

Field Probes Overview

Lightweight: AL-4607 Series
High Accuracy: AL-4608 Series

Aperture Field Probe systems are used to evaluate the extraneous signals which exist in the location of the Device Under Test due to reflections, other transmitting sources, etc.

The Aperture Field Probe can rest on a polarization positioner which moves on a linear carriage, which is mounted on another polarization positioner. Thus a circular area can be observed at any location in any desired polarization.

The carriage rotation is achieved by a standard polarization positioner, AL-560-1P, AL-760-1P, AL-1260-1P or AL-1760-1P according to series and carriage size.

The linear slide is used for the radial motion.

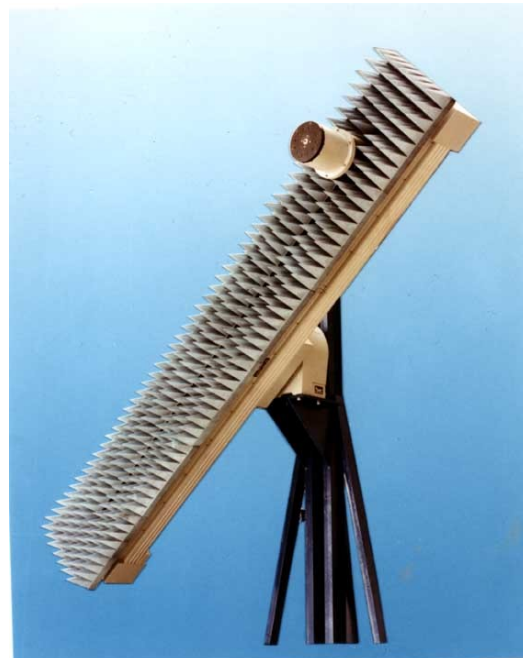
The main purpose of the probe polarization positioner is to keep the probe in a constant polarization by rotating in reverse direction to the Field Probe polarization positioner. For example, if the probe is in vertical polarization at a given position, and the Field Probe rotates 30° , then the probe itself rotates -30° to retain the same vertical polarization. The probe polarization positioner can also serve to sample the field at several polarizations at any given point.

It is recommended that the probe be mounted on the smallest polarization positioner which complies with the probe's mechanical constraints (weight and bending moment).

Options for both series include:

Rotary joint for the probe positioner

- RF cable installation
- Probe fixtures
- Replace the synchro transducer with Incremental rotary encoder. This option is required when using AL-060-1P or AL-160-1P positioners
- Preparation and installation of absorbing material



