

# HADECS 3



## Site Calibration Certificate

M60-9172A-004

Motorway: M60

Site Location: 9172A

### HADECS 3 Equipment

Camera Head Enclosure Serial No	816097006		
Control Unit Serial No	816149007		
Radar Assembly Serial No	8541570003		
Radar Serial No	101334-0004		
Radar Calibration Date	16/02/2021	until	16/02/2022

### HADECS 3 Software

Camera Head Enclosure Version No	0.3.13
Control Unit Version No	0.3.3
Radar Version No	MI-146-5 5C57811F
Instation ERCU Version No	3.0.0.0

### Valid until

Date Next Calibration Due: 16/02/2022

*I certify that the HADECS equipment identified above complies with the terms of the specification for Type Approval and has passed all necessary calibration checks on the date recorded below.*

Signed:



24/03/2021

Technical Manager

DATE



TEST EQUIPMENT:

# HYPERION™

designed and developed by AGD Systems



PRODUCT TEST:

## 342 CERTIFICATE OF CALIBRATION

ADDRESS:

AGD Systems Limited  
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### PRODUCT IDENTIFICATION

CERTIFICATE NUMBER 34200224

MODEL AGD342-100-000

SERIAL NUMBER 101334-0004

SECURITY ID 0D440344,6279574C,99F299F2,40304030

SOFTWARE VERSION APPLICATION CODE MI-146-5 CSUM 5C57811F

DATE OF CALIBRATION 16 February 2021

CALIBRATION PROCEDURE REFERENCE CAL-022 Issue 1

COMMENTS / TYPE

OEM

# PASS

### ENVIRONMENTAL DATA

TEMPERATURE (°C): 19.1 RELATIVE HUMIDITY (%): 45.5

### CALIBRATION STANDARDS

INSTRUMENT DESCRIPTION	SERIAL NUMBER	CALIBRATION CERTIFICATE NUMBER	NEXT CALIBRATION DUE DATE
TE0320: Rohde and Schwarz FSP40 Spectrum Analyser	100395/040	475958	21/08/2021
TE0401: Pendulum/Spectracom CNT-90XL Frequency Counter	187934	1-10004369473	14/06/2021
TE0366: Tektronix AFG3022B Arbitrary/Function Generator	C034314	TERISO_656276	12/07/2021
TE0429: Comet T3610 Temperature/Humidity Meter	14960950	TE0429-CAL005	08/01/2022
TE0383: AGD Systems TRTS True Ranging Target Simulator	TE0383	TE0383-CAL008	24/03/2021
TE0432: Kikusui PCR500M AC/DC Programmable Power Supply	UG001557	239441-03-002	08/07/2022

This unit has been calibrated to standards whose accuracies are traceable to National Standards except where none exist, and the units of measurement realised at the National Physical Laboratory (NPL) or other national standards laboratories.

The unit was calibrated in accordance with our Quality Management System which complies with BS EN ISO 9001:2008.

This certificate of calibration shall not be reproduced except in full, without written approval of AGD Systems Limited.

CALIBRATION BY:



NEXT CALIBRATION DUE:

16/02/2022

**VISUAL INSPECTION**      No observations

**OPERATING VOLTAGES (DC)**

VOLTAGE	SPEED (30mph)		RANGE (53.4m)		CURRENT (mA)		PASS/FAIL
	MEASURED	LIMITS	MEASURED	LIMITS	MEASURED	LIMITS	
10	30.0	29.7 - 30.3	52.5	50.0 - 55.0	303	280 - 330	<i>PASS</i>
12	30.0	29.7 - 30.3	52.4	50.0 - 55.0	251	230 - 280	<i>PASS</i>
16	30.0	29.7 - 30.3	52.3	50.0 - 55.0	191	170 - 220	<i>PASS</i>
9.5	UNDER VOLTAGE (<10V)			SOLID LED			<i>PASS</i>
16.5	OVER VOLTAGE (>16V)			FLASHING LED			<i>PASS</i>

