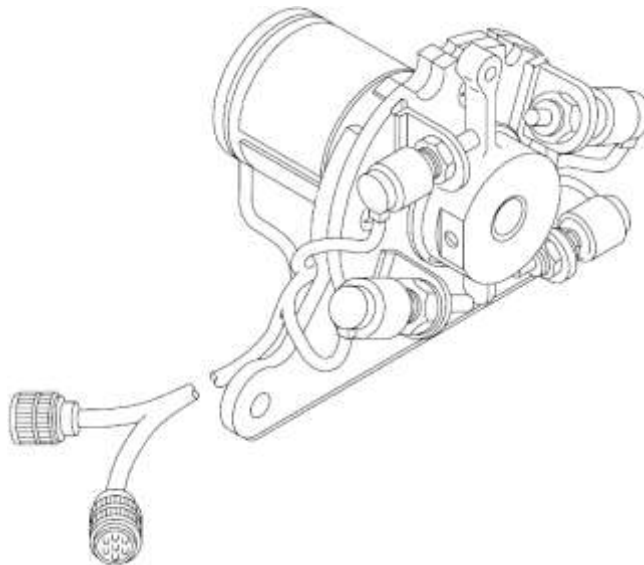




**Commercial Troubleshooting Supplement to
TM 1-1520-237-23 dated 30 July 2010, and
TM 1-1520-280-23 dated 14 August 2009**

**Limit Switch Adjustment Procedure
for use with
Limit Switch / Stabilator Position Sensor Set
PN 10-1009-56
used on the
H60A/L and H60M Helicopters**



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Rev 3, 2 Mar 2011



Direct All Inquiries To:

ULTRAX Aerospace, Inc.
4200 NE Sun Court
Lee's Summit, MO 64064

www.ultraxinc.com
Phone (816)-214-9999
Fax (816)-214-9998

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Revision Status Page

This is Revision 3 of ULTRAX Technical Manual PN 06-1229-50, dated March 2, 2011:

Commercial Troubleshooting Supplement to
TM 1-1520-237-23 dated 10 July 2010, and
TM 1-1520-280-23 dated 14 August 2009

Limit Switch Adjustment Procedure for use with the Limit Switch / Stabilator Position Sensor Set, PN 10-1009-56

MANUAL REVISIONS:

Dates of issue for the original manual and any revisions are:

Revision	Date of Issue
1 – Original Issue	17 Mar 2009
2	29 Oct 2010
3	2 Mar 2011

LIST OF EFFECTIVE PAGES:

The total number of pages is 42.

Page	Revision	Changes Made
1 to 5	1	NONE – Original Issue
1 to 12 6 to 9	2	Reformatted, Added an Equipment Needed section Added a figure of the Position Transmitter/ Limit Switch Assembly
9 to 42	3	Completely revised – replace manual. Separated procedures for on and off aircraft. Added procedures for H60M Helicopters - TM1-1520-280-23.

For changes to text: The portion of the text affected by the latest change is indicated by a vertical line in the outer margin of the page.

For changes to illustrations: Changes are indicated by a vertical line in the outer margin of the page next to the title of the illustration, and a hand pointing to the changed area on the illustration.

Table of Contents

1.0 Description of ULTRAX Equipment	9
1.1 Limit Switch / Stabilator Position Sensor Set.....	9
1.2 Series I or II UxValidator Set	11
2.0 On-Aircraft Procedure for H60A/L Helicopters	13
2.1 Initial Set-up	13
2.2 Preparation.....	13
2.3 Connections	14
2.4 Full Range.....	15
2.5 10° Down.....	15
2.6 8° Up.....	16
2.7 40° Down.....	16
2.8 Shut-down.....	17
3.0 On-Bench Procedure for H60A/L Helicopters	19
3.1 Initial Set-up	19
3.2 Preparation.....	19
3.3 Connections	20
3.4 Full Range.....	21
3.5 10° Down.....	22
3.6 8° Up.....	22
3.7 40° Down.....	23
3.8 Shut-down.....	24
4.0 On-Aircraft Procedure for H60M Helicopters	25
4.1 Initial Setup.....	25
4.2 Preparation.....	25
4.3 Connections	25
4.4 Full Range.....	28
4.5 10° Down.....	28
4.6 8° Up.....	29
4.7 40° Down.....	30
4.8 Shut-down.....	30
5.0 On-Bench Procedure for H60M Helicopters	31
5.1 Initial Setup.....	31
5.2 Preparation.....	31
5.3 Connections	31
5.4 Full Range.....	33
5.5 10° Down.....	34
5.6 8° Up.....	34
5.7 40° Down.....	35
5.8 Shut-down.....	35
6.0 Figures	37

Table of Figures

Figure 1-1 – Limit Switch / Stabilator Position Sensor Set	9
Figure 1-2 – Series I UxValidator Chassis with BrainPak.....	11
Figure 1-3 – Series II UxValidator Chassis with BrainPak.....	12
Figure 2-1 – On Aircraft (AVUM) System Hook-ups, H60A/L.....	14
Figure 2-2 – Power Hook-up with Series I UxValidator.....	14
Figure 3-1 – On Bench (AVIM) System Hook-ups, H60A/L.....	20
Figure 3-2 – Power Hook-up with Series I UxValidator.....	20
Figure 3-3 – DC Power Connection to Bench Power Adapter.....	21
Figure 4-1 – On Aircraft (AVUM) System Hook-ups, H60M.....	26
Figure 4-2 – Power Hook-up with Series I UxValidator.....	26
Figure 4-3 – Location of Stabilator Indication	28
Figure 5-1 – On Bench (AVIM) System Hook-ups, H60M.....	32
Figure 5-2 – Power Hook-up with Series I UxValidator.....	32
Figure 5-3 – DC Power Connection to Bench Power Adapter.....	33
Figure 6-1 – Position Transmitter/Limit Switch Assembly	37
Figure 6-2 – Installation of Position Transmitter/Limit Switch Assembly	38
Figure 6-3 – Position Transmitter/Limit Switch Assembly Schematic.....	39

Table of Tables

Table 1-1 – Limit Switch / Stabilator Position Sensor Set.....	9
Table 1-2 – Physical Characteristics	10



5

Safety steps to follow if someone is the victim of electrical shock

1

Do not try to pull or grab the person.

2

If possible, turn off the electrical power.

3

If you cannot turn off the electrical power, then pull, push, or lift the person to safety using a wooden pole, a rope, or some other insulating material.

4

Send for help as soon as possible.

5

When the injured person is no longer in contact with the source of electrical shock, move the person a short distance away and immediately start resuscitation.

FIRST AID

Refer to FM 21-11.

Warnings, Cautions, and Notes

WARNING

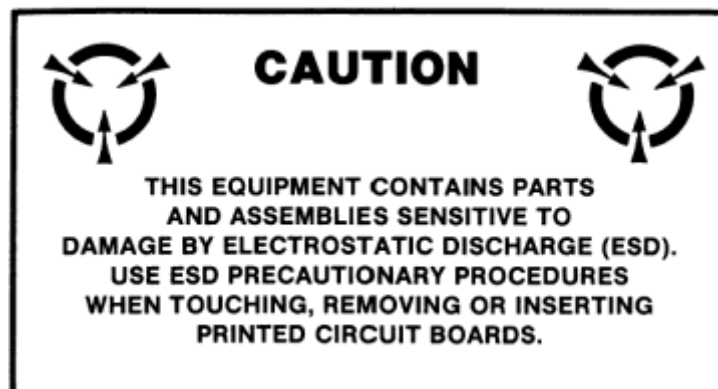
WARNING indicates a procedure, practice, condition, or statement that must be strictly observed. Failure to observe a WARNING could result in injury or death.

CAUTION

CAUTION indicates a procedure, practice, condition, or statement that must be strictly observed. Failure to observe a CAUTION could result in damage to equipment, loss of mission effectiveness, or long-term health hazards.

NOTE

NOTE indicates additional related information that is helpful or otherwise significant.



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Limit Switch Adjustment

Operation and Troubleshooting Procedure

1.0 Description of ULTRAX Equipment

Information on the Limit Switch / Stabilator Position Sensor Set follows.