AL-4608-1

Lightweight Aperture Field Probe AL-4607 Series

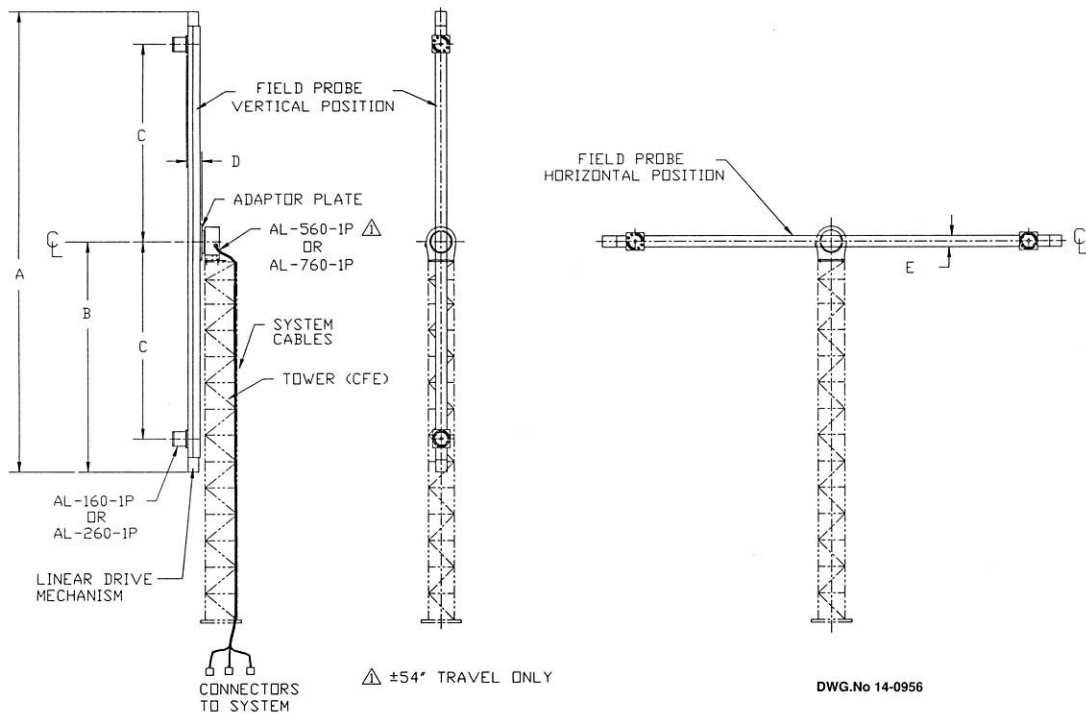
AL-4607 Series

The AL-4607-1 lightweight aperture field probe has two linear travel ranges: 54" or 108". The model with 54" linear travel can be mounted on an AL-560-1P polarization positioner for a maximum load of 20 lbs, or on an AL-760-1P for a maximum load of 50 lbs.

The model with 108" linear travel is mounted on the AL-760-1P for a maximum load of 20 lbs.

Options

- **EN001** Replace synchro readout with rotary incremental encoder for all axes. Required when ordering with AL-160-1
- **PRB** Probe holder
- **RFC** RF cable installation through Field Probe
- **RJ12L** Coaxial single-channel Rotary Joints, DC-12.4 GHz (including precision RF path, N-type connector and mounting flange), for same or lower axis.
- **RJ18L** Coaxial single-channel rotary joints, DC-18 GHz (including precision RF path, SMA-type connector and mounting flange) for same or lower axis.
- **RJ40L** Coaxial single-channel rotary joints, DC-40 GHz (including precision path, K-type connector and mounting flange), for same or lower axis.
- **RJ12U** Coaxial single-channel rotary joints, DC-12.4 GHz (including precision RF path, N-type connector and mounting flange), for upper Azimuth positioners.
- **RJ18U** Coaxial single-channel rotary joints, DC-18 GHz (including precision RF path, SMA connector and mounting flange), for upper Azimuth positioners.
- **RJ40U** Coaxial single-channel rotary joints, DC-40 GHz (including precision RF path, K-type connector and mounting flange), for upper Azimuth positioners.



Ordering Information

Supplied Accessories

AL-4607-1 Lightweight Field Probe

Lightweight Aperture Field Probe AL-4607 Series (Cont'd)

AL-4607 Series

Specifications:

		AL-4607-1-560-54	AL-4607-1-760-54	AL-4607-1-760-108	AL-4607-1-1260-108
Travel	mm	±1,371.6	±1,371.6	±2,743.2	±2,743.2
	in	±54	±54	±108	±108
Polarization Positioner		AL-560-1P	AL-760-1P	AL-760-1P	AL-1260-1P
Max. Load	kg	9	23	9	9
	lbs	20	50	20	20
Carriage Bending Moment	m-kg	5.5	8.3	5.5	5.5
	ft-lbs	40	60	40	40
Max. Carriage Speed	m/min	5	5	5	5
	ft/min	15	15	15	15
Carriage Motor	hp	1/16	1/16	1/16	1/16
Backlash	mm	0.4	0.4	0.4	0.4
	in	0.0016	0.0016	0.0016	0.0016
Carriage Weight	kg	96	96	125	125
	lbs	210	210	275	275
Data Take-off Accuracy	mm	±0.5	±0.5	±1.0	±1.0
	in	±0.02	±0.02	±0.04	±0.04
Planarity	mm	±1.5	±1.5	±3.0	±3.0
	in	±0.06	±0.06	±0.12	±0.12
Deflection at max. Load	mm	±1.5	±1.5	±3.0	±3.0
	in	±0.06	±0.06	±0.12	±0.12
Repeatability	mm	±0.25	±0.25	±0.5	±0.5
	in	±0.01	±0.01	±0.02	±0.02
Probe Positioner 1		AL-160-1 1	AL-160-1P	AL-160-1 1	AL-160-1 AL-260-1P 1