**RADAR MODULE**

	MEASURED	LIMITS	PASS/FAIL
TX FREQUENCY LOW (GHz)	24.0960	24.090 - 24.100	<i>PASS</i>
TX FREQUENCY HIGH (GHz)	24.1040	24.100 - 24.110	<i>PASS</i>
TX FREQUENCY CENTRE (GHz)	24.1000	24.098 - 24.102	<i>PASS</i>
TX BANDWIDTH (MHz)	8.800	8.0 - 10.0	<i>PASS</i>
DIGITISING FREQUENCY (Hz)	50001.5	49995.0 - 50005.0	<i>PASS</i>
	MEASURED	LIMITS (Ambient +20°C)	PASS/FAIL
BOARD TEMPERATURE (°C)	27.3	19.1 - 39.1	<i>PASS</i>

**SIMULATED RADAR OUTPUT**

TARGET	DIRECTION	SPEED (mph)		RANGE (m)		PASS/FAIL
		MEASURED	LIMITS	MEASURED	LIMITS	
*TS=1,A	X	50.0	49.8 - 50.2	16.0	15.5 - 16.5	<i>PASS</i>
*TS=1,R	Y	50.0	49.8 - 50.2	15.9	15.5 - 16.5	<i>PASS</i>
*TS=12,A	X	189.9	189.5 - 190.5	64.0	63.5 - 64.5	<i>PASS</i>
*TS=12,R	Y	190.1	189.5 - 190.5	64.0	63.5 - 64.5	<i>PASS</i>

**CHECK OPERATIONAL SETTINGS**

COUNTER BANDWIDTH = 8.3MHz (for reference only)  
PRODUCT PARAMATERS (BAUD 460800) - Pass

Limits specified during calibration have taken into account the measurement uncertainties of the instruments used.