1.1 Limit Switch / Stabilator Position Sensor Set

A list of the parts in Limit Switch / Stabilator Position Sensor Set, PN 10-1009-56, is given in the table below, followed by an illustration of the parts, a description of the components, and a table of physical characteristics.

Table 1-1 – Limit Switch / Stabilator Position Sensor Set

Item	Description	Part Number
	Limit Switch / Stabilator Position Sensor Set	10-1009-56
1	Limit Switch / Stabilator Position BrainPak	06-0125-40
2	Stabilator / Limit Switch Harness	10-1111-01
3	Bench Power Adapter	10-1201-04
4	Series I to Series II Power Adapter Harness	11-0106-02
5	Lock Pin	06-1009-55
6	Limit Switch Adjustment Procedure	06-1229-50
7	Transit Case	11-0106-04

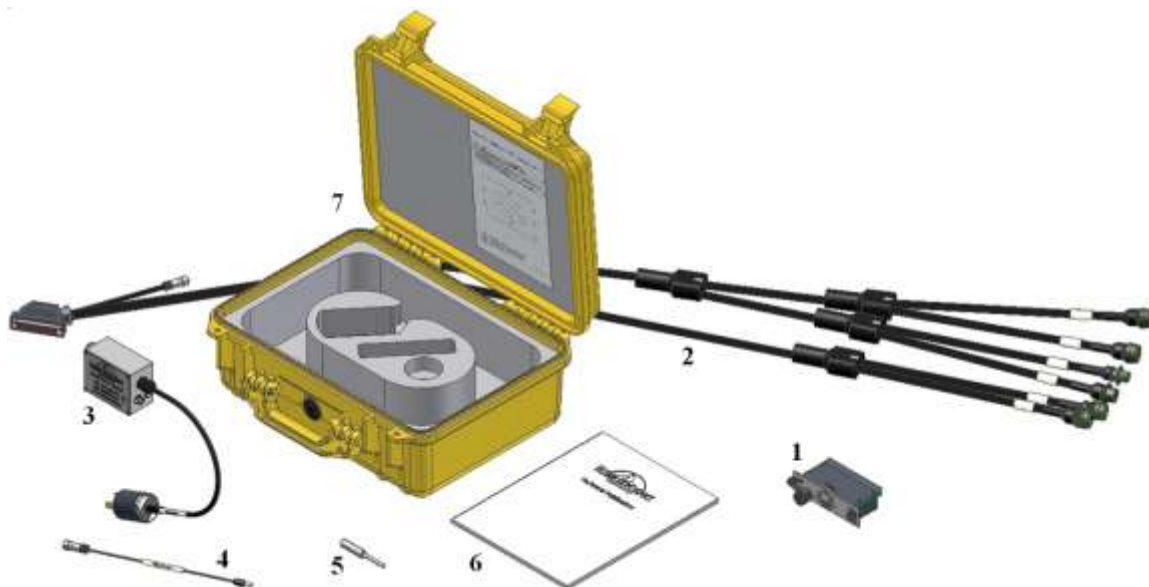


Figure 1-1 – Limit Switch / Stabilator Position Sensor Set

Item 1 – BrainPak

The BrainPak is a removable hardware cartridge that contains the system’s programming. The user directs system operation via the BrainPak’s Encoder knob.

Item 2 – Stabilator / Limit Switch Harness

This harness connects the UxValidator to the Position Transmitter / Limit Switch Assembly.

Item 3 – Bench Power Adapter

This component interfaces between bench power and Stabilator / Limit Switch Harness connectors P604 and P605.

Item 4 – Series I to Series II Power Adapter Harness

This component interfaces between the Stabilator / Limit Switch Harness power connector and a Series I UxValidator power port.

Item 5 – Lock Pin

The lock pin is used to hold the pivot arm in place during the adjustment procedure.

Item 6 – Limit Switch Adjustment Procedure

A copy of this procedure is provided with this set. An on-line version (in PDF format) is available at the ULTRAX website.

Item 7 – Transit Case

The Limit Switch / Stabilator Position Sensor Set is provided in a transit case that houses the set’s components. The set’s Serial Number and Part Number are located on the data plate next to the carrying handle.

The following table lists the physical characteristics of the Limit Switch / Stabilator Position Sensor Set.

Table 1-2 – Physical Characteristics

Input Power	
DC Voltage	18 to 36 VDC, <0.6A
Dimensions (L x W x H, in inches)	
BrainPak	4.5 x 1.2 x 3.0
Bench Power Adapter	4.1 x 2.5 x 1.7
Transit Case	12.75 x 16.5 x 6.75
Weight	
BrainPak	0.31 lbs
Transit Case, full, with standard equipment	7.25 lbs

1.2 Series I or II UxValidator Set

An UxValidator is needed to operate the Limit Switch / Stabilator Position Sensor Set, but it is not part of the set. Either a Series I or Series II UxValidator can be used.

A. Series I UxValidator, PN 03-1217-02:

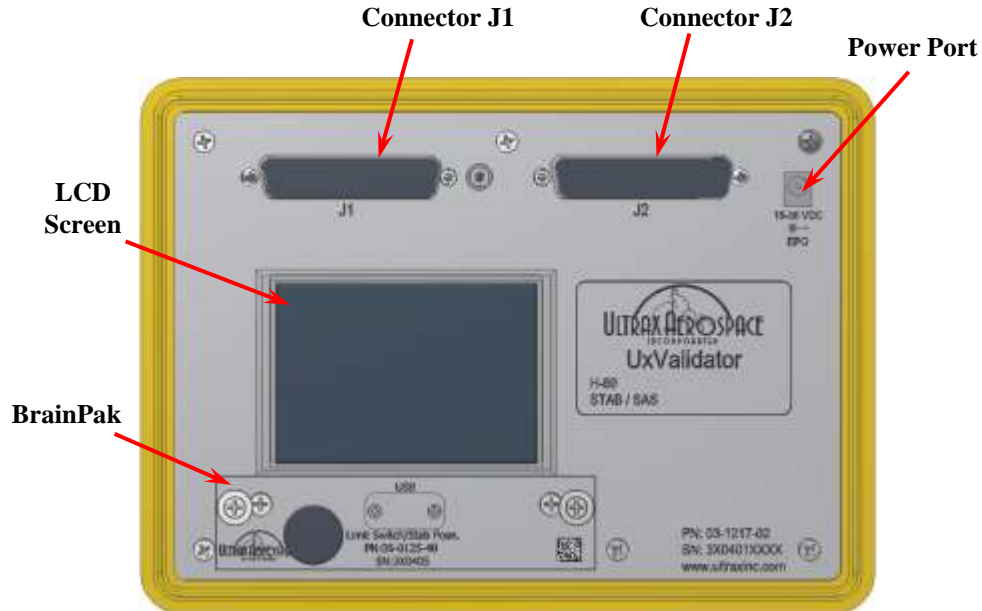


Figure 1-2 – Series I UxValidator Chassis with BrainPak

To be used with the Limit Switch / Stabilator Position Sensor Set, this UxValidator chassis must have several additional components, all of which are included in TS-3920C Stab/SAS Set PN 05-0330-07 or the Series I Pod Adapter Set, PN 10-0210-01. (Refer to the Series I Pod Adapter Set Maintenance Manual, PN 10-0210-19, for further information about using the Series I UxValidator and the Pod Adapter Set.)

