



COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LISTE DES RENVOIS

ATA

23-12-30

Fabricant

P/N

Date d'édition originale

2003/03/01

Date d'édition 2003/03/01



COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

TRANSMITTAL SHEET

TO: HOLDERS OF COMPONENT MAINTENANCE MANUAL FOR EVR716 AND EVR750 ATA 23-12-30.

FILING INSTRUCTIONS

- Revision No. P04 of the CMM replaces the revision No. 3.
- Revision No. 3 is deleted.

23-12-30

TS Page 1 of 1
2003/03/01

COMPONENT MAINTENANCE MANUAL (FOR USE WITH SEPARATE ILLUSTRATED PARTS CATALOG)

PRELIMINARY

Enhanced VHF Radio VHF Communications Transceiver

**P/Ns: EVR716-01-0100A
EVR716-01-0200A
EVR750-03-0100A
EVR750-04-0100A
EVR750-04-0200A**



COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

RECORD OF REVISIONS

[illegible]

DEV	ISSUE	INSERTED	
		DATE	BY

[illegible]

23-12-30

REV. No.	ISSUE DATE	INSERTED	
		DATE	BY



COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

RECORD OF TEMPORARY REVISIONS

[illegible]

23-12-30

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

SERVICE BULLETIN LIST

SERVICE BULLETIN NUMBER	REVISION	INCLUDED IN REVISION	DATE OF INCORPORATION	TITLE
1 EVR716-23-01	2	3	2002/10/15	To increase the internal test filtering during power switching. To improve the general behaviour of the sidetone, for CLIMAX and COSITE configuration. (P/Ns: EVR716-01-0100A/01-0200A).
2 EVR716-23-02	B A S I C	3	2002/10/15	To upgrade the actual Transmitter Board (TX) to industrial level by a re-layout of the printed circuit board. (P/Ns: EVR716-01-0100A/01-0200A).
3 EVR716-23-03	B A S I C	3	2002/10/15	To upgrade the actual Receiver Board (RX) to industrial level by a re-layout of the printed circuit board. (P/Ns: EVR716-01-0100A/01-0200A).
4 EVR716-23-04	B A S I C	3	2002/10/15	To upgrade the actual HIRF Board to industrial level by a re-layout of the printed circuit board. (P/Ns: EVR716-01-0100A/01-0200A).
5 EVR716-23-05	1	3	2002/10/15	To correct some non-working units at 136.025 MHz Frequency due to the disparity of the CR8 zener diode regulating the 17V Power Supply of MA21. (P/Ns: EVR716-01-0100A/01-0200A).
6 EVR716-23-06	B A S I C			Not issued.
7 EVR716-23-07	B A S I C	3	2002/10/15	To provide the 8.33 KHz channelling compatibility between VHF data radio unit and the control panel on BOEING B777. (P/N: EVR716-01-0200A).

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

SERVICE BULLETIN NUMBER	REVISION	INCLUDED IN REVISION	DATE OF INCORPORATION	TITLE
8 EVR716-23-08	3	3	2002/10/15	To improve the interference response due to COSITE Transmitter (especially for ACARS transmissions). To enhance the transmitter spectrum at ± 75 kHz detected by the ground stations. To improve the squelch response at the range limit. To change the monitoring of the power interrupt information. To correct the management of a "busy channel" during autotest. To provide data link improvement for received audio time establishment and for SQP. To provide the 8.33 kHz channelling compatibility between VHF data radio unit and control panel on BOEING 777 whatever the unit P/N is. P/Ns: EVR716-01-0100A/01-0200A
9 EVR716-23-09	1	3	2002/10/15	To convert the EVR716 Radio into a EVR750 "A" Radio. <u>Note: This service bulletin is not included in this C.M.M.</u> Refer to SB No. 9 for technical information. This SB is only for EVR716 version: 01-0100A.
10 EVR716-23-10				Not issued.
11 EVR716-23-11	1	3	2002/10/15	To improve the reliability of the EVR716 P/N: EVR716-01-0200A.
1 EVR7-23-01	1	3	2002/10/15	To improve the reliability of the EVR716 P/N: EVR716-01-0100A EVR750 P/N: EVR750-03-0100A
2 EVR7-23-02	1	3	2002/10/15	To adapt the receivers design to all TCXO suppliers. To correct on some units a random 400ms noise in the headset when the PTT is released. To check C180 polarity on the Tx board. Applicable to P/N EVR716-01-0100A and EVR750-03-0100A.

COMPONENT MAINTENANCE MANUAL*P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A***LIST OF EFFECTIVE PAGES**

SERVICE BULLETIN NUMBER	R E V	INCLUDED IN REVISION	DATE OF INCORPORATION	TITLE
1 EVR750-23-01	B A S I C	3	2002/10/15	To upgrade the existing transmitter board (TX) by a re-layout of the printed circuit board. P/Ns: EVR750-03-0100A/03-0200A
2 EVR750-23-02	B A S I C	3	2002/10/15	To upgrade the existing receiver board (RX) by a re-layout of the printed circuit board. P/Ns: EVR750-03-0100A/03-0200A
3 EVR750-23-03	B A S I C	3	2002/10/15	To upgrade the existing HIRF board by a re-layout of the printed circuit board. P/Ns: EVR750-03-0100A/03-0200A
4 EVR750-23-04	B A S I C			Not issued.



COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

SERVICE INFORMATION LETTER LIST

[illegible]

SUBJECT

PAGE

DATE _____

SUBJECT

PAGE

DATE _____

23-12-30

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

<u>SUBJECT</u>	<u>PAGE</u>	<u>DATE</u>	<u>SUBJECT</u>	<u>PAGE</u>	<u>DATE</u>
Title Page	1	2003/03/01		5	2003/03/01
	2	Blank		6	Blank
Record of Revisions	1	2003/03/01	Description and Operation	1	2003/03/01
	2	Blank		2	2003/03/01
Record of Temporary Revisions	1	2003/03/01		3	2003/03/01
	2	Blank		4	2003/03/01
List of Effective Temporary Revisions	1	2003/03/01		5	2003/03/01
	2	Blank		6	2003/03/01
Service Bulletin List	1	2003/03/01		7	2003/03/01
	2	2003/03/01		8	2003/03/01
	3	2003/03/01		9	2003/03/01
	4	Blank		10	2003/03/01
Service Information Letter List	1	2003/03/01		11	2003/03/01
	2	Blank		12	2003/03/01
List of Effective Pages	1	2003/03/01		13	2003/03/01
	2	2003/03/01		14	2003/03/01
	3	2003/03/01		15	2003/03/01
	4	2003/03/01		16	2003/03/01
	5	2003/03/01		17	2003/03/01
	6	2003/03/01		18	2003/03/01
	7	2003/03/01		19	2003/03/01
	8	Blank		20	2003/03/01
Table of Contents	1	2003/03/01		21	2003/03/01
	2	2003/03/01		22	2003/03/01
	3	2003/03/01			
	4	2003/03/01			
Introduction	1	2003/03/01			
	2	2003/03/01			
	3	2003/03/01			
	4	2003/03/01			

LIST OF EFFECTIVE PAGES

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
TRANSMITTAL SHEET.....	1
RECORD OF REVISIONS	1
RECORD OF TEMPORARY REVISIONS.....	1
SERVICE BULLETIN LIST	1
SERVICE INFORMATION LETTER LIST	1
LIST OF EFFECTIVE PAGES.....	1
TABLE OF CONTENTS	1
INTRODUCTION	1
1. General.....	1
2. Equipment Identification	2
A. Generic Part Number.....	2
B. Front panel labels.....	2
3. Uncommon Abbreviations/Acronyms.....	2
DESCRIPTION AND OPERATION	1
1. Description.....	1
A. General.....	1
B. Frontispiece	3
2. Function of Equipment.....	4
A. Characteristics.....	5
B. Description.....	10
3. Operation	18
A. General.....	18
B. Wired Chassis Assembly (CHC).....	23

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

INTRODUCTION

1. General

This Component Maintenance Manual includes maintenance instructions prepared in accordance with Air Transport Association Specification Nr. 100 for the THALES COMMUNICATIONS Enhanced VHF Radio. Parts lists are provided in a separate Illustrated Parts Catalog ATA: 23-12-30 (Ref/Doc: 36708031).

In this issue, the CMM provides informations concerning the EVR716/750 versions.

This manual provides procedures for shop testing and repair. It presents detailed circuit theory with emphasis on items which will be especially helpful for effective fault isolation. It contains complete performance tests and adjustment procedures.

