6.3. Unit line-up sheets

6.3.1. Multiplex card - 45 324 500 – REG

PURPOSE	:	LINE-UP OF A REPLACEMENT UNIT
DURATION	:	25 mn
EQUIPMENT	:	
♦ **Measuring instruments**	:	None
♦ **Specialised tools**	:	None
♦ **Documentation**	:	None

♦ **PRELIMINARY - SAFETY INSTRUCTIONS**

- Shutdown the transmitter.

♦ **PERFORMANCE INSTRUCTIONS**

The multiplex card is accessible via the rear of the equipment.

- Make sure that the jumper positions on the new card match those of the old one. Please refer to the illustration below to make sure that all jumpers are properly placed.

- If necessary, adjust the new card to conform to the old one.
- Note the position of the cables to be disconnected on the multiplex card.
- Disconnect the connectors.
- Unscrew the fixings on the multiplex card (3 mm hex. spanner).
- Replace the card and fix it into position.
- Reconnect the connectors to their original positions and restart the equipment.

The green LED (light on) on the card signals the presence of the + 5v voltage necessary for the function of the protection loop; loosening this switch (LED light off) will show the message **MUXBOARD FAULT** on the LCD screen of the equipment.

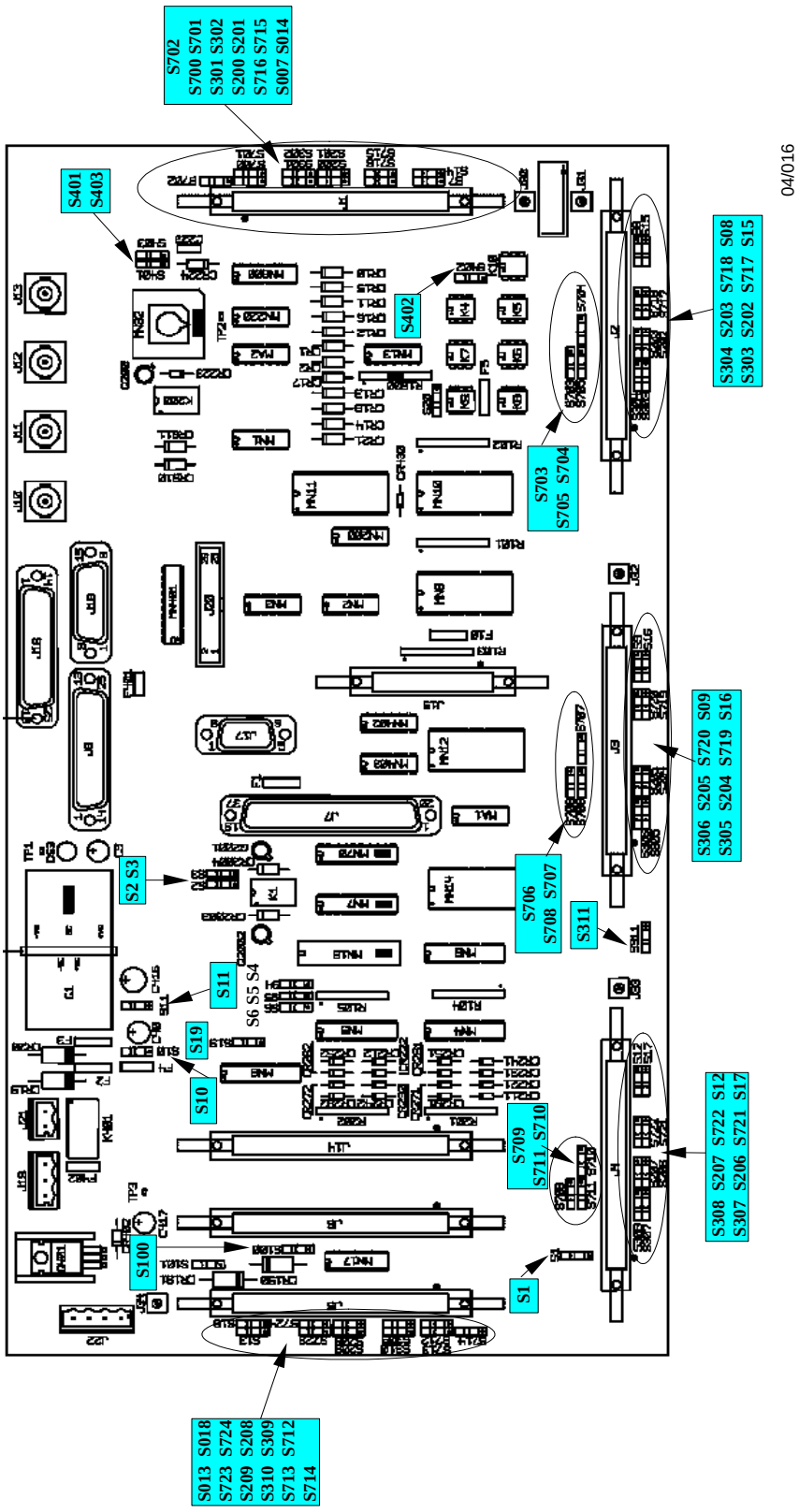


Fig 1 - Layout of jumpers

6.3.2. Central Processing Unit (CPU) TH860 - REG

PURPOSE	**:**	**LINE-UP OF A REPLACEMENT UNIT**
DURATION	**:**	10 mn
EQUIPMENT	**:**	
♦ Measuring instruments	:	None
♦ Specialised tools	:	None
♦ Documentation	:	Remove/re-insert sheet: 45323570-DMR ou 45321208-DMR ou 45323663-DMR

♦ **PRELIMINARY - SAFETY INSTRUCTIONS**

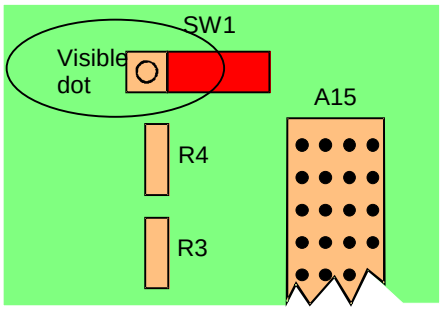
