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REPORT NO 55B 636-1  
DATE 11 July 1961  
NO OF PAGES 202

# CONVAIR ASTRONAUTICS

CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION

CENTAUR SUBSYSTEM NO. 2

TELEPAK ASSEMBLY

FLIGHT CERTIFICATION TEST

REPORT NUMBER 55B 636-1

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**INTRODUCTION:**

The Telepak Assembly Unit is a device which converts instrumentation measurement signals into 0-5 VDC inputs to voltage controlled oscillators.

**OBJECTIVE:**

The test objective is to determine the ability of the signal conditioning portion of the Telepak Assembly to comply with the requirements of test procedure 55B636.

Additional testing was conducted to solve cannister shock mount problems which arose during vibration tests.

**CONCLUSIONS:**

The signal conditioning portion of Telepak Assembly Unit 55-13903-500, S/N 1 passed flight proofing tests with several major exceptions. Differential amplifier 55-01120-1 failed while the package was being subjected to radiant heating and had to be replaced. Rubber O rings used on the shock mounts failed four times during 8G sinusoidal vibration tests. An 8G sweep along the X axis of Mercury specimen 27-12290-1, S/N 1 damaged its O rings (see Figures 1 and 2). O rings were replaced with rubber inserts to solve the vibration problem. The test specimen failed to comply with applicable sections of radio interference specification MIL-I-26600.

Minor problems included failure of several module output voltages to meet design specifications and an 800 cps noise voltage on the 28 VDC bus. Several output signals drifted as testing progressed. Some modules were affected by severe environments.

**RECOMMENDATIONS:**

It is recommended that rubber inserts, properly cemented to the cannister per vendor instructions be used in place of the O rings until more information can be obtained concerning the problem. Steps should be taken to eliminate the 800 cps noise problem.

**SPECIMEN:**

Centaur specimen 55-13903-500, S/N 1 was used for tests called out in the procedure. Additional vibration tests were performed with Mercury specimen 27-12290-1 S/N 1.

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**TEST PROCEDURE:**

Test Procedure 55B 636, used in this test, is included in Appendix A.

**TEST RESULTS:**

**Initial Satisfactory Performance Test:** Several transducer power supply outputs did not comply with the specifications. The demodulator output voltage was about 250 mv low for each input. This might have been due to a loading down of the 2.5 VDC bias voltage. The crystal rectifier performed satisfactorily. Maximum test input to the DC section was 30.25 VDC as any larger voltage might have damaged other modules connected to the 28 VDC bus. The commutator power supply apparently was feeding an 800 cycle signal onto the 28 VDC bus.

As a result, most other modules had a 100-200 mv noise component on the output signal. The other modules performed satisfactorily. These results were brought to the attention of the design group and testing was continued.

**Acceleration:** The specimen was subjected to 10.0 G acceleration for at least 30 seconds in each direction along each axis and passed these tests satisfactorily.

**Altitude:** An attempt to reach an altitude of  $10^{-5}$  mm of Hg, did not proceed beyond  $2.0 \times 10^{-4}$  mm of Hg due to leakage problems. The specimen operated satisfactorily throughout the test.

**Temperature-Humidity:** The specimen was subjected to radiant heating as called out in Paragraph 5.5-a of the procedure.

Maximum non-operating temperature was found to be 133°F. A visual inspection of the unit revealed that several epoxy beads in the package were starting to warp and that one had a slight crack. A proof cycle showed that differential amplifier, S/N 113 had no output voltage. This amplifier was replaced with S/N 112 and testing was continued. A proof cycle after procedure Paragraph 5.5-b (-30°F) showed that AC section outputs of the crystal rectifier were 0.5-0.6 VDC too high. Function tone generator outputs 7, 8, 9 and 10 were 20 cps too high.

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**TEST RESULTS:** (Continued)

The specimen was returned to 80°F. At this temperature all function tone generator outputs were normal. Crystal rectifier outputs were still 0.4-0.6 VDC high and remained high during subsequent tests. A proof cycle at 110°F and 95% relative humidity revealed that several commutator segments had become noisy. Amplifier gains of Ch 7 and 8 were low and remained low during the following tests. The calibrator module would not operate at this time, but worked satisfactorily during the proof cycle of Section 5.5-d (40°F and 95% relative humidity). Several transducer power supply voltages were not within limits at this point.

A proof cycle after temperature shock tests revealed that the negative gates of all commutated channels were at -1.0 VDC instead of -1.25 VDC. A visual inspection of the specimen components after the series of tests revealed that epoxy boards were warping more and exposed metal was beginning to rust. These results were brought to the attention of the design group before testing was continued.

**Vibration:** The specimen was subjected to 8 G's sinusoidal vibration along each axis. The Z axis sweep was completed satisfactorily. (See Figure 3 for the axis designations). The Y axis sweep progressed to 97 cps at which point the shock mount O rings were worn very badly. They were replaced and a second sweep began at 50 cps. The O rings started to wear badly at 68 cps but held until the sweep was completed. At the start of this sweep the differential amplifier (S/N 112) output of Ch 8 fell off, but returned during the sweep. The demodulator output amplitude fluctuated during this sweep.

The O rings were replaced and an X axis sweep progressed to 18 cps. At that point the O rings were very badly worn and replaced. The next sweep was begun at 100 cps and progressed to 2000 cps without incident. Then a sweep was started toward zero from 100 cps and proceeded to 68 cps. At 68 cps the package was receiving 72 G's and the O rings were in very bad condition. No further vibration was done using this specimen. The shock mount seats, Astronautics machined, were worn and may have contributed to rapid deterioration of the O rings. At this point the signal conditioning portion of the specimen was working satisfactorily. A loose screw on the VCO module voltage regulator was noted upon visual inspection of the specimen.

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**TEST RESULTS: (Continued)**

To obtain more data and determine if test specimen shock mount seats might have been improperly machined, a Project Mercury Specimen (27-12290-1, S/N-1) was subjected to an X axis sweep. This specimen had an R.F. section installed whereas the original test specimen contained a dummy mass and electrical lead. The Mercury specimen was machined entirely by the vendor and had successfully passed vendor vibration tests. The X axis sweep was completed to 2000 cps although the O rings were badly worn at 100 cps (see Figures 1 and 2). At 68 cps the specimen experienced a maximum G level -18G. These results were brought to the attention of the design group and the vendor. The vendor indicated improper O rings, made of too soft a rubber had been used. A vendor supplied, rubber insert was glued to the specimen and used in place of O rings at each mounting hole. The specimen was then subjected to a 0-2000 cps vibration sweep along each axis. Both shock mounts and rubber inserts were intact after the three sweeps. The rubber inserts were only slightly worn. Mounting plate G levels were monitored at the four shock mount locations. The shaker input was controlled to keep the G level of all four locations at not more than 8G's. When using O rings, most of the damage occurred during X and Y axis sweeps around 70 cps. Damage when using inserts occurred mainly during Z axis vibration at about 174 cps. Figure 3 shows the setup for the Z axis sweep using rubber inserts.

**Radio Interference:** The specimen was subjected to and failed to pass the MIL-I-26600 requirements for conducted interference, radiated interference and audio susceptibility. Tests were conducted by Department 551-7 and complete results published in Test Report AB61-0377.

**Life Test:** With all power, signals and loads applied, the specimen was operated in cycles of 5 hours "on time" and 1 hour "off time" until 500 hours of "on time" had been accumulated. The specimen performed satisfactorily during the 500 hours with one exception. At 440 hours the transducer power supply 8.8 VDC (adjustable) output fell off to 2.2 volts and varied from 2-5 volts during the remainder of the test. No further changes were noted in signals that had shifted during previous tests.

**NOTE:**

The data from which this report was prepared is recorded in Astronautics Engineering Test Laboratories Notebook Number 7611.

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## 5.2 I.S.P.T.

Reference Paragraph 5.2.2  
Transducer Power Supply TestDate 3/18/61  
Test Eng. R. H. Troester  
Witness E. P. Hartley  
USAF Witness   
Start Time 409.3  
End Time 999.0

|                                     |                    |                     |                     |
|-------------------------------------|--------------------|---------------------|---------------------|
| Input Voltage<br>(Volts DC)         | 24.75              | 27.50               | 30.25               |
| Output Voltage<br>Limits (Volts DC) | -5.94 to -6.06     | -5.94 to -6.06      | -5.94 to -6.06      |
| Meter Reading                       | -5.839             | -5.849              | -5.867              |
| Output Noise<br>Level (Volts AC)    | 0.04 Max<br>0.02 + | 0.04 Max<br>0.02 +  | 0.04 Max<br>0.02 +  |
| Meter Reading                       | 200 mvr spikes     | 200 mvr spikes      | 200 mvr spikes      |
| Output Voltage<br>Limits (Volts DC) | -1.21 to -1.27     | -1.21 to -1.27      | -1.21 to -1.27      |
| Meter Reading                       | -1.228             | -1.230              | -1.233              |
| Output Noise<br>Level (Volts AC)    | 0.04 Max<br>0.02 + | 0.04 Max<br>0.02 +  | 0.04 Max<br>0.02 +  |
| Meter Reading                       | 90 mvr spikes      | 90 mvr spikes       | 90 mvr spikes       |
| Output Voltage<br>Limits (Volts DC) | 2.494 - 2.506      | 2.494 - 2.506       | 2.494 - 2.506       |
| Meter Reading                       | 2.533              | 2.533               | 2.533               |
| Output Noise<br>Level (Volts AC)    | 0.02 Max<br>0.02 + | 0.02 Max<br>0.04 +  | 0.02 Max<br>0.045 + |
| Meter Reading                       | 100 mvr spikes     | 100 mvr spikes      | 110 mvr spikes      |
| Output Voltage<br>Limits (Volts DC) | 4.999 - 5.001      | 4.999 - 5.001       | 4.999 - 5.001       |
| Meter Reading                       | 5.079              | 5.079               | 5.079               |
| Output Noise<br>Level (Volts AC)    | 0.02 Max<br>0.03 + | 0.02 Max<br>0.025 + | 0.02 Max<br>0.025 + |
| Meter Reading                       | 90 mvr spikes      | 90 mvr spikes       | 90 mvr spikes       |

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.2

Transducer Power Supply  
Test (Continued)

|                                     |                    |                    |                    |
|-------------------------------------|--------------------|--------------------|--------------------|
| Output Voltage<br>Limits (Volts DC) | 5.0 - 5.2          | 5.0 - 5.2          | 5.0 - 5.2          |
| Meter Reading                       | 5.140              | 5.146              | 5.158              |
| Output Noise<br>Level (Volts AC)    | 0.05 Max<br>0.02 + | 0.05 Max<br>0.02 + | 0.05 Max<br>0.02 + |
| Meter Reading                       | 200mV spikes       | 200mV spikes       | 200mV spikes       |
| Output Voltage<br>Limits (Volts DC) | 5.1 - 5.3          | 5.1 - 5.3          | 5.1 - 5.3          |
| Floating<br>Meter Reading           | 4.85               | 4.84               | 4.86               |
| Output Noise<br>Level (Volts AC)    | 0.05 Max<br>—      | 0.05 Max<br>—      | 0.05 Max<br>—      |
| Meter Reading                       | —                  | —                  | —                  |
| Output Voltage<br>Limits (Volts DC) | 7.75 - 8.25        | 7.75 - 8.25        | 7.75 - 8.25        |
| Meter Reading                       | 8.488              | 8.498              | 8.515              |
| Output Noise<br>Level (Volts AC)    | 0.05 Max<br>0.02 + | 0.05 Max<br>0.02 + | 0.05 Max<br>0.02 + |
| Meter Reading                       | 175mV spikes       | 175mV spikes       | 175mV spikes       |
| Output Voltage<br>Limits (Volts DC) | 8.6 - 9.0          | 8.6 - 9.0          | 8.6 - 9.0          |
| Temp<br>Meter Reading               | 8.62               | 8.63               | 8.65               |
| Output Noise<br>Level (Volts AC)    | 0.05 Max           | 0.05 Max           | 0.05 Max           |
| Meter Reading                       | 200mV              | 200mV              | 200mV              |

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## 5.2 I.S.P.T. (Continued)

## Reference Paragraph 5.2.3

## Crystal Rectifier Test

| Input Voltage             | Output Voltage Limits (Volts DC)    | Meter Reading | Output Noise Level (Volts AC) | Meter Reading               |
|---------------------------|-------------------------------------|---------------|-------------------------------|-----------------------------|
| Section A<br>(Volts DC)   |                                     |               |                               |                             |
| +20.0                     | $\pm 150$ mv                        | +40 mvr       | 0.04 Max                      | 0.12 <sup>v</sup><br>Spikes |
| +25.0                     | 1.5-1.8                             | 1.56          | 0.04 Max                      | 0.12 <sup>v</sup><br>spikes |
| +30.0                     | —                                   | —             | 0.04 Max                      | —                           |
| 30.25<br><del>+35.0</del> | 3.3 - 3.5<br><del>4.05 - 5.45</del> | 3.18          | 0.04 Max                      | 0.12 <sup>v</sup><br>spikes |
| Section B<br>(Volts AC)   |                                     |               |                               |                             |
| 105.0                     | $\pm 250$ mv                        | +80 mvr       | 0.04 Max                      | 0.03 *                      |
| 110.0                     | 1 - 1.5                             | 1.20          | 0.04 Max                      | ↑                           |
| 115.0                     | 2.25-2.75                           | 2.50          | 0.04 Max                      | ↓                           |
| 120.0                     | 3.5-4.0                             | 3.70          | 0.04 Max                      | ↓                           |
| 125.0                     | 4.75 - 5.25                         | 5.00          | 0.04 Max                      | 0.03 *                      |

\* Also 100 mvr P-P of 900% noise present from commutator power supply.

