INTERNATIONAL CIVIL AVIATION ORGANIZATION
South American Regional Office - Regional Project RLA/06/901
Assistance for the implementation of a Regional ATM System, taking into account the ATM operational concept and the corresponding CNS technological support
Eighth Workshop/Meeting of the SAM Implementation Group (SAM/IG/8)
(Lima, Peru, 10-14 October 2011)

SAM/IG/8-WP/16
15/09/11

Agenda Item 6: Assessment of the operational requirements to determine the implementation of improvements in communication, navigation and surveillance (CNS) capabilities for en-route and terminal area operations

ACTION PLAN FOR THE IMPLEMENTATION OF CNS IMPROVEMENTS IN BRAZIL

(Presented by Brazil)

Summary

This working paper presents an update of the *Action plan for short- and medium-term CNS improvements in en-route and terminal area operations* corresponding to the Aeronautical Administration of Brazil.

References:

- SAM/IG/4 meeting report
- Conclusion SAM/IG/4-8

ICAO strategic objectives:	*A – Safety* *C – Environmental protection*

1. Background

1.1 As a follow up to Conclusion SAM/IG/4-8 (*Update of the Action plans for the improvement of CNS systems in order to meet short- and medium-term operational requirements in en-route and terminal area operations*), the Aeronautical Administration of Brazil presents in the appendix to this paper (in Spanish only) an update to the Action Plan for CNS Improvements in Brazil.

1.2 While updates were done in chapter 3 (Analysis and diagnosis of the status of CNS systems), chapter 5 (Improvements to be introduced in communication, navigation and surveillance systems) and the corresponding tables, the content of chapter 4 could not be updated (regional plans and guidelines for the implementation of the new ICAO CNS systems approved by GREPECAS), which is part of the model plan that has been circulated to the States for the drafting of the first version.

2. Suggested action

2.1 The Meeting is invited to:

a) take note of the information presented herein; and

b) urge the Secretariat to coordinate the updating of chapter 4 of the model Action Plan for CNS Improvements.

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APPENDIX

ACTION PLAN FOR IMPROVING COMMUNICATION, NAVIGATION AND SURVEILLANCE SYSTEMS TO MEET SHORT- AND MEDIUM-TERM OPERATIONAL REQUIREMENTS FOR EN-ROUTE AND TERMINAL AREA OPERATIONS

Rio de Janeiro, 19 October 2011

(Presented by Brazil)

SUMMARY: This Action Plan describes the action to be taken by the Aeronautical Administration of Brazil for the implementation of improvements to CNS systems in support of en-route and terminal area operations in the short and medium term.

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1. Objective

Within the framework of the Global Air Navigation Plan, this action plan describes the action to be taken for the implementation of improvements in CNS systems with a view to supporting en-route and terminal area operations in the short and medium term.

In order to meet this objective, an analysis and a diagnosis have been made of the current situation of CNS systems that support en-route and terminal area operational requirements.

Taking into account the current situation, as well as the regional implementation plans of the new CNS/ATM systems approved by GREPECAS, the activities required for improving CNS systems in support of en-route and terminal area operations are presented herein.

2. Scope

This document analyses the short- and medium-term implementations of the Brazilian Administration up until 2015 and between 2016 and 2020, respectively, in accordance with the guidelines contained in the Global Air Navigation Plan.

3. Analysis and diagnosis of the current situation of CNS systems

3.1 Communications

3.1.1 Aeronautical fixed service

Conventional services

3.1.1.1 The AFTN in Brazil

Although its replacement by the AMHS will be completed by the year 2012 in accordance with the action plan, the characteristics of the AFTN are included because both systems still coexist.

The structure of the AFTN implemented in Brazil in 1975 includes the aeronautical communication stations that support fixed communications between ATS bodies. Thus, every aeronautical unit has a room with communication terminals connected to an automatic message-switching centre. Messages received at the stations are printed and, normally, distributed manually to the units indicated in the address list, including a traffic control sector, aeronautical information, meteorology or aeronautical administration.

Users wishing to transmit a message, with the support of an ECM, must write it and deliver it to the station so that it can be inserted in the AFTN network through a communication terminal.

At the ECM, communication operators provide message exchange support through the AFTN for the other ATS operators. In addition to being responsible for the procedures for processing messages (format, use of the appropriate channel, use of alternate medium, etc.), ECM operators take over the function of message certifiers, that is, they ensure that the issuer is really an authorised user.

Communication stations are connected through dedicated channels to Automatic Message Switching Centres (CCAMs).

The CCAMs are aeronautical units that operate 24H and use qualified personnel (supervisors and operators), who are responsible for the monitoring and supervision of message processing, and for the configuration, maintenance, and coordination for restoring subscriber lines.

At present, there are two centres in Brazil, located in Brasilia and Manaus, called CCAM-BR and CCAM-MN, respectively. Some stations that use the CCAM-BR have their terminals connected through the Recife and Curitiba concentrators, which centralise communications and exchange messages with the CCAM-BR through circuits with TCP/IP protocol. Figure 1 shows a diagram of the AFTN architecture in Brazil.

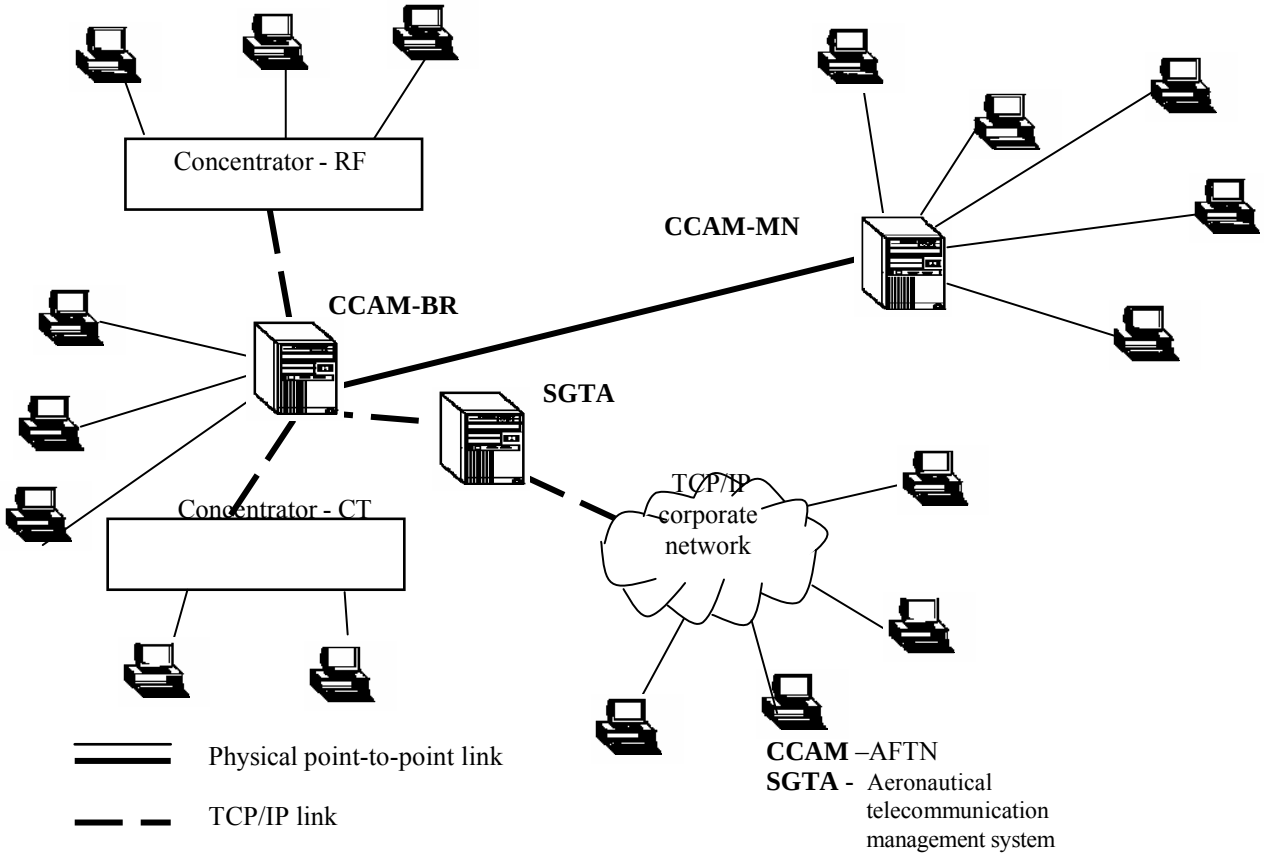

Figure 1: Basic AFTN topology in Brazil

The CCAM-MN was commissioned in 2003 with the capacity of operating as CCAM-BR backup.

Some steps have been taken to ensure the availability of the system as a whole, including the revitalisation of the CCAM-BR hardware and software, with a view to maintaining the quality of the existing AFTN services until the messaging service can migrate to the AMHS.