- Verify that the replacement card has the exact same number as the faulty card:

Note: That activating the installation will erase the data stored in memory by the CPU card. For example, the following information will be erased: operating time, password. The password is reset to 0.

Open the CPU main switch. Remark: the touch screen is no longer fed.

♦ **PERFORMANCE INSTRUCTIONS**

- To protect the CPU card, the power supply must be turned off. Then pull out the faulty card.
- Set switch or jumper SW1 (located on the exciter/CPU interconnection card on the sub-assembly side behind the CPU card) to the "Installation parameters" position (see Fig).
- Plug the replacement card into the exciter frame.
- Close the CPU main switch.



Switch SW1

or

Jumper SW1 for installation parameters

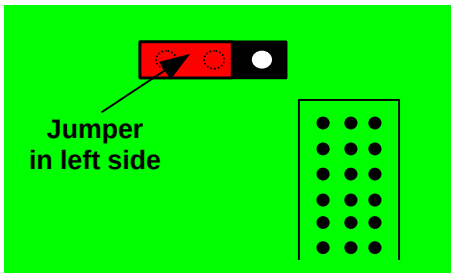


Fig 1 - SW1 position to enter "installation parameter"

At the end of re-assembly (see Fig):

- the green LED must be flashing to indicate an active card,
- the yellow LED must be lit (presence of 5 V),
- the orange/red LED must be off.

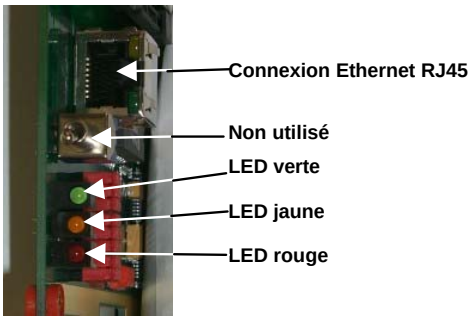


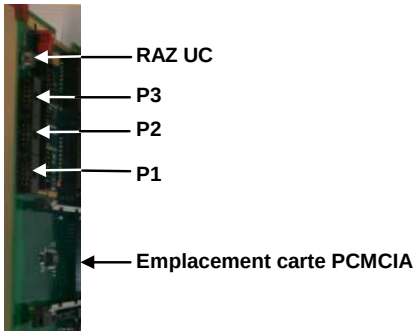
Fig 2 - Front panel of CPU card

If necessary, configure the card using the installation menu on the touch screen (see Figure 3). Two cases are possible:

1st case

The configuration of the card is compliant to specifications:

- switch SW1 to its initial position:
  - in case of switch, the dot should not be visible
  - in case of jumper, the jumper should be on the right side (see Figure 1),
- Push on RAZ UC button (see Figure 3).
- Check that the monitoring panel (LCD screen) is functioning.



