Svenska EMC Lab
Minervavägen 20 S-371 41 Karlskrona
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TEST REF. NO: 98/1900
DATE: December 14, 1998

TEST REPORT

47 Cfr Ch. 1 (10-1-97 Edition)

FOREWORD: This Test Report is a complement to the Test Report No 97/1750 of May 5, 1997. Both Test Reports are needed to demonstrate compliance with Part 90. Field strength of spurious radiation will be found in Report No 97/1750.

CUSTOMER: Saab Marine Electronics AB
SE-581 88 Linköping
Sweden

MANUFACTURER: Saab Marine Electronics AB
Box 13045
SE-402 51 Göteborg
Sweden

EQUIPMENT UNDER TEST (EUT): Radar Level Gauge, TankRadar Pro TH40 with Horn Antenna, pre-production unit 4A.

TEST SPEC.: 47 Cfr Ch. 1 (10-1-97 Edition), Part 90, Subpart F
Complementary tests to Test Ref. No: 97/1750

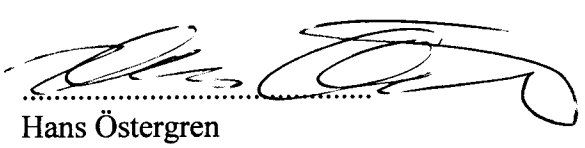
DATE: November 24, 1998

TEST SITE: Svenska EMC Lab AB, Karlskrona, Sweden.
FCC List No 31040/SIT 1300F2.

TEST PERSONNEL: Svenska EMC Lab AB: Bo Gidlöw.
Saab Marine Electronics AB: Mikael Kleman.

TEST RESULT: The EUT (Equipment Under Test) did pass the above mentioned test.

Karlskrona December 14, 1998



Hans Östergren
Manager Svenska EMC Lab AB

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TEST EQUIPMENT:

Type/Manufacturer/Bandwidth	s/n	Calibration information	
		Date	Interval
Spectrum Analyzer, HP 8566B	2950A06284	9710	12 months
Plotter, HP 7475A	2641L16543	NA	NA
Standard Gain Horn Antenna, Narda mod. 640, 8.2 - 12.4 GHz	8909SME180588	NA	NA
Coaxial Cable, Sealectro u-wave-cable, l = 3 m	A4746	9805	12 months
Antenna Mast System, Jyske EMC, h = 1 - 5 m	93-90172	NA	NA
Turn Table, Jyske EMC	93-90171	NA	NA
Open Area Test Site for 3 m antenna distance	-	9704	36 months

DESCRIPTION OF THE EUT:

The EUT is a Radar Tank Gauge used in industrial environments. The used radar frequency is sweeping in the range 9.5 GHz to 10.5 GHz. The output power is below 1 mW. To control the radar digital circuits are integrated in the same enclosure as the radar transmitter-receiver. After installation is the radar antenna totally enclosed in a metal tank and the unwanted radiation is therefor extremely low. The measurements were performed on the radar transmitter only.

TEST SET-UP AND PROCEDURE:

As laid out in ANSI C.63.4:1992 Document. Test equipment set-up as in Appendix 1.

TEST PERFORMANCE:

Part 90, Subpart F:

§ 2.985: RF power output.
Not measured in antenna terminal. Antenna terminal is non existing. Instead, the radiated power was calculated from the measured radiated field strength. Direct on the waveguide of The EUT was a circulair horn antenna with a gain of 21 dB mounted. The radiated emission was measured with this horn antenna oriented to give maximum signal from the receiving antenna.
Antenna distance of 3 m (far field) was used. Measured with peak detector and with RBW = 3 MHz. The emission was maximized by small variations in the antenna height. See Appendix 2 and 3.
The relationship field strength – effective radiated power for free space propagation in far field is:
$E = k \sqrt{P} / d$; $k = 7$;
Test result: Measured field strength was 87.4 dBuV/m at the distance of 3 m. The calculated output power (erp) will be 0.1 mW.

