

RLB-30 DESIGN VERIFICATION PRE-PRODUCTION TEST REPORT
ETS 300 152:1991

GENERAL

The first pre-production run of RLB-30's consisted of 18 units, all of which passed final test. Five of these units were selected at random to be thoroughly tested to ETS 300 152. All five units met all the specifications and requirements.

ENVIRONMENTAL TESTS

The testing began with a series of environmental tests. The units were subjected to the following environmental tests as detailed in Annex VI to CEPT Recommendation T/R 34-01: "Environmental Testing of Maritime Radio Equipment":

Vibration,	Paragraph 4
Dry Heat cycle,	Paragraph 5.1
Damp heat cycle,	Paragraph 6
Low temperature cycle,	Paragraph 7.1

The results are shown in Charts 1 through 4 along with ETS 300 152 specification limits.

Next the units were placed in an atmosphere with a temperature of 70° C for one hour followed by immersion in water at 20° C at a depth of 10 cm. for one hour. This test was followed by a series of drop tests. Each unit was dropped six times from a height of one meter, once on each face. The final environmental test was an operating immersion test. Each unit was immersed in water with the transmitter operating for five minutes, once with the antenna fully extended and once with the antenna fully retracted.

The units were inspected for mechanical damage, both internal and external, after completion of all the environmental tests. The units did not show any sign of internal or external damage, or penetration of water.

In addition, a comparison was made to compare measurements in the antenna coupler tuning test fixture made initially during pre-production to those obtained in the same test fixture after completion of all the environmental and performance testing. Chart 5 summarizes these results and indicates better than any other testing, the negligible effect of inspection paint, conformal coating, drop testing, vibration, and other test environs on this tuning.

SYSTEM PERFORMANCE TESTS

System performance was tested in accordance with ETS 300 152 on the transmitters operating into a 50 ohm load at both the Upper Extreme Test Voltage and the Lower Extreme Test Voltage at +55° C, room temperature, and -10° C. The Upper Extreme Test Voltage is defined as, "the voltage which the battery gives at the upper extreme temperature with a load equal to that of the equipment." The Lower Extreme Test Voltage is defined as, "the voltage which the battery gives at the extreme lower temperature with a load equal to that of the equipment, after 24 hours of operation." For the RLB-30 these voltages are 6.09 volts and 4.92 volts, respectively.

Charts 6 through 8 show the results of this testing along with ETS 300 152 specification limits.

The final performance test required by ETS 300 152 is for Radiated Peak Envelope Power. This power is defined as:

"The peak envelope power is the average power during one radio frequency cycle at the crest of the modulation envelope. The radiated peak envelope power is the peak envelope power required at the input of a quarter wave monopole antenna normal to a horizontal earth plane to produce at the same distance in a horizontal direction, the same field strength as produced by the equipment in the direction of maximum field strength under specified conditions."

Chart 9 shows the Radiated Peak Envelope Power calculated based on temperature and antenna range measurements made on each individual serial number RLB-30. The minimum Radiated Peak Envelope Power is shown at room, hot and cold temperature. Minimum Radiated Peak Envelope Power occurs in all cases at the Lower Extreme Test Voltage which is 4.92 volts.

Vibration ETS 300 152 (T/R 34-01E)							
Serial #	Bias Volts	Bias mA	Peak Power dBm	Freq (Hz) Deviation from Nominal	Modulation	Vibration Freq Hz	Vibration Deviation Mils P-P
1	5.50	39	23.47	-1700	OK	0	0
2	5.50	40	23.52	-1800	OK	0	0
3	5.50	39	23.50	-1500	OK	0	0
4	5.50	39	23.50	-1700	OK	0	0
6	5.50	39	23.57	-1550	OK	0	0
1	5.50	39	23.45	-1700	OK	11	127
2	5.50	40	23.52	-1800	OK	24	30.5
3	5.50	39	23.50	-1500	OK	45	8.00
4	5.50	39.5	23.50	-1700	OK	25	30.3
6	5.50	39.5	23.52	-1550	OK	48	7.99
ETS 300 152 Spec			18.75 min.	± 3500 max.			