Figure 2 shows the interconnections with international AFTN centres.

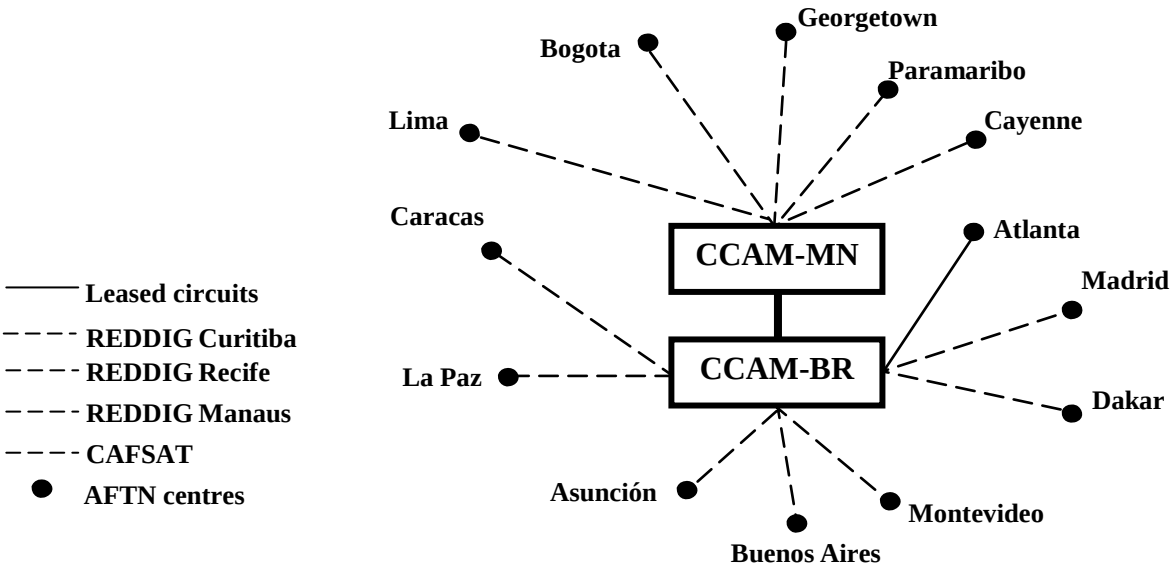

Figure 2: International AFTN interconnections

3.1.1.2 Telephony and data

Fixed networks consist of the ground-ground voice and data telecommunication infrastructure made up by local networks (LAN), metropolitan networks (MAN) and wide area networks (WAN).

Currently, WAN networks are based on satellite links, supported by the TELESAT system, an MPLS infrastructure and links between regional units subordinated to DECEA, and its local ATC units, called air traffic control units. The TELESAT system covers the whole national territory of Brazil, using PAMA/DAMA resource assignment and the FDMA/SCPC/MCPC accessing methodology. The MPLS infrastructure provides data communication services based on an Internet protocol suite (IPS), interconnected to the main operational points of SISCEAB (Brazilian Airspace Control System).

Wide area aeronautical communications between domestic ATS units use various voice and data subsystems, including PABX, which are distributed on various locations and use the telecommunication infrastructure described above.

To supplement the aforementioned networks, mainly in terms of the last mile, there are microwave digital links with high transmission capacity, as well as fibre optics.

In Brazil, telephone networks for ATS purposes consist of TF-1 (direct communications between ATS units) and TF-2 (switched communications between ATS units) links. Direct communications (TF-1 network) are used between ACCs, between ACCs and APPs, and between Apis and TWRs. TF-1 switched communications are achieved through a network of digital telephone switches consisting of 22 telephone switches and approximately 450 subscribers throughout the national territory. The telephone switches currently used in Brazil were installed during the 1995 and 2007 period.

Services under the ICAO CNS/ATM concept

3.1.1.3 ATN AMHS/AIDC ground applications

The Aeronautical Message Handling Service (STMA), based on AMHS, is under implementation in Brazil, which will replace the current AFTN until the end of 2012. Steps being taken to this end are shown in Section 5 of this Plan.

The AMHS specification was based on the implementation of MHS communication standards (X-400) for the exchange of ATS messages, using the store-and-send modality, over a communication network infrastructure that uses IPS protocols (Internet Protocol Suite).

Currently, the Aeronautical Message Handling Centres (CTMAs) are already installed at the Brasilia and Manaus communication centres, and, in time, will replace the two CCAMs of said locations. The CTMA are already certified since January 2010, and will support all terminals, whether or not automated, whose transition will take place until December 2012. Figure 3 illustrates the AMHS layered architecture.

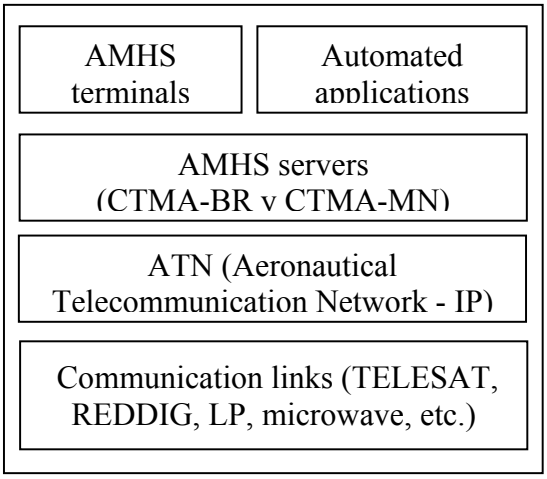

Figure 3 – AMHS layered architecture

The new ATC automated system, called SAGITARIO, will have, native to the system, AIDC protocol handling for the interconnection with adjacent ACCs, both domestic and international.

3.1.2 Aeronautical mobile service

Conventional services

Annex A to this plan contains an update to List n° 3 – List of VHF frequency assignments in the 117.975 – 137.000 MHz band, which lists the modifications made since the last update in 2009 (new, cancelled, or to be implemented frequencies). Subsequently, this list will be supplemented with the implementation dates of all VHF frequencies in operation in Brazil.

Services under the ICAO CNS/ATM concept

The aeronautical administration of Brazil implemented in 1995 a data communication system called DATACOM, which currently has 22 remote ACARS stations and 2 remote ACARS/VDL/AOA stations (Galeão and Guarulhos).

In July 2009, the X-4000 automated system with CPDLC functionality was implemented in the Atlántico ACC.

Two D-ATIS stations (Guarulhos y Galeão) have been implemented on an experimental basis, in addition to one DCL application in Guarulhos.

3.1.3 Broadcasting service

The list of ATIS and VOLMET frequencies implemented in Brazil appears in Annex B to this Plan.

3.1.4 National communication network for air navigation services

Operational communications consist of fixed (ground-ground links) and mobile (air-ground links) networks. Fixed networks are made up by telephony networks and the gorund-ground telecommunication infrastructure (LAN, MAN and WAN), supported by wide-area networks (WAN) based on satellite systems (TELESAT), covering the whole national territory, using FDMA, SCPC, PAMA/DAMA accessing methods, and which should evolve to a digital TDMA or CDMA technology, and a digital IP network that uses MPLS technology, to interconnect the main operational centres of the SISCEAB.

3.2 Navigation

Conventional services

3.2.1 Conventional aids

The list of all air navigation aids installed in Brazil is attached to this Plan (Annex C - NDB and Annex D – Other aids).

Services under the ICAO CNS/ATM concept

3.2.2 GBAS/ABAS

AIC N10/09 (Portuguese version) and AIC A08/09 (English version) were published on 09/04/2009, updating the documentation that regulates the application of GNSS in Brazil (ABAS). Approximately 160 GNSS approach procedures have already been published. Seventy-four (74) GNSS/Baro-VNAV approach procedures, 159 GNSS departure procedures, 33 RNAV/ILS approach procedures, and 17 STAR RNAV procedures for 28 airports will be published until December 2010.

In September 2009, the Project Opening Terms (TAP) were signed for the purchase of a GBAS station to "implement a GBAS CAT I station at the Antônio Carlos Jobim – Galeão airport, with a view to defining the technical and operational requirements for future GBAS CAT I station implementations at airports whose operational demand warrants it, taking into account the environmental and specific conditions of the SISCEAB (Brazilian Airspace Control System)".

Subsequently, the technical, logistic and industrial requirements were developed for the purchase of a GBAS CAT I system already certified by an internationally-recognised body and, in July 2010, Honeywell was awarded the bid with an SLS-4000 system.

The SLS-4000 system is installed at the Rio de Janeiro International Airport, and tests have already started using GEIV aircraft equipped with the new UNIFIS 3000 flight inspection system, capable of inspecting GBAS systems, using the GNLU-930 receiver.