Doppler Frequency	Simulated Range	Simulated Speed	Advancing			Receding			Limits			Pass/Fail
			Range	Speed	Power	Range	Speed	Power	Range	Speed	Power	
1333	5.4	20.0	5.4	20.0	87.2	5.5	20.0	87.1	3.4-7.4	19.7-20.3	82.0-90.0	Pass
1999	5.4	30.0	5.4	30.0	87.4	5.5	30.0	87.2	3.4-7.4	29.7-30.3	82.0-90.0	Pass
2666	5.4	40.0	5.5	40.0	87.0	5.4	40.0	87.0	3.4-7.4	39.7-40.3	82.0-90.0	Pass
3332	5.4	50.0	5.5	50.0	87.2	5.4	50.0	87.2	3.4-7.4	49.7-50.3	82.0-90.0	Pass
3998	5.4	60.0	5.4	60.0	87.3	5.4	60.0	87.2	3.4-7.4	59.7-60.3	82.0-90.0	Pass
4665	5.4	70.0	5.6	70.0	86.9	5.4	70.0	86.9	3.4-7.4	69.7-70.3	82.0-90.0	Pass
5331	5.4	80.0	5.4	80.0	87.2	5.5	80.0	87.2	3.4-7.4	79.7-80.3	82.0-90.0	Pass
5998	5.4	90.0	5.4	90.0	87.2	5.4	90.0	87.3	3.4-7.4	89.7-90.3	82.0-90.0	Pass
6664	5.4	100.0	5.5	100.0	86.9	5.4	100.0	86.9	3.4-7.4	99.7-100.3	82.0-90.0	Pass
1333	25.9	20.0	25.5	20.0	83.1	25.5	20.0	83.0	23.9-27.9	19.7-20.3	78.0-86.0	Pass
1999	25.9	30.0	25.5	30.0	83.2	25.5	30.0	83.2	23.9-27.9	29.7-30.3	78.0-86.0	Pass
2666	25.9	40.0	25.6	40.0	83.0	25.4	40.0	83.0	23.9-27.9	39.7-40.3	78.0-86.0	Pass
3332	25.9	50.0	25.4	50.0	83.1	25.4	50.0	83.0	23.9-27.9	49.7-50.3	78.0-86.0	Pass
3998	25.9	60.0	25.5	60.0	83.3	25.6	60.0	83.2	23.9-27.9	59.7-60.3	78.0-86.0	Pass
4665	25.9	70.0	25.6	70.0	82.8	25.4	70.0	82.8	23.9-27.9	69.7-70.3	78.0-86.0	Pass
5331	25.9	80.0	25.5	80.0	83.0	25.7	80.0	83.1	23.9-27.9	79.7-80.3	78.0-86.0	Pass
5998	25.9	90.0	25.4	90.0	83.1	25.5	90.0	83.3	23.9-27.9	89.7-90.3	78.0-86.0	Pass
6664	25.9	100.0	25.6	100.0	82.8	25.5	100.0	82.8	23.9-27.9	99.7-100.3	78.0-86.0	Pass
1333	53.4	20.0	52.2	20.0	77.6	52.4	19.9	77.4	51.4-55.4	19.7-20.3	73.0-81.0	Pass
1999	53.4	30.0	52.4	30.0	77.5	52.5	30.1	77.7	51.4-55.4	29.7-30.3	73.0-81.0	Pass
2666	53.4	40.0	52.4	40.0	77.4	52.4	40.0	77.4	51.4-55.4	39.7-40.3	73.0-81.0	Pass
3332	53.4	50.0	52.5	50.0	77.4	52.5	50.0	77.4	51.4-55.4	49.7-50.3	73.0-81.0	Pass
3998	53.4	60.0	52.5	60.0	77.7	52.5	60.0	77.6	51.4-55.4	59.7-60.3	73.0-81.0	Pass
4665	53.4	70.0	52.4	70.0	77.4	52.3	70.0	77.2	51.4-55.4	69.7-70.3	73.0-81.0	Pass
5331	53.4	80.0	52.4	80.0	77.7	52.5	80.0	77.6	51.4-55.4	79.7-80.3	73.0-81.0	Pass
5998	53.4	90.0	52.3	90.0	77.5	52.2	90.0	77.6	51.4-55.4	89.7-90.3	73.0-81.0	Pass
6664	53.4	100.0	52.5	100.0	77.2	52.5	100.0	77.3	51.4-55.4	99.7-100.3	73.0-81.0	Pass
7330	53.4	110.0	52.4	110.0	77.6	52.5	110.0	77.7	51.4-55.4	109.7-110.3	73.0-81.0	Pass
7997	53.4	120.0	52.3	120.0	77.5	52.4	120.0	77.6	51.4-55.4	119.7-120.3	73.0-81.0	Pass
8663	53.4	130.0	52.5	130.0	77.3	52.5	130.0	77.4	51.4-55.4	129.7-130.3	73.0-81.0	Pass
9330	53.4	140.0	52.5	140.0	77.6	52.5	140.0	77.6	51.4-55.4	139.7-140.3	73.0-81.0	Pass
9996	53.4	150.0	52.6	150.0	77.5	52.4	150.0	77.6	51.4-55.4	149.7-150.3	73.0-81.0	Pass
10663	53.4	160.0	52.4	160.0	77.4	52.1	160.0	77.4	51.4-55.4	159.7-160.3	73.0-81.0	Pass
11329	53.4	170.0	52.4	170.0	77.6	52.3	170.0	77.6	51.4-55.4	169.7-170.3	73.0-81.0	Pass
11995	53.4	180.0	52.4	180.0	77.6	52.2	180.0	77.5	51.4-55.4	179.7-180.3	73.0-81.0	Pass
12662	53.4	190.0	52.5	190.0	77.5	52.5	190.0	77.6	51.4-55.4	189.7-190.3	73.0-81.0	Pass

NOTE: Simulation at 24.100GHz, 22°, ± 0.5m (Units: range = m, speed = mph, power = dB, frequency = Hz)