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TEST PERFORMANCE (CONTINUED):

§ 2.987: Modulation.
The modulation is a frequency modulation with 96 kHz sine wave. Type: FXN. The frequency is swept from a start frequency (factory set to 9.5 GHz) to a stop frequency (factory set to 10.5 GHz).
Test result: The modulation was measured an found in compliance with the manufacturers technical description.

§ 2.989: Occupied bandwidth.
The sweep was stopped at 10.083 GHz, and Measured with RBW = 100 kHz and peak detector, in max hold. The modulation was activated. The bandwidth of the signal was measured between the points "Peak value minus 26 dB".
Test result: See Appendix 4. Maximum bandwidth @-26 dB = 6.16 MHz.
Note: The frequencies at the swept band edges were also measured at the points "Peak– 26 dB".
Result: With the modulation on is no emission outside the band 9.500 – 10.500 GHz.

§ 2.991: Spurious at antenna terminals.
Not applicable.

§ 2.993: Field strength of spurious radiation.
See: Radiated Electromagnetic Field in the Test Report No 97/1750 of May 5, 1997.

§ 2.995: Frequency stability.
Not applicable.

SUMMARY OF RESULTS:

The Radar Level Gauge. Model: TankRadar TH40, s/n: TP-3050, did pass the above mentioned tests in Part 90, Subpart F.

Karlskrona December 14, 1998

Hans Östergren
Manager Svenska EMC Lab AB

Bo Gidlöw
Test Engineer

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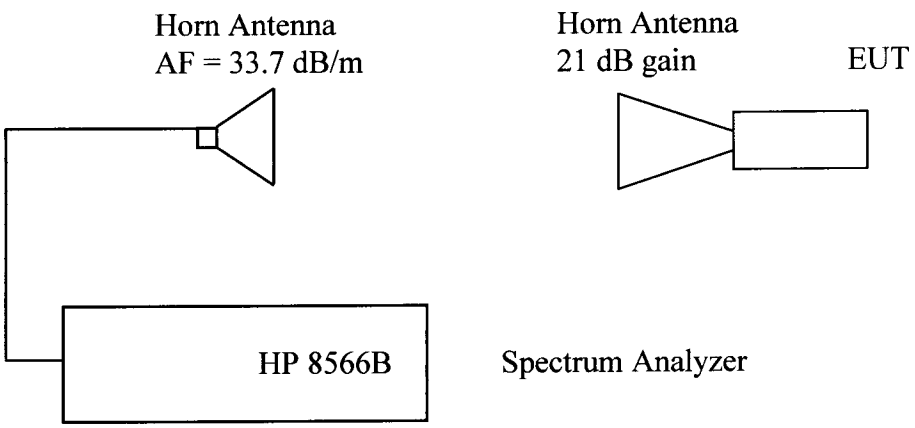
Test equipment set-up