This Component Maintenance Manual provides shop verified procedures that will enable a technician, unfamiliar with the equipment, to restore it to serviceable condition. The procedures are prepared for the technician that performs shop work and not for the aircraft technician.

CAUTION: THE MATERIAL IN THIS MANUAL IS SUBJECT TO CHANGE. BEFORE ATTEMPTING ANY MAINTENANCE OPERATION ON THE EQUIPMENT COVERED IN THIS MANUAL, VERIFY THAT YOU HAVE COMPLETE AND UP-TO-DATE PUBLICATIONS BY REFERRING TO THE APPLICABLE PUBLICATIONS, SERVICE BULLETIN, SERVICE INFORMATION LETTER INDEXES.

Refer to the Table of Contents for the page location of applicable sections.

A list of uncommon/acronyms abbreviations used in the manual is described in paragraph 2 of the INTRODUCTION section. The manual will be revised as necessary to reflect current information.

We welcome your comments concerning this manual. Although effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph or figure number, and the page number.

Send your comments to:

THALES AVIONICS
Aérodrome de Villacoublay
B.P59
78 141 VELIZY VILLACOUBLAY CEDEX
FRANCE

COMPONENT MAINTENANCE MANUAL

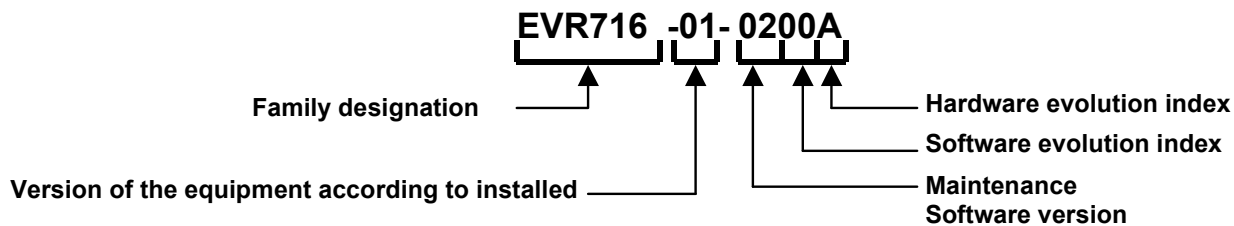
P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

2. Equipment Identification

A. Generic Part Number

The part number has the following format (example).



B. Front panel labels

Different kinds of labels are stuck on the front panel of the EVR716/750 unit. According of EVR716 or EVR750 unit versions, all labels are not similar. For more information, refer to the Illustrated Parts Catalog, ATA: 23-12-30 (Ref/Doc: 36708031) Figures 1 and 1A for the localization on the front panel of the unit.

3. Uncommon Abbreviations/Acronyms

ABBREVIATION/ACRONYM	IDENTIFICATION
ACARS	Aircraft Communications Addressing and Reporting System
ADC	Analog to Digital Converter
AF	Audio Frequency
AGC	Automatic Gain Control
AIN	Analog INput
AM	Amplitude Modulation
AMU	Audio Management Unit
ANT	ANTenna
ARINC	Aeronautical Radio INCorporated
ATE	Automatic Test Equipment
BCD	Binary Coded Decimal
BER	Bit Error Rate
BIT	Built-In Test
BITE	Built-In Test Equipment
BNC	BiNary Code
BNR	BiNaRy
CCITT	Comité Consultatif International de Télécommunication et Transmission
CDU	Control Display Unit

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

ABBREVIATION/ACRONYM	IDENTIFICATION
CFDS	Centralized Fault Display System
CHC	CHassis Câblé (Wired Chassis)
CODEC	COder/DECoder
CMC	Centralized Maintenance Computer
CMU	Communications Management Unit
CPT	Counter
CPTT	Control Push To Talk
CRT	Cathode Ray Tube
CS	Chip Select
CSMA	Carrier Sense Multiple Access
CW	Carrier Wave or Continuous Wave
DAC	Digital to Analog Converter
D/A	Digital/Analog
dBc	DeciBel Carrier
dBm	DeciBel referred to 1 Milliwatt
DC	Direct Current
DF	Design Function
DFIU	Discrete Function Interface Unit
DFS	Data Frequency System
DISP	DISPlay
DPU	Data Processing Unit
DSP	Digital Signal Processor
D8PSK	Differential 8 Phases Shift Keying
EEPROM	Electrically Erasable PROM
EPLD	Erasable Programmable Logical Device
EPROM	Electrically Programmable ROM
ESDS	ElectroStatic Discharge Sensitive
EVR	Enhanced VHF Radio
EXT	EXTernal
FET	Field Effect Transistor
FIFO	First In, First Out
FILT	FILTer
FM	Frequency Modulation
FO	Oscillator Frequency
FT	Functional Test
FW	Failure Warning
GND	GrouND
HF	High Frequency
HIRF	High Intensity Rejected Frequency
ICAO	International Civil Aviation Organisation

(cont'd)

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

ABBREVIATION/ACRONYM	IDENTIFICATION
IF	Intermediate Frequency
IRQ	Interrupt ReQuest
I/O	Input/Ouput
IT	InTerrupt
Ko	Kilo Octet (1024 octets)
LED	Light Emitting Diode
LF	Low Frequency
LO	Local Oscillator
LRU	Line Replaceable Unit
LSB	Less Significant Bit
MAN	Manual
MCU	Module Control Unit
MSB	Most Significant Bit
MSK	Minimum Shift Keying
MU	Management Unit
NB	Narrow Band
NC	Normally Closed
NR	NumbeR
NU	Not Used
NVM	Non Volatile Memory
OEM	Original Equipment Manufacturer
OMS	On-board Maintenance System
PCB	Printed Circuit Board
PIN	P (dopping) Intrinsic N (dopping)
P/N	Part Number
PPM	Pulse Position Modulation
PRG	Program
PROM	Programmable ROM
PTT	Push To Talk
PWR	Power
RAM	Random Access Memory
RC	Resistor Capacitor
RCU	Remote Control Unit
RD	ReaD
RDY	ReaDY
RF	Radio Frequency
RMT	ReMoTe
ROM	Read Only Memory
RST	Reset
R/T	Receiver/Transmitter

(cont'd)

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

ABBREVIATION/ACRONYM	IDENTIFICATION
Rx	Reception
SELCAL	SElective CALLing
SDI	Source/Destination Identifier
SMD	Surface Mounted Device
SRU	Shop Replaceable Unit
SWR	Standing Wave Ratio
TF	Technical Function
TP	Top Part
T/R	Transmitter/Receiver
TRIG	TRIGger
Tx	Transmission
VCO	Voltage Control Oscillator
VHF	Very High Frequency
VMA	Valid Memory Address
Vpp	Volt Peak-to-Peak
Vrms	Volt Root Mean Square Value
VSWR	Voltage Standing Wave Ratio
WB	Wide Band
WRN	WaRNing
μP	Microprocessor

COMPONENT MAINTENANCE MANUAL P/N EVR716-01-0100A and EVR750-03-0100A

DESCRIPTION AND OPERATION

1. Description

A. General

This section gives the description of the EVR716/750 Enhanced VHF Radio (VHF communications transceiver).

THALES Part-Number	Features
EVR716-01-0100A	118 MHz -136.975 MHz frequency range. 25 kHz and 8.33 kHz channel spacing. Compliant with ICAO Annex 10 FM immunity. Conform to DO-178B and DO-160C requirements. Fault memory. ACARS compatible (analogue interface). 200 ms power drop-out transparency. Software data loading via RS232 interface. Airbus ABD0048 or Boeing D243W220 interface maintenance interface selectable by pin programming with Airbus ABD0048 maintenance interface by default.
EVR716-01-0200A	118 MHz-136.975 MHz frequency range. 25 kHz and 8.33 kHz channel spacing. Compliant with ICAO Annex 10 FM immunity. Conforms to DO-178B and DO-160C requirements. Fault memory. ACARS compatible (analogue interface). 200 ms power drop-out transparency. Software dataloading via RS232 interface. Airbus ABD0048 or Boeing D243W220 interface maintenance interface selectable by pin programming with Boeing D243W220 maintenance interface by default.

