



**INSTRUCTIONS FOR CONTINUED
AIRWORTHINESS**

**FOR
CONQUEST 425 AIRCRAFT**

**WITH
ELECTRONIC TORQUE INDICATION SYSTEM**

PER FAA STC SA10816SC

Document No. 200707-30

REV. IR

<u>NOTICE</u>
<p>This document must be referenced on Block 8 of FAA form 337 and added to the aircraft permanent record as required by 14 CFR Part 91, §91.417(a)(2)(vi) when the reference FAA-STC part is installed on eligible aircraft. This document complies with the requirements of 14 CFR Part 23, §23.1529, in accordance with 14 CFR Part 23, Appendix G.</p>
<p style="text-align: center;">Aircraft Serial No. _____</p> <p style="text-align: center;">Aircraft Registration No. _____</p>

REVISION LOG

REVISION	CHANGE DESCRIPTION	ENGINEER	DATE
IR	INITIAL RELEASE	C. ECKHART	01-22-08

TABLE OF CONTENTS

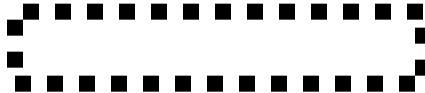
<u>Section</u>	<u>Page</u>
1. Introduction	3
2. Description	3
a. Engine Torque Indicator	3
b. Indicator Self-Tests	4
c. Engine Torque Transducer	5
d. Items Specific to S/N 425-0002 Thru S/N 425-0204 WITHOUT SK425-21 Incorporated	5
e. Items Specific to S/N 425-0002 Thru S/N 425-0204 WITH SK425- 21 Incorporated and S/N 425-0205 and After	
3. Inspection Requirements	5
4. Overhaul Periods	5
5. Maintenance Instructions	6
a. Inspection Procedures	6
b. Troubleshooting	6
c. Removal and Replacement	7
d. System Accuracy Check	7
e. Replacement Parts	8
f. Special Tools	10
6. Diagrams	10
Figure 1. Wiring Diagram for S/N 425-0002 thru S/N 425-0204 without SK425-21 incorporated	11
Figure 2. Wiring Diagram for S/N 425-0002 thru S/N 425-0204 with SK425-21 incorporated and S/N 425-0205 and after	12
Figure 3. Typical Wiring Routing for S/N 425-0002 thru S/N 425-0204 without SK425-21 incorporated	13
Figure 4. Typical Torque Transducer and Hose Installation	14
7. Reference Data	15
8. Airworthiness Limitations	15
9. Revision	15
10. Assistance	15

1. Introduction:

This document provides Instructions for the Continued Airworthiness (ICA) for Blackhawk Modifications, Inc. STC SA10816SC. This STC replaces the original engine torque indication system with a new electronic engine torque indication system with digital torque indication display.

NOTICE:

Section 8, titled “Airworthiness Limitations” and encircled by the following dash lined box is FAA approved and specifies maintenance required under 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved. To remain in compliance with the STC, the aircraft shall be maintained in accordance with these limitations.



This document supplements or supersedes the applicable and basic Conquest 425 Series Maintenance Manual only in those areas listed herein for the appropriate aircraft model and serial number.

2. Description:

a. Engine Torque Indicator

Each original torque indicator has been replaced by an electronic, micro-processor based indicator (Figure 1). Each indicator

1. is electrically powered by the DC electrical bus for the engine instruments through a 5 amp circuit breaker.
2. indicates the engine torque based upon a voltage signal from a DC powered pressure transducer mounted on the left side of the engine gear box flange.
3. displays the torque indication via the familiar rotating pointer showing power trends and torque limitations against a fixed scale plate, but now also provides better accuracy via a digital display.
4. includes a two-color (green/red) status LED.
5. is backlit and dimmable using the existing engine indicator lighting rheostats. Note: original post-lights have been removed.