Dimensions:

		AL-4607-1-560-54	AL-4607-1-760-54	AL-4607-1-760-108	AL-4607-1-1260-108
Outline Dimensions Drawing Number		11-2450	11-2450	11-2449	11-2449
A	Length	mm	3,600	3,600	6,400
		in	141.7	141.7	252
B	Radius	mm	1,800	1,800	3,200
		in	70.87	70.87	126
C	Travel	mm	1,372	1,372	2,743
		in	54	54	108
D 1	Thickness	mm	113 1	113	113 1
		in	4.4 1	4.4	4.4 1
E	Width	mm	160	160	160
		in	6.3	6.3	6.3

High-Precision Aperture Field Probe

AL-4608 Series

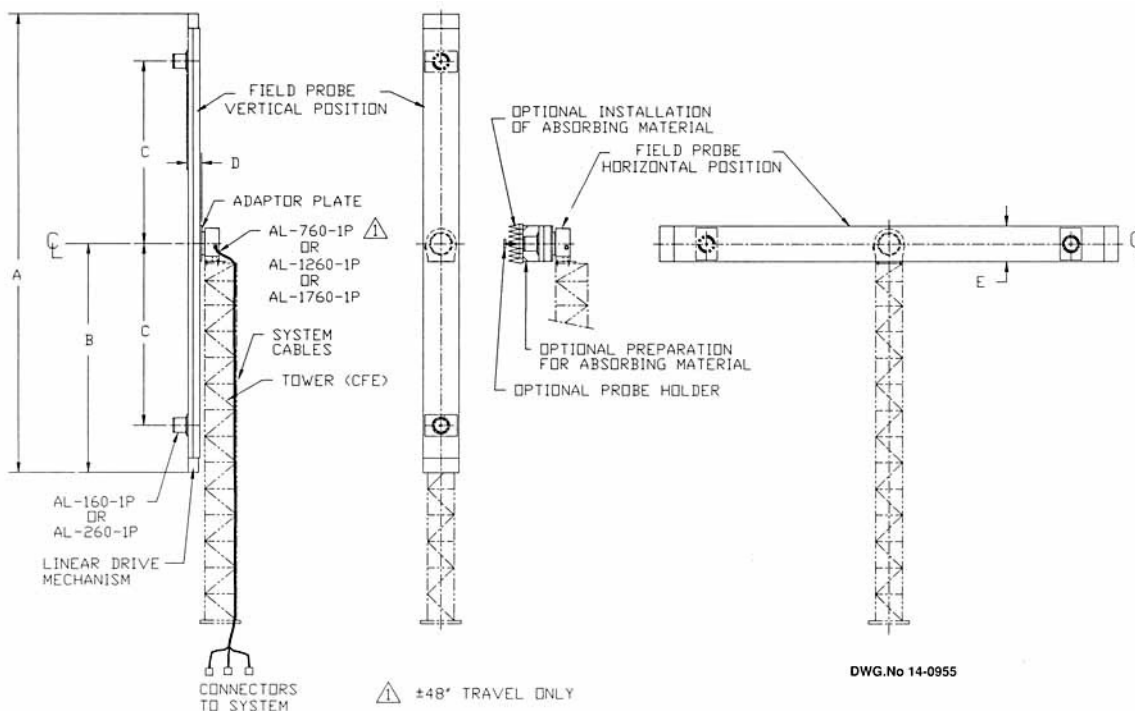
The AL-4608-1 high-precision aperture field probe has two linear travel ranges: 48" or 100". These high precision models are extremely accurate and have very low deflection under maximum load.

The models with 48" linear travel can be mounted on an AL-760-1P polarization positioner for maximum load of 50 lbs, or on AL-1260-1P for maximum load of 100 lbs.

The models with 100" linear travel can be mounted on an AL-1260-1P polarization positioner for a maximum load of 50 lbs, or on an AL-1760-1P for a maximum load of 100 lbs.

