

# Installation Note

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**Agilent Technologies ESA E4401B/E4411A/E4411B  
Spectrum Analyzers  
and E7401A EMC Analyzer  
1.5 GHz Tracking Generator Retrofit Kit  
50  $\Omega$  Retrofit Kit (Option 1DN)  
75  $\Omega$  Retrofit Kit (Option 1DQ)**



Part Number E4401-90267

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# Tracking Generator Retrofit Kit

Products Affected: .....	E4401B E4411A E4411B E7401A
Serial Numbers: .....	US00000000/US99999999
To Be Performed By: .....	(x) Agilent Service Center (x) Personnel Qualified by Agilent (x) Customer
Estimated Installation Time: .....	1 Hour
Estimated Verification Time: .....	2 Hours

## Introduction

These kits contain the parts and instructions to install a 50 Ω Tracking Generator (Option 1DN) or a 75 Ω Tracking Generator (Option 1DQ, ESA models only). A 75 Ω Tracking Generator should not be installed in an analyzer with a 50 Ω input. Similarly, a 50 Ω Tracking Generator should not be installed in an analyzer with a 75 Ω input.

## Installation Kit Parts List

**Table 1. 50 Ω Tracking Generator Kit (Option 1DN) E4401-60175**

Item	Quantity	Description	Part Number
1	1	Board Assembly Tracking Generator, 50 Ω	E4401-60128
2	1	Adapter, Type-N(m) to STET (f), 50 Ω	1250-0780
3	4	Screw, M3 x 8 mm (crest washer - pan head - TORX)	0515-0372
4	1	Type-N EMC Seal	E4403-20046
5	1	Installation Note (this document)	---

**Table 2. 75 Ω Tracking Generator Kit (Option 1DQ) E4401-60176**

Item	Quantity	Description	Part Number
1	1	Board Assembly Tracking Generator, 75 Ω	E4401-60129
2	1	Adapter, BNC(m) to F(f), 75 Ω	1250-2477
3	4	Screw, M3 x 8 mm (crest washer - pan head - TORX)	0515-0372
4	1	Type-N EMC Seal	E4403-20046
5	1	Installation Note (this document)	---

## Tools Required

- ❑ T-8 TORX screwdriver
- ❑ T-10 TORX screwdriver
- ❑ T-15 TORX screwdriver
- ❑ Spectrum analyzer, microwave
- ❑ 50  $\Omega$  termination, 2 required (Option 1DN only)
- ❑ 75  $\Omega$  termination, 2 required (Option 1DQ only)
- ❑ Power meter
- ❑ RF Power sensor
- ❑ Power sensor, 75  $\Omega$  (Option 1DQ only)
- ❑ Digital voltmeter (Option 1DN only)
- ❑ BNC (f) to dual banana plug (Option 1DN only)
- ❑ Cable, BNC 91 cm (36 in)
- ❑ Adapter, Type-N tee, (m)(f)(f) (Option 1DN only)
- ❑ Adapter, Type-N(m) to BNC (f) (Option 1DN only)
- ❑ Adapter, BNC(m) to Type-N (f) 75  $\Omega$ , 2 required (Option 1DQ only)
- ❑ Cable, Type-N, 62 cm (24 in.)
- ❑ Cable, BNC, 23 cm (9 in.)
- ❑ Cable, BNC, 122 cm (48 in.)
- ❑ Torque driver (Torque driver requirements are shown in Table 3.)

# Installation Procedure

**WARNING** Before you disassemble the instrument, turn the power switch OFF and unplug the instrument. Failure to unplug the instrument can result in personal injury.

**CAUTION** Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation. Refer to the documentation that pertains to your instrument for information about static-safe workstations and ordering static-safe accessories.