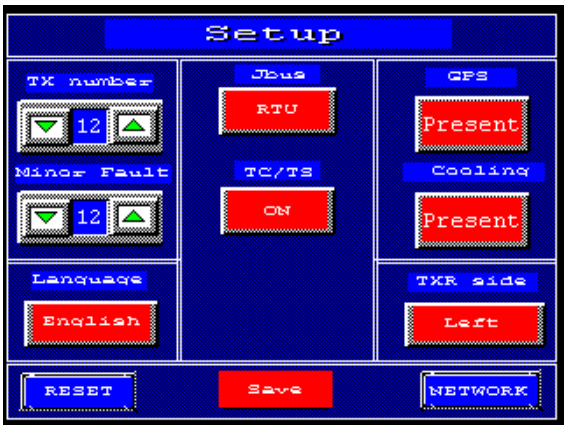
2nd case

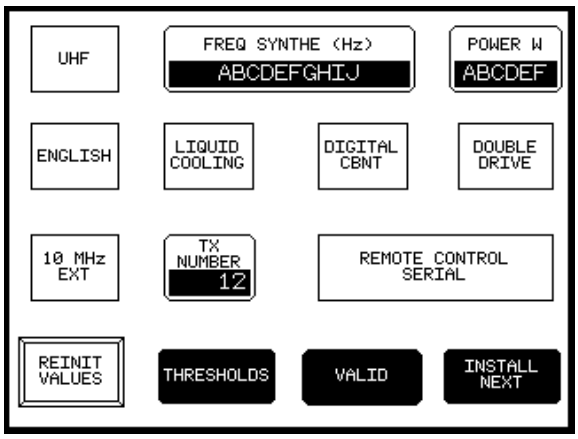
The configuration of the card is not compliant to specifications:

- to set the system configuration, enter appropriate values on the touch screen,
- to validate, press VALID,
- follow the instructions on the display screen.

  Set the installation switch (initial position).

  Shutdown the CPU cards via the main switch and close the main switches again.
- Check that the monitoring panel (LCD screen) is functioning.





01/171 (e)

N + 1 or PR**

DIGITAL TRANSMITTER*

Fig 3 - Installation configuration screen

* The digital transmitter is configured via 6 screens installation.

** N+1 / PR System configured via 5 screens

6.3.3. Reforming of PSU capacitors - 37419600_700 – REG and 45323334-REG

PURPOSE	**:**	**REFORMING OF ELECTROCHEMICAL CAPACITORS**
DURATION	**:**	30 mn
EQUIPMENT:		
♦ Measuring instruments :		Voltmeter
♦ Specialised tools :		Tooling
♦ Documentation :		Remove/Re-insert 37419600/700 – DMR and 45323334-DMR

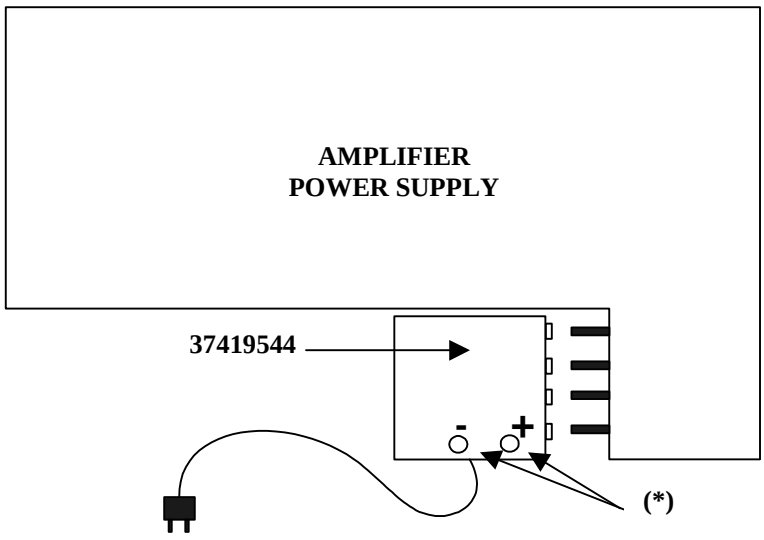
♦ **PRELIMINARY - SAFETY INSTRUCTIONS**

- Read the remove/re-insert sheet (37419600_700 – DMR and 45323334-DMR).