Figure 1. Face of Torque Indicator

b. Indicator Self-Tests:

Upon initial power up, each indicator performs a self-test. During this test and prior to assuming normal operation,

1. the digital display initially displays “OK”, followed by “----”, then when the self test is complete the actual engine torque indication.
2. the status LED illuminates red then green, then extinguishes.
3. the pointer is driven from off scale to the full scale position, followed by the off scale zero position, then displays the actual torque indication.

During normal operation each indicator is conducting a continuous self-test on the indicator and the transducer’s signal. The result of this self-test is displayed using the status LED which is defined in Table 1 below.

Status LED Illumination	Description
None	Instrument is functioning normally ⁽¹⁾
Constant Red	Engine torque exceeds 1477 ft-lbs.
Flashing Red (4x per second)	Transducer signal has failed
Flashing Red (2x per second)	Instrument is not working correctly.

(1) If the pointer is parked below zero, the indicator is not electrically powered.

Table 1. Description of Status LED Illuminations

c. Engine Torque Transducer

Each original differential torque transducer has been replaced by an electronic differential transducer and is

1. mounted on the left side of the engine gear box flange,
2. powered by the same DC bus as for the engine instruments, and
3. sensing a high and low gear box oil pressure and converts this differential pressure into an electrical voltage which is the input to the cockpit torque indicators.

d. Items Specific to S/N 425-0002 Thru S/N 425-0204 WITHOUT SK425-21 Incorporated

1. All original high and low pressure plumbing has been removed between the pressure vessel and the engine except maybe within the wing leading edge directly behind the firewall.
2. All original high and low pressure plumbing in the cabin may be either retained, secured, and capped or removed. This is optional to the installer.
3. The original transmitter on the right side of the engine, and the original adaptor and oil separators on low pressure port have been discarded.
4. The pressure bulkhead fitting for the high pressure plumbing is capped, if originally existed.
5. The pressure bulkhead fitting for the low pressure plumbing has been removed.
6. Post-lights have been discarded.

e. Items Specific to S/N 425-0002 Thru S/N 425-0204 WITH SK425-21 Incorporated and S/N 425-0205 and After

1. Transducers and indicators and associated connectors have been replaced.
2. Post-lights have been removed.

3. Inspection Requirements

- a. No inspections are required with this installation.
- b. No life limited components exist with this installation.

4. Overhaul Periods

- a. No specific overhaul intervals are required with this installation.
- b. Overhaul is on condition for all components installed with this installation.

5. Maintenance Instructions:

a. Inspection Procedures:

No specific inspection procedures are required with this installation.

b. Troubleshooting:

Use the STATUS LED light in the indicator to assist with troubleshooting then Refer to Table 2. If the problem is not listed in Table 2, contact Blackhawk Modifications, Inc. or see the Blackhawk Modifications Installation Instructions, 200707-05 for additional guidance.

Refer to Section 5.f for special tools.

In general, adhere to the following:

1. Ensure no leaks exist from oil lines to the torque transducer.
2. Always check the aircraft wiring for shorts, opens or grounds and ensure no electrical power is being supplied before components are switched one side to the other for troubleshooting.
3. Never ground either transducer signal wire.
4. Always conduct a continuity check if any wires are changed or suspect. Refer to Section 6 Wiring Diagrams.
5. When operating the engine, do not indiscriminately increase engine power if the torque indicator appears to be reading excessively low. It is possible to overtorque the engine to the point where power selection overhaul is required without exceeding inter turbine temperature (ITT) or gas generator speed Ng Limits. Always troubleshoot the torque system if the indicator appears to be reading low.

Status LED Illumination	Description	Action
None and torque indication is suspect		Conduct system accuracy check in Section 5.d. If out of calibration, replace indicator and transducer.
None and analog pointer is sticking		Replace indicator.
None and pointer is parked below zero.	Indicator is not electrically powered.	Check circuit breaker, check connector security, or check continuity of wiring, otherwise replace indicator.
Constant Red	Torque indication exceeds 1477 ft-lbs or transducer signal exceeds 3.57 volts	Swap transducers or indicators, or conduct the calibration check in Section 5.d. to see if either the transducer or indicator needs to be replaced.
Flashing Red (4x per second)	Transducer signal has failed	Check connector security, check continuity of wiring, or swap transducers or indicators to see if transducer or indicator needs to be replaced.
Flashing Red (2x per second)	Instrument is not working correctly.	Check connector security, check continuity of wiring, or swap transducers or indicators to see if transducer or indicator needs to be replaced.

