

# COPY FOR INFORMATION ONLY



GKN AEROSPACE

Engineering Services  
Test Facilities

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## TEST FACILITIES TEST CERTIFICATE

Issued under  
UKAS Accreditation No. 0100

### NAME AND ADDRESS OF CUSTOMER:

Mr. Matt Clarke,  
Software Radio Technology plc.,  
Wireless House, Westfield Ind. Estate,  
Midsomer Norton, Bath, BA3 4BS

CERTIFICATE No: WA/TF/0689

SHEET No: 1 OF: 9

DATE OF SPECIMEN RECEIPT: 16.08.2006

DATE OF TEST: 16.08.2006 to 17.08.2006

DATE OF CERTIFICATE: 23.08.2006

### CONTRACT No:

WORKS ORDER No: TFT458

CUSTOMER ORDER No: 8424

### VIBRATION AND SHOCK TESTS ON TWO MARINE AIS ELECTRONIC UNITS

During the period 16<sup>th</sup> and 17<sup>th</sup> August 2006, Vibration and Shock Tests were performed on two Marine Automatic Identification Systems Electronic units at laboratory ambient temperature generally in accordance with IEC 62287-1 and IEC 60945 as described below.

### Test Specimens

SRT – MTB - OEM Unit No. #005

COMAR CSB 200 Serial No. 003

Certified that the above mentioned specimens/parts/materials/systems\* have been tested/examined in accordance with the terms of the Contract/Order applicable thereto and unless stated above conform fully to the standards/specifications quoted hereon and the requirements of the Civil Aviation Authority.

Test Engineer

Name:

For and on behalf of  
GKN Aerospace  
Engineering Services

Date:

- \* This does not guarantee the bulk of the items/material to be of equal quality
- \* Delete where applicable.

Certified that the above mentioned specimens/parts/materials/systems\* have been tested/examined in accordance with the terms of the Contract/Order applicable thereto and unless stated above conform fully to the standards/specifications quoted hereon and that the Quality Control requirements are in accordance with our UKAS Accreditation.

Test Engineer

Name: D.J. Bishop

Signed:

For and on behalf of  
GKN Aerospace  
Engineering Services

Date: 23.08.2006

Name: M.C. Marlow

Title: Chief Test Engineer

Signed:

\* This Certificate does not relate to the standard or quality of manufacture of the item/material except as may be specified in the test Contract/Order.

\* Delete where applicable.

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**GKN Aerospace Services Test Equipment Used**

**(i) Vibration Facility Comprising :-**

- |    |  |   |
|----|--|---|
| a. | Data Physics Vibration Controller Type DP560 | System No 5109                            |
|    |  | CAL DUE: Oct 2006                         |
| b. | Derritron Amplifier                          | Type MSA2                                 |
|    |  | S/No. DE 55252/MSA/2                      |
| c. | Derritron Shaker                             | Type DV5LTA                               |
|    |  | S/No. D55245                              |
| d. | LDS Amplifier                                | Type MPA16                                |
|    |  | S/No. 151                                 |
| e. | LDS Shaker                                   | Type V825L                                |
|    |  | S/No. 133                                 |
| f. | Kimball Slip Table                           | P/N 8018-11-30-2                          |
|    |  | KI No. 3094                               |
| g. | IEPE Accelerometer<br>Endevco Model 7254-100 | S/No. AN35 (Control)    CAL DUE: Jul 2007 |

**(iii) Medium Weight Shock Rig**

**(iv) Shock Rig Instrumentation Comprising :-**

- |    |  |                                |
|----|--|--------------------------------|
| a. | Structural Dynamics Systems Transient Capture System (Calibrated before use) |                                |
| b. | Charge Amplifier   |                                |
|    | Endevco Model 104  | S/No AB75    CAL DUE: Nov 2006 |

Items c to e were used to perform an end to end calibration on items a and b.