(cont'd)

Table 1 - Part Numbers List

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

THALES Part-Number	Features
EVR750-03-0100A	118 MHz-136.975 MHz frequency range. 25 kHz and 8.33 kHz channel spacing. Compliant with ICAO Annex 10 FM immunity. Conforms to DO-178B and DO-160C requirements. Fault memory. Analogue or Digital Interface ACARS compatible (digital interface with ATSU/CMU-mode A-). 200 ms power drop-out transparency. Software dataloading via RS232 interface. Airbus ABD0048 or Boeing D243W201 interface maintenance. Interface selectable by pin programming with Airbus ABD0048 maintenance interface by default.
EVR750-04-0100A	118 MHz-136.975 MHz frequency range. 25 kHz and 8.33 kHz channel spacing. Compliant with ICAO Annex 10 FM immunity. Conforms to DO-178B and DO-160D requirements. Fault memory. Analogue or Digital Interface ACARS compatible (digital interface with ATSU/CMU-mode A-). 200 ms power drop-out transparency. Data transmission (31.5kb/sec) with the VDL mode 2 protocol (D8PSK modulation and CSMA access according to ARINC 750 and SARPS VDL2). Interface with ATSU/CMU mode 2. Software dataloading via RS232 interface. Airbus ABD0048 or Boeing D243W201 interface maintenance. Interface selectable by pin programming with Airbus ABD0048 maintenance interface by default.
EVR750-04-0200A	118 MHz-136.975 MHz frequency range. 25 kHz and 8.33 kHz channel spacing. Compliant with ICAO Annex 10 FM immunity. Conforms to DO-178B and DO-160D requirements. Fault memory. Analogue or Digital Interface ACARS compatible (digital interface with ATSU/CMU-mode A-). 200 ms power drop-out transparency. Data transmission (31.5kb/sec) with the VDL mode 2 protocol (D8PSK modulation and CSMA access according to ARINC 750 and SARPS VDL2). Interface with ATSU/CMU mode 2. Software dataloading via RS232 interface. Airbus ABD0048 or Boeing D243W201 interface maintenance. Interface selectable by pin programming with Boeing D243W201 maintenance interface by default.

Table 1 - Part Numbers List

B. Frontispiece

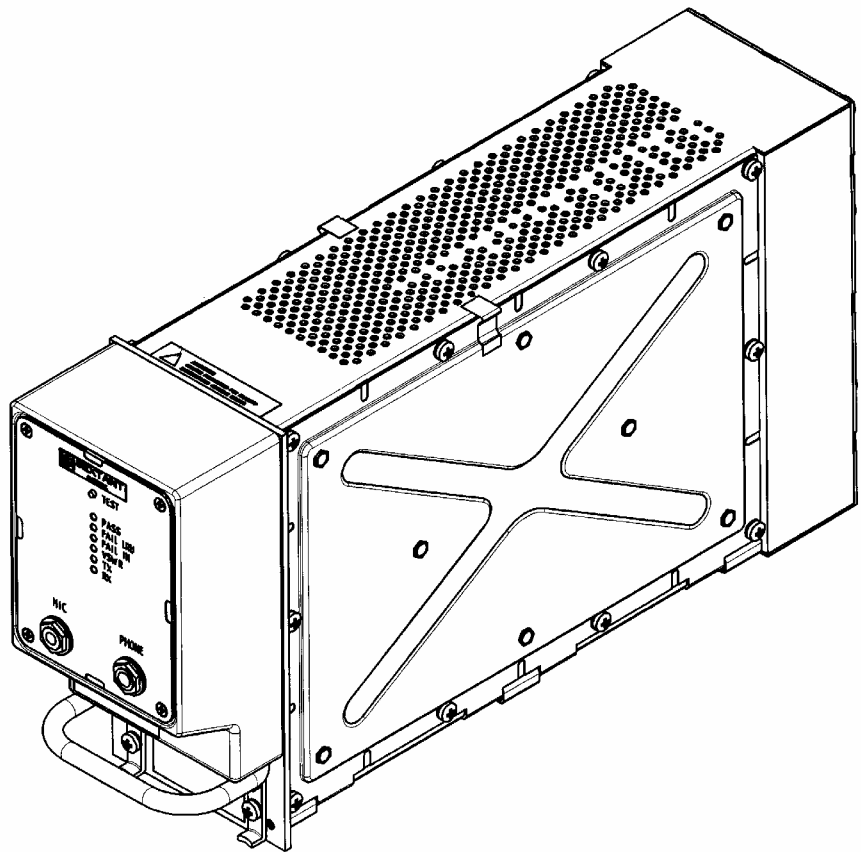
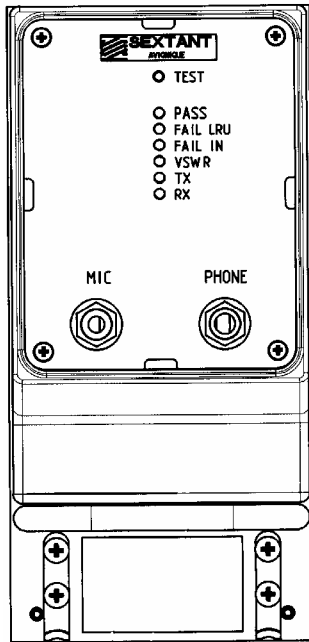


Figure 1 - EVR716/750 Unit

LIST OF EFFECTIVE PAGES

2. Function of Equipment

The airborne equipment, called EVR (Enhanced VHF Radio), is a VHF communications transceiver operating in the aeronautical band (118 MHz to 137 MHz or 118 MHz to 152 MHz), used by Air Transport Aircraft as a primary equipment for communications with the ground air traffic control infrastructure (in continental areas) or for communications between aircraft (relay, emergency).

The basic version of EVR-716 (EVR716-01-xxxxx) and EVR750 (EVR750-03-xxxxx and EVR750-04-xxxxx) operates in the 118 MHz-137 MHz aeronautical band and a specific version for frequency band extension up to 152 MHz is also available (EVR716-02-xxxxx).

Aboard the aircraft, the EVR716/750 transceiver can operate with the following equipment:

- a Frequency Selection System which can be an RCU (Radio Control Unit or control unit) or an RMP (Radio Management Panel) to agree with the aircraft configuration,
- an ACARS MU (Management Unit, ARINC 724) or a CMU (Communications Management Unit, ARINC 758),
- an Audio Management Unit (AMU),
- a maintenance computer: OMS (ARINC 624) or CFDS (ARINC 604),
- a SELCAL decoder system,
- a ATSU/CMU mode 2,
- a VHF antenna.

The EVR716 transceiver operates according the following modes of operation:

- Mode 0A: transmits/receives voice signals in one-way mode with 25 kHz channels spacing, Amplitude Modulation and Double Side Bands,
- Mode 0B: transmits/receives voice signals in one-way mode with the channels 8.33 kHz channels spacing, Amplitude Modulation and Double Side Bands,
- Mode 1A: transmits/receives data signals in one-way mode with AM-MSK modulation, MSK modulation being performed externally in the (C) MU (standard ACARS mode). The signal rate is 2.4 kb/sec. with the 25 kHz apart channels spacing.

The EVR750 transceiver operates according to the same modes as EVR716 (0A/0B/1A) and in addition according to the following mode:

- Mode 1C: transmits/receives data signals in one-way mode with AM-MSK modulation, MSK modulation being performed internally. The signal rate is 2.4 kb/sec. with the 25 kHz apart channels spacing.
- Mode 2: transmits/receives data signals in one-way mode with D8PSK modulation. The signal rate is 31.5 kb/sec with the 25 kHz apart channel spacing.

