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Scandinavian Airlines System

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80-FAULT 1 2	CODE INDEX NOV 10/96 MAY 10/96	NO3 NO2						
80-11-00 101 102 103 104 105 106 107 108 109 110	FEB 10/88 AUG 10/92 AUG 10/94 AUG 10/94 APR 22/99 APR 22/99 APR 22/99 APR 22/99 BLANK	NO1 NO1 NO2 NO1 NO1 NO1 NO1 NO1						

R = REVISED, A = ADDED OR D = DELETED F = FOLDOUT PAGE 33 AUG 22/09 D633T633

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CHAPTER 80 - STARTING

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Component Location 101 ALL

Component Index
Component Location

Fault Isolation

Eng N2 Shows Zero During 106

Start. Start Valve Indicated Open. No Oil Press Rise (Fig.

105).

Slow or No N2 Rotation With 105

Low Duct Pressure (Fig. 104)
Start Valve Light (Failed to 104)

Start Valve Light (Failed to, 104 Remained) Illuminated. No N2

Rotation. (Fig. 103)

80-CONTENTS

NSAS Page 1 Dec 22/08

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
 80 03 XA	1. A (O1=L, O2=R) Start VALVE lgt illum (eng operating) problem problem was encountered by the flight crew which is not covered in the fault code diagrams (Ref Chapter 71 for fault code diagram and flight crew actions). 2. SSM 80-11-01.
80 03 XB	 (O1=L, O2=R) A starting problem was encountered by the flight crew which is not covered in the fault code diagrams (Ref Chapter 71 for fault code diagram and flight crew actions).
	2. SSM 80-11-01.
80 03 01	 (O1=L, O2=R) Start VALVE lgt illum and EICAS msg (L,R) ENG STARTER displayed during eng operation (Ref Chapter 71 for fault code diagram).
	2. Replace the Starter Control Valve V351 (AMM 80-11-02/401). Do the EICAS STATUS/MAINTENANCE message erase procedure (FIM 31-41-00/101, Fig. 109).
80 03 02	 (O1=L, O2=R) Eng N2 failed to rotate with start selector in GND, start VALVE light was extin and duct press was norm. (Ref Chapter 71 for fault code diagram).
	2. FIM 80-11-00/101, Fig. 105, Block 1
80 03 03	 (01=L, 02=R) eng N2 failed to rotate with start selector in GND, duct press was low with start vlv open. (Ref Chapter 71 for fault code diagram). FIM 80-11-00/101, Fig. 104, Block 1
80 03 04	 (01=L, 02=R) eng low max N2 motoring speed during start, duct press was norm with start vlv open. (Ref Chapter 71 for fault code diagram).
	2. Replace the starter (AMM 80-11-01/401). If the problem continues, replace the engine (AMM 71-00-02/401).
80 03 05	 (01=L, 02=R) eng low max N2 motoring speed during start, duct press was low with start vlv open. (Ref Chapter 71 for fault code diagram). FIM 80-11-00/101, Fig. 104, Block 1

EFFECTIVITY-

80-FAULT CODE INDEX

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	FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
80	03 06	 (01=L, 02=R) eng start VALVE light (failed to, remained) illum with start selector in GND, eng failed to rotate. (Ref Chapter 71 for fault code diagram). FIM 80-11-00/101, Fig. 103, Block 1
80	03 07	 (01=L, 02=R) eng start VALVE light (failed to, remained) illum with start selector in GND, eng rotation was norm. (Ref Chapter 71 for fault code diagram). Replace the L(R) Engine Start Switch YAY S1(S2) on the Engine Ignition and Control Module M49 on P5 panel (WDM 80-11-11, WDM 80-11-21).
80	03 08	 (01=L, 02=R) eng start selector sw failed to hold in GND during start, eng rotated norm when held in GND. (Ref Chapter 71 for fault code diagram). Replace the L(R) Engine Start Switch YAY S1(S2) on the Engine Ignition and Control Module M49 on P5 panel (WDM 80-11-11, WDM 80-11-21).
80	03 09	1. (O1=L, O2=R) eng start selector sw failed to hold in GND during start, eng failed to rotate when held in GND. (Ref Chapter 71 for fault code diagram).
80	03 10	 Replace the Starter Control Valve V351 (AMM 80-11-02/401). (01=L, 02=R) eng start VALVE light remained illum during start when start selector returned to AUTO. (Ref Chapter 71 for fault code diagram).
80	03 11	 Replace the Starter Control Valve V351 (AMM 80-11-02/401). (01=L, 02=R) eng start selector failed to return to AUTO at 50% N2 during start. (Ref Chapter 71 for fault code diagram). Replace the L(R) Engine Speed Card M1093 (M1092) (AMM 77-12-01/401).
80	03 12	 (01=L, 02=R) eng start selector returned to AUTO at% N2 during start. (Ref Chapter 71 for fault code diagram). Replace the L(R) Engine Speed Card M1093 (M1092)

