

## Operational Procedure

### Procedure for re-pointing the Vatican Radio RX Station's over the 60 Deg East Satellite ( IS 904)

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### Document Status Sheet

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## 1. Introduction

Vatican Radio is going to move the broadcast services at the moment operated via the Intelsat 902 @ 62.0 °E ( Indian Region) to the Intelsat 904 @ 60.0 °E.

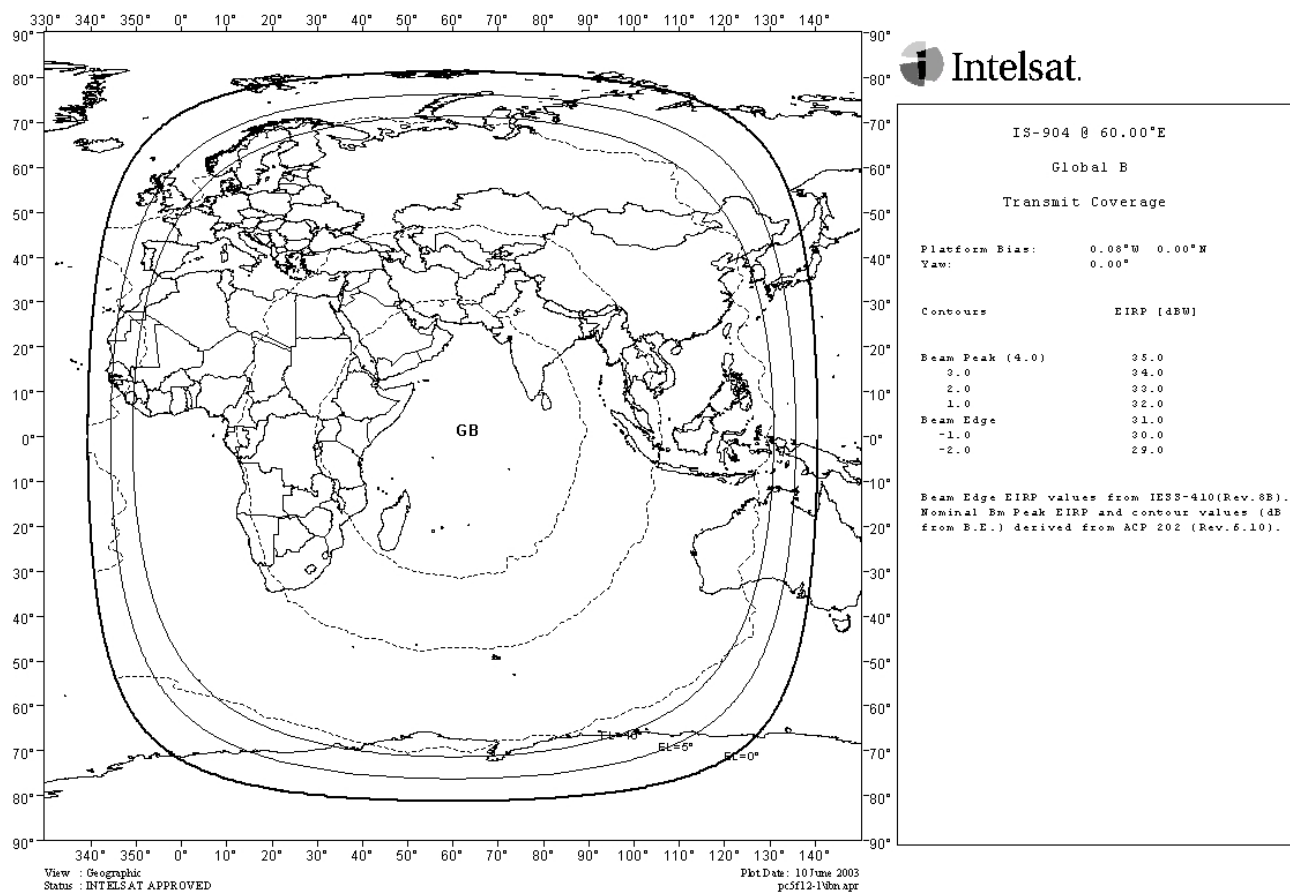
The change will be carried out in a smooth way throughout a dual feed on both the satellites for a period of about 3 months in order to minimize the interruption of the receiving sides.