B. Series II UxValidator, PN 08-0911-02:

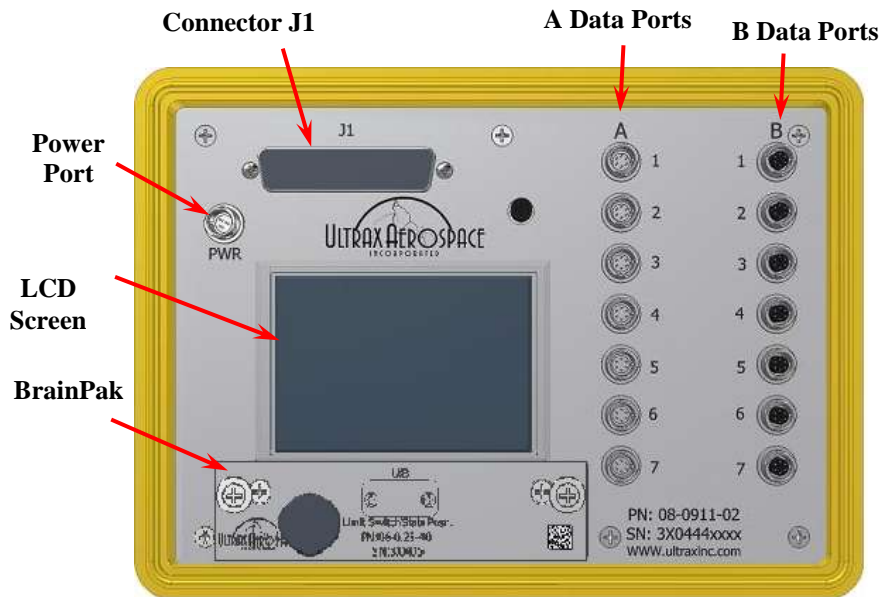


Figure 1-3 – Series II UxValidator Chassis with BrainPak

The Series II UxValidator is the main component in the Series II UxValidator Set, PN 10-0210-02, which contains both the UxValidator chassis PN 08-0911-02 and other needed components. This set can be used with many of the ULTRAX specific troubleshooting sets.

Refer to the Series II UxValidator Set Maintenance Manual, PN 10-0210-17, for further information about the Series II UxValidator and the other components in the set.

C. Either UxValidator:

The UxValidator chassis (Series I or Series II) houses the LCD Display and also holds the BrainPak. System power is typically provided through the UxValidator's power port. Physical connections to other system components are provided via J1 and J2 on a Series I UxValidator or via and J1 and the A and B Data Ports on a Series II UxValidator.

Power is applied to the UxValidator power port. During aircraft testing, 28Vdc aircraft power is normally supplied through the UxValidator Power Supply cable (24V/1.5A DC). When updating firmware or doing maintenance procedures, the AC power adapter cable is typically used. During any operation of the UxValidator, if power is removed, the UxValidator immediately shuts down and all outputs turn off.



2.0 On-Aircraft Procedure for H60A/L Helicopters

2.1 Initial Set-up

Test Equipment:

Series II UxValidator Set, PN 10-0210-02

or

Series 1 UxValidator, PN 03-1217-02 (part of the 05-0330-07 TS-3920C Stab/SAS Set)

Tools:

Limit Switch / Stabilator Position Sensor Set, PN 10-1009-56

Electrical Repairer Toolkit, SC 5180-99-B06

Torque Wrench, 0 to 30 inch-pounds

Materials and Parts:

Cleaning Compound, Solvent (-23)

Cheesecloth, CCCC440 (-23)

Towel, Machinery-Wiping (-23)

Personnel Required:

Aircraft Electrical Repairer MOS 15F

References:

TM 1-1520-237-23

Equipment Condition:

Position Transmitter/Limit Switch

Assembly removed.

2.2 Preparation

- A. If not already done, remove the Position Transmitter/Limit Switch Assembly from the aircraft. (-23)
- B. Remove all dirt, dust, oil, grease, and other foreign matter from the position transmitter, limit switches, wiring, and connectors using cheesecloth dampened with an appropriate cleaning compound. (-23)
- C. Dry all surfaces using a machinery-wiping towel. (-23)
- D. Inspect the assembly.
VERIFY that:
 1. Wires are not broken or burnt.
 2. Connector pins are not broken or bent.
 3. Components are secure and in good condition.
 - If results are not as specified, repair or replace wiring and/or components as required.

NOTE

Before using the UxValidator, always run Self-test as described in the applicable ULTRAX maintenance manual.

2.3 Connections

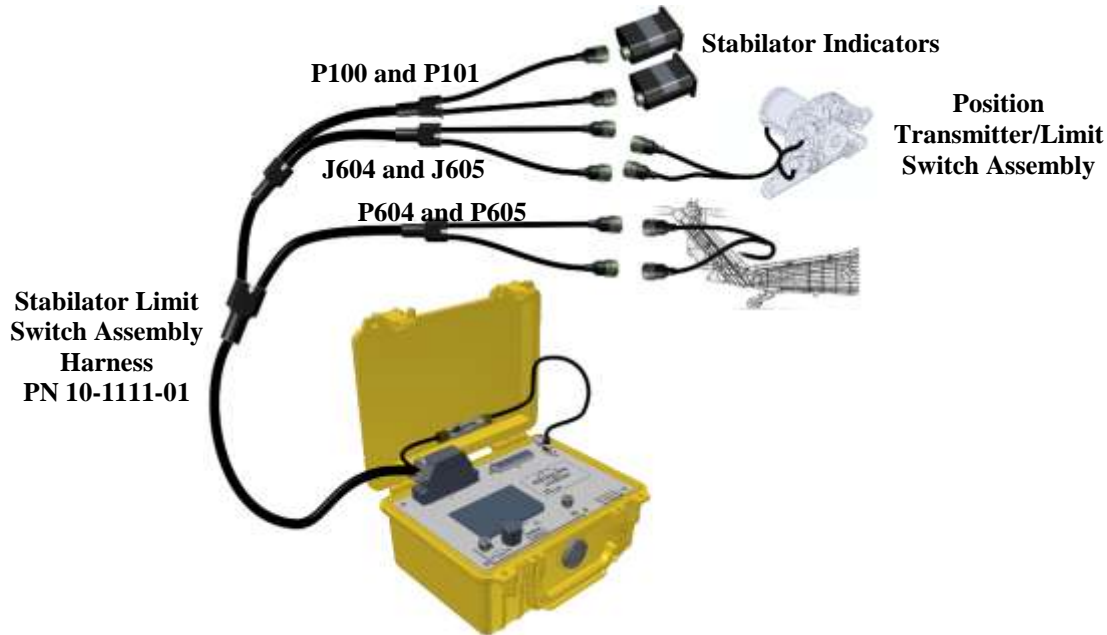


Figure 2-1 – On Aircraft (AVUM) System Hook-ups, H60A/L

- A. Install BrainPak PN 06-1025-40 into the UxValidator chassis.
- B. Connect the Stabilator Limit Switch / Harness, PN 10-1111-01:
 1. Connect the harness to J1 on the UxValidator, and connect its adjacent power connector to the UxValidator's power port. (See the following figure.) If you are using a Series I UxValidator chassis (PN 03-1217-02), connect the Series I to Series II Power Adapter Harness, PN 11-0106-02, between the UxValidator's power port and the adjacent power connector on the Stabilator / Limit Switch Harness.



Figure 2-2 – Power Hook-up with Series I UxValidator

2. Connect Position Transmitter/Limit Switch Assembly connectors P604 and P605 to connectors J604 to J605, respectively, of the Stabilator / Limit Switch Harness.

3. Connect Stabilator / Limit Switch Harness connectors P604 and P605 to aircraft connectors J604 and J605, respectively.

NOTE

- The Position Transmitter/Limit Switch Assembly is adjusted to match the load of the Stabilator Position Indicators. Therefore, when adjusting this assembly, use the indicators that will be installed on the aircraft.
- Only one set of Stabilator Indicators should be connected at one time.

4. If desired, remove the Stabilator Indicators from the cockpit and connect them to Stabilator / Limit Switch Harness connectors P100 and P101.

2.4 Full Range

- A. While observing the Stabilator Indicators, gently move the pivot arm on the Position Transmitter/Limit Switch Assembly through its full range.
- B. VERIFY that the Stabilator Indicator pointers move smoothly as the pivot arm assembly is moved from the up limit to the down limit.
 - If the result is not as specified, replace the Position Transmitter. (-23)

2.5 10° Down

- A. Turn the pivot arm to the 10° down position. Lock the arm in place using lock pin PN 06-1009-55 through the slot in the baseplate and the hole in the pivot arm.
- B. VERIFY that the UxValidator indicates 9.5° to 7.5°.
 - If the result is not as specified, adjust the Position Transmitter:
 1. Remove the cotter pins.
 2. Loosen the nuts enough to allow the Position Transmitter to turn.
 3. Adjust the Position Transmitter until the Stabilator Indicators indicate 10° down. (The UxValidator will read 8.4 to 8.6°.)
 - If an 8.5° indication cannot be obtained, replace the Position Transmitter. (-23)
 4. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
 5. Re-install the cotter pins. (-23)

CAUTION

Use care when positioning the pivot assembly in the -8° and +40° slot positions. Too much force through the alignment pin can damage the Position Transmitter's synchro shaft.