CHART 1

Dry Heat ETS 300 152 (T/R 34-01E)							
Serial #	Bias Volts	Bias mA	Peak Power dBm	Freq (Hz) Deviation from Nominal	Modulation	Time	Temperature C°
11/27/95							
1	5.50	39	23.70	-1700	OK	1:45 PM	20.7
2	5.50	40	23.75	-1800	OK	1:48 PM	20.7
3	5.50	39	23.65	-1550	OK	1:52 PM	20.7
4	5.50	39	23.47	-1800	OK	2:22 PM	21.1
6	5.50	39	23.62	-1600	OK	1:58 PM	20.8
11/28/95							
1	5.50	39	23.42	-1350	OK	8:50 AM	55.2
2	5.50	41	23.57	-1600	OK	8:54 AM	55.2
3	5.50	40	23.50	-1300	OK	8:56 AM	56.1
4	5.50	40	23.42	-1400	OK	8:58 AM	56.1
6	5.50	39.5	23.45	-1450	OK	9:05 AM	55.2
1	5.50	39.5	23.35	-1500	OK	11:17 AM	55.0
2	5.50	40.5	23.42	-1700	OK	11:19 AM	54.8
3	5.50	40	23.30	-1400	OK	11:22 AM	54.9
4	5.50	40	23.20	-1450	OK	11:25 AM	55.3
6	5.50	40	23.25	-1400	OK	11:28 AM	55.4
ETS 300 152 Spec			18.75 min.	± 3500 max.			

CHART 2

Damp Heat ETS 300 152 (T/R 34-01E)							
Serial #	Bias Volts	Peak Power dBm	Freq (Hz) Deviation from Nominal	Modulation	Time	Temperature C°	Humidity %
11/27/95							
1	5.49	23.10	-1700	OK	8:41 AM	40	93
2	5.50	23.17	-1800	OK	8:44 AM	40	93
3	5.50	23.05	-1500	OK	8:48 AM	40	93
4	5.50	22.97	-1900	OK	8:51 AM	40	94
6	5.50	23.00	-1600	OK	8:53 AM	40	93
1	5.50	23.02	-1700	OK	9:02 AM	40	93
2	5.50	23.10	-1800	OK	9:05 AM	40	93
3	5.50	23.10	-1500	OK	9:07 AM	40	93
4	5.50	22.87	-1900	OK	9:09 AM	40	94
6	5.50	22.95	-1600	OK	9:11 AM	40	94
ETS 300 152 Spec		18.75 min.	± 3500 max.				

CHART 3

Low Temperaturem ETS 300 152 (T/R 34-01E)						
Serial #	Bias Volts	Peak Power dBm	Freq (Hz) Deviation from Nominal	Modulation	Time	Temperature C°
11/30/95						
1	5.50	23.32	-2200	OK	8:38 AM	-10
2	5.50	23.35	-2200	OK	8:42 AM	-10
3	5.50	23.32	-1900	OK	8:44 AM	-10
4	5.50	23.10	-2900	OK	8:48 AM	-10
6	5.50	23.17	-1900	OK	8:51 AM	-10
1	5.50	23.15	-2200	OK	8:55 AM	-10
2	5.50	23.17	-2200	OK	8:57 AM	-10
3	5.50	23.12	-1900	OK	9:00 AM	-10
4	5.50	23.00	-2900	OK	9:03 AM	-10
6	5.50	23.00	-1900	OK	9:07 AM	-10
ETS 300 152 Spec 18.75 min. ± 3500 max.						

CHART 4

Antenna Coupler Tuning (Before & After)				
Serial #	Initial Null Frequency	Final Null Frequency	Initial Null Depth dB	Final Null Depth dB
1	117.89	117.89	-22.4	-20.3
2	118.00	117.93	-22.2	-20.2
3	117.96	117.93	-23.0	-21.8
4	118.01	117.94	-23.4	-20.3
6	117.87	117.90	-25.7	-22.4