The station is considered as pre-operational and will be comprehensively tested during the next period of maximum solar activity, which shall occur between mid 2012 and 2014..

3.3 Surveillance

Conventional services

3.3.1 New surveillance systems

The list of all the surveillance equipment installed in Brazil is shown in Annex E to this Plan.

3.3.2 New surveillance systems

Services under the ICAO CNS/ATM concept

In July 2009, the X-4000 automated system with ADS-C functionality was installed at the Atlántico ACC.

A bidding process is underway to purchase an ADS-B system for low altitude in the Campos oil basin, in a homogeneous area used for helicopter operations.

The concept of providing surveillance service throughout the upper airspace of Brazil, using ADS-B, has been developed.

Likewise, technical specifications are being developed for the purchase of a wide-area multilateration system (WAM) for the VT TMA, given the conditions around the Vitoria aerodrome.

4. Regional plans and guidelines for the implementation of the new ICAO CNS systems approved by GREPECAS

4.1 Introduction

This section describes the plans and strategies for the new CNS systems that should be taken into account by the Brazilian aeronautical administration when submitting action plans for the implementation of CNS improvements under Chapter 4 of this document.

4.2 Communications

4.2.1 Aeronautical fixed service

For the implementation of ATN and its ground-ground applications in the Region, there is an ATN router plan and an ATN ground application plan.

The ATN router plan contains router planning information, indicating, for each router: administration and location of the router, type, connections, link speed, link protocols, means of communication used, and implementation date.

The ATN router plan for the SAM Region (Table CNS 1Ba) appears in Appendix D to SAM /IG/3-WP/19.

The ATN ground-ground application implementation plan contemplates the implementation of AMHS and AIDC applications. The plan indicates the administration and location of the application, type of ground-ground application to be implemented, locations to be interconnected, the standard to be applied, and the implementation date. The ATN ground-ground application plan is shown in Appendix D to SAM/IG/2-WP/19.

4.2.2 Aeronautical mobile service

For the implementation of communication systems in support of the aeronautical mobile service, GREPECAS approved an *Action plan for the planning and implementation of air-ground data links*. The action plan contains guidelines for the States before starting the implementation of data link systems for ground-air communications.

SAM action plan for the planning and implementation of air-ground data links:

a) Participate in seminars and workshops on air-ground data links.

b) Review and update the Regional air-ground data link plan (FASID Table CNS 2A) in order to derive benefits from data communications, improving safety, efficiency and capacity by reducing voice communications and gradually implementing automation processes to meet the operational requirements coordinated and harmonised with the global ATM system.

c) Assess the capacity and need for modernising control centres and the aircraft fleet that operates in the FIR and the respective airspace for the implementation of air-ground data links, in accordance with the operational requirements and ICAO SARPs and guidance, incorporating the planning for the implementation of the cited capacity.

d) Establish and participate in a trial and demonstration programme for air-ground data link systems and applications.
e) Study and assess the arrangements made by other States/international organisations for data link implementation, establishing multinational cooperation mechanisms.
f) In accordance with the global roadmap, establish a CAR/SAM regional programme for the gradual implementation of air-ground data links, ensuring regional and inter-regional interoperation to meet the requirements of the global ATM system in a coordinated, harmonious and seamless manner.
g) Conduct and monitor research and development on communication technology, and do the follow up of ICAO SARPs and guidance for the future evolution of data links and their services.
h) These activities are required for the execution of the ground-air application implementation programme described below.

Regional air-ground data link implementation programme

The Regional air-ground data link implementation programme contains information for the implementation of air-ground data links in the short term (2009-2011), medium term (2011-2015) and long term (2015 and beyond).

CAR/SAM REGIONAL AIR-GROUND DATA LINK IMPLEMENTATION PROGRAMME		
TERM	**INFRASTRUCTURE IMPLEMENTATION GOALS**	**SERVICES**
Short term (2009-2011)	Implement data link services based on ACARS and FANS and start using VDL - Mode 2 and HFDL in accordance with ICAO SARPs and ICAO guidelines.	Maximise the use of: - pre-departure dispatch; - oceanic dispatch; - D-ATIS; - other flight information and routine messages; and flight information and routine messages; and - automatic aircraft position reporting system.
Medium term (2011-2015)		- more complex safety-related information may be exchanged, including ATC dispatch.
Long term (beyond 2015)	Implement VDL data links in keeping with their future evolution and in accordance with the new ICAO SARPs and guidance.	- their use will include downlink of aircraft flight parameters for use in the ATM system; and - downlink of traffic data to improve situational awareness in the cockpit.

4.3 Navigation service

For the navigation service, a *Strategy for the Introduction and Application of Non-Visual Aids for Approach, Landing and Departure in the CAR/SAM* has been established, as indicated below:

a) continue with ILS operations with the highest level of service as long as they are operationally acceptable and cost effective, trying not to deny airport access to aircraft only equipped with ILS;

b) implement GNSS with augmentation for APV and Category I operations if operationally required and cost effective;

c) promote the development and use of a multimodal landing capacity;

d) promote the use of APV operations, particularly those using GNSS vertical guidance, to improve safety and access; and

e) identify and resolve operational and technical obstacles for GNSS with ground-based augmentation system (GBAS), and support Category II and III operations. Implement GNSS for Category II and III operations if operationally required and cost effective.

Guidelines for the transition of satellite navigation in the CAR/SAM Regions

Likewise, GREPECAS developed the following guidelines for the transition of satellite navigation in the CAR/SAM Regions:

The GNSS should be introduced gradually, with GNSS capacity improvements that will increasingly generate more advantages and result in a GNSS that supports all flight phases. As the GNSS evolves, plans to eliminate ground radio aids should take into account the following aspects:

The ground infrastructure of the existing air navigation systems must continue to be available during the transition period.

a) The States and international organisations may consider the possibility of segregating traffic based on navigation capacity and granting preferential routes to aircraft that have better navigation performance when this can be done without reducing airspace capacity.

b) Before considering the elimination of any existing ground infrastructure, a reasonable transition time will be given to users for purchasing GNSS equipment and attain an equivalent navigation service.

c) As GNSS is introduced for en-route operations, the States and international organisations should coordinate their initiatives in order to ensure the development and adoption of harmonised separation standards and procedures, which should be introduced simultaneously in all flight information regions along the main traffic flows, in order to enable a seamless transition to GNSS-based navigation.

c) When planning GNSS transition, the following should be taken into account:

- maintain or improve the exiting level of safety;

- plan for the supply or adoption of a GNSS service, including aircraft and operator approval processes;

- extent of the existing ground-based radio navigation services;
- strategy of the plan for the transition to GNSS functions (that is, benefit-oriented or mandatory);
- appropriate level of user equipment with GNSS capacity;
- supply of other air traffic services (that is, surveillance and communications);
- traffic density and frequency of operations;
- mitigation of risks corresponding to failures caused by radio frequency interference and ionosphere factors;
- procedure design and implementation; and
- general economic aspects and deadline for the introduction of the necessary avionic requirements.

4.4 Surveillance services

The surveillance system implementation plans are contained in FASID Table CNS 4A. The planning of the new surveillance systems is contained in the surveillance system implementation guide presented at the Sixth Meeting of the CNS Subgroup (ATM/CNS/SG/6), which is described below.

4.2.3 Evolution of the surveillance infrastructure

En-route airspace and TMA

Independent surveillance in the form of primary radar surveillance will continue to be used in en-route and terminal area (TMA) surveillance, in accordance with the specific local safety requirements of each country.

Short term (until 2011)

Between 2008 and 2011, the main means of surveillance will continue to be cooperative surveillance, in the form of SSR and SSR Mode S, which will be extensively used by civil agencies for air traffic surveillance in TMA and en-route services within the coverage of the ground-based querying station(s). The implementation of SSR monopulse, adaptable to Mode S will continue en-route and in terminal areas of medium and high traffic density. ADS-B (ES Mode S receivers) will start to be used in en-route and terminal areas not covered by radar, and will strengthen surveillance in areas covered by SSR Modes A/C and S.

Medium term (2011-2015)

ADS-B (based on ES Mode S receivers) on the ground will increase as of 2010 to cover en-route and terminal areas not covered by radar and to strengthen surveillance in areas covered by SSR Modes A/C.

Depending on the percentage of aircraft equipped with ADS-B, consideration should be given to the implementation of wide-area multilateration (WAM) as a possible means of transition to the ADS-B environment in a shorter term.

Operational use of ADS-C surveillance should be made in all oceanic and remote airspaces associated to FANS 1/A capabilities.

Surveillance data processing and distribution systems based on surveillance server technology shall be enhanced gradually to promote the merger of legacy radar data contained in the ADDs, and/or multilateration position calculations, and foster data sharing between States through the use of TCP/IP protocols.

Each State/Territory/Organisation should analyse and report on the policy applied by its Administration regarding ADS-B data sharing with neighbouring States, and its cooperative goals.