- C. Remove the lock pin from the pivot arm and slot.

2.6 8° Up

- A. Turn the pivot arm to the 8° UP position. Lock the arm in place using the wide end of the lock pin in the slot.
- B. VERIFY that the Stabilator Indicators indicate a deflection of 7° to 9° up.
 - If the result is not as specified, ensure that pressure is applied only to the hole end of the pivot arm (to hold against the spring force of the limit switch).
- C. VERIFY that the No. 1 and No. 2 UP LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the UP limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 UP LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates -7.0° to -9.0°.
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. Remove the lock pin from the pivot arm and baseplate.

2.7 40° Down

- A. Turn the pivot arm to the 40° DOWN position. Lock the arm in place using the lock pin.
- B. VERIFY that the Stabilator Indicator indicates a deflection of 37° to 39°.
 - If the result is not as specified, ensure that pressure is applied only to the hole end of the pivot arm (to hold against the spring force of the limit switch).

- C. VERIFY that the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the DOWN limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates 36.5 to 39.5°.
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. Remove the lock pin from the pivot arm and baseplate.

2.8 Shut-down

- A. Turn off aircraft power.
- B. Disconnect all test equipment.
- C. Re-install the Position Transmitter/Limit Switch Assembly into the aircraft. (-23)

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3.0 On-Bench Procedure for H60A/L Helicopters

3.1 Initial Set-up

Test Equipment:

Series II UxValidator Set, PN 10-0210-02
or
Series 1 UxValidator, PN 03-1217-02 (part of
the 05-0330-07 TS-3920C Stab/SAS Set)

Personnel Required:

Aircraft Electrical Repairer MOS 15F

Tools:

Limit Switch / Stabilator Position Sensor Set,
PN 10-1009-56
Electrical Repairer Toolkit, SC 5180-99-B06
Torque Wrench, 0 to 30 inch-pounds

References:

TM 1-1520-237-23

Materials and Parts:

Cleaning Compound, Solvent (-23)
Cheesecloth, CCCC440 (-23)
Towel, Machinery-Wiping (-23)

Equipment Condition:

Position Transmitter/Limit Switch
Assembly removed.
115Vac, 400Hz, single-phase power
available.

WARNING

Use extreme care when working with the 115Vac/400Hz bench power supply voltage.

3.2 Preparation

- A. Remove all dirt, dust, oil, grease, and other foreign matter from the position transmitter, limit switches, wiring, and connectors using cheesecloth dampened with an appropriate cleaning compound. (-23)
- B. Dry all surfaces using a machinery-wiping towel. (-23)
- C. Inspect the assembly.
VERIFY that:
 1. Wires are not broken or burnt.
 2. Connector pins are not broken or bent.
 3. Components are secure and in good condition.
 - If results are not as specified, repair or replace wiring and/or components as appropriate.

NOTE

Before using the UxValidator, always run Self-test as described in the applicable ULTRAX maintenance manual.

3.3 Connections

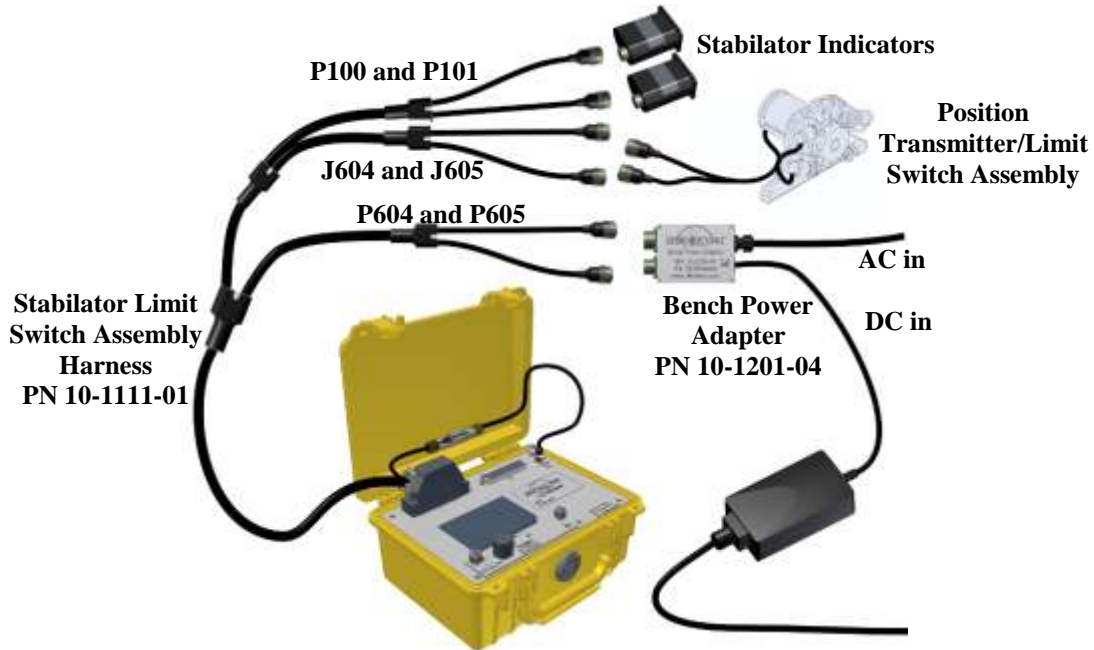


Figure 3-1 – On Bench (AVIM) System Hook-ups, H60A/L

- A. Install BrainPak PN 06-1025-40 into the UxValidator chassis.
- B. Connect the Stabilator / Limit Switch Harness, PN 10-1111-01:
 1. Connect the harness to J1 on the UxValidator, and connect its adjacent power connector to the UxValidator’s power port. (See the following figure.) If you are using a Series I UxValidator chassis (PN 03-1217-02), connect Series I to Series II Power Adapter Harness, PN 11-0106-02, between the UxValidator’s power port and the adjacent power connector on the Stabilator / Limit Switch Harness.



Figure 3-2 – Power Hook-up with Series I UxValidator

2. Connect Position Transmitter/Limit Switch Assembly connectors P604 and P605 to connectors J604 to J605, respectively, of the Stabilator / Limit Switch Harness.

3. Connect Stabilator / Limit Switch Harness connectors P604 and P605 to the Bench Power Adapter PN 10-1201-04.

NOTE

The Position Transmitter/Limit Switch Assembly is adjusted to match the load of the Stabilator Position Indicators. Therefore, when adjusting this assembly, use the indicators that will be installed on the aircraft.

4. Connect the Stabilator Indicators to Stabilator / Limit Switch Harness connectors P100 and P101.

C. Apply AC and DC power to Bench Power Adapter PN 10-1201-04:

1. Apply 24V DC power:

- For a Series I chassis PN 03-1217-02, connect Power Adapter PN 08-1210-31 from Stab/SAS Kit PN 05-0330-07.
- For a Series II chassis PN 08-0911-0X, connect AC Power Adapter PN 08-1229-20 from the Series II UxValidator Kit PN 10-0210-02.



**Series I
Power Adapter Connection**



**Series II
Power Adapter Connection**

Figure 3-3 – DC Power Connection to Bench Power Adapter

2. Apply 115VAC, 400Hz power by connecting P1 of the Bench Power Adapter to 115Vac 400Hz bench supply.

NOTE

If the 115Vac connector isn't compatible with your power source, remove the connector and hook up power as follows:

- Connect the black wire to 115VAC, 400Hz.
- Connect the white wire to AC source neutral.