To avoid potential RFI leakage and prevent connector damage, tighten screws and RF coax cable connectors to the following values:

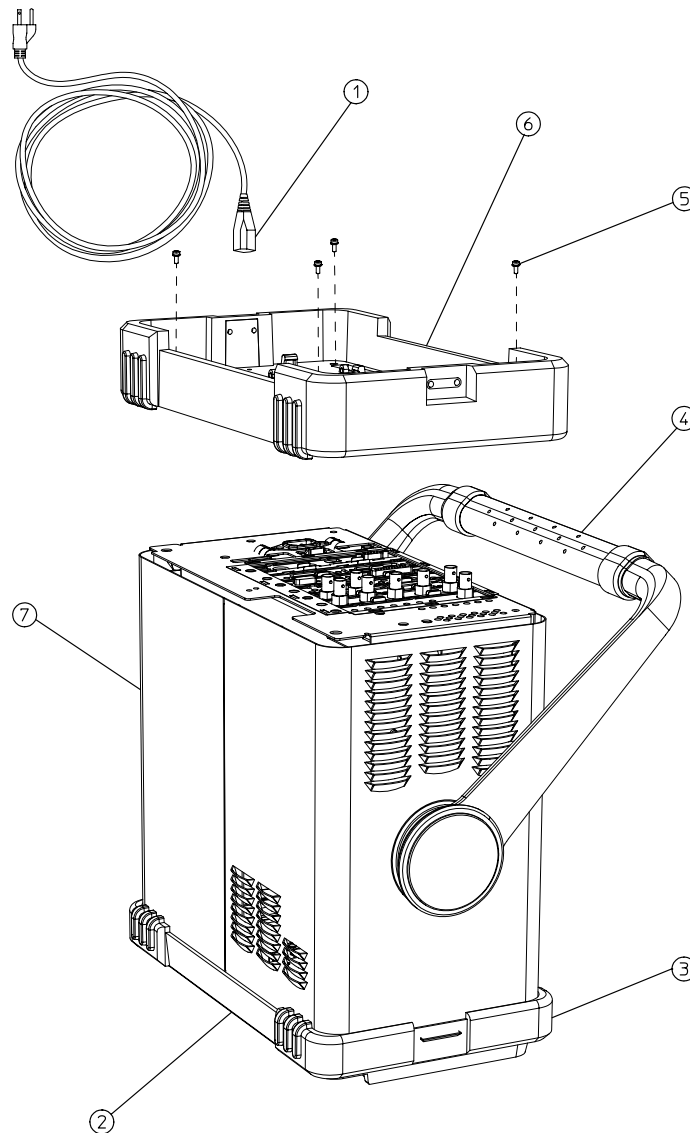
**Table 3. Torque Settings**

<b>Item</b>	<b>Torque in-lb.</b>	<b>Torque N-cm</b>
SMA connectors	8.5	95
SMC connectors	5.5	62
3-mm, T-10 TORX screws	9.0	101
3.5-mm, T-10 TORX screws	14	157
4-mm, T-15 TORX screws	21	236
Pozidrive Screws	14	157

## Remove Rear Frame and Outer Cover

1. Disconnect the ac power cord from the spectrum analyzer.
2. Refer to [Figure 1](#). Carefully put the analyzer on the work surface with the front frame, (2) and (3), facing down.
3. Position the handle (4) as shown in the figure.
4. Remove the four screws (5) that hold the rear frame (6) and outer cover (7) in place.
5. Lift the instrument rear frame (6) and outer cover (7) up and off of the instrument and set them aside.

