

DEVELOPMENT OF INFORMATIC SOLUTIONS FOR THE SEARCH OF AVAILABLE TV AND FM CHANNELS IN CUBA

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Introduction

- TDT criteria planning
- FM Radio
- Analog Television
- Protection Ratios



Protection Ratios

FM Interference

Cochannel	$N\pm1$	$N\pm2$	$N\pm3$	$N+53$	$N+54$	CH 6 para 98.6
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FM Protection Ratios

Cochannel	$N\pm1$	$N\pm2$	$N\pm3$
20 dB	6 dB	-20 dB	-40 dB

Protection Ratios

Analog TV Interference

Cochannel	$N \pm 1$	$N \pm 2$ (Intermodulation)	$N \pm 5$ (Intermodulation)	$N \pm 7$ (LO)	$N \pm 8$ (FI)	$N \pm 14$ (Audio Image Channel)	$N \pm 15$ (Video Image Channel)
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Digital TV Interference

Cochannel	$N \pm 1$
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Protection Ratios

Digital and Analog TV Protection Ratios

Interference	Cochannel	N+1	N-1	Image Channel
DTMB ← DTMB	18 dB	-29 dB	-29 dB	-
DTMB ← NTSC	5 dB	-43 dB	-37 dB	-
NTSC ← DTMB	35 dB	-8 dB	-8 dB	-15 dB
NTSC ← NTSC	28 dB	-10 dB	-13 dB	5 dB

TRANSMISSION CENTER CLASIFICACIONES

Television Transmission Center Classification in Cuba

	DTT ERP (dBk)	NTSC ERP (dBk)		EHAAT (m)	Class Protected Outline (km)
Class	Band IV, V	Band IV, V			
A	20	30	35	400	75
B	14	24	30	200	50
C	3	14	20	100	25
D	-12	-3	2	30	6

TRANSMISSION CENTER CLASIFICACIONES

FM Transmission Center Classification in Cuba

	FM ERP (dBk)	EHAAT (m)	Class Protected Outline (km)
Class	Band II		
A	20	350	75
B	17	150	50
C	6	100	25
D	-16	30	4

Method for calculating the minimum distances between centers

$$E_c = E - R_p + PA$$

Ec: Maximum value that the signal of each station can have in the service outline of the others stations to avoid causing interference. E (50.10) (50% of locations 10% of the time)

E: Value of the field strength of the signal to be protected from interference from the other station. E (50.50) (95% of the locations in case of DTT)

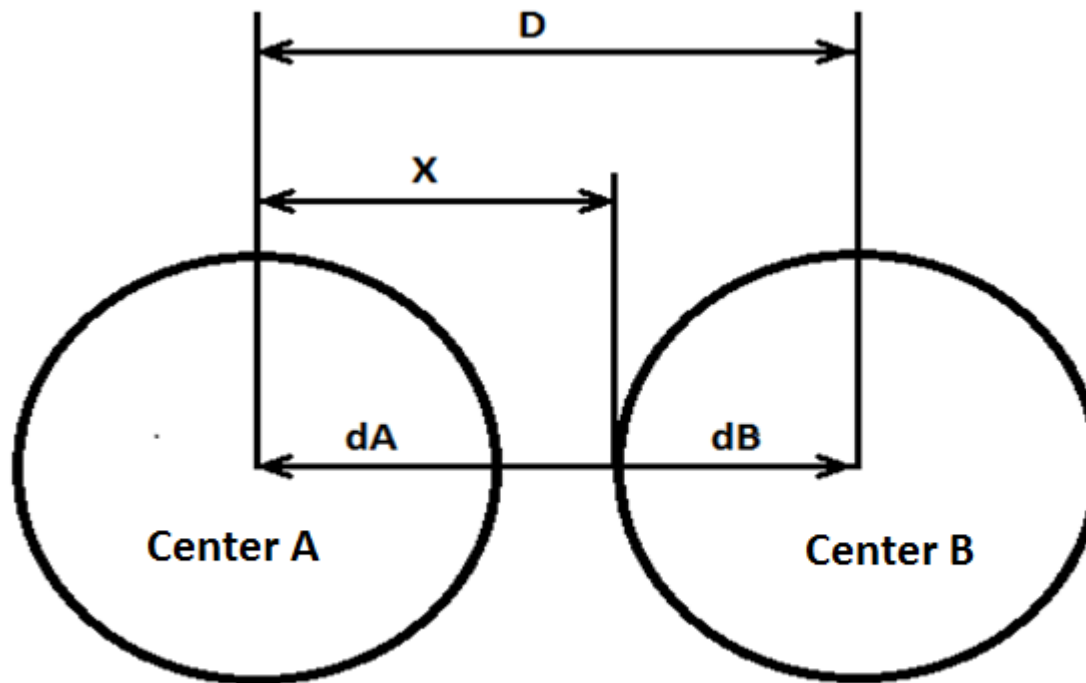
Rp: Protection Ratios

PA: Antenna directivity discrimination.

ITU P.1546-1 Propagation curves synthesized in the software CoverUtilities.

Method for calculating the minimum distances between centers

$$D = d + X$$



Software for the search of available TV and FM channels

FM Channels Searcher (CanalesFM)

Buscador Canales FM

Editar Centros Editar Canales Ayuda

Centro

☒ Clase Actual C
☐ Otra Clase A

CentroName
▶ 18 Plantas
Abreus
Aguada de Pasajero
Alamar
Alquizar
Antillas

Canales Disponibles

0

Buscar Canales

Exportar a Excel

TV Channels Searcher (TVChannel)

Buscar Canales TV

Editar Centros Editar Canales Ayuda

Centro

☐ Clase Actual D
☐ Otra Clase A

Tipo de canal DTMB

CentroName
▶ Roncali Cabo de San ..
COM TV-FM Sandino
Guane
Mantua
San Carlos
San Juan y Martínez
San Luis

Buscar Canales

Exportar a Excel

Software for the search of available TV and FM channels

Radio FM Centers Database

Editar Centros FM

Editar Canales Buscar Canales Ayuda

Centro

Cord. X(Lat)

Cord. Y(Lon)

Clase Canal 6

Buscar

	Centro	Coord. X(Lat)	Coord. Y(Lon)	Clase	Canal 6
▶	78 18 Plantas	557829.5500	257059.8700	C	No
	Abreus	544087.0400	272821.1300	C	No
	Aguada de Pasaj...	515600.0400	283488.0500	C	No
3	Alamar	368343.8500	369566.1800	C	No
	Alquizar	337186.0700	330999.7900	C	No
3	Antillas	1047828.9100	121784.3300	C	No
	Artemisa	319054.9800	333540.9600	C	No
	Báguanos	1017551.9100	111952.8300	C	No

Digital and Analog TV Centers Database

Editar Centros TV

Editar Canales Buscar Canales Ayuda

Centro

X (Long)

Y (Lat)

Clase

Buscar

Coordenadas Geograficas

	Centro	X (Long)	Y (Lat)	Clase
▶	Roncali Cabo de San Antonio	-84.9477	21.8667	D
	COM TV-FM Sandino	-84.2049	22.0799	D
	Guane	-84.0879	22.1949	D
	Mantua	-84.2881	22.2920	D
	San Carlos	-83.9695	22.3948	D
	San Juan y Martínez	-83.8377	22.2801	D
	San Luis	-83.7586	22.2771	D

Software for the search of available TV and FM channels

Radio FM Channels Database

Editar Canales FM

Editar Centros Buscar Canales Ayuda

Seleccionar Centro

Canal

Insertar Editar Eliminar

Centros

- ▶ Televilla
- Tercer Frente
- Topes de Collantes
- Trinidad
- Unión de Reyes
- Urbano Noris

Centro	Canales
▶ Televilla	94.7
Televilla	99.9
Televilla	101.5
Televilla	104.7

Digital and Analog TV Channels Database

Editar Canales TV

Editar Centros Buscar Canales Ayuda

Buscar Centro

Canal Modulación

Insertar Editar Eliminar

Centros

- CT TV Menocal
- CT TV Telecentr...
- CT TV-FM Haba...
- CT TV-FM Loma ...
- CT TV-FM Loma ...
- ▶ CT TV-FM Salón
- El Abra

Centro	Canales	Modulacion
▶ CT TV-FM Salón	19	NTSC
CT TV-FM Salón	25	NTSC
CT TV-FM Salón	47	DTMB

Digital and Analog TV channels interference report

Reporte.xlsx

Archivo Inicio Insertar Diseño de página Fórmulas Datos Revisar Vista

Calibri 11 Fuente Alineación

C4	A	B	C	D
1	CH	Incidencias		
2	90,1	Los Guineos 90.1 Cocanal . Falta para evitar interferencia 26.2753370374479 km		
3	90,1	Cauto Cristo 90.1 Cocanal . Falta para evitar interferencia 88.5176204797104 km		
4	90,3	Jesús Menéndez 90.9 N-3 . Falta para evitar interferencia 0.60568876376832 km		
5	90,3	Guáimaro 90.3 Cocanal . Falta para evitar interferencia 17.9169430918508 km		
6	90,3	Guardalavaca (Cerro Yaguajay) 90.5 N-1 . Falta para evitar interferencia 29.2787711631289 km		
7	90,3	Cauto Cristo 90.1 N+1 . Falta para evitar interferencia 35.5176204797104 km		
8	90,3	Boniato 90.5 N-1 . Falta para evitar interferencia 30.1730067259782 km		
9	90,5	Jesús Menéndez 90.9 N-2 . Falta para evitar interferencia 8.60568876376832 km		
10	90,5	Guardalavaca (Cerro Yaguajay) 90.5 Cocanal . Falta para evitar interferencia 82.2787711631289 km		
11	90,5	Cauto Cristo 90.1 N+2 . Falta para evitar interferencia 1.5176204797104 km		
		Boniato 90.5 Cocanal . Falta para evitar interferencia 17.9169430918508 km		

Hoja1

Conclusions

- Implementation of the mathematical method for the calculation of the interfering contours and minimum distances between transmitting centers

Recommendations

- Keep perfecting these software.
- Modify CanalesFM to allow geographic coordinates and use a single database on a single PC in the form of a server.
- Merge these two applications.