EFFECTIVITY-

80-FAULT CODE INDEX

STARTING SYSTEM

	FIG.			
COMPONENT	102 SHT	QTY	ACCESS/AREA	REFERENCE
ADAPTER - QAD	2	1	415AL,416AR, THRUST REVERSER, L ENGINE, MAIN GEARBOX	80-11-03
ADAPTER - QAD	2	1	425AL,426AR, THRUST REVERSER, R ENGINE, MAIN GEARBOX	80-11-03
CIRCUIT BREAKERS START CONT LEFT, C1510 START CONT RIGHT, C1511 APU ENG START, C1512 COMPUTER - (REF 31-41-00, FIG. 101)	1	1 1 1	FLT COMPT, P11 11D19 11D20 11B36	*
EICAS L, M10181 EICAS R, M10182 DIODES - (REF 31-01-06, FIG. 101) STARTER L, R225 STARTER R, R226 START IND L, R10119 START IND R, R10120				
FILTER - STARTER CONTROL VALVE	2	1	417AL,418AR, CORE COWL, L ENGINE, MAIN GEARBOX	80-11-04
FILTER - STARTER CONTROL VALVE MODULE - (REF 49-61-00, FIG. 101)	2	1	427AL,428AR, CORE COWL, R ENGINE, MAIN GEARBOX	80-11-04
APU CONT UNIT, M206 MODULE - ENG IGN AND START CONTROL, M49 MODULE - (REF 73-21-00, FIG. 101) L N2 ENG SPEEDCARD, M1093 R N2 ENG SPEEDCARD, M1092 MODULE (REF 31-01-06, FIG. 101) L START FAIL T/D, M10334 R START FAIL T/D, M10335 RELAY - (REF 31-01-06, FIG. 101) L ENG START 1, K665 L ENG START 2, K10247 R ENG START 2, K10247 R ENG START 2, K10250 RELAY - (REF 31-01-36, FIG. 101) FLT RECORDER CONTROL, K163 RELAY - (REF 31-01-37, FIG. 101) FLT RECORDER CONTROL, K164 L ENG START SENSE, K680 R ENG START SENSE, K681 RELAY - (REF 76-11-00, FIG. 101) L FUEL/IGN CONTROL, K168 R FUEL/IGN CONTROL, K168	1	1	FLT COMPT, P5	
STARTER - PNEUMATIC	2	1	415AL,416AR, THRUST REVERSER, L ENGINE, MAIN GEARBOX	80-11-01
STARTER - PNEUMATIC	2	1	425AL,426AR, THRUST REVERSER, R ENGINE, MAIN GEARBOX	80-11-01
VALVE - STARTER CONTROL, V351	2	1	417AL,418AR, CORE COWL, L ENGINE, MAIN GEARBOX	80-11-02
VALVE - STARTER CONTROL, V351	2	1	427AL,428AR, CORE COWL, R ENGINE, MAIN GEARBOX	80-11-02

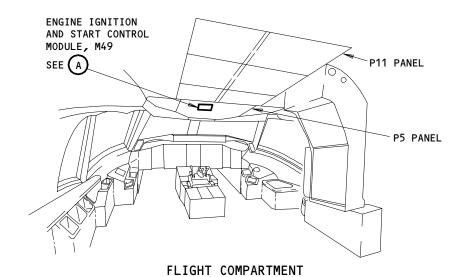
^{*} SEE WM EQUIPMENT LIST

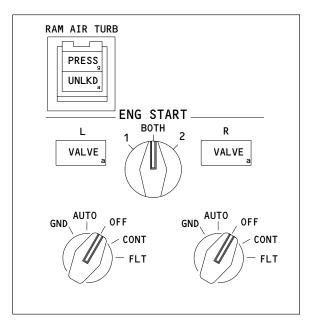
Component Index Figure 101

EFFECTIVITY-ALL

80-11-00







ENGINE IGNITION AND START CONTROL MODULE, M49



Starting System - Component Location Figure 102 (Sheet 1)