3.4 Full Range

- A. While observing the Stabilator Indicators, gently move the pivot arm on the Position Transmitter/Limit Switch Assembly through its full range.
- B. VERIFY that the Stabilator Indicator pointers move smoothly as the pivot assembly is moved from the up limit to the down limit.
 - If the result is not as specified, replace the Position Transmitter. (-23)

3.5 10° Down

- A. Turn the pivot arm to the 10° down position. Lock the arm in place using lock pin PN 06-1009-55 through the slot in the baseplate and the hole in the pivot arm.
- B. VERIFY that the UxValidator indicates 9.5° to 7.5°.
 - If the result is not as specified, adjust the Position Transmitter:
 1. Remove the cotter pins.
 2. Loosen the nuts enough to allow the Position Transmitter to turn.
 3. Adjust the Position Transmitter until the Stabilator Indicators indicate 10° down. (The UxValidator will read 8.4 to 8.6°.)
 - If an 8.5° indication cannot be obtained, replace the Position Transmitter. (-23)
 4. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
 5. Re-install the cotter pins. (-23)

CAUTION

Use care when positioning the pivot assembly in the -8° and +40° slot positions. Too much force through the alignment pin can damage the Position Transmitter's synchro shaft.

- C. Remove the lock pin from the pivot arm and slot.

3.6 8° Up

- A. Turn the pivot arm to the 8° UP position. Lock the arm in place using the wide end of the lock pin in the slot.
- B. VERIFY that the Stabilator Indicators indicate a deflection of 7° to 9° up.
 - If the result is not as specified, ensure that pressure is applied only to the hole end of the pivot arm (to hold against the spring force of the limit switch).
- C. VERIFY that the No. 1 and No. 2 UP LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the UP limit switches. (Firm pressure might be needed to activate the limit switches.)

- E. VERIFY that both the No. 1 and No. 2 UP LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates -7.0° to -9.0° .
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. Remove the lock pin from the pivot arm and baseplate.

3.7 40° Down

- A. Turn the pivot arm to the 40° DOWN position. Lock the arm in place using the lock pin.
- B. VERIFY that the Stabilator Indicator indicates a deflection of 37° to 39° .
 - If the result is not as specified, ensure that pressure is applied only to the hole end of the pivot arm (to hold against the spring force of the limit switch).
- C. VERIFY that the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the DOWN limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates 36.5 to 39.5° .
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. Remove the lock pin from the pivot arm and baseplate.

3.8 Shut-down

- A. Turn off bench power.
- B. Disconnect all test equipment.
- C. Re-install the Position Transmitter/Limit Switch Assembly into the aircraft.
(-23)



4.0 On-Aircraft Procedure for H60M Helicopters

4.1 Initial Setup

Test Equipment:

Series II UxValidator Set, PN 10-0210-02
or
Series 1 UxValidator, PN 03-1217-02
(part of the 05-0330-07 TS-3920C
Stab/SAS Set)

Personnel Required:

Aircraft Electrical Repairer MOS 15F

Tools:

Limit Switch / Stabilator Position Sensor
Set, PN 10-1009-56
Electrical Repairer Toolkit,
SC 5180-99-B06
Torque Wrench, 0 to 30 inch-pounds

References:

TM 1-1520-280-23

Materials and Parts:

Cleaning Compound, Solvent (-23)
Cheesecloth, CCCC440 (-23)
Towel, Machinery-Wiping (-23)

Equipment Condition:

Position Transmitter/Limit Switch
Assembly removed.

4.2 Preparation

- A. If not already done, remove the Position Transmitter/Limit Switch Assembly from the aircraft. (-23)
- B. Remove all dirt, dust, oil, grease, and other foreign matter from the position transmitter, limit switches, wiring, and connectors using cheesecloth dampened with an appropriate cleaning compound. (-23)
- C. Dry all surfaces using a machinery-wiping towel. (-23)
- D. Inspect the assembly.
VERIFY that:
 1. Wires are not broken or burnt.
 2. Connector pins are not broken or bent.
 3. Components are secure and in good condition.
 - If results are not as specified, repair or replace wiring and/or components as required.

NOTE

Before using the UxValidator, always run Self-test as described in the applicable ULTRAX maintenance manual.

4.3 Connections

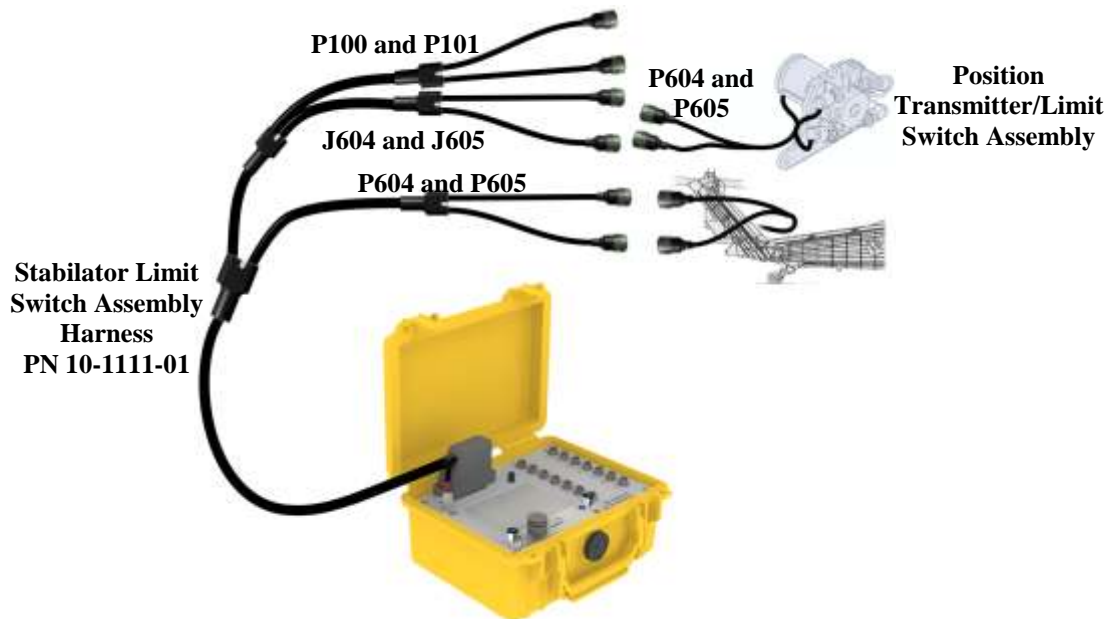


Figure 4-1 – On Aircraft (AVUM) System Hook-ups, H60M

- A. Install BrainPak PN 06-1025-40 into the UxValidator chassis.
- B. Connect the Stabilator / Limit Switch Harness, PN 10-1111-01:
 1. Connect the harness to J1 on the UxValidator, and connect its adjacent power connector to the UxValidator's power port. (See the following figure.) If you are using a Series I UxValidator chassis (PN 03-1217-02), connect Series I to Series II Power Adapter Harness, PN 11-0106-02, between the UxValidator's power port and the adjacent power connector on the Stabilator / Limit Switch Harness.



Figure 4-2 – Power Hook-up with Series I UxValidator

2. Connect Position Transmitter/Limit Switch Assembly connectors P604 and P605 to connectors J604 to J605, respectively, of the Stabilator / Limit Switch Harness.

3. Connect Stabilator / Limit Switch Harness connectors P604 and P605 to aircraft connectors J604 and J605, respectively.

NOTE

Nothing will be connected to Stabilator / Limit Switch Harness connectors P100 and P101. These connectors are used only with H-60A/L aircraft.

- C. Turn on AC and DC aircraft power.

NOTE

Both the pilot's and copilot's FMSs are used during this operational check.

- D. On the copilot's FMS, momentarily press the TST fixed function key (FFK-TST) to display the FMS TEST page.
- E. On the AFCS, momentarily press the 7 soft key (SK-7) to display the AFCS TEST page.

NOTE

If PARAM DISPLAY does not appear as the label for SK-4, then momentarily press SK-5 (RETURN).

- F. Momentarily press SK-4 (PARAM DISPLAY) to display the NEXT PARAM PAGE page.
- G. Repeatedly press SK-4 (NEXT PARAM PAGE) until the STABILATOR PARAM page is displayed.

NOTE

If PARAM DISPLAY does not appear as the label for SK-4, then momentarily press SK-5 (RETURN).

- H. Momentarily press FFK-TST (on the pilot's FMS) to display the FMS TEST page.
- I. Momentarily press SK-7 (on the AFCS) to display the AFCS TEST page.

4.4 Full Range

- A. While observing the Stabilator Indicator on the MFD, gently move the pivot arm on the Position Transmitter/Limit Switch Assembly through its full range.