Options

- ABI01 Installation of absorbing material.
- EN001 Replace synchro readout with rotary incremental encoder for all axes. Required when ordering with AL-160-1
- PRB Probe holder
- RFC RF cable installation through Field Probe
- RJ12L Coaxial single-channel Rotary Joints, DC-12.4 GHz (including precision RF path, N-type connector and mounting flange), for same or lower axis.
- RJ18L Coaxial single-channel rotary joints, DC-18 GHz (including precision RF path, SMA-type connector and mounting flange) for same or lower axis.
- RJ40L Coaxial single-channel rotary joints, DC-40 GHz (including precision path, K-type connector and mounting flange), for same or lower axis.
- RJ12U Coaxial single-channel rotary joints, DC-12.4 GHz (including precision RF path, N-type connector and mounting flange), for upper Azimuth positioners.
- RJ18U Coaxial single-channel rotary joints, DC-18 GHz (including precision RF path, SMA connector and mounting flange), for upper Azimuth positioners.
- RJ40U Coaxial single-channel rotary joints, DC-40 GHz (including precision RF path, K-type connector and mounting flange), for upper Azimuth positioners.



Ordering Information

Supplied Accessories

AL-4608-1 High-Precision Aperture Field Probe

High-Precision Aperture Field Probe (Cont'd)

AL-4608 Series

Specifications:

		AL-4608-1-760-48	AL-4608-1-1260-48	AL-4608-1-1260-100	AL-4608-1-1760-100
Polarization Positioner		AL-760-1P	AL-1260-1P	AL-1260-1P	AL-1760-1P
Travel	mm	±1,219.2	±1,219.2	±2,540	±2,540
	in	±48	±48	±100	±100
Max. Load	kg	23	45	23	45
	lbs	50	100	50	100
Carriage Bending Moment	m-kg	14	28	14	28
	ft-lbs	100	200	100	200
Max. Carriage Speed	m/min	3.3	3.3	303	303
	ft/min	10	10	10	10
Carriage Motor	hp	1/8	1/8	1/8	1/8
Backlash	mm	0.2	0.2	0.2	0.2
	in	0.008	0.008	0.008	0.008
Carriage Weight	kg	205	205	340	340
	lbs	450	450	750	750
Data Take-off Accuracy	mm	±0.15	±0.15	±0.30	±0.30
	in	±0.006	±0.006	±0.012	±0.012
Planarity	mm	±0.3	±0.3	±0.5	±0.5
	in	±0.012	±0.012	±0.02	±0.02
Deflection at max. Load	mm	±0.2	±0.2	±0.4	±0.4
	in	±0.008	±0.008	±0.016	±0.016
Repeatability	mm	±0.1	±0.1	±0.15	±0.15
	in	±0.004	±0.004	±0.006	±0.006
Probe Positioner		AL-160-1 / AL-260-1P			

Dimensions:

			AL-4608-1-760-48	AL-4608-1-1260-48	AL-4608-1-1260-100	AL-4608-1-1760-100
Outline Dimensions Drawing Number			11-2448	11-2448	11-2447	11-2447
A	Length	mm	3,400	3,400	6,400	6,400
		in	133.9	133.9	252	252
B	Radius	mm	1,700	1,700	3,200	3,200
		in	66.9	66.9	126	126
C	Travel	mm	1,219	1,219	2,540	2,540
		in	48	48	100	100
D	Thickness	mm	213 <u>1</u>	213 <u>1</u>	213 <u>1</u>	213 <u>1</u>
		in	8.4 <u>1</u>	8.4 <u>1</u>	8.4 <u>1</u>	8.4 <u>1</u>
E	Width	mm	510	510	510	510
		in	20	20	20	20

Special High-Accuracy Field Probe

AL-4608-1S Series

The AL-4608-1S series provides increased accuracy, travel, probe weight, or alignment.

As an example, the AL-4608-1S-1770-±2750-360 (shown in the picture) has a planarity of ± 0.08 mm, an AL-1770 as polarization positioner and an AL-360 as probe positioner. The travel is 5.5 meters plus an acceleration and deceleration range. The maximum probe weight is 15 Kg. An optimized RF cable installation will make the RF cable effects negligible, even at frequencies as high as 40 GHz. A mirror cube on the field probe allows correlation to the plane of the field probe to the mirror cube surfaces to within ± 0.005 deg.