All the receiving stations will have to repoint their antenna over the new satellite according to their location.

To help in the calculation of the new pointing data, a simple program issued by Intelsat is provided along with the present procedure ( AZEL PC) by Telespazio. It can be downloaded from the Telespazio's Web Site at the location: <http://www.telespazio.com/radioVad.html>.

## 2. Coverage Areas

The coverage areas of the two new satellites are depicted in the following pictures:



**Fig. 1 Intelsat 904 @ 60 °E**

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### 3. Carriers Characteristics

In the following table the parameters of the new carriers are listed, as well as the RX antenna details:

<b>TECHNICAL SPECIFICATIONS OF VATICAN RADIO SATELLITE BROADCAST</b>	
Satellite Position	60° E
Used Band	C-Band ( 6/4 Ghz )
Satellite Coverage	Global Beam
Transponder	86/86 GB/GB
Carrier Frequency	6328.350/4103.350 MHz ( channels I.1 – I.2) 6328.650/4103.650 MHz ( channel I.3)
Polarization RX	LHCP ( left hand polarity)
Carrier Modulation	BPSK, ( ½ FEC)
Audio Signal Coding	ISO/MPEG-2, 128 Kbps ( channels I.1 – I.2) 64 Kbps ( channel I.3)
RX Antenna Size	> 2.4 m
FEED	C-Band Circular Polarization
LNB	NorSat or ComStream PLL-LNB
LNB Interface	WR-229
Output Frequency LNB	1046.650 MHz ( channel I.1 – I.2) 1046.350 MHz ( channel I.3)
Receiver	ComStream ABR 200/202
Decoder	Sequential 1/2
Eb/N0 Nominal	> 7 db
Audio Channel	I.1, I.2 I.3

#### Tools and Equipment required

In order to accomplish the correct repointing of the antenna, it's necessary that the personnel on site is equipped with the following instrumentation:

- Spectrum Analyzer L Band ( 950 – 1950 MHz)
- Inclinometer
- Magnetic Compass
- Coax Cable , 5 m long terminated with an F connector on one end and a spectrum analyzer compatible connector on the other end
- Mechanical tools to loose and fasten the bolts of the antenna to move it.
- Program for the calculation of the pointing data
- PC with a serial port RS232 available and a emulation terminal program such as Hyper Terminal
- One RF splitter, one input 2 output

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## 4. Procedure for the antenna repointing

