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AEROFLEX

Ramp Test Set MLS-801

Operation Manual

1002-7401-500

Issue-2

OPERATION MANUAL

RAMP TEST SET

MLS-801

PUBLISHED BY
Aeroflex

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SAFETY FIRST: TO ALL SERVICE PERSONNEL

REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL. THIS UNIT CONTAINS NO OPERATOR SERVICEABLE PARTS.

WARNING: USING THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE ACCOMPANYING DOCUMENTATION MAY IMPAIR THE SAFETY PROTECTION PROVIDED BY THE EQUIPMENT.

CASE, COVER OR PANEL REMOVAL

Opening the Case Assembly exposes the operator to electrical hazards that can result in electrical shock or equipment damage. Do not operate this Test Set with the Case Assembly open.

SAFETY IDENTIFICATION IN TECHNICAL MANUAL

This manual uses the following terms to draw attention to possible safety hazards, that may exist when operating or servicing this equipment.

CAUTION: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (E.G., FIRE).

WARNING: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.

SAFETY SYMBOLS IN MANUALS AND ON UNITS



AC OR DC TERMINAL: Terminal that may supply or be supplied with ac or dc voltage.



DC TERMINAL: Terminal that may supply or be supplied with dc voltage.



AC TERMINAL: Terminal that may supply or be supplied with ac or alternating voltage.

EQUIPMENT GROUNDING PRECAUTION

Improper grounding of equipment can result in electrical shock.

USE OF PROBES

Check the specifications for the maximum voltage, current and power ratings of any connector on the Test Set before connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications before using it for measurement, to prevent electrical shock or damage to the equipment.

POWER CORDS

Power cords must not be frayed, broken nor expose bare wiring when operating this equipment.

USE RECOMMENDED FUSES ONLY

Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.

WARNING: THE MLS-801 USES A LEAD ACID BATTERY. THE FOLLOWING WARNINGS CONCERNING LEAD ACID BATTERIES MUST BE HEDED:

- DO NOT RECHARGE OUTSIDE THE MLS-801.
- DO NOT CRUSH, INCINERATE OR DISPOSE OF IN NORMAL WASTE.
- DO NOT SHORT CIRCUIT OR FORCE DISCHARGE AS THIS MIGHT CAUSE THE BATTERY TO VENT, OVERHEAT OR EXPLODE.



CAUTION: SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICES OUT TO A DISTANCE OF SEVERAL MILES. USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND ENSURE COMPLIANCE WITH INSTRUCTIONS IN FAA CIRCULAR AC 170-6C, DATED FEBRUARY 19, 1981.



TABLE OF CONTENTS

Title	Chapter/Section
Title/Copyright Page	
Safety Page	
Table of Contents	
Introduction	
Chapter 1	
Section 1 - Description	1-1
Section 2 - Operation	1-2
Section 3 - Specifications	1-3
Section 4 - Shipping	1-4
Section 5 - Storage	1-5
Appendix A - MLS-801 Beams	
Appendix B - Table of Connectors	
Appendix C - MLS-801 Data Words	
Appendix D - Metric/British Imperial Conversion Table with Nautical Distance Conversions	
Appendix E - Abbreviations	
Index	



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INTRODUCTION

This manual contains the information necessary to operate the MLS-801 Test Set.

It is strongly recommended that personnel be thoroughly familiar with the contents of this manual before attempting to operate this equipment.

ORGANIZATION

This manual is divided into the following Chapters and Sections:

CHAPTER 1 - OPERATION

Section 1 - DESCRIPTION

Section 2 - OPERATION (installation; description of controls, connectors and indicators; performance evaluation; and general operating procedures)

Section 3 - SPECIFICATIONS

Section 4 - SHIPPING

Section 5 - STORAGE



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CHAPTER ONE
MLS-801 RAMP TEST SET
OPERATION MANUAL
TABLE OF CONTENTS

Title	Chapter/Section/Subject	Page
<u>SECTION 1 - DESCRIPTION</u>	1-1	
1. General Description and Capabilities	1-1-1	1
A. General	1-1-1	1
B. Functional Capabilities	1-1-1	1
C. Mechanical Description	1-1-1	1
<u>SECTION 2 - OPERATION</u>	1-2	
1. Installation	1-2-1	1
A. General	1-2-1	1
B. Battery Operation	1-2-1	1
C. Battery Charging	1-2-1	1
D. Safety Precautions	1-2-1	1
(1) Complying with Instructions	1-2-1	1
(2) Grounding Requirements	1-2-1	1
(3) Operating Safety	1-2-1	1
(4) CAUTION and WARNING Labels	1-2-1	2
E. Battery Removal	1-2-1	2
F. Battery Recharging	1-2-1	2
2. Description of Controls, Connectors and Indicators	1-2-2	1
3. Performance Evaluation	1-2-3	1
A. General	1-2-3	1
B. Self-Test	1-2-3	1
4. General Operating Procedures	1-2-4	1
A. Controls, Connectors and Indicators	1-2-4	1
B. MLS-801 Test Examples	1-2-4	1
(1) Auto Test Examples	1-2-4	3
(2) Deflection Test Examples	1-2-4	7
(3) Clearance Test Example	1-2-4	11
<u>SECTION 3 - SPECIFICATIONS</u>	1-3	
1. General	1-3-1	1
A. Generator RF	1-3-1	1
B. Range	1-3-1	1
C. DPSK Modulation	1-3-1	1
D. Beam Characteristics	1-3-1	2
E. Deflection	1-3-1	2
F. General Characteristics	1-3-1	3
G. Reference Table	1-3-1	3
<u>SECTION 4 - SHIPPING</u>	1-4	
1. Shipping Test Sets	1-4-1	1
A. Information	1-4-1	1
B. Repacking Procedure	1-4-1	1
<u>SECTION 5 - STORAGE</u>	1-5	



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LIST OF ILLUSTRATIONS

<u>Title</u>	<u>Chapter/Section/Subject</u>	<u>Page</u>
MLS-801 Composite Assembly	1-1-1	2
Battery Removal	1-2-1	3
MLS-801 Controls, Connectors and Indicators	1-2-2	1
Range Select	1-2-4	1
AZ Low Range CDI Indications	1-2-4	2
BAZ Low Range CDI Indications	1-2-4	4
Manual UP LEFT CDI Indications	1-2-4	6
Manual DOWN RIGHT Indications	1-2-4	8
Clearance CDI Indications	1-2-4	10
Repacking Procedure	1-4-1	1

LIST OF TABLES

<u>Title</u>	<u>Chapter/Section/Subject</u>	<u>Page</u>
Assumptions for Range Calculations	1-3-1	3



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SECTION 1 - DESCRIPTION

1. General Description and Capabilities

A. General

The MLS-801 is a ruggedized ramp tester designed for ease of use, portability, reliability and long service life. The MLS-801 conforms to MIL-T-28800D, Type 2, Class II, Style A requirements. All power is derived from an internal battery. An ac input connection is provided for battery charging or servicing. All accessories (RF Test Cable and Operator's Guide) are stored in the case lid.

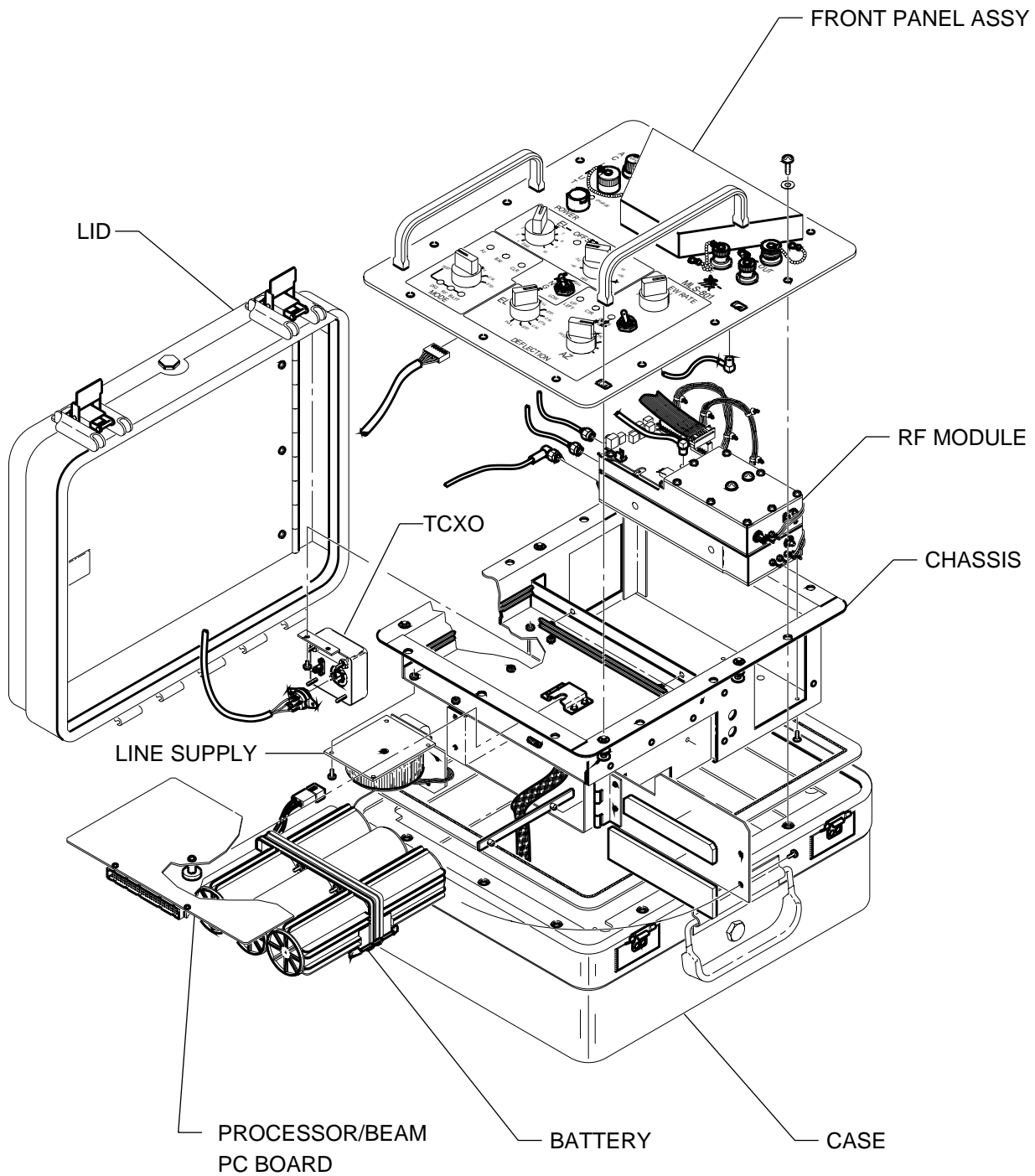
The MLS-801 provides GO/NOGO verification of the Microwave Landing System angle receiver in a ramp situation. The MLS-801 generates a single channel, which includes all necessary AM and DPSK modulation for testing of Azimuth (AZ), Elevation (EL), Back Azimuth (BAZ) and Clearance (CLR) functions, as well as all the basic data words in their standard test conditions. Controls are provided for angle deviation with slew capability to exercise the Glideslope (G/S) and Localizer (LOC) indicators. Angle offset control is provided to test offset approach angle up to $\pm 40^\circ$. The internal circuitry is modularized with a built-in Self Test to provide functional fault isolation. All internal components are attached to an inner chassis for easy composite removal.