IMPORTANT:	The procedure of maintenance applies to the following power supplies: 45323573, 45323583, 45323593, 45323603, 37419600, 37419700, 45323334 whatever their number of version (from .01 to .07) The maintenance is necessary because of the presence of electrochemical capacitors in these power supplies. Maintenance is necessary for the power supplies, which undergo storage without any voltage, applied more than 6 month (e.g. spare parts).

♦ **PERFORMANCE INSTRUCTIONS**

- Unplug the 37419544 mains cable.
- Realize the assembly shown above: connection of the tooling to power supplies.



Connecting of the tooling for reforming capacitors to a power supply.

(*) The above mentioned voltmeter must be plugged on sockets marked + and -.

- Plug the mains cable into a 240V plug (2wires) with earth's wire.
- Verify by means of a voltmeter (*) that the voltage after a dozen-second is lower than 5V or at least continuously decreasing.
- Let the tooling re-form capacitors during at least 30 minutes.
- If after a period of 30 minutes the measured value is greater than 1V for power supply whose the part number ends as .01, .02, .03, .07, the reforming operation failed, the capacitors have to

be replaced. Idem if the measured value is greater than 3V for a part number ending as .04, .05, .06.

- Even if the current stays than this threshold before the end of 30 minutes, it is wise to leave the reforming till the end of recommended time.

NOTA :	It is recommended to replace in a preventive way capacitors C23, C24, C43, C44, C45, C46 every 10 years. This operation being delicate, it is better to realize this replacement by returning the power supply to THALES or calling THALES customer service.

- The power supply having undergone the reforming mist be used within a maximal period of 6 months.

6.3.4. SIRIUS EXCITER rack – 45321627 – REG

To be update IN ORDER TO MATCHED SWITCH ALE/CALIB CL/WITHOUT PREAMP

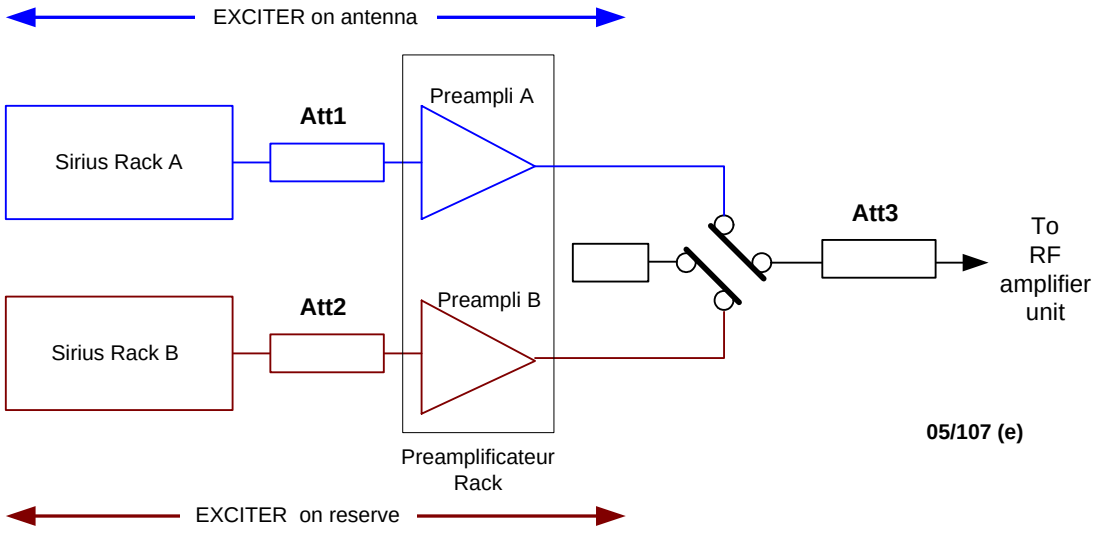
PURPOSE	:	LINE-UP OF REPLAEMENT RACK
DURATION	:	30 mn
EQUIPMENT :		
♦ Measuring instruments	:	Spectrum Analyser, Wattmeter, MediaFLO Analyser, DVB-T Generator
♦ Specification tools	:	None
♦ Documentation	:	Remove/re-insert sheet : 45321627-DMR

♦ **PRELIMINARY – SAFETY INSTRUCTION**

- Read the remove/re-insert sheet : 45321627-DMR

♦ **PERFORMANCE INSTRUCTIONS**

- Replace the SIRIUS rack and insert it into position.