CHART 5

System Performance Test ETS 300 152										
Room Temperature										
Serial #	Bias Volt	Bias mA	Peak Power dBm	Freq (Hz) Deviation from Nominal	% Duty	Modulation	On Time Sec.	Off Time Sec.	Time	Temp.
11/30/95										
1	4.92	32	22.75	-2000	52.16	OK	2.1+	1.+	4:25 PM	23.6
1	6.09	40.5	24.32	-1300	51.64	OK	2.1+	1.+	4:34 PM	23.0
2	4.92	35	22.62	-2050	52.02	OK	2.1+	1.+	4:43 PM	23.2
2	6.09	44	24.32	-1450	52.59	OK	2.1+	1.+	4:40 PM	23.0
3	4.92	33	22.42	-1800	51.29	OK	2.1+	1.+	4:56 PM	23.2
3	6.09	43	24.12	-1200	52.49	OK	2.1+	1.+	4:52 PM	23.4
4	4.92	34	22.45	-2200	52.29	OK	2.1+	1.+	5:02 PM	23.0
4	6.09	41.5	24.10	-2050	51.55	OK	2.1+	1.+	5:06 PM	23.0
6	4.92	33	22.47	-1850	52.09	OK	2.1+	1.+	5:19 PM	23.2
6	6.09	43.5	24.15	-1300	52.91	OK	2.1+	1.+	5:15 PM	23.0
ETS 300 152 SPEC			18.75 min.	±3500 max.	50 min.		2 min.	1 min.		

CHART 6

System Performance Test ETS 300 152										
Hot Temperature										
Serial #	Bias Volt	Bias mA	Peak Power dBm	Freq (Hz) Deviation from Nominal	% Duty	Modulation	On Time Sec.	Off Time Sec.	Time	Temp.
11/30/95										
1	4.92	35	22.50	-2000	51.77	OK	2.1+	1.+	5:30 PM	55.0
1	6.09	42	24.15	-1300	52.60	OK	2.1+	1.+	5:33 PM	55.6
2	4.92	35	22.42	-2000	51.98	OK	2.1+	1.+	5:42 PM	56.0
2	6.09	43.5	24.12	-1400	52.26	OK	2.1+	1.+	5:39 PM	56.4
3	4.92	34	21.65	-1750	52.04	OK	2.1+	1.+	5:47 PM	55.8
3	6.09	41	23.55	-1200	52.36	OK	2.1+	1.+	5:51 PM	55.4
4	4.92	34.5	22.15	-1900	52.08	OK	2.1+	1.+	6:00 PM	55.5
4	6.09	42.5	23.85	-1300	52.52	OK	2.1+	1.+	5:57 PM	55.4
6	4.92	35	22.32	-1800	52.35	OK	2.1+	1.+	6:19 PM	53.4
6	6.09	42	23.97	-1100	52.53	OK	2.1+	1.+	6:21 PM	54.2
ETS 300 152 SPEC			18.75 min.	±3500 max.	50 min.		2 min.	1 min.		

CHART 7

System Performance Test ETS 300 152

Cold Temperature

Serial #	Bias Volt	Bias mA	Peak Power dBm	Freq (Hz) Deviation from Nominal	% Duty	Modulation	On Time Sec.	Off Time Sec.	Time	Temp.
12/1/95										
1	4.92	33.5	22.80	-2300	52.37	OK	2.1+	1.+	9:05 AM	-10.2
1	6.09	43	24.45	-2100	52.90	OK	2.1+	1.+	9:10 AM	-10.4
2	4.92	33	22.72	-2550	52.25	OK	2.1+	1.+	9:20 AM	-10.6
2	6.09	44	24.47	-2400	51.95	OK	2.1+	1.+	9:15 AM	-10.4
3	4.92	33.5	22.72	-2250	52.17	OK	2.1+	1.+	9:27 AM	-10.2
3	6.09	43	24.32	-2000	52.67	OK	2.1+	1.+	9:31 AM	-10.2
4	4.92	32	22.52	-2900	51.19	OK	2.1+	1.+	9:41 AM	-10.2
4	6.09	43	24.25	-2700	52.47	OK	2.1+	1.+	9:36 AM	-10.2
6	4.92	33.5	22.72	-2350	51.98	OK	2.1+	1.+	10:08 AM	-10.2
6	6.09	43	24.35	-2100	51.78	OK	2.1+	1.+	10:13 AM	-10.2
ETS 300 152 SPEC			18.75 min.	±3500 max.	50 min.		2 min.	1 min.		

CHART 8

Radiated PEAK Envelope Power ETS 300 152			
Serial #	PERP mW +23°C	PERP mW -10°C	PERP mW +55°C
1	155.2	157.0	146.5
2	156.3	160.0	149.3
3	146.3	156.7	122.5
4	148.9	151.4	139.0
6	151.3	160.3	146.0
ETS 300 152 spec.	75 min.	75 min.	75 min.

CHART 9