal connections are used only during the calibration step of the MultiScope control software, and these connections can be removed after the calibration step is completed.

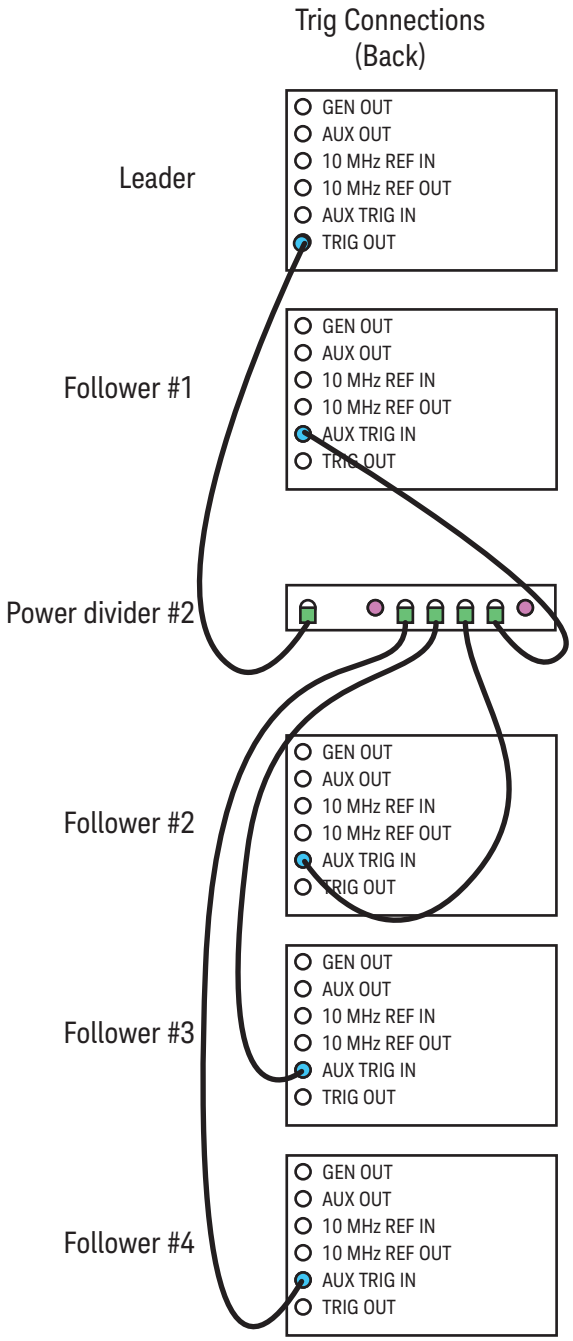
TRIG OUT Signal Connections



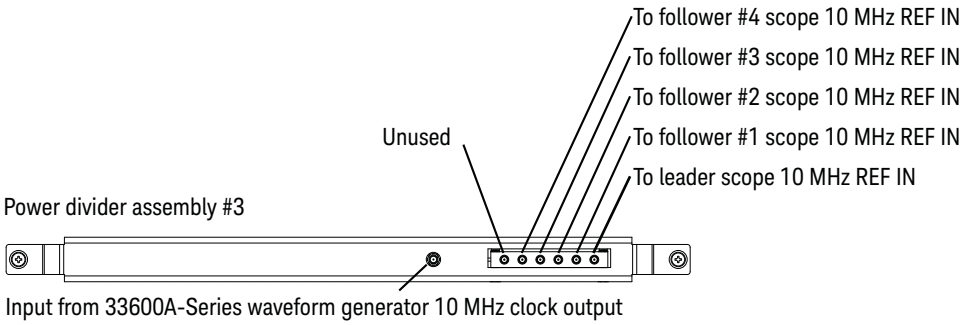
Place 1250-2818 adapters on all used power divider outputs