- Remove the output connection of the preamplifier corresponding to the spare SIRIUS rack.

A - Line up the ADAPT exciter on antenna

♦ **A1 - Powered-on of exciter with maintenance Mode or Normal mode**

Verify, before the powered-on, on the screen Exciter level 1 (Icon ON / OFF / PSU Fault / Com Fault) that the exciter is indicated for communication fault.

Made the powered-on of exciter, it starts automatically and after some seconds, all LEDs located in the front panel of exciter should be in their state of normal functioning:

Red LED FAULT: Light-off

Orange LED ALARM: Light-off if input signal MPEG **and** the signal GPS presence (10MHZ and 1PPS) according to the table below

MPEG	10 MHz	1 PPS

		MUTE	NOT MUTE	MUTE	NOT MUTE
SFN	Present	Present	Indifferent	Present	Indifferent

	MPEG	10 MHz	1 PPS
MFN	Present	Indifferent	Indifferent

Green LED OK : Switched on indicating the good operating of the microprocessor

Note : During the made the powered-on of exciter, the LED is lit during approximately 15 seconds indicating the operated of power supply then, put out during approximately 10 seconds indicating the starting-up of the microprocessor and to end lit.

Verify that the communication fault disappears at the end of 30 seconds.

- **A2 – Initialisation**

Made controls with Digital transmitter in the STOP

Changes switches into good position for line-up procedures

WINDOWS	TOUCH BOUTON	SETTING
CONTROL Level 1	LOCAL MODE ou REMOTE MODE	LOCAL
	MAINT MODE or NORMAL MODE	MAINT
MAINTENANCE CONTROL Level 3	RIPPLE THRESHOLD (dB)	0.20 (Typical Value)
	SHOULDER THRESHOLD (dB)	35 for DVB-T (Typical Value),

Verify that there are no different software configuration for the CPU board and the new Adapt Exciter; used « MODULATOR Configuration » and « MODULATOR STATE » windows and liken it state with commands of « Modulator Parameters » et « Miscellaneous Parameters » windows.

Changes switches into good position for line-up procedures

WINDOWS	TOUCH BOUTON	SETTING
MISCELLANEOUS PARAMETERS	CORR. LIN MODE ADAPT or FIXED	FIXED
	CORR. N.LIN MODE ADAPT or FIXED or FLAT FILT	FLAT FILT Note : To create the state " FLAT FILT " to select the "FIXED" mode and to validate. Three states for the correction "NO LIN" are then visible
AGC	MAN GAIN or AUTO GAIN	MAN GAIN

♦ A3 - Line up procedures

Check that the exciter is into MGC Mode (MAN GAIN) via the window « EXC \ EXC NEXT \ PARAMS \ AGC ».

In the same window, set the value of each attenuator « MAN » et « LIMIT » to 0

Made the powered on the transmitter via the touch button “ON” located on the display board (Reminder: the output of preamplifier corresponding to the SIRIUS on antenna is disconnect)

A3.1 - Adjustment of the local frequency value (Synthesizer)

Connects one frequency-meter on the connector « Local Test » located in rear view of exciter (LF= Central carrier frequency of the channel + 36MHz).

- Case n°1 :
  - 1PPS or 10 MHz signal is present ➔ The frequency value is automatically adjusted.
- Case n°2 :
  - 1PPS and 10 MHz signal is absent ➔ the set up is done via the window « EXC \ EXC NEXT \ PARAMS \ 10MHz PLL ».

Note	For channel frequency with an type of the offset type YYY,166667 MHz *(ex :634,166667 MHz)*, the frequency measured (LF) is of type XXX,150000 MHz *(ex : 598,150000 MHz)*.

A3.2 - Adjustment of the I & Q /RF Modulator (Local Oscillator Rejection)

Connect a spectre analyzer on the monitoring located in the front panel of Sirius rack

Spectrum analyzer parameters:

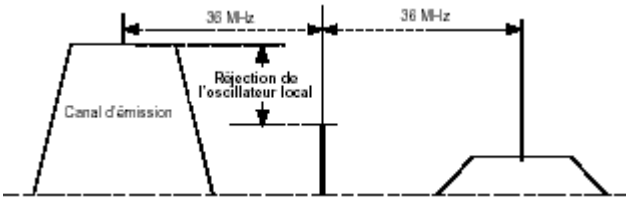
RBW: 30 kHz

VBW: 300 Hz

SPAN: 1 MHz

Freq: Carrier local frequency

The adjustment of I & Q modulator is done via the window « EXC \ EXC NEXT \ PARAMS \ REJECT ».