Table 2. Troubleshooting Guidelines

c. Removal and Replacement:

Refer to Chapter 77-10-04 Page 201 Section 2.A and 2.B in basic Cessna Model 425 Maintenance Manual for removal and installation of torque transducer or indicator except refer to Figure 4.

d. System Accuracy Check:

Refer to Section 5.f for special tools.

1. With 28v power applied to the aircraft, select battery master “on” and observe the torque indicator performs a self test after which the indicator pointer should be parked at or below “0”, the digital

indication should read “0” +50/-0 ft-lbs, and the Status LED lights at the 12:00 position must be extinguished.

2. Remove the pressure and vent hose from the transducer. Using a calibrated dead weight tester or air pressure regulator, apply pressure at the transducer high pressure fitting (on end of transducer) and check for the correct indication per the table below. Indicated digital torque tolerance is +/- 50 ft-lbs for the following pressure inputs. (indicated torque = 35.22 x pressure applied).

<u>Pressure (psi)</u>	<u>Indication (ft-lbs)</u>
35	1232
42	1479

3. Reconnect hoses. Re-install removed aircraft equipment.

e. Replacement Parts:

Refer to Section 6 and Table 3 on the next page for part definition and contact applicable vendor for replacement parts or Blackhawk Modifications.



		QTY	PART NO.	NAME	DESCRIPTION, VENDOR	ITEM
	x	1	MIL-S-38249	SEALANT	CS1900. FOR FIREWALL.	27
	x	4	AN363-1032	NUT	ITEM 17 CLAMPS	26
	x	2	AN365D-832	NUT	POST-LIGHT	25
	x	2	AN520B-832R15	SCREW	POST-LIGHT	24
	x	--	MIL-W-22759/16-20-9	WIRE	20 AWG, PLAIN, SINGLE WIRE	23
	x	2	200707-22	BRACKET	MADE FROM CESSNA P/N 5950052-5 OR -6 IAW 200707-05	22
	x	4	AN960-10L	WASHER	ITEM 17 CLAMPS	21
	x	4	AN525-10R8	SCREW	ITEM 17 CLAMPS	20
x	x	2	PT06E8-4S-SR	CONNECTOR	AMPHENOL. AT TRANSDUCER	19
	x	--	M27500-20TE2T14	WIRE	20 AWG, SHEILDDED, TWISTED PAIR	18
x	x	4	MS21919WH15	CLAMP	SECURES TRANSDUCERS	17
2	x	10	MS21919WH08	CLAMP	SECURES ITEM 14 HOSE AND WIRE BUNDLES.	16
x	x	2	124F003-4CR-0070	HOSE	STRATOFLEX TYPE C TSO-C53 FIRESLEEVED OR EQUIV.	15
x	x	2	124F002-4CR-0150	HOSE	STRATOFLEX TYPE C TSO-C53 FIRESLEEVED OR EQUIV.	14
x	x	2	APTE-51R-1000-68.3D	TRANSDUCER, TORQUE	BLACKHAWK	13
x	x	2	160816-1	INDICATOR, TORQUE	BLACKHAWK	12
	x	1	MIL-S-8802	SEALANT	SEMKIT B1/2 (U470499) FOR PRESSURE BULKHEAD	11
	x	6	S1367-1-10	TERMINAL	GROUND FOR TRANSDUCER.	10
	x	2	S1367-1-6	TERMINAL	GROUND FOR CIRCUIT BREAKER	9
x	x	--	AE102-6	FIRESLEEVE	AEROQUIP. ALT. STRATOFLEX 2650-6	8
	x	2	MS35489-9	GROMMET	IN PRESSURE BULKHEAD	7
	x	6	AN806-2J	PLUG	FOR COCKPIT PLUMBING	6
x	x	2	JT06RE-14-15SB	CONNECTOR	AMPHENOL. AT INDICATOR	5
	x	2	5900181-201	PLACARD	CESSNA OR BLACKHAWK	4
	OPT	2	6050013-1	BRACKET	CESSNA (OPTIONAL IF 200707-22 IS NOT USED)	3
	x	4	AN929-2J	CAP	AT ENGINE FIREWALL AND PRESSURE BULHEAD	2
	x	2	7277-5-5	CIRCUIT BREAKER	KLIXON	1
-2					S/N 425-0205 AND AFTER, 425-0002 THRU 425-0204 WITH SK425-21	
	-1				S/N 425-0002 THRU 425-0204 WITHOUT SK425-21	
		QTY	PART NO.	NAME	DESCRIPTION, VENDOR	ITEM

