CAP AÉRONAUTIQUE

Option : Avionique

ÉPREUVE EP1 : Utilisation de la Documentation Technique

DOSSIER RESSOURCES

SESSION: 2022

Svstèmes de l'aéronef

Chapitre ATA	Dénomination	Dénomination en français
ATA 20	STANDARD PRACTICES – AIRFRAME	
ATA 21	AIR CONDITIONING AND PRESSURIZATION	Air conditionné et pressurisation
ATA 22	AUTOFLIGHT	Pilote automatique
ATA 23	COMMUNICATIONS	Communications
ATA 24	ELECTRICAL POWER	Génération électrique
ATA 25	EQUIPMENT/FURNISHINGS	Équipements / Ameublement
ATA 26	FIRE PROTECTION	Protection incendie
ATA 27	FLIGHT CONTROLS	Commandes de vol
ATA 28	FUEL	Carburant
ATA 29	HYDRAULIC POWER	Génération hydrauliques
ATA 30	ICE AND RAIN PROTECTION	Protection givre et pluie
ATA 31	INDICATING / RECORDING SYSTEM	Système d'indication / d'enregistrement
ATA 32	LANDING GEAR	Trains d'atterrissage
ATA 33	LIGHTS	Feux de signalisation
ATA 34	NAVIGATION	Navigation
ATA 35	OXYGEN	Oxygène
ATA 36	PNEUMATIC	Pneumatique
ATA 37	VACUUM	Dépression
ATA 38	WATER/WASTE	Eau et toilettes
ATA 42	INTEGRATED MODULAR AVIONICS	Avionique Modulaire Intégrée
ATA 44	CABIN SYSTEM	Système de la cabine

AMM: Aircraft Maintenance Manual

IPC: Illustrated Parts Catalog

PIPC: Power Plant Illustrated Parts

TSM: Trouble Shooting Manual

WDM: Wiring Diagram Manual

ASM: Aircraft Schematic Manual

AWM: Aircraft Wiring Manual

AWL: Aircraft Wiring List

ESPM: Electrical Standard Pratices Manual

1. General

(Ref. Fig. 001)

The aircraft navigation systems provide the crew with the data required for flight within the most appropriate safety requirements.

These data can be divided into four groups :

- Air Data/Inertial Reference System (ADIRS)
- Landing and taxing aids
- Independent position determining
- Dependent position determining.

2. System Description

A. ADIRS

This part of the navigation system comprises :

- three Air Data/Inertial Reference Units (ADIRU)
- standby systems.

Each ADIRU performs :

- the air data function through its Air Data Reference (ADR) portion.
- the attitude, heading and position function through its Inertial Reference (IR) portion.

(1) Air data function

Air data are provided by four independent sources :

(a) Three main systems

Each of the three main systems includes static probes, pitot probes and their associated Air Data Modules (ADM), Total Air Temperature (TAT) sensors and Angle of Attack (AOA) sensors. They provide the ADR portion of the ADIRU with the necessary data for the generation of parameters which are transmitted to the Primary Flight Displays (PFD) and Navigation Displays (ND) and the Angle of Attack (AOA) indicator (optional) and to the various aircraft systems.