EFFECTIVITY-ALL

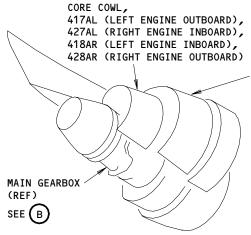
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THRUST REVERSER,
415AL (LEFT ENGINE OUTBOARD), 425AL (RIGHT ENGINE INBOARD), 416AR (LEFT ENGINE INBOARD), 426AR (RIGHT ENGINE OUTBOARD)

STARTER CONTROL VALVE SEE (C) **QAD ADAPTER PNEUMATIC** STARTER

MAIN GEARBOX (REF)



STARTER CONTROL VALVE, V351

(c)

Starting System - Component Location Figure 102 (Sheet 2)

EFFECTIVITY-ALL

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N₀2

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STARTER CONTROL VALVE **FILTER**

START VALVE LIGHT (FAILED TO, REMAINED) ILLUMINATED. NO N2 ROTATION.

PREREQUISITES

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED: (LEFT ENGINE) 11D19 (RIGHT ENGINE) 11D20

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)



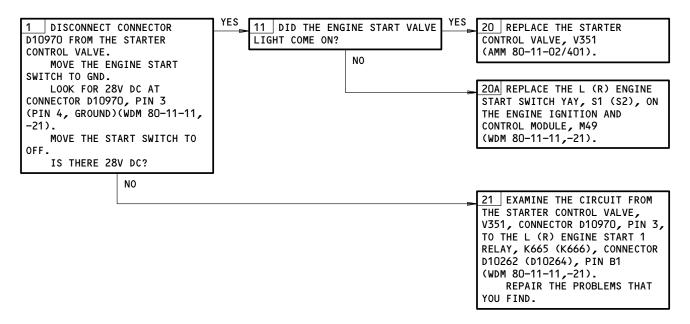
DESCRIPTION:

ENGINE START IS ATTEMPTED, BUT START VALVE LIGHT DID NOT ILLUMINATE OR CONTINUES TO ILLUMINATE, AND N2 DID NOT TURN.

POSSIBLE CAUSES:

- 1. STARTER CONTROL VALVE IS DAMAGED (AMM 80-11-02/401).
- 2. LEFT OR RIGHT ENGINE START SWITCH YAY ON THE ENGINE IGNITION AND CONTROL MODULE, M49, IS DEFECTIVE (WDM 80-11-11,-21).
- 3. CIRCUIT BETWEEN THE STARTER CONTROL VALVE AND THE LEFT OR RIGHT ENGINE START 1 RELAY IS DEFECTIVE (WDM 80-11-11,-21).

FAULT ISOLATION:



Start Valve Light (Failed to, Remained) Illuminated. No N2 Rotation. Figure 103

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NO1

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PREREQUISITES NONE

SLOW OR NO N2 ROTATION WITH LOW **DUCT PRESSURE**



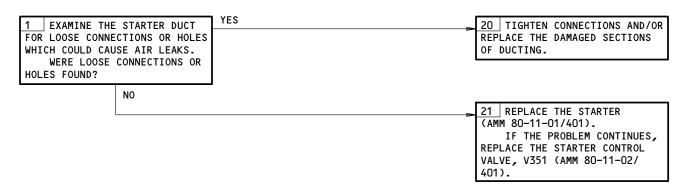
DESCRIPTION:

ENGINE START IS ATTEMPTED, BUT N2 DOES NOT TURN OR TURNS SLOWLY, AND THERE IS LOW DUCT PRESSURE.

POSSIBLE CAUSES:

- 1. STARTER DUCT HAS LOOSE CONNECTIONS OR HAS HOLES.
- 2. STARTER IS DAMAGED (AMM 80-11-01/401).
- 3. STARTER CONTROL VALVE IS DAMAGED (AMM 80-11-02/401).