The ADS-B data sharing plan should be based on the selection of centres by pairs, the analysis of benefits, and the formulation of proposals for the use of ADS-B for each pair of centres/cities, with a view to improve surveillance capacity.

In order to support the regional ADS-C and ADS-B plan, the States/Territories/International organisations, as well as the entity representing airspace users, should provide the following information: focal point, their respective implementation plan, including a timetable, and information about their air-ground communication and automation systems.

The ADS-B data link technology to be used for 1,090 MHz (1090 ES) Mode S extended squitter. ADS-B data sharing could be started.

SSR Mode A/C and SSR Mode S will continue to be the main surveillance elements for approach, en-route and terminal areas.

Long term (2015-2025)

Most SSR and SSR Mode S systems currently installed will reach the end of their life cycle around 2015. SSR Mode A/C radars that reach the end of their life cycle will not be replaced. These SSRs that reach the end of their life cycle will be replaced for continued use of ADS-B using the 1090 ES technique and plans to begin ADS-B implementation with new data links to meet the requirements of the global ATM system.

Airport operations

Short term (until 2011)

The main technology for calculating the position of moving targets (both aircraft and vehicles) will be surface movement (primary) radar.

Multilateration will be gradually implemented as aircraft are capable of responding to SSR Mode A/C or SSR Mode S queries.

Medium term (2011-2015)

A-SMGCS Level I/II will provide benefits at the aerodrome, as ground systems will require additional information. The most effective way of achieving this would be through the ADS-B, once aircraft are equipped and a cost-effective way of improving multilateration ground stations is available, although it may have an impact on avionics. Although many multilateration systems are normally configures with their own data merging trackers, it might be necessary to improve the existing SDPDs to support aerodrome operations.

Long term (until 2015-2025)

The introduction of A-SMGCS Levels III/IV in selected aerodromes will require crews to receive a map of the airport or other moving targets in order to have situational awareness, as well as conflict prediction tools on board the aircraft. Where airports anticipate benefits from such applications, it might be necessary to have a TIS-B service to ensure a complete and consistent picture of airport conditions.

Aircraft systems

Short term (until 2011)

According to ICAO requirements, all aircraft flying within controlled airspace of the CAR/SAM Regions must be equipped with a pressure-altitude reporting device. No significant changes to aircraft systems are anticipated before 2011 in this regard.

The proportion of equipped aircraft is also fundamental for the installation of ADS-C and ADS-B systems, to which end the ANSP and aircraft users must periodically coordinate at least the following information: the number of equipped aircraft operating in the airspace in question, the number and name of airlines that have equipped their aircraft for ADS-C and ADS-B, the type of equipped aircraft, the classification of accuracy/integrity data available on the aircraft.

5. Improvements to be introduced in communications, navigation, and surveillance (CNS/ATM concept)

5.1 Introduction

In this section, the aeronautical administration of Brazil describes all its plans for improving the following services. In this regard, the aeronautical administration of Brazil indicates the dates it estimates to implement the improvements.

5.2 Communications

5.2.1 Aeronautical fixed service

Conventional services

The actions foreseen for improving conventional services are indicated in Annex F to this Plan.

Services under the ICAO CNS/ATM concept

Short term (until 2015)

a) implementation of the Aeronautical Message Handling System – AMHS;

b) increased ATM automation with the implementation of new functionalities, such as AIDC and the new flight plan format, and the revitalisation of automated systems of SISCEAB operational units; and

c) ATM automation between ATC units.

5.2.2 Aeronautical mobile service

Conventional services

The actions foreseen for improving conventional services are indicated in Annex G to this Plan.

Services under the ICAO CNS/ATM concept

Short term (until 2015)

a) implementation of VDL Mode 2.

Medium term (2016-2020)

a) studies for the development of continental CPDLC.

5.2.3 Broadcasting service

Short term (until 2015)

a) implementation of D-ATIS applications according to the timetable contained in Annex H.

Medium term (2016-2020)

a) implementation of D-ATIS applications according to the timetable contained in Annex H; and
b) implementation of the D-VOLMET service in the Atlántico, Amazonica, Brasilia, Curitiba and Recife FIRs.

5.2.4 National communication network for providing air navigation services

Short term (until 2015)

a) implementation of a telecommunication infrastructure that serves all SISCEAB, with an open architecture that can absorb all the current and future services required for the CNS/ATM transition programme and that can be integrated into the regional REDDIG and CAFSAT networks.

5.3 Navigation service

Conventional services

The actions foreseen for improving conventional services are shown in Annex I to this Plan.

Services under the ICAO CNS/ATM concept

Short term (until 2015)

a) start the implementation of GBAS stations at airports where the operational demand warrants it;

b) implement RNAV-5 for en-route operations;

c) implement SID/STAR RNAV-1 at the following TMAs: Brasilia, Recife and São Paulo;

d) implement RNP APCH and APV- Baro/VNAV approach procedures at all airports operating IFR; and

e) implement RNP AR approach procedures where consistent operational benefits can be derived.

Medium term (2016-2020)

a) implement GBAS at selected airports;

b) start the deactivation of ground navigation aids, only maintaining the backup infrastructure;

c) implement RNP 2 for en-route operations; and

d) implement SID/STAR RNAV-1 in the other TMAs of Brazil.

5.4 Surveillance service

Conventional services

The actions foreseen for improving conventional services are shown in Annex J to this Plan.

Services under the ICAO CNS/ATM concept

Short term (until 2015)

a) introduce ADS-B "off-shore" operations of Bacía de Campos;

b) start ADS-B implementation in continental airspace;

b) develop the requirements for the implementation of surface movement surveillance capacity at selected airports; and

d) implement wide-area multilateration (WAM) for selected TMAs.

Medium term (2015-2020)

a) implement ADS-B coverage throughout Brazilian airspace; and

b) plan the deactivation of secondary radar coverage overlays for en-route operations (it assumes that users will be properly equipped with ADS-B).