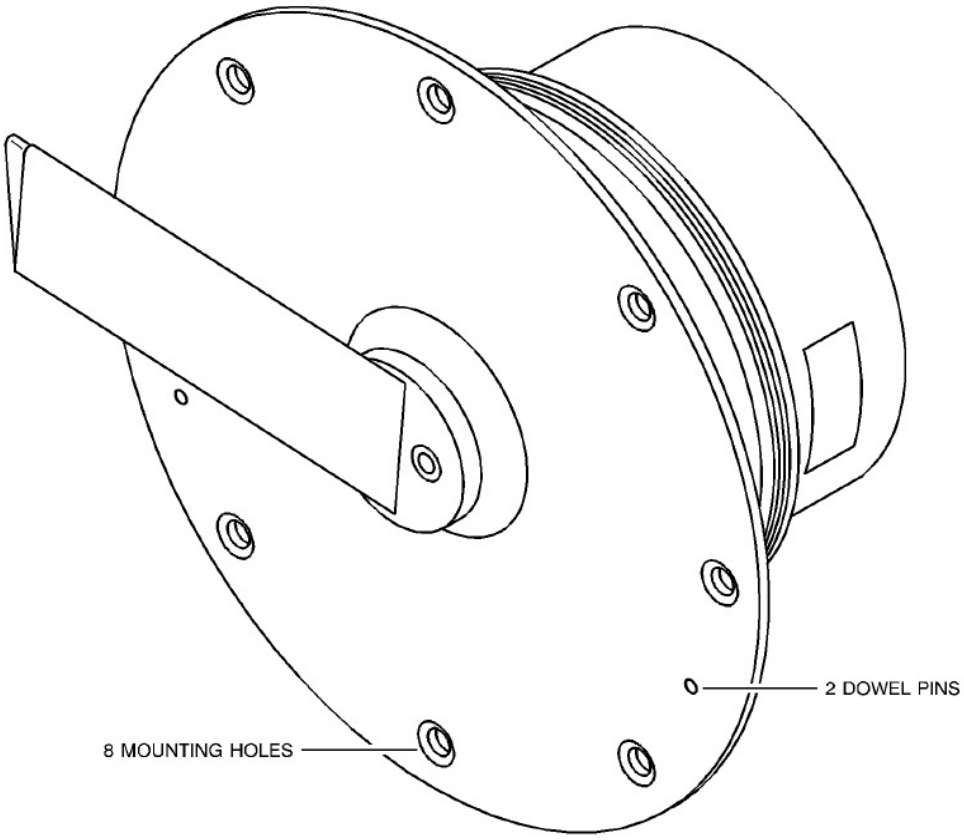
(b) A standby system

1 The standby system includes a standby altimeter, a standby airspeed indicator and a metric altimeter (optional) (Ref. 34-21) and the optional system ISIS (Ref. 34-22). They are provided with pressure by static probes and pitot probe linked to the ADIRU 3.
More explanations are given in the ADIRU system (Ref. 34-13).

E. Angle Of Attack (AOA) Sensor
(Ref. Fig. 009)
The aircraft is equipped with three AOA sensors. Two are located on the right side and one on the left side of the fuselage. Each of these AOA sensors is respectively linked to each ADR portion of the ADIRUs. The AOA sensors 1 and 3 are set at 6.08 deg. and 31 deg. below the fuselage datum line (Z = 0) on the left side. The AOA sensor 2 is set at 6.08 deg. below the fuselage datum line (Z = 0) on the right side.
The angle of attack sensor is of the wind vane type. Its sensing element is a small wing which is positioned in the direction of airflow. The small wing is mechanically linked to a free turn-shaft which drives the devices transmitting the local angle of attack signal. These transmitting devices are made up of resolver transformers which convert the angular information into proportional electrical information (angle sine and cosine). The resolvers are supplied with a 26VAC signal. The same signal is also received by the ADIRU as a reference for the decoding of AOA values. Each sensor has three resolver outputs but only two are wired to the ADIRU.
The whole mechanism is stabilized around the rotation axis. In addition, a damping device enables a satisfactory dynamic response to be obtained (filtering of mechanical oscillation).
A self-regulated heating element (CTP resistances: positive coefficient of temperature) inserted into the vane eliminates or avoids icing. It is supplied with 115VAC through the PHC (Ref. 30-31-00).
The AOA sensor is equipped with a self-test device which is activated by a 28VDC signal, from the ADR (through the relay 21FP1, 21FP2 or 21FP3) when the test is entered via the maintenance system (CFDIU and MCDU). The self-test positions the vane at a resolver angle of +15 deg. (left side test) or -15 deg. (right side test).
The mounting and wing of AOA resolvers determine the relationship between the measured resolver angle and indicated angle of attack. This relationship for each resolver input is as follows:
(Ref. Fig. 010)

AOA 1 and AOA 3 in degrees	Indicated AOA:	+85	+60	+25	0	-35
	Resolver angle:	-60	-35	0	+25	+60
AOA 2 in degrees	Indicated AOA:	+85	+60	+25	0	-35
	Resolver angle:	+60	+35	0	-25	-60

The ADRs receive the same 26VAC, 400 Hz reference as the AOA resolvers. This reference is common to both AOA resolver inputs 1 and 2.
Characteristics:



ADIRS - AOA Sensor
Figure 009

Excitation	: 26 V 400 Hz
Phase shift	: 18 deg. to 30 deg.
Resolver transformer ratio RT	: 0.4029 to 0.4629
Rotor impedance	: Zro = 125 + j175 ohms +/-20%
Stator impedance	: Zso = 115 + j90 ohms +/-30%
Range	: +/-60 deg.
Scale factor	: 1 deg. resolver/1 deg. local AOA

The accuracy of the AOA sensor, at 100 knots, is +/-0.3 deg.