- |    |  |  |
|----|--|--|
| c. | Wavetek Arbitrary Waveform Generator Model 75      | S/No. B6580250<br>CAL DUE: Sept 2006   |
| d. | Fluke 45 Multimeter                                | S/No. 6520022    CAL DUE: End Aug 2006 |
| e. | 1000 pf Capacitor                                  | S/No. 468    CAL DUE: Jan 2007         |
| f. | Piezo-electric Accelerometer<br>Endevco Model 233E | S/No. HC61    CAL DUE: Jan 2007        |

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**GKN Aerospace Services Test Equipment Used / continued**

(v) Temperature and Humidity Indicators

Oregon Scientific Model EM-913R	S/No TLG 1341.	CAL DUE: Sept 2006
Oregon Scientific Model EM-913R	S/No TLG 1342.	CAL DUE: Sept 2006

Where applicable the above equipment is covered by certificates of calibration issued by an approved authority whose standards are traceable to U.K. National Standards.

**Procedures**

The Vibration Facility was operated in accordance with TFI.01.07

The Medium Weight Shock Rig was operated in accordance with TFI.01.09

The Shock Rig Instrumentation was calibrated in accordance with TFI.01.17

**Applied Sinusoidal Vibration Test Curve**

The Sweep Rate for the Applied Sinusoidal Vibration Test Curve (0.2 octave per minute), was extracted from paragraph 9.2.1 of IEC 622871-1 first Edition IEC 2006(E). The Amplitude levels were as specified in paragraph 8.7 of IEC 60945 IEC 2002. Due to Shaker limitations the lower extremity of the frequency range was limited to 5 Hz rather than the 2 Hz specified.

The Applied Vibration Test Curve is listed below.

Frequency (Hz)	Amplitude
5.0 to 13.32	+ / - 1.0 mm Displacement
13.32 to 100 Hz	0.7138 g <sub>n</sub> Peak (0.7 m/s <sup>2</sup> )

One Bi-directional sweep per axis was applied at a sweep rate of 0.2 octave per minute. The resultant test duration was 43 minutes 15 seconds for a 5 Hz to 100 Hz to 5 Hz sweep.

In order to restore the test duration to that of a 2 Hz to 100 Hz to 2 Hz sweep, a sine dwell was performed in each axis at a fixed frequency of 5 Hz. and + / - 1.0 mm displacement ( 0.1 g<sub>n</sub> peak) for a duration of 13 minutes 20 seconds.

Continued on Sheet 4.

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**UUUUUOrder of Tests and Results**

(i) **Vibration**

All Vibration Tests were performed with the units powered and operating in the order :-

Vibration Run 1 Bi-directional Sine sweep in the Vertical Axis.

Vibration Run 2 Sine Dwell in the Vertical Axis.

Vibration Run 3 Bi-directional Sine sweep in the Lateral Axis.

Vibration Run 4 Sine Dwell in the Lateral Axis.

Vibration Run 5 Bi-directional Sine sweep in the Longitudinal Axis.

Vibration Run 6 Sine Dwell in the Longitudinal Axis.

No visible resonances were noted during the vibration tests.

(ii) **Operational Shock Test**

Three off Half Sine Shocks of 10.0 g peak amplitude and 25.0 milliseconds duration were applied in the Bottom to Top direction of the vertical axis only, in accordance with paragraph 9.2.2 of IEC 622871-1 first Edition IEC 2006(E).

Tolerances to BS EN 60068-2-27 Part 2.1 Test EA Fig.2 were applied.

Functional Tests were performed as required by Mr. Matt Clarke of SRT plc and are not covered by this certificate.

Both specimens survived the tests without sustaining visible damage

For Mounting Details and Test Axis Definition see Figures 1 to 4 on sheets 6 to 9.

Copies of the Test Log Sheets are appended to this certificate along with Vibration Control Graphs and Acceleration / Time histories for the Shock Tests.