ANNEX A / ANNEX A

A/G VHF STATIONS INSTALLED / ESTACIONES VHF T/A INSTALADAS

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
122,250	GAMA	B	ACC	ICAO	OP		OFF-SET	15°59' S / 047°59' W
122,250	TRES MARIAS	B	ACC	NAT	OP		OFF-SET	18°06' S / 045°16' W
122,250	BURITIS	B	ACC	NAT	OP		OFF-SET	15°37' S / 046°25' W
122,650	SÃO ROQUE	B	ACC	ICAO	OP		OFF-SET	23°21' S / 047°03' W
122,650	PIRASSUNUNGA	B	ACC	ICAO	OP		OFF-SET	21°59' S / 047°20' W
122,650	UBERABA	B	ACC	ICAO	OP		OFF-SET	19°45' S / 047°57' W
123,000	MONTES CLAROS	B	ACC	NAT	OP		OFF-SET	16°42' S / 043°49 W
123,000	TRES MARIAS	B	ACC	NAT	OP		OFF-SET	18°06' S / 045°16' W
123,000	BARBACENA	B	ACC	NAT	OP		OFF-SET	21°15' S / 043°45' W
123,300	ALTO PARAÍSO	B	ACC	ICAO	OP		OFF-SET	14°18' S / 047°30' W
123,300	CANARANA	B	ACC	ICAO	OP		OFF-SET	13°34' S / 052°16' W
123,300	GURUPI	B	ACC	ICAO	OP		OFF-SET	11°44' S / 049°07' W
123,300	SÃO LUIZ DO NORTE	B	ACC	ICAO	OP		OFF-SET	14°51' S / 049°19' W
123,300	PALMAS	B	ACC	ICAO	OP		OFF-SET	10°17' S / 048°21' W
123,350	TRES MARIAS	B	ACC	ICAO	OP		OFF-SET	18°06' S / 045°16' W
123,350	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
123,350	VARGINHA	B	ACC	ICAO	OP		OFF-SET	21°35' S / 045°28' W
123,350	ALTAMIRA	B	ACC	ICAO	FORESEEN		OFF-SET	03°15' S / 052°14' W
123,350	SANTAREM	B	ACC	ICAO	FORESEEN		OFF-SET	02°25' S / 054°44' W
123,350	TIRIOS	B	ACC	ICAO	FORESEEN		OFF-SET	02°13' N / 055°56' W
123,350	PORTO TROMBETAS	B	ACC	ICAO	FORESEEN		OFF-SET	01°28' S / 056°23' W
123,550	ARIPUANÃ	B	ACC	ICAO	FORESEEN		OFF-SET	10°15' S / 059°23' W
123,550	JI-PARANÁ	B	ACC	ICAO	FORESEEN		OFF-SET	10°52' S / 061°50' W
123,550	VILHENA	B	ACC	ICAO	FORESEEN		OFF-SET	12°41' S / 060°06' W
123,700	CORUMBÁ	B	ACC	NAT	FORESEEN		OFF-SET	19°00' S / 057°40' W
123,700	COXIM	B	ACC	NAT	FORESEEN		OFF-SET	18°28' S / 054°42' W
123,700	JARAGUARI	B	ACC	NAT	FORESEEN		OFF-SET	22°20' S / 054°24 W
123,700	URUBUPUNGÁ	B	ACC	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
123,750	IPAMERI	B	ACC	ICAO	OP		OFF-SET	17°41' S / 048°09' W
123,750	UBERABA	B	ACC	ICAO	OP		OFF-SET	19°45' S / 047°57' W
123,800	CURITIBA/BACACHERI	B	ACC	NAT	FORESEEN		OFF-SET	25°24' S / 049°14' W
123,800	ASSIS	B	ACC	NAT	FORESEEN		OFF-SET	22°38' S / 050°26 W
123,800	GUARAPUAVA	B	ACC	NAT	FORESEEN		OFF-SET	25°23' S / 051°31' W
123,800	PASSO FUNDO	B	ACC	NAT	FORESEEN		OFF-SET	28°14' S / 052°19' W
123,800	ARIPUANÃ	B	ACC	NAT	FORESEEN		OFF-SET	10°15' S / 059°23' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
123,800	CACHIMBO	B	ACC	NAT	FORESEEN		OFF-SET	09º20' S/ 054º57' W
123,800	PORTO ALEGRE DO NORTE	B	ACC	NAT	FORESEEN		OFF-SET	10°52' S / 051°37' W
123,800	SORRISO	B	ACC	NAT	FORESEEN		OFF-SET	12°53' S / 055°50' W
123,950	BELÉM/VAL DE CANS	B	ACC	NAT	FORESEEN		OFF-SET	01°24' S / 048°27' W
123,950	MACAPÁ	B	ACC	NAT	FORESEEN		OFF-SET	00°02' N / 051°05' W
123,950	OIAPOQUE	B	ACC	NAT	FORESEEN		OFF-SET	03°51' N / 051°47' W
123,950	CHAPADA DOS GUIMARÃES	B	ACC	ICAO	OP		OFF-SET	15°17' S / 055°29' W
123,950	JATAÍ	B	ACC	ICAO	OP		OFF-SET	17°49' S / 051°46' W
123,950	BARRA DO GARÇAS	B	ACC	ICAO	OP		OFF-SET	15°30' S / 052°10' W
123,950	SANTAREM	B	ACC	ICAO	OP		OFF-SET	02°25' S / 054°44' W
123,950	ALTAMIRA	B	ACC	ICAO	OP		OFF-SET	03°15' S / 052°14' W
124,000	RIO DE JANEIRO/COUTO	B	ACC	ICAO	OP		OFF-SET	22°27' S / 043°17 W
124,000	CAMPINAS	B	ACC	ICAO	OP		OFF-SET	23°00' S / 047°08' W
124,000	VARGINHA	B	ACC	ICAO	OP		OFF-SET	21°35' S / 045°28' W
124,000	ASSIS	B	ACC	ICAO	FORESEEN		OFF-SET	22°38' S / 050°26 W
124,150	JI-PARANÁ	B	ACC	ICAO	EXCLUDE		OFF-SET	10°52' S / 061°50' W
124,150	PORTO ESPIRIDIÃO	B	ACC	ICAO	EXCLUDE		OFF-SET	15°51' S / 058°28' W
124,150	VILHENA	B	ACC	ICAO	EXCLUDE		OFF-SET	12°41' S / 060°06' W
124,200	GAMA	B	ACC	ICAO	OP		OFF-SET	15°59' S / 047°59' W
124,200	UBERABA	B	ACC	ICAO	OP		OFF-SET	19°45' S / 047°57' W
124,200	IPAMERI	B	ACC	ICAO	OP		OFF-SET	17°41' S / 048°09' W
124,250	TEOFILO OTONI	B	ACC	ICAO	OP		OFF-SET	17°53' S / 041°30' W
124,250	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
124,250	SANTA TERESA	B	ACC	ICAO	OP		OFF-SET	19°35' S / 040°20' W
124,250	CAMPOS	B	ACC	ICAO	OP		OFF-SET	21°42' S / 041°18' W
124,300	BARRA DO GARÇAS	B	ACC	NAT	FORESEEN		OFF-SET	15°30' S / 052°10' W
124,300	JATAÍ	B	ACC	NAT	FORESEEN		OFF-SET	17°49' S / 051°46' W
124,350	CONCEIÇÃO DO ARAGUAIA	B	ACC	ICAO	OP		OFF-SET	08°20' S / 049°18' W
124,350	MARABA	B	ACC	ICAO	OP		OFF-SET	05°21' S / 049°07' W
124,350	SÃO FÉLIX DO XINGU	B	ACC	ICAO	OP		OFF-SET	06°38' S / 051°57' W
124,350	SÃO FÉLIX DO ARAGUAIA	B	ACC	ICAO	OP		OFF-SET	11°37' S / 050°41' W
124,400	PARANAGUÁ	B	ACC	NAT	FORESEEN		OFF-SET	25°32' S / 048°31' W
124,400	SANTOS	B	ACC	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
124,550	CORRENTES	B	ACC	NAT	OP		OFF-SET	10°27' S / 045°08' W
124,550	FLORIANO	B	ACC	NAT	OP		OFF-SET	06°50' S / 043°04' W
124,550	PAULO AFONSO	B	ACC	NAT	OP		OFF-SET	09º24' S/ 038º15' W
124,550	VITÓRIA DA CONQUISTA	B	ACC	NAT	OP		OFF-SET	14°51' S / 040°51' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
124,550	CRUZEIRO DO SUL	B	ACC	NAT	FORESEEN		OFF-SET	07°35' S / 072°45' W
124,550	RIO BRANCO	B	ACC	NAT	FORESEEN		OFF-SET	09°51' S / 067°53' W
124,550	TABATINGA	B	ACC	NAT	FORESEEN		OFF-SET	04°14' S / 069°55' W
124,550	TARAUACÁ	B	ACC	NAT	FORESEEN		OFF-SET	08°09' S / 070°46' W
124,650	CORUMBÁ	B	ACC	NAT	FORESEEN		OFF-SET	19°00' S / 057°40' W
124,650	COXIM	B	ACC	NAT	FORESEEN		OFF-SET	18°28' S / 054°42' W
124,650	PONTA PORÃ	B	ACC	NAT	FORESEEN		OFF-SET	22°32' S / 055°42 W
124,700	CARAUARI	B	ACC	NAT	FORESEEN		OFF-SET	04°53' S / 066°54' W