FAULT ISOLATION:



Slow or No N2 Rotation With Low Duct Pressure Figure 104

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11	///////////////////////////////////////	//

ENG N2 SHOWS ZERO DURING START. START VALVE INDICATED OPEN. NO OIL PRESS RISE.

PREREQUISITES

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)



DESCRIPTION:

ENGINE START IS ATTEMPTED AND START VALVE IS INDICATED OPEN, BUT ENG N2 DOES NOT TURN, AND THE OIL PRESSURE DOES NOT INCREASE.

POSSIBLE CAUSES:

- 1. AIR PRESSURE IN THE STARTER CONTROL VALVE DUCT IS BELOW LIMITS (AMM 36-00-00/201)
- 2. FOREIGN OBJECT DAMAGE (FOD)(FIM 71-05-00/101)
- 3. N2 ROTOR IS CAUGHT (AMM 72-00-00/601)
- 4. STARTER CONTROL VALVE DOES NOT OPERATE (AMM 80-11-02/401)
- 5. STARTER DRIVE COUPLING IS DAMAGED (AMM 72-61-09/401)
- 6. STARTER DOES NOT OPERATE (AMM 80-11-01/401)

NOTE: IF IT IS NECESSARY, DO THIS PROCEDURE: ENGINE OVERTEMPERATURE INSPECTION REQUIREMENTS (GROUND AND IN-FLIGHT STARTING, AND ENGINE OPERATION BELOW IDLE SPEED (FIM 71-06-00/101, FIG. 104).

FAULT ISOLATION:

Eng N2 Shows Zero During Start.
Start Valve Indicated Open. No Oil Press Rise.
Figure 105 (Sheet 1)

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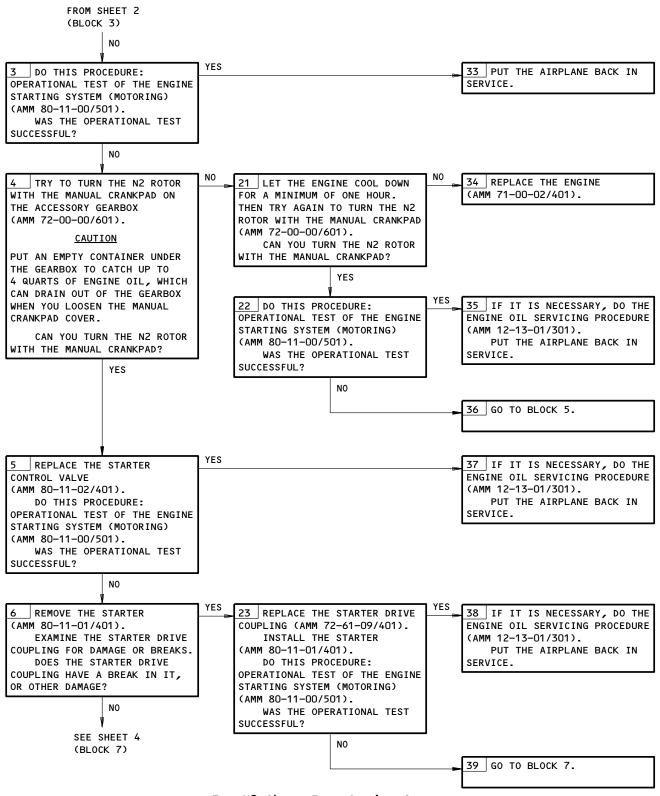
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YES DO THIS PROCEDURE: PIMU 30 REFER TO THE PIMU MESSAGE MAINTENANCE RECALL PROCEDURE TABLES AND DO THE APPLICABLE (FIM 71-PIMU MESSAGE INDEX, CORRECTIVE ACTION FOR EACH FIG. 3). PIMU MESSAGE THAT YOU FOUND (FIM 71-PIMU MESSAGE INDEX). LOOK FOR THE MESSAGES THAT FOLLOW: GO TO BLOCK 2. EEC CH-A/B DEM PLUG INVALID (350-26)EEC CH-A/B FMU TR-CK FAIL (351-19)EEC CH-A/B FMU FD-BK FAIL (351-24)EEC CH-A/B N2 RANGE FAIL (352-15)EEC CH-A/B PMA FAULT (353-16)EEC CH-A/B FMU CR-CK FAIL (353-24)EEC CH-A/B SVA T/M W/A FAIL (351-15)EEC CH-A/B P-SENSOR DISAGREE (350-20)EEC CH-A/B XTRN DIS DISAGREE (350-23)EEC CH-A/B UNIT FAULT (350-15)EEC CH-A/B N2 CROSS-CK FAIL (353-15)EEC CH-A/B PMA PWR SOL SHRT (354-24)EEC CH-A/B STRT SOL W/A FAIL (354-15)EEC CH-A/B OVS SOL W/A FAIL (354-14)EEC CH-A/B SVA FD-BK FAIL (351-25)EEC CH-A/B SVA TR-CK FAIL (351-20)DID YOU FIND ONE OR MORE OF THESE MESSAGES? YES YES 2 EXAMINE THE ENGINE INLET 20 DO THIS PROCEDURE: 31 REPLACE THE ENGINE (AMM 71-00-02/401). FOR FOD OR SIGNS THAT THE FAN BIRDSTRIKE/FOD, ENGINE BLADES HAVE CAUSED DAMAGE TO PARAMETERS NORMAL/ABNORMAL THE RUBSTRIPS. EXAMINE THE (FIM 71-05-00/101, FIG. 102). 2.5 BLEED OPENINGS FOR WERE THE FOD, DAMAGE, UNWANTED MATERIAL, OR METAL UNWANTED MATERIAL. ALSO EXAMINE THE TURBINE EXHAUST PARTICLES MORE THAN THE AREA FOR FOD, DAMAGE OR METAL PERMITTED LIMITS? PARTICLES. NO DID YOU FIND FOD, DAMAGE, UNWANTED MATERIAL, OR METAL PARTICLES? 32 GO TO BLOCK 3. NO