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A and EVR750-03-0100A

A. Characteristics

(1) Electrical characteristics

CHARACTERISTICS	SPECIFICATIONS
GENERAL	
Operational modes	Voice/25 kHz (0A) Voice/8.33 kHz (0B) Data AM/MSK (1A) (with external modem) Data AM/MSK (1C) (with internal modem) Data D8PSK (2)
Power requirements	28 VDC/180 W Mode 2 :28VDC/210W
Form factor	3 MCU, ARINC Specification 600 i.e. 200x94x387.5 (mm)
Weight	4450 g ± 50 g
Operating Temperature	-25 °C to +70 °C (+13°F to +158°F)
Storage Temperature	-55 °C to +85 °C (-67°F to +185°F)
Over pressure decompression	In accordance with DO-160C, section 4.6, category A2 and D1 (Cf: SSS and DDP) (DO-160D for EVR750-04-xxxxx)
Vibrations	In accordance with DO-160C, section 8, category B (DO-160D for EVR750-04-0x00A)
Electromagnetic compatibility	In accordance with DO-160C, section 15, 16, 17, 18, 19, 20, 21 and 22. (DO-160D for EVR750-04-xxxxx)
Frequency control	Serial digital in accordance with ARINC 429
Frequency range	117.975 MHz to 137.000 MHz
Channel spacing	25 kHz and 8.33 kHz
Frequency stability	< ± 5 ppm
Duty cycle	Continuous transmission (with ARINC 600 cooling system). Duty cycle of 20% (1mn/4mn) with natural convection
Channel Switching	Less than 60 ms
Transmit to receive switching time	Less than 50 ms in mode 0A, 0B, 1A, 1C Less than 1.5 ms in mode 2
Receive to transmit switching time	Less than 50 ms in mode 0A, 0B, 1A, 1C Less than 1.5 ms in mode 2

(cont'd)

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

CHARACTERISTICS		SPECIFICATIONS
RECEIVER		
ED-23B/DO-186A		Class C and E
ED-92		Class F
Sensitivity (modes 0A & 0B)		For a wanted signal of -106 dBm, modulated 1kHz/30%, (S+N)/N* is greater than 6 dB (nominal). (*): CCITT weighted
Sensitivity (mode 2)		Better than -98dBm to get a BER (non corrected) better than 1.10^{-3}
Selectivity (mode 0A)		> ± 9 kHz at 6 dB bandwidth < ± 17 kHz at 60 dB bandwidth < ± 25 kHz at 70 dB bandwidth
Selectivity (mode 0B)		> ± 2.78 kHz at 6 dB bandwidth < ± 7.37 kHz at 60 dB bandwidth
Adjacent channel rejection (mode 2)		Better than 44dB to get a BER better than 1.10^{-3}
Co-channel interference (mode 2)		Co-channel interference ratio better than 20dB to get a BER better than 1.10^{-3}
Dynamic Range (mode 2)		From -98dBm up to -7dBm to get a BER better than 1.10^{-3}
Strong Signals within the VHF range (mode 2)		Better than -27dBm to get a BER better than 1.10^{-3}
Cross modulation		Unwanted signal level (1 kHz/50%) to obtain - 10 dB referred to a signal of -87 dBm (1 kHz/50%): - at ± 25 kHz > - 20 dBm - at ± 50 kHz > - 15 dBm - at ± 100 kHz > - 10 dBm
AGC regulation		Within 3 dB (-93 dBm to -13 dBm input); no more than 6 dB (-101 dBm to +1 dBm)
Audio output		10 mW (adjustable from 5 mW to 40 mW) into 600 ohms ($\pm 20\%$) resistive load for -53 dBm signal modulated 30% at 1000 Hz
Audio output frequency response		Within 6 dB from 300 Hz to 2500 Hz better than -20 dB at 3750 Hz
Audio output harmonic distortion		Not to exceed < 3% for -53 dBm signal modulated 30% at 1000 Hz
Undesired responses		< 80 dB
Intermodulation (FM immunity)		as per ARINC 716 section 3.6.7.5
Selcal/Data Output	Output level	0.5 Vrms (min.) into 600 ohms ($\pm 20\%$) resistive load
	Frequency response	Selcal (mode Voice): < 3 dB from 312 Hz to 1200 Hz AM-MSK (mode data) < ± 6 dB from 300 Hz to 6600 Hz
	Distortion	< 3% for a signal of -53 dBm, modulated 30% at 1000 Hz

(cont'd)

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A and EVR750-03-0100A

CHARACTERISTICS		SPECIFICATIONS
TRANSMITTER		
ED-23B/DO-186A		Class 3 and 5
ED-92		Class 7
Output power		> 25 W
Output power (mode 2)		> 15 W
Harmonics		H ₂ < -16 dBm H _n < -26 dBm (n ≥ 3)
AF response		Within 6 dB from 300 Hz to 2500 Hz
Audio distortion		< 10%
Modulation level		> 80 % for 0.25 Vrms at 1000 Hz
Spectrum mask (8.33 kHz)		For an audio frequency from 300 Hz to 10 kHz and an audio level attenuated by 10 dB/octave from 800 Hz to 10 kHz, referred to 70% modulation level < -45 dBc from ± 3.2 kHz to ± 5 kHz < -60 dBc from ± 5 kHz to ± 7 kHz < -70 dBc for frequency shift greater than ± 7 kHz
Data Input	Modulation ratio	> 80% for a frequency of 1000 Hz at -10 dBm
	Frequency response	Within 6 dB from 600 Hz to 6600 Hz
	Distortion	< 10% for 80% modulation ratio over frequency range from 600 Hz to 6600 Hz
RF Power rise time		< 190 μs
RF Power release time		< 190 μs
Symbol constellation error		Error vector Magnitude (EVM) < 6%
Adjacent channel power		1 st ACP : < -18dBm 2 nd ACP : < -28dBm 3 rd ACP : < -38dBm
Wide band noise		< -53dBm
Certification		Pour EVR716-01-xxxxx et EVR750-03-xxxxx : DO160C/A2D1/YBA/BCMN/XXXXXXXXABAZZUZ/A2E2/XX Pour EVR750-04-xxxxx : DO160D Env.Cat.[(A2)(D1)Y]BAB[SMBC]XXXXXXXXAAZZUZ[A2E2]X XA
		QAC1

NOTE: "Nominal" relates to Standard Conditions.

The first and last selectable 25 kHz channels are respectively:

- 118.000 (F0 = 118.0000 MHz)
- 136.975 (F0 = 136.9750 MHz)

LIST OF EFFECTIVE PAGES

The first and last selectable 8.33 kHz channels are respectively:

- 118.005 (F0 = 118.0000 MHz)
- 136.990 (F0 = 136.9917 MHz)

COMPONENT MAINTENANCE MANUAL P/N EVR716-01-0100A and EVR750-03-0100A

(2) Environmental Certification

The EVR716/750 Transceiver meets the environmental conditions of the Radio Technical Commission for Aeronautics (RTCA) document number DO-160C, "Environmental Conditions and Test Procedures for Airline Electronic/electrical Equipment and Instruments". (DO-160D for EVR750-04-xxxxx).

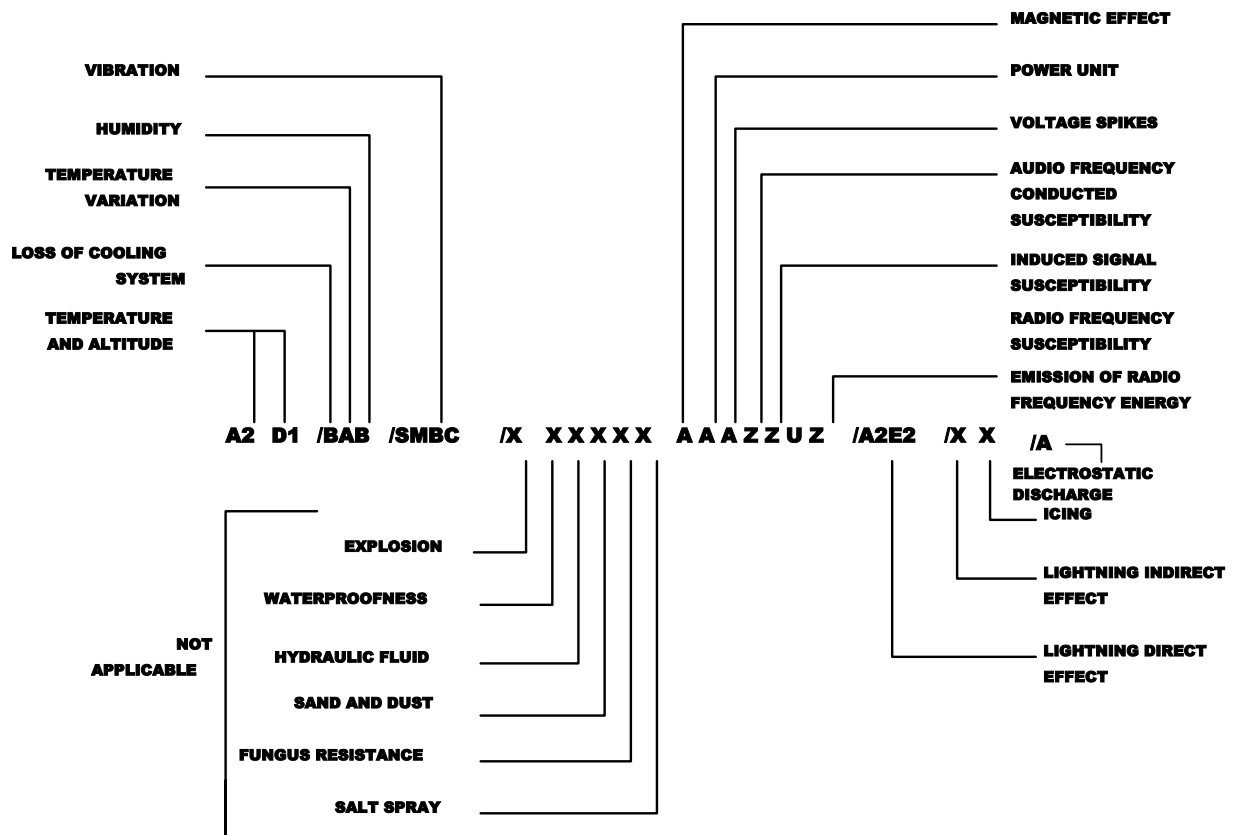


Figure 2 - Environmental Certification Categories

LIST OF EFFECTIVE PAGES

B. Description

See Figure 3.