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**TEST FACILITIES TEST CERTIFICATE**  
**CONTINUATION SHEET**

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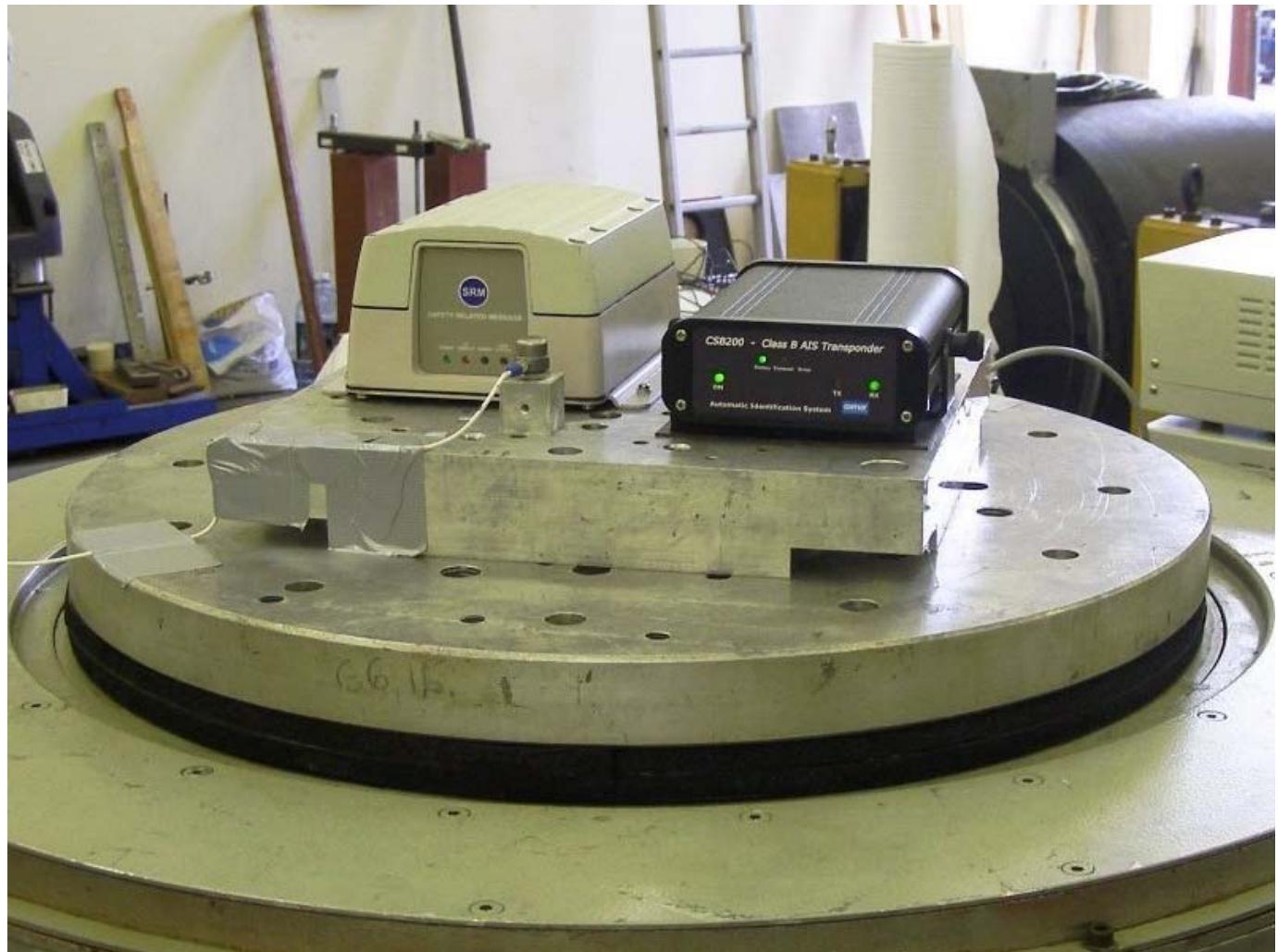
**CERTIFICATE No: WA/TF/0689**  
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<b><u>Tests Witnessed</u></b>	For GKN Aerospace Services	Mr. D. Bishop Mr. B. Harrison
	For Software Radio Technology plc. For Oriel Laboratories	Mr. M. Clarke Mr. I. Atkinson
<b><u>CIRCULATION</u></b>	Software Radio Technology plc. GKN Aerospace Services	Mr. M. Clarke File (2)

**TEST FACILITIES TEST CERTIFICATE**  
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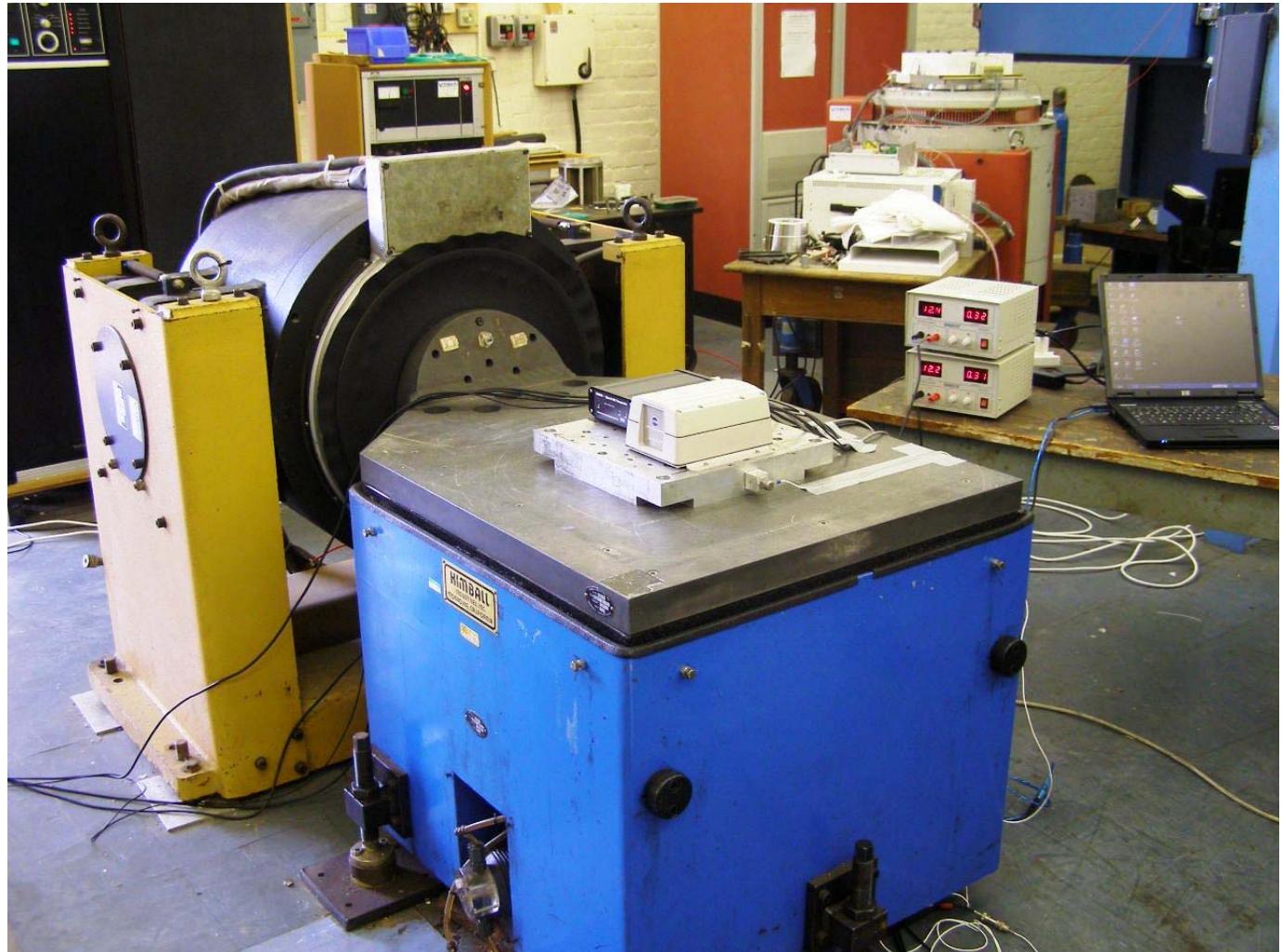
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**Figure 1. General View of Test Setup for Vertical Vibration Tests  
Performed on the Derritron DV5 Shaker.**

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**Figure 2. General View of Test Setup for Lateral Vibration Tests Performed on the Kimball Slip Table Driven By the LDS V825L Shaker.**

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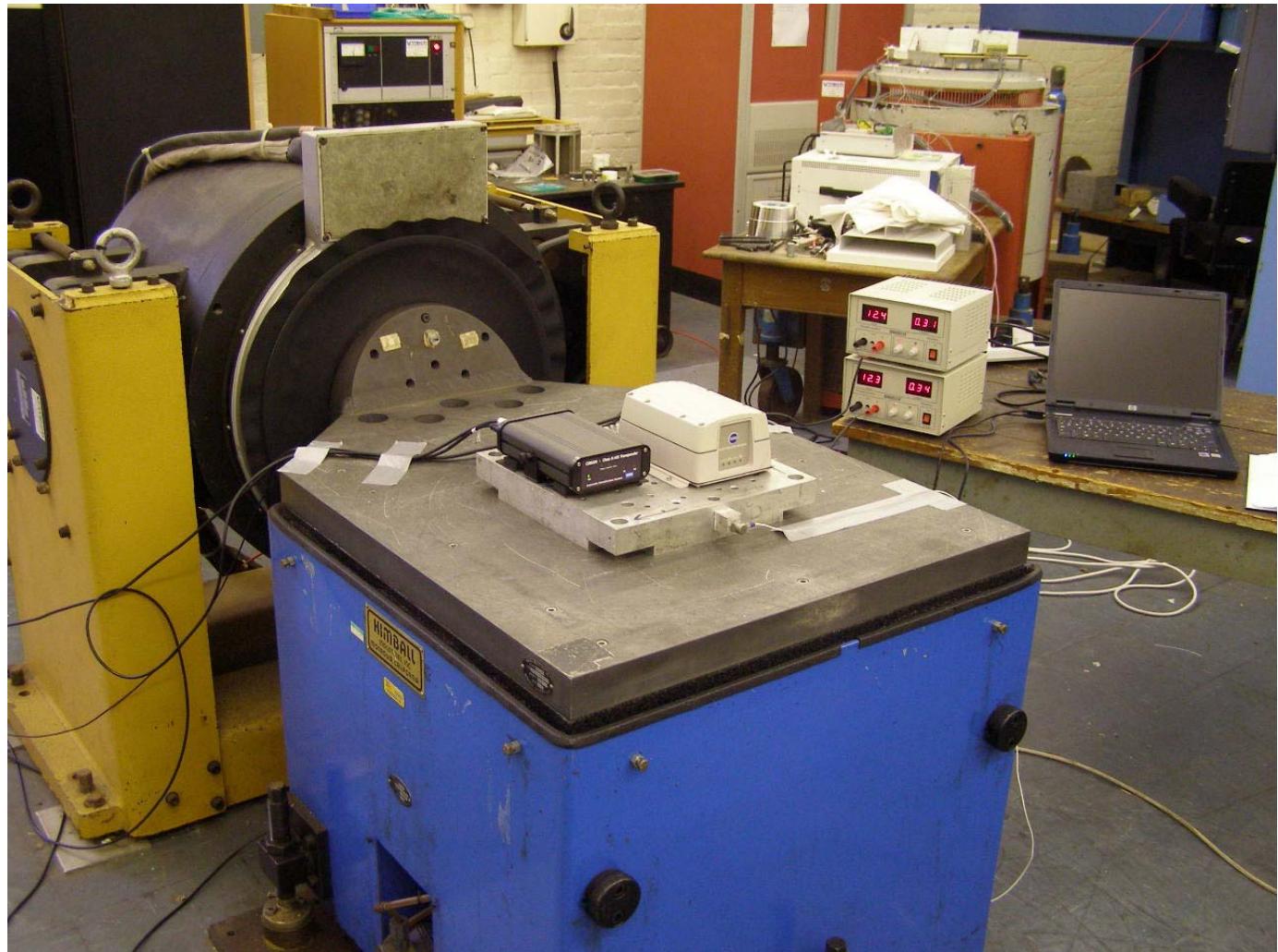
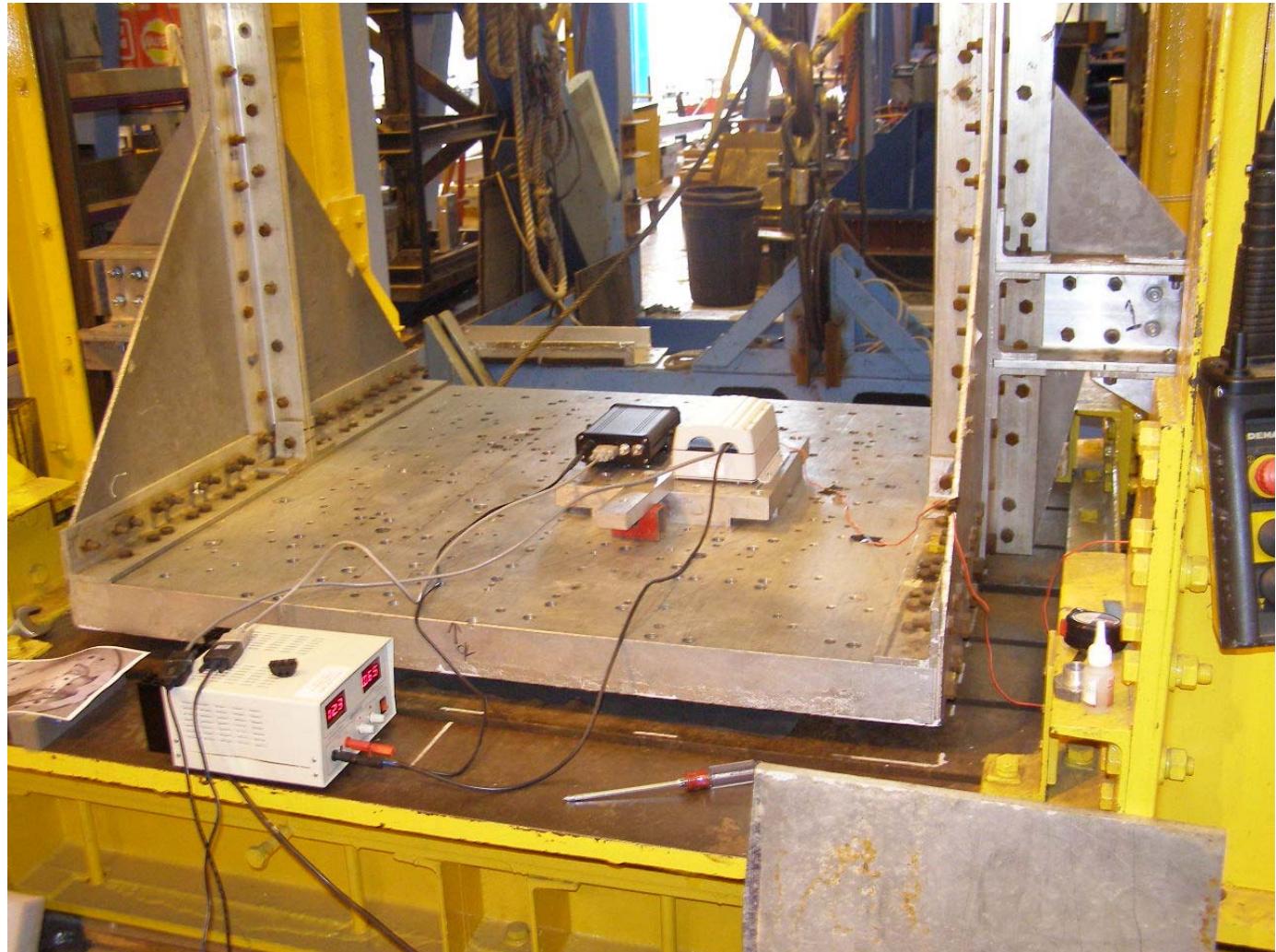


Figure 3. General View of Test Setup for Longitudinal Vibration Tests Performed on the Kimball Slip Table Driven By the LDS V825L Shaker.

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**Figure 4. General View of Test Setup for Shock Test Performed on Medium Weight Shock Rig .**