Place 1250-3745 terminators on all unused power divider outputs

Place 1250-2015 adapters on all oscilloscope AUX TRIG IN inputs


Trig Connections
(Back)
Leader
GEN OUT
AUX OUT
10 MHz REF IN
10 MHz REF OUT
AUX TRIG IN
TRIG OUT
Follower #1
GEN OUT
AUX OUT
10 MHz REF IN
10 MHz REF OUT
AUX TRIG IN
TRIG OUT
Power divider #2
Follower #2
GEN OUT
AUX OUT
10 MHz REF IN
10 MHz REF OUT
AUX TRIG IN
TRIG OUT
Follower #3
GEN OUT
AUX OUT
10 MHz REF IN
10 MHz REF OUT
AUX TRIG IN
TRIG OUT
Follower #4
GEN OUT
AUX OUT
10 MHz REF IN
10 MHz REF OUT
AUX TRIG IN
TRIG OUT

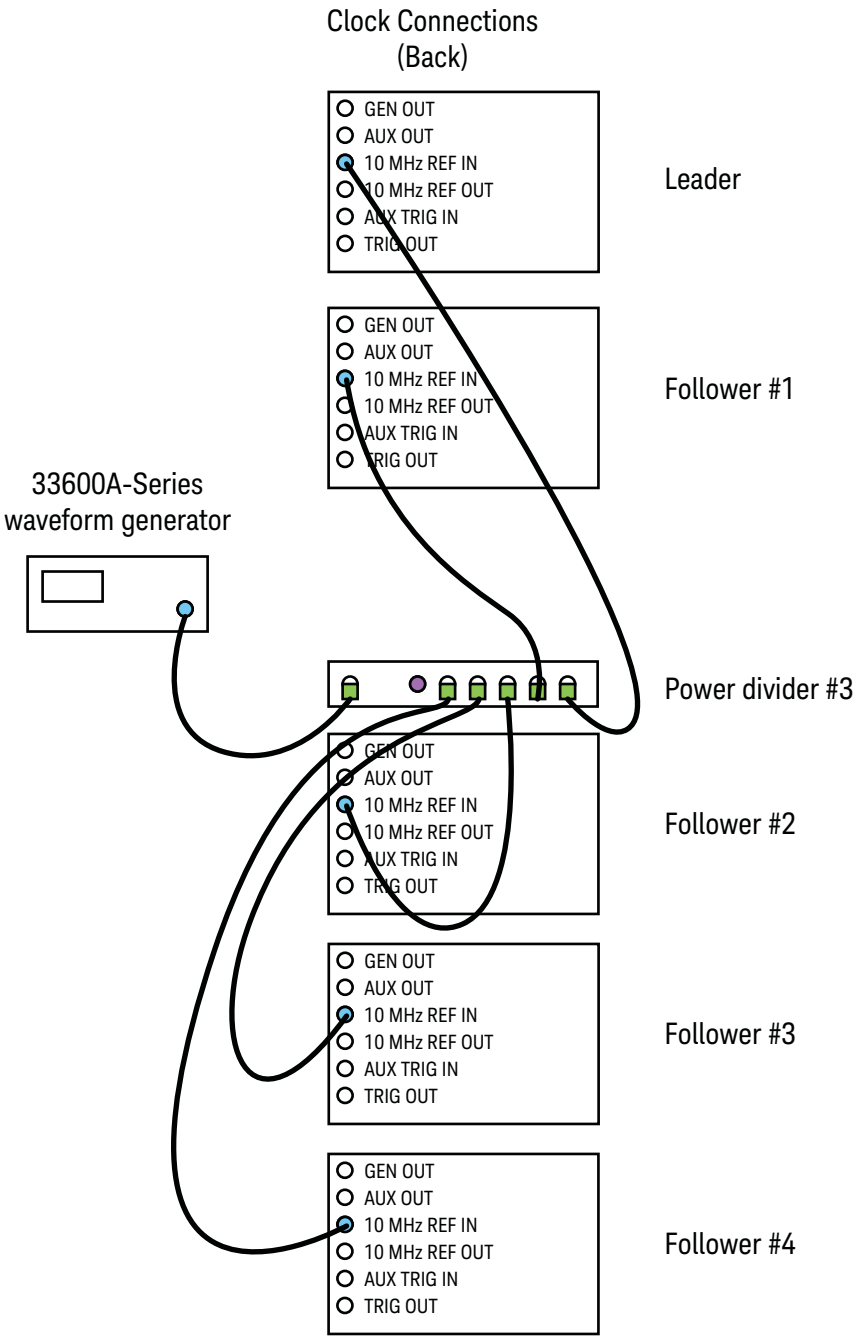
10 MHz REF IN Signal Connections



Place 1250-2818 adapters on all used power divider outputs

Place 1250-3745 terminators on all unused power divider outputs

Place 1250-2015 adapters on all oscilloscope 10 MHz REF IN inputs


Clock Connections
(Back)
GEN OUT
AUX OUT
10 MHz REF IN
10 MHz REF OUT
AUX TRIG IN
TRIG OUT
Leader
Follower #1
33600A-Series
waveform generator
Power divider #3
Follower #2
Follower #3
Follower #4

Connecting the Three Oscilloscopes

Using the parts in a 3INRACK (three in rack) expansion set, follow these instructions:

1. Mount the first, second, and third N2759-60002 power divider assemblies in the designated rack location. See "Mounting Oscilloscopes in Rack" on page 32.
2. Make sure the synchronization port (channel 4, for example) input on each oscilloscope has a BNC (m) to SMA (f) adapter (1250-2015).
3. Connect the 11 right angle male to female SMA adapters (1250-2818) to:
   - The power divider assemblies' inputs (3 adapters).
   - The first power divider assembly's three right-most outputs (3 adapters).
   - The second power divider assembly's second and third outputs from the right (2 adapters).
   - The third power divider assembly's three right-most outputs (3 adapters).
4. Connect 10 SMA 50 Ω terminators (1250-3745) to the unused power divider assembly outputs.