The EVR716/750 appears as a 3 MCU form box.

The EVR716/750 transceiver has the operating subassemblies (SRU) below:

- a receiver module
- a transmitter module
- a power supply module
- a Data Processing unit (DPU module)
- an HIRF module
- a power storage module (behind the rear panel)
- a wired chassis

The EVR716/750 transceiver is built with a center chassis which holds (See Figure 4):

- a front panel assembly which hold the LED type indicators, a pushbutton for the triggered test and the headset and microphone connectors. The six indicators are:
 - "FAIL LRU" (red)
 - "FAIL IN" (red)
 - "PASS" (green)
 - "VSWR" (red)
 - "Tx" (green)
 - "Rx" (green)
- on left side, the receiver module,
- on right side, the DPU module,
- on the center part, the Power Supply module and the Transmitter module.
- a rear panel with power supply, antenna input, inputs/outputs (discretes, ARINC buses) and ATE (Automatic Test Equipment) interface.

The rear connector has the three parts below:

- the 60-way Middle Part (MP) with all the transceiver inputs (discretes, ARINC buses),
- the 60-way Top Part (TP) with the contacts used for the ATE,
- the Bottom Part (BP) with the power supply contacts and the antenna coaxial connector.

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A and EVR750-03-0100A

(1) Electrical interfaces

NOTE:

Hi = High
 Lo = Low
 LS = Low Speed
 HS = High Speed

(a) Middle Part connector

CONNECTOR/PIN	SIGNAL NAME
MPA1	Mike Input
MPB1	“
MPC1	“
MPD1	Key Event
MPA2	Max Trans cutoff
MPB2	Mike Input (Ground)
MPC2	Data Loader Input
MPD2	“
MPA3	Optional
MPB3	(Remote Squelch)
MPC3	“
MPD3	DC Ground
MPA4	Self Test Discrete
MPB4	Audio Ground (Ground)
MPC4	Data Loader Output
MPD4	“
MPA5	Data Link Input
MPB5	“
MPC5	Reserved for ARNIC 716 compatibility
MPD5	8.33 kHz program for ARINC 716 compatibility
MPA6	Data from OMS/CFDS # 1 input Port A
MPB6	“ “ “
MPC6	Data from OMS/CFDS# 2 input Port B
MPD6	“ “ “
MPA7	Freq./Func: Select
MPB7	Data I/P Port B
MPC7	Voice/Data Select
MPD7	Data key line

(cont'd)

MPA8	Reserved
MPB8	Data loader enable
MPC8	Reserved
MPD8	Return (DC Ground)
MPA9	SDI code input

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

CONNECTOR/PIN	SIGNAL NAME			
MPB9	SDI code input			
MPC9	Ground			
MPD9	Reserved for AGC			
MPA10	Program common			
MPB10	Reserved			
MPC10	Data to both CMUs Output port		A	HS
MPD10	" " "		B	
MPA11	Freq./Funct. Select Data I/P Port A		A	LS
MPB11	" " "		B	
MPC11	Maintenance interface software pin programming			
MPD11	Data select discrete			
MPA12	Data from CMU#1 Input Port A		A	HS
MPB12	" " "		B	
MPC12	Data from CMU#2 Input Port B		A	LS
MPD12	" " "		B	
MPA13	Selcal audio and Data output		HI	
MPB13	" " "		Lo	
MPC13	Squelch disable			
MPD13	Squelch disable return (Ground)			
MPA14	Maintenance interface software pin programming			
MPB14	Ground/air discrete			
MPC14	Data to OMS or CFDS Output port		A	LS
MPD14	" " "		B	
MPA15	Audio/sidetone output		HI	
MPB15	" " "		Lo	
MPC15	Muting output			
MPD15	Muting return (Ground)			

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A and EVR750-03-0100A

(b) Top Part connector

CONNECTOR/PIN	SIGNAL NAME
TPA1	MANUFACTURER IDENTIFIER
TPB1	MANUFACTURER
TPC1	RESERVED
TPD1	RESERVED
TPA2	
TPB2	
TPC2	COMMON
TPD2	NOT USED
TPA3	NOT USED
TPB3	NOT USED
TPC3	NOT USED
TPD3	NOT USED
TPA4	NOT USED
TPB4	NOT USED
TPC4	NOT USED
TPD4	NOT USED
TPA5	SELECT MODE ATE
TPB5	TX 232A
TPC5	DC GROUND
TPD5	RX 232A
TPA6	LED A1
TPB6	LED A2
TPC6	LED A3
TPD6	LED A4
TPA7	LED A5
TPB7	RESERVED FOR AGC
TPC7	RESERVED
TPD7	WRITTEN
TPA8	P5VT
TPB8	P15VT
TPC8	M15VT
TPD8	NOT USED
TPA9	RESPUATE1
TPB9	RESPUATE2
TPC9	NOT USED
TPD9	NOT USED
TPA10	BLOSQLT
TPB10	CANOCT
TPC10	COMPRESSOR-ON/OFF-INPUT
TPD10	RESERVED
TPA11 TO TPD15	NOT USED

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

(c) Bottom Part connector

CONNECTOR/PIN	SIGNAL NAME
BP1	ANTENNA RF
BP2	POWER INPUT + 28 VDC
BP3	SPARE
BP4	POWER INPUT GROUND
BP5	NOT USED

(d) Pin programming for maintenance software selection

- P/N EVR 716/750 with BOEING maintenance interface by default: EVR7xx-0x-0200A.
- P/N EVR716750 with AIRBUS maintenance interface by default: EVR7xx-0x-0100A.

Pin Programming for maintenance software selection		Maintenance Software selected
MC11	MA14	
0	0	Airbus
0	1*	Boeing
1*	0	Airbus
1*	1*	Default

* or not wired.