Look for the inflexion point by acting on the command OFFSET I by step of 100 (numeric keyboard) then when this last one is obtained to operate in a identical way with the command OFFSET Q.

Repeat this stage above by using successively a step of 10 then 1 to obtain a maximum rejection of the local frequency (< 35dB approximately).

A3.3 - Adjustment the rejection of the unwanted lateral band (Image rejection)

Connect a spectre analyzer on the monitoring located in the front panel of Sirius rack.

Spectrum analyzer parameters:

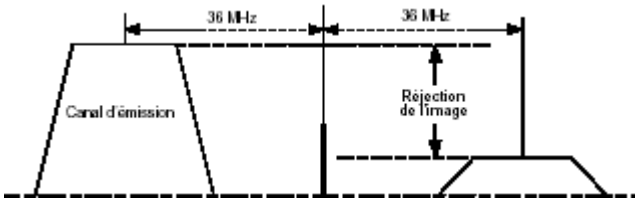
RBW: 30 kHz

VBW: 300 Hz

SPAN: 20 MHz

Freq: Central output carrier + 72 MHz

The adjustment of Image rejection is done via the window « EXC \ EXC NEXT \ PARAMS \ REJECT ».



Look for the minimum level (< 40dB approximately) by acting on the commands **GAIN** and **PHASE** (numeric keyboard or buttons + /-)

Verify the rejection of the local frequency and re-adjust if need be (to see § Adjustment of the I & Q /RF Modulator).

A3.4 - Adjustment of the power reserve

Connect a wattmeter or a spectrum analyzer on the monitoring located in the front panel of Sirius rack.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », Adjust the "MANUAL" attenuator to obtain approximately 3 dB from power reserve.

Note The value displayed of the "MANUAL" attenuator will be between 2 and 4 dB.

A3.5 - Adjustment of the preamplifier output level

Connect a wattmeter or a spectrum analyzer at the preamplifier output.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », Select the value 15dB with the "LIMITER" attenuator.

Decrease the value of " LIMITER " attenuator so as to obtain between 14 dBm and 15 dBm in the preamplifier output (Measure possible for the wattmeter or for the spectrum analyzer in marker noise mode by adding 69 dB to the measure).

Insert a fixed attenuator " **Att.1** " corresponding to the value of the attenuator " LIMITER " between the SIRIUS output and the preamplifier input.

Put the value of the " LIMITER " attenuator to 0

Note Shoulder levels at the preamplifier output are about 48 dB.

A3.6 - Adjustment of the transmitter output power with MGC

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », Select the value 15dB with the "LIMITER" attenuator.

Re-connect the cable in the preamplifier output.

Decrease the value of the " LIMITER "attenuator so as to obtain the nominal power in +/-0.6 dB in the transmitter output.

Insert a fixed attenuator " **Att.3** " corresponding to the value of the attenuator " LIMITER " at the splitter input of the RF chain.

Put the value of the " LIMITER " attenuator to 0

Use the "MANUAL" attenuator to line up finely the output power of the transmitter.

Note The value displayed of the "MANUAL" attenuator will be between 2 and 4 dB..

A3.7 - Not linear correction

With the window « CONTROL \ NEXT CONTROL \ MISCELLANEOUS », Select the command « ONE SHOT » for the « NOT LINEAR » correction then pressing the « VALID » touch bottom.

Repeat the stage above 2 or 3 times to optimize the level of shoulders in the transmitter output.

Press on the "SAVE" command next on the "VALID" button to save the corrections.

Changed possibly in the adaptive mode the not linear correction « N.LIN CORR ».

Press on the "SAVE" command next on the "VALID" button to save the corrections.

A3.8 - Adjustment of the preamplifier fault

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », Select the value 4dB with the "LIMITER" attenuator then press the « ENTER » command.

With the window « EXC \ NEXT EXC \ PARAMS \ PREAMP », push the button « PARAM REFER » then press the « ENTER » command to save the detected value.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », Select the value 0dB with the "LIMITER" attenuator then press the « ENTER » command.

A3.9 - AGC switching

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », push the button « PARAM REFER » then press the « VALID » command to do the AGC reference.