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.3

Crystal Rectifier Test

| Input Voltage Limits (Volts DC) | Output Voltage Limits (Volts DC) | Meter Reading | Output Noise Level (Volts AC) | Meter Reading |
|---------------------------------|----------------------------------|---------------|-------------------------------|---------------|
| Section C (Volts AC)            |                                  |               |                               |               |
| 105.0                           | $\pm 250$ mv                     | 0 mv          | 0.04 Max                      | 0.03 *        |
| 110.0                           | 1-1.5                            | 1.20          | 0.04 Max                      | ↑<br>↓        |
| 115.0                           | 2.25-2.75                        | 2.50          | 0.04 Max                      |               |
| 120.0                           | 3.5-4.0                          | 3.70          | 0.04 Max                      |               |
| 125.0                           | 4.75-5.25                        | 5.00          | 0.04 Max                      | 0.03 *        |
| Section D (Volts AC)            |                                  |               |                               |               |
| 105.0                           | $\pm 250$ mv                     | +80 mv        | 0.04 Max                      | 0.03 *        |
| 110.0                           | 1-1.5                            | 1.20          | 0.04 Max                      | ↑<br>↓        |
| 115.0                           | 2.25-2.75                        | 2.50          | 0.04 Max                      |               |
| 120.0                           | 3.5-4.0                          | 3.70          | 0.04 Max                      |               |
| 125.0                           | 4.75-5.25                        | 5.00          | 0.04 Max                      | 0.03 *        |

\* Also 100 mV P-P of 800 ~ noise present from the commutator power supply.

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.4

Rate Demodulator Test

| Input Voltage<br>(Volts AC) | Output Voltage<br>Limits (Volts DC) | Meter<br>Reading    | Output Noise<br>Level (Volts AC) | Meter<br>Reading |
|-----------------------------|-------------------------------------|---------------------|----------------------------------|------------------|
| Out of Phase                |                                     |                     |                                  |                  |
| 0.125                       | $\pm 40$ mv                         | -300mv <sup>✓</sup> | 0.05 Max                         | 50mv *           |
| 0.100                       | 0.4 - 0.6                           | +200mv <sup>✓</sup> | 0.05 Max                         | ↑                |
| 0.075                       | 0.9 - 1.0                           | +720mv <sup>✓</sup> | 0.05 Max                         |                  |
| 0.050                       | 1.4 - 1.6                           | 1.22 L              | 0.05 Max                         |                  |
| 0.025                       | 1.9 - 2.1                           | 1.72 ✓              | 0.05 Max                         |                  |
| 0                           | 2.4 - 2.6                           | 2.25 ✓              | 0.05 Max                         |                  |
| In Phase                    |                                     |                     |                                  |                  |
| 0                           | 2.4 - 2.6                           | 2.25 ✓              | 0.05 Max                         |                  |
| 0.025                       | 2.7 - 3.1                           | 2.72 ✓              | 0.05 Max                         |                  |
| 0.050                       | 3.4 - 3.6                           | 3.22 ✓              | 0.05 Max                         |                  |
| 0.075                       | 3.7 - 4.1                           | 3.75 ✓              | 0.05 Max                         |                  |
| 0.100                       | 4.4 - 4.6                           | 4.25 ✓              | 0.05 Max                         |                  |
| 0.125                       | 4.90 - 5.10                         | 4.75                | 0.05 Max                         | 50mv *           |

\* Also 100 mv of 800 c/s noise from commutator power supply.

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.5

Differential Amplifier Test

|                                  | Amplifier No 1<br>Section A | Amplifier No 1<br>Section B | Amplifier No 2 |
|----------------------------------|-----------------------------|-----------------------------|----------------|
| Gain Limits                      | 49 - 51                     | 49 - 51                     | 49 - 51        |
| Gain                             | 50                          | 50                          | 50             |
| Output Noise<br>Level (Volts AC) | 0.05 Max                    | 0.05 Max                    | 0.05 Max       |
| Meter Reading                    | 0.02 *                      | 0.02 *                      | 0.02 *         |

\* Also 100 mV spikes from commutator power supply.

Reference Paragraph 5.2.6

Temperature Bridge Test

Satisfactory check ✓

Unsatisfactory explain \_\_\_\_\_

Note: Some segments noisy.

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.7

Circuit Board Assy. Test

Limiter Section

| Section                      | A    | B    | C    | D    | F    | J    | K    |
|------------------------------|------|------|------|------|------|------|------|
| Input Voltage<br>(Volts DC)  | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 |
| Output Voltage<br>(Volts DC) | -1.8 | -1.8 | -1.8 | -1.8 | -1.8 | -1.8 | -1.8 |
| Input Voltage<br>(Volts DC)  | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Output Voltage<br>(Volts DC) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Input Voltage<br>(Volts DC)  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| Output Voltage<br>(Volts DC) | +1.0 | +1.0 | +1.0 | +1.0 | +1.0 | +1.0 | +1.0 |
| Input Voltage<br>(Volts DC)  | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Output Voltage<br>(Volts DC) | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Input Voltage<br>(Volts DC)  | 5.0  | 5.0  | 5.0  | 5.0  | 5.0  | 5.0  | 5.0  |
| Output Voltage<br>(Volts DC) | 5.0  | 5.0  | 5.0  | 5.0  | 5.0  | 5.0  | 5.0  |
| Input Voltage<br>(Volts DC)  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  |
| Output Voltage<br>(Volts DC) | 5.7  | 5.7  | 5.7  | 5.7  | 5.7  | 5.7  | 5.7  |

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.7

Circuit Board Assy. Test

Blip SectionSatisfactory check ✓

Unsatisfactory explain \_\_\_\_\_

Divider SectionOutput Voltage Limits      -1.0 volts DC-MinimumMeter Reading -1 VDC, also 80mv of noise

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.8

Function Tone Generator Test

| Channel                                                     | 1                                                                                                        | 2                    | 3                    | 4                    | 5                    |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
| Input Voltage<br>(Volts DC)                                 | 27.5                                                                                                     | 27.5                 | 27.5                 | 27.5                 | 27.5                 |
| Output Frequency<br>Limits (cps)                            | 28 - 38                                                                                                  | 69 - 79              | 110 - 120            | 151 - 161            | 192 - 202            |
| Meter Reading                                               | 33                                                                                                       | 76                   | 118                  | 158                  | 200                  |
| Output Voltage<br>Limits (RMS)<br><del>(Peak to Peak)</del> | 0.071<br>to<br>0.087                                                                                     | 0.071<br>to<br>0.087 | 0.115<br>to<br>0.141 | 0.154<br>to<br>0.188 | 0.198<br>to<br>0.242 |
| Meter Reading                                               | 0.091                                                                                                    | 0.084                | 0.131                | 0.175                | 0.220                |
| Interference<br>caused by<br>other channels                 | No APPARENT channel interference<br>or Beat frequencies on the output of<br>the FUNCTION TONE Generator. |                      |                      |                      |                      |

Note: 150mv P-P of 800 cps NOISE Present from Comm. P.S.

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.8

Function Tone Generator Test

| Channel                                                                    | 6                                                                                                  | 7                    | 8                    | 9                    | 10                   |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
| Input Voltage<br>(Volts DC)                                                | 27.50                                                                                              | 27.50                | 27.50                | 27.50                | 27.50                |
| Output Frequency<br>Limits (cps)                                           | 233 - 243                                                                                          | 274 - 284            | 315 - 325            | 356 - 366            | 397 - 407            |
| Meter Reading                                                              | <del>245</del>                                                                                     | 280                  | 322                  | 364                  | 403                  |
| Output Voltage<br>Limits (Volts <del>DC</del><br><del>Peak to Peak</del> ) | 0.245<br>to<br>0.299                                                                               | 0.289<br>to<br>0.353 | 0.322<br>to<br>0.392 | 0.369<br>to<br>0.451 | 0.407<br>to<br>0.497 |
| Meter Reading                                                              | 0.268                                                                                              | 0.315                | 0.358                | 0.412                | 0.443                |
| Interference<br>caused by<br>other channels                                | No APPARENT Beat Frequencies or<br>Noise Problems on the output of<br>the Function Tone Generator. |                      |                      |                      |                      |

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.9

Commutator Power Supply Test

Input Voltage - +27.5 Volts DC

Output Voltage Limits - 98 - 126.5 Volts AC

Meter Reading 112 VRMS Comm. ON

Reference Paragraph 5.2.10

Power Changeover and Commutator  
Command Relay TestPower Changeover RelaySatisfactory check ✓

Unsatisfactory explain \_\_\_\_\_

Commutator Command RelaySatisfactory Check ✓

Unsatisfactory explain \_\_\_\_\_

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## 5.2 I.S.P.T. (Continued)

Reference Paragraph 5.2.11

Filter Limiter Test

| Channel                                                               | 1                                  | 4                                    |
|-----------------------------------------------------------------------|------------------------------------|--------------------------------------|
| Input Voltage                                                         | 115 Volts AC                       | as in Figure 1                       |
| Output Voltage<br>Limits<br><del>(115 Volts AC)</del><br>Volts AC P-P | <del>5.7-6.2</del><br>.7-1.3       | <del>5.7-6.2</del><br>.7-1.3         |
| Output Voltage<br>Volts AC P-P                                        | 1.0                                | 0.7 - 1.0 - 0.8                      |
| Output Frequency<br>(cps)                                             | <del>888 - 1032</del><br>370 - 430 | <del>4995 - 5805</del><br>888 - 1032 |
| Output Frequency                                                      | 400                                | 888 - 960 - 1032                     |

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## I. S. P. T. Additional Mercury Modules

Calibrator

Calibrator Off

Output Voltage - 2.5 Volts D. C. (Nominal)

OK.

Calibrator On

Output - 0-5 Volts D. C. square wave for 15-35 seconds,  
frequency approximately 1 cps.

Oscilloscope Reading

OK.Sub-Carrier OscillatorsCh II

|                  |       |       |       |       |       |
|------------------|-------|-------|-------|-------|-------|
| Input Voltage    | 0     | +1.25 | +2.5  | +3.75 | +5.0  |
| Output Frequency | 6,798 | 7,072 | 7,346 | 7,622 | 7,897 |
| Linearity        | OK    |       |       |       |       |

Ch A

|                  |        |        |        |        |        |
|------------------|--------|--------|--------|--------|--------|
| Input Voltage    | -.6    | +1.5   | +9     | +1.65  | +26    |
| Output Frequency | 18,670 | 20,380 | 22,043 | 23,679 | 25,300 |
| Linearity        | OK     |        |        |        |        |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests

X, Axis Acceleration

Date 3/22/61  
Test Eng. R.H. Troester  
Witness J. Bentley  
USAF Witness J. Bentley  
Start Time 1045  
End Time 1118

| Module                                  | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply              | ✓                     |                           |
| Crystal<br>Rectifier                    | ✓                     |                           |
| Rate<br>Demodulator<br>↓<br>Lim. Filter | ✓                     |                           |
| Differential<br>Amplifiers              | ✓                     |                           |
| Temperature<br>Bridges                  | ✓                     |                           |

R.H. Troester

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | Not<br>checked        |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | Not<br>checked        |                        |

11 July 1961

## 5.3 Proof Cycle Test

After X, AXIS ACCELERATION

Date 3/22/61  
Test Eng. R. H. Torrest  
Witness C. D. Hartley  
USAF Witness \_\_\_\_\_  
Start Time 1118  
End Time 1160

| Module                                  | Satisfactory<br>Check | Unsatisfactory<br>Explain                                     |
|-----------------------------------------|-----------------------|---------------------------------------------------------------|
| Transducer<br>Power Supply              | ✓                     |                                                               |
| Crystal<br>Rectifier                    | ✓                     |                                                               |
| Rate<br>Demodulator<br>↓<br>Lim. Filter | ✓                     |                                                               |
| Differential<br>Amplifiers              | ✓                     | Note: Leading edges of Commutator<br>Segments are Rounded off |
| Temperature<br>Bridges                  | ✓                     |                                                               |

R. H. Torrest

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.4, 5.5, 5.6 Operational Tests

 $X_2$  AXIS ACCELERATION

Date 3/22/61  
Test Eng. R.H. Tronster  
Witness C.D. Bentley  
USAF Witness \_\_\_\_\_  
Start Time 1160  
End Time 1163

| Module                     | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply | ✓                     |                           |
| Crystal<br>Rectifier       | ✓                     |                           |
| Rate<br>Demodulator        | ✓                     |                           |
| Differential<br>Amplifiers | ✓                     |                           |
| Temperature<br>Bridges     | ✓                     |                           |

R.H. Tronster

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | Not<br>checked        |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | Not<br>checked        |                        |

11 July 1961

## 5.3 Proof Cycle Test

After  $X_2$  AXIS ACCELERATION

Date 3/22/60  
Test Eng. R.H. Tenester  
Witness [Signature]  
USAF Witness             
Start Time 1163  
End Time 1190

| Module                                        | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply                    | ✓                     |                           |
| Crystal<br>Rectifier                          | ✓                     |                           |
| Rate<br>Demodulator<br>↓<br><i>Lim Filter</i> | ✓                     |                           |
| Differential<br>Amplifiers                    | ✓                     |                           |
| Temperature<br>Bridges                        | ✓                     |                           |

*R.H. Tenester*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.4, 5.5, 5.6 Operational Tests

Y AXIS ACCELERATION

Date 3/22/61  
Test Eng. R. H. Troester  
Witness [Signature]  
USAF Witness \_\_\_\_\_  
Start Time 1191  
End Time 1196

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|----------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply             | ✓                     |                           |
| Crystal<br>Rectifier                   | ✓                     |                           |
| Rate<br>Demodulator<br>↓<br>Lim. Filt. | ✓                     |                           |
| Differential<br>Amplifiers             | ✓                     |                           |
| Temperature<br>Bridges                 | ✓                     |                           |

R. H. Troester

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | Not<br>checked        |                        |
| SUPCARRIER<br>OSCILLATORS<br>Ch II and Ch A | Not<br>checked        |                        |

11 July 1961

5.3 Proof Cycle Test  
After Y<sub>1</sub> AXIS ACCELERATIONDate 3/22/61  
Test Eng. R.H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 1146  
End Time 1212

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|--------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply           | ✓                     |                           |
| Crystal<br>Rectifier                 | ✓                     |                           |
| Rate<br>Demodulator<br>↓<br>Lim Filt | ✓                     |                           |
| Differential<br>Amplifiers           | ✓                     |                           |
| Temperature<br>Bridges               | ✓                     |                           |

R.H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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5.4, 5.5, 5.6 Operational Tests

Y<sub>2</sub> Axis ACCELERATION

Date 3/22/61  
Test Eng. R. H. Treester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 1212  
End Time 1216

| Module                          | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|---------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply      | /                     |                           |
| Crystal<br>Rectifier            | ✓                     |                           |
| Rate<br>Demodulator<br>Lim Filt | ✓                     |                           |
| Differential<br>Amplifiers      | ✓                     |                           |
| Temperature<br>Bridges          | ✓                     |                           |

R. H. Treester

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY | EXPLAIN |
|---------------------------------------------|-----------------------|----------------|---------|
| CALIBRATOR                                  | Not<br>checked        |                |         |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | Not<br>checked        |                |         |

11 July 1961

## 5.3 Proof Cycle Test

After Y<sub>2</sub> Axis Acceleration

Date 3/22/61  
Test Eng. R. H. Torresten  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 1216  
End Time 1238

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|----------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply             | ✓                     |                           |
| Crystal<br>Rectifier                   | ✓                     |                           |
| Rate<br>Demodulator<br>↓<br>Lim. Filt. | ✓                     |                           |
| Differential<br>Amplifiers             | ✓                     |                           |
| Temperature<br>Bridges                 | ✓                     |                           |

R. H. Torresten

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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5.4, 5.5, 5.6 Operational Tests

Z<sub>1</sub> AXIS ACCELERATION

Date 7/22/61  
Test Eng. R.H. Tröster  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 1238  
End Time 1243

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|----------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply             | ✓                     |                           |
| Crystal<br>Rectifier                   | ✓                     |                           |
| Rate<br>Demodulator<br>+<br>Lim Filter | ✓                     |                           |
| Differential<br>Amplifiers             | ✓                     |                           |
| Temperature<br>Bridges                 | ✓                     |                           |

R.H. Tröster

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                       | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|------------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly    | ✓                     |                           |
| Function Tone<br>Generator   | ✓                     |                           |
| Commutator<br>Power Supply   | ✓                     |                           |
| Power<br>Changeover Relay    | ✓                     |                           |
| Commutator<br>Command Relay. | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | Not<br>checked        |                        |
| SUPCARRIER<br>OSCILLATORS<br>Ch II and Ch A | Not<br>checked        |                        |

11 July 1961

5.3 Proof Cycle Test  
After Z, AXIS ACCELERATION

Date 3/22/61  
Test Eng. R. H. Traester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 1243  
End Time 1252

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|--------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply           | ✓                     |                           |
| Crystal<br>Rectifier                 | ✓                     |                           |
| Rate<br>Demodulator<br>+<br>Lim Filt | ✓                     |                           |
| Differential<br>Amplifiers           | ✓                     |                           |
| Temperature<br>Bridges               | ✓                     |                           |

R. H. Traester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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## 5.4, 5.5, 5.6 Operational Tests

 $Z_2$  AXIS ACCELERATION

Date 7/22/61  
Test Eng. R. H. Treester  
Witness C. D. Hestley  
USAF Witness                       
Start Time 1252  
End Time 1256

| Module                                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|---------------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply                  | ✓                     |                           |
| Crystal<br>Rectifier                        | ✓                     |                           |
| Rate<br>Demodulator<br>+<br><i>Lim Filt</i> | ✓                     |                           |
| Differential<br>Amplifiers                  | ✓                     |                           |
| Temperature<br>Bridges                      | ✓                     |                           |

*R. H. Treester*

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK  | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|------------------------|------------------------|
| CALIBRATOR                                  | <i>Not<br/>checked</i> |                        |
| SUPCARRIER<br>OSCILLATORS<br>Ch II and Ch A | <i>Not<br/>checked</i> |                        |

11 July 1961

## 5.3 Proof Cycle Test

After  $Z_2$  AXIS ACCELERATION

Date 3/22/61  
Test Eng. R. H. Troester  
Witness C. D. Hattley  
USAF Witness                       
Start Time 1256  
End Time 1351

| Module                                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|---------------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply                  | ✓                     |                           |
| Crystal<br>Rectifier .                      | ✓                     |                           |
| Rate<br>Demodulator<br>+<br><i>Lim Filt</i> | ✓                     |                           |
| Differential<br>Amplifiers                  | ✓                     |                           |
| Temperature<br>Bridges                      | ✓                     |                           |

*R. H. Troester*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK                                               | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|---------------------------------------------------------------------|------------------------|
| CALIBRATOR                                  | ✓                                                                   |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | Ch II: 6800<br>7360<br>7915<br><br>Ch A: 18,782<br>22,141<br>25,407 |                        |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests

High Altitude

Date 3/23/61  
Test Eng. R. H. Troester  
Witness C. H. Helling  
USAF Witness \_\_\_\_\_  
Start Time 1400  
End Time 1600

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|--------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply           | ✓                     |                           |
| Crystal<br>Rectifier                 | ✓                     |                           |
| Rate<br>Demodulator<br>↓<br>Lim Filt | ✓                     |                           |
| Differential<br>Amplifiers           | ✓                     |                           |
| Temperature<br>Bridges               | ✓                     |                           |

R. H. Troester

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.3 Proof Cycle Test  
After High AltitudeDate 3/23/61  
Test Eng. R.H. Torrey  
Witness C. H. H. H.  
USAF Witness   
Start Time 1640  
End Time 1650

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|----------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply             | ✓                     |                           |
| Crystal<br>Rectifier                   | ✓                     |                           |
| Rate<br>Demodulator<br>+<br>Lim. Filt. | ✓                     |                           |
| Differential<br>Amplifiers             | ✓                     |                           |
| Temperature<br>Bridges                 | ✓                     |                           |

R. H. Torrey

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.3 Proof Cycle Test  
After Section 5.5 a  
RADIANT HEAT

Date 3/24/61  
Test Eng. R.H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 1641  
End Time 1746

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain                                     |
|--------------------------------------|-----------------------|---------------------------------------------------------------|
| Transducer<br>Power Supply           | ✓                     |                                                               |
| Crystal<br>Rectifier                 | ✓                     |                                                               |
| Rate<br>Demodulator<br>+<br>LIM Filt | ✓                     |                                                               |
| Differential<br>Amplifiers           |                       | No output on amplifier<br>of ch 8.<br>AMPLIFIER WAS REPLACED. |
| Temperature<br>Bridges               | ✓                     |                                                               |

R.H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

After Section 5.5 b  
(-30°F + 3.44" Hg)

Temp. At 0°F During this  
Proof Cycle.

Date 3/25/61  
Test Eng. R. H. Troester  
Witness C. R. Hall  
USAF Witness \_\_\_\_\_  
Start Time 1797  
End Time 1830

| Module                                | Satisfactory<br>Check | Unsatisfactory<br>Explain                                                                                                |
|---------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------|
| Transducer<br>Power Supply            | ✓                     |                                                                                                                          |
| Crystal<br>Rectifier                  |                       | Output Voltages MAY Be Starting<br>to DRIFT.<br>A.C. Section Outputs ARE .5 to<br>.6 Volts too high at this temperature. |
| Rate<br>Demodulator<br>+<br>LM Filter | ✓                     |                                                                                                                          |
| Differential<br>Amplifiers            | ✓                     |                                                                                                                          |
| Temperature<br>Bridges                | ✓                     |                                                                                                                          |

R. H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain                                                                                     |
|-----------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------|
| Function Tone<br>Generator  |                       | The output frequencies of<br>ch 2.10.7 through 2.10.10 ARE<br>ALL ABOUT 20 % too high<br>at this temperature. |
| Commutator<br>Power Supply  | ✓                     |                                                                                                               |
| Power Changeover<br>Relay   | ✓                     |                                                                                                               |
| Commutator<br>Command Relay | ✓                     |                                                                                                               |
| Circuit<br>Board Assembly   | ✓                     |                                                                                                               |

11 July 1961

## 503 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UN-SATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|-------------------------|
| CALIBRATOR                                  | ✓                     |                         |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                         |

11 July 1961

## 5.3 Proof Cycle Test

AFTER PARA 5.5 c  
TEMP-HUMIDITY ENV.

110°F + 95% Rel. Humidity  
DURING PROOF CYCLE

Date 3/27/61  
Test Eng. R.H. Trester  
Witness Chas. H. Hays  
USAF Witness                       
Start Time 1933  
End Time 2054

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain                                                   |
|----------------------------------------|-----------------------|-----------------------------------------------------------------------------|
| Transducer<br>Power Supply             |                       | 5.00 CALIB. SIGNAL IS<br>.11 Volts too high                                 |
| Crystal<br>Rectifier                   |                       | AC section outputs ARE<br>ABOUT .6 VDC too high for<br>the RANGE of INPUTS. |
| Rate<br>Demodulator<br>+<br>Lim Filter | ✓                     |                                                                             |
| Differential<br>Amplifiers             |                       | GAIN ch7 - 47<br>ch8 - 46<br>ch9 - 50-AK                                    |
| Temperature<br>Bridges                 |                       | MANY Segments ARE NOISY.<br>Some RESISTANCE VALUES MAY<br>have changed.     |

R.H. Trester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN               |
|---------------------------------------------|-----------------------|--------------------------------------|
| CALIBRATOR                                  |                       | The CALIBRATOR FAILED<br>to operate. |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                                      |

11 July 1961

## 5.3 Proof Cycle Test

After 40°F + 95°F  
Relative Humidity  
for 4 hours

Date 3/27/61  
Test Eng. R. H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2055  
End Time 2126

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain                                         |
|----------------------------------------|-----------------------|-------------------------------------------------------------------|
| Transducer<br>Power Supply             |                       | Several Outputs out of spec.<br>-1.16'<br>+2.56<br>+5.10          |
| Crystal<br>Rectifier                   |                       | D.C. Section OK.<br>A.C. Section Outputs .4-.6<br>Volts too high. |
| Rate<br>Demodulator<br>+<br>Lim Filter | ✓                     |                                                                   |
| Differential<br>Amplifiers             |                       | GAIN Ch 7 - 47<br>" Ch 8 - 48<br>" Ch 9 - 50                      |
| Temperature<br>Bridges                 |                       | Noisy segments present<br>Resistance values may have<br>changed.  |

R. H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                                   | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|----------------------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                               | ✓ *                   |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II <sup>2</sup> and Ch A | ✓                     |                        |

\* Note: CALIBRATOR DIDN'T WORK AT END OF LAST  
PROOF CYCLE.

11 July 1961

## 5.3 Proof Cycle Test

After Section 5.5

Temp. Shock Test

Date 3/29/61  
Test Eng. R.H. Trooster  
Witness W.H. Hays  
USAF Witness W.H. Hays  
Start Time 2130  
End Time 2200

| Module                                 | Satisfactory Check | Unsatisfactory Explain                                                    |
|----------------------------------------|--------------------|---------------------------------------------------------------------------|
| Transducer<br>Power Supply             |                    | SEVERAL OUTPUTS OUT OF SPEC:<br>-1.19 V CAL<br>+2.56 V CAL<br>+5.12 V CAL |
| Crystal<br>Rectifier                   |                    | A.C. Section Outputs High                                                 |
| Rate<br>Demodulator<br>+<br>Lim Filter | ✓                  |                                                                           |
| Differential<br>Amplifiers             |                    | CH 7 - GAIN 47<br>CH 8 - GAIN 48                                          |
| Temperature<br>Bridges                 |                    | Some Noisy Segments<br>Some Resistances MAY HAVE<br>changed.              |

R. H. Trooster

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.3 Proof Cycle Test  
Prior to VibrationDate 3/30/61  
Test Eng. R.H. Tronster  
Witness (Signature)  
USAF Witness                       
Start Time 2302  
End Time 2600

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain                      |
|--------------------------------------|-----------------------|------------------------------------------------|
| Transducer<br>Power Supply           | ✓                     |                                                |
| Crystal<br>Rectifier .               |                       | AC Voltage outputs ARE<br>ABOUT .6VDC too high |
| Rate<br>Demodulator<br>+<br>Lim Filt | ✓                     |                                                |
| Differential<br>Amplifiers           |                       | GAINS OFF AS IN LAST PROOF<br>CYCLE            |
| Temperature<br>Bridges               |                       | Some Segments noisy                            |

R.H. Tronster

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests

## Z AXIS VIBRATION

Date 3/3/61  
Test Eng. R.H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2637  
End Time 2710

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|--------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply           | ✓                     |                           |
| Crystal<br>Rectifier                 | ✓                     |                           |
| Rate<br>Demodulator<br>+<br>400 Filt | ✓                     |                           |
| Differential<br>Amplifiers           | ✓                     |                           |
| Temperature<br>Bridges               | ✓                     |                           |

R. H. Troester

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY<br>EXPLAIN |
|---------------------------------------------|-----------------------|---------------------------|
| CALIBRATOR                                  | ✓                     |                           |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                           |

11 July 1961

5.3 Proof Cycle Test  
After Z AXIS VIBRATIONDate 3/31/61  
Test Eng. R. H. Torcator  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2720  
End Time 2750

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain              |
|----------------------------------------|-----------------------|----------------------------------------|
| Transducer<br>Power Supply             | ✓                     |                                        |
| Crystal<br>Rectifier                   |                       | Outputs of A.C. section<br>-6VDC high. |
| Rate<br>Demodulator<br>+<br>Lim Filter | ✓                     |                                        |
| Differential<br>Amplifiers             |                       | Ch 7+8 GAINS LOW                       |
| Temperature<br>Bridges                 | ✓                     |                                        |

R. H. Torcator

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.4, 5.5, 5.6 Operational Tests

Y AXIS

Date 3/31/61  
Test Eng. R.H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2767  
End Time 2890

| Module                                             | Satisfactory<br>Check | Unsatisfactory<br>Explain                                                                |
|----------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------|
| Transducer<br>Power Supply                         | ✓                     |                                                                                          |
| Crystal<br>Rectifier                               | ✓                     |                                                                                          |
| Rate<br>Demodulator<br><u>Lim Filt</u> — <u>OK</u> |                       | Demos. output AMPLITUDE VARIED<br>AT LOW VIBRATION FREQUENCIES<br>(60-90% <sup>s</sup> ) |
| Differential<br>Amplifiers                         |                       | CH 8 AMPLIFIER Lost output<br>for a time.<br>Output later came back<br>satisfactorily    |
| Temperature<br>Bridges                             | ✓                     |                                                                                          |

R.H. Troester

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

AFTER Y AXIS VIBRATION

Date 7/31/61  
Test Eng. R.H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2850  
End Time 2910

| Module                                       | Satisfactory<br>Check | Unsatisfactory<br>Explain            |
|----------------------------------------------|-----------------------|--------------------------------------|
| Transducer<br>Power Supply                   | ✓                     |                                      |
| Crystal<br>Rectifier                         |                       | outputs high                         |
| Rate<br>Demodulator<br>↓<br><u>Line Filt</u> | ✓                     | Amplitude Noisy                      |
| Differential<br>Amplifiers                   |                       | ch 748 GAINS LOW                     |
| Temperature<br>Bridges                       |                       | Some Segments Not at<br>PROPER VALUE |

R.H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | • ✓                   |                        |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests

## X AXIS VIBRATION

Date 3/31/61  
Test Eng. R.H. Trooster  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2910  
End Time 2930

| Module                               | Satisfactory<br>Check | Unsatisfactory<br>Explain                                   |
|--------------------------------------|-----------------------|-------------------------------------------------------------|
| Transducer<br>Power Supply           | ✓                     |                                                             |
| Crystal<br>Rectifier                 | ✓                     |                                                             |
| Rate<br>Demodulator<br>+<br>Lim Filt |                       | Demod Output Noisy<br>At Low Freq. (60-70%) of<br>VIBRATION |
| Differential<br>Amplifiers           | ✓                     |                                                             |
| Temperature<br>Bridges               | ✓                     |                                                             |

R.H. Trooster

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Circuit<br>Board Assembly   | ✓                     |                           |
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power<br>Changeover Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |

11 July 1961

## 5.4, 5.5, 5.6 Operational Tests (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY    EXPLAIN |
|---------------------------------------------|-----------------------|---------------------------|
| CALIBRATOR                                  | ✓                     |                           |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test

AFTER X AXIS VIBRATION

Date 3/3/61  
Test Eng. R. H. Truster  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2230  
End Time 2941

| Module                                 | Satisfactory<br>Check | Unsatisfactory<br>Explain                  |
|----------------------------------------|-----------------------|--------------------------------------------|
| Transducer<br>Power Supply             | ✓                     |                                            |
| Crystal<br>Rectifier                   | ✓                     |                                            |
| Rate<br>Demodulator<br>+<br>Lim Filter | ✓                     | Output of Demod OK                         |
| Differential<br>Amplifiers             |                       | Outputs Present<br>Gain of ch 7 + ch 8 Low |
| Temperature<br>Bridges                 |                       | Some segments Noisy                        |

R. H. Truster

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                       | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|----------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                   | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS,<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Prior to start of  
Life Testing

Date 4/6/61  
Test Eng. R. H. Troester  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 2946  
End Time 3068

| Module                                | Satisfactory<br>Check | Unsatisfactory<br>Explain                                                          |
|---------------------------------------|-----------------------|------------------------------------------------------------------------------------|
| Transducer<br>Power Supply            | ✓                     |                                                                                    |
| Crystal<br>Rectifier                  |                       | DC output high for ALL INPUTS<br>DA 125V IN gives 5.4 VDC out,<br>should be 5.0 V. |
| Rate<br>Demodulator<br>+<br>LM Filter | ✓                     |                                                                                    |
| Differential<br>Amplifiers            |                       | Gain CH 7 47<br>" CH 8 48<br>" CH 9 50                                             |
| Temperature<br>Bridges                | ✓                     |                                                                                    |

R. H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

## Life Test

Date 4/7/61  
Test Eng. R.H. Troster  
Witness C.W. Bailey  
USAF Witness                       
Start Time 3973  
End Time 3993

| Module                             | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply         | ✓                     |                           |
| Crystal<br>Rectifier               | ✓                     |                           |
| Rate<br>Demodulator<br>Lim. Filter | ✓                     |                           |
| Differential<br>Amplifiers         |                       | Ch 7 & 8 GAINS LOW        |
| Temperature<br>Bridges             | ✓                     |                           |

R.H. Troster

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Test*

Date April 17 1961  
Test Eng. T. Trotter  
Witness C. D. Hartley  
USAF Witness \_\_\_\_\_  
Start Time 9:00 AM  
End Time 11:00 AM

| Module                                | Satisfactory<br>Check | Unsatisfactory<br>Explain               |
|---------------------------------------|-----------------------|-----------------------------------------|
| Transducer<br>Power Supply            | ✓                     |                                         |
| Crystal<br>Rectifier                  | ✓                     |                                         |
| Rate<br>Demodulator<br><i>Lim Fil</i> | ✓                     |                                         |
| Differential<br>Amplifiers            |                       | <i>CH 748 Low<br/>Gain on Amplifier</i> |
| Temperature<br>Bridges                | ✓                     |                                         |

*R. H. Trotter*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

9 54 AM

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

## Life Test

Date 4/18/61  
Test Eng. R. H. T. Troester  
Witness C. D. H. H. H.  
USAF Witness   
Start Time 9:00 AM  
End Time 10:00 AM

| Module                                | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|---------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply            | ✓                     |                           |
| Crystal<br>Rectifier                  | ✓                     |                           |
| Rate<br>Demodulator<br><i>Lim Fil</i> | ✓                     |                           |
| Differential<br>Amplifiers            |                       | CH 748 Low Gain           |
| Temperature<br>Bridges                | ✓                     |                           |

R. H. T. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Test*

Date 4/19/61  
Test Eng. Procter  
Witness C. H. H. H.  
USAF Witness   
Start Time 8:15  
End Time

| Module                              | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply          | ✓                     |                           |
| Crystal<br>Rectifier                | ✓                     |                           |
| Rate<br>Demodulator<br><i>L. F.</i> | ✓                     |                           |
| Differential<br>Amplifiers          |                       | <i>Low on CH 7+8</i>      |
| Temperature<br>Bridges              | ✓                     |                           |

*R. H. T. meyer*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Test

Date 4/20/61  
Test Eng. Troester  
Witness C. D. Hartley  
USAF Witness                       
Start Time 9:35  
End Time                     

| Module                       | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply   | ✓                     |                           |
| Crystal<br>Rectifier         | ✓                     |                           |
| Rate<br>Demodulator<br>L. F. | ✓                     |                           |
| Differential<br>Amplifiers   |                       | CH 7 & 8 Low              |
| Temperature<br>Bridges       | ✓                     |                           |

R.H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     | 1-2 & 3 loc               |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Cycle*

Date 4/21/61  
Test Eng. Troester  
Witness C. H. Troester  
USAF Witness   
Start Time 9:15  
End Time 10:12

| Module                       | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply   | ✓                     |                           |
| Crystal<br>Rectifier         | ✓                     |                           |
| Rate<br>Demodulator<br>L. F. | ✓                     |                           |
| Differential<br>Amplifiers   | ✓<br>Note: →          | CH 7 & 8 Low              |
| Temperature<br>Bridges       | ✓                     |                           |

*R. H. Troester*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.2 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | L                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | L                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Test*

Date 4/24/61  
Test Eng. Tronster  
Witness C. D. Heston  
USAF Witness \_\_\_\_\_  
Start Time 8:15  
End Time \_\_\_\_\_

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | CH 748 Low                |
| Temperature<br>Bridges      | ✓                     |                           |

*R. H. Tronster*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.2 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Test*

Date April 25-61  
Test Eng. Tracy  
Witness C. O. Hartley  
USAF Witness \_\_\_\_\_  
Start Time 8:15  
End Time \_\_\_\_\_

| Module                       | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply   | ✓                     |                           |
| Crystal<br>Rectifier         | ✓                     |                           |
| Rate<br>Demodulator<br>L. F. | ✓                     |                           |
| Differential<br>Amplifiers   |                       | 748 Low                   |
| Temperature<br>Bridges       | ✓                     |                           |

*R. H. Torrance*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Test

Date

4/26/61

Test Eng.

T. Troester

Witness

C. Bentley

USAF Witness

Start Time

8:15

End Time

8:45

| Module                        | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply    | ✓                     |                           |
| Crystal<br>Rectifier          | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. ) | ✓                     |                           |
| Differential<br>Amplifiers    |                       | 748 Low                   |
| Temperature<br>Bridges        | ✓                     |                           |

R. N. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Test*

Date 4/29/61  
Test Eng. T. Prosser  
Witness C. D. Hitting  
USAF Witness                       
Start Time 8:30  
End Time                     

| Module                          | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|---------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply      | ✓                     |                           |
| Crystal<br>Rectifier            | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. (S) | ✓                     |                           |
| Differential<br>Amplifiers      | ✓                     | 748 Low                   |
| Temperature<br>Bridges          | ✓                     |                           |

*R. H. T. Prosser*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle/Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Cycle*

Date 4/27/61  
Test Eng. Procter  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 8:15  
End Time           

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | 748 Low                   |
| Temperature<br>Bridges      | ✓                     |                           |

*P.H. Procter*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Cycle Test*

Date 5/1/61  
Test Eng. T. Foster  
Witness C. H. H. H.  
USAF Witness \_\_\_\_\_  
Start Time 8:15  
End Time 8:45

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | 748 Low                   |
| Temperature<br>Bridges      | ✓                     |                           |

*R. H. Foster*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

5.3 Proof Cycle Test (Continued)

*Life Test*

| MODULE                                      | SATISFACTORY<br>CHECK                                                               | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-------------------------------------------------------------------------------------|------------------------|
| CALIBRATOR                                  |    |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A |  |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Cycle*

Date May 2-61  
Test Eng. Treco/er  
Witness C. D. H. H. H.  
USAF Witness   
Start Time 8:15  
End Time

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | 748 Low                   |
| Temperature<br>Bridges      | ✓                     |                           |

*R. H. T. T. T.*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.3 Proof Cycle Test  
*Life Test*Date 5/3/61  
Test Eng. Troester  
Witness C. H. Taylor  
USAF Witness \_\_\_\_\_  
Start Time 8:15  
End Time 9:45

| Module                           | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|----------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply       | ✓                     |                           |
| Crystal<br>Rectifier             | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. (15) | ✓                     |                           |
| Differential<br>Amplifiers       |                       | 748 Low                   |
| Temperature<br>Bridges           | ✓                     |                           |

*R. H. Troester*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

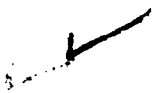
*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| MODULE                                      | SATISFACTORY<br>CHECK                                                               | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-------------------------------------------------------------------------------------|------------------------|
| CALIBRATOR                                  |    |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A |  |                        |

11 July 1961

## 5.3 Proof Cycle Test

*Life Test*

Date 5/4/61  
Test Eng. T. J. Foster  
Witness C. J. H. H. H.  
USAF Witness   
Start Time 8:15  
End Time 8:45

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | 748 Low                   |
| Temperature<br>Bridges      | ✓                     |                           |

*R. H. T. Foster*

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commulator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commulator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Cycle

Date 5/5/61  
Test Eng. J. Prosser  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 9:15  
End Time 9:45

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | CA 748 Low                |
| Temperature<br>Bridges      | ✓                     |                           |

R.H. Torrey

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     | <i>not tested</i>         |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Cycle

Date 5/8/61  
Test Eng. Trooster  
Witness [Signature]  
USAF Witness [Signature]  
Start Time 7:15  
End Time           

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply  | ✓                     |                           |
| Crystal<br>Rectifier        | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. | ✓                     |                           |
| Differential<br>Amplifiers  |                       | 748 Low                   |
| Temperature<br>Bridges      | ✓                     |                           |

R.H. Trooster

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Cycle

Date 5/9/61  
Test Eng. T. J. Taylor  
Witness C. J. Shultz  
USAF Witness   
Start Time 11:30  
End Time

| Module                        | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply    | ✓                     |                           |
| Crystal<br>Rectifier          | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. ) | ✓                     |                           |
| Differential<br>Amplifiers    |                       | CH 748 Low                |
| Temperature<br>Bridges        | ✓                     |                           |

R. H. Towner

11 JULY 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.2 Proof Cycle Test (Continued)

*Life Test*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Cycle

Date 5/14/61  
Test Eng. Troester  
Witness C. H. Miller  
USAF Witness   
Start Time 8:16  
End Time

| Module                                                                                                          | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-----------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply                                                                                      | ✓                     |                           |
| Crystal<br>Rectifier                                                                                            | ✓                     |                           |
| Rate<br>Demodulator<br>L.F.  | ✓                     |                           |
| Differential<br>Amplifiers                                                                                      |                       | CH 7 & 8 Low              |
| Temperature<br>Bridges                                                                                          | ✓                     |                           |

R. H. Troester

11 July 1961

## 5.3 Proof Cycle Test (Continued)

Life Cycle

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | <i>✓</i>              |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | <i>✓</i>              |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Test

Date 5/11/61  
Test Eng. Prosser  
Witness McNally  
USAF Witness   
Start Time 8:15  
End Time 8:45

| Module                                                                                                          | Satisfactory<br>Check | Unsatisfactory<br>Explain                                                                                      |
|-----------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------|
| Transducer<br>Power Supply                                                                                      | ✓                     |                                                                                                                |
| Crystal<br>Rectifier                                                                                            | ✓                     | <del>CH 7+8 Low</del><br> |
| Rate<br>Demodulator<br>L.F.  | ✓                     |                                                                                                                |
| Differential<br>Amplifiers                                                                                      |                       | CH 7+8 Low                                                                                                     |
| Temperature<br>Bridges                                                                                          | ✓                     |                                                                                                                |

R.H. T... 

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

5.3 Proof Cycle Test  
*Life Cycle*Date 5/12/61  
Test Eng. T. Crocker  
Witness C. D. Sullivan  
USAF Witness \_\_\_\_\_  
Start Time 8:15  
End Time 8:45

| Module                          | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|---------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply      | ✓                     |                           |
| Crystal<br>Rectifier            | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. (V) | ✓                     |                           |
| Differential<br>Amplifiers      | <del>CH 748</del> (V) | CH 748 Low                |
| Temperature<br>Bridges          | ✓                     |                           |

R. H. Torrey

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | <i>✓</i>              |                           |
| Commutator<br>Power Supply  | <i>✓</i>              |                           |
| Power Changeover<br>Relay   | <i>✓</i>              |                           |
| Commutator<br>Command Relay | <i>✓</i>              |                           |
| Circuit<br>Board Assembly   | <i>✓</i>              |                           |

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Test*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

11 July 1961

## 5.3 Proof Cycle Test

Life Cycle

Date 5/15/61  
Test Eng. H. J. Foster  
Witness W. H. Kelley  
USAF Witness \_\_\_\_\_  
Start Time 8:15  
End Time 9:15

H. J. Foster

| Module                      | Satisfactory<br>Check | Unsatisfactory<br>Explain              |
|-----------------------------|-----------------------|----------------------------------------|
| Transducer<br>Power Supply  |                       | 8.2 Volts Adj.<br>dropped to 2.2 Volts |
| Crystal<br>Rectifier        | ✓                     |                                        |
| Rate<br>Demodulator<br>L.F. | ✓                     |                                        |
| Differential<br>Amplifiers  |                       |                                        |
| Temperature<br>Bridges      | ✓                     | 748 Low                                |

R. H. Torster

11 July 1961

## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

NOT REPRODUCIBLE

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commulator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commulator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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## 5.3 Proof Cycle Test

Life Cycle

Date 5/16/61  
Test Eng. W. H. T. T. T.  
Witness W. H. T. T. T.  
USAF Witness W. H. T. T. T.  
Start Time 8:15  
End Time           

| Module                          | Satisfactory<br>Check | Unsatisfactory<br>Explain    |
|---------------------------------|-----------------------|------------------------------|
| Transducer<br>Power Supply      | ✓                     | 8.2 V. Adjust Reads<br>5.3 V |
| Crystal<br>Rectifier            | ✓                     |                              |
| Rate<br>Demodulator<br>L.F. (C) | ✓                     |                              |
| Differential<br>Amplifiers      | -                     | CH 847 Low                   |
| Temperature<br>Bridges          | ✓                     |                              |

R. H. T. T. T.

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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## 5.3 Proof Cycle Test

Life Cycle

Date 5/17/61  
Test Eng. Throster  
Witness C. H. H. H.  
USAF Witness                       
Start Time 8:15  
End Time                     

| Module                        | Satisfactory<br>Check | Unsatisfactory<br>Explain |
|-------------------------------|-----------------------|---------------------------|
| Transducer<br>Power Supply    |                       | 8.2 Volts Adj. Low        |
| Crystal<br>Rectifier          | ✓                     |                           |
| Rate<br>Demodulator<br>L.F. Ⓢ | ✓                     |                           |
| Differential<br>Amplifiers    |                       | CH 7+8 Low                |
| Temperature<br>Bridges        | ✓                     |                           |

R. H. Troster

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle***NOT REPRODUCIBLE**

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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## 5.3 Proof Cycle Test

*Life Cycle*

Date 5/19/61  
Test Eng. Throster  
Witness W. H. H. H.  
USAF Witness W. H. H. H.  
Start Time 8:15  
End Time           

| Module                             | Satisfactory<br>Check                                                               | Unsatisfactory<br>Explain        |
|------------------------------------|-------------------------------------------------------------------------------------|----------------------------------|
| Transducer<br>Power Supply         |                                                                                     | 8.2 Volts Adj.<br>15 Low - 4 VDC |
| Crystal<br>Rectifier               | <i>✓</i>                                                                            |                                  |
| Rate<br>Demodulator<br><i>L.F.</i> | <i>✓</i>                                                                            |                                  |
| Differential<br>Amplifiers         |  | CH 748 Low                       |
| Temperature<br>Bridges             | <i>✓</i>                                                                            |                                  |

*R. H. Throster*

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle***NOT REPRODUCIBLE**

| Module                      | Satisfactory<br>check | Unsatisfactory<br>Explain |
|-----------------------------|-----------------------|---------------------------|
| Function Tone<br>Generator  | ✓                     |                           |
| Commutator<br>Power Supply  | ✓                     |                           |
| Power Changeover<br>Relay   | ✓                     |                           |
| Commutator<br>Command Relay | ✓                     |                           |
| Circuit<br>Board Assembly   | ✓                     |                           |

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## 5.3 Proof Cycle Test (Continued)

*Life Cycle*

| MODULE                                      | SATISFACTORY<br>CHECK | UNSATISFACTORY EXPLAIN |
|---------------------------------------------|-----------------------|------------------------|
| CALIBRATOR                                  | ✓                     |                        |
| SUBCARRIER<br>OSCILLATORS<br>Ch II and Ch A | ✓                     |                        |

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O RING DETERIORATION

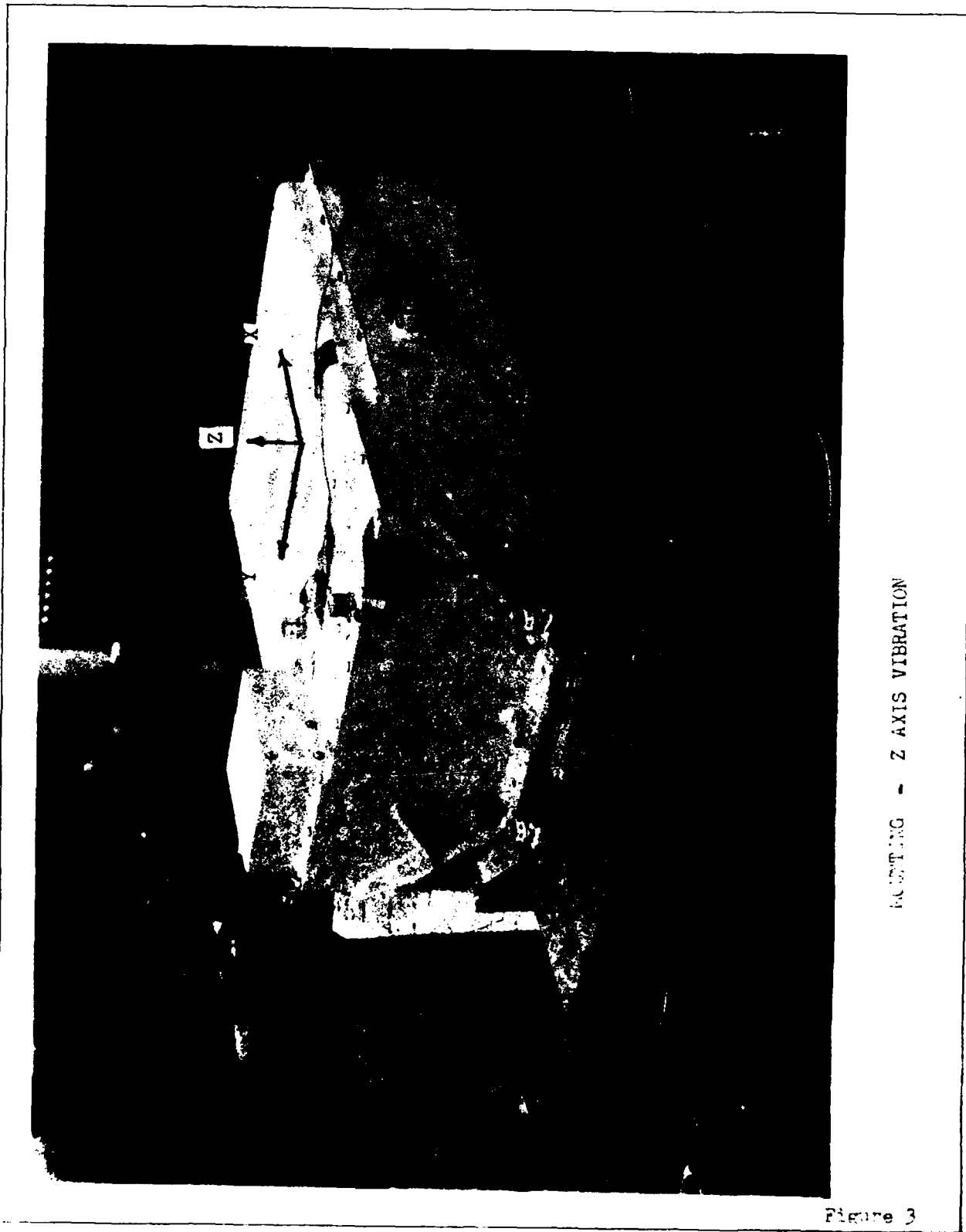
MERCURY SPECIMEN

Figure 1



○ RING DETERIORATION  
MERCURY SPECIMEN

Figure 2



BUCKETING - Z AXIS VIBRATION

Figure 3

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**APPENDIX A**

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~~REVISION~~ 173

# CONVAIR ASTRONAUTICS

CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION

FLIGHT PROOFING TEST PROCEDURE

FOR

CENTAUR TELEMARK ASSEMBLY

UNIT 55-13503

REPORT NUMBER 55B636

PREPARED BY *R. H. Trosset*  
for S. A. Schwartz

CHECKED BY *J. E. Shaw*  
J. E. Shaw  
Asst. Test Lab Group Ingr.

Checked by *A. R. Hollenbeck* 2-2-61  
A. R. Hollenbeck  
Qualification Coordinator

APPROVED BY *R. S. Campbell*

R. S. Campbell  
Chief of Test Lab

APPROVED BY *J. E. Shaw*

J. E. Shaw  
Design Group Ingr.

## REVISIONS

NO

DATE

BY

CHANGE

PAGES AFFECTED

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MEMO FOR THE RECORD

The following information shall be added to procedure 55B636.

Add to 3.2 Operating Requirements and Tolerances:

| <u>Parameter</u>                                            | <u>Value</u>                                                                           | <u>Tolerance</u> |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------|
| <u>Sub-Carrier Oscillators</u> (Used on Mercury Units only) |                                                                                        |                  |
| Ch 11                                                       |                                                                                        |                  |
| Input Voltage                                               | 0-5.0 volts DC                                                                         | $\pm .1$ V       |
| Output Frequency                                            | 6799-7901 cps                                                                          | $\pm 63$ cps     |
| Ch A                                                        |                                                                                        |                  |
| Input Voltage                                               | - .6 - +2.4 Volts DC                                                                   | $\pm .1$ V       |
| Output Frequency                                            | 18,700 - 25,300 cps                                                                    | $\pm 379$ cps    |
| <u>Pre-Flight Calibrator</u> (Used on Mercury Units only)   |                                                                                        |                  |
| Input Voltage                                               | 28 Volts DC                                                                            | $\pm 3$ V        |
| Output Voltage                                              | 0-5 Volts DC Square<br>Wave at a 1 cps<br>repetition rate of<br>15-35 seconds duration | $\pm .2$ V       |

Add to 5.2 Initial Satisfactory Performance Test:

5.2.12 Sub-Carrier Oscillators

Monitor output frequencies of each oscillator as the input voltage is varied in five steps over the full range.

5.2.13 Pre-Flight Calibrator

Monitor output waveshape with a 28 volt DC input signal.

Add 5.7 Radio Interference Test:

Radio Interference and Susceptibility Tests shall be conducted to determine compliance with applicable portions of MIL-I-26600. The Radio Interference Lab, Department 551-7 shall determine tests to be performed, designate test points to be used and report test results to the Design Group.

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MEMO FOR THE RECORD: (Continued)

## Add 5.8 Life Tests

The unit shall be operated under normal laboratory conditions to obtain 500 hours of operation. Four on-off cycles shall be completed each day. Each cycle shall consist of 5 hours "on time" and 1 hour "off time". The unit shall be operated through one proof cycle each day. Operating time during any other portion of the flight proofing test may be applied to the life test requirement. Any repair, adjustment, or maintenance of the unit during this test, unless specifically approved by the Design Group, shall cause the unit to be re-tested until 500 hours of maintenance free operation have been achieved.

Prepared by R. H. Troester  
R. H. TroesterApproved by R. S. Campbell  
R. S. Campbell  
Chief of Test LabsChecked by H. E. Shaw  
for H. E. Shaw  
Asst. Test Lab Group Engr.Approved by F. T. Sinnott  
F. T. Sinnott  
Design Group Engr.Checked by A. R. Mollenkopf  
A. R. Mollenkopf  
Qualification Coordinator

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MEMO FOR THE RECORD

The following information shall be added to Procedure 55B636.  
Replace 2.6 Sequence of Tests with the following:

The sequence of tests shall be as called out in the body of this report. This sequence may be varied due to time limitations, equipment availability or design considerations.

Prepared by R. H. Troester  
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A. L. Mollenkopf  
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Approved by R. S. Campbell  
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Chief of Test Lab  
Approved by F. T. Sinnott  
F. T. Sinnott  
Design Group Engr.

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1.0

PURPOSE:

The purpose of this report is to describe the test equipment and test procedure to be used in flight proofing of the Telepak Assembly Unit, Missileborne, 55-13503.

REFERENCES:

- a) 55-13503 Top Assembly - Telepak Assembly.
- b) 55-13202 Schematic - Telepak Assembly.
- c) 55-01125 Commutator Assembly - Telepak Assembly.
- d) 55-13540-1 Transducer Power Supply - Telepak Assembly.
- e) 55-13537-1 Crystal Rectifier - Telepak Assembly.
- f) 55-13535-1 Commutator Power Supply - Telepak Assembly.
- g) 55-13533-1 Limiter Filter - Telepak Assembly.
- h) 55-13590 Demodulator Assembly - Telepak Assembly.
- i) 55-01104 Function Tone Generator - Telepak Assembly.
- j) 55-13557 Temperature Circuit Board - Telepak Assembly.
- k) 55-13556 Limiter, Blip and Isolation Circuit Board - Telepak Assembly.

2.0

SPECIAL INSTRUCTIONS:

The environmental tests prescribed in this procedure are written to conform to Convair Report No. 55-00200.

2.1

Nomenclature:

Missileborne Telepak Assembly Unit 55-13503 shall be referred to in the body of this report as the "Test Specimen".

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2.0 SPECIAL INSTRUCTIONS: (Cont'd)2.2 Adjustments and Repairs During Tests:

No adjustments, repairs, or maintenance shall be allowed during test runs except those not due to faults in design, materials, workmanship, or the test conditions imposed. If the unit does not perform satisfactorily during testing, the condition shall be noted and brought to the attention of the design group. Only at the discretion of the design group will testing be continued.

2.3 Test Data:

All data shall be recorded on data sheets such as those in Appendix A. All original data sheets shall be maintained in the System Test Lab files for a period of at least six months. Copies of the original data sheets shall be included in the final report describing the flight proofing tests.

2.4 Witnessing:

All tests covered by this procedure shall be witnessed by a Convair inspector, and the data sheets signed off in the appropriate spaces provided.

2.5 Atmospheric Conditions:

Unless otherwise specified, all tests called out in this procedure shall be performed at an atmospheric pressure between 28 and 32 inches of mercury, a temperature of between +60°F and +95°F, and a relative humidity of not more than 90%. Where tests are performed with atmospheric conditions substantially different from the specified values, proper allowance for changes in instrument readings shall be made to compensate for the deviation from the specified conditions.

2.6 Sequence of Tests:

The sequence of tests shall be as called out in the body of this report.

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2.0 SPECIAL INSTRUCTIONS: (Cont'd)2.7 Tolerances:

The maximum allowable tolerances on test conditions during environmental testing shall be as follows:

- a) Temperature - plus or minus 4°F
- b) Barometric Pressure - plus or minus 5 percent
- c) Relative Humidity - plus or minus 10 percent
- d) Vibration Amplitude - plus or minus 10 percent
- e) Vibration Frequency - plus or minus 2 percent
- f) Shock - plus or minus 10 percent
- g) Acceleration - plus or minus 10 percent

2.8 Measurements:

All measurements shall be made with instruments whose accuracies have been certified by the Astronautics Standards Laboratory, and which bear a current calibration decal.

2.9 Temperature Stabilization:

Temperature stabilization has been reached when the temperature of the largest centrally located mass of the unit does not vary more than 5°F from the temperature ambient to the unit.

3.0 TEST SPECIMEN:3.1 Description of Test Specimen:

The Telepak Assembly Unit is a device which is capable of converting instrumentation measurement signals into suitable inputs for a telemeter transmitter, and then transmit these signals. This is accomplished through the use of appropriate electronic sub-assemblies which perform the following functions:

- a) DC voltage signal conversion and measurement.

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3.1 Description of Test Specimen: (Cont'd)

- b) Alternating current amplitude, and phase measurement.
- c) Transducer and measurement circuitry excitation.
- d) Temperature measurement
- e) Filter, limit and multiplex frequency measurements.
- f) Low level voltage amplification.
- g) Monitor ten "on-off" functions for single channel telemetry.

3.2 Operating Requirements and Tolerances:

| <u>PARAMETER</u>               | <u>NOMINAL<br/>VALUE</u>     | <u>TOLERANCE</u> |
|--------------------------------|------------------------------|------------------|
| <u>Transducer Power Supply</u> |                              |                  |
| Input Voltage                  | +27.5 Volts DC               | $\pm 10\%$       |
| Output Voltage                 | -1.24 Volts DC,<br>at 1 ma   | $\pm 0.03$ V.    |
| Output Voltage                 | -6.0 Volts DC,<br>at 5 ma    | $\pm 1\%$        |
| Output Voltage                 | +2.5 Volts DC,<br>at 0.05 ma | $\pm 0.006$ V.   |
| Output Voltage                 | +5.0 Volts DC,<br>at 0.05 ma | $\pm 0.02\%$     |
| Output Voltage                 | +5.1 Volts DC,<br>at 100 ma  | $\pm 0.1$ V.     |
| Output Voltage                 | +5.2 Volts DC,<br>at 50 ma   | $\pm 0.1$ V.     |
| Output Voltage                 | 4.5v to 8.6v DC<br>at 50 ma  | $\pm 0.25$ V     |
| Output Voltage                 | +8.8 Volts DC,<br>at 300 ma  | 0.2 V            |

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3.2

Operating Requirements and Tolerances: (Cont'd)

| <u>PARAMETER</u> | <u>NOMINAL<br/>VALUE</u> | <u>TOLERANCE</u> |
|------------------|--------------------------|------------------|
|------------------|--------------------------|------------------|

Commulator Power Supply

|                  |                |      |
|------------------|----------------|------|
| Input Voltage    | +27.5 Volts DC | ±10% |
| Output Voltage   | 115 Volts AC   | ±15% |
| Output Frequency | 400 CPS        | ±5%  |
| Output Load      | 0.6 P.F.       |      |

Commulators

|               |                       |      |
|---------------|-----------------------|------|
| Input Voltage | 115 Volts AC, 400 CPS | ±15% |
|---------------|-----------------------|------|

Crystal Rectifier

## Section A

|                |                        |      |
|----------------|------------------------|------|
| Input Voltage  | +20 to +35 Volts DC    | ± 1% |
| Output Voltage | ±150 mv to +5 Volts DC | ± 3% |

## Section B

|                |                                           |        |
|----------------|-------------------------------------------|--------|
| Input Voltage  | 105 to 125 Volts AC,<br>400 CPS - Phase A | ±1.75% |
| Output Voltage | 250 mv to +5 Volts DC                     | ±5%    |

## Section C

|                |                                           |        |
|----------------|-------------------------------------------|--------|
| Input Voltage  | 105 to 125 Volts AC,<br>400 CPS - Phase B | ±1.75% |
| Output Voltage | ±250 mv to +5 Volts DC                    | ±5%    |

## Section D

|                |                                           |        |
|----------------|-------------------------------------------|--------|
| Input Voltage  | 105 to 125 Volts AC,<br>400 CPS - Phase C | ±1.75% |
| Output Voltage | ±250 mv to +5 Volts DC                    | ±5%    |

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3.2

Operating Requirements and Tolerances: (Cont'd)

| <u>PARAMETER</u> | <u>NOMINAL<br/>VALUE</u> | <u>TOLERANCE</u> |
|------------------|--------------------------|------------------|
|------------------|--------------------------|------------------|

Differential Amplifiers

## Section A

|               |                 |     |
|---------------|-----------------|-----|
| Input Voltage | 0 to +100 mv DC | ±2% |
|---------------|-----------------|-----|

|                |                  |     |
|----------------|------------------|-----|
| Output Voltage | 0 to +5 Volts DC | ±2% |
|----------------|------------------|-----|

## Section B

|               |                |     |
|---------------|----------------|-----|
| Input Voltage | 0 to 100 mv DC | ±2% |
|---------------|----------------|-----|

|                |                  |     |
|----------------|------------------|-----|
| Output Voltage | 0 to +5 Volts DC | ±2% |
|----------------|------------------|-----|

Demodulators

|               |                                |     |
|---------------|--------------------------------|-----|
| Input Voltage | 0 - 0.125 Volts AC,<br>400 CPS | ±1% |
|---------------|--------------------------------|-----|

|                |                      |     |
|----------------|----------------------|-----|
| Output Voltage | ±40 mv to 5 Volts DC | ±2% |
|----------------|----------------------|-----|

Filter Assembly - Limiter

## Channel 1

|               |                                  |     |
|---------------|----------------------------------|-----|
| Input Voltage | 115 Volts AC 400 CPS,<br>Phase A | ±1% |
|---------------|----------------------------------|-----|

|             |            |  |
|-------------|------------|--|
| Output Load | 160 K Ohms |  |
|-------------|------------|--|

|                |                |     |
|----------------|----------------|-----|
| Output Voltage | 0.096 Volts AC | ±4% |
|----------------|----------------|-----|

|                  |         |            |
|------------------|---------|------------|
| Output Frequency | 400 CPS | ±30 Cycles |
|------------------|---------|------------|

## Channel 4

|               |                |     |
|---------------|----------------|-----|
| Input Voltage | As in Figure 1 | ±1% |
|---------------|----------------|-----|

|             |            |  |
|-------------|------------|--|
| Output Load | 160 K Ohms |  |
|-------------|------------|--|

|                |                |     |
|----------------|----------------|-----|
| Output Voltage | 0.096 Volts AC | ±4% |
|----------------|----------------|-----|

|                  |          |             |
|------------------|----------|-------------|
| Output Frequency | 5400 CPS | ±405 Cycles |
|------------------|----------|-------------|

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3.2 Operating Requirements and Tolerances: (Cont'd)

| <u>PARAMETER</u>               | <u>NOMINAL<br/>VALUE</u> | <u>TOLERANCE</u> |
|--------------------------------|--------------------------|------------------|
| <u>Function Tone Generator</u> |                          |                  |
| Channel 1                      |                          |                  |
| Input Voltage                  | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage                 | 0.079 Volts AC           | $\pm 10\%$       |
| Output Frequency               | 33 CPS                   | $\pm 5$ CPS      |
| Channel 2                      |                          |                  |
| Input Voltage                  | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage                 | 0.079 Volts AC           | $\pm 10\%$       |
| Output Frequency               | 74 CPS                   | $\pm 5$ CPS      |
| Channel 3                      |                          |                  |
| Input Voltage                  | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage                 | 0.128 Volts AC           | $\pm 10\%$       |
| Output Frequency               | 115 CPS                  | $\pm 5$ CPS      |
| Channel 4                      |                          |                  |
| Input Voltage                  | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage                 | 0.171 Volts AC           | $\pm 10\%$       |
| Output Frequency               | 156 CPS                  | $\pm 5$ CPS      |
| Channel 5                      |                          |                  |
| Input Volts                    | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage                 | 0.220 Volts AC           | $\pm 10\%$       |
| Output Frequency               | 197 CPS                  | $\pm 5$ CPS      |

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3.2 Operating Requirements and Tolerances: (Cont'd)

| <u>PARAMETER</u> | <u>NOMINAL<br/>VALUE</u> | <u>TOLERANCE</u> |
|------------------|--------------------------|------------------|
| Channel 6        |                          |                  |
| Input Voltage    | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage   | 0.272 Volts AC           | $\pm 10\%$       |
| Output Frequency | 238 CPS                  | $\pm 5$ CPS      |
| Channel 7        |                          |                  |
| Input Voltage    | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage   | 0.321 Volts AC           | $\pm 10\%$       |
| Output Frequency | 279 CPS                  | $\pm 5$ CPS      |
| Channel 8        |                          |                  |
| Input Voltage    | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage   | 0.357 Volts AC           | $\pm 10\%$       |
| Output Frequency | 320 CPS                  | $\pm 5$ CPS      |
| Channel 9        |                          |                  |
| Input Voltage    | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage   | 0.410 Volts AC           | $\pm 10\%$       |
| Output Frequency | 361 CPS                  | $\pm 5$ CPS      |
| Channel 10       |                          |                  |
| Input Voltage    | +27.5 Volts DC           | $\pm 10\%$       |
| Output Voltage   | 0.452 Volts AC           | $\pm 10\%$       |
| Output Frequency | 402 CPS                  | $\pm 5$ CPS      |

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3.2 Operating Requirements and Tolerances: (Cont'd)

| <u>PARAMETER</u>              | <u>NOMINAL<br/>VALUE</u>                                                                                                                                                                                                             | <u>TOLERANCE</u> |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <u>Circuit Board Assembly</u> |                                                                                                                                                                                                                                      |                  |
| Limiter Section               |                                                                                                                                                                                                                                      |                  |
| Input Voltage                 | -1.25 to +5.0 Volts DC                                                                                                                                                                                                               | $\pm 1\%$        |
| Output Voltage                | Shall vary linearly with input from -1.25 volts to 5.0 volts $\pm 0.1$ volt. For input below -1.8 volts or above 6.0 volts, the output shall not vary more than -0.1 volt or +0.2 volt from the limits of -1.8 volts or 6.0 volts DC |                  |
| Blip Section                  |                                                                                                                                                                                                                                      |                  |
| Input Voltage                 | +27.5 Volts DC                                                                                                                                                                                                                       | $\pm 10\%$       |
| Output Voltage                | +5.25 Volts DC, Decaying exponentially to zero                                                                                                                                                                                       | $\pm 2\%$        |
| Divider Section               |                                                                                                                                                                                                                                      |                  |
| Input Voltage                 | -1.25 Volts DC                                                                                                                                                                                                                       | $\pm 3\%$        |
| Output Voltage                | -1.0 Volts DC                                                                                                                                                                                                                        | Minimum          |
| Output Load                   | 1 meg ohm                                                                                                                                                                                                                            | Minimum          |
| <u>Temperature Board</u>      |                                                                                                                                                                                                                                      |                  |
| Input Resistance              | Proper value to simulate appropriate transducer                                                                                                                                                                                      |                  |
| Output Voltage                | 0 to +100 mv                                                                                                                                                                                                                         | $\pm 2\%$        |

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3.2 Operating Requirements and Tolerances: (Cont'd)

| <u>PARAMETER</u>                                  | <u>NOMINAL<br/>VALUE</u> | <u>TOLERANCE</u> |
|---------------------------------------------------|--------------------------|------------------|
| <u>Power Changeover Switch and Command Relays</u> |                          |                  |
| Input Voltage                                     | +27.5 Volts DC           | ±10%             |

4.0 TEST FACILITIES AND TEST EQUIPMENT:4.1 Environmental Test Equipment:4.1.1 Vibration Equipment:

MB Model C-25H vibration system, or equivalent, together with suitable monitoring and recording equipment.

4.1.2 Temperature - Altitude - Humidity Equipment:

BEMCO Environmental Chamber, Model WPA-100-45, or equivalent.

4.1.3 Acceleration Test Equipment:

Genisco Rotary Accelerator, Model C-159, or equivalent.

4.2 Initial Satisfactory Performance Test Equipment:

The following test equipment or equivalent shall be used.

- a. Digital Voltmeter, Electro Instruments, Model 41R.
- b. DC Power Supply, Hewlett Packard, Model 712B
- c. DC Power Supply, Magnetic Research Corporation, Model MR-28-5.
- d. AC Power Supply, Behlman Engineering Corporation, Model 253C-1.
- e. Recorder, Sanborn Company, Model 150
- f. Recorder, Midwestern Instruments, Model 591
- g. Oscilloscope, Tektronic Inc., Model 315R
- h. Wave Analyser, Hewlett Packard, Model 302-A

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4.3 Proof Cycle Test Equipment

a. Same as in paragraph 4.2

5.0 TEST CONDITIONS AND PROCEDURES:5.1 Preliminary Inspection:

The test specimen shall be examined visually prior to any test to determine that the specimen meets the requirements of workmanship, identification markings, external dimensions, and proper inspection approval.

5.2 Initial Satisfactory Performance Test:

The initial satisfactory performance test (ISPT) shall be performed prior to any environmental tests. If the specimen fails any test, for any reason, and must be adjusted or repaired, an initial satisfactory performance test shall be performed before testing is resumed.

5.2.1 Preparation for Testing:

5.2.1.1 Connect the test specimen with the correct power sources and associated test equipment.

5.2.1.2 Turn on test equipment power switches and allow 20 minutes warm up time.

5.2.1.3 Turn on power switches to test specimen.

5.2.2 Transducer Power Supply

5.2.2.1 Monitor output voltages, and output noise voltage with input voltages of +24.75, +27.5 and +30.25 volts DC.

5.2.3 Crystal Rectifier

## 5.2.3.1 Section A

Monitor output voltage and output noise voltage as input is varied from +20 to +35 volts DC,  $\pm 1\%$ , in 5 volts increments.

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5.2.3 Crystal Rectifier (Cont'd)

## 5.2.3.2 Section B

Monitor output voltage and output noise voltage as input voltage is varied from 105 to 125 volts AC,  $\pm 1\%$ , in 5 volt increments.

## 5.2.3.3 Section C

Same as paragraph 5.2.3.2

## 5.2.3.4 Section B

Same as paragraph 5.2.3.2

5.2.4 Rate Demodulator

5.2.4.1 Monitor output voltage, and output noise voltage as input varies from 0 to 0.125 volts AC,  $\pm 1\%$ , in 5 steps. Input is in phase with 115 volt AC reference voltage applied to demodulator.

5.2.4.2 Repeat 5.2.4.1, except input is  $180^\circ$  out of phase with reference voltage.

5.2.5 Differential Amplifiers

## 5.2.5.1 Section A

Monitor output voltage, and output noise voltage as input voltage varies from 0 to +100 mv DC.

## 5.2.5.2 Section B

Same as paragraph 5.2.5.1

5.2.6 Temperature Bridges

5.2.6.1 Complete each temperature bridge with a resistance that will simulate an appropriate transducer.

5.2.6.2 Monitor output voltage.

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5.2.7 Limiter - Blip Board

## 5.2.7.1 Blip Circuit

Monitor output voltage with an input voltage pulse of +27.5 volts DC,  $\pm 10\%$ .

## 5.2.7.2 Limiter Section

Monitor output voltage as input voltage varies from -3 to +7 volts,  $\pm 1\%$ , in 2 volt increments.

## 5.2.7.3 Divider Circuit

Monitor output voltage.

5.2.8 Function Tone Generator

5.2.8.1 Turn on each tone oscillator, one at a time, and monitor; output voltage, and output frequency.

5.2.8.2 Turn on all tone oscillators and monitor output voltage of each oscillator.

5.2.9 Commutator Power Supply

5.2.9.1 Monitor output voltage with input voltages of +24.75, +27.5 and +30.25 volts DC.

5.2.10 Power Changeover and Command Relays:

5.2.10.1 Energize each of the relays with +27.5 volts DC and then de-energize. Monitor TIM output and commutator wiper.

5.2.11 Filter Assembly - Limiter:

5.2.11.1 Monitor output voltage with an input of 115 volts AC, 400 CPS, and with an input as in Figure 1. ✓

5.3 Proof Cycle Test:

The proof cycle test for this unit consists of the following sequence of operation.

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5.3 Proof Cycle Test: (Cont'd)5.3.1 Preparation for Testing:

5.3.1.1 Connect the test specimen with the correct power sources and associated test equipment.

5.3.1.2 Turn on test equipment power switches and allow 20 minutes warm up time.

5.3.1.3 Turn on power switches to test specimen.

5.3.2 Testing:

5.3.2.1 Adjust all input voltages within the limits called out in Section 3.2.

5.3.2.2 Monitor output voltages and output noise voltages of every module within the system to determine compliance with Section 3.2.

5.4 Vibration Test:

The test specimen shall be subjected to a proof cycle, as called out in Section 5.3, after each vibration test.

5.4.1 Sinusoidal Vibration

While operating, the unit shall be subjected to a slow speed scanning sweep, at frequencies and amplitudes of sinusoidal vibration as shown in Figure 2, and a sweep period as shown in Figure 3 along each of any three mutually perpendicular axes of the test specimen.

5.5 Temperature-Altitude-Humidity Tests:

The following test sequence shall be conducted in a temperature-altitude-humidity test chamber in the order specified. A thermo couple shall be placed with good

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5.5 Temperature-Altitude-Humidity Tests: (Cont'd)

thermal contact on the largest centrally located internal mass within the unit, or in any other location deemed necessary to check temperature stabilization.

- a. The unit shall be placed within the chamber and the specimen temperature shall be stabilized and maintained at plus 125°F for a period of one hour. The chamber temperature shall be maintained and the specimen shall be subjected to radiant heat at the rate of 360/STU/sq./ft./hr. upon its largest surface area for a period of four hours. The maximum unit temperature during this period shall be determined and where indicated in the following tests by the term "maximum non-operating temperature", used in conducting tests.
- b. The chamber temperature shall be reduced to -30°F, at a rate of 0.75 to 1.25°F per minute, and maintained at this temperature for a period of not less than eight hours, or until unit temperature stabilizes, whichever is longer. During or at the end of the period, the chamber absolute internal pressure shall be reduced to 3.44 inches of mercury for a period of at least one hour and then returned to approximately thirty inches of mercury. The test specimen shall then be operated through one proof cycle while supplied with sufficient cooling or heating air to maintain the test specimen skin temperature at 0°F, and a record made of all data necessary to determine compliance with the proof cycle requirements of this procedure.
- c. The chamber temperature shall be increased at a rate of 0.75 to 1.25°F per minute to maximum nonoperating temperature, or 160°F, whichever is greater, and maintained with a relative humidity of not less than 95 percent, for a period of four hours, or until test specimen temperature stabilizes, whichever is longer. At the end of this period the chamber internal absolute pressure shall be reduced to 3.44 inches of mercury for a period of at least one hour, and then returned to approximately thirty inches of mercury.

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5.5 Temperature-Altitude-Humidity Tests: (Cont'd)

## c. (Cont'd)

During this period of one hour, relative humidity may be decreased, but shall be returned to 95 percent at a pressure of thirty inches of mercury. The chamber shall then be allowed to return to ambient temperature until the test specimen temperature stabilizes. The test specimen shall be operated through one proof cycle while supplied with sufficient heating or cooling air to maintain the test specimen skin temperature at 110°F, and a record made of all data necessary to determine compliance with the proof cycle requirements of this report. Immediately following, the test specimen shall be operated while the chamber internal absolute pressure is reduced to not more than 0.1 micron of mercury as rapidly as possible (no humidity control), and a record made of all data necessary to determine compliance with the proof cycle requirements of this report.

d. The chamber absolute pressure shall be returned to 30 inches of mercury and the chamber temperature shall be returned to plus 40°F at a rate of 0.75 to 1.25°F per minute, and a relative humidity of not less than 95 percent, and maintained for a period of not less than 4 hours, or until the unit temperature stabilizes, whichever is longer. At the end of this time, the unit shall be operated, and a record made of all data necessary to determine compliance with the proof cycle requirements of this procedure.

e. The unit shall be placed within the chamber and the chamber maintained at a temperature of 70°F for a period of at least one hour, or until the unit temperature stabilizes. The unit shall then, within a period of 2 minutes, be placed in a chamber whose temperature is at maximum non-operating temperature, or 160°F, whichever is greater, and maintained at this temperature for a period of one hour, or until temperature stabilizes. The unit shall then, within a period of 2 minutes, be placed in a chamber whose temperature is minus 30°F, and maintained at this temperature until the unit temperature stabilizes. The unit shall then be returned to room ambient conditions and examined for evidence of deterioration, and operated to determine compliance with the proof cycle requirements of this procedure.

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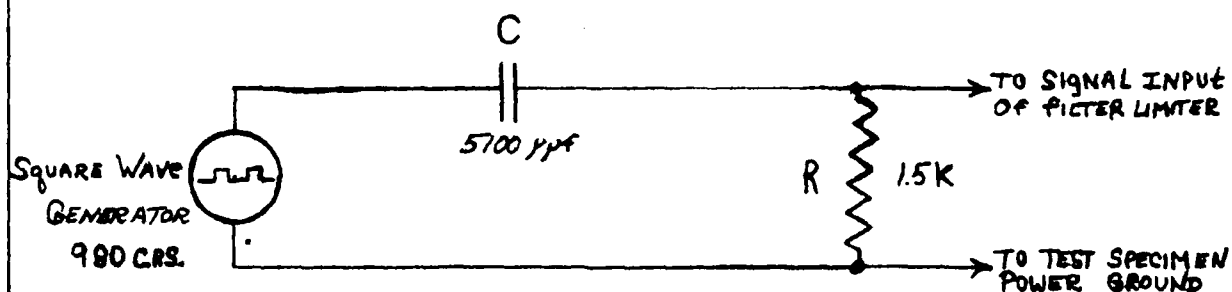
5.6 Acceleration Test:

The test specimen shall be subjected to the following tests while operating. A record shall be made of all data necessary to determine compliance with the proof cycle requirements of this procedure prior to and immediately following completion of this test.

- a. The unit shall be subjected to 10.0g for a period of at least 30 seconds, along each of three mutually perpendicular axes of the unit.

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## FILTER LIMITER - INPUT Signal



APPLICATION OF A SQUARE WAVE TO THE RC DIFFERENTIATING CIRCUIT WILL RESULT IN A SPIKED WAVEFORM ACROSS THE 1.5 K RESISTOR AS BELOW.

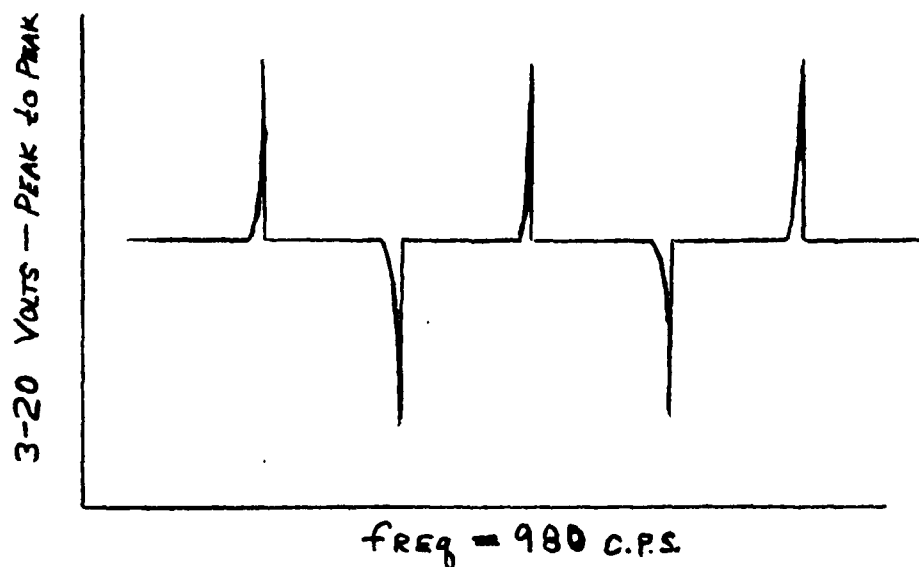


Figure 1

RNT 9-13-60

|               |      |            |      |            |      |
|---------------|------|------------|------|------------|------|
| PREPARED BY   | DATE | CHECKED BY | DATE | REVISED BY | DATE |
| R.H. Traester |      |            |      |            |      |

K-E SEMI-LOGARITHMIC 359-91  
KEUFFEL & ESSER CO. MADE IN U.S.A.  
5 IN. DIA. x 10 IN. VIB. DISC  
Frequency C.P.S.

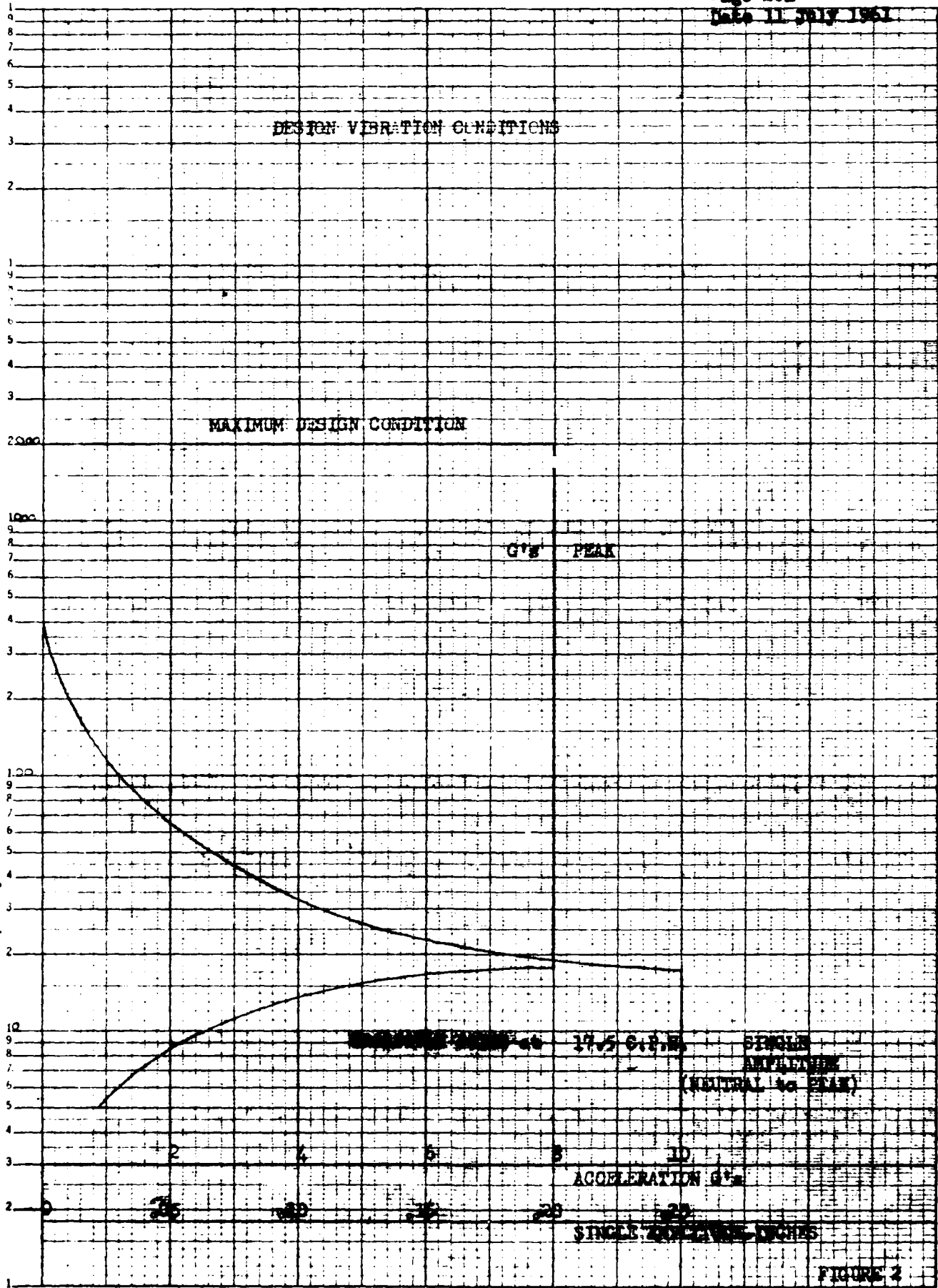


FIGURE 2

Date 11 July 1961

SWEEP TIME  
FREQUENCY VS. TIMEK&E SEMI-LOGARITHMIC 359-91  
KEUFFEL & ESSER CO. BOSTON, U.S.A.  
5 CYCLES X 70 DIVISIONS  
Frequency C.P.S.FIGURE 3  
RMT  
TIME-MINUTES