5. Connect the 11 BNC (m) to SMA (f) adapters (1250-2015) to:
   - The follower oscilloscope's **AUX OUT**.
   - The leader oscilloscope's **TRIG OUT** output.
   - The follower #1 and follower #2 oscilloscopes' **AUX TRIG IN** inputs (2 adapters).
   - The 33600A-Series waveform generator's 10 MHz clock output.
   - The three oscilloscopes' **10 MHz REF IN** inputs (3 adapters).
   - The three oscilloscopes' synchronization port (channel 4, for example) inputs (3 adapters).
6. Connect an SMA cable between the follower #1 ocsilloscope's **AUX OUT** output and the first power divider assembly's input.
7. Connect SMA cables between the first power divider assembly outputs and the oscilloscopes' synchronization port (channel 4, for example) inputs. See "Sync Signal Connections" on page 34.
8. Connect an SMA cable between the leader ocsilloscope's **TRIG OUT** output and the second power divider assembly's input.
9. Connect SMA cables between the second power divider assembly outputs and the follower #1 and follower #2 oscilloscopes' **AUX TRIG IN** inputs. See "TRIG OUT Signal Connections" on page 36.
10. Connect an SMA cable between the 33600A-Series waveform generator's 10 MHz clock output and the third power divider assembly's input.

11 Connect SMA cables between the third power divider assembly outputs and the oscilloscopes' **10 MHz REF IN** inputs. See "10 MHz REF IN Signal Connections" on page 38.

12 Connect the oscilloscopes to the host computer through the desired remote interface connection (LAN, USB, etc.).

13 If these are the last oscilloscopes to be connected, see Chapter 6, "Next Steps," starting on page 43.

Connecting the Follower #3 Through Follower #4 Oscilloscopes

Before connecting the follower #3 through follower #4 oscilloscopes, first follow the instructions for connecting a three-oscilloscope rackmount system in "Connecting the Three Oscilloscopes" on page 40.