Table 3. Parts List

f. Special Tools

1. Regulated variable pressure source such as a Model 61-10 hydraulic dead weight tester or air pressure regulator.
2. Calibrated Pressure Gage, 0 to 60 PSI, 0.5 PSI resolution. Used with variable pressure source.
3. Volt/Ohm Meter – Used for continuity checks.

6. Diagrams

If available, see Blackhawk Drawing Number 200707-05 for guidance otherwise refer to the following figures on the next few pages.

Figure 1. Wiring Diagram for S/N 425-0002 thru S/N 425-0204 without SK425-21 incorporated

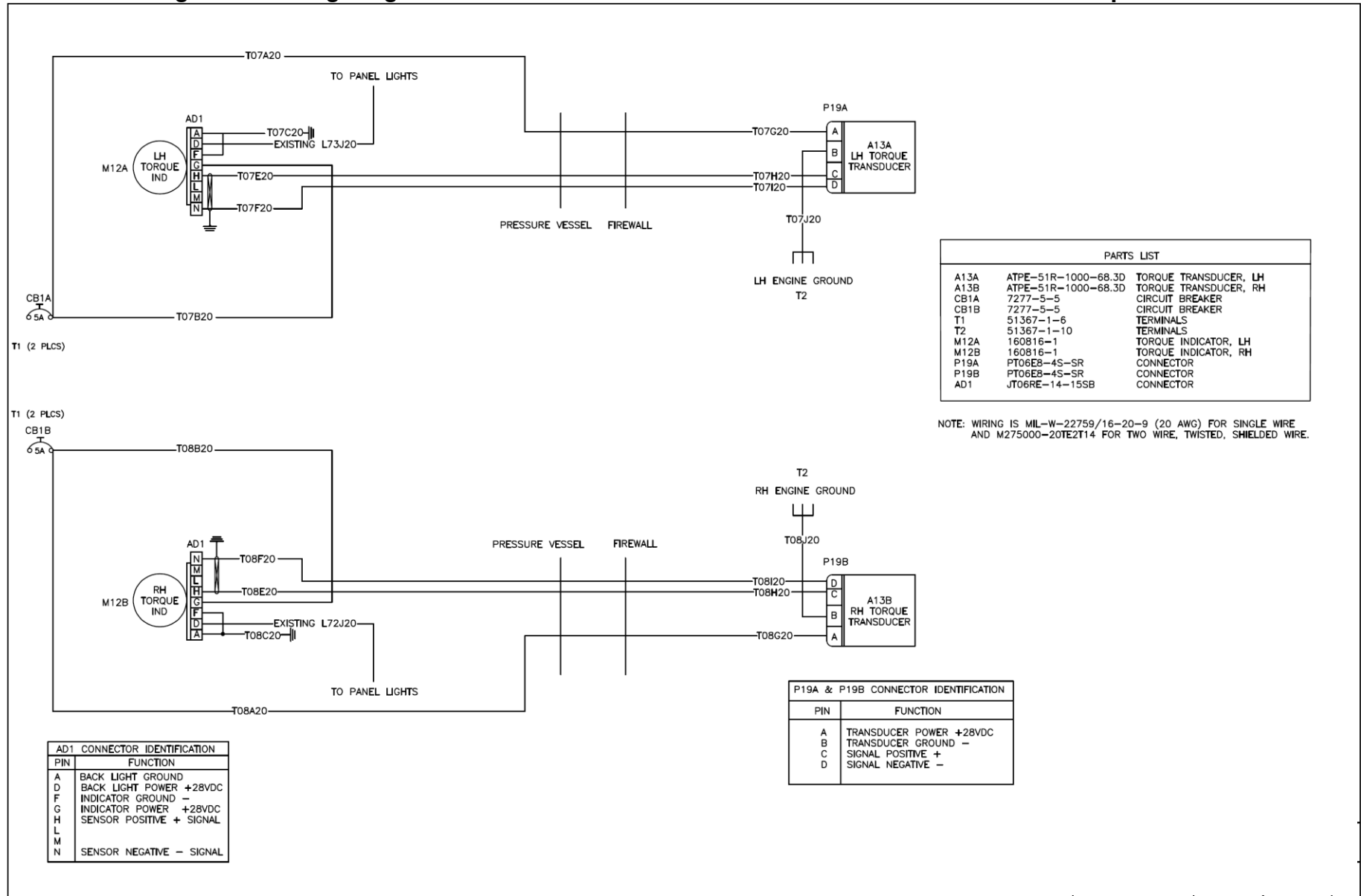


Figure 2. Wiring Diagram for S/N 425-0002 thru S/N 425-0204 with SK425-21 incorporated and S/N 425-0205 and after