TASK 34-11-00-810-858

Different Angle of Attack Value on the ADIRU 1 and the ADIRU 2

1. Possible Causes

- SENSOR-ANGLE OF ATTACK, 1 (3FP1)
- SENSOR-ANGLE OF ATTACK, 2 (3FP2)

2. Job Set-up Information

A. Fixtures, Tools, Test and Support Equipment

REFERENCE	QTY	DESIGNATION
No specific		ARINC Reader

B. Referenced Information

REFERENCE	DESIGNATION
AMM 31-36-00-740-008	Access to the Parameter Call-Up Menus
AMM 34-10-00-860-002	ADIRS Start Procedure
AMM 34-10-00-860-005	ADIRS Stop Procedure
AMM 34-11-19-000-001	Removal of the Angle of Attack Sensor (3FP1, 3FP2, 3FP3)
AMM 34-11-19-400-001	Installation of the Angle of Attack Sensor (3FP1, 3FP2, 3FP3)
ASM 34-13/01	

3. Fault Confirmation

A. Test
Not applicable, you cannot confirm this fault on the ground.

4. Fault Isolation

R **ON A/C 001-008, 012-012, 015-029, 031-033, 036-037, 040-065, 068-069,
R 072-099, 201-210, 227-229, 403-499,

A. Solution 1: aircraft without AIDS.
If the POST FLIGHT REPORT gives the maintenance message AOA SENSOR 3FP1 - AOA SENSOR 3FP2 DISAGREE:
- do a visual check of the SENSOR-ANGLE OF ATTACK, 1 (3FP1) and SENSOR-ANGLE OF ATTACK, 2 (3FP2).

(1) If one angle of attack sensor is damaged:
- replace the defective angle of attack sensor (Ref. AMM TASK 34-11-19-000-001) and (Ref. AMM TASK 34-11-19-400-001).

(2) If the angle of attack sensors are not damaged:
- do the ADIRS start procedure (Ref. AMM TASK 34-10-00-860-002)
- connect the ARINC Reader to the test connector 198VC on the panel 188VU and to the test connector 199VC on the panel 187VU (Ref. ASM 34-13/01)
- manually turn the angle of attack sensors (3FP1) and (3FP2) to the down position
- manually turn the angle of attack sensors (3FP1) and (3FP2) to the up position
- compare the angle of attack values (between -39,5 deg. and -34,5 deg. for the down position and between +84,5 deg. and +89,5 deg. for the up position) read on label 221:

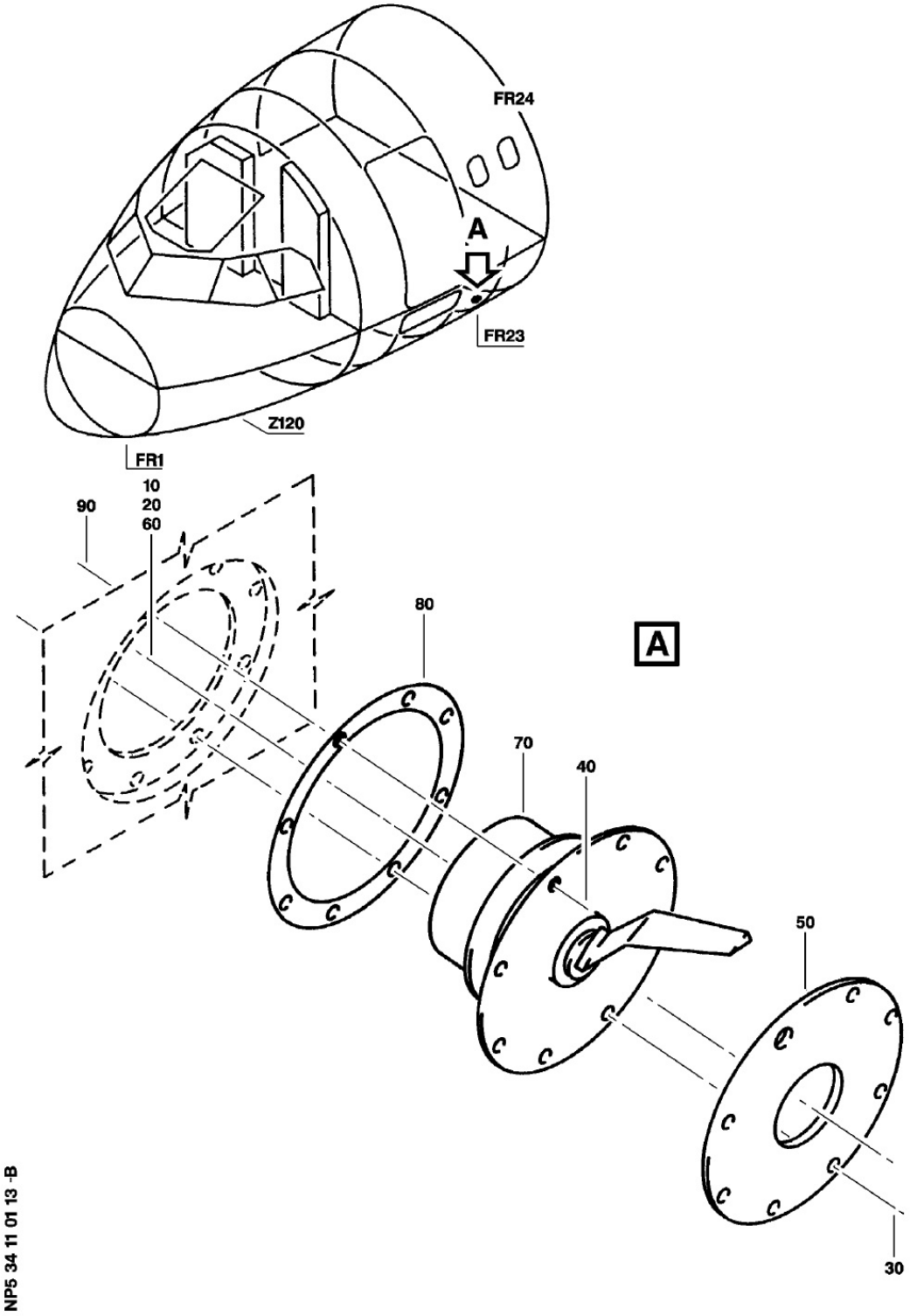
ADIRU 1	199VC pins GG, HH	3FP1
ADIRU 2	198VC pins GG, HH	3FP2

