VIAVI

TC-201A

TCAS/Transponder Antenna Coupler Operation Manual

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TCAS/Transponder Antenna Coupler

Release Num. 000

Operation Manual

VIAVI

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About this Guide

This prefix explains how to use this manual. Topics discussed include the following:

Purpose and scope

The purpose of this guide is to help you successfully use the TC-201A features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the TC-201A. Additionally, this guide provides a complete description of VIAVI's warranty, services, and repair information, including terms and conditions of the licensing agreement.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the TC-201A effectively and efficiently. We are assuming that you have basic aircraft maintenance experience.

Related information

This is the Operation manual for the TC-201A. It provides basic instructions for assembling the instrument components, setting up the TC-201A, instrument specifications, and contact information for Viavi's Technical Assistance Center (TAC). Please review this manually completely prior to connecting the TC-201A to the test set and prior to connecting any test equipment to the devices to be tested.

Safety and compliance information

Safety and compliance information for the instrument are provided in printed form and ship with your instrument.

Table 1 Safety definitions

Term	Definition
DANGER	Indicates a potentially hazardous situation that, if not avoided, *will* result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
WARNING	Indicates a potentially hazardous situation that, if not avoided, *could* result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury and/or damage to equipment. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. When applied to software actions, indicates a situation that, if not avoided, could result in loss of data or a disruption of software operation.
ALERT	Indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.

Technical assistance

If you require technical assistance, call 1-800-835-2350. For the latest TAC information, go to https://www.viavisolutions.com/en-us/support/technical-product-support/support-avionics-and-radio-test-products.

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1

TC-201A Overview

This chapter provides a general description of the TC-201A. Topics discussed in this chapter include the following:

About the TC-201A

The VIAVI TC-201A Antenna Coupler is used on TCAS and combined TCAS and transponder directional antennas, to shield the RF signal during testing of the TCAS or transponder system. The TC-201A supports, when used with the IFR6000, IFR6015 or APM-424(V)5, maintenance testing in the airborne condition without interfering with air traffic control or nearby aircraft.

Effects of Multi-path

The TC-201A eliminates errors due to effects of multi-path. TCAS is tested as a coupled connection through the UUT antenna avoiding multi-path from the ramp, hangar, buildings and other aircraft, eliminating the need for moving UUT aircraft away from factors causing multi-path.

TCAS Display Clutter

The TC-201A provides the isolation needed to reduce actual airborne traffic from responding to TCAS interrogations. Therefore, fewer targets are displayed, allowing the Ramp Test Set generated target to be easily distinguished.