B. Functional Capabilities

- Complete simulation of MLS transmission cycle, including angular information and data words.
- Ruggedized construction designed to meet requirements of MIL-T-28800D in a Class II environment.
- Automatic Test Sequence mode to allow "one man" operation on ramp.
- Dynamic Slew capability at 0.05, 0.1, 0.5 and 1.0 deg/sec.
- Control Motion deflection position to test auto-pilot engagement.
- Built-In-Test (BIT) for confidence testing and fault isolation.
- Left and Right Clearance pulse simulation.
- Manual deflection controls for Azimuth and Elevation.
- Azimuth, High Rate Azimuth and Back Azimuth offset approach simulation up to 40° .
- Elevation approach angle simulation from 1° to 10° .
- Two power output levels for short and long range testing requirements.
- Fixed transmission frequency set to FAA specified channel for ground testing.
- Bright indicators with automatic dimming.
- Auxiliary RF, Video and Sync Pulse outputs for use in bench testing.
- Internal Battery allowing up to two hours of operation before recharge.
- Automatic power shutdown after approximately 15 minutes of non-use.

C. Mechanical Description

The MLS-801 mechanical description is shown in 1-1-1, Figure 1.



MLS-801 Composite Assembly
Figure 1

SECTION 2 - OPERATION

1. Installation

A. General

The MLS-801 is powered by an internal battery. The MLS-801 contains a battery charging circuit to enable the operator to recharge the battery when connected to ac power.

NOTE: The MLS-801 is operated continuously on ac power for servicing and bench tests if a functional battery is installed.

B. Battery Operation

The internal battery is equipped to power the MLS-801 for two hours of continuous use, after which time, the MLS-801 battery will need recharging. When executing the Self-Test function, the "BATT" SELF-TEST Indicator (10) (1-2-2, Figure 2) indicates when the battery is usable or in need of recharging.

The MLS-801 contains an automatic time-out to conserve power. If a control is not changed within a 15 minute time period, the MLS-801 will shut OFF.

C. Battery Charging

The battery charger operates whenever ac power is applied to the MLS-801. When the POWER Switch (15) (1-2-2, Figure 2) is switched to OFF, the battery will reach an 80% charge in approximately two hours. When the MLS-801 is operating, the battery is charged at a slower rate. The battery should be charged every three months (minimum) and/or disconnected for long term nonactive storage periods of more than six months.

D. Safety Precautions

Listed are several important safety precautions which must be observed during installation and operation. IFR Systems, Inc. assumes no liability for failure to comply with any safety precautions outlined in this manual.

(1) Complying with Instructions

Installation/operating personnel should not attempt to install or operate the MLS-801 without reading and complying with all instructions contained in this manual. All procedures must be performed in exact sequence and manner described.

(2) Grounding Requirements

To minimize shock hazard, all equipment chassis and cabinets must be connected to electrical ground. All IFR Systems, Inc. test sets are equipped with a standard three-prong power cable which must be connected to a properly grounded three-prong wall receptacle. It is the customer's responsibility to:

Have a qualified electrician check wall receptacle(s) for proper grounding.

Replace any standard two-prong wall receptacle(s) with properly grounded three-prong receptacle(s).

WARNING: DUE TO POTENTIAL SAFETY HAZARDS, USE OF THREE-PRONG TO TWO-PRONG ADAPTOR PLUG(S) IS NOT RECOMMENDED.

(3) Operating Safety

Due to presence of potentially lethal voltages within MLS-801, operating personnel must not remove top or bottom covers at any time.

(4) CAUTION and WARNING Labels

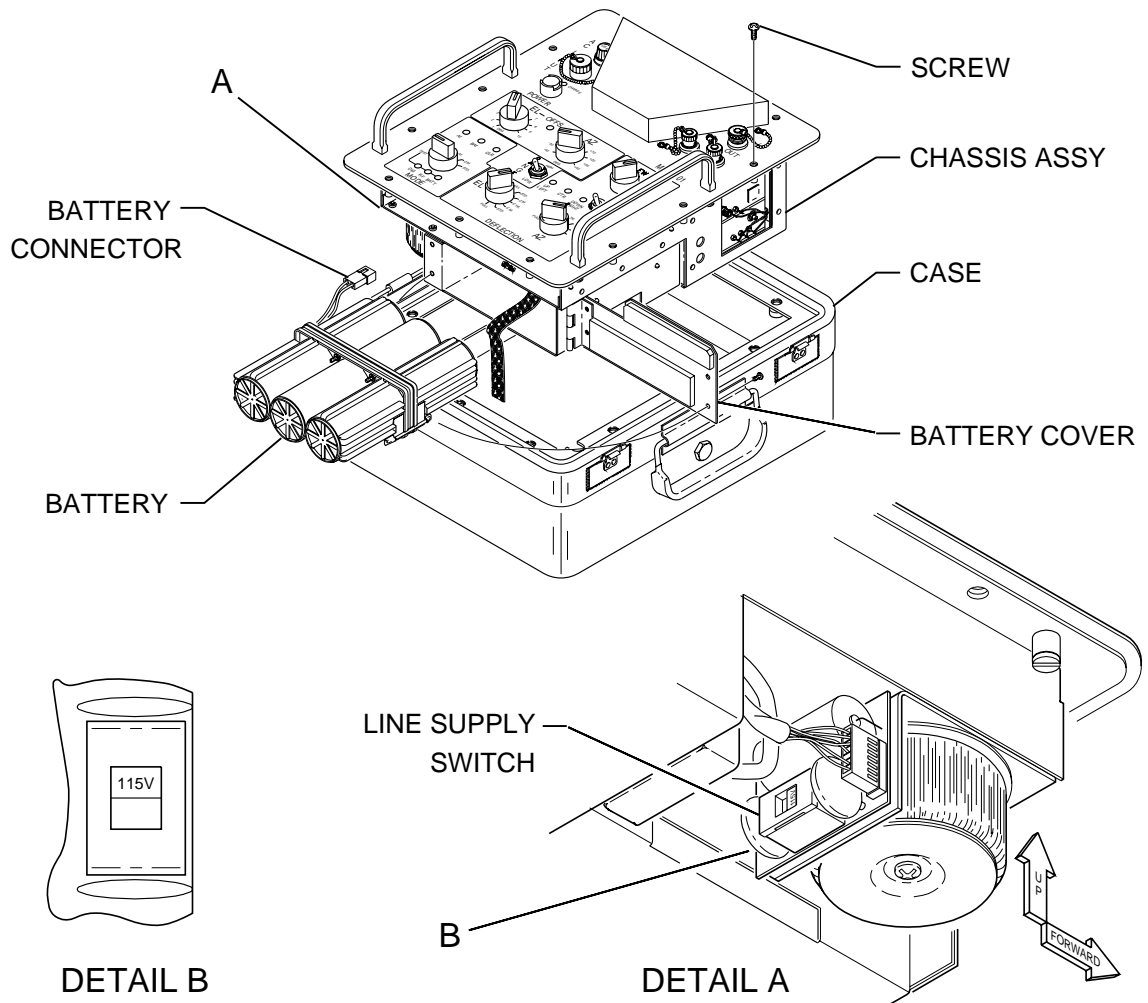
Extreme care should be exercised when performing any operations preceded by a CAUTION or WARNING label. CAUTION labels appear where possibility of damage to equipment exists and WARNING labels denote conditions where bodily injury or death may result.

E. Battery Removal (1-2-1, Figure 1)

STEP	PROCEDURE
1.	Verify MLS-801 is OFF and not connected to ac power.
2.	Disconnect Battery Connector.
3.	Remove twelve screws and Chassis Assembly from Case.
4.	Remove two screws, open Battery Cover and remove Battery.

F. Battery Recharging

STEP	PROCEDURE
1.	Remove cover from AC INPUT Connector (J10004) (17) (1-2-2, Figure 2).
2.	Set Line Supply Switch (1-2-2, Figure 1) to 115 and connect furnished ac power cable between 103.5 to 129 VAC at 47.5 to 420 Hz power source or set Line Supply Switch to 230 and connect furnished ac power cable between 207 to 253 VAC at 47.5 to 420 Hz power source and AC INPUT Connector (J10004) (17) (1-2-2, Figure 2). NOTE: Line Supply Switch factory setting is 115 VAC.
3.	Verify CHARGE Indicator (16) (1-2-2, Figure 2) illuminates red.
4.	Allow two hours for battery charge or until CHARGE Indicator (16) (1-2-2, Figure 2) illuminates green.

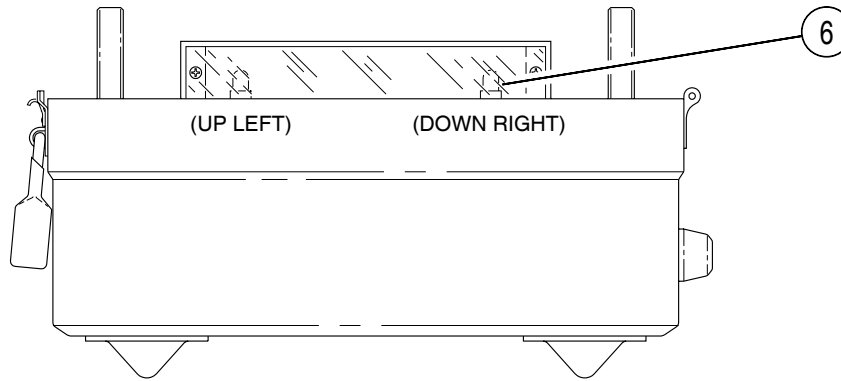


Battery Removal
Figure 1

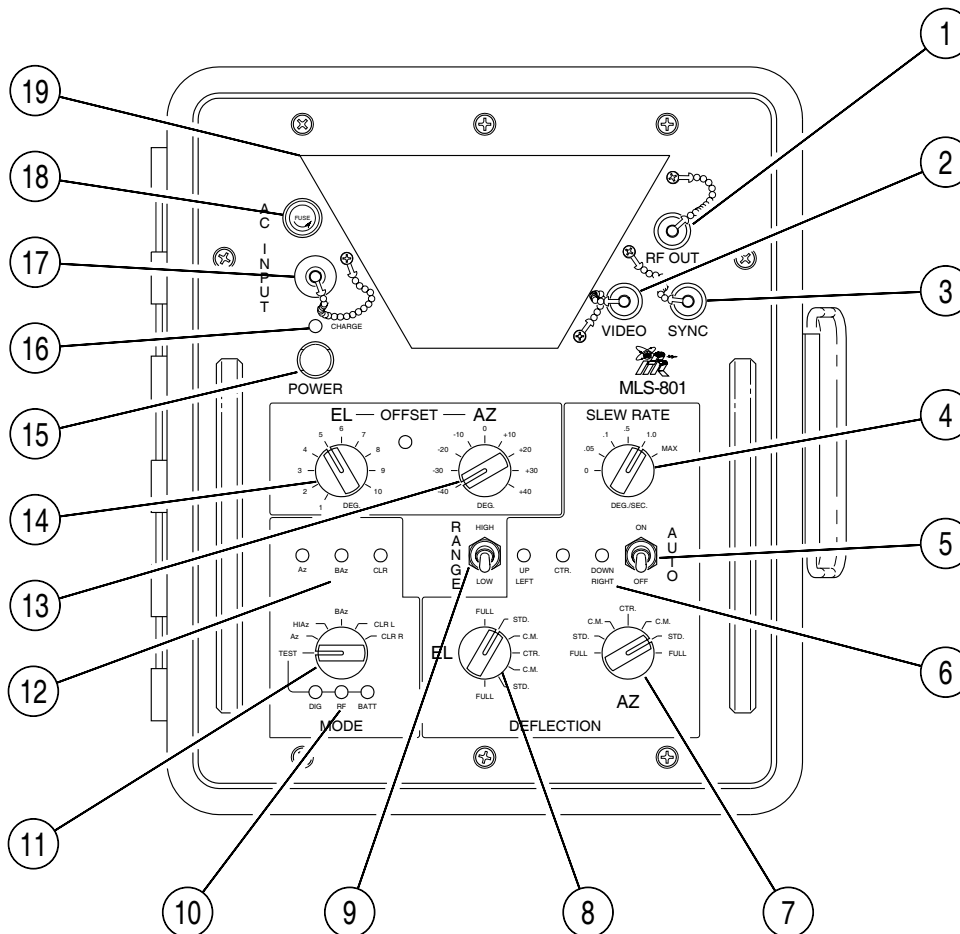


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2. Description of Controls, Connectors and Indicators