124,750	BARCELOS	B	ACC	ICAO	OP		OFF-SET	00°58' S / 062°55' W
124,750	SÃO GABRIEL DA CACHOEIRA	B	ACC	ICAO	OP		OFF-SET	00°08' S / 067°03' W
124,750	TEFÉ	B	ACC	ICAO	OP		OFF-SET	03°22' S / 064°43' W
124,750	IAUARETÉ	B	ACC	ICAO	OP		OFF-SET	00°36' N / 069°12' W
124,800	TRES MARIAS	B	ACC	ICAO	OP		OFF-SET	18°06' S / 045°16' W
124,800	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
124,800	VARGINHA	B	ACC	ICAO	OP		OFF-SET	21°35' S / 045°28' W
124,800	UBERABA	B	ACC	ICAO	OP		OFF-SET	19°45' S / 047°57' W
124,850	CATANDUVAS	B	ACC	NAT	FORESEEN		OFF-SET	25°07' S / 053°07' W
124,850	PONTA PORÃ	B	ACC	NAT	FORESEEN		OFF-SET	22°32' S / 055°42 W
124,850	PORTO PRIMAVERA	B	ACC	NAT	FORESEEN		OFF-SET	21º55' S / 050º14' W
125,000	COXIM	B	ACC	NAT	FORESEEN		OFF-SET	18°28' S / 054°42' W
125,000	JARAGUARI	B	ACC	NAT	FORESEEN		OFF-SET	22°20' S / 054°24 W
125,000	URUBUPUNGÁ	B	ACC	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
125,050	SANTAREM	B	ACC	ICAO	OP		OFF-SET	02°25' S / 054°44' W
125,050	TIRIOS	B	ACC	ICAO	OP		OFF-SET	02°13' N / 055°56' W
125,050	PORTO TROMBETAS	B	ACC	ICAO	OP		OFF-SET	01°28' S / 056°23' W
125,050	GAMA	B	ACC	ICAO	OP		OFF-SET	15°59' S / 047°59' W
125,050	BURITIS	B	ACC	ICAO	OP		OFF-SET	15°37' S / 046°25' W
125,050	TRES MARIAS	B	ACC	ICAO	OP		OFF-SET	18°06' S / 045°16' W
125,200	ALTO PARAÍSO	B	ACC	ICAO	OP		OFF-SET	14°18' S / 047°30' W
125,200	CANARANA	B	ACC	ICAO	OP		OFF-SET	13°34' S / 052°16' W
125,200	SÃO LUIZ DO NORTE	B	ACC	ICAO	OP		OFF-SET	14°51' S / 049°19' W
125,200	GURUPI	B	ACC	ICAO	OP		OFF-SET	11°44' S / 049°07' W
125,200	PORTO ALEGRE DO NORTE	B	ACC	ICAO	OP		OFF-SET	10°52' S / 051°37' W
125,250	JATAÍ	B	ACC	ICAO	OP		OFF-SET	17°49' S / 051°46' W
125,250	BARRA DO GARÇAS	B	ACC	ICAO	OP		OFF-SET	15°30' S / 052°10' W
125,250	CHAPADA DOS GUIMARÃES	B	ACC	ICAO	OP		OFF-SET	15°17' S / 055°29' W
125,250	SORRISO	B	ACC	ICAO	OP		OFF-SET	12°53' S / 055°50' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
125,250	TANGARÁ DA SERRA	B	ACC	ICAO	OP		OFF-SET	14°39' S / 057°26' W
125,350	RIO DE JANEIRO/COUTO	B	ACC	ICAO	OP		OFF-SET	22°27' S / 043°17 W
125,350	BARBACENA	B	ACC	ICAO	OP		OFF-SET	21°15' S / 043°45' W
125,350	VARGINHA	B	ACC	ICAO	OP		OFF-SET	21°35' S / 045°28' W
125,350	CAMPOS	B	ACC	ICAO	OP		OFF-SET	21°42' S / 041°18' W
125,350	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
125,400	SURUCUCU	B	ACC	ICAO	OP		OFF-SET	02°49' N / 063°39' W
125,400	JUNDIÁ	B	ACC	ICAO	OP		OFF-SET	00°13' S / 060°41' W
125,400	BARCELOS	B	ACC	ICAO	OP		OFF-SET	00°58' S / 062°55' W
125,400	BOA VISTA	B	ACC	ICAO	OP		OFF-SET	02°50' N / 060°41' W
125,400	PARANAGUÁ	B	ACC	NAT	FORESEEN		OFF-SET	25°32' S / 048°31' W
125,400	SANTOS	B	ACC	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
125,400	MORRO DA PEDREIRA	B	ACC	NAT	FORESEEN		OFF-SET	26°52' S / 048°39' W
125,750	CANGUÇU	B	ACC	NAT	FORESEEN		OFF-SET	31°24' S / 052°41' W
125,750	CANOAS	B	ACC	NAT	FORESEEN		OFF-SET	29°56' S / 051°08' W
125,800	PORTO VELHO	B	ACC	ICAO	OP		OFF-SET	08°42' S / 063°53' W
125,800	ASSIS	B	ACC	ICAO	FORESEEN		OFF-SET	22°38' S / 050°26 W
125,800	CATANDUVAS	B	ACC	ICAO	FORESEEN		OFF-SET	25°07' S / 053°07' W
125,800	JARAGUARI	B	ACC	ICAO	FORESEEN		OFF-SET	22°20' S / 054°24 W
125,800	CORUMBÁ	B	ACC	ICAO	FORESEEN		OFF-SET	19°00' S / 057°40' W
125,800	JATAÍ	B	ACC	ICAO	FORESEEN		OFF-SET	17°49' S / 051°46' W
125,800	PORTO PRIMAVERA	B	ACC	NAT	FORESEEN		OFF-SET	21º55' S / 050º14' W
125,800	URUBUPUNGÁ	B	ACC	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
125,850	JI-PARANÁ	B	ACC	NAT	FORESEEN		OFF-SET	10°52' S / 061°50' W
125,850	PORTO VELHO	B	ACC	NAT	FORESEEN		OFF-SET	08°42' S / 063°53' W
126,050	CANGUÇU	B	ACC	NAT	FORESEEN		OFF-SET	31°24' S / 052°41' W
126,050	CANOAS	B	ACC	NAT	FORESEEN		OFF-SET	29°56' S / 051°08' W
126,100	BARREIRAS	B	ACC	NAT	OP		OFF-SET	12°04' S / 045°00' W
126,100	VITÓRIA DA CONQUISTA	B	ACC	NAT	OP		OFF-SET	14°51' S / 040°51' W
126,100	JACAREACANGA	B	ACC	NAT	FORESEEN		OFF-SET	06°14' S / 057°46' W
126,100	MANICORE	B	ACC	NAT	FORESEEN		OFF-SET	05°48' S / 061°17' W
126,100	MANAUS	B	ACC	NAT	FORESEEN		OFF-SET	03°02' S / 060°03' W
126,100	TEFÉ	B	ACC	NAT	FORESEEN		OFF-SET	03°22' S / 064°43' W
126,150	SÃO ROQUE	B	ACC	NAT	OP		OFF-SET	23°21' S / 047°03' W
126,150	CAMPINAS	B	ACC	NAT	OP		OFF-SET	23°00' S / 047°08' W
126,150	VARGINHA	B	ACC	NAT	OP		OFF-SET	21°35' S / 045°28' W
126,200	BELÉM/VAL DE CANS	B	ACC	ICAO	OP		OFF-SET	01°24' S / 048°27' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
126,200	IMPERATRIZ	B	ACC	ICAO	OP		OFF-SET	05°32' S / 047°27' W
126,200	MACAPÁ	B	ACC	ICAO	OP		OFF-SET	00°02' N / 051°05' W
126,200	MARABA	B	ACC	ICAO	OP		OFF-SET	05°21' S / 049°07' W
126,200	VISEU	B	ACC	ICAO	OP		OFF-SET	01°11' S / 046°09' W
126,350	FORTALEZA	B	ACC	ICAO	OP		OFF-SET	03°46' S / 038°31' W
126,350	RIO DE JANEIRO/COUTO	B	ACC	NAT	FORESEEN		OFF-SET	22°27' S / 043°17 W
126,350	SANTOS	B	ACC	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
126,400	CANOAS	B	ACC	NAT	FORESEEN		OFF-SET	29°56' S / 051°08' W
126,400	MORRO DA IGREJA	B	ACC	NAT	FORESEEN		OFF-SET	28°07' S / 049°28' W
126,400	PASSO FUNDO	B	ACC	NAT	FORESEEN		OFF-SET	28°14' S / 052°19' W
126,450	JACAREACANGA	B	ACC	ICAO	OP		OFF-SET	06°14' S / 057°46' W
126,450	CACHIMBO	B	ACC	ICAO	OP		OFF-SET	09º20' S/ 054º57' W
126,450	SINOP	B	ACC	ICAO	OP		OFF-SET	11°53' S / 055°34' W
126,500	COXIM	B	ACC	NAT	FORESEEN		OFF-SET	18°28' S / 054°42' W
126,500	URUBUPUNGÁ	B	ACC	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
126,550	TEOFILO OTONI	B	ACC	ICAO	OP		OFF-SET	17°53' S / 041°30' W
126,550	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