> Eng N2 Shows Zero During Start. Start Valve Indicated Open. No Oil Press Rise. Figure 105 (Sheet 2)

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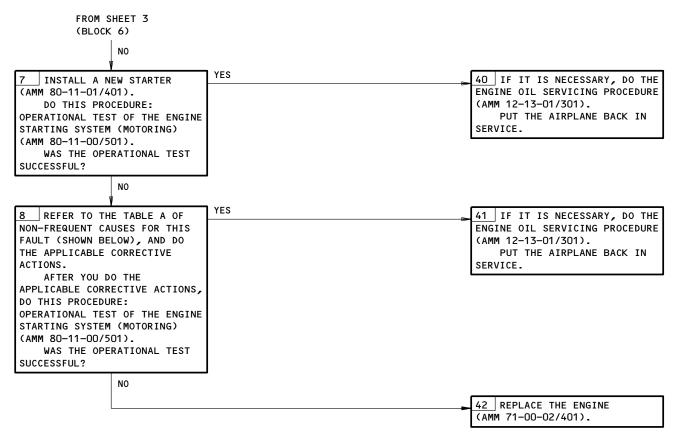
SEE SHEET 3 (BLOCK 3)



Eng N2 Shows Zero During Start. Start Valve Indicated Open. No Oil Press Rise. Figure 105 (Sheet 3)

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NON-FREQUENT CAUSES OF THIS PROBLEM IN ALPHABETICAL ORDER	RECOMMENDED CORRECTIVE ACTION
GASPATH DAMAGE	DO THE APPLICABLE BORESCOPE TASKS IN THIS PROCEDURE: ENGINE GASPATH - INSPECTION/CHECK (AMM 72-00-00/601).
GEARBOX OR ANGLE GEARBOX WITH INTERNAL DAMAGE	DO A CHECK OF THE APPLICABLE GEARBOX CHIP DETECTORS (AMM 72-61-01/601).
MAINTENANCE HISTORY	EXAMINE THE MAINTENANCE HISTORY RECORD FOR THE ENGINE TO FIND PAST PROBLEM TRENDS, AND DO THE APPLICABLE CORRECTIVE ACTION(S).

TABLE A

Eng N2 Shows Zero During Start. Start Valve Indicated Open. No Oil Press Rise. Figure 105 (Sheet 4)

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