Then, for each of the oscilloscopes from follower #3 to follower #4, using the parts in a PLUS1 (add one) expansion set, follow these instructions:

1. Remove the SMA 50 Ω terminators (1250-3745) from the power dividers' outputs that will be used for the oscilloscope. See "Sync Signal Connections" on page 34, "TRIG OUT Signal Connections" on page 36, and "10 MHz REF IN Signal Connections" on page 38.
2. Connect three right angle male to female SMA adapters (1250-2818) to the power divider outputs that you just removed a terminator from.
3. Connect three BNC (m) to SMA (f) adapters (1250-2015) to:
   - The oscilloscope's **AUX TRIG IN** input.
   - The oscilloscope's **10 MHz REF IN** input.
   - The oscilloscope's synchronization port (channel 4, for example) input.
4. Connect one SMA cable between the first power divider's output and the oscilloscope's synchronization port (channel 4, for example) input. See "Sync Signal Connections" on page 34.
5. Connect one SMA cable between the second power divider's output and the oscilloscope's **AUX TRIG IN** input. See "TRIG OUT Signal Connections" on page 36.
6. Connect one SMA cable between the third power divider's output and the oscilloscope's **10 MHz REF IN** input. See "10 MHz REF IN Signal Connections" on page 38.
7. Connect the oscilloscope to the host computer through the desired remote interface connection (LAN, USB, etc.).
8. If this is the last oscilloscope to be connected, see Chapter 6, "Next Steps," starting on page 43.

6 Next Steps

With UXR-Series MultiScope systems, you make a long calibration cable and later follow prompts by the Infiniium oscilloscope software to connect the cable to individual oscilloscopes in the system as necessary.

With MXR/EXR-Series MultiScope systems, all the physical connections for calibration have already been made (as described in the previous chapters of this manual). In this case, you can let the Infiniium oscilloscope software perform calibration without being prompted to change connections.

Individually Calibrate the Oscilloscopes in the MultiScope System

For best performance under any conditions, it is useful to verify the current operating temperature of the oscilloscopes in the rack(s) or stackmount configuration once the entire system has reached a stable thermal condition. The temperature deviation from the previous calibration is displayed in the Calibration dialog box of each oscilloscope.

If the inlet air temperature is not within the calibration temperature range, the oscilloscope will provide a visual warning on the screen.

The oscilloscopes are warranted to meet all specifications when the ambient temperature is ±5 °C of the calibration temperature.

UXR-Series MultiScope Calibration Connections

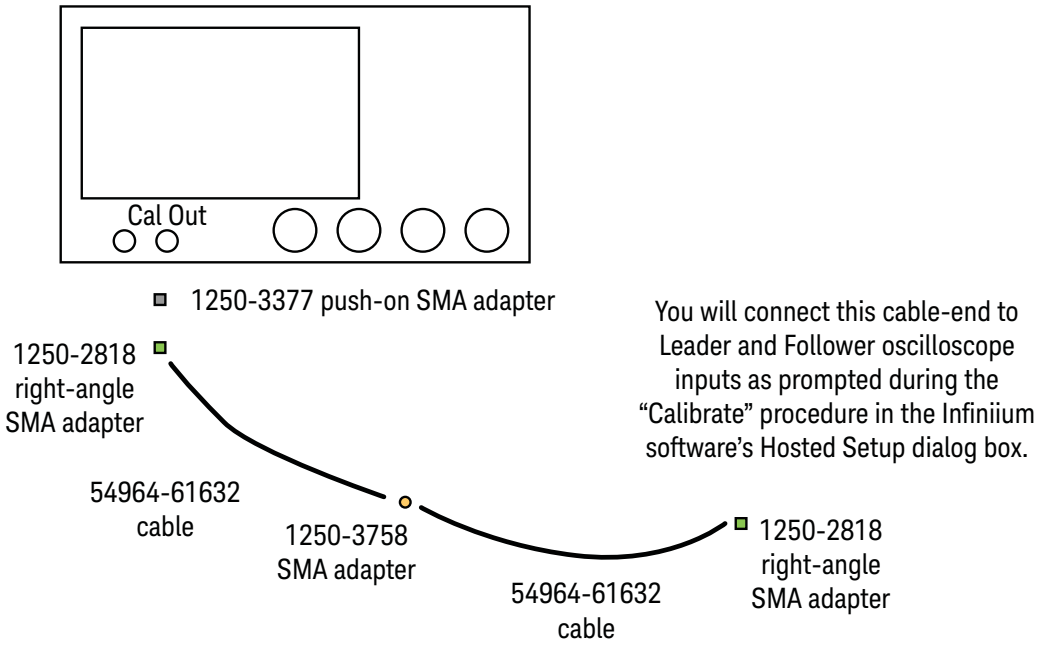
Part of what the MultiScope control software provides is the ability to automatically deskew multiple oscilloscope frames and channels using a calibration procedure.