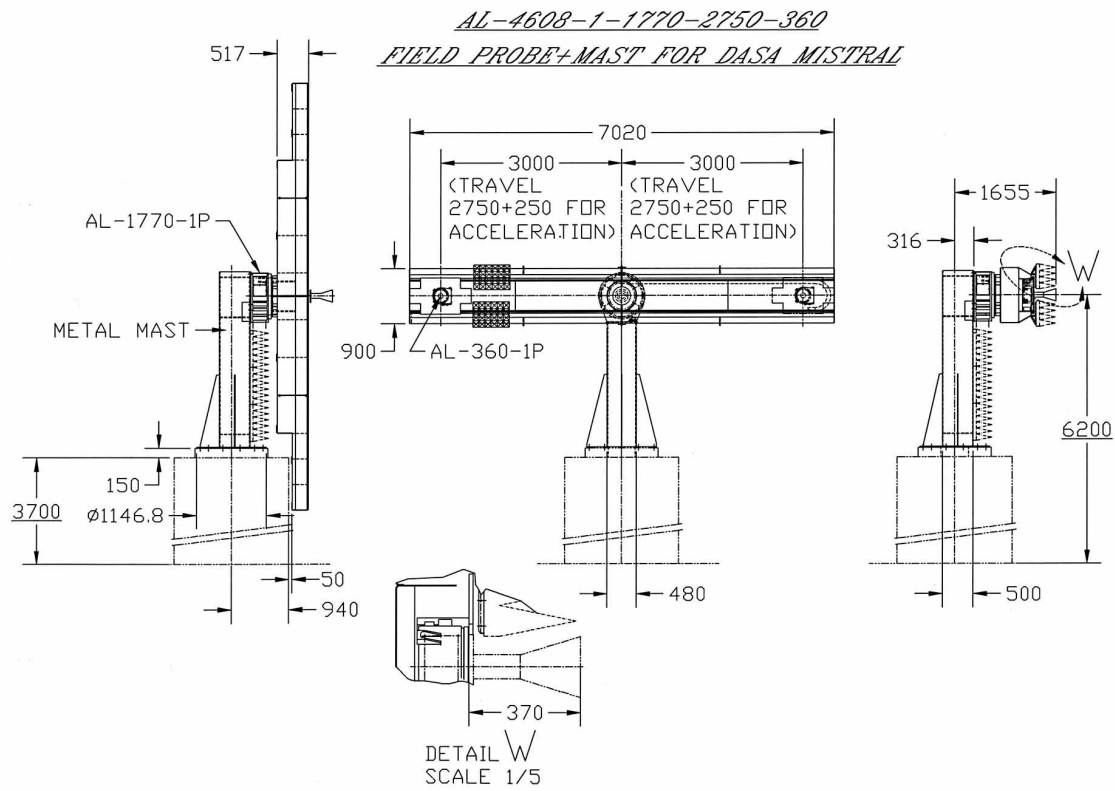
AL-4608-1S

Specifications:

		AL-4608-1S Scanner Linear Slide	AL-4608-1S Probe Positioner	AL-4608-1S Scanner Positioner
Load	kg	N/A	2 - 15	N/A
	lbs	N/A	4.4 - 33.3	N/A
Carriage Bending Moment (With 370 mm distance between	m-kg	N/A	5.55	N/A
	ft-lbs	N/A	41.1	N/A
Travel	mm	± 2.75	N/A	N/A
	in	± 9.16	N/A	N/A
	deg	N/A	± 95	± 95
Velocity	mm/sec	1—55	N/A	N/A
	in/sec	0.04 - 2.17	N/A	N/A
	deg/sec	N/A	0.156 - 15.6	0.08 - 1.2
Planarity Y-Direction	mm	± 0.080	N/A	N/A
	in	± 0.003	N/A	N/A
Position Accuracy (Independent Axis)	mm	0.5	N/A	N/A
	in	0.02	N/A	N/A
	deg	N/A	0.05	0.05
Position Repeatability	mm	0.1	N/A	N/A
	in	0.004	N/A	N/A
	deg	N/A	0.03	0.02

Notes:

AL-160-1 is available with incremental encoder readout only.