F0: 9.5 – 10.5 GHz



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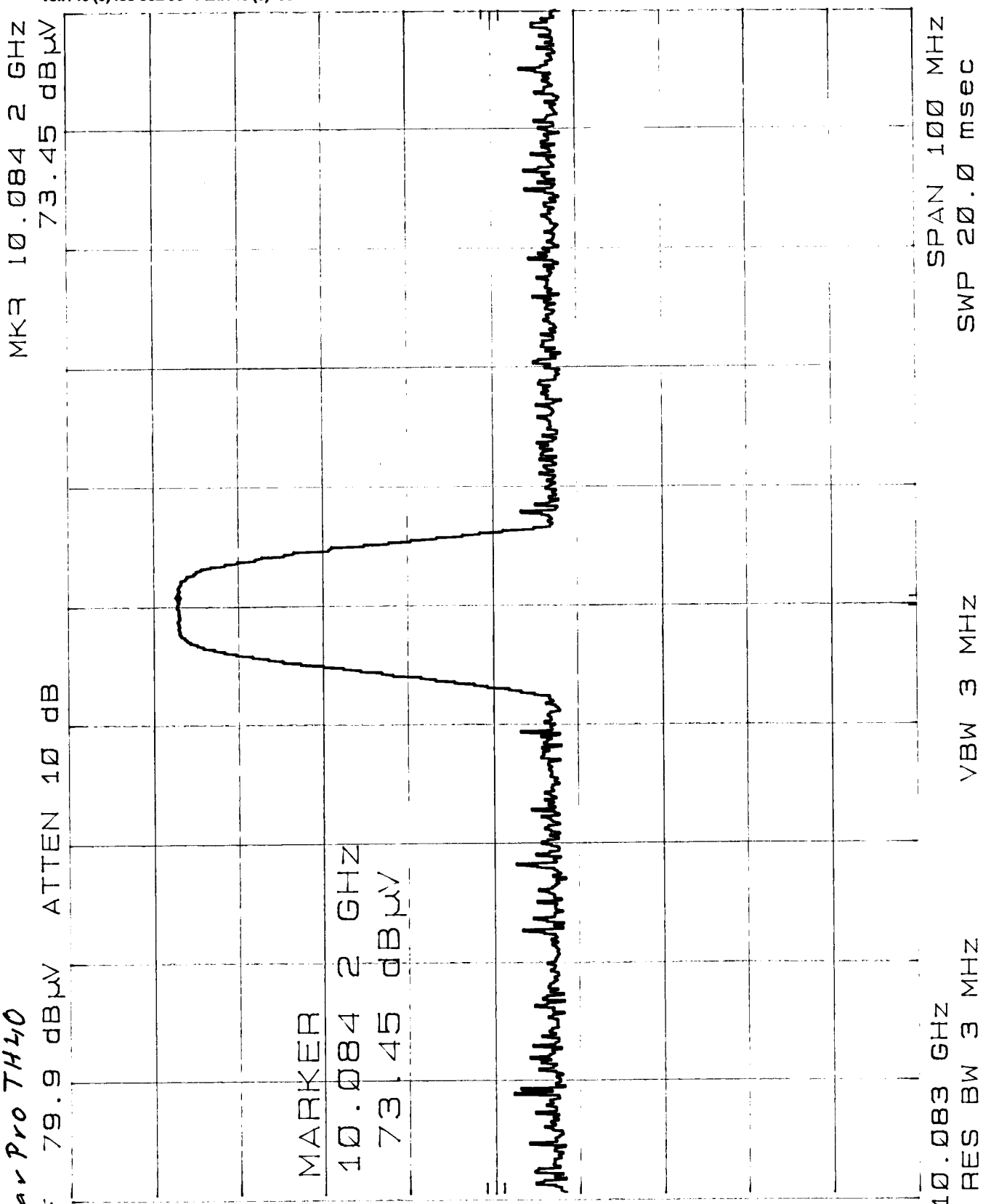
(10) Max out put 3m 21dB ind ant gain 6" horn
Tank Radar Pro TH40



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RF power output test. Calculation of final emission level and output power.

EUT: Radar Level Gauge, TankRadar Pro TH40 with Horn Antenna, pre-production unit 4A.

Test spec.: 47 Cfr Ch. 1 (10-1-97 Edition), Part 90
- Subpart F
Radiated emission on fundamental, Open Area Test Site
3 m antenna distance.

Date: November 24, 1998

Operation: Fixed operating frequency.

1) Field strength (dBuV/m) = Amplitude (dBuV) + Antenna factor (dB/m) + gain (dB) + cable loss (dB)

2) $E = k\sqrt{P} / d$; $k = 7$; $P = (E\ d / k)^2$ P (W), E(V/m), d(m).

Tested frequency: 10.083 GHz
Measured maximum peak value.