The hardware for performing MultiScope calibration is included in the N2164A UXR-Series Multi-Frame Base Kit. These parts are used to create a long calibration cable:

Part number	Qty	Description
54964-61632	2	1 m phase-stable cable
1250-2818	2	Right-angle male to female SMA adapter
1250-3758	1	Female/female SMA adapter 3.5 mm (f)
1250-3347	1	Push-on male SMA to female SMA adapter

The long calibration cable is connected from the Follower #1 oscilloscope's **Cal Out** output to MultiScope system input channels, as prompted by the MultiScope control software's calibration procedure.

Calibration Cable Connections
(Follower #1 Front)



Analog channel input adapter(s) necessary to connect to the 1250-2818 right-angle SMA adapter are included with the UXR-Series oscilloscope:

UXR-Series oscilloscope input connector type	Adapter needed for channel deskew cable connection
3.5 mm	5061-5311 adapter, 3.5 mm female to female
1.85 mm	5061-5311 adapter, 3.5 mm female to female
1.0 mm	5067-1393 adapter, 1 mm ruggedized female to 2.92 mm female

Use MultiScope Control Software

After the MultiScope system hardware has been configured and you have performed each oscilloscope's calibration procedure, you can use MultiScope control software to make data acquisitions. Your options are:

- Infiniium oscilloscope software on the Leader oscilloscope. MultiScope software is included as a standard feature.
- D9010BSEO Infiniium Offline oscilloscope analysis software on an external host computer. MultiScope software is included as a standard feature.

Infiniium Oscilloscope Software on the Leader Oscilloscope

With Infiniium oscilloscope software version 10.20 and higher, the MultiScope hosted instruments capability is available from within an Infiniium UXR-Series oscilloscope (in the box) as well as from the Infiniium Offline software running on a PC. Connecting to and controlling multiple oscilloscopes from within an Infiniium oscilloscope has the following advantages:

- You have the full triggering capability of the Infiniium oscilloscope, including InfiniiScan. (From the Infiniium Offline software, you have only edge and glitch trigger modes.)
- No additional computer is required to run the Infiniium Offline software.
- No space for an additional computer is necessary.

MultiScope software is included as a standard feature.

When using Infiniium oscilloscope software on the Leader oscilloscope, you must set up remote connections to the Follower oscilloscopes using the Keysight Connection Expert (which is part of the Keysight IO Libraries Suite).

D9010BSEO Infiniium Offline Oscilloscope Analysis Software

The D9010BSEO Infiniium Offline oscilloscope analysis software lets you identify oscilloscopes in a MultiScope system, perform time-correlation calibration (including channel deskew, see "UXR-Series MultiScope Calibration Connections" on page 44), capture data, view waveforms, and perform analysis.

When using Infiniium Offline software on the host computer, you must set up remote connections to the Leader and Follower oscilloscopes using the Keysight Connection Expert (which is part of the Keysight IO Libraries Suite).

Host Computer Requirements

For the D9010BSEO Infiniium Offline oscilloscope analysis software, Keysight recommends a host computer with:

- A Windows 10 64-bit operating system with at least 8 GBytes of RAM and 25 GBytes of hard drive space.

Go To “Using Hosted Infiniium Oscilloscopes” in the Online Help

For instructions on:

- Identifying oscilloscopes in the MultiScope system (making software connections).
- Time-correlating oscilloscopes (calibration).
- Using the MultiScope system.

Go to the “Using Hosted Infiniium Oscilloscopes” topic in the Infiniium oscilloscope software’s *Online Help*.

Index