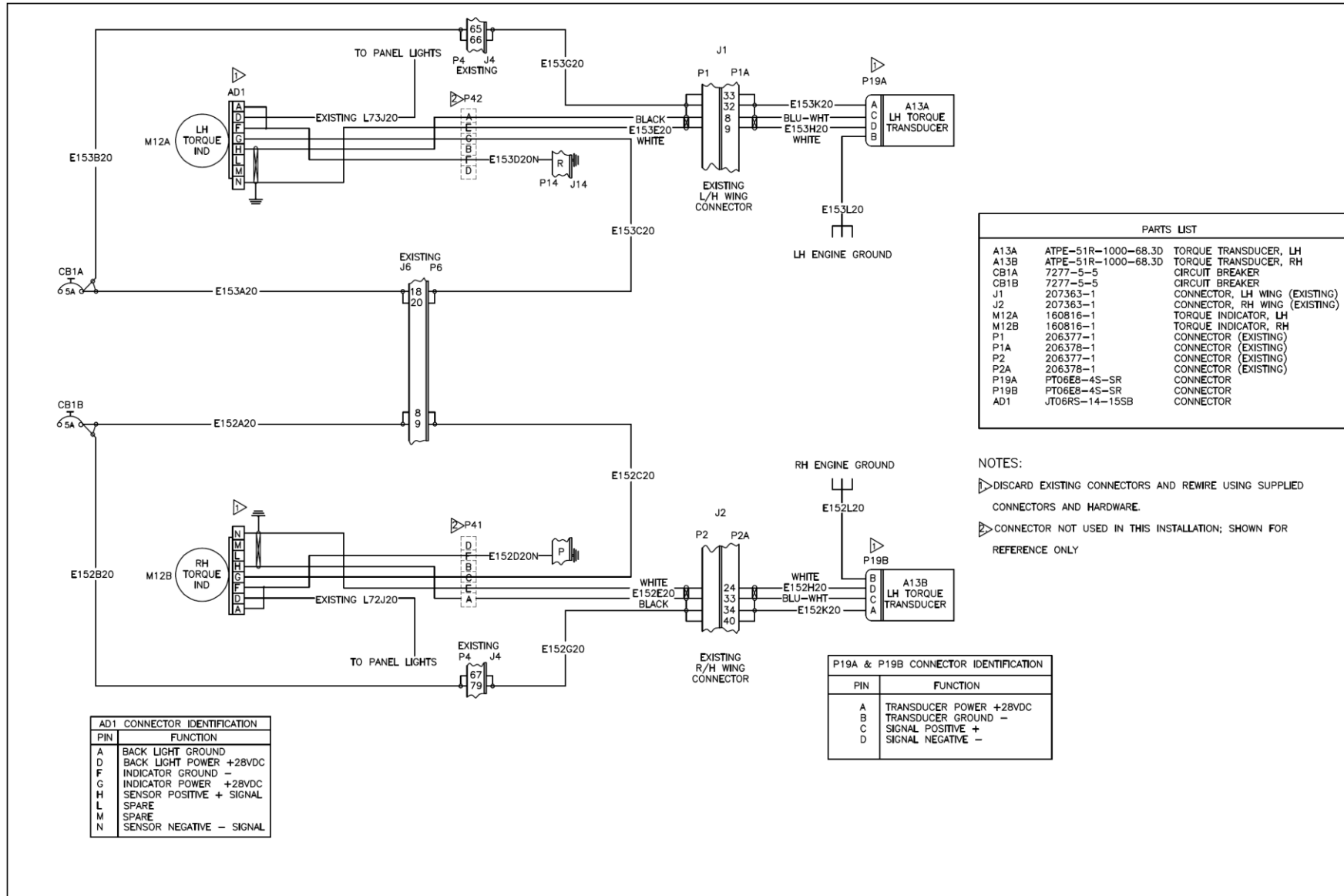


Figure 3. Typical Wiring Routing for S/N 425-0002 thru S/N 425-0204 without SK425-21 incorporated