126,550	SANTA TERESA	B	ACC	ICAO	OP		OFF-SET	19°35' S / 040°20' W
126,550	CAMPOS	B	ACC	ICAO	OP		OFF-SET	21°42' S / 041°18' W
126,650	BELÉM/VAL DE CANS	B	ACC	NAT	FORESEEN		OFF-SET	01°24' S / 048°27' W
126,650	VISEU	B	ACC	NAT	FORESEEN		OFF-SET	01°11' S / 046°09' W
126,750	ASSIS	B	ACC	ICAO	FORESEEN		OFF-SET	22°38' S / 050°26 W
126,750	CURITIBA/BACACHERI	B	ACC	ICAO	FORESEEN		OFF-SET	25°24' S / 049°14' W
126,750	MORRO DA IGREJA	B	ACC	ICAO	FORESEEN		OFF-SET	28°07' S / 049°28' W
126,750	PASSO FUNDO	B	ACC	ICAO	FORESEEN		OFF-SET	28°14' S / 052°19' W
126,750	SANTIAGO	B	ACC	ICAO	FORESEEN		OFF-SET	29°13' S / 054°55' W
126,750	CANGUÇU	B	ACC	ICAO	FORESEEN		OFF-SET	31°24' S / 052°41' W
126,800	PIRASSUNUNGA	B	ACC	ICAO	OP		OFF-SET	21°59' S / 047°20' W
126,800	CAMPINAS	B	ACC	ICAO	OP		OFF-SET	23°00' S / 047°08' W
126,850	MACEIÓ	B	ACC	ICAO	FORESEEN		OFF-SET	09º31' S / 035º47' W
126,850	SALVADOR	B	ACC	ICAO	FORESEEN		OFF-SET	12°54' S / 038°19' W
126,950	CURITIBA/BACACHERI	B	ACC	NAT	FORESEEN		OFF-SET	25°24' S / 049°14' W
126,950	SÃO ROQUE	B	ACC	NAT	FORESEEN		OFF-SET	23°21' S / 047°03' W
127,000	TRES MARIAS	B	ACC	ICAO	OP		OFF-SET	18°06' S / 045°16' W
127,000	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
127,000	VARGINHA	B	ACC	ICAO	OP		OFF-SET	21°35' S / 045°28' W
127,000	UBERABA	B	ACC	ICAO	OP		OFF-SET	19°45' S / 047°57' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
127,000	MANAUS	B	ACC	NAT	FORESEEN		OFF-SET	03°02' S / 060°03' W
127,000	PORTO TROMBETAS	B	ACC	NAT	FORESEEN		OFF-SET	01°28' S / 056°23' W
127,200	ASSIS	B	ACC	ICAO	OP		OFF-SET	22°38' S / 050°26 W
127,200	CURITIBA/BACACHERI	B	ACC	ICAO	OP		OFF-SET	25°24' S / 049°14' W
127,200	CATANDUVAS	B	ACC	ICAO	OP		OFF-SET	25°07' S / 053°07' W
127,200	FOZ DO IGUAÇU	B	ACC	ICAO	OP		OFF-SET	25°36' S / 054°29' W
127,200	PASSO FUNDO	B	ACC	ICAO	OP		OFF-SET	28°14' S / 052°19' W
127,200	BARREIRAS	B	ACC	NAT	OP		OFF-SET	12°04' S / 045°00' W
127,200	B.J.LAPA	B	ACC	NAT	OP		OFF-SET	13°15' S / 043°24' W
127,200	CORRENTES	B	ACC	NAT	OP		OFF-SET	10°27' S / 045°08' W
127,200	SALVADOR	B	ACC	NAT	OP		OFF-SET	12°54' S / 038°19' W
127,200	VITÓRIA DA CONQUISTA	B	ACC	NAT	OP		OFF-SET	14°51' S / 040°51' W
127,300	MONTES CLAROS	B	ACC	ICAO	OP		OFF-SET	16°42' S / 043°49 W
127,300	TRES MARIAS	B	ACC	ICAO	OP		OFF-SET	18°06' S / 045°16' W
127,300	PIEDADE	B	ACC	ICAO	OP		OFF-SET	19°29' S / 043°24' W
127,400	SANTIAGO	B	ACC	ICAO	OP		OFF-SET	29°13' S / 054°55' W
127,400	CANGUÇU	B	ACC	ICAO	OP		OFF-SET	31°24' S / 052°41' W
127,400	PASSO FUNDO	B	ACC	ICAO	OP		OFF-SET	28°14' S / 052°19' W
127,500	FLORIANO	B	ACC	NAT	OP		OFF-SET	06°50' S / 043°04' W
127,500	PAULO AFONSO	B	ACC	NAT	OP		OFF-SET	09º24' S/ 038º15' W
127,500	PETROLINA	B	ACC	NAT	OP		OFF-SET	09°22' S / 040°33' W
127,500	BLUMENAU	B	ACC	NAT	FORESEEN		OFF-SET	26°49' S / 049°05' W
127,500	CURITIBA/BACACHERI	B	ACC	NAT	FORESEEN		OFF-SET	25°24' S / 049°14' W
127,500	MORRO DA IGREJA	B	ACC	NAT	FORESEEN		OFF-SET	28°07' S / 049°28' W
128,000	BELÉM/VAL DE CANS	B	ACC	ICAO	OP		OFF-SET	01°24' S / 048°27' W
128,000	MACAPÁ	B	ACC	ICAO	OP		OFF-SET	00°02' N / 051°05' W
128,000	OIAPOQUE	B	ACC	ICAO	OP		OFF-SET	03°51' N / 051°47' W
128,000	ALTAMIRA	B	ACC	ICAO	FORESEEN		OFF-SET	03°15' S / 052°14' W
128,000	GURUPI	B	ACC	ICAO	OP		OFF-SET	11°44' S / 049°07' W
128,000	CANARANA	B	ACC	ICAO	OP		OFF-SET	13°34' S / 052°16' W
128,000	ALTO PARAÍSO	B	ACC	ICAO	OP		OFF-SET	14°18' S / 047°30' W
128,000	SÃO LUIZ DO NORTE	B	ACC	ICAO	OP		OFF-SET	14°51' S / 049°19' W
128,000	PORTO ALEGRE DO NORTE	B	ACC	ICAO	OP		OFF-SET	10°52' S / 051°37' W
128,050	SÃO ROQUE	B	ACC	ICAO	OP		OFF-SET	23°21' S / 047°03' W
128,050	TANABI	B	ACC	ICAO	OP		OFF-SET	23°21' S / 047°03' W
128,050	VARGINHA	B	ACC	ICAO	OP		OFF-SET	21°35' S / 045°28' W
128,050	UBERABA	B	ACC	ICAO	OP		OFF-SET	19°45' S / 047°57' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
128,050	RIO DE JANEIRO/COUTO	B	ACC	ICAO	OP		OFF-SET	22°27' S / 043°17 W
128,150	CATANDUVAS	B	ACC	NAT	OP		OFF-SET	25°07' S / 053°07' W
128,150	PONTA PORÃ	B	ACC	NAT	OP		OFF-SET	22°32' S / 055°42 W
128,150	JARAGUARI	B	ACC	NAT	OP		OFF-SET	22°20' S / 054°24 W
128,150	CORUMBÁ	B	ACC	NAT	OP		OFF-SET	19°00' S / 057°40' W
128,150	PORTO PRIMAVERA	B	ACC	NAT	FORESEEN		OFF-SET	21º55' S / 050º14' W
128,150	PORTO MURTINHO	B	ACC	NAT	FORESEEN		OFF-SET	21°42' S / 057°52' W
128,150	PORTO SEGURO	B	ACC	NAT	FORESEEN		OFF-SET	16°26' S / 039°04 W
128,250	VARGINHA	B	ACC	NAT	OP		OFF-SET	21°35' S / 045°28' W
128,250	BARBACENA	B	ACC	NAT	OP		OFF-SET	21°15' S / 043°45' W
128,250	RIO DE JANEIRO/COUTO	B	ACC	NAT	OP		OFF-SET	22°27' S / 043°17 W
128,250	CAMPINAS	B	ACC	NAT	OP		OFF-SET	23°00' S / 047°08' W
128,250	SÃO ROQUE	B	ACC	NAT	OP		OFF-SET	23°21' S / 047°03' W
128,300	JI-PARANÁ	B	ACC	NAT	OP		OFF-SET	10°52' S / 061°50' W
128,300	MANICORE	B	ACC	NAT	OP		OFF-SET	05°48' S / 061°17' W
128,300	VILHENA	B	ACC	NAT	OP		OFF-SET	12°41' S / 060°06' W
128,300	PORTO VELHO	B	ACC	NAT	OP		OFF-SET	08°42' S / 063°53' W
128,350	IPAMERI	B	ACC	NAT	OP		OFF-SET	17°41' S / 048°09' W
128,350	UBERABA	B	ACC	NAT	OP		OFF-SET	19°45' S / 047°57' W
128,400	SÃO LUÍS/MCAL.CUNHA MACHADO	B	ACC	NAT	FORESEEN		OFF-SET	02°35' S / 044°14' W
128,400	VISEU	B	ACC	NAT	FORESEEN		OFF-SET	01°11' S / 046°09' W
128,450	FLORIANO	B	ACC	NAT	FORESEEN		OFF-SET	06°50' S / 043°04' W
128,450	PAULO AFONSO	B	ACC	NAT	FORESEEN		OFF-SET	09º24' S/ 038º15' W
128,450	PETROLINA	B	ACC	NAT	FORESEEN		OFF-SET	09°22' S / 040°33' W
128,450	ARIPUANÃ	B	ACC	NAT	FORESEEN		OFF-SET	10°15' S / 059°23' W
128,450	JI-PARANÁ	B	ACC	NAT	FORESEEN		OFF-SET	10°52' S / 061°50' W