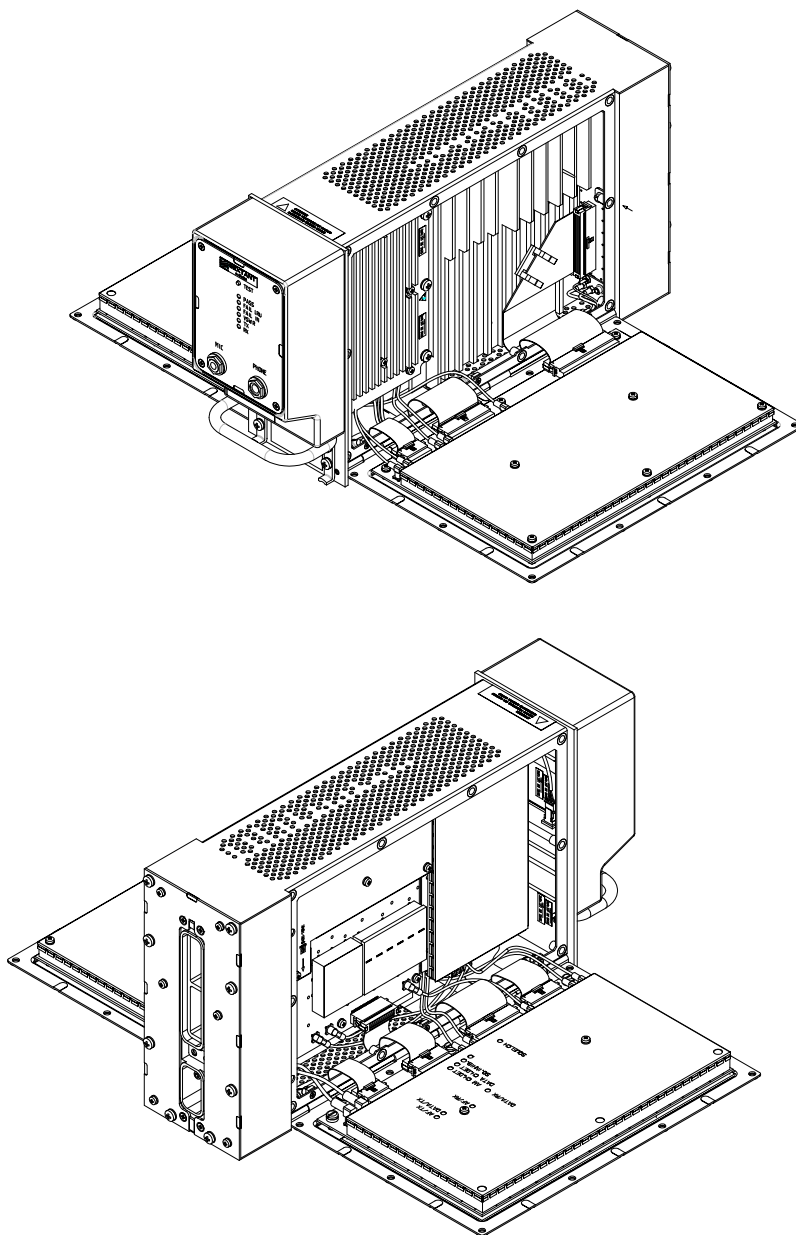


Figure 3 - SRU Location

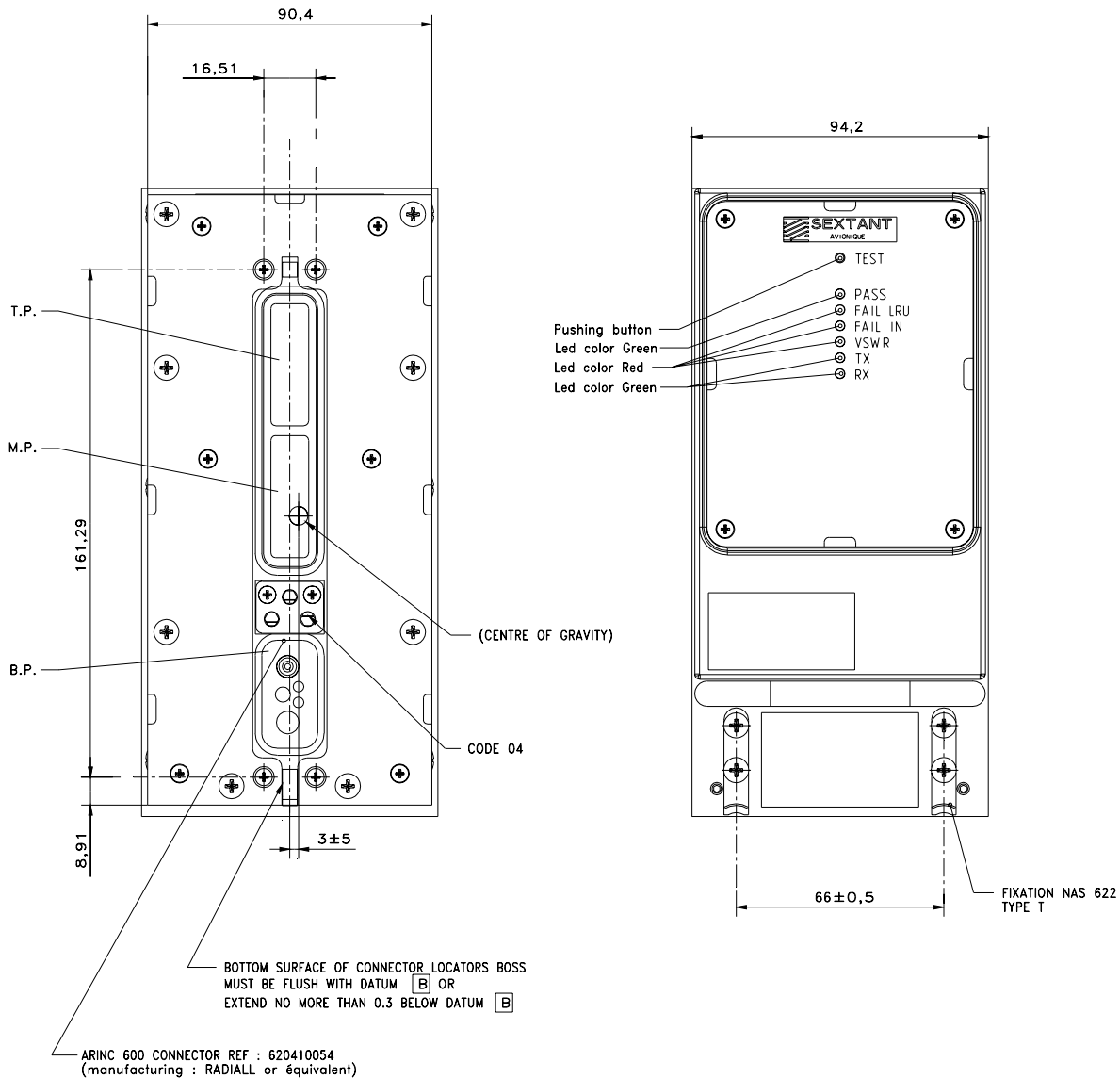
COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

REAR PANEL

FRONT PANEL



Weight : 4450g ± 50g

NOTE : all dimensions are in mm

Figure 4 - Rear and Front Panels

COMPONENT MAINTENANCE MANUAL P/N EVR716-01-0100A and EVR750-03-0100A

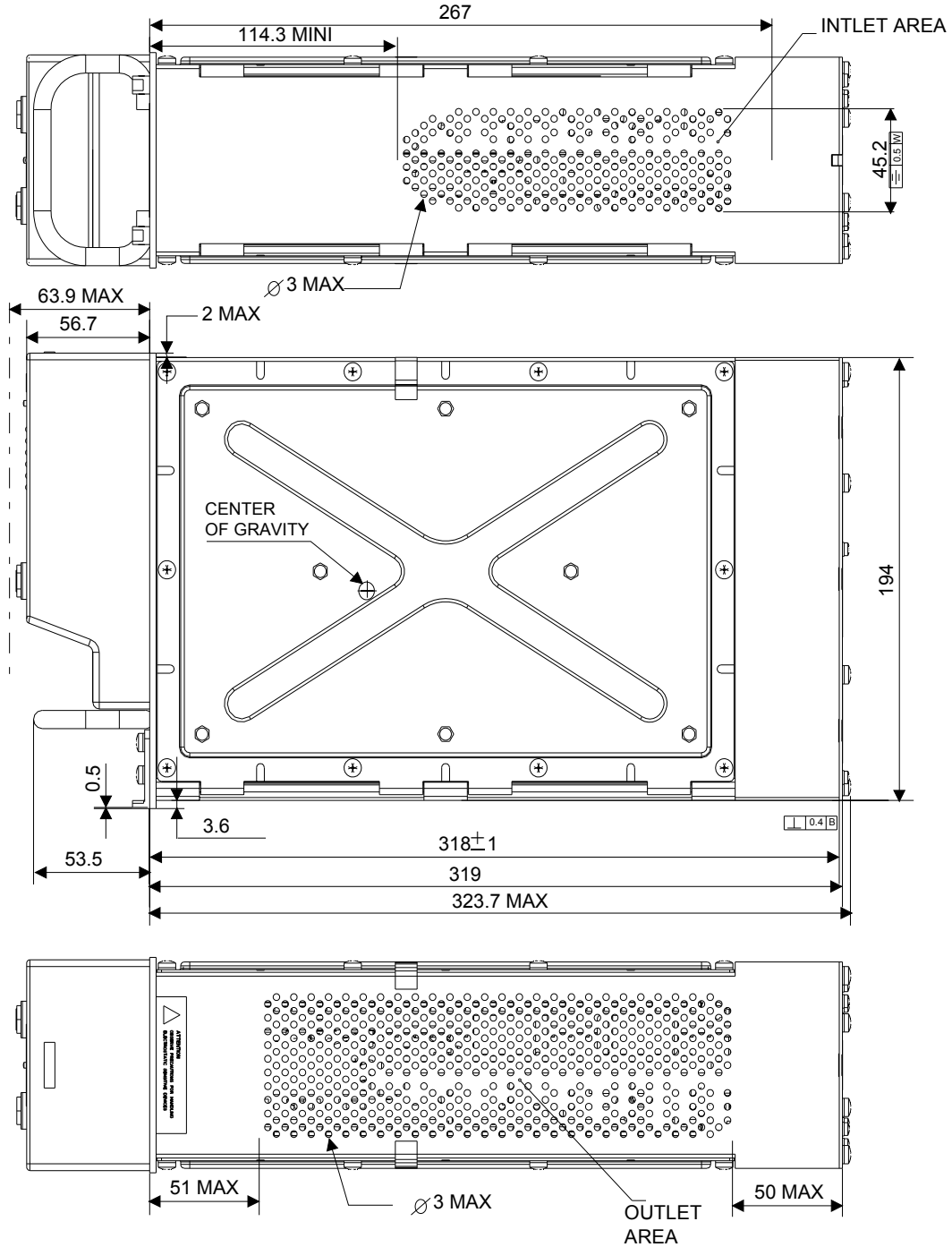


Figure 5 – Dimensions

LIST OF EFFECTIVE PAGES

3. Operation

A. General

The primary function of the EVR716/750 transceiver is to provide voice and data communications for Air Transport Aircraft, in the aeronautical band (118 MHz to 137 MHz).