**Figure 1. Remove Rear Frame and Outer Cover**

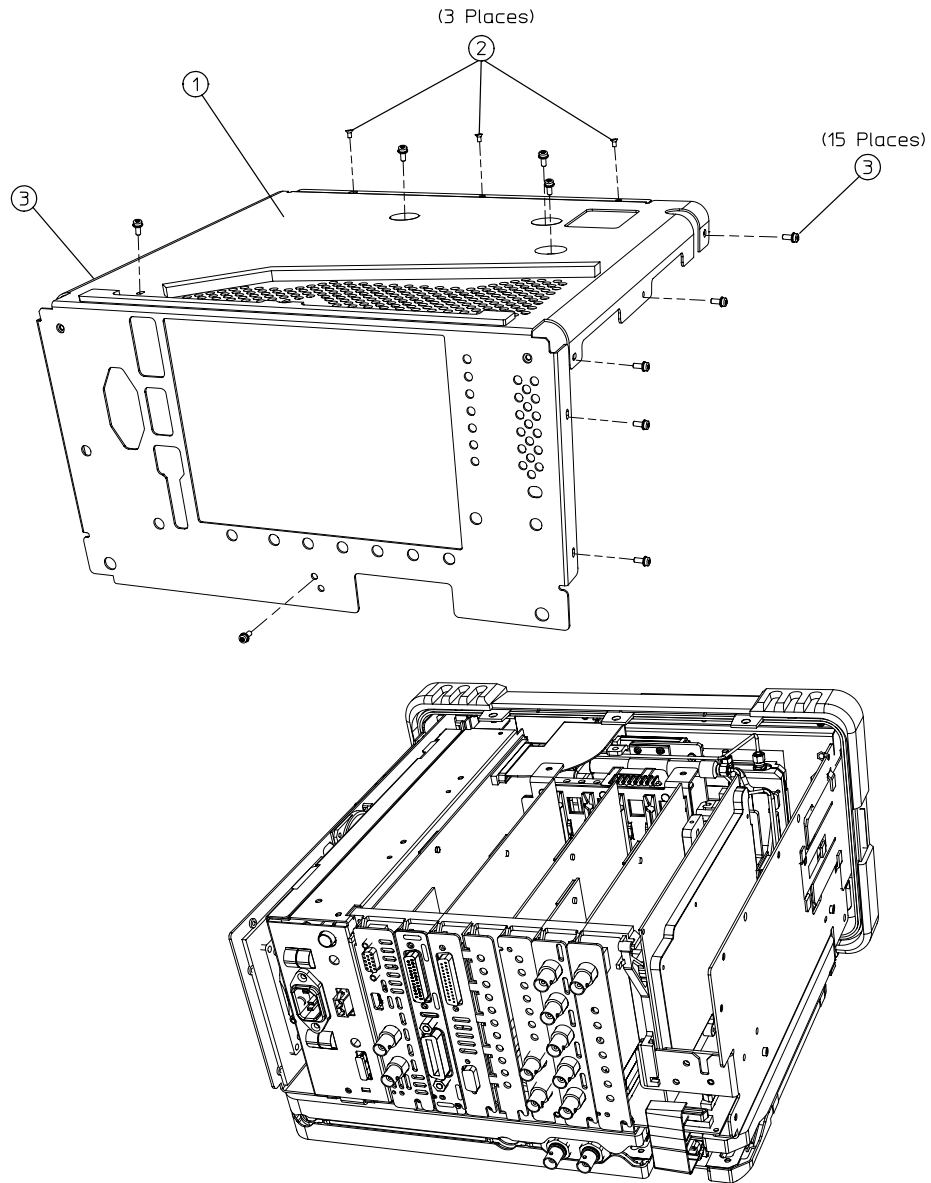


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## Remove Chassis Cover

6. Refer to [Figure 2](#). Remove the screws (2 and 3) attaching the chassis cover (1) to the chassis.
7. Remove the chassis cover from the chassis.