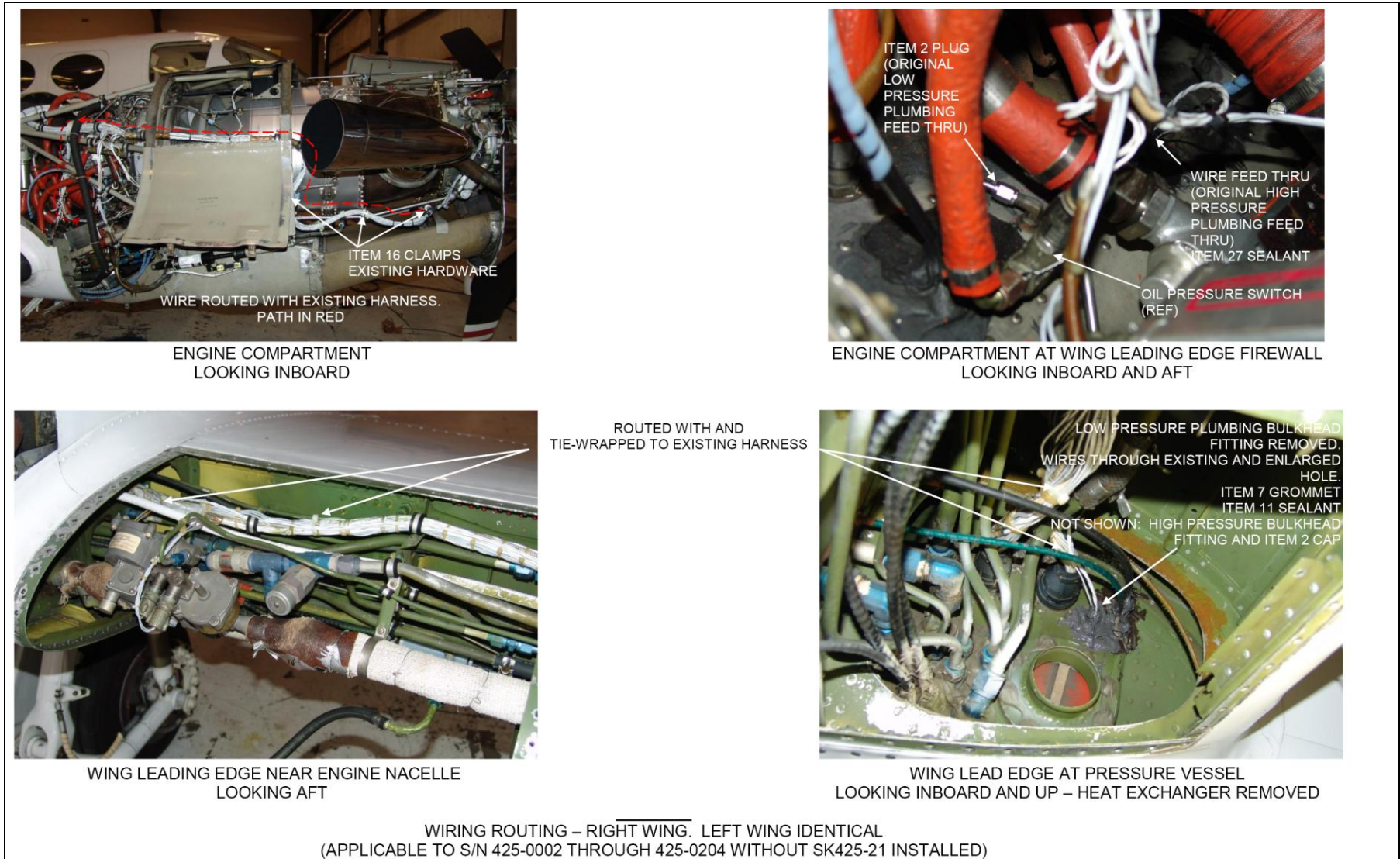
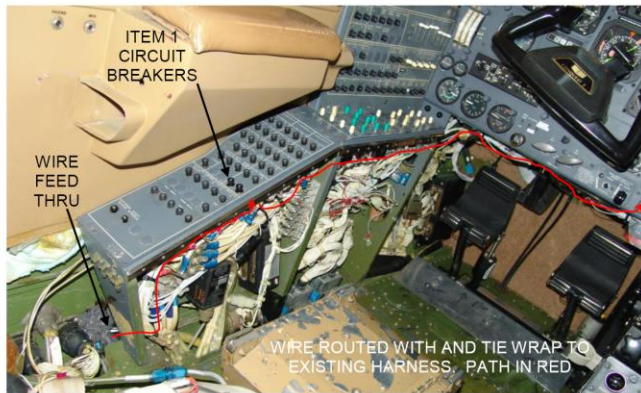
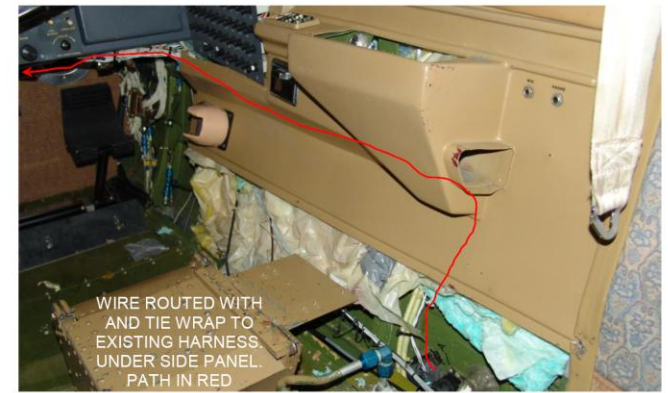


Figure 3. Typical Wiring Routing for S/N 425-0002 thru S/N 425-0204 without SK425-21 incorporated (Cont.)