Select the « AUTO GAIN » mode then press the button « VALIDE » to confirm the change over into AGC mode

♦ A4 - End of operation

At the end of operation, put back the transmitter in « NORMAL » mode.

•

B - Line up the ADAPT exciter on reserve

♦ B1 - Powered-on of exciter with maintenance Mode or Normal mode

Verify, before the powered-on, on the screen Exciter level 1 (Icon ON / OFF / PSU Fault / Com Fault) that the exciter is indicated for communication fault.

Made the powered-on of exciter, it starts automatically and after some seconds, all LEDs located in the front panel of exciter should be in their state of normal functioning:

Red LED FAULT: Light-off

Orange LED ALARM: Light-off if input signal MPEG **and** the signal GPS presence (10MHZ and 1PPS) according to the table below

	MPEG	10 MHz		1 PPS	
		MUTE	NOT MUTE	MUTE	NOT MUTE
SFN	Present	Present	Indifferent	Present	Indifferent

	MPEG	10 MHz	1 PPS
MFN	Present	Indifferent	Indifferent

Green LED OK : Switched on indicating the good operating of the microprocessor

Note : During the made the powered-on of exciter, the LED is lit during approximately 15 seconds indicating the operated of power supply then, put out during approximately 10 seconds indicating the starting-up of the microprocessor and to end lit.

Verify that the communication fault disappears at the end of 30 seconds.

- **B2 - Initialisation**

Select the « LOCA L » mode via the « CONTROL » window then valid the command

Select the « MAINTENANCE » mode via the « CONTROL » window then valid the command

Check parameters configuration of the reserve exciter via « EXC \ NEXT EXC \ MODUL \ CONFIG ».

- **B3 - Line up procedures**

Check that the exciter is into AGC Mode (MAN GAIN) via the window « EXC \ EXC NEXT \ PARAMS \ AGC \ OTHER EXCITER ».

In the same window, set the value of each attenuator « MAN » et « LIMIT » to 0

With the window « CONTROL », made the powered on the reserve exciter via the command « STDBY », then pressing the « VALID » touch bottom.

B3.1 - Adjustment of the local frequency value (Synthesizer)

Connects one frequency-meter on the connector « Local Test » located in rear view of exciter (LF= Central carrier frequency of the channel + 36MHz).

- Case n°1 :
  - 1PPS or 10 MHz signal is present ➔ The frequency value is automatically adjusted.
- Case n°2 :
  - 1PPS and 10 MHz signal is absent ➔ the set up is done via the window « EXC \ EXC NEXT \ PARAMS \ 10MHz PLL ».

Note: For channel frequency with an type of the offset type YYY,166667 MHz *(ex :634,166667 MHz)*, the frequency measured (LF) is of type XXX,150000 MHz *(ex : 598,150000 MHz)*.

B3.2 - Adjustment of the I & Q /RF Modulator (Local Oscillator Rejection)

Connect a spectre analyzer on the monitoring located in the front panel of Sirius rack

Spectrum analyzer parameters:

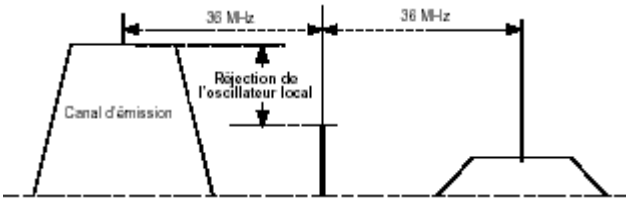
RBW: 30 kHz

VBW: 300 Hz

SPAN: 1 MHz

Freq: Carrier local frequency

The adjustment of I & Q modulator is done via the window « EXC \ EXC NEXT \ PARAMS \ REJECT ».



Look for the inflexion point by acting on the command OFFSET I by step of 100 (numeric keyboard) then when this last one is obtained to operate in a identical way with the command OFFSET Q.

Repeat this stage above by using successively a step of 10 then 1 to obtain a maximum rejection of the local frequency (< 35dB approximately).

B3.3 - Adjustment the rejection of the unwanted lateral band (Image rejection)

Connect a spectre analyzer on the monitoring located in the front panel of Sirius rack.