**Figure 2. Remove Chassis Cover**

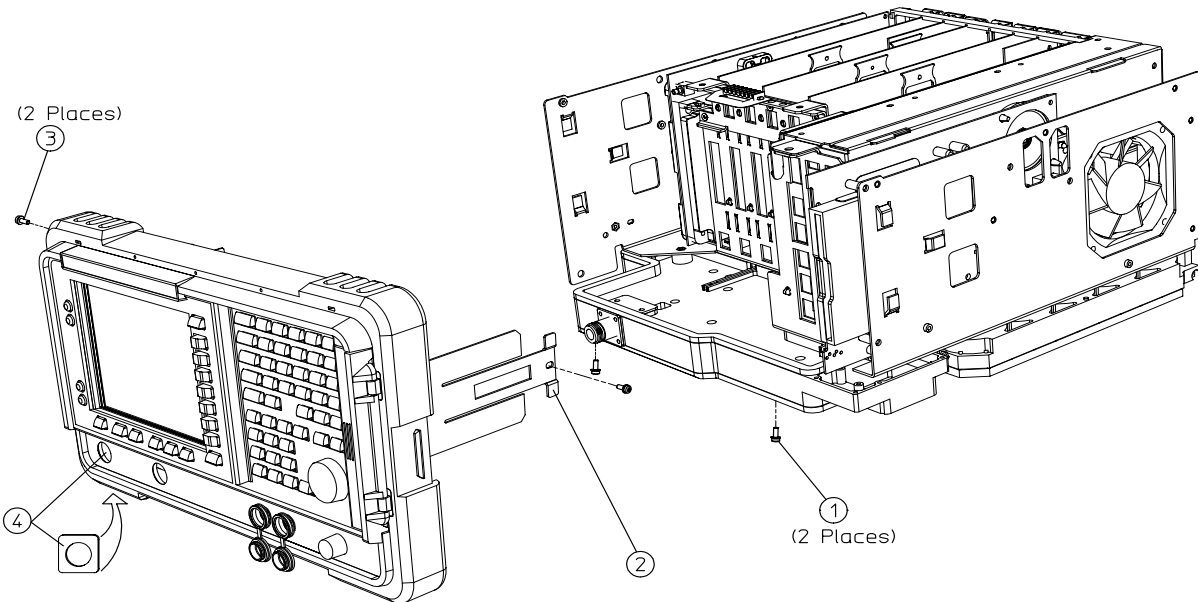


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## Remove Front Frame and Install Tracking Generator

8. Refer to [Figure 3](#). Remove the two screws on the bottom side (1) of the instrument that secure the front frame to the RF assembly.
9. Place the instrument with the top side facing up. Remove the two screws (2) that secure the front frame subpanel to the chassis sides.

**Figure 3. Remove Front Frame**



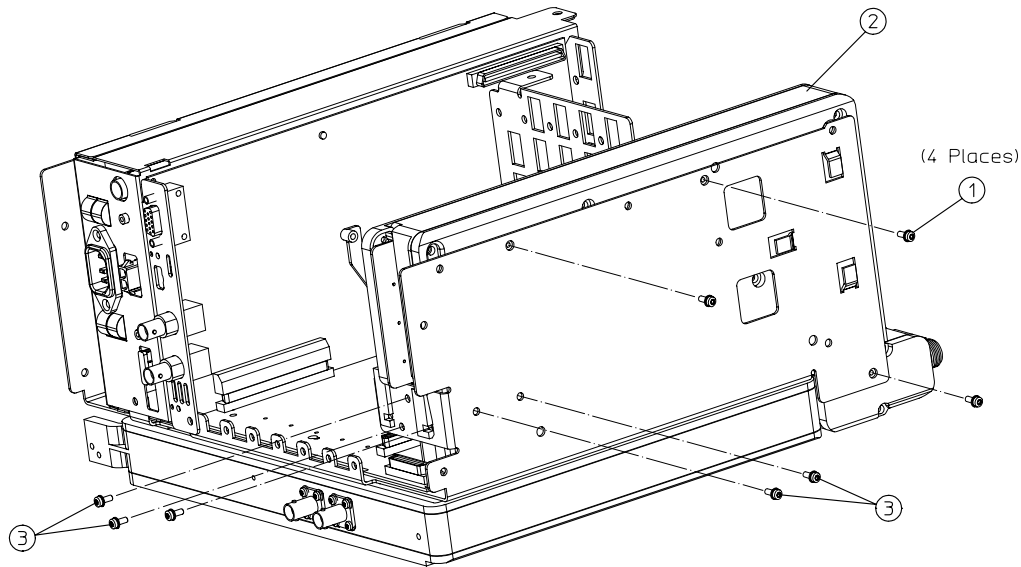
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10. Slide the front frame forward until it latches. Disengage the latches on each side of the instrument by sliding the front frame back toward the instrument a small amount and then gently pulling out on the latch tabs (3).
11. Slide the front frame forward just far enough to reach the ribbon connector attached to J2 on the front panel keyboard printed circuit board. Disconnect the ribbon cable from J2.
12. Remove the front frame and position it with the display face down. With a flat-blade screwdriver, carefully press the side tabs of the hole plug in the tracking generator RF Out connector hole (from the inside of the front panel) and push the plug out of the hole. Discard the hole plug and set the front panel assembly aside.
13. Install the Type-N EMC Seal (included with this kit) onto the inside front panel RF OUT connector hole (4), unless this seal is already installed on your instrument front panel. Remove the adhesive backing from the seal and press it into the front frame pocket. The foiled edges must make contact with the top and bottom of the frame pocket.
14. Refer to [Figure 4](#). Remove the IF bracket by removing four screws (3). This bracket is located in back of the aluminum protrusion at (4). Discard the bracket.
15. Carefully insert the tracking generator assembly (2) into the motherboard.