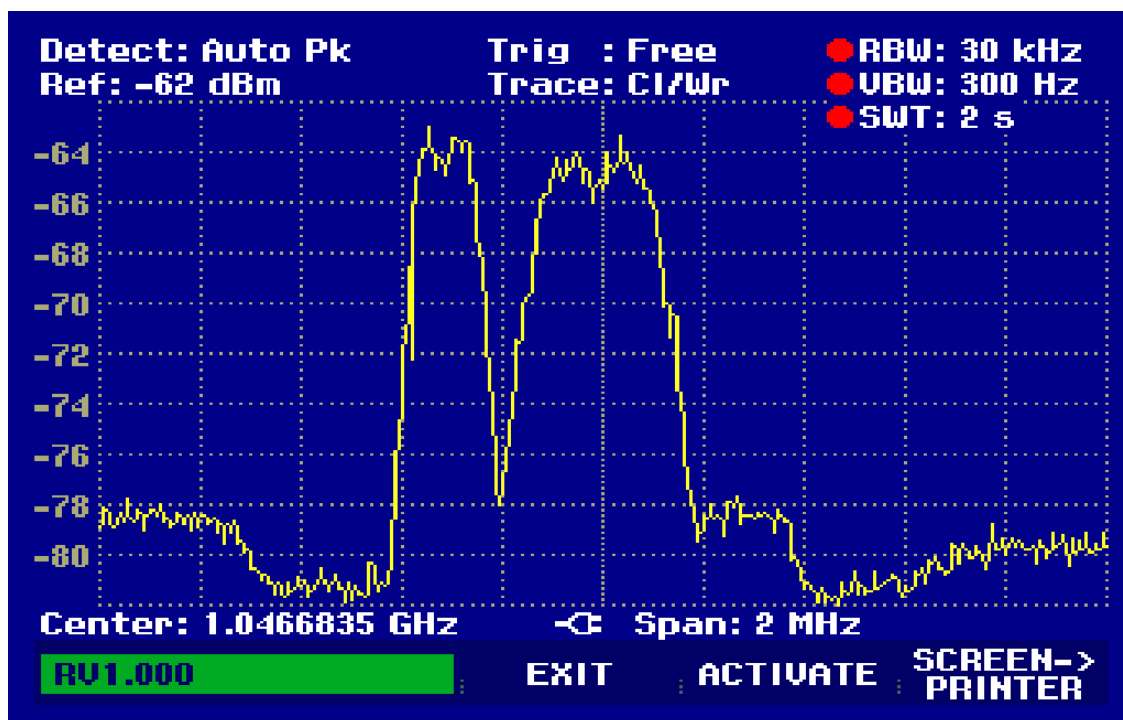
Before starting the shift of the antenna, calculate the new pointing data using a computational program such as AZEL PC provided by Telespazio. A copy of the software will be delivered along with this procedure. Both the procedure and the AZEL PC program can be down loaded from the Telespazio's Web Site at the following URL:

<http://www.telespazio.com/radioVad.html>

As an option, it is possible the use of an on line tool such as the one available on the Panamsat web site at the following location:

[http://www.panamsat.com/global\\_network/calc\\_look\\_angle.asp](http://www.panamsat.com/global_network/calc_look_angle.asp)

To help the user in the 60 Deg. satellite finding, a plot of the spectrum with 2 Mhz, 20 Mhz and 100 Mhz span are shown in the figure 2, 3 and 4.



**Fig. 2 Spectrum Plot at 2 Mhz Span**

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Once the new pointing data are available, record the EB/N0 value read on the receiver and plot or record the carrier received from the old satellite using the Spectrum with the following setting:

Center Frequency	1052.9 MHz
Span	2 MHz
Attenuation	10 db
Amplitude Reference level	-60 dbm
Scale Division	1 db/div
RBW	30 KHz
VBW	30 Hz
Sweep Time	2 Sec

For ABR200 receiver, connect the spectrum analyzer RF IN to the ABR 200 RF OUT connector. For ABR202, connect the spectrum RF IN to the one of the two output of an RF splitter and the receiver to the other one.

At this point loose the bolt in azimuth and elevation and, using the compass and the inclinometer move the antenna over the new satellite. Please note that if the antenna is an offset one, the offset angle has to be subtracted from the calculated elevation angle. Take into account the magnetic declination for the azimuth angle too, according to the site.

During this phase, set the spectrum as follows

Center Frequency	1046.650 MHz
Span	400 MHz
Attenuation	10 db
Amplitude Reference level	-44 dbm
Scale Division	2 db/div
RBW	1 MHz
VBW	1 KHz
Sweep Time	2 Sec

Move slightly the antenna in order to find the satellite and look for the higher level.

Once the position where the received signal is the highest has been found, tighten the bolts .

Since the new satellite use the opposite polarization, it'll be necessary rotate the feed too.

After the antenna has been pointed over the new satellite, it'll be necessary to reconfigure the receiver to properly receive the correct frequency.

To accomplish that, connect the serial port of a PC to the M&C port of the receiver. Set the communication port of the PC using the Hyper Terminal Program as follow:

Speed	2400
Data bit	7
Parity	odd
Bit Stop	1
Flow Control	xon/xoff

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It is suggested to save this configuration to a file in order to have it available in case of its use for test and check purpose.