Freq.	App	Amplitude peak / av.	RBW / VBW	Ant. factor	Preamp + cable corr.	Field strength	Field strength	Dist.	ERP	Note
GHz	No	dBuV	kHz / kHz	dB/m	dB	dBuV/m	V/m	m	mW	
10.083		73.5 / -	3000/3000	33.7	-21+1.2	87.4	0.023	3	0.1	peak

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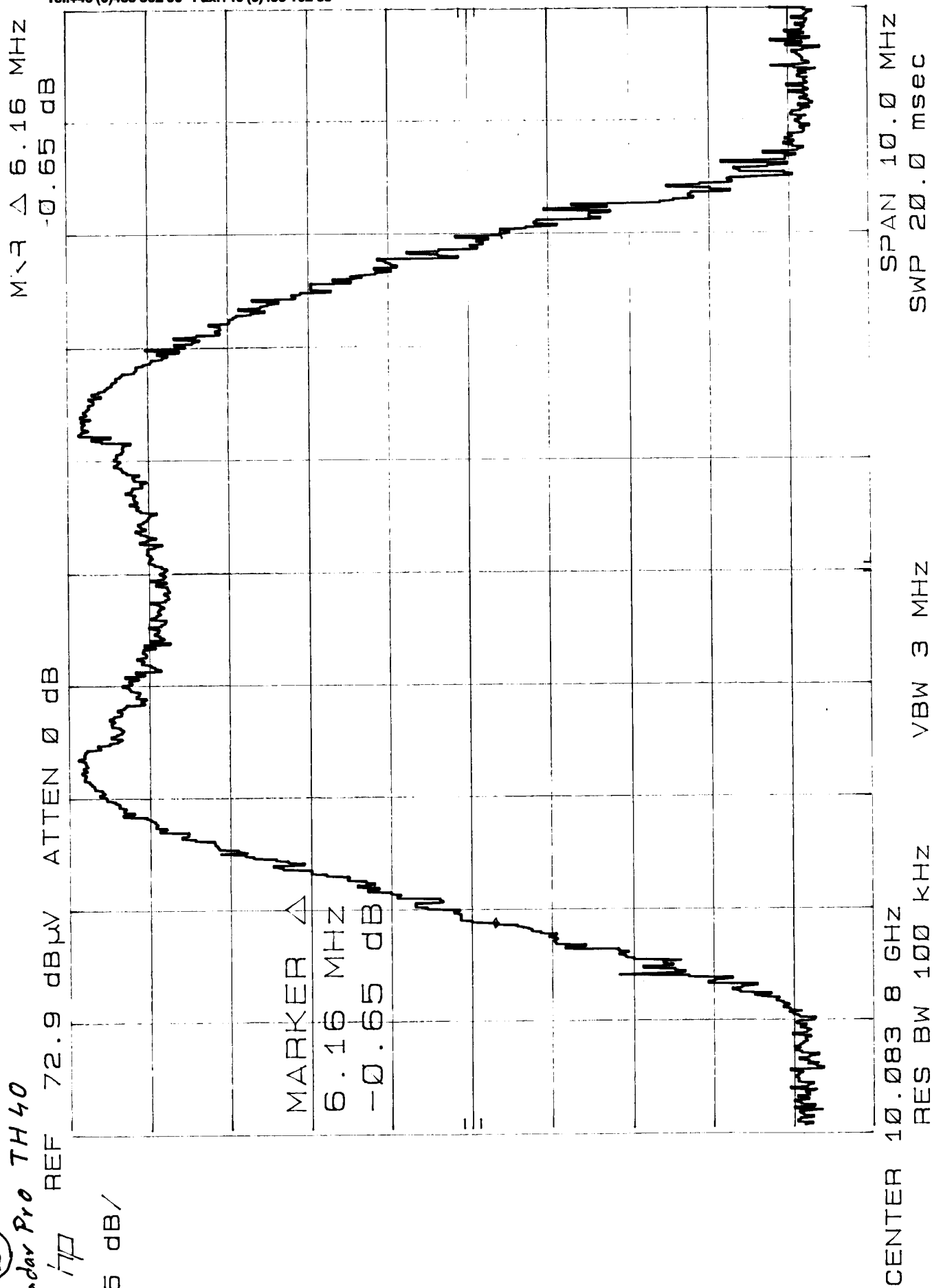

8. Bandbredd
Tank Radar Pro TH 40