16. Insert and attach the four screws (1) that secure the tracking generator to the chassis. These screws are supplied in this kit. Torque these screws to 101 N-cm (9 in-lb.).

**Figure 4. Remove the IF Bracket and Install the Tracking Generator**



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## Replace Front Frame

17. Make sure the water seal is still in place around the output connector hole on the front panel assembly.
18. Carefully slide the front frame onto the chassis and attach the ribbon cable to connector A2 on the front panel keyboard printed circuit board. Make sure that the ribbon cable is not pinched between assemblies.
19. Refer to [Figure 3](#). Replace the four screws that secure the front frame to the chassis at locations (1), (2) and (3). Torque these screws to 9 in-lb. (101 N-cm).

## Replace Chassis Cover

20. Refer to [Figure 2](#). Carefully position the chassis cover on the instrument as shown.
21. Replace the 15 pan head screws (3) and three flathead screws (2) as shown. Torque these screws to 101 N-cm (9 in-lb.).

## Replace Outer Cover and Rear Frame

22. Refer to [Figure 1](#). Carefully place the spectrum analyzer on the work surface with the front frame facing down.
23. Replace the instrument outer cover by matching the grill on the bottom of the cover to the bottom of the analyzer (E4401B, E4411B, and E4701A).

24. Replace the instrument outer cover by matching the grill on the side of the case to the fan on the A5 power supply assembly (E4411A only).
25. Fit the leading edge of the case completely into the slot on the back of the front frame assembly (E4411A only).
26. The rear EMI contact grid that clips onto the rear frame can come loose. When replacing the rear frame, make sure the gasket is in the correct position.
27. Replace the rear frame assembly (6) using the four screws (5) to fasten the rear frame to the instrument. Torque these screws to 236 N-cm (21 in-lb.).

## **Verify Analyzer Performance (Models E4401B, E4411B, and E7401A)**

Perform the following performance verification tests found in the calibration guide for the instrument being upgraded.

1. Displayed Average Noise Level
2. Tracking Generator Absolute Amplitude and Vernier Accuracy
3. Tracking Generator Level Flatness
4. Tracking Generator Harmonic Spurious Outputs
5. Tracking Generator Non-Harmonic Spurious Outputs

## **Verify Analyzer Performance (ESA Model E4411A)**

Perform the following performance verification tests found in the *“Agilent ESA-L1500A Spectrum Analyzer User’s and Calibration Guide.”*

1. Tracking Generator Feedthrough
2. Absolute Amplitude, Vernier, and Power Sweep Accuracy
3. Tracking Generator Level Flatness
4. Harmonic Spurious Outputs
5. Non-Harmonic Spurious Outputs