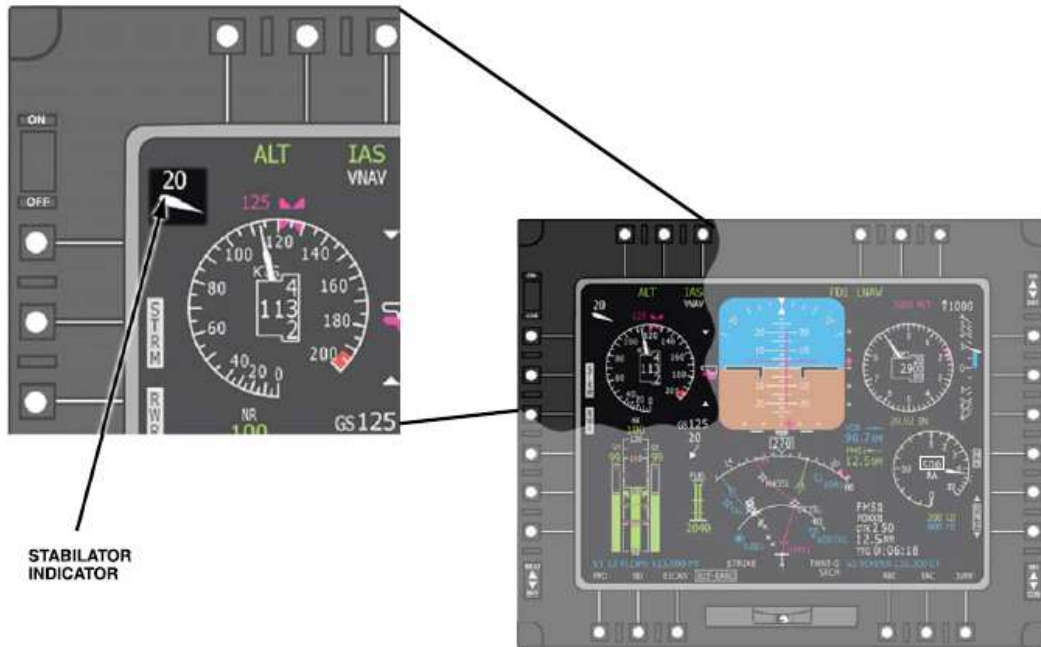


Figure 4-3 – Location of Stabilator Indication

- B. VERIFY that the numbers on the Stabilator Indicator and the UxValidator display change smoothly as the pivot arm is moved through its full range.
- If the result is not as specified, replace the Position Transmitter. (-23)

4.5 10° Down

- A. Turn the pivot arm to the 10° down position. Lock the arm in place using lock pin PN 06-1009-55 through the slot in the baseplate and the hole in the pivot arm.
- B. VERIFY that the UxValidator indicates 9.0° to 11.0°.
- If the result is not as specified, adjust the Position Transmitter:
 1. Remove the cotter pins from the 4 bolts securing the transmitter mounting brackets.
 2. Loosen the nuts enough to allow the Position Transmitter to turn.
 3. Adjust the Position Transmitter until the UxValidator indicates 9.9 to 10.1°. (The Stabilator Indicators will indicate 10° down.)
 - If a 10° indication cannot be obtained, replace the Position Transmitter. (-23)
 4. Tighten the nuts, and torque them to 19 to 21 inch-pounds.

5. Re-install the cotter pins. (-23)

CAUTION

Use care when positioning the pivot assembly in the -8° and $+40^{\circ}$ slot positions. Too much force through the alignment pin can damage the Position Transmitter's synchro shaft.

- C. VERIFY that the Pilot's and Copilots FMSs display a stabilator angle of 9.5° to 10.5° .
- D. Remove the lock pin from the pivot arm and slot.

4.6 8° Up

- A. Turn the pivot arm to the 8° UP position. Lock the arm in place using the wide end of the lock pin in the slot.
- B. VERIFY that the UxValidator indicates a deflection of -7.0° to -9.0° .
- C. VERIFY that the No. 1 and No. 2 UP LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 - 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 - 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the UP limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 UP LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 - 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 - 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates -7.0° to -9.0° .
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. VERIFY that the Pilot's and Copilots FMSs display a stabilator angle of 7.0° to 9.0° .
- I. Remove the lock pin from the pivot arm and baseplate.

4.7 40° Down

- A. Turn the pivot arm to the 40° DOWN position. Lock the arm in place using the lock pin.
- B. VERIFY that the UxValidator indicates a deflection of 39.0° to 41.0°.
- C. VERIFY that the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the DOWN limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates 39.0° to 41.0°.
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. VERIFY that the Pilot's and Copilots FMSs display a stabilator angle of 37° to 39°.
- I. Remove the lock pin from the pivot arm and baseplate.

4.8 Shut-down

- A. Turn off aircraft power.
- B. Disconnect all test equipment.
- C. Re-install the Position Transmitter/Limit Switch Assembly into the aircraft.
(-23)

5.0 On-Bench Procedure for H60M Helicopters

5.1 Initial Setup

Test Equipment:

Series II UxValidator Set, PN 10-0210-02
or
Series 1 UxValidator, PN 03-1217-02
(part of the 05-0330-07 TS-3920C
Stab/SAS Set)

Personnel Required:

Aircraft Electrical Repairer MOS 15F

Tools:

Limit Switch / Stabilator Position Sensor
Set, PN 10-1009-56
Electrical Repairer Toolkit,
SC 5180-99-B06
Torque Wrench, 0 to 30 inch-pounds

References:

TM 1-1520-280-23

Materials and Parts:

Cleaning Compound, Solvent (-23)
Cheesecloth, CCCC440 (-23)
Towel, Machinery-Wiping (-23)

Equipment Condition:

Position Transmitter/Limit Switch
Assembly removed.
115Vac, 400Hz, single-phase power
available.

WARNING

Use extreme care when working with the 115Vac/400Hz bench power supply voltage.

5.2 Preparation

- A. Remove all dirt, dust, oil, grease, and other foreign matter from the position transmitter, limit switches, wiring, and connectors using cheesecloth dampened with an appropriate cleaning compound. (-23)
- B. Dry all surfaces using a machinery-wiping towel. (-23)
- C. Inspect the assembly.
VERIFY that:
 1. Wires are not broken or burnt.
 2. Connector pins are not broken or bent.
 3. Components are secure and in good condition.
 - If results are not as specified, repair or replace wiring and/or components as required.

NOTE

Before using the UxValidator, always run Self-test as described in the applicable ULTRAX maintenance manual.

5.3 Connections

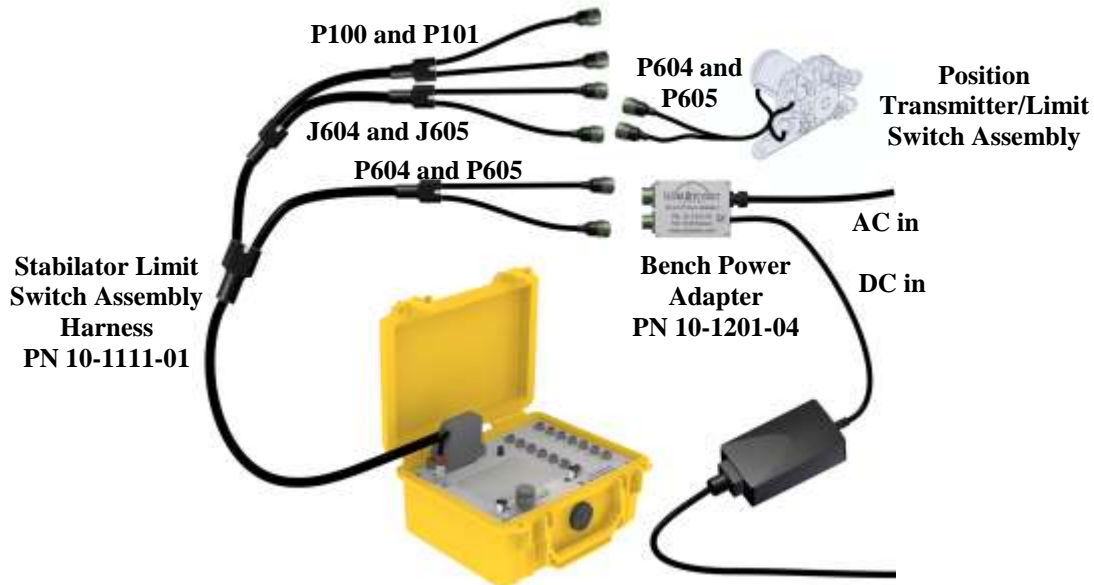


Figure 5-1 – On Bench (AVIM) System Hook-ups, H60M

- A. Install BrainPak PN 06-1025-40 into the UxValidator chassis.
- B. Connect the Stabilator / Limit Switch Harness, PN 10-1111-01:
 1. Connect the harness to J1 on the UxValidator, and connect its adjacent power connector to the UxValidator's power port. (See the following figure.) If you are using a Series I UxValidator chassis (PN 03-1217-02), connect Series I to Series II Power Adapter Harness, PN 11-0106-02, between the UxValidator's power port and the adjacent power connector on the Stabilator / Limit Switch Harness.