Ordering Information

Supplied Accessories

Field Probes - Ordering Guide

<u>AL-460X-1</u>	-	<u>YYY</u>	-	<u>ZZZ</u>	-	<u>PPP</u>
Basic Field Probe Carriage		Polarization Positioner		Carriage Linear travel range from rotation center to both sides		Polarization Positioner for probe
AL-4607-1 or AL-608-1		AL-560-1P ⁽¹⁾ or AL-760-1p ⁽²⁾ or AL-1260-1P ⁽³⁾ or AL-1760-1P ⁽³⁾		AL-4607: 54" or 108" AL-4608: 48" or 100"		AL-160-1 ⁽⁴⁾ or AL-260-1P

Notes:

(1) AL-4607 series 54" travel only.

(2) AL-4607 all travel lengths and AL-4608 series 48" travel only

(3) AL-4608 all travel lengths

(4) AL-160-1 available with rotary incremental encoder readout only. Requires Option EN003

EXAMPLE

For a high precision aperture field probe with 48" travel and light loads only, fitted with incremental encoder readout, order: **AL-4608-1-760-48-160 option EN001**

Obtaining Best Results When Using An Aperture Field Probe

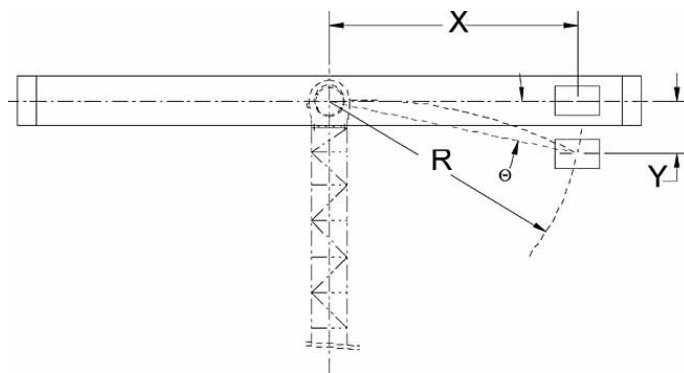
When scanning with an Aperture Field Probe, as the probe moves along the linear axis, angular movement may occur in the carriage roll axis due to gear compliance. The torque applied on the gear increases as the load moves away from the center. This angular deviation can be observed and read by the synchro or incremental encoder of the positioner.

In order to obtain accurate positioning data, it is necessary to monitor the roll angle Q , because it may change as the probe moves away from the center (see drawing).

The probe position is given as (R, Θ) in polar coordinates, where R is the probe distance from the center of rotation and Θ is the roll angle. In Cartesian units the following transformation applies:

$$X = R \cos\Theta$$

$$Y = R \sin\Theta$$



Obtaining Best Results When Using An Aperture Field Probe

AL-5000 Series

ORBIT/FR Source Towers allow the positioning of radiation sources at selected heights in an elevated antenna testing system. The transmitting antenna is easily installed and adjusted on the built-in carriage of the tower. The track-guided, vertical motion of the carriage is achieved by a motor-driven cable and pulley combination.

Two standard tower heights are offered. However, the tower's modular design makes customer selected heights also available. Coarse and fine height values are measured and monitored by a dual speed synchro system (36:1, 1:1). To avoid over travel, adjustable upper and lower limit switches are incorporated. Tachometers are provided to enable speed regulation and control. The carriage is compatible with ORBIT/FR Series 8000 Mounting Fixtures, to which polarization positioners may be attached.

The vertical motion is controlled and monitored by standard ORBIT/FR power control and display units. For long distance control, the AL-4706-3B fiber-optic controller may be used. ORBIT/FR Source Towers are shipped in compact modular units, ready for assembly at the customer site.



AL-5006-1

Specifications:

		AL-5004-1	AL-5006-1
Height	mm	7,315	12,801
	ft	24	42
Carriage Travel	mm	5,486	10,973
	ft	18	36
Bending Moment	m-kg	675	675
	ft-lbs	5,000	5,000
Vertical Load	kg	115	386
	lbs	253	850
Drive Power	hp	4-Mar	4-Mar
Max. Speed	m/min	2.3	2.3
	ft/min	7.5	7.5
Weight	kg	1,405	2,495
	lbs	3,100	5,500

Notes:

1. Consult ORBIT/FR for special options.
2. Vertical travel measured by dual speed synchro transducers (36:1, 1:1).

Options

Ordering Information

Supplied Accessories