Features and Capabilities

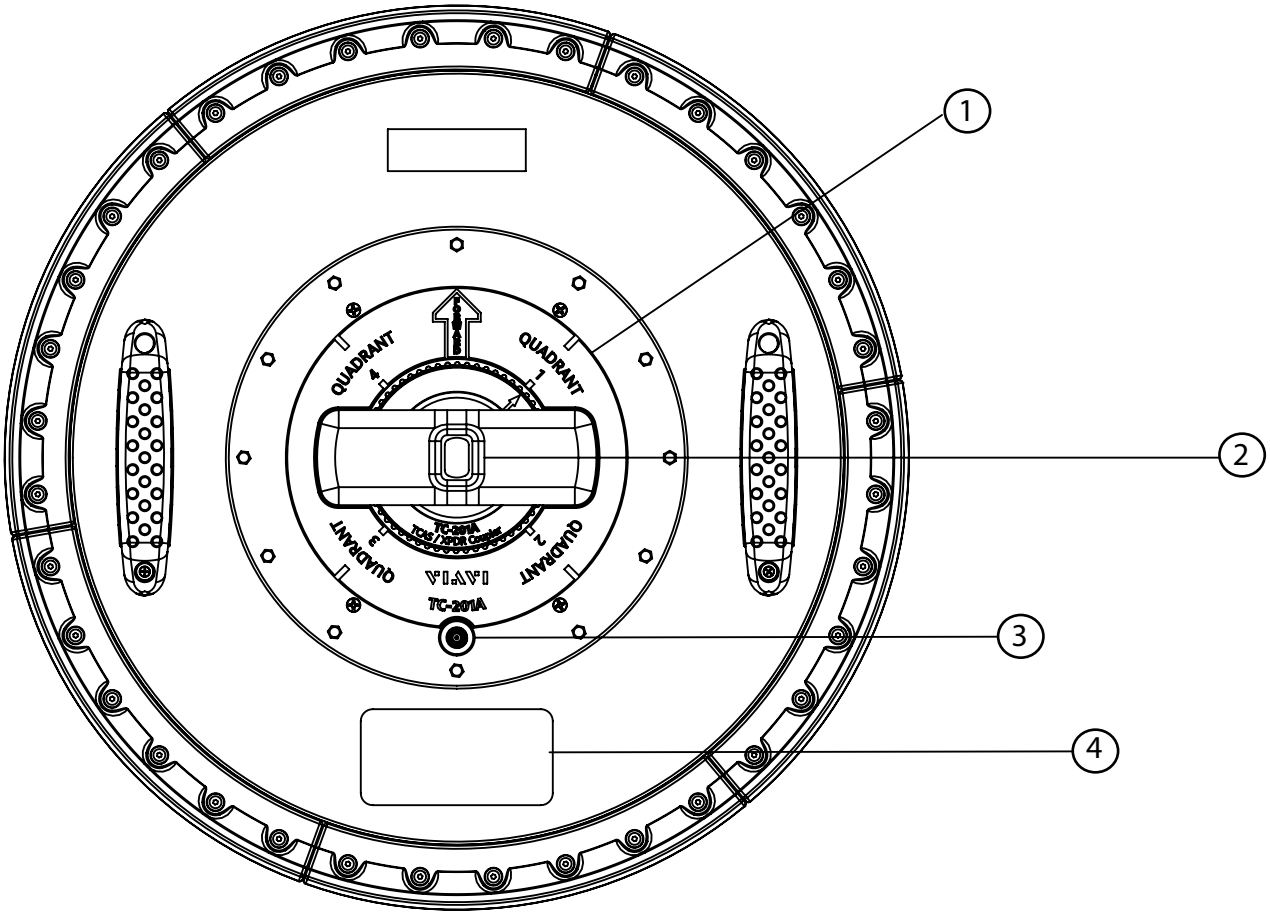
The TC-201A operates in conjunction with Ramp Test Sets.The TC-201A is compatible with Phase and Amplitude TCAS systems and combined transponder systems and features the following:

- Accommodates both phase and amplitude type antennas
- Reliable, FAR Part 43, Appendix F, ERP and MTL testing in high multi-path environments
- Provides >20 dB of isolation
- Provides proper shielding for all transponder and ADS-B performance testing
- Lower antenna adjustable support pole
- Perform four-quadrant testing by simply rotating the bearing selector dial
- TCAS bearing accuracy < 10 degrees

Controls and Connectors

Antenna Coupler

Figure 1 TC-201A TCAS/Transponder Antenna Coupler



Quadrant Selection Control (1)

Selects quadrant of the intruding aircraft simulated by the TC-201A. For correct quadrant, the TCAS Coupler must be placed over the TCAS UUT Antenna so the FORWARD label is towards the front of the aircraft.

Support Pole Socket (2)

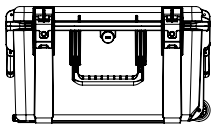
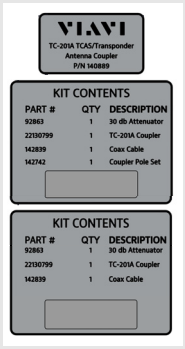
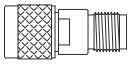
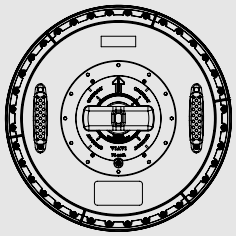
Secures the support pole or extender pole used with the support pole to TCAS Coupler.