Figure 5-2 – Power Hook-up with Series I UxValidator

2. Connect Position Transmitter/Limit Switch Assembly connectors P604 and P605 to connectors J604 to J605, respectively, of the Stabilator / Limit Switch Harness.

3. Connect Stabilator / Limit Switch Harness connectors P604 and P605 to the Bench Power Adapter PN 10-1201-04.

NOTE

Nothing will be connected to Stabilator / Limit Switch Harness connectors P100 and P101. These connectors are used only with H-60A/L aircraft.

- C. Apply AC and DC power to Bench Power Adapter PN 10-1201-04:

1. Apply 24V DC power:

- For a Series I chassis PN 03-1217-02, connect Power Adapter PN 08-1210-31 from Stab/SAS Kit PN 05-0330-07.
- For a Series II chassis PN 08-0911-0X, connect AC Power Adapter PN 08-1229-20 from the Series II UxValidator Kit PN 10-0210-02.



**Series I
Power Adapter Connection**



**Series II
Power Adapter Connection**

Figure 5-3 – DC Power Connection to Bench Power Adapter

2. Apply 115VAC, 400Hz power by connecting P1 of the Bench Power Adapter to 115Vac 400Hz bench supply.

NOTE

If the 115Vac connector isn't compatible with your power source, remove the connector and hook up power as follows:

- Connect the black wire to 115VAC, 400Hz.
- Connect the white wire to AC source neutral.

5.4 Full Range

- A. While observing the display of the UxValidator, gently move the pivot arm on the Position Transmitter/Limit Switch Assembly through its full range.
- B. VERIFY that the numbers on the UxValidator display change smoothly as the pivot arm is moved through its full range.
 - If the result is not as specified, replace the Position Transmitter. (-23)

5.5 10° Down

- A. Turn the pivot arm to the 10° down position. Lock the arm in place using lock pin PN 06-1009-55 through the slot in the baseplate and the hole in the pivot arm.
- B. VERIFY that the UxValidator indicates 9.0° to 11.0°.
 - If the result is not as specified, adjust the Position Transmitter:
 1. Remove the cotter pins from the 4 bolts securing the transmitter mounting brackets.
 2. Loosen the nuts enough to allow the Position Transmitter to turn.
 3. Adjust the Position Transmitter until the UxValidator indicates 9.9 to 10.1°. (The Stabilator Indicators will indicate 10° down.)
 - If a 10° indication cannot be obtained, replace the Position Transmitter. (-23)
 4. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
 5. Re-install the cotter pins. (-23)

CAUTION

Use care when positioning the pivot assembly in the -8° and +40° slot positions. Too much force through the alignment pin can damage the Position Transmitter's synchro shaft.

- C. Remove the lock pin from the pivot arm and slot.

5.6 8° Up

- A. Turn the pivot arm to the 8° UP position. Lock the arm in place using the wide end of the lock pin in the slot.
- B. VERIFY that the UxValidator indicates a deflection of -7.0° to -9.0°.
- C. VERIFY that the No. 1 and No. 2 UP LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the UP limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 UP LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)



2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates -7.0° to -9.0° .
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. Remove the lock pin from the pivot arm and baseplate.

5.7 40° Down

- A. Turn the pivot arm to the 40° DOWN position. Lock the arm in place using the lock pin.
- B. VERIFY that the UxValidator indicates a deflection of 39.0° to 41.0° .
- C. VERIFY that the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator remain off.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns off.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- D. With the lock pin still installed, push the pivot arm toward the DOWN limit switches. (Firm pressure might be needed to activate the limit switches.)
- E. VERIFY that both the No. 1 and No. 2 DOWN LIMIT lights on the UxValidator turn on.
 - If the result is not as specified:
 1. Adjust the corresponding limit switch just until the light turns on.
 - If the trouble remains, replace the limit switch. (-23)
 2. Tighten the nuts, and torque them to 19 to 21 inch-pounds.
- F. With the lock pin still in the slot, carefully move the pivot arm back and forth.
- G. VERIFY that the UxValidator indicates 39.0° to 41.0° .
 - If the result is not as specified, replace the baseplate and/or retainer. (-23)
- H. Remove the lock pin from the pivot arm and baseplate.

5.8 Shut-down

- A. Turn off bench power.
- B. Disconnect all test equipment.

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6.0 Figures

Refer to the following figures as needed.