TOP VIEW AS SEEN FROM AIRCRAFT



MLS-801 Controls, Connectors and Indicators
Figure 2



NUMERICAL LOCATION LIST	ALPHABETICAL LOCATION LIST	
1. RF OUTPUT Connector (J10002)	AC INPUT Connector (J10004)	17
2. VIDEO OUTPUT Connector (J10001)	AC LINE Fuse	18
3. SYNC OUTPUT Connector (J10003)	ANTENNA	19
4. SLEW RATE Control	AUTO-TEST SEQUENCE ON/OFF Switch	55
5. AUTO-TEST SEQUENCE ON/OFF Switch	AZ DEFLECTION Control	7
6. DEFLECTION Indicators	AZ OFFSET Control	13
7. AZ DEFLECTION Control	CHARGE Indicator	16
8. EL DEFLECTION Control	DEFLECTION Indicators	6
9. RANGE SELECT Switch	EL DEFLECTION Control	8
10. SELF-TEST Indicators	EL OFFSET Control	14
11. MODE SELECT Control	MODE Indicators	12
12. MODE Indicators	MODE SELECT Control	11
13. AZ OFFSET Control	POWER Switch	15
14. EL OFFSET Control	RANGE SELECT Switch	9
15. POWER Switch	RF OUTPUT Connector (J10002)	1
16. CHARGE Indicator	SELF-TEST Indicators	10
17. AC INPUT Connector (J10004)	SLEW RATE Control	4
18. AC LINE Fuse	SYNC OUTPUT Connector (J10003)	3
19. ANTENNA	VIDEO OUTPUT Connector (J10001)	2

ITEM	DESCRIPTION
1. RF OUTPUT Connector (J10002)	<p>TNC Connector provides alternate RF signal output for servicing/bench use.</p> <p>NOTE: Antenna output is constantly active.</p>
2. VIDEO OUTPUT Connector (J10001)	<p>BNC Connector provides detected video output for servicing/bench use.</p>
3. SYNC OUTPUT Connector (J10003)	<p>BNC Connector provides Oscilloscope Sync for servicing/bench use.</p>
4. SLEW RATE Control	<p>Selects rate of change (0, .05, .1, .5 and 1.0 or MAX) in deg/sec from one deflection state to another. MAX setting is free-run or instantaneous.</p>
5. AUTO-TEST SEQUENCE ON/OFF Switch	<p>Selects automatic override or manual setting for control of AZ DEFLECTION Control (7) and EL DEFLECTION Control (8). When set to ON, deflection follows a repetitive sequence of DOWN/RIGHT (full scale) for six seconds, CTR (both) for six seconds and UP/LEFT (full scale) for six seconds. SLEW RATE Control (4) affects rate of change between states.</p> <p>NOTE: AUTO test mode is only used when AZ, HiAZ and BAZ functions are selected. Clearance mode selection results in an error condition indicated by alternate flashing of DEFLECTION Indicators (6) and MODE Indicators (12) simultaneously at a 0.5 second rate.</p>
6. DEFLECTION Indicators	<p>NOTE: Additional Deflection Indicators (UP LEFT and DOWN RIGHT), located inside ANTENNA (19), allow operator to monitor transmitter deflection signal change from Aircraft cockpit during AUTO-TEST Sequence.</p> <ul style="list-style-type: none"> <li data-bbox="290 1213 1455 1289">● UP LEFT (Red) Indicates full scale (100%) UP Deflection for EL and (100%) LEFT Deflection for AZ. <li data-bbox="290 1312 1105 1388">● CTR (Amber) Indicates EL and AZ Deflection is at 0% Full Scale (CTR). <li data-bbox="290 1411 1468 1505">● DOWN RIGHT (Green) Indicates full scale (100%) DOWN Deflection for EL and (100%) RIGHT Deflection for AZ.
7. AZ DEFLECTION Control	<p>Selects Localizer (AZ) needle deflection as one of seven discrete values (three \pm values plus a center position). SLEW RATE Control (4) selects rate of angular change, in deg/sec, between deflection angles selected. AZ DEFLECTION Control is active only when AUTO-TEST SEQUENCE ON/OFF Switch (5) is set to OFF.</p> <ul style="list-style-type: none"> <li data-bbox="290 1719 972 1795">● FULL ($\pm 100\%$ FSD) Full Scale Deflection (FSD) left or right ($\pm 3.2^\circ$). <li data-bbox="290 1818 889 1894">● STANDARD ($\pm 52\%$ FSD) Standard Deflection left or right ($\pm 1.66^\circ$).

ITEM	DESCRIPTION
7. AZ DEFLECTION Control (cont)	<ul style="list-style-type: none"> ● C.M. ($\pm 7\%$ FSD) Control Motion. Small angular deflection (left or right) for testing control surface movement when Autopilot is engaged ($\pm 0.22^\circ$). ● CENTER ($\pm 0\%$) Centers Localizer (AZ) needle.
8. EL DEFLECTION Control	<p>Selects Glideslope (EL) needle deflection as one of seven discrete values (three \pm values plus a center position). SLEW RATE Control (4) selects rate of angular change, in deg/sec, between deflection angles selected. EL DEFLECTION Control is active only when AUTO-TEST SEQUENCE ON/OFF Switch (5) is set to OFF.</p> <ul style="list-style-type: none"> ● FULL ($\pm 100\%$ FSD) Full Scale Deflection (FSD) UP or DOWN (5/4 to 3/4 of EL Offset selected). ● STANDARD ($\pm 52\%$ FSD) Standard Deflection UP or DOWN ($\pm 1.66^\circ$). ● C.M. ($\pm 7\%$ FSD) Control Motion. Small angular deflection (up or down) for testing control surface movement when Autopilot is engaged ($\pm 0.22^\circ$). ● CENTER ($\pm 0\%$) Centers Glideslope (EL) needle.
9. RANGE SELECT Switch	<p>HIGH/LOW position switch changes output level by 20 dB, which changes maximum transmitting range from approximately 300 feet (91.4 meters) to 30 feet (9.1 meters).</p>
10. SELF-TEST Indicators	<p>Used for fault isolation of Digital Circuit, RF Circuit and Battery Charge Circuit.</p> <ul style="list-style-type: none"> ● DIG - (Green/Red) Indicates Digital Circuit Pass/Fail when MODE SELECT Control (11) is set to TEST. ● RF - (Green/Red) Indicates RF Circuit Pass/Fail when MODE SELECT Control (11) is set to TEST. ● BATT - (Red/Green) Red indicates battery is low (approximately 25% charge) and green indicates battery is over 25% charged when MODE SELECT Control (11) is set to TEST. <p>NOTE: MODE SELECT Control (11) does not need to be set to TEST for BATT SELF-TEST Indicator (10) to show a low voltage indication.</p> <p>NOTE: Charging battery before use prevents low voltage shut-off.</p>

ITEM	DESCRIPTION
------	-------------

11. MODE SELECT Control

Selects Azimuth (AZ), High Rate Azimuth (HiAZ) or Back Azimuth (BAZ) function to be varied along with Elevation (EL) using the AZ DEFLECTION Control (7) and EL DEFLECTION Control (8). Clearance Left (CLR L) or Clearance Right (CLR R) functions are fixed AZ angle tests with no AZ Deflection Control capability. MODE SELECT Control (11), set to TEST, initiates Built-In TEST sequence.

NOTE: When MODE SELECT Control is set to BAZ, all controls applicable to AZ or HiAZ are applicable to BAZ.

NOTE: EL DEFLECTION Control (8) is still active in Clearance Mode.

- TEST

System Test. Tests Digital Circuit, RF Circuit and Battery Charge Circuit in MLS-801. System Test gives operator a GO or NOGO indication for status of MLS-801. "DIG" and "RF" SELF-TEST Indicators (10) illuminate red when test is initiated, followed by green when test is successfully completed. In this mode, RF output transmission is CW.

NOTE: "BATT" SELF-TEST Indicator (10) indicates green unless a low voltage condition exists.

- AZ

Selects normal forward Azimuth function transmitted at a 13 Hz rate (Appendix A).

- HiAZ

Selects High Rate Azimuth function transmitted at a 39 Hz rate (Appendix A). AZ OFFSET Control (13) and AZ DEFLECTION Control (7) apply only to High Rate Azimuth.

- BAZ

Selects the Back Azimuth function transmitted at a 6.5 Hz rate (Appendix A). AZ OFFSET Control (13) and AZ DEFLECTION Control (7) apply only to Back Azimuth.

- CLR L

Selects Clearance Left function (Appendix A).

AZ OFFSET Control (13) and AZ DEFLECTION Control (7) are overridden. EL OFFSET Control (14) and EL DEFLECTION Control (8) are active. Approach AZ Proportional Coverage Limits in Data Word #1 are set to $\pm 10^\circ$. Receiver output indicates full scale left deflection without generation of warning signals.

- CLR R

Selects Clearance Right function (Appendix A).

AZ OFFSET Control (13) and AZ DEFLECTION Control (7) are overridden. EL OFFSET Control (14) and EL DEFLECTION Control (8) are active. Approach AZ Proportional Coverage Limits in Data Word #1 are set to $\pm 10^\circ$. Receiver output indicates full scale right deflection without generation of warning signals.

ITEM	DESCRIPTION
12. MODE Indicators	<ul style="list-style-type: none"> ● AZ - (Amber) Indicates forward Azimuth mode when MODE SELECT Control (11) is set to AZ or HiAZ. ● BAZ - (Red) Indicates Back Azimuth mode when MODE SELECT Control (11) is set to BAZ. ● CLR - (Green) Indicates LEFT/RIGHT Clearance Test is active when MODE SELECT Control (11) is set to CLR L or CLR R.
13. AZ OFFSET Control	Selects Azimuth Offset to correspond to programmed offset approach angle (Localizer) in receiver.
14. EL OFFSET Control	Selects Elevation Offset to correspond to programmed offset approach angle (Glideslope) in receiver.
15. POWER Switch	<p>Push ON/Push OFF momentary switch applies power to MLS-801. Green indicator inside POWER Switch indicates active status.</p> <p>NOTE: Internal automatic time-out removes all power from MLS-801 following ten minutes of no-switch activity.</p>
16. CHARGE Indicator (Red/Green)	<p>Red indicates external power is applied to MLS-801 and battery is recharging. Green indicates battery is more than 80% charged.</p> <p>NOTE: Battery charger is active when ac power is applied.</p>
17. AC INPUT Connector (J10004)	Covered 103.5-129/207-253 VAC, 47.5 to 420 Hz Input Connector for battery charging and servicing.
18. AC LINE Fuse	1.0 A, 250 V Fast-Blo.
19. ANTENNA	Directional paraboloidal reflector.

3. Performance Evaluation

A. General

The MLS-801 is equipped with a Self-Test for testing the Digital, RF and Battery Charge Circuits. Front Panel Indicators verify Pass (Green)/Fail (Red).

Refer to 1-2-2, Figure 2 for the location of the Controls, Connectors and Indicators used in the Self-Test.

B. Self-Test

STEP	PROCEDURE
------	-----------

1. Push POWER Switch (15). Verify switch indicator is illuminated.

2. Set MLS-801 controls as follows:

CONTROL	SETTING
(9) RANGE SELECT Switch	HIGH
(11) MODE SELECT Control	TEST

3. Verify **DIG** and **RF** SELF-TEST Indicators (10) are **RED**, then turn to **GREEN** within seven seconds.

NOTE: The **BATT** SELF-TEST Indicator (10) is not dependent upon the MODE SELECT Control (11) set to **TEST** to indicate low voltage.

NOTE: If a SELF-TEST Indicator (10) remains **RED**, an error exists within the circuit. Refer to 2-2-2 in MLS-801 Maintenance Manual for further testing and maintenance instructions.



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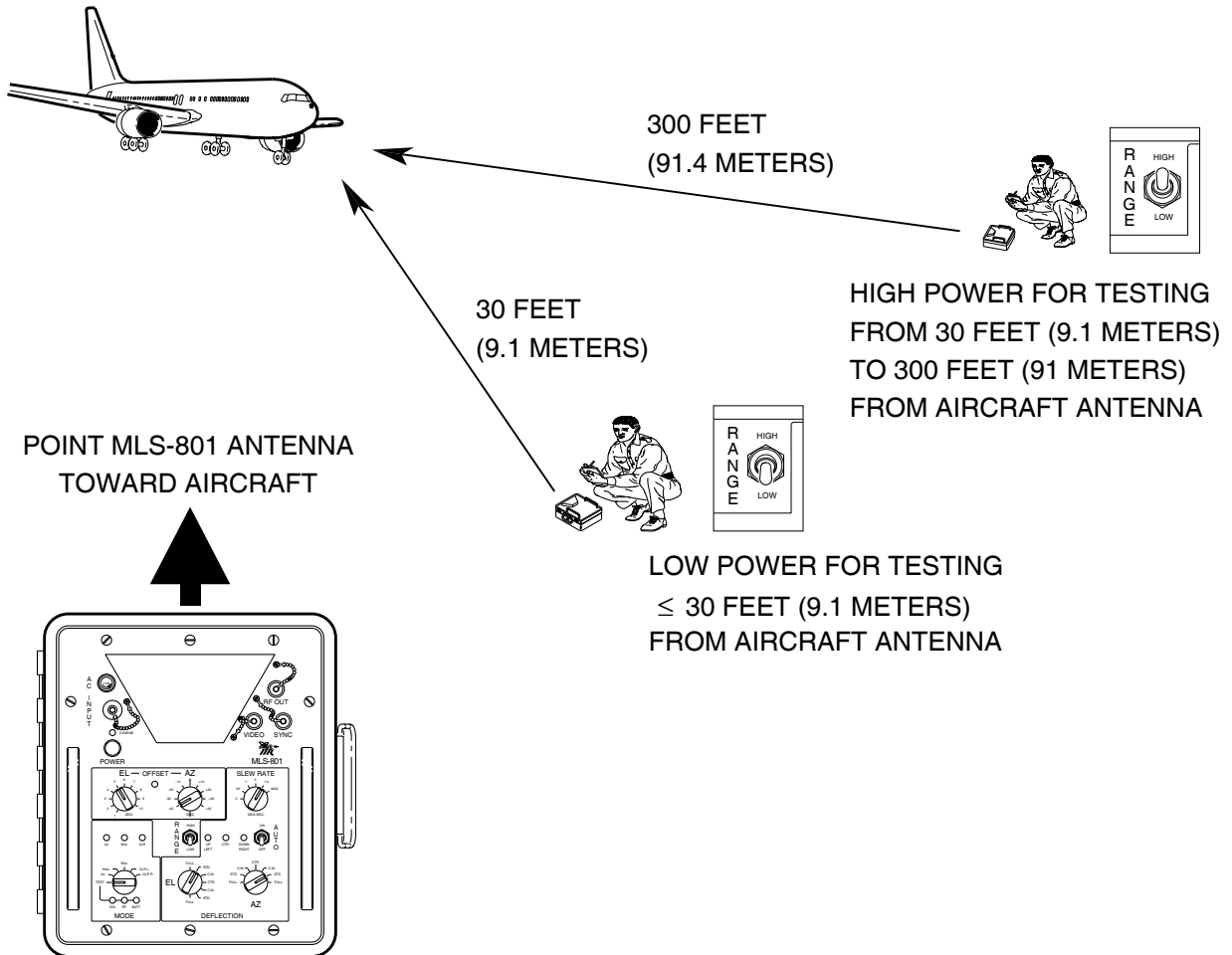
4. General Operating Procedures

A. Controls, Connectors and Indicators

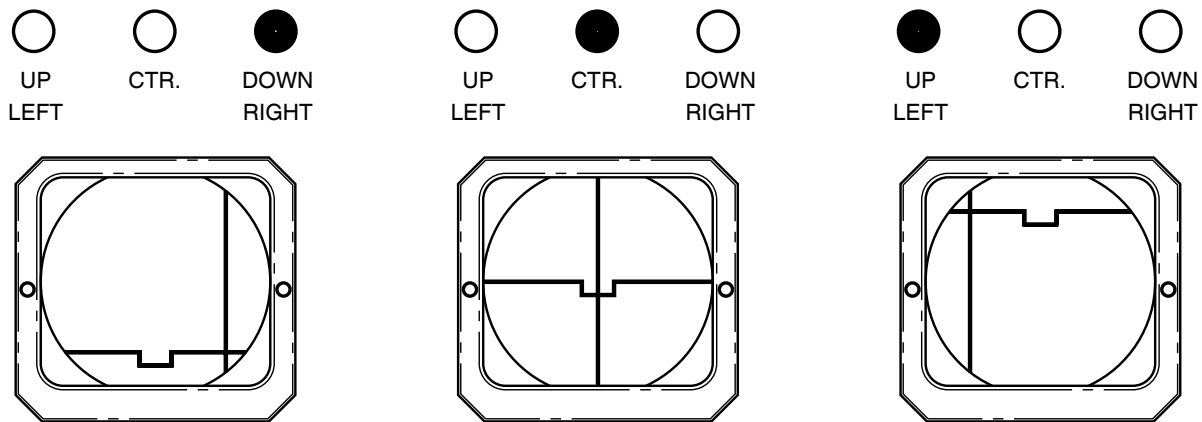
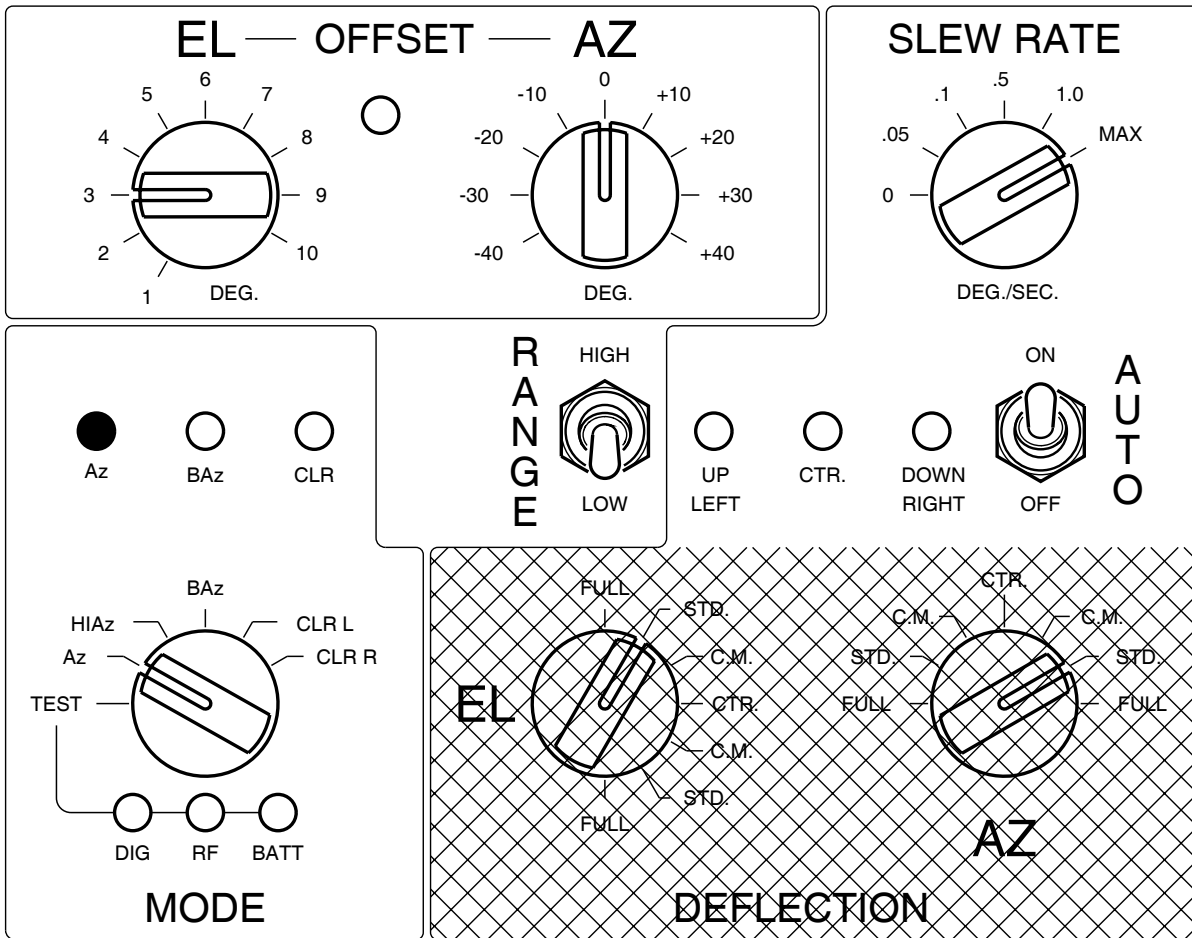
The various MLS-801 Controls, Connectors and Indicators specified in the test examples are followed by an item number. Refer to 1-2-2, Figure 2 for the location of each Control, Connector and Indicator.

B. MLS-801 Test Examples

TEST EXAMPLE	PAGE
Auto Test Examples	3
AZ Low Range Test Example	3
BAZ Low Range Test Example	5
Deflection Test Examples.....	7
Manual UP LEFT Test Example.....	7
Manual DOWN RIGHT Test Example.....	9
Clearance Test Example	11



Range Select
Figure 3



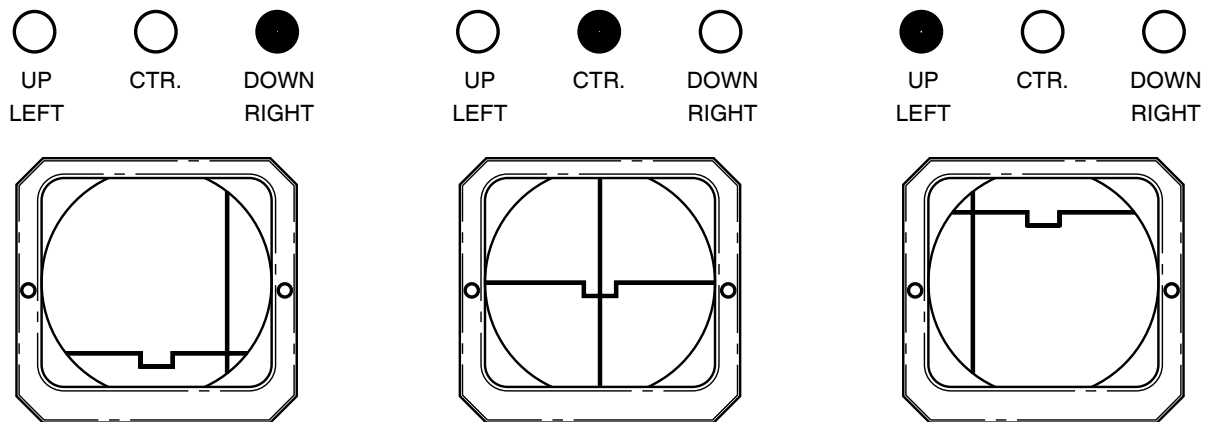
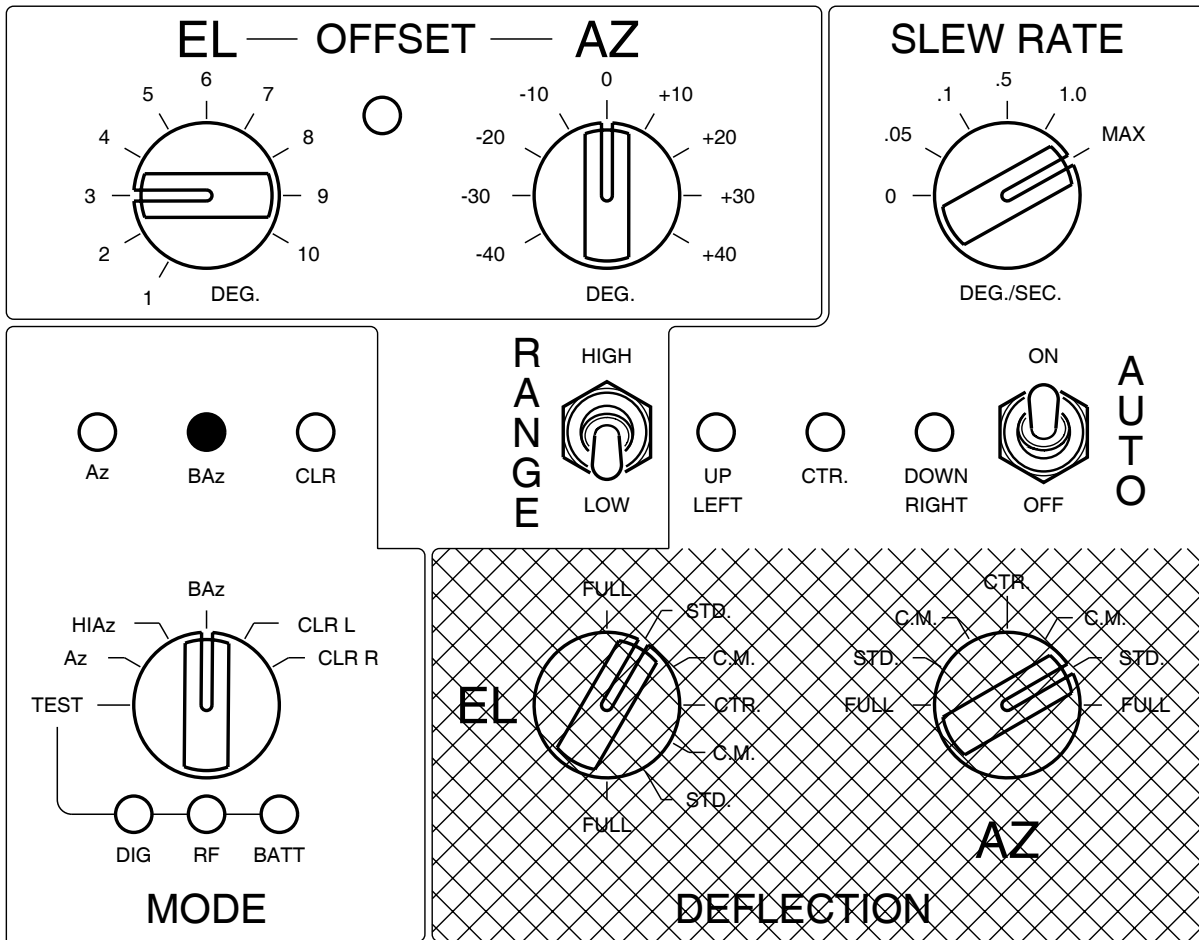
AZ Low Range CDI Indications
Figure 5



(1) Auto Test Examples

(a) AZ Low Range Test Example

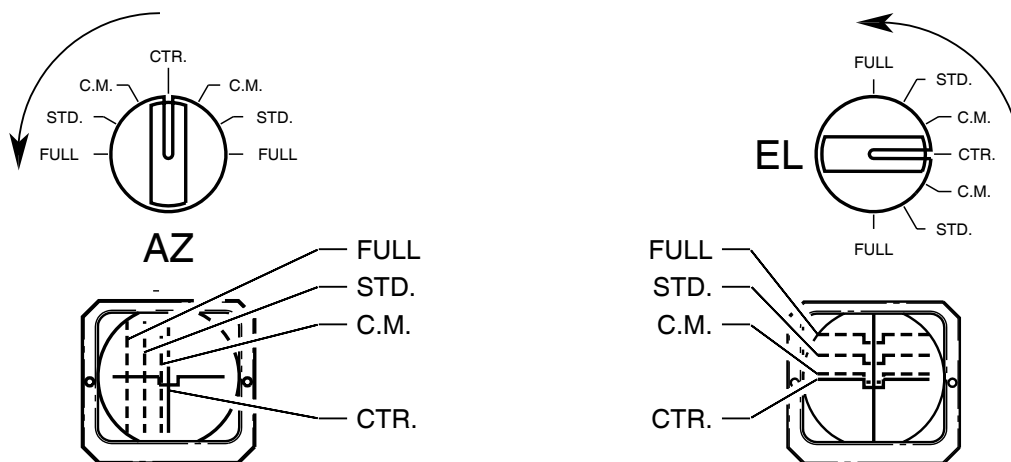
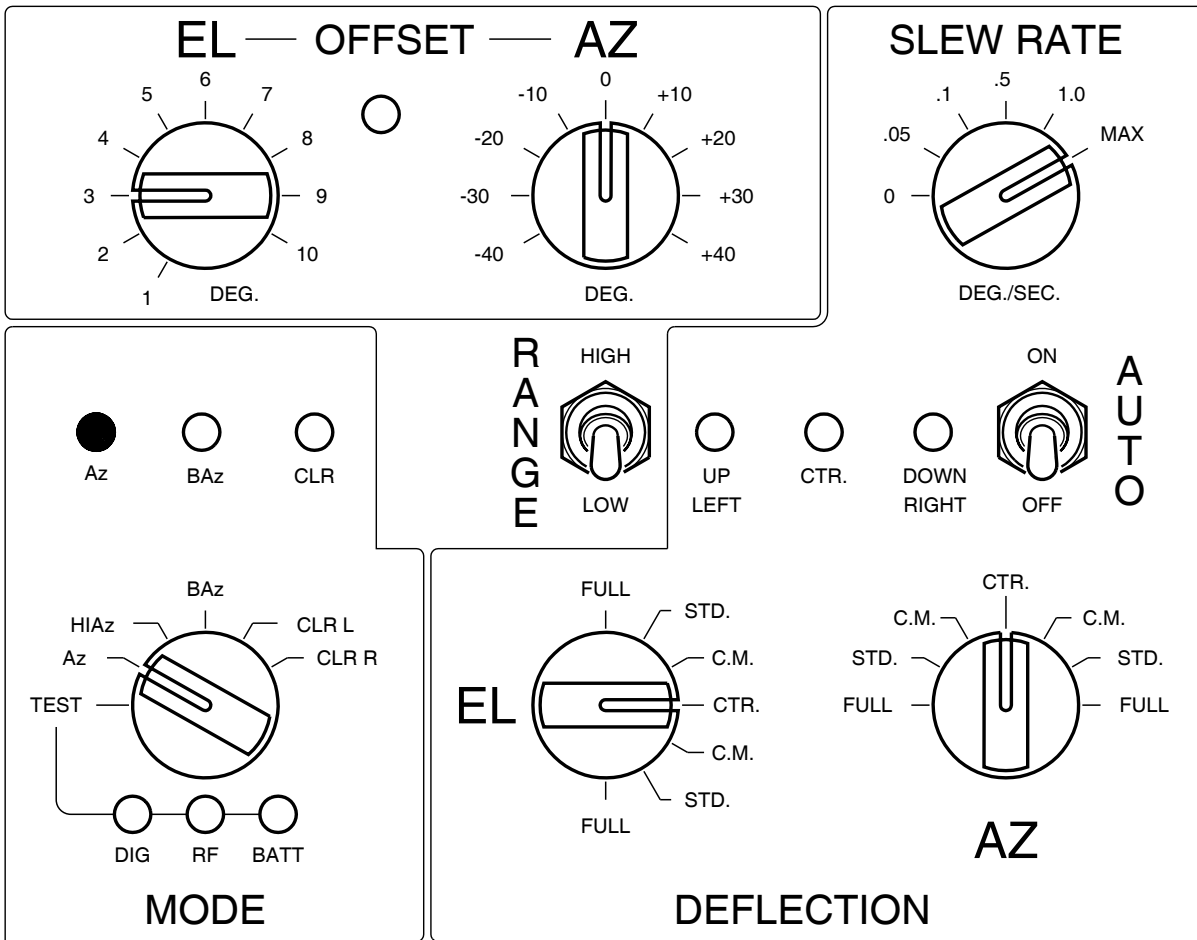
<u>STEP</u>	<u>PROCEDURE</u>														
1.	Set MLS-801 approximately 30 Feet (9.1 Meters) from aircraft.														
2.	Point ANTENNA (19) toward aircraft antenna (1-2-4, Figure 3).														
3.	Set MLS-801 controls as follows (1-2-4, Figure 4):														
	<table><thead><tr><th><u>CONTROL</u></th><th><u>SETTING</u></th></tr></thead><tbody><tr><td>(4) SLEW RATE Control</td><td>MAX</td></tr><tr><td>(5) AUTO TEST SEQUENCE ON/OFF Switch</td><td>ON</td></tr><tr><td>(9) RANGE SELECT Switch</td><td>LOW</td></tr><tr><td>(11) MODE SELECT Control</td><td>AZ</td></tr><tr><td>(13) AZ OFFSET Control</td><td>0</td></tr><tr><td>(14) EL OFFSET Control</td><td>3</td></tr></tbody></table>	<u>CONTROL</u>	<u>SETTING</u>	(4) SLEW RATE Control	MAX	(5) AUTO TEST SEQUENCE ON/OFF Switch	ON	(9) RANGE SELECT Switch	LOW	(11) MODE SELECT Control	AZ	(13) AZ OFFSET Control	0	(14) EL OFFSET Control	3
<u>CONTROL</u>	<u>SETTING</u>														
(4) SLEW RATE Control	MAX														
(5) AUTO TEST SEQUENCE ON/OFF Switch	ON														
(9) RANGE SELECT Switch	LOW														
(11) MODE SELECT Control	AZ														
(13) AZ OFFSET Control	0														
(14) EL OFFSET Control	3														
4.	Verify aircraft CDI needle movements as shown in 1-2-4, Figure 5.														



BAZ Low Range CDI Indications
Figure 7

(b) BAZ Low Range Test Example

STEP	PROCEDURE														
1.	Set MLS-801 approximately 30 Feet (9.1 Meters) from aircraft.														
2.	Point ANTENNA (19) toward aircraft antenna (1-2-4, Figure 3).														
3.	Set MLS-801 controls as follows (1-2-4, Figure 6):														
	<table border="1"> <thead> <tr> <th data-bbox="516 447 646 468">CONTROL</th> <th data-bbox="1305 447 1425 468">SETTING</th> </tr> </thead> <tbody> <tr> <td data-bbox="516 493 862 514">(4) SLEW RATE Control</td> <td data-bbox="1365 493 1425 514">MAX</td> </tr> <tr> <td data-bbox="516 520 1130 541">(5) AUTO TEST SEQUENCE ON/OFF Switch</td> <td data-bbox="1386 520 1425 541">ON</td> </tr> <tr> <td data-bbox="516 548 911 569">(9) RANGE SELECT Switch</td> <td data-bbox="1365 548 1425 569">LOW</td> </tr> <tr> <td data-bbox="516 575 902 596">(11) MODE SELECT Control</td> <td data-bbox="1370 575 1425 596">BAZ</td> </tr> <tr> <td data-bbox="516 602 857 623">(13) AZ OFFSET Control</td> <td data-bbox="1414 602 1425 623">0</td> </tr> <tr> <td data-bbox="516 630 857 651">(14) EL OFFSET Control</td> <td data-bbox="1414 630 1425 651">3</td> </tr> </tbody> </table>	CONTROL	SETTING	(4) SLEW RATE Control	MAX	(5) AUTO TEST SEQUENCE ON/OFF Switch	ON	(9) RANGE SELECT Switch	LOW	(11) MODE SELECT Control	BAZ	(13) AZ OFFSET Control	0	(14) EL OFFSET Control	3
CONTROL	SETTING														
(4) SLEW RATE Control	MAX														
(5) AUTO TEST SEQUENCE ON/OFF Switch	ON														
(9) RANGE SELECT Switch	LOW														
(11) MODE SELECT Control	BAZ														
(13) AZ OFFSET Control	0														
(14) EL OFFSET Control	3														
4.	Verify aircraft CDI needle movements as shown in 1-2-4, Figure 7.														

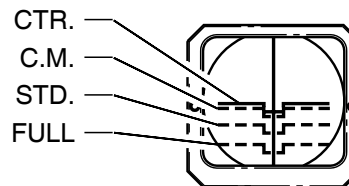
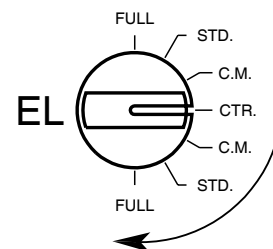
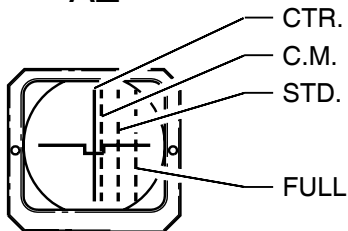
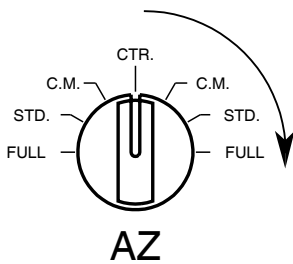
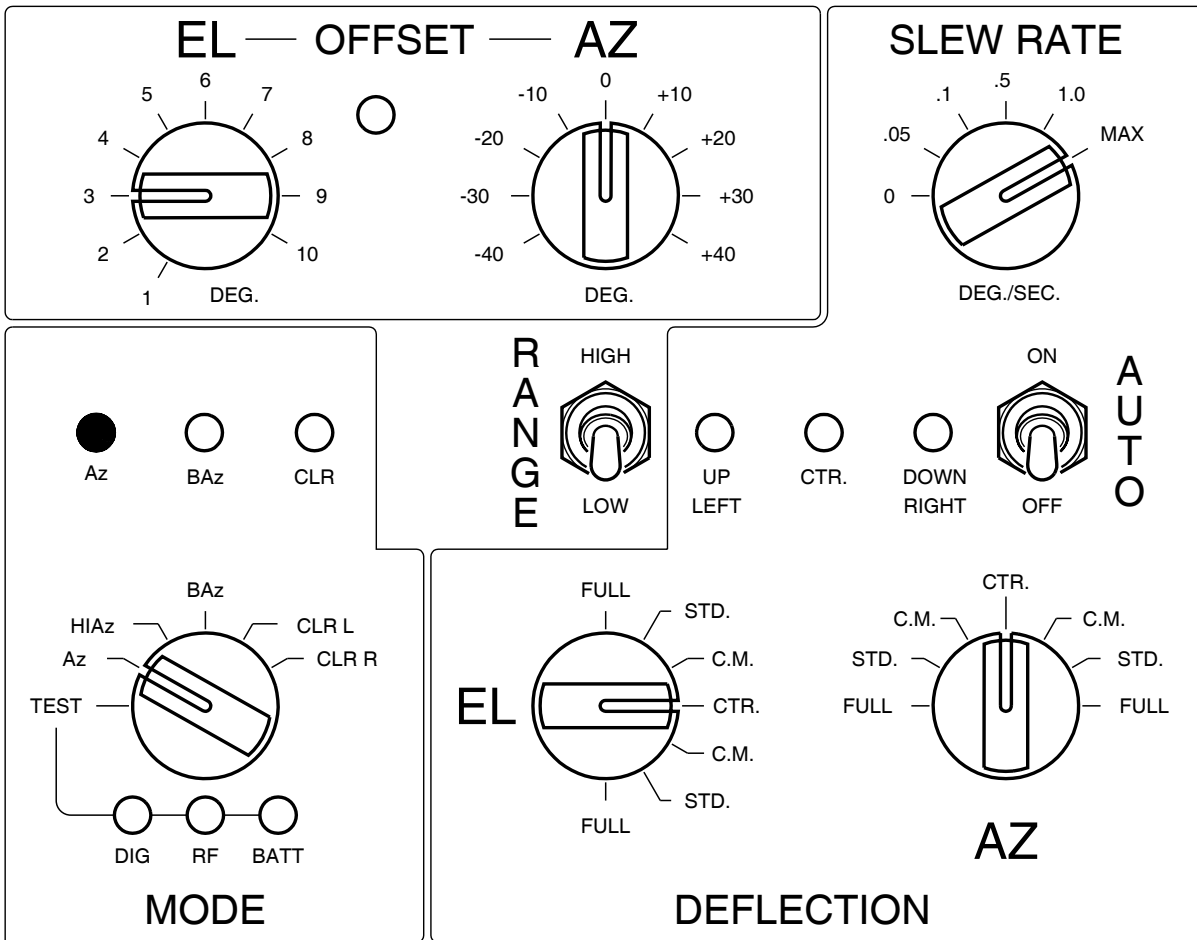


Manual UP LEFT CDI Indications
Figure 9

(2) Deflection Test Examples

(a) Manual UP LEFT Test Example

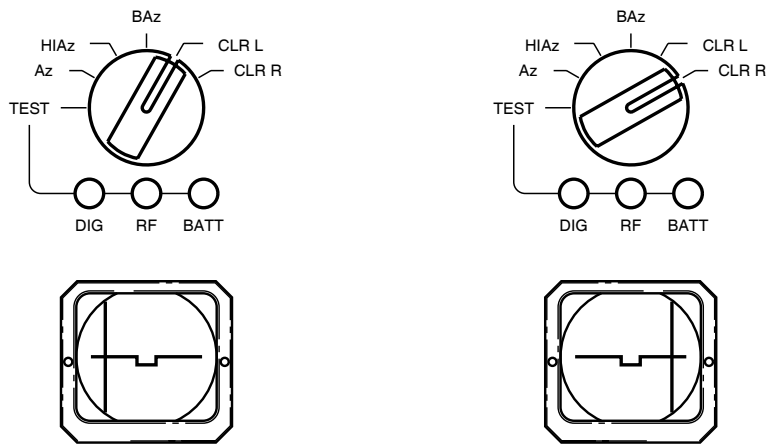
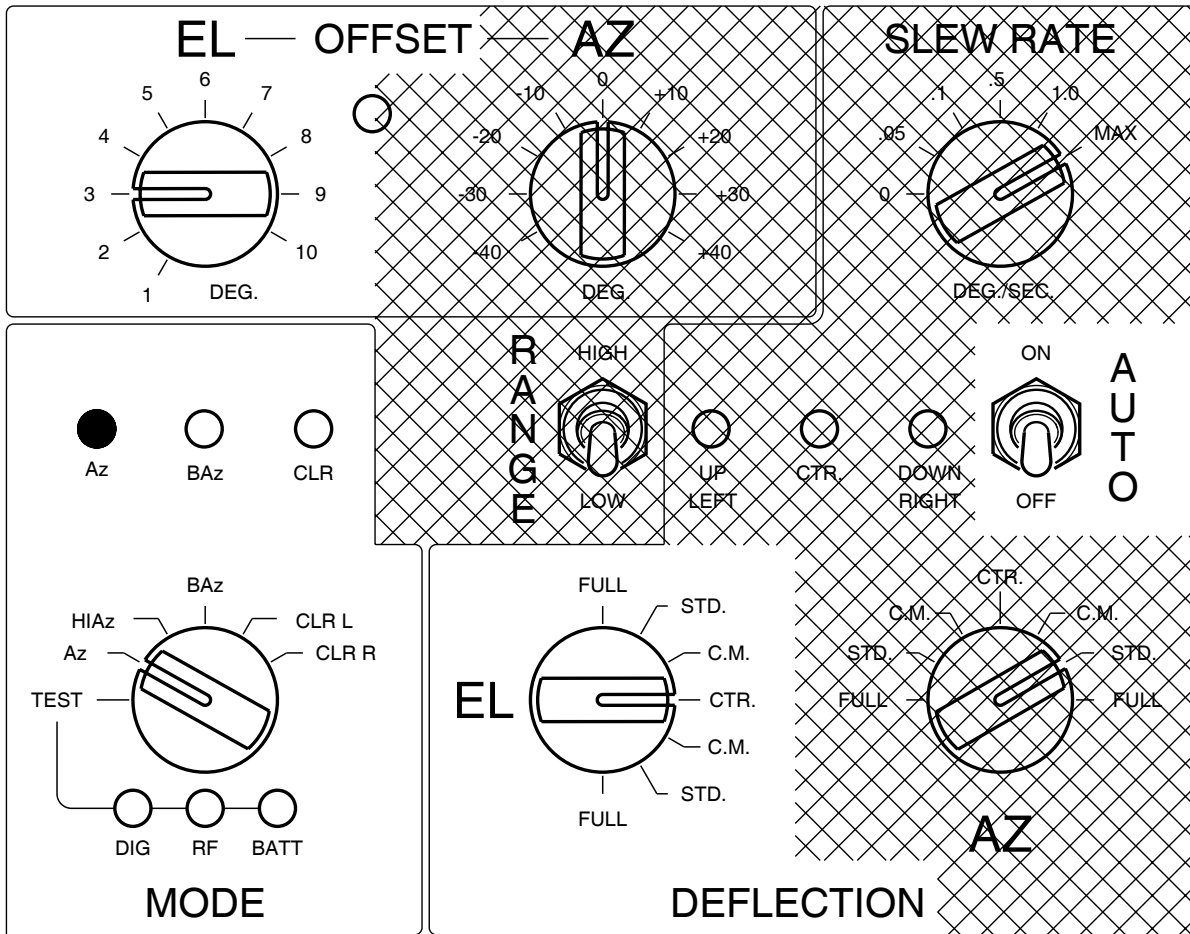
STEP	PROCEDURE																		
1.	Set MLS-801 approximately 30 Feet (9.1 Meters) from aircraft.																		
2.	Point ANTENNA (19) toward aircraft antenna (1-2-4, Figure 3).																		
3.	Set MLS-801 controls as follows (1-2-4, Figure 8):																		
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CONTROL	SETTING																		
(4) SLEW RATE Control	MAX																		
(5) AUTO TEST SEQUENCE ON/OFF Switch	OFF																		
(7) AZ DEFLECTION Control	CTR																		
(8) EL DEFLECTION Control	CTR																		
(9) RANGE SELECT Switch	LOW																		
(11) MODE SELECT Control	AZ																		
(13) AZ OFFSET Control	0																		
(14) EL OFFSET Control	3																		
4.	Set SLEW RATE Control (4) to .1 . Verify CDI locks on to 0° AZ Deflection.																		
5.	Rotate AZ DEFLECTION Control (7) ccw from CTR to FULL . Verify CDI needle movements as shown in 1-2-4, Figure 9.																		
6.	Set AZ DEFLECTION Control (7) to CTR .																		
7.	Verify CDI locks on to 0° EL Deflection.																		
8.	Rotate EL DEFLECTION Control (8) ccw from CTR to FULL . Verify CDI needle movements as shown in 1-2-4, Figure 9.																		
9.	Set EL DEFLECTION Control (8) to CTR .																		



Manual DOWN RIGHT CDI Indications
Figure 10

(b) Manual DOWN RIGHT Test Example

STEP	PROCEDURE																		
1.	Set MLS-801 approximately 30 Feet (9.1 Meters) from aircraft.																		
2.	Point ANTENNA (19) toward aircraft antenna (1-2-4, Figure 3).																		
3.	Set MLS-801 controls as follows (1-2-4, Figure 10):																		
	<table border="1"> <thead> <tr> <th>CONTROL</th> <th>SETTING</th> </tr> </thead> <tbody> <tr> <td>(4) SLEW RATE Control</td> <td>MAX</td> </tr> <tr> <td>(5) AUTO TEST SEQUENCE ON/OFF Switch</td> <td>OFF</td> </tr> <tr> <td>(7) AZ DEFLECTION Control</td> <td>CTR</td> </tr> <tr> <td>(8) EL DEFLECTION Control</td> <td>CTR</td> </tr> <tr> <td>(9) RANGE SELECT Switch</td> <td>LOW</td> </tr> <tr> <td>(11) MODE SELECT Control</td> <td>AZ</td> </tr> <tr> <td>(13) AZ OFFSET Control</td> <td>0</td> </tr> <tr> <td>(14) EL OFFSET Control</td> <td>3</td> </tr> </tbody> </table>	CONTROL	SETTING	(4) SLEW RATE Control	MAX	(5) AUTO TEST SEQUENCE ON/OFF Switch	OFF	(7) AZ DEFLECTION Control	CTR	(8) EL DEFLECTION Control	CTR	(9) RANGE SELECT Switch	LOW	(11) MODE SELECT Control	AZ	(13) AZ OFFSET Control	0	(14) EL OFFSET Control	3
CONTROL	SETTING																		
(4) SLEW RATE Control	MAX																		
(5) AUTO TEST SEQUENCE ON/OFF Switch	OFF																		
(7) AZ DEFLECTION Control	CTR																		
(8) EL DEFLECTION Control	CTR																		
(9) RANGE SELECT Switch	LOW																		
(11) MODE SELECT Control	AZ																		
(13) AZ OFFSET Control	0																		
(14) EL OFFSET Control	3																		
4.	Set SLEW RATE Control (4) to .1 . Verify CDI locks on to 0° AZ Deflection.																		
5.	Rotate AZ DEFLECTION Control (7) cw from CTR to FULL . Verify CDI needle movements as shown in 1-2-4, Figure 11.																		
6.	Set AZ DEFLECTION Control (7) to CTR .																		
7.	Verify CDI locks on to 0° EL Deflection.																		
8.	Rotate EL DEFLECTION Control (8) cw from CTR to FULL . Verify CDI needle movements as shown in 1-2-4, Figure 11.																		
9.	Set EL DEFLECTION Control (8) to CTR .																		



Clearance CDI Indications
Figure 11

(3) Clearance Test Example

STEP	PROCEDURE
------	-----------

1. Set MLS-801 approximately 30 Feet (9.1 Meters) from aircraft.
2. Point ANTENNA (19) toward aircraft antenna (1-2-4, Figure 3).
3. Set MLS-801 controls as follows (1-2-4, Figure 12):

CONTROL	SETTING
(5) AUTO TEST SEQUENCE ON/OFF Switch	OFF
(8) EL DEFLECTION Control	CTR
(11) MODE SELECT Control	AZ
(14) EL OFFSET Control	3

4. Set MODE SELECT Control (11) to **CLR L**. Verify CDI needle movement as shown in 1-2-4, Figure 13.
5. Set MODE SELECT Control (11) to **CLR R**. Verify CDI needle movement as shown in 1-2-4, Figure 13.



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SECTION 3 - SPECIFICATIONS

1. General

NOTE: Specifications and features are subject to change without notice.

A. Generator RF

Frequency:	Single Frequency tuned to Channel 500 (5031 MHz)
Frequency Accuracy:	±10 kHz
Antenna Output Level (at preamble):	
CAL Position:	
HIGH:	-69.5 dB (W/m ² at 30 Feet (9.14 Meters))
LOW:	-89.5 dB (W/m ² at 30 Feet (9.14 Meters))
Level Accuracy:	±2 dB
RF Output Connector Level (at preamble):	
HIGH:	-69 dBm
Accuracy:	±3 dB
LOW:	-89 dBm
Accuracy:	±3 dB
Phase Noise:	<0.2 Radian Peak measured in a 300 Hz to 15 kHz Bandwidth

B. Range

HIGH:	300 Feet (91.4 Meters) typical (Refer to 1-3-1G.)
LOW:	30 Feet (9.14 Meters) typical (Refer to 1-3-1G.)

C. DPSK Modulation

Phase Accuracy:	180° (±10°)
Transition Time:	≤8 μs

D. Beam Characteristics

Standard Functions (Appendix A):

Beam Level:	Fixed at 6 dB above preamble.
Beam Level Accuracy:	±2 dB
Beam Width:	
AZ:	1.0° measured at -3 dB point
HiAZ:	3.0° measured at -3 dB point
BAZ:	1.0° measured at -3 dB point
EL:	1.0° measured at -3 dB point
Beam Width Accuracy:	±10%
Angle Offset:	
Azimuth:	±40° in 10° Steps
Elevation:	1 to 10° in 1° Steps
Angle Accuracy:	±0.1°

Clearance Functions (Appendix A):

Pulse Levels:	
CLR L:	+6 dB (left), -4 dB (right)
CLR R:	-4 dB (left), +6 dB (right)
Width:	1/2 (1°) Beam plus Clearance Pulse at -3 dB point = 75 µs
Position:	Pulses fixed at -12.5° left and +12.5° right

E. Deflection

Center:	0% Full Scale Deflection (FSD)
Center Accuracy:	±0.1°

NOTE: FSD in Elevation is from 3/4 to 5/4 of reference angle or ±0.75° at a 3° offset.

NOTE: FSD in Azimuth assumes a linear proportional coverage of ±350 feet (106.7 meters) at runway threshold with an Azimuth-to-Threshold distance (Data Word #1) computed by formula: "tan -1 (350/D)" or "tan -1 (106.7/D)". For maximum resolution in angle of 0.05°, FSD equals ±3.2°.

Full:	100% FSD
Standard:	52% FSD
Control Motion:	7% FSD
Slew Rate:	0.0, 0.05, 0.1, 0.5 and 1.0 deg/sec
Slew Rate Accuracy:	±0.05 deg/sec



F. General Characteristics

Power:

Battery Operation: Two hours minimum. Automatic 15 minute time-out following absence of switch activity.

AC Input: Used to recharge battery and operate unit.
103.5-129/207-253 VAC, 47.5 to 420 Hz, 50 W

Environmental:

Operating Temperature: -40° to +55° C
-40° to +131° F

Storage Temperature: -40° to +60° C
-40° to +140° F

G. Reference Table

ANTENNA GAIN, MLS-801	10.5 dB
ANTENNA GAIN, AIRCRAFT	00.0 dB
CABLE LOSS, AIRCRAFT	-11.0 dB
*PATH LOSS AT 30 FEET	-65.5 dB
*PATH LOSS AT 9.14 METERS	-65.5 dB
*PATH LOSS AT 300 FEET	-85.5 dB
*PATH LOSS AT 91.4 METERS	-85.5 dB
RECEIVER SENSITIVITY	-106.0 dBm
* = $(1/(4*\pi)*\lambda/D)**2$	
Where pi = 3.14159 λ = Wavelength in Feet (Meters) D = Distance in Feet (Meters)	

Assumptions for Range Calculations
Table 1



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SECTION 4 - SHIPPING

1. Shipping Test Sets

A. Information

Test Sets returned to factory for calibration, service or repair must be repackaged and shipped according to the following conditions:

Authorization

Do not return any products to factory without first receiving authorization from Aeroflex Customer Service Department.

CONTACT: Aeroflex
Customer Service

Telephone: (800) 835-2350
FAX: (316) 524-2623
email: service@aeroflex.com

Tagging Test Sets

All Test Sets must be tagged with:

- Identification and address of owner
- Nature of service or repair required
- Model Number
- Serial Number

Shipping Containers

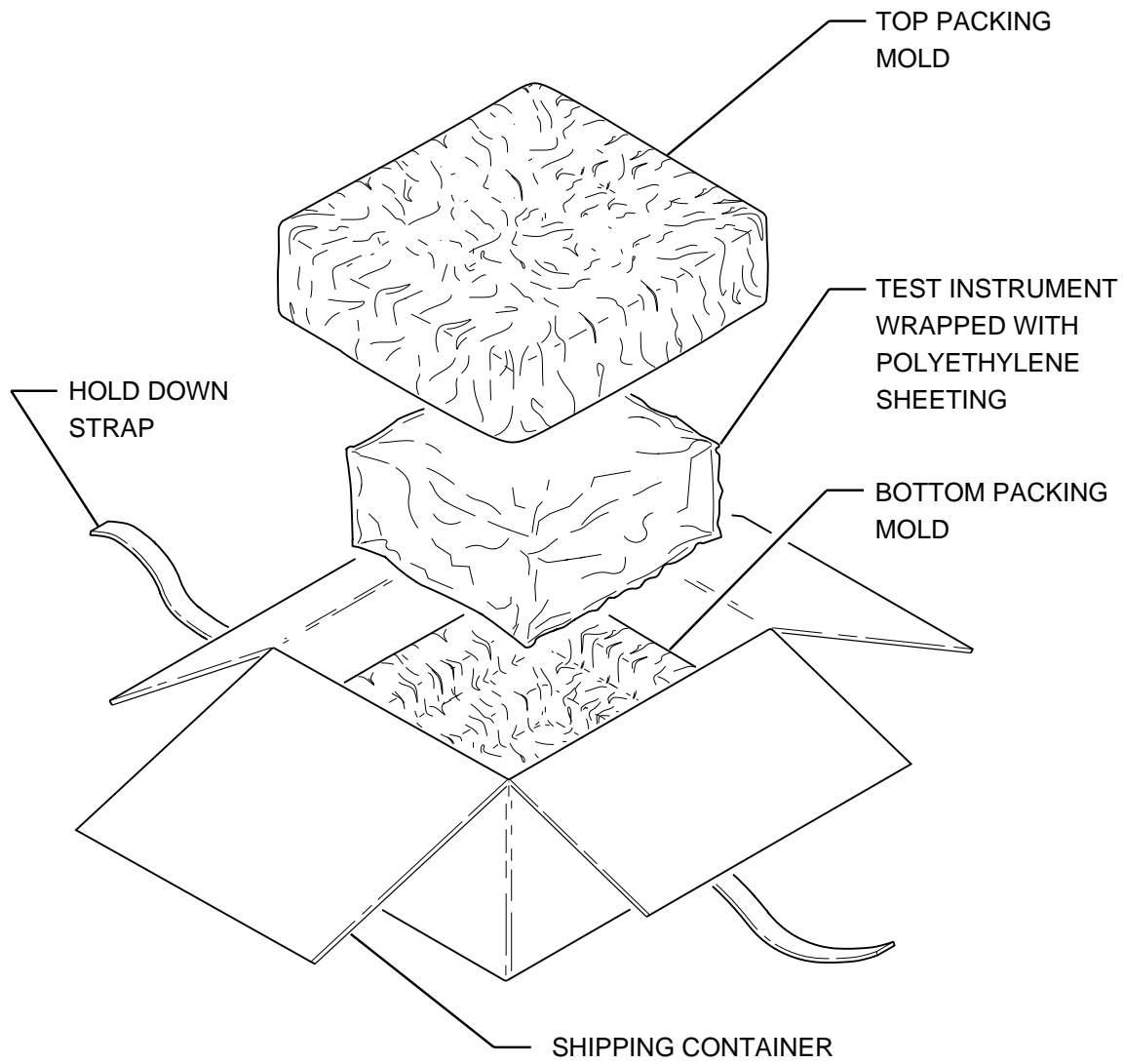
Test Sets must be repackaged in original shipping containers using Aeroflex packing molds. If original shipping containers and materials are not available, contact Aeroflex Customer Service for shipping instructions.

Freight Costs

All freight costs on non-warranty shipments are assumed by the customer. (See "Warranty Packet" for freight charge policy on warranty claims.)

B. Repacking Procedure

- Make sure bottom packing mold is seated on floor of shipping container.
- Carefully wrap Test Set with polyethylene sheeting to protect finish.
- Place Test Set into shipping container, making sure Test Set is securely seated in bottom packing mold.
- Place top packing mold over top of Test Set and press down until mold rests solidly in bottom packing mold.
- Close shipping container lids and seal with shipping tape or an industrial stapler. Tie all sides of container with break resistant rope, twine or equivalent.



Repacking Procedure
Figure 1

SECTION 5 - STORAGE

1. General

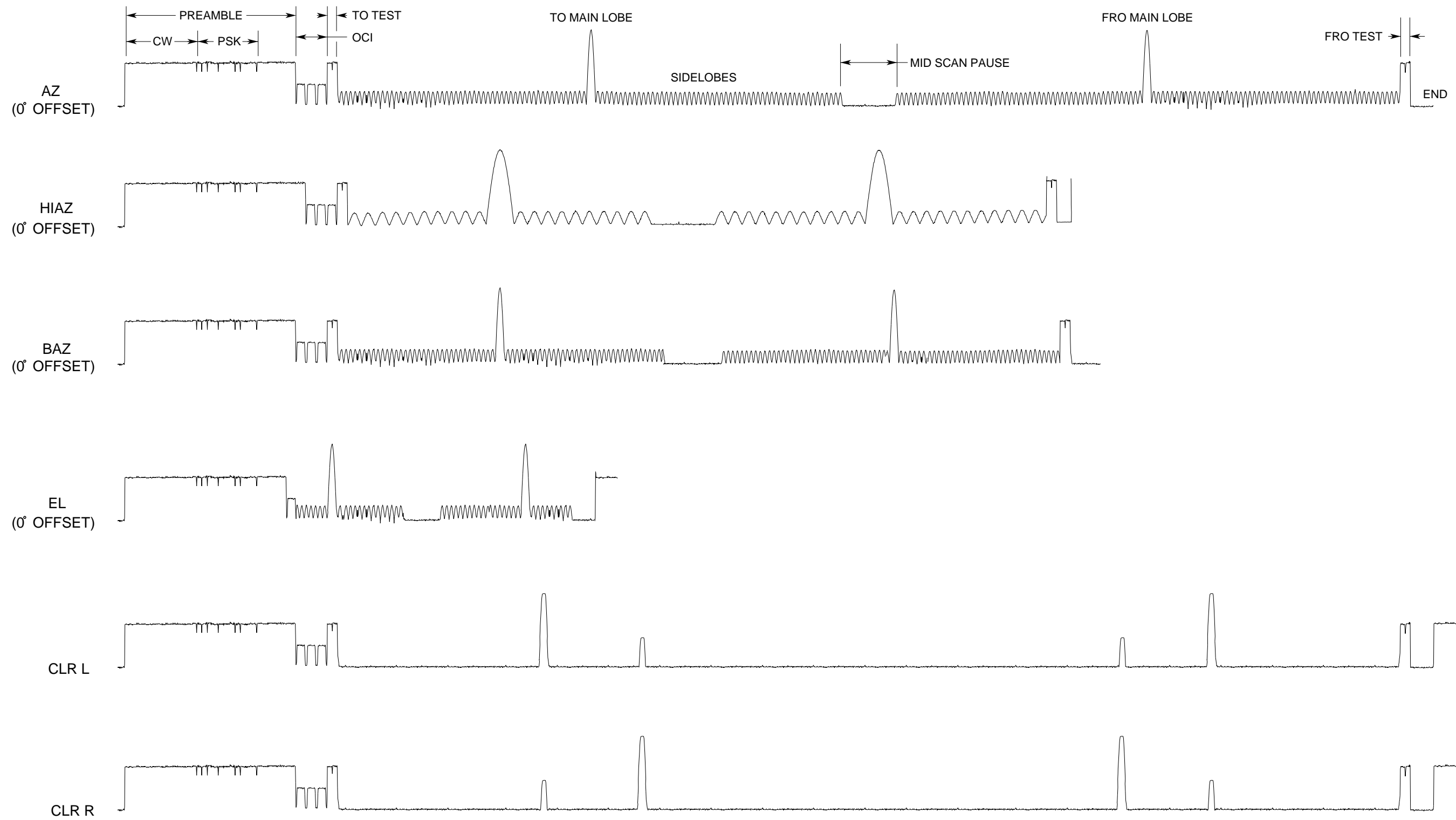
The following storage precautions should be accomplished whenever the Test Set is stored for extended periods:

- Disconnect Test Set from electrical power source.
- Remove battery (1-2-1E).
- Disconnect and store ac power cable and accessories with Test Set.
- Cover Test Set to prevent dust and debris from covering and entering Test Set.



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APPENDIX A – MLS-801 BEAMS



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APPENDIX B – TABLE OF CONNECTORS

CONNECTOR		SIGNAL TYPE	INPUT/OUTPUT
J10004	AC	AC	INPUT
J10002	RF	RF	OUTPUT
J10003	SYNC	TTL	OUTPUT
J10001	VIDEO	VIDEO	OUTPUT



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APPENDIX C – MLS-801 DATA WORDS1. AZ and HiAZ Data Words

A. Data Word #1:

AZ to Threshold Distance = 1900 Meters
Proportional Coverage Limit = -40° to +40°
Clearance Signal Type = Pulse
Parity = Odd
Update Rate = 1 Hz

B. Data Word #2:

Minimum Glide Path = 3.0°
BAZ Status = 1 (radiated)
DME Status = 11 (FA Mode, Standard 2, available)
Approach AZ Status = 1 1 (radiated)
Parity = Odd
Update Rate = 6.25 Hz

C. Data Word #3:

Approach AZ Beamwidth = 1.0° (AZ and BAZ) 3.0° (HiAZ)
Approach EL Beamwidth = 1.0°
DME Distance = 0 Meters
Parity = Odd
Update Rate = 1 Hz

D. Data Word #4:

Approach AZ Magnetic Orientation = 0°
BAZ Magnetic Orientation = 180°
Parity = Odd
Update Rate = 1.0 Hz

E. Data Word #6:

MLS Ground Equipment ID = "IFR"
Parity = Odd
Update Rate = 1 Hz

F. Data Word A1:

Approach AZ Antenna Offset = 0 Meters
Approach AZ to MLS Datum Point = 0 Meters
Approach AZ Antenna Alignment w/Runway Centerline = 0°
Approach AZ Antenna Coordinate System = 0 (conical)
Parity = Even
Update Rate = 1 Hz

G. Data Word A2:

Approach EL Antenna Offset = 0 Meters
MLS Datum Point to Threshold Distance = 0 Meters
Approach EL Antenna Height = 0 Meters
Parity = Even
Update Rate = 1 Hz



H. Data Word A3:

DME Offset = 0 Meters

DME to MLS Datum Point = 0 Meters

Parity = Even

Update Rate = 1 Hz when AZ function is selected, 0.25 Hz when BAZ function is selected

2. BAZ Data Words

A. Data Word #5:

BAZ Prop. Coverage Limit = $\pm 40^\circ$

BAZ Beamwidth = 1.0°

BAZ Status = 1 (radiated in normal mode)

Parity = Odd

Update Rate = 1 Hz

B. Data Word A4:

BAZ Antenna = 0 Meters

BAZ to MLS Datum Point Distance = 0 Meters

BAZ Antenna Alignment w/Runway Centerline = 0°

Parity = Even

Update Rate = 0.75 Hz when BAZ is selected, 0.25 Hz when AZ is selected

3. Clearance Data Words

A. Clearance Left:

Same as AZ Setup except on Data Word #1:

Approach AZ Proportional Coverage Limit = -10° to $+10^\circ$

B. Clearance Right:

Same as AZ Setup except on Data Word #1:

Approach AZ Proportional Coverage Limit = -10° to $+10^\circ$



**APPENDIX D - METRIC/BRITISH IMPERIAL CONVERSION TABLE
WITH NAUTICAL DISTANCE CONVERSIONS**

TO CONVERT:	INTO:	MULTIPLY BY:	TO CONVERT:	INTO:	MULTIPLY BY:
cm	feet	0.03281	meters	feet	3.281
cm	inches	0.3937	meters	inches	39.37
feet	cm	30.48	m/sec	ft/sec	3.281
feet	meters	0.3048	m/sec	km/hr	3.6
ft/sec	km/hr	1.097	m/sec	miles/hr	2.237
ft/sec	knots	0.5921	miles	feet	5280
ft/sec	miles/hr	0.6818	miles	km	1.609
ft/sec ²	cm/sec ²	30.48	miles	meters	1609
ft/sec ²	m/sec ²	0.3048	miles	nmi	0.8684
grams	ounces	0.03527	miles/hr	ft/sec	1.467
inches	cm	2.54	miles/hr	km/hr	1.609
kg	pounds	2.205	miles/hr	knots	0.8684
kg/cm ²	psi	0.0703	nmi	feet	6080.27
km	feet	3281	nmi	km	1.8532
km	miles	0.6214	nmi	meters	1853.2
km	nmi	0.5396	nmi	miles	1.1516
km/hr	ft/sec	0.9113	ounces	grams	28.34953
km/hr	knots	0.5396	pounds	kg	0.4536
km/hr	miles/hr	0.6214	psi	kg/cm ²	0.0703
knots	ft/sec	1.689	100 ft	km	3.048
knots	km/hr	1.8532	100 ft	miles	1.894
knots	miles/hr	1.1516	100 ft	nmi	1.645



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APPENDIX E – ABBREVIATIONS

A			
A	Ampere	ILS	Instrument Landing System
ac	Alternating Current	I/O	Input/Output
AM	Amplitude Modulation		
Assy	Assembly		
AZ	Azimuth		
B			
BATT	Battery	kg	Kilogram
BAZ	Back Azimuth	kHz	Kilohertz
BIT	Built-In Test	km	Kilometer
C			
C	Celsius	L	Left
ccw	Counterclockwise	LOC	Localizer
CDI	Course Direction Indicator	LSD	Least Significant Digit
CLR	Clearance		
CLR L	Clearance Left		
CLR R	Clearance Right		
cm	Centimeter		
C.M.	Control Motion		
CTR	Center		
cw	Clockwise		
CW	Continuous Wave		
D			
dB	Decibel	m	Meter
dBm	Decibels Relative to Milliwatts	MAX	Maximum
deg	Degree	MHz	Megahertz
DIG	Digital	MIN	Minimum
DME	Distance Measuring Equipment	MLS	Microwave Landing System
DPSK	Differential Phase Shift Keying	ms	Millisecond
E			
EL	Elevation	nmi	Nautical Mile
F		ns	Nanosecond
F	Fahrenheit		
FSD	Full Scale Deflection		
ft	Feet		
G			
GHz	Gigahertz		
	G/S Glideslope		
H			
HiAZ	High Azimuth		
hr	Hour		
Hz	Hertz		
I			
J			
K			
L			
M			
N			
O			
P			
R			
S			
V			
W			



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INDEX

Abbreviations	App. E
Auto Test Examples	
AZ Low Range	1-2-4, p 3
BAZ Low Range	1-2-4, p 5
Battery Charging	1-2-1, p 1
Battery Operation	1-2-1, p 1
Battery Recharging	1-2-1, p 2
Battery Removal	1-2-1, p 2
Clearance Test Example	1-2-4, p 11
Deflection Test Examples	
Manual DOWN RIGHT	1-2-4, p 9
Manual UP LEFT	1-2-4, p 7
Description	1-1-1, p 1
Controls, Connectors and Indicators	1-2-2, p 1
Functional Capabilities	1-1-1, p 1
General Description and Capabilities	1-1-1, p 1
General Operating Procedures	1-2-4, p 1
Installation	1-2-1, p 1
Mechanical Description	1-1-1, p 1
Metric/British Imperial Conversion Table	App. D
MLS-801 Beams	App. A
MLS-801 Data Words	
AZ and HiAZ	App. C
BAZ	App. C
Clearance	App. C
MLS-801 Test Examples	1-2-4, p 1
Performance Evaluation	1-2-3, p 1
Repacking Procedure	1-4-1, p 1
Safety Precautions	1-2-1, p 1
Self-Test	1-2-3, p 1
Shipping	1-4-1, p 1
Shipping Information	1-4-1, p 1
Specifications	1-3-1, p 1
Storage	1-5-1, p 1
Table of Connectors	App. B



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USA	Tel: [+1] (316) 522 4981 Toll Free: 800 835 2352 (US only)	Fax: [+1] (316) 522 1360

The logo for AEROFLEX features a stylized 'A' with a blue triangle at its base, followed by the word 'AEROFLEX' in a bold, sans-serif font. The logo is positioned within a large, light blue curved shape that sweeps across the bottom right of the page.

Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven, customer-focused.