The EVR716/750 transceiver operates in the voice and data modes given in the ARINC 716/750 specifications, that is for the voice modes: Amplitude Modulation with Double Side Bands, with the channels 25 kHz (0A mode) or 8.33 kHz (0B mode) apart; and in data mode: ACARS mode with an external modem. (internal modem for EVR-750) and VDL Mode 2 (D8PSK).

MODE	CHARACTERISTICS
0A	Analog voice transmission 25 kHz
0B	Analog voice transmission 8.33 kHz
1A	Data, 25 kHz channel AM-MSK modulation (2.4 kb/sec.) External modem, CSMA access ACARS protocol (analog interface for digital interface with ATSU/CMU for EVR-750).
1C	Data, 25 kHz channel AM-MSK modulation (2.4 kb/sec.) Internal modem, ACARS protocol (analog interface with ATSU/CMU).
2	Data, 25 kHz channel D8PSK modulation (bit rate 31.5kb/sec, symbol rate 10.5 kbauds) Access to the channel :CSMA non adaptive p-persistent Interface with ATSU/CMU through link ARINC 429 high speed.

Table 2 - Modes of Operation

COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A and EVR750-03-0100A

The EVR716/750 transceiver has seven subassemblies (SRU) which can be replaced in a maintenance shop. These are:

Name	Short name
WIRED CHASSIS	CHC
HIRF module	HIRF
RECEIVER Module	REC
TRANSMITTER Module	EME
DPU Module	DPU
POWER SUPPLIES Module	ALM
POWER STORAGE module	PST

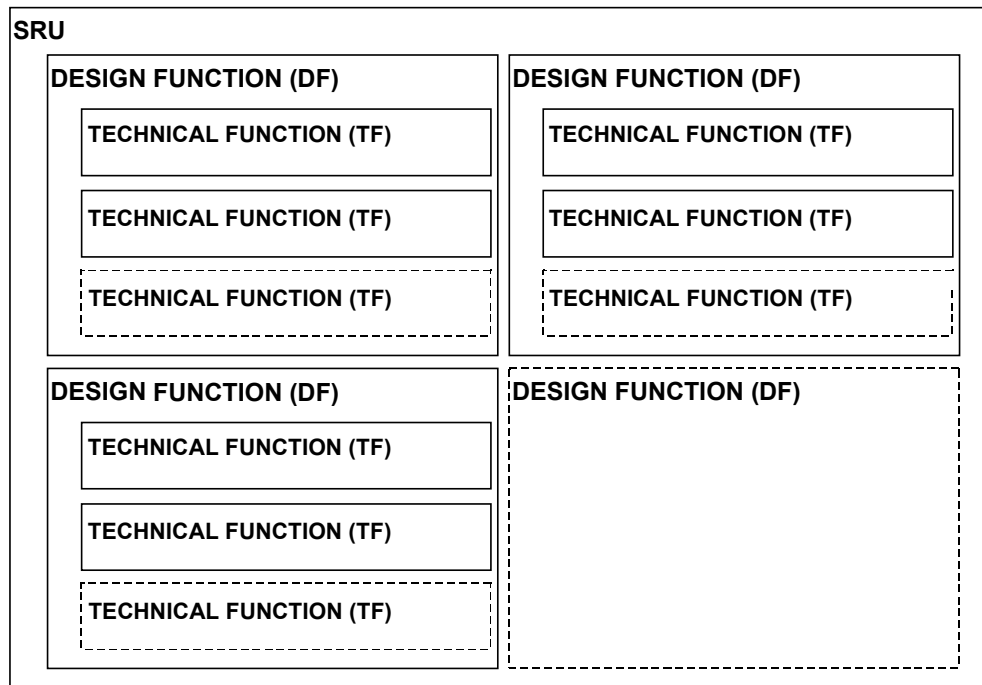
Table 3 - SRU of EVR716/750

The primary functions of an SRU are known as the Design Functions (DF).

Each function of a design function is known as a Technical Function (TF). An TF is a set of components related to a primary component.

The functions are identified by the short name (mnemonic) of SRU and the short names of the design function and technical function.

Example: SRU_DF_TF
HIRF_HIRF_RECIN





COMPONENT MAINTENANCE MANUAL

P/N EVR716-01-0100A, EVR750-03-0100A and EVR750-04-0100A

LIST OF EFFECTIVE PAGES

Figure 6 - Organization of Functions

23-12-30

INTRO - Page 20
2003/03/01

The next block diagrams show the connections between all the subassemblies of the EVR716/750:

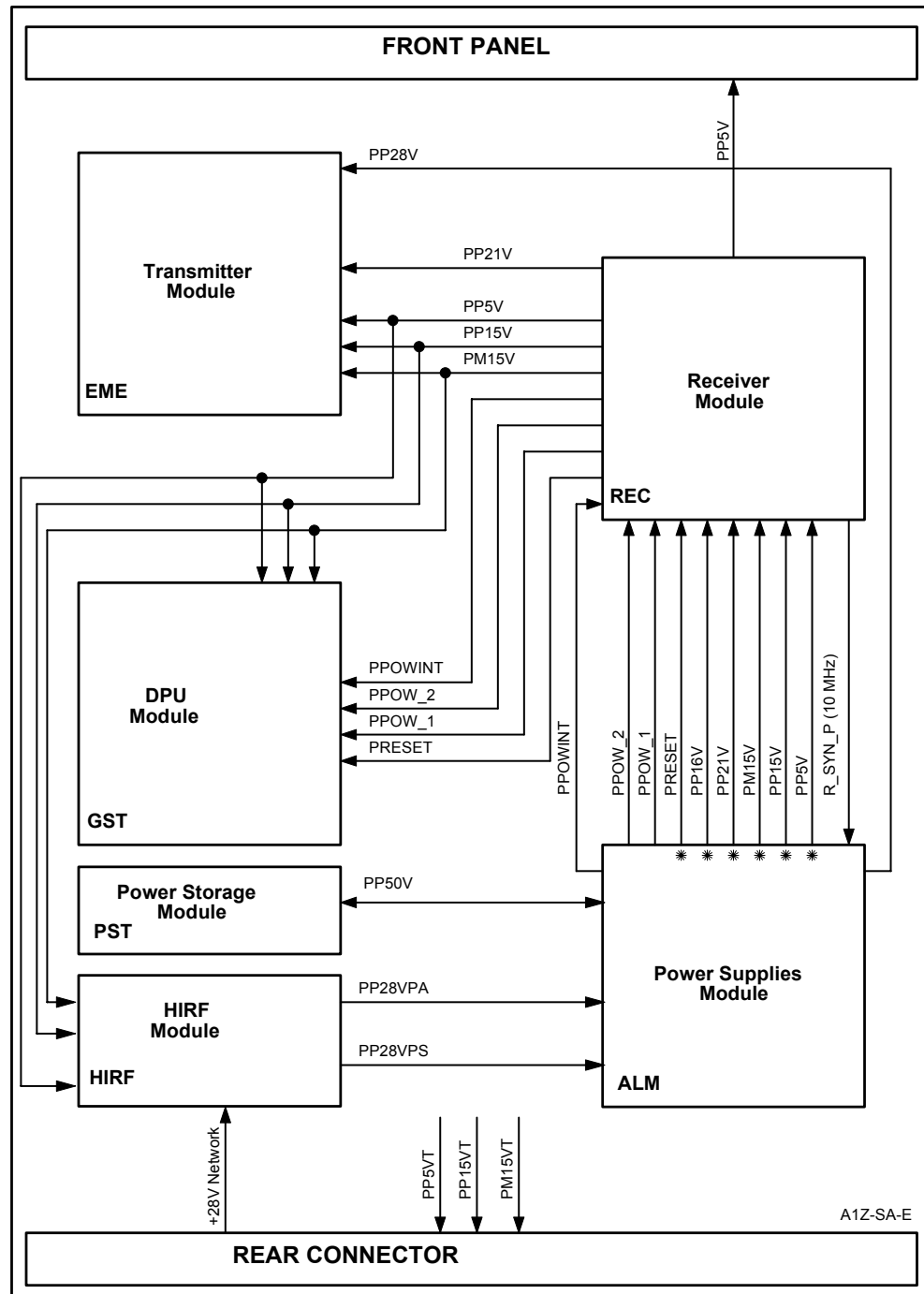


Figure 7 - Power Supply Connections

LIST OF EFFECTIVE PAGES

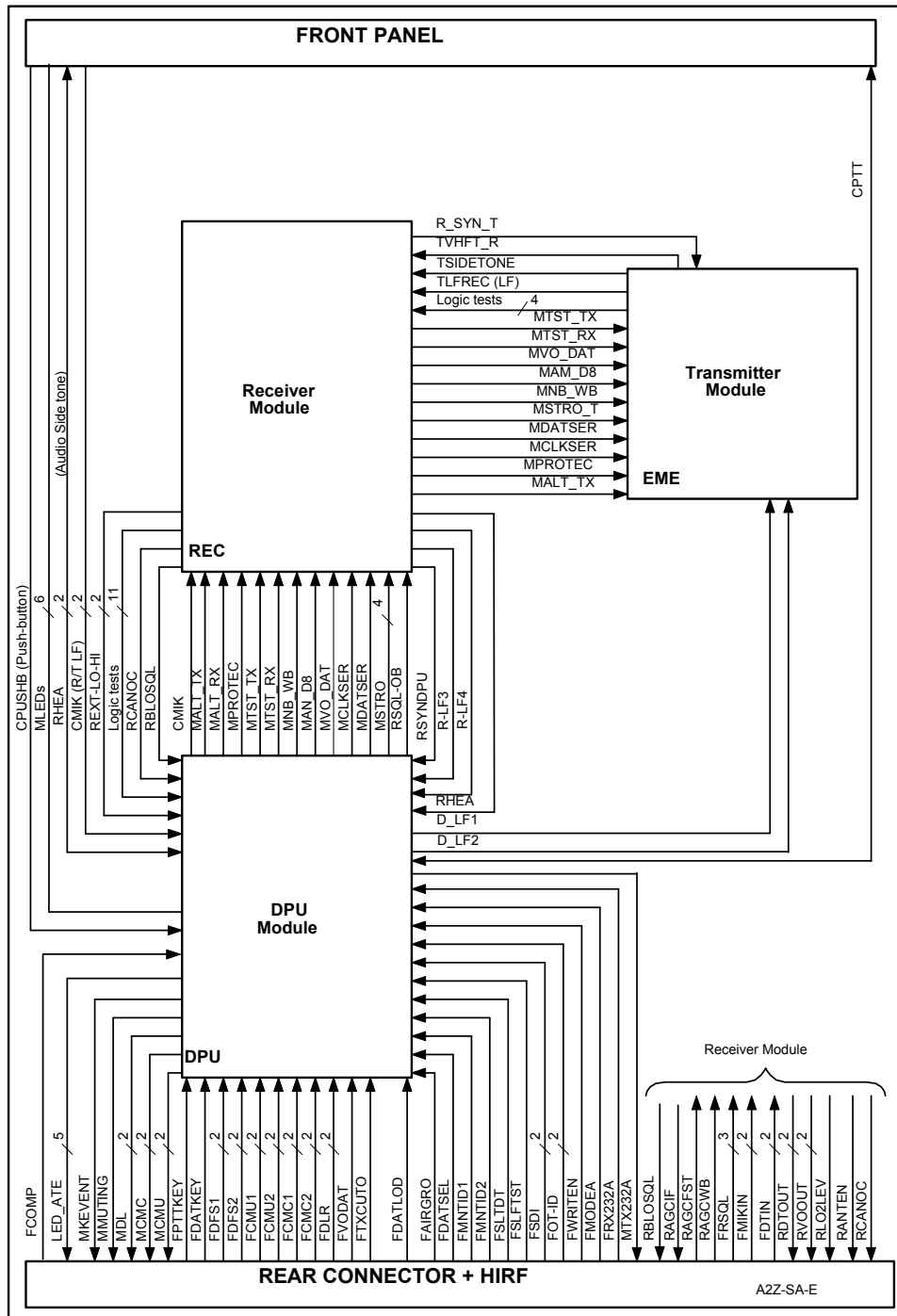


Figure 8 - Signal Connections

B. Wired Chassis Assembly (CHC)

The wired chassis assembly does the functions below (without the mechanical functions):

- electrical interface between the internal functions of the equipment,
- dissipation of the heat caused by the operation of the electrical subassemblies,
- control of a serviceability test using six LEDs.

Ribbon cables connect the cards and the rear connector.

The wired chassis assembly has one Design Function (DF):

Name	Short name
Front Panel	CHC_FAV

Table 4 - Wired Chassis
Design Function

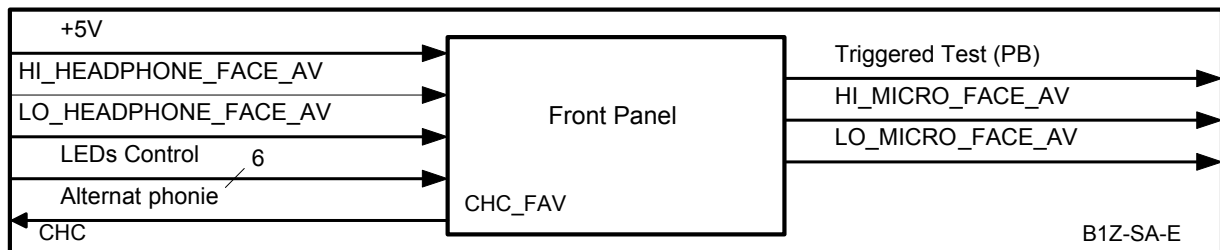


Figure 9 - Wired Chassis (CHC)
Block Diagram

This DF has one TF:

Name	Short name
Front Panel	CHC_FAV_FAV

Table 5 - Front Panel
Technical Function

This TF is the front panel of the EVR716/750 transceiver. It has six LED type indicators, one "TEST" pushbutton to trigger the tests. There are also two jack type sockets, one for the headset and the other for the microphone (See Figure 4).

LIST OF EFFECTIVE PAGES

The six indicators are:

- "FAIL LRU" (red): lights on when the continuous or/and triggered tests (init or pushbutton) find a malfunction in the transceiver and not in the inputs (discrete or ARINC 429 bus).
- "FAIL IN" (red): lights on when the EVR716/750 transceiver finds a malfunction in the inputs (DFS ARINC 429 bus).
- "PASS" (green): lights on when the continuous or/and triggered tests (init or pushbutton) do not find any malfunctions.
- "VSWR" (red): lights on when the transceiver measures an VSWR larger than 2:1.
- "Tx" (green): lights on when the transceiver transmits.
- "Rx" (green): lights on when the transceiver is in receive mode.

The front panel connections are as follows:

Signal	Input/Output	SRU_DF_TF
LED Tx control	I	DPU_G/M_AFFAV
LED Tx control	I	DPU_G/M_AFFAV
LED VSWR control	I	DPU_G/M_AFFAV
LED PASS control	I	DPU_G/M_AFFAV
LED FAIL LRU control	I	DPU_G/M_AFFAV
LED FAIL IN control	I	DPU_G/M_AFFAV
Front Panel Test (PB)	O	DPU_G/M_DECTEST
+5V voltage	I	REC_ALM_+ 5V
HI_CASQUE_FACE_AV (RHEA_H)	I	REC_AIGUI_BFAUDIO
LO_CASQUE_FACE_AV (RHEA_L)	I	REC_AIGUI_BFAUDIO
HI_MICRO_FACE_AV (CMIK_H)	O	REC_AIGUI_AUDIOIN
LO_MICRO_FACE_AV (CMIK_L)	O	REC_AIGUI_AUDIOIN
Alternat phonie (CPTT)	I	