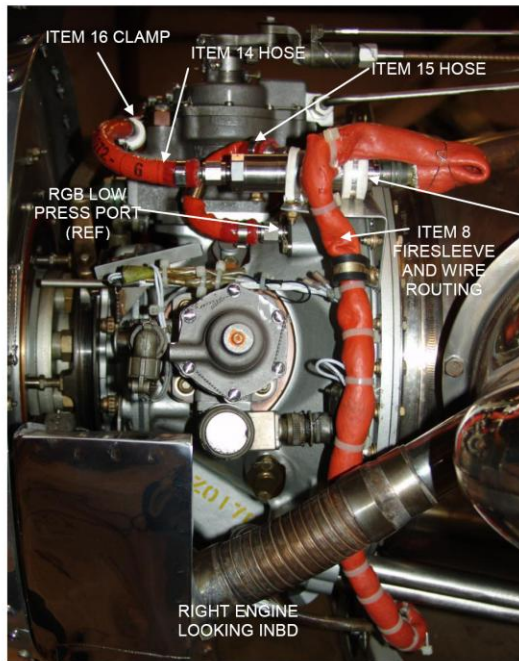


LEFT SIDE OF CABIN

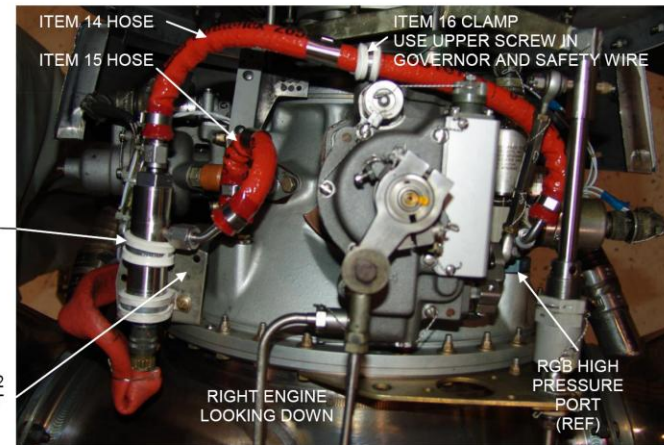


RIGHT SIDE OF CABIN


Figure 4. Typical Torque Transducer and Hose Installation for S/N 425-0002 thru S/N 425-0204 without SK425-21 incorporated



ITEM 17 CLAMP
ITEM 21 WASHER
ITEM 20 SCREW
ITEM 26 NUT
(2 PLACES)



TRANSDUCER INSTALLATION AND HOSE CONNECTION
(APPLICABLE TO S/N 425-0002 THROUGH 425-0204 WITHOUT SK425-21 INSTALLED)
(FIRESLEEVE INSTALLATION APPLICABLE TO ALL INSTALLATIONS)

<small>THIS DOCUMENT CONTAINS TRADE SECRET INFORMATION OWNED BY BLACKHAWK. UNAUTHORIZED DISCLOSURE OF THE INFORMATION CONTAINED IN THIS DOCUMENT TO GROUPS OR INDIVIDUALS WILL BE TREATED AS THEFT OF A TRADE SECRET. DISCLOSURE OF THE INFORMATION CONTAINED IN THIS DOCUMENT IS AUTHORIZED ONLY BY MEANS OF A LETTER OF AUTHORIZATION FROM BLACKHAWK.</small>				
		<small>SIZE</small> B	<small>DWG NO.</small> 200705-05	<small>REV</small> IR
<small>SCALE:</small> NONE		<small>SHEET</small> 7 OF 7		

7. Reference Data

- a. Airplane Flight Manual Supplement Doc. No. 200707
- b. Engine Electric Torque Installation Procedures Dwg. No. 200707-05

8. Airworthiness Limitations

There are no changes to limitations for the aircraft, engine, propeller or any item installed in this aircraft which are listed in the basic maintenance manual.

9. Revision:

Each time this ICA is revised or reissued, the revised ICA will be distributed to operators using a Service Letter/Bulletin by Blackhawk Modifications, Inc. This revision will include a new Log of Revisions page along with the revised pages. The upper right hand corner of each revised page will reflect the revision letter. That portion of text or an illustration, which has been revised by the addition of, or change in, information is denoted by a solid revision bar located adjacent to the area of change, and placed along the outside margin of a page. Revision bars show only information changed within latest revision.

10. Assistance

For assistance with ICA issues not addressed herein, contact Blackhawk Modifications at the following address or phone number.

Blackhawk Modifications, Inc.
7601 Karl May Dr.
Waco, Texas, USA 76708
254-755-6711