NOTE : To know the AOA position:
- convert the binary value of bits 17 to 28 of Label 221 to a decimal value,
- multiply the decimal value by 0.0439 (ARINC definition).
Example:

1°) Positive value with BIT29=(0)
DATABITS 29-11:
(0)01 1110 0011 1000 0000
---
01 1110 0011 10 = 1934
1934 X 0.0439 = 84.9 ===> +84.9 deg.

2°) Negative value with BIT29=(1)
DATABITS 29-11:
(1)11 0011 1000 1110 1000
---
11 0011 1000 11 for negative value, change 1 to 0 and 0 to 1 as follows
00 1100 0111 00 = 796
796 X 0.0439 = 34.9 ===> -34.9 deg.

(a) If one value is different:
- replace the defective angle of attack sensor (Ref. AMM TASK 34-11-19-000-001) and (Ref. AMM TASK 34-11-19-400-001).



SENSOR INSTL-ANGLE OF ATTACK, Z127

FIGURE 13

FIG-ITEM	PART NUMBER	1234567 NOMENCLATURE		USAGE FROM TO	UNIT PER ASSY	
13 - 1A	D34110100000 60	SENSOR INSTL-ANGLE OF ATTACK,Z127	(NP)	202202 205205 232232 245245 276277 280280 282282 284285 426428 476480 701702	RF	R
- 1C	D34110100000 60	SENSOR INSTL-ANGLE OF ATTACK,Z127	(NP)	503503 551551 703703	RF	R
- 1D	D34110100000 60	SENSOR INSTL-ANGLE OF ATTACK,Z127	(NP)	247253 429433 451457 481481 553555 557557 559561 563565	RF	R
10	E0080-02-18C	.BACKSHELL OPT TO GTR71-18VACS1 (V06324) OPT TO GTR71-18CACS1 (V06324)	VACRT	202202 205205 232232 245245 276277 280280 282282 284285 426428 476480 503503 551551 701703	1	R
10A	ABS0638B18	.BACKSHELL-CONNECTOR OPT TO GK5445GK5425GK5402 (VC3471)	VACRT	247253 429433 451457 481481 553555 557557 559561 563565	1	R
20	E0052R18B32SNE	.CONNECTOR-PLUG OPT TO 8525-16R18B32SNH008 (VF0225) OPT TO FDBA56-18-32SNKA246 (CONTINUED)	VACRT		1	

-ITEM NOT ILLUSTRATED
MISSING ITEMS AND VARIANTS ARE NOT APPLICABLE

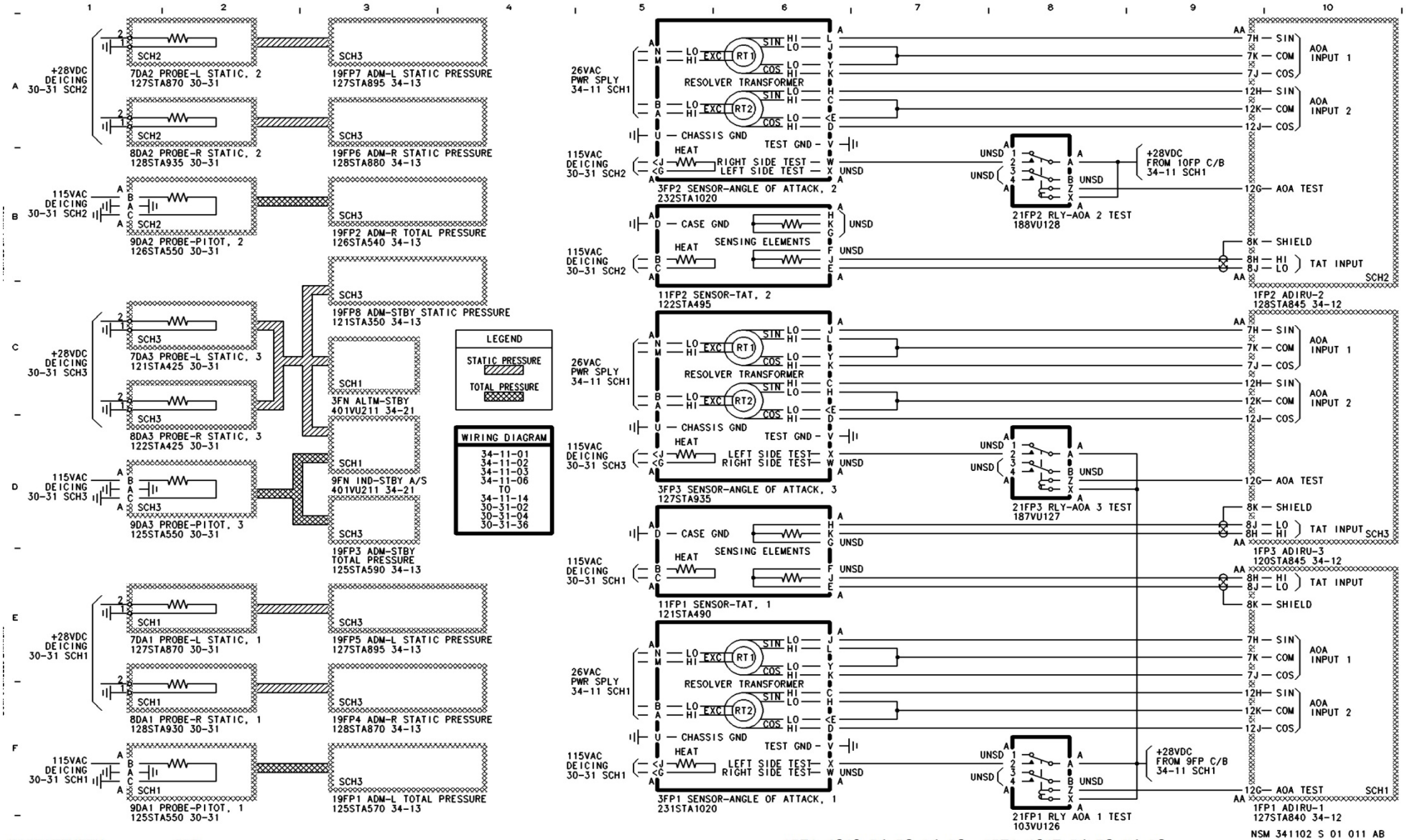
SROS

Printed in France

FIG-ITEM	PART NUMBER	1234567 NOMENCLATURE	USAGE FROM TO	UNIT PER ASSY
13 20		(VF1983) OPT TO 1260A11-18-32SN (VF6162) OPT TO PVW6R18-32SN57 (VF3132) OPT TO MBL16A18-32S (V14283) OPT TO FDBA56-18-32SNK (VF1983) OPT TO EN3646A61832DN		
30	NAS1153E10	.SCREW VACRT		7
40	NAS1153E8	.SCREW VACRT		1
50	D3411007620000	.PLATE D3411007620000 I/W D3411013520000		1
50A	D3411013520000	.PLATE CLOSING D3411013520000 I/W D3411007620000		1
60	E0248A2-4H9	.LABEL VACRT OPT TO E0248A2-4H9R OPT TO TMSCM20-4H9 (V06090)		1
70A	45150320	.SENSOR-ANGLE OF ATTACK VF9111 SEE 34-11-19-01 FOR DET CMM 34-20-12 REFER TO SIL 34-074 45150320 I/W C16291AA (VF9111) IF 45150320, REFER TO 16990568 IN ICD (VF9111) IF 45150320, SEE ICD FOR 0861ED (V59885) IF C16291AA, SEE ICD FOR 0861ED (V59885)		1
70B	C16291AA	.SENSOR-ANGLE OF ATTACK VF9111 SEE 34-11-19-01 FOR DET CMM 34-20-12 REFER TO SIL 34-081 C16291AA I/W 45150320 (VF9111) IF 45150320, REFER TO 16990568 IN ICD (VF9111) IF C16291AA, SEE ICD FOR 0861ED (V59885) IF 45150320, SEE ICD FOR 0861ED (V59885)		1
80	A9232075320000	.SEAL		1
90	NAS1473A3	.NUT VACRT OPT TO SE98A3 (VF0224) (CONTINUED)		8

-ITEM NOT ILLUSTRATED
MISSING ITEMS AND VARIANTS ARE NOT APPLICABLE

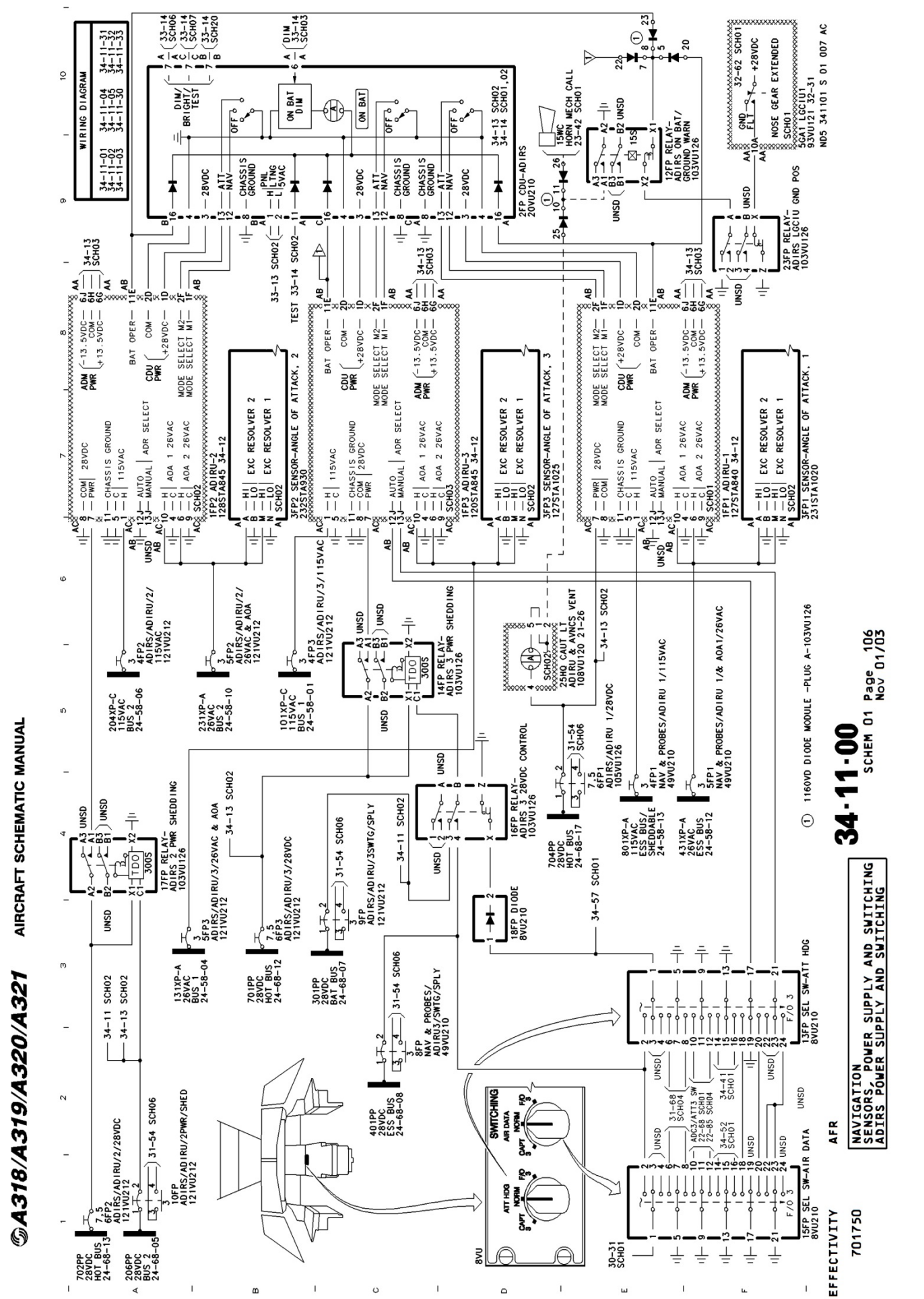
SROS



EFFECTIVITY AFR

040065-074099 101129-131199 201210-227229 231299 301399	NAVIGATION SENSORS, POWER SUPPLY AND SWITCHING ADIRS SENSORS

SB34-1012 B6-B8-D6-D8 SB34-1013 B6-B8-D6-D8


A318/A319/A320/A321
AIRCRAFT SCHEMATIC MANUAL
34-11-00
SCHEM 01 Page 106
Nov 01/03
NAVIGATION
SENSORS, POWER SUPPLY AND SWITCHING
ADIRS POWER SUPPLY AND SWITCHING
EFFECTIVITY
701750
AFR
WIRING DIAGRAM
34-11-01 34-11-04 34-11-31
34-11-02 34-11-05 34-11-32
34-11-03 34-11-30 34-11-33
1160VD DIODE MODULE -PLUG A-103VU126
NOSE GEAR EXTENDED
SCH01
5GA1 LGC1U1
93VU121 32-31
ND5 341101 S 01 007 AC
2FP CDU-ADIRS
20VU210
12FP RELAY-
ADIRS ON BAT/
GROUND WARN
103VU126
23FP RELAY-
ADIRS LGCIU GND POS
103VU126
3FP1 SENSOR-ANGLE OF ATTACK, 1
231STA1020
3FP2 SENSOR-ANGLE OF ATTACK, 2
232STA930
3FP3 SENSOR-ANGLE OF ATTACK, 3
127STA1025
1FP1 ADIRU-1
127STA840 34-12
1FP2 ADIRU-2
128STA845 34-12
1FP3 ADIRU-3
120STA845 34-12
EXC RESOLVER 1
EXC RESOLVER 2
CHASSIS GROUND
28VDC
115VAC
ADR SELECT
AUTO
MANUAL
MODE SELECT M1
MODE SELECT M2
BAT OPER
ON BAT
DIM/BRIGHT/TEST
HORN MECH CALL
15WC
23-42 SCH01
17FP RELAY-
ADIRS 2 PWR SHEDDING
103VU126
14FP RELAY-
ADIRS 3 PWR SHEDDING
103VU126
16FP RELAY-
ADIRS 3 28VDC CONTROL
103VU126
18FP DIODE
8VU210
13FP SEL SW-ATT HDG
8VU210
15FP SEL SW-AIR DATA
8VU210
SWITCHING
ATT HDG
AIR DATA
NORM
CAPT
F/O
SCHEM 01 Page 106
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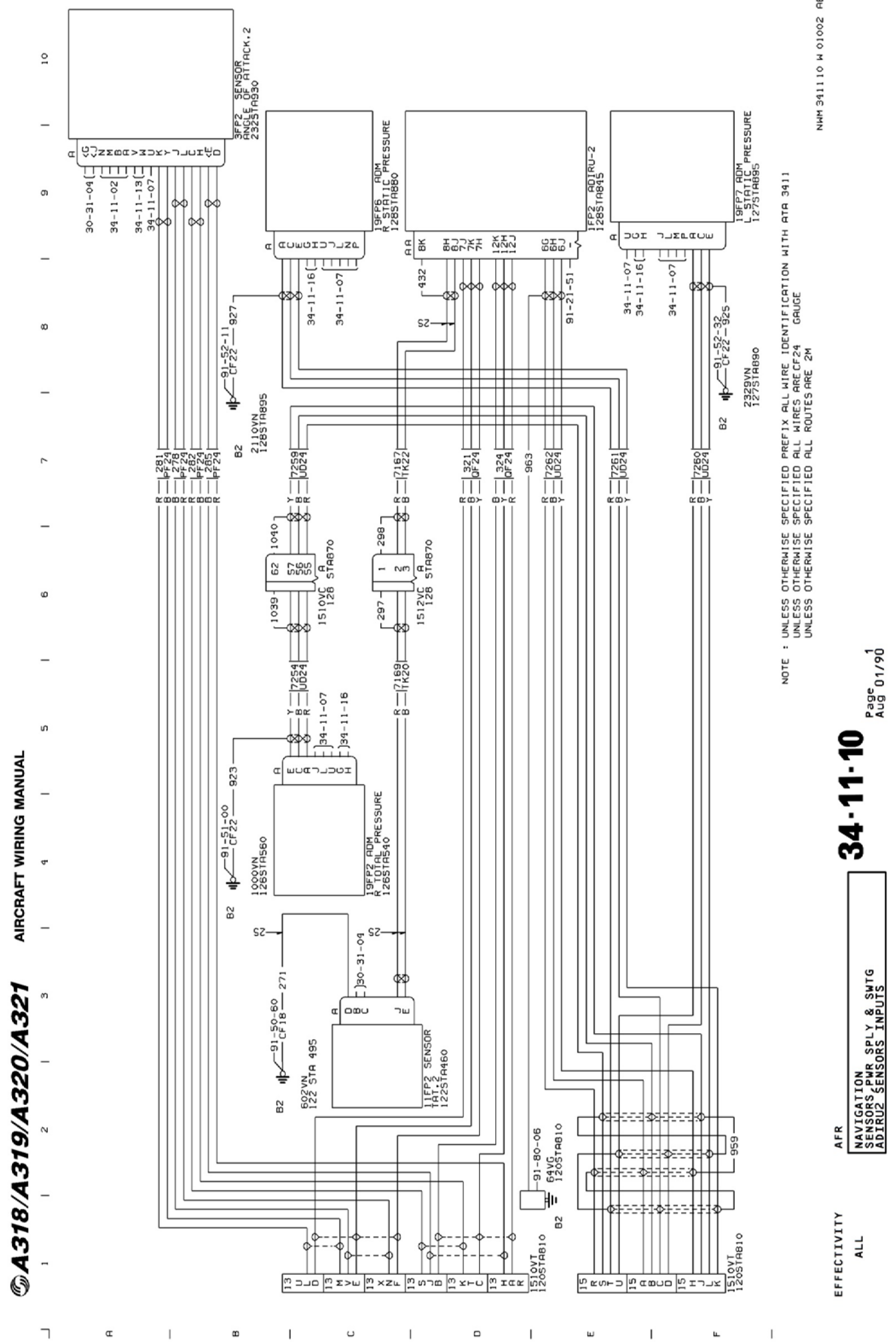

A318/A319/A320/A321
AIRCRAFT WIRING MANUAL
34-11-10
Page 1
Aug 01/90
NWM 341110 W 01002 AB
EFFECTIVITY
ALL
AFR
NAVIGATION
SENSORS PWR SPLY & SWTG
ADIRU2 SENSORS INPUTS
NOTE : UNLESS OTHERWISE SPECIFIED PREFIX ALL WIRE IDENTIFICATION WITH ATA 3411
UNLESS OTHERWISE SPECIFIED ALL WIRES ARE CF24 GAUGE
UNLESS OTHERWISE SPECIFIED ALL ROUTES ARE 2M

Caractéristiques des prises 8525

8525 Series

Applications

For all general purposes in civil aeronautical applications

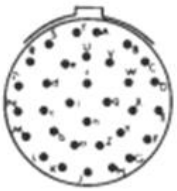
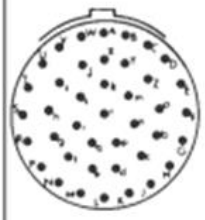
Standards

NFC 93422 - HE 302
NFL 54130 - NAS 1599
GAM T1 list
LN 29504

Description

- Light weight version of MIL-C 26482 Series II
- Intermateable and interchangeable with MIL-C 26482 Series I and II
- Environmental stainless steel version on request
- RFI shielding plug
- Gold plating crimp contacts # 20, # 16, # 12
- Minicoax contacts # 16
- Hermetic version available

Contact layouts
viewed from front face of male insulator

shells								
8	10	12	14	16	18	20	22	24
8 B 3A*	10 B 6*	12 B 10*	14 B 19*	16 B 26*	18 B 32*	20 B 41*	22 B 55*	24 B 61*
								
3 # 20	6 # 20	10 # 20	19 # 20	26 # 20	32 # 20	41 # 20	55 # 20	61 # 20

Ordering information sealed connectors aluminum version

basic series			8525 -	10	R	18 B 32	P	N	H	•••
shell type	10	- square flange receptacle								
	17	- jam nut receptacle								
	16	- plug								
	36	- RFI shielded plug								
plating	R	- black anodized (non conductive plating)								
	N	- nickel (conductive plating)								
	G	- yellow cadmium (conductive plating)								
contact layout		- see table p 45								
contact type	P	- male contact								
	S	- female contact								
orientation	N	- normal								
	W, X, Y, Z	- see table p 46								
obligatory suffix	H	- 3 rear teeth at 120 degrees								
	K	- rear teeth over 360 degrees								

specification

- connector supplied without backshell, without specification
- **L** - connector supplied without contact
- **008** - connector supplied with special contacts # 20 for 0.38 to 0.93 mm² cable or # 16 for 0.93 to 1.91 mm² cable
- **068** - mixed contact layouts (# 20 and # 16)
  connector supplied with special contacts # 20 for 0.38 to 0.93 mm² cable, and standard contacts # 16
- **009** - receptacle 10 or 17 with straight spills contacts size 20 - Ø 0.60 mm - size 16 - Ø 1.00 mm - length max 7.30 mm
  connector supplied with backshells

001 - backnut		**007** - backshell for heatshrink sleeving	
002 - straight cable clamp		**057** - backnut for heatshrink sleeving	
003 - elbow cable clamp		**012** - straight cable clamp*	
011 - backnut*		**017** - backshell for heatshrink sleeving*	
013 - elbow cable clamp*		**018** - backshell for solder shield termination*	