Spectrum analyzer parameters:

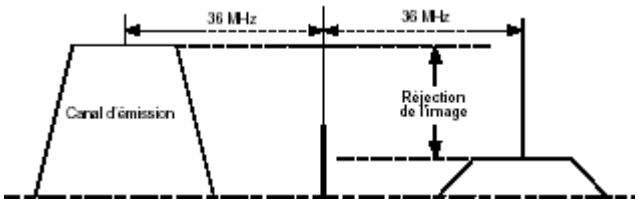
RBW: 30 kHz

VBW: 300 Hz

SPAN: 20 MHz

Freq: Central output carrier + 72 MHz

The adjustment of Image rejection is done via the window « EXC \ EXC NEXT \ PARAMS \ REJECT ».



Look for the minimum level (< 40dB approximately) by acting on the commands **GAIN** and **PHASE** (numeric keyboard or buttons + /-)

Verify the rejection of the local frequency and re-adjust if need be (to see § Adjustment of the I & Q /RF Modulator).

B3.4 - Adjustment of the power reserve

Connect a wattmeter or a spectrum analyzer on the monitoring located in the front panel of Sirius rack.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC \ OTHER EXCITER », Adjust the "MANUAL" attenuator to obtain approximately 3 dB from power reserve.

Note	The value displayed of the "MANUAL" attenuator will be between 2 and 4 dB.

♦

B3.5 - Adjustment of the preamplifier output level

Connect a wattmeter or a spectrum analyzer at the preamplifier output.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC \ OTHER EXCITER», Select the value 15dB with the "LIMITER" attenuator.

Decrease the value of " LIMITER " attenuator so as to obtain between 14 dBm and 15 dBm in the preamplifier output (Measure possible for the wattmeter or for the spectrum analyzer in marker noise mode by adding 69 dB to the measure).

Insert a fixed attenuator " **Att.2** " corresponding to the value of the attenuator " LIMITER " between the SIRIUS output and the preamplifier input.

Put the value of the " LIMITER " attenuator to 0

Note Shoulder levels at the preamplifier output are about 48 dB.

B3.6 - Adjustment of the preamplifier fault

With the window « EXC \ NEXT EXC \ PARAMS \ AGC \ OTHER EXCITER », Select the value 4dB with the "LIMITER" attenuator then press the « ENTER » command.

With the window « EXC \ NEXT EXC \ PARAMS \ PREAMP \ OTHER EXCITER», push the button « PARAM REFER » then press the « ENTER » command to save the detected value.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC \ OTHER EXCITER », Select the value 0dB with the "LIMITER" attenuator then press the « ENTER » command.

B3.7 - AGC switching (Power reference)

With the window « EXC \ NEXT EXC \ PARAMS \ AGC \ OTHER EXCITER», push the button « PARAM REFER », then press the « VALID » command to do the AGC reference.

Select the « AUTO GAIN » mode then press the button « VALIDE » to confirm the change over into AGC mode

Adjustment of the transmitter output power with MGC

- **B3.8 - Re-connect the cable in the preamplifier output.**

With the window « CONTROL », made the powered off the exciter on reserve via the command « STDBY », then pressing the « VALID » touch bottom.

With the window « EXC \ NEXT EXC \ PARAMS \ AGC », Select the value 15dB with the "LIMITER" attenuator.

With the window « EXC », change over the exciter to antenna.

Check that the exciter is into MGC Mode (MAN GAIN) via the window « EXC \ EXC NEXT \ PARAMS \ AGC ».

The value of the attenuator " **Att.3** " has been adjusted with the other exciter, if it's not true refer to §A 3.6

Use the "MANUAL" attenuator to line up finely the output power of the transmitter.

Check that the exciter is into AGC Mode (AUTO GAIN) via the window « EXC \ EXC NEXT \ PARAMS \ AGC ».

Note The value displayed of the "MANUAL" attenuator will be between 2 and 4 dB..

B3.9 - Not linear correction

With the window « CONTROL \ NEXT CONTROL \ MISCELLANEOUS », Select the command « ONE SHOT » for the « NOT LINEAR » correction then pressing the « VALID » touch bottom.

Repeat the stage above 2 or 3 times to optimize the level of shoulders in the transmitter output.

Press on the "SAVE" command next on the "VALID" button to save the corrections.

Changed possibly in the adaptive mode the not linear correction « N.LIN CORR ».

Press on the "SAVE" command next on the "VALID" button to save the corrections.

B3.10 - AGC

Verify that the exciter is into AGC Mode (AUTO GAIN) via the window « EXC \ EXC NEXT \ PARAMS \ AGC ».

♦ B4 - End of operation

At the end of operation, put back the transmitter in « NORMAL » mode.