128,450	VILHENA	B	ACC	NAT	FORESEEN		OFF-SET	12°41' S / 060°06' W
128,500	CAMPINAS	B	ACC	NAT	OP		OFF-SET	23°00' S / 047°08' W
128,500	VARGINHA	B	ACC	NAT	OP		OFF-SET	21°35' S / 045°28' W
128,800	PORTO SEGURO	B	ACC	NAT	OP		OFF-SET	16°26' S / 039°04 W
128,800	SALVADOR	B	ACC	NAT	OP		OFF-SET	12°54' S / 038°19' W
132,800	ASSIS	B	ACC	NAT	OP		OFF-SET	22°38' S / 050°26 W
132,800	CURITIBA/BACACHERI	B	ACC	NAT	OP		OFF-SET	25°24' S / 049°14' W
132,800	SÃO ROQUE	B	ACC	NAT	OP		OFF-SET	23°21' S / 047°03' W
132,900	GUARATINGUETÁ	B	ACC	NAT	FORESEEN		OFF-SET	22°47' S / 045°12 W
132,900	RIO DE JANEIRO/COUTO	B	ACC	NAT	FORESEEN		OFF-SET	22°27' S / 043°17 W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
132,900	PIEDADE	B	ACC	NAT	FORESEEN		OFF-SET	19°29' S / 043°24' W
132,900	SANTA TERESA	B	ACC	NAT	FORESEEN		OFF-SET	19°35' S / 040°20' W
132,900	SANTOS	B	ACC	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
133,050	GURUPI	B	ACC	NAT	OP		OFF-SET	11°44' S / 049°07' W
133,050	CANARANA	B	ACC	NAT	OP		OFF-SET	13°34' S / 052°16' W
133,050	PORTO ALEGRE DO NORTE	B	ACC	NAT	OP		OFF-SET	10°52' S / 051°37' W
133,050	SÃO LUIZ DO NORTE	B	ACC	NAT	OP		OFF-SET	14°51' S / 049°19' W
133,100	BURITIS	B	ACC	NAT	OP		OFF-SET	15°37' S / 046°25' W
133,100	TRES MARIAS	B	ACC	NAT	OP		OFF-SET	18°06' S / 045°16' W
133,100	IPAMERI	B	ACC	NAT	OP		OFF-SET	17°41' S / 048°09' W
133,100	GAMA	B	ACC	NAT	OP		OFF-SET	15°59' S / 047°59' W
133,250	ASSIS	B	ACC	NAT	FORESEEN		OFF-SET	22°38' S / 050°26 W
133,250	CAMPINAS	B	ACC	NAT	FORESEEN		OFF-SET	23°00' S / 047°08' W
133,250	SALVADOR	B	ACC	NAT	OP		OFF-SET	12°54' S / 038°19' W
133,300	CORUMBÁ	B	ACC	NAT	OP		OFF-SET	19°00' S / 057°40' W
133,300	COXIM	B	ACC	NAT	FORESEEN		OFF-SET	18°28' S / 054°42' W
133,300	JARAGUARI	B	ACC	NAT	OP		OFF-SET	22°20' S / 054°24 W
133,400	RIO DE JANEIRO/COUTO	B	ACC	NAT	OP		OFF-SET	22°27' S / 043°17 W
133,400	PIEDADE	B	ACC	NAT	OP		OFF-SET	19°29' S / 043°24' W
133,400	CAMPOS	B	ACC	NAT	OP		OFF-SET	21°42' S / 041°18' W
133,400	VARGINHA	B	ACC	NAT	OP		OFF-SET	21°35' S / 045°28' W
133,400	BARBACENA	B	ACC	NAT	FORESEEN		OFF-SET	21°15' S / 043°45' W
133,450	MORRO DA PEDREIRA	B	ACC	NAT	FORESEEN		OFF-SET	26°52' S / 048°39' W
133,450	PARANAGUÁ	B	ACC	NAT	FORESEEN		OFF-SET	25°32' S / 048°31' W
133,450	SANTOS	B	ACC	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
133,500	SÃO ROQUE	B	ACC	NAT	OP		OFF-SET	23°21' S / 047°03' W
133,500	PIRASSUNUNGA	B	ACC	NAT	OP		OFF-SET	21°59' S / 047°20' W
133,600	RIO DE JANEIRO/COUTO	B	ACC	NAT	OP		OFF-SET	22°27' S / 043°17 W
133,600	PIEDADE	B	ACC	NAT	OP		OFF-SET	19°29' S / 043°24' W
133,600	BARBACENA	B	ACC	NAT	OP		OFF-SET	21°15' S / 043°45' W
133,600	CAMPOS	B	ACC	NAT	OP		OFF-SET	21°42' S / 041°18' W
133,600	VARGINHA	B	ACC	NAT	OP		OFF-SET	21°35' S / 045°28' W
133,650	JARAGUARI	B	ACC	NAT	FORESEEN		OFF-SET	22°20' S / 054°24 W
133,650	PORTO PRIMAVERA	B	ACC	NAT	FORESEEN		OFF-SET	21°55' S / 050º14' W
133,650	CATANDUVAS	B	ACC	NAT	FORESEEN		OFF-SET	25°07' S / 053°07' W
133,650	URUBUPUNGÁ	B	ACC	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
133,700	CONCEIÇÃO DO ARAGUAIA	B	ACC	NAT	OP		OFF-SET	08°20' S / 049°18' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
133,700	IMPERATRIZ	B	ACC	NAT	OP		OFF-SET	05°32' S / 047°27' W
133,700	MARABA	B	ACC	NAT	OP		OFF-SET	05°21' S / 049°07' W
133,700	SÃO FÉLIX DO ARAGUAIA	B	ACC	NAT	OP		OFF-SET	11°37' S / 050°41' W
133,700	SÃO LUÍS/MCAL.CUNHA MACHADO	B	ACC	NAT	OP		OFF-SET	02°35' S / 044°14' W
133,700	VISEU	B	ACC	NAT	OP		OFF-SET	01°11' S / 046°09' W
133,750	TANABI	B	ACC	NAT	OP		OFF-SET	23°21' S / 047°03' W
133,750	UBERABA	B	ACC	NAT	OP		OFF-SET	19°45' S / 047°57' W
133,750	CAMPINAS	B	ACC	NAT	OP		OFF-SET	23°00' S / 047°08' W
133,750	IPAMERI	B	ACC	NAT	OP		OFF-SET	17°41' S / 048°09' W
133,800	CATANDUVAS	B	ACC	NAT	FORESEEN		OFF-SET	25°07' S / 053°07' W
133,800	GUARAPUAVA	B	ACC	NAT	FORESEEN		OFF-SET	25°23' S / 051°31' W
133,800	PASSO FUNDO	B	ACC	NAT	FORESEEN		OFF-SET	28°14' S / 052°19' W
133,900	BARCELOS	B	ACC	NAT	OP		OFF-SET	00°58' S / 062°55' W
133,900	SÃO GABRIEL DA CACHOEIRA	B	ACC	NAT	OP		OFF-SET	00°08' S / 067°03' W
133,900	TEFÉ	B	ACC	NAT	OP		OFF-SET	03°22' S / 064°43' W
133,900	IAUARETÉ	B	ACC	NAT	OP		OFF-SET	00°36' N / 069°12' W
133,900	PARANAGUÁ	B	ACC	NAT	FORESEEN		OFF-SET	25°32' S / 048°31' W
133,900	SANTOS	B	ACC	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
134,150	EIRUNEPE	B	ACC	NAT	OP		OFF-SET	06°40' S / 069°55' W
134,150	RIO BRANCO	B	ACC	NAT	OP		OFF-SET	09°51' S / 067°53' W
134,150	CRUZEIRO DO SUL	B	ACC	NAT	OP		OFF-SET	07°35' S / 072°45' W
134,150	TARAUACÁ	B	ACC	NAT	OP		OFF-SET	08°09' S / 070°46' W
134,150	CARAUARI	B	ACC	NAT	OP		OFF-SET	04°53' S / 066°54' W
134,250	PORTO TROMBETAS	B	ACC	NAT	OP		OFF-SET	01°28' S / 056°23' W
134,250	JACAREACANGA	B	ACC	NAT	OP		OFF-SET	06°14' S / 057°46' W
134,250	MANAUS	B	ACC	NAT	OP		OFF-SET	03°02' S / 060°03' W
134,250	ITAITUBA	B	ACC	NAT	OP		OFF-SET	04°14' S / 056°00' W
134,500	BARBACENA	B	ACC	NAT	FORESEEN		OFF-SET	21°15' S / 043°45' W
134,500	GUARATINGUETÁ	B	ACC	NAT	FORESEEN		OFF-SET	22°47' S / 045°12 W
134,500	RIO DE JANEIRO/COUTO	B	ACC	NAT	FORESEEN		OFF-SET	22°27' S / 043°17 W
134,700	MANAUS	B	ACC	ICAO	OP		OFF-SET	03°02' S / 060°03' W
134,700	MANICORE	B	ACC	ICAO	OP		OFF-SET	05°48' S / 061°17' W
134,700	JACAREACANGA	B	ACC	ICAO	OP		OFF-SET	06°14' S / 057°46' W
134,700	CURITIBA/BACACHERI	B	ACC	ICAO	FORESEEN		OFF-SET	25°24' S / 049°14' W
134,700	MORRO DA PEDREIRA	B	ACC	ICAO	FORESEEN		OFF-SET	26°52' S / 048°39' W
134,700	MORRO DA IGREJA	B	ACC	ICAO	FORESEEN		OFF-SