

Sec 68-3584



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GENERAL DYNAMICS | POMONA

TECHNICAL MEMORANDUM

DATE: 10 October 1966

FROM: Weapon System Dynamics

TO: Distribution

TM NO.	TM 6-343-47.23-3
SUPERSEDES TM NO.	
MODEL	Shrike
CONTRACT NO.	50-9533
AWO NO.	3805
EWO NO.	1521
WA NO.	1998

SUBJECT:

Open Loop Dark Room Tests (U)

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
1 st Review Date: <u>9-15-97</u>	Underactions (Circle Numbers)
Authority: <input type="checkbox"/> ADC <input checked="" type="checkbox"/> RADD	1 Classification Retained <u>u</u>
Name: <u>W. Wayne</u>	2 Classification Changed to
2 nd Review Date: <u>7/16/97</u>	3 Contains No DOE Classified Information
Authority: ADD	4 Coordinate With:
Name: <u>R. B. Cramer</u>	5 Contains UCAI?
	6 Comments: <u>at for pomsat</u>

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APPROVED BY: R. L. Auletta
R. L. Auletta

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
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CLASSIFICATION: <u>u</u>	AUTHORITY: <u>R. B. Cramer</u>
PERSON CHANGING: <u>Emelda Septh</u>	RECORD ID: <u>975W 36446</u>
DATE: <u>10/22/97</u>	DATED: <u>9/16/97</u>
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1. This memo lists the individual open loop Dark Room Tests to be conducted on each guidance computer utilized in the General Dynamics, Pomona Division SHRIKE Multiple Target Evaluation Program. The tests are to provide an operational check of the dark room and data for correlation with video level acceptance tests. The tests selected are taken from the Bureau of Naval Weapons Department of the Navy Purchase Description WS 5504A, dated 18 January 1966. A few changes have been made to the test procedures as outlined in WS 5504A to make the tests compatible with General Dynamics, Pomona Division test facilities.
2. TEST CONDITIONS
 - (a) The guidance section shall be mounted in an anechoic chamber on a test fixture of a material which will minimize reflected radio frequency (RF) energy. The fixture shall be capable of at least 180 degrees rotation about its longitudinal axis. The axis of rotation shall be in the plane of the antenna. The guidance section shall be located so that the reference mark (the alignment slot in the aft end) is on top and within \pm 1 degree of the vertical axis (12 O'clock position).
 - (b) The anechoic chamber shall have a reflected energy level in the quiet zone that is a minimum of 40 db below the level of the directly transmitted RF energy. If the test antenna, assurance shall be provided that all tests are valid as compared to far field measurements.
 - (c) The guidance section shall be connected to the test box shown in Figure 1, or acceptable equivalent thereof (hereafter referred to as the test box) which shall be located external to the anechoic chamber. All auxilliary test instruments shall also be located outside the chamber.
 - (d) The guidance section is energized by the application of two potentials to the applicable test box terminals: 30 ± 0.5 vdc, one ampere capacity and 17 ± 0.5 vdc, one ampere capacity.
 - (e) The RF pulse from the transmitter, or source, shall have a maximum rise time of 0.1 microsecond and a maximum overshoot of five percent of the pulse amplitude. Pulse width shall be 0.8 ± 0.1 microsecond with a pulse repetition frequency (prf) of 2000 ± 10 pulses per second (pps).

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- (f) The RF source antenna shall be located within the anechoic chamber so that the axis of the source antenna coincides with the longitudinal axis (mechanical boresight) of the guidance section. This is defined as zero degree in azimuth. The guidance section antenna shall be sufficiently distant from the source antenna to ensure that the measurements are valid.

3. TESTS

3.1 SENSITIVITY

- (a) Connect a digital counter and an oscilloscope to the headtone output of the test box. With the guidance section energized but with no RF input, and with the multiple fire switch turned off at the test box, the counter shall indicate a maximum false alarm rate (FAR) of 1.0 pps averaged over a 10-second period.
- (b) Adjust the frequency of the Band I RF source to $f(E)$. Adjust the RF power level into the transmitting antenna so that the peak power density in the plane of the guidance section antenna is 1.26 watts per square meter. The power level being fed into the transmitting antenna is leveled to within ± 2 db from $f(C)$ to $f(G)$ and is referred to as the 0.0 dbm reference level. For example, the peak power density in the plane of the guidance section antenna will be 0.945 watts per square meter at $f(C)$ and 1.62 watts per square meter at $f(G)$ at the 0.0 dbm reference level. Set the frequency to $f(E)$ for Band I. The counter reading shall be 2000 ± 10 pps. The headtone shall be clear and steady and the peak amplitude shall be a minimum of 3.5 volts measured at TP 19 of the test box.
- (c) With the multiple target actuate switch turned off at the test box, decrease the RF source power level until the counter reads not less than 80 percent of the source prf and determine the power density in the plane of the guidance section antenna. The power density (peak) shall be not greater than -48.0 dbm with respect to the 0.0 dbm reference level. (Minus 48.0 dbm corresponds to 1.99×10^{-5} watts per square meter at the frequency of $f(E)$).
- (d) With the multiple target actuate switch turned on at the test box, repeat the test of 3.1 (c). The power density in the plane of the guidance section antenna shall be not greater than -47 dbm with respect to the 0.0 dbm reference level.

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3.2 BORESIGHT

The guidance section shall be tested for boresight error at combinations of the two variables of frequency, and power density, as follows:

Frequency: A complete sweep across the bandwidth.

Power density reference: Plus 5 dbm, -10 dbm, and -40 dbm.

3.2.1 TEST CONDITIONS, PROCEDURES, AND REQUIREMENTS

The test conditions, procedures, and requirements shall be as follows:

(a) Room Temperature

1. Energize the RF source and the guidance section and turn the pilot's indicator switch to the off position.
2. Adjust the RF source to provide a peak power reference of +5 dbm in the plane of the guidance section antenna.
3. For band I or band II, swing the antenna section 2.0 (+ 0.0, - 0.5) degrees to the left in azimuth from mechanical boresight.
4. Sweep the frequency across the bandwidth (zero, 45, 90, and 135 degrees) and simultaneously record the differential output voltage from test points (TP) 11 and 22 at the test box. The guidance section, band I or band II, has more than 2.0 degrees of boresight error if the voltage on TP 11 is greater than the voltage on TP 22.
5. Repeat steps (a) 1 through (a) 4; except, the antenna section shall be swung 2.0 degrees in azimuth to the right of mechanical boresight. The guidance section has more than 2.0 degrees of boresight error if the voltage on TP 22 is greater than the voltage on TP 11.
6. Repeat steps (a) 3 through (a) 5 with the power density set to -10 dbm. Boresight error shall be determined in the same manner as for steps (a) 4 and (a) 5.
7. Repeat steps (a) 3 through (a) 5 with the power density set to -40 dbm. Boresight error shall be determined in the same manner as for steps (a) 4 and (a) 5.

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8. Rotate the guidance section 90 ± 1 degrees clockwise about its longitudinal axis as viewed from the aft end.
9. Repeat steps (a) 1 through (a) 7; except monitor the differential output voltages from TP 9 and 10 at the test box. When the antenna section is swung to the left as in (a) 3, the guidance section has more than 2.0 degrees boresight error if the voltage on TP 9 is greater than the voltage on TP 10. When the antenna section is swung to the right as in (a) 5, the guidance section has more than 2.0 degrees of boresight error if the voltage on TP 10 is greater than the voltage on TP 9.

3.3 ANGLE GATE

The guidance section shall be tested for the width of angle gate under the following conditions:

Frequency f(E) for band I, and f(P) for band II.

Power density 0.0 dbm, - 30 dbm, and - 40 dbm
reference:

3.3.1 TEST CONDITIONS, PROCEDURES AND RESULTS

The test conditions, procedures, and results shall be as follows:

- (a) Energize the RF source and the guidance section.
- (b) Adjust the RF source to provide a peak power density reference of - 30.0 dbm in the plane of the guidance section antenna.
- (c) Turn the pilot's indicator switch to the off position, at the test box.

WARNING

Care must be taken not to exceed 20 volts and also to limit current to 12 milliamperes in order to avoid damage to the equipment.

- (d) Lock the guidance section at a boresight condition, by applying an external dc source voltage, not exceeding 20 volts and current limited to 12 milliamperes (see WARNING note), to TP 17 on the guidance computer. Adjust the external voltage to produce a differential of 0.000 ± 0.010 volts between TP 11 and TP 22 at the test box.

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- (e) With the multiple target actuate switch turned on at the test box, swing the antenna section to the right in azimuth from mechanical boresight until the counter indicates a headtone frequency of 1000 ± 500 pps. Record the number of degrees (in azimuth) off mechanical boresight.
- (f) Repeat the test of (e), except swing the antenna section to the left from mechanical boresight.
- (g) Sum the absolute magnitudes of the recorded degrees in (e) and (f). This summation shall be 7.8 ± 0.3 degrees.
- (h) Repeat the tests of (d), (e), (f) and (g), for each of the remaining values of power density indicated in 3.3. Except for the power density corresponding to - 40 dbm, displace the antenna section in each instance for a headtone frequency of 1000 ± 500 pps. For - 40 dbm a frequency of 1000 ± 250 pps shall apply.
- (i) Rotate the guidance section 90 ± 1 degrees clockwise about its longitudinal axis (section viewed from the aft end).
- (j) Repeat steps (b) through (h), except apply the current limited dc voltage of step (d) to TP 16 on the guidance computer and monitor the differential voltage from TP 9 and TP 10.

3.4 LOGIC

Adjust the RF source to provide a peak power density reference of 0.0 dbm in the plane of the guidance section antenna, and adjust the source frequency to f(E) for band I, or to f(P) for band II. Energize the guidance section and continue as follows:

- (a) Swing the antenna section 5, (+ 1, - 0), degrees to the left (section viewed from the aft end), in azimuth, from mechanical boresight. The pilot's indicator and wing-drive meters on

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the test box shall indicate a target position to the left of boresight as shown in Figure 3.

- (b) Repeat 3.4 (a), except swing the antenna section 5, (+ 1, - 0), degrees to the right of mechanical boresight. The meters of the test box shall indicate a target position to the right of boresight.
- (c) Rotate the guidance section 90 ± 1 degree clockwise about the longitudinal axis (viewed from aft), and repeat the test of 3.4 (a). The meters of the test box shall indicate a target position below the boresight axis.
- (d) With the guidance section rotated as in (c) above, repeat the tests of 4.3 (b). The meters of the test box shall indicate a target position above the boresight axis.

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POS 4
DEUTSCH
ID500-27P-4003

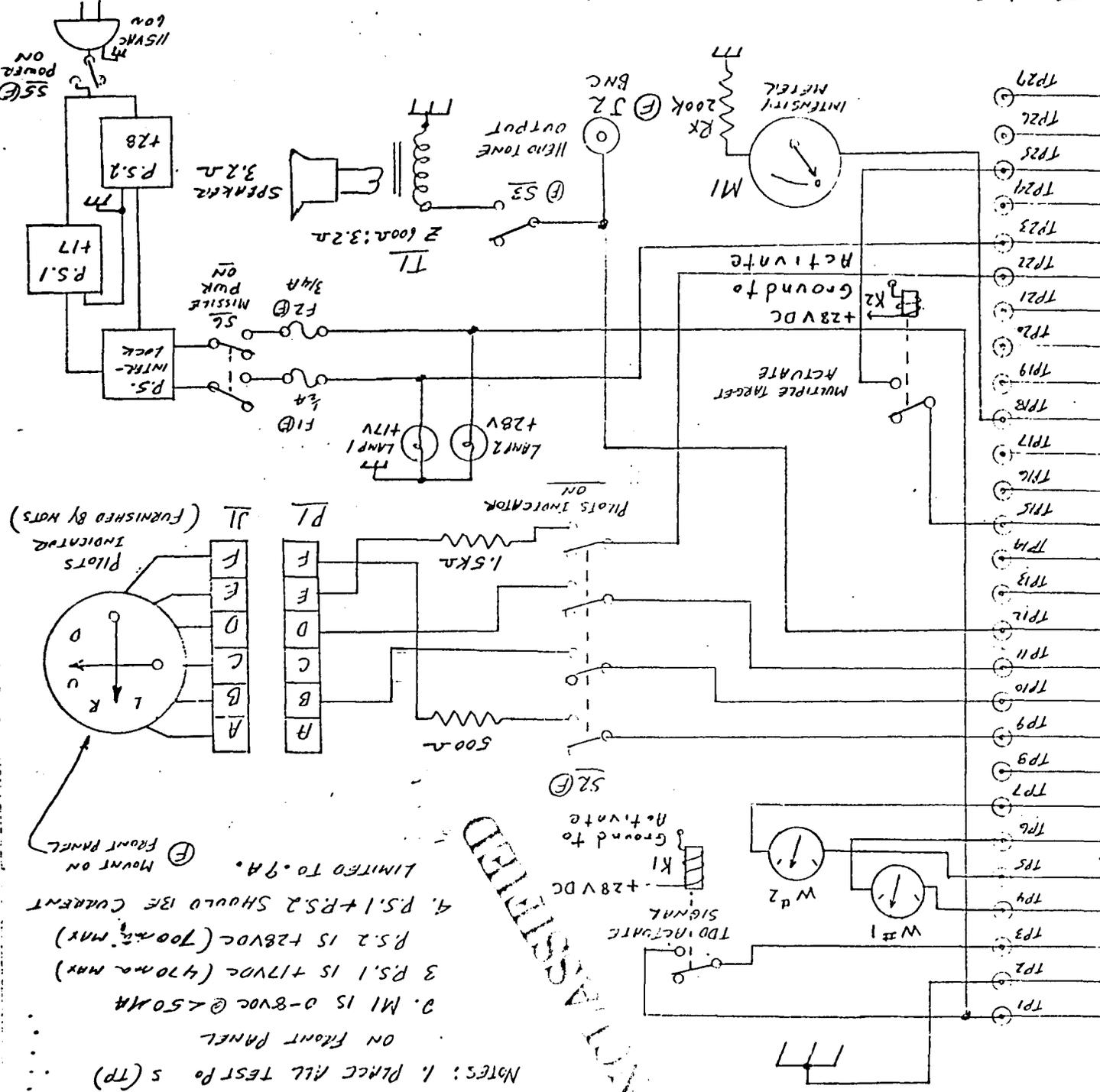
CABLE 15 FT LONG
WIRES PIN TO PIN

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JO4	CONTINUITY
1	+28VDC
2	ALC GND
3	TDD ACTIVATE
4	SOLENOID L-2
5	SOLENOID L-3
6	SOLENOID L-4
7	SOLENOID L-5
8	TARGET RESET
9	PILOTS INQ. UP
10	PILOTS INQ. DOWN
11	PILOTS INQ. RT.
12	HEAD TONE
13	115V 400m HZ
14	HTR GND
15	MULTI. TAR. ACT.
16	SPACE
17	R.F. SHUTTER MONITOR
18	SUM INTG. TM.
19	HEAD TONE MONI.
20	MULT. TAR. MON. D.L.
21	TDD MONITOR
22	PILOTS IND. LT.
23	+17VDC
24	TDD FIRE SIG.
25	+24 VDC TM
26	+12VDC TM
27	CONTINUITY

Test Box - SHIPIKE CONTROL FRONT

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1. PLACE ALL TEST PINS (TP) ON FRONT PANEL
2. M1 IS 0-8VDC @ 450mA
- 3 R.S.1 IS +17VDC (470mA MAX)
- R.S.2 IS +28VDC (700mA MAX)
4. R.S.1+R.S.2 SHOULD BE CURRENT LIMITED TO .9A.

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NOTES: 1. PLACE ALL TEST PINS (TP) ON FRONT PANEL

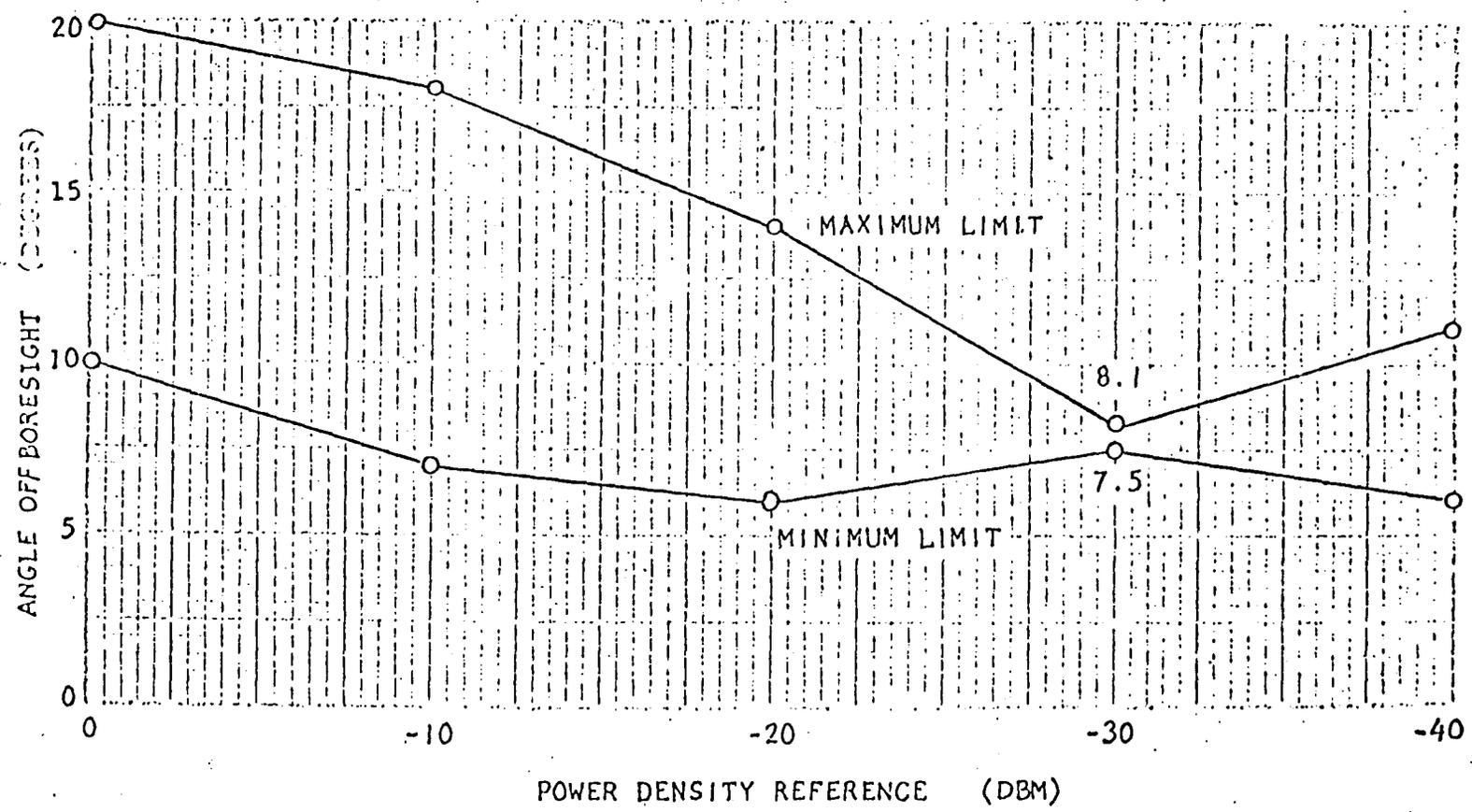


Figure 2. Angle Gate Limits

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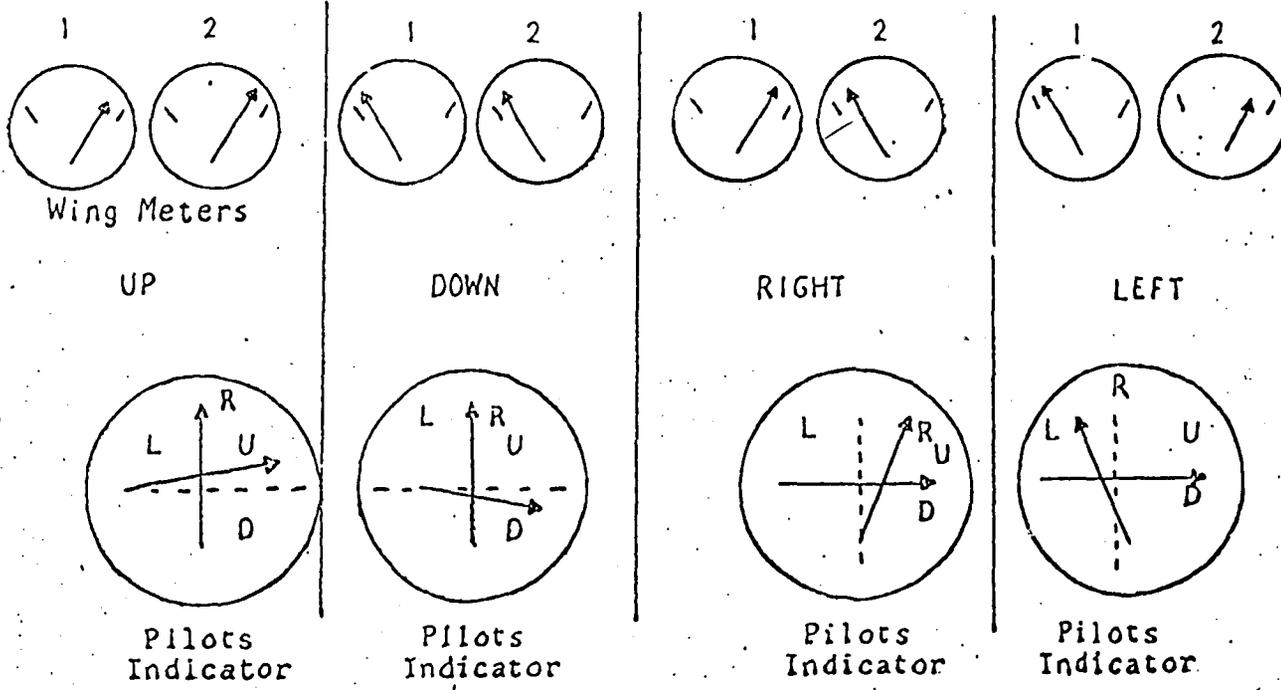


Figure 3. Test Box Meter Indications

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