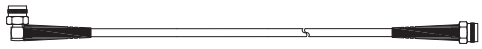
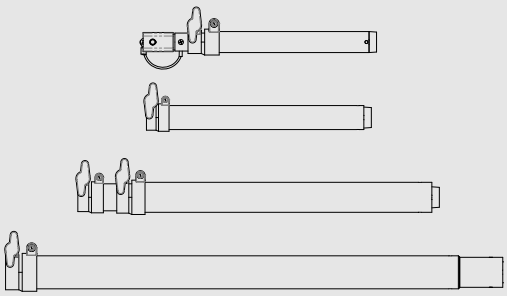
Antenna Connector (3)

TNC connector used to connect the Ramp Test Set (ANT Connector) to the TCAS Coupler.

Loss Label (4)

Contains coupler loss information for supported antenna types.

	Part Number	Description	QTY
	142743	Transit Case	1
	142840	Transit Case Placard	1
	92863	30 dB Attenuator	1
	140889	TC201-A TCAS/Transponder Antenna Coupler	1

	Part Number	Description	QTY
	142839	Coax Assembly (50 ft) (TNC Male to TNC Male 90 Deg.)	1
	142742 (Optional)	Extension Pole Kit (Optional)	
	142761	Piston Monopole	1
	91079	Monopole Extension, section 2	1
	91078	Monopole Extension, section 3	1
	91077	Monopole Extension, section 4	2

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Using the TC-201A

This chapter provides task-based instructions for using the TC-201A features. Topics discussed in this chapter are as follows:

General Operating Procedure

The following general procedure is suggested for using the TCAS Coupler to verify TCAS power and quadrant accuracy. This procedure is presented as a supplement to the recommended test procedure in the Ramp Test Set Operation Manual. Specific requirements and operation settings for the various TCAS displays, antennas, and Mode S equipment are not addressed in this procedure. Refer to the Ramp Test Set Operation Manual and UUT manual for specific testing guidelines.

Aircraft Setup

The aircraft may be configured to “in the airborne condition” before testing can be performed. A transponder test can be performed with the aircraft in the Airborne or Surface condition. Please refer to aircraft specific information to complete this step. The following are some common required settings:

- Weight off wheels
- Air Data set for altitude of 10,000 ft and airspeed of 300 kts.
- RadAlt Antennas covered. (speed tape)

Testing Using TC-201A

1. Connect the TC-201A to the IFR-6000 Antenna Port using the supplied cable and the 30dB attenuator.
2. Set the TC-201A to Quadrant 1.

XPDR Setup

ANTENNA	Top	**RF PORT**	Antenna
ANT RANGE	See coupler loss label	**ANT HEIGHT**	See coupler loss label
ANT CABLE LEN	Length of cable used	**ANT GAIN (dBi)**	
ANT Cable Loss	See cable loss label	**0.96 GHz**	0.0
Coupler Loss	0.0 dB	**1.03 GHz**	0.0
UUT ADDRESS	AUTO	**1.09 GHz**	0.0

TCAS Setup

RF PORT	ANTENNA	**ANT RANGE**	See coupler loss label.
ANT HEIGHT	See Coupler loss label	**UUT ADDRESS**	AUTO
ANT CABLE LEN	Length of cable used.	**ANT CABLE LOSS**	See cable loss label.
SQUITTERS	ON	**ALT REPORTING**	ON
ANT GAIN (dBi) **1.03 GHz** **1.09 GHz**	 0.0 0.0		

Transponder Auto Testing

Config: Generic Mode S

1 After the coupler is placed on the TCAS/Transponder antenna, press Run Test softkey.

2 Allow the IFR6000/IFR6015 to complete the testing and review the screen for a pass or fail indication.

NOTE

If a fail indication is present then press the Test List softkey to determine which test has failures.

3 Switch the TC 201A coupler to quadrant 1, 2, 3 and 4 and record data into Table 2.

NOTE

These setup instructions are for reference only. Please refer to the IFR 6000/6015 operator's manual for detailed instructions.

Table 2 Data Table

Qudrant 1								
REPLIES	_____%	**FREQ**	_____MHz	**ERP**	_____dBm	**MTL**	_____dBm	
Quadrant 2								
REPLIES	_____%	**FREQ**	_____MHz	**ERP**	_____dBm	**MTL**	_____dBm	
Quadrant 3								
REPLIES	_____%	**FREQ**	_____MHz	**ERP**	_____dBm	**MTL**	_____dBm	
Quadrant 4								
REPLIES	_____%	**FREQ**	_____MHz	**ERP**	_____dBm	**MTL**	_____dBm	

NOTES:_____
_____
_____

TCAS Target Test

1 Select the type of scenario. (most generally begin with a canned scenario and will switch to Custom Scenario if the operator changes any parameter)

2 Choose the TCAS Type: TCAS II (as appropriate)

3 Choose % reply: 100

4 Choose intruder type: mode S

5 Set the target start range: 10 nm.

6 Set Stop distance: 0.000 nm.

7 Set Range rate: 300 kts.

8 Set Alt start: +1000 ft.

9 Set Alt stop: 0 ft.

10 Set Alt rate: 500 fpm.

11 Set converge: off

12 Enter UUT altitude: (as observed on UUT altimeter)

13 Set Alt detect: off

14 Record results in Table 3.

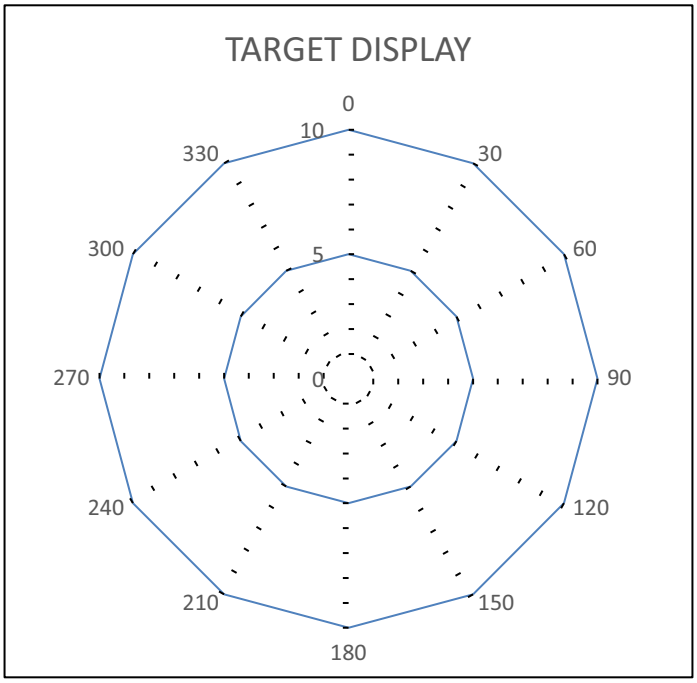
NOTE

These setup instructions are for reference only. Please refer to the IFR6000/6015 operator's manual for detailed instructions.

Table 3 TCAS Data Table

Quadrant 1				
	FREQ	_____MHz	**ERP**	_____dBm
Qudrant 2				
	FREQ	_____MHz	**ERP**	_____dBm
Quadrant 3				
	FREQ	_____MHz	**ERP**	_____dBm
Quadrant 4				
	FREQ	_____MHz	**ERP**	_____dBm

14 Record the bearing of the target for each quadrant in the chart below.



NOTES:_____

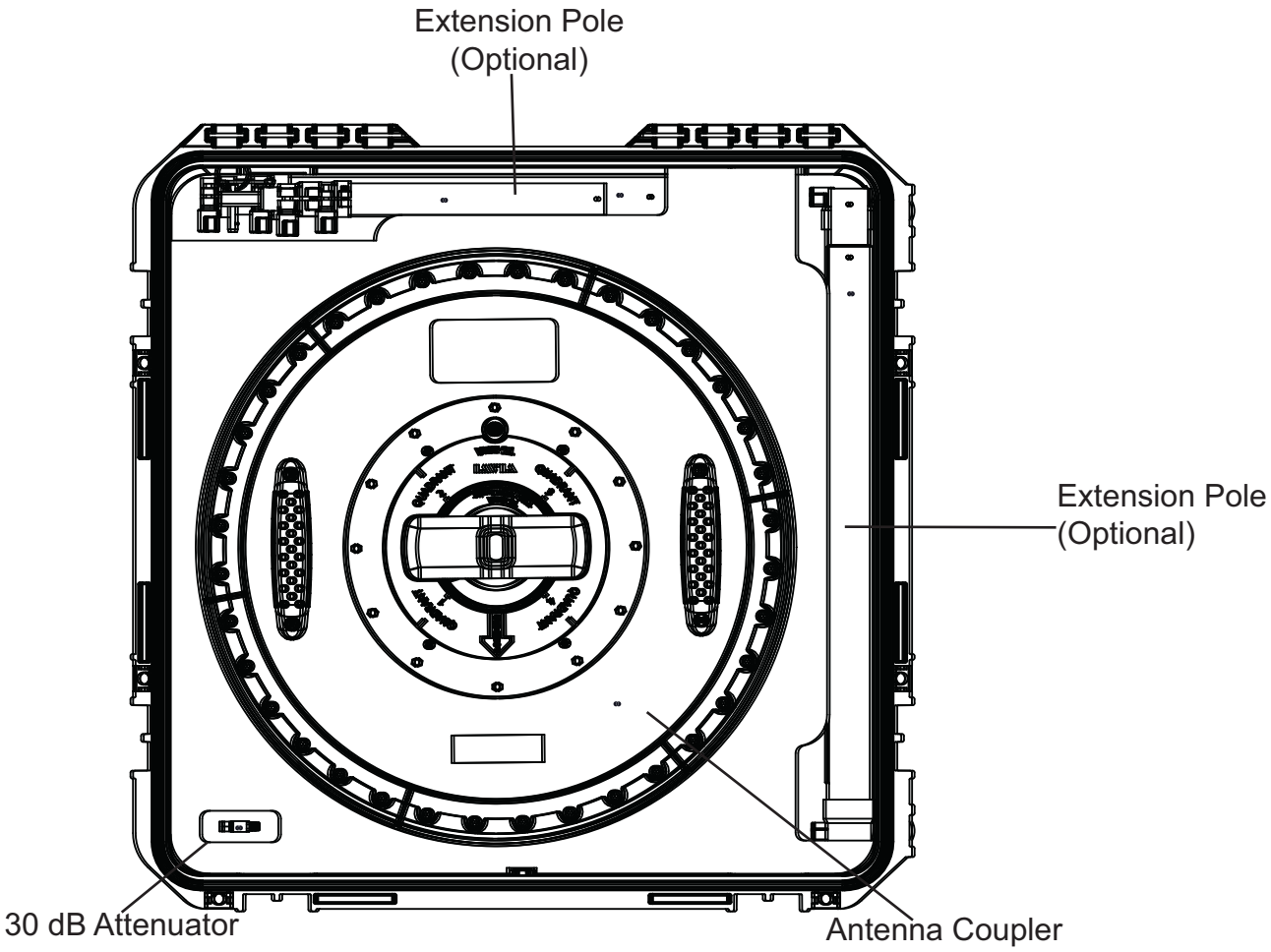
_____

_____

Storage

Store TCAS Coupler Cable inside the TCAS Coupler. Store two EXTENDER POLES in each side slot. Store TCAS Coupler as shown. Store Case away from dampness and temperature extremes.

Figure 2 Transit Case



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Specifications

This appendix describes the TC-201A specifications. Topics discussed in this appendix are as follows:

Unit specifications

Table 4 Physical specifications

Parameter	Specification
Height	8.38 in (21.29 cm)
Diameter	18.84 in (47.85 cm)
Weight	11 lbs (4.9 kg)

Table 5 Coupler specifications

Parameter	Specification
Quadrant	Range: 45 - 315 Deg. Increments: 90 Deg. Accuracy: ± 10 Deg. Typical ± 18 Deg. Max
Return Loss	> 9 dB
Insertion Loss	15 dB typical
Repeatability	< 1 dB
Isolation	> 20 dB
VSWR (Coupler Port to UUT Antenna)	≤ 2.5:1
Frequency	1030 MHz, 1090 MHz
Connector	TNC Female

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English