Note: **all the commands to the receiver has to be entered in capital letters and confirmed by enter key**

Press enter : the receiver should answer requesting to log in with the following prompt:

**LOGIN v X,XX**

Enter the string **HOMEYD** to log in.

The configuration of the receiver has to be maintained essentially the same as for the previous satellites, we have only to change the receiving frequency.

For the tuning of the receiver, enter the following command:

**CC 2,4103350,256000,0 <ENTER>** (FOR INDIAN REGION CH A.1 – A.2)

**CC 4,4103650,128000,0 <ENTER>** (FOR INDIAN REGION CH A.3)

All the other parameters will remain unchanged.

For a check of the configuration, enter the following commands:

**CC? <ENTER>**

For the verification of the frequency and bit rate.

The receiver will show:

**CC 2, 4103350,256000,0 <ENTER>** (FOR INDIAN REGION CH A.1 – A.2)

or

**CC 4, 4103650,128000,0 <ENTER>** (FOR INDIAN REGION CH A.3)

Enter

**FD? <ENTER>**

For the verification of the format

The receiver will show:

**FD 2,2,2,7** (FOR INDIAN REGION CH A.1 – A.2)

or

**FD 4,2,4,7** (FOR INDIAN REGION CH A.3)

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Enter

**FS? <ENTER>**

For the verification of the selected format.  
The receiver will show:

**FS 2** (FOR INDIAN REGION CH A.1 – A.2)

or

**FS 4** (FOR INDIAN REGION CH A.3)

If any of the parameters differs from the values listed above, enter the correct one typing the correct command from the following list:

**Indian Region Channel A1 – A2**

**Indian Region Channel A.3**

**CC 1, 4103350,256000,0 <ENTER>**

**CC 3, 4103650,128000,0 <ENTER>**

**FD 1,1,1,7<ENTER>**

**FD 3,1,3,7<ENTER>**

**B3 2000<ENTER>**

**B3 2000<ENTER>**

**FS 1<ENTER>**

**FS 3<ENTER>**

**AQ 2<ENTER>**

**AQ 2<ENTER>**

Completed the reconfiguration of the receiver, switch it off and then on.  
Now it is ready to operate.

To verify the operation of the receiver, enter the following commands:

**CF 0 <ENTER>** to clear all the faults

**EB?<ENTER>** to show the Eb/N0 Value. This should be > 7db

**ST ?<ENTER>** to check the faults of the receiver. The answer should be ST 0 ( no faults)

**DP ? <ENTER>** to request a summary output of all command parameters that are single valued.

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The receiver will respond with the following list:

<b><u>AG101</u></b>	DE1	LC0	Q1 3.5
AI 0	DQ128000	<b><u>LO34295</u></b>	RB57
AL 1	DX 0	LR 0	<b><u>RF4103350 ( for IOR.1&amp;2)</u></b>
AO 0	<b><u>EB 7.0</u></b>	LT 1	SI 1111111
AP 15	EE 1	MU 0	<b><u>SL 0</u></b>
AQ 0	<b><u>EM 4.1</u></b>	<b><u>MO 3.0</u></b>	SR 3749707775
AS 0	EN 0	<b><u>MI 3.1</u></b>	SS 0
AT 0	ET 3.5	<b><u>NF 0</u></b>	ST 0
B1 38	<b><u>EX 5.0</u></b>	OM 1	S1 0
B2 38	FL 0	PA 31	S2 0
<b><u>B3 2000</u></b>	FS 1	PO 0	S3 1
CE 63	F1 0	P1 2400,O,7,1	TB 0
CO XXXXXXXXX	F2 0	P2 2400,O,7,1	X1 0
CQ 00000000	HM 0	P3 2400,O,7,1	X2 0
CS 00000000	ID 11549	Q0 3.0	X3 0

The most important parameters are in bold and underlined.

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## 5. Contact Points

In case of problems, the local operators can require telephonic support to our shift in the Telecommunication center at the following numbers:

Telephone	+39-0863-550233/231
Fax	+39-0863-550232
e-mail	<a href="mailto:Intelsat.fucino@telespazio.com">Intelsat.fucino@telespazio.com</a>

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