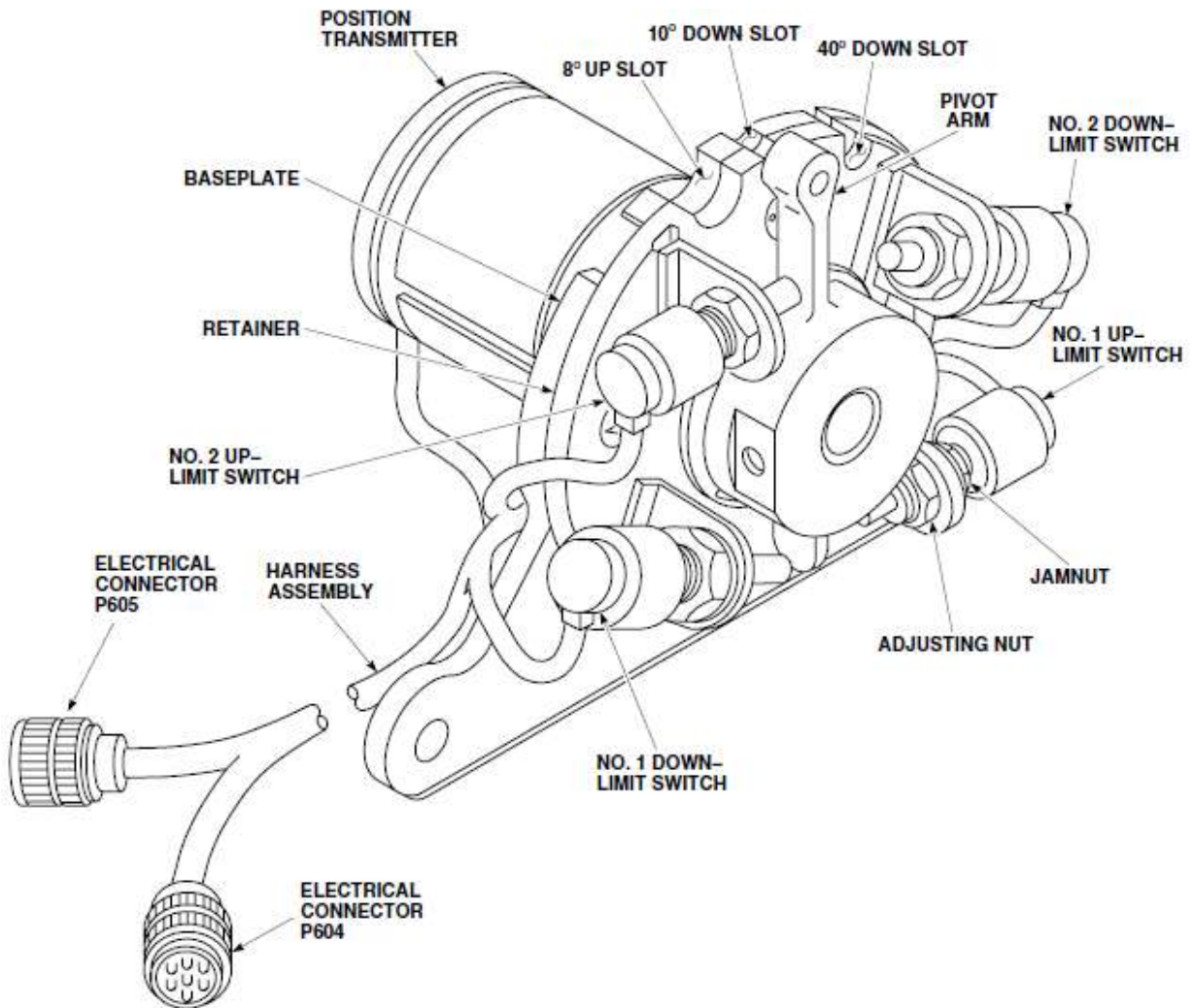


Figure 6-1 – Position Transmitter/Limit Switch Assembly

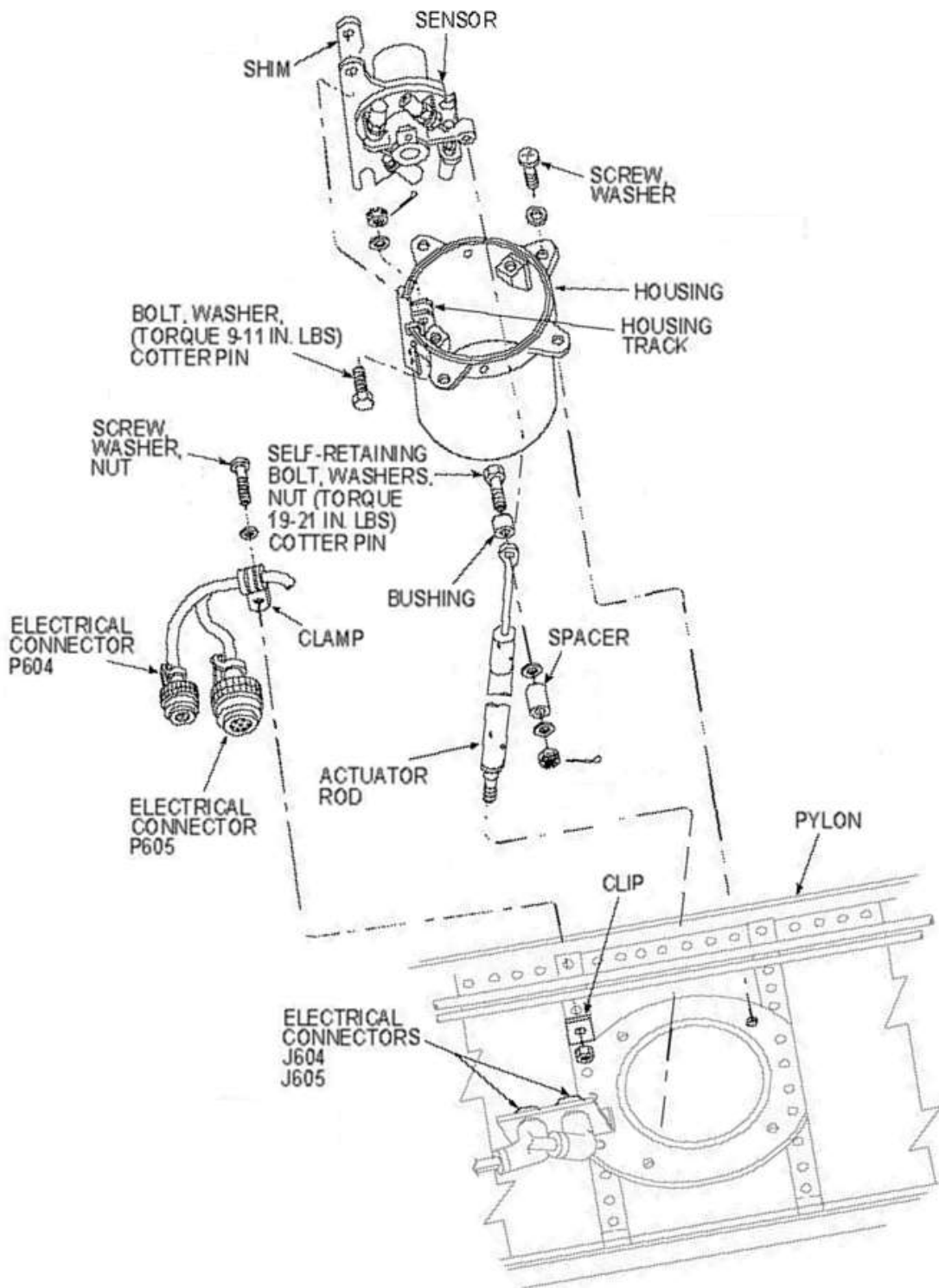


Figure 6-2 – Installation of Position Transmitter/Limit Switch Assembly

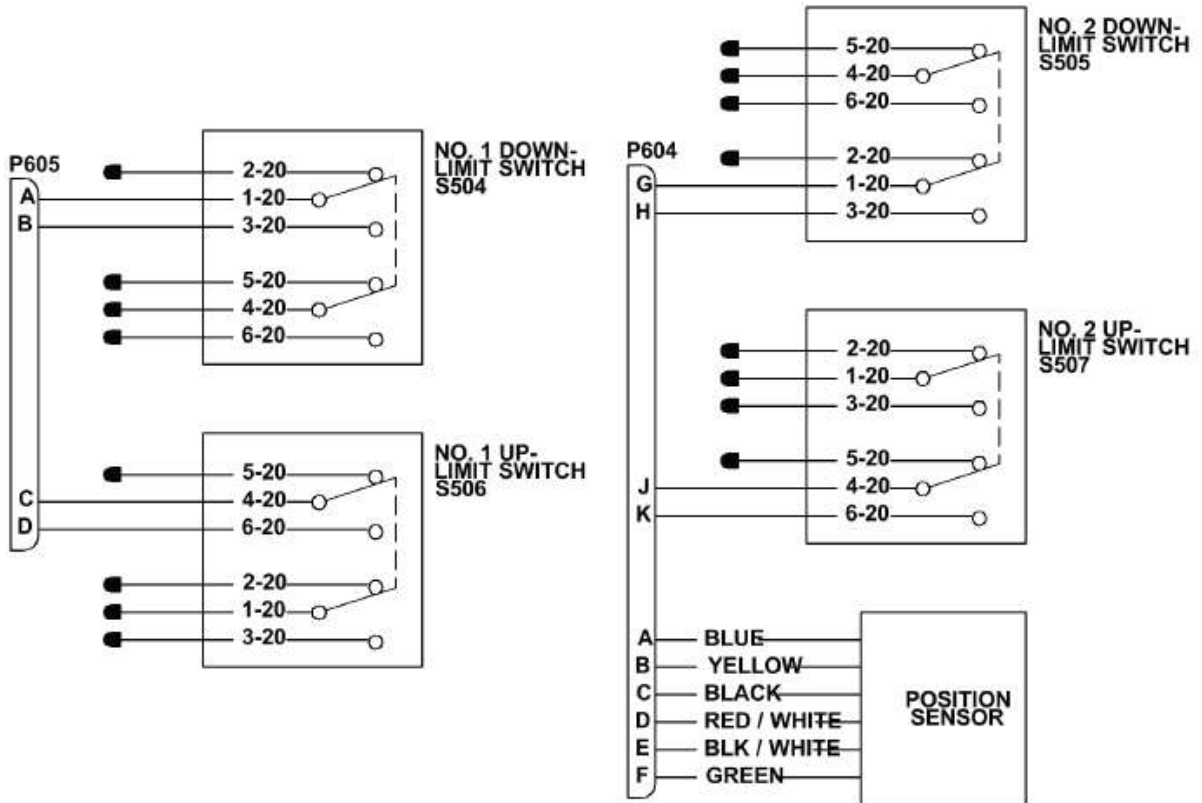


Figure 6-3 – Position Transmitter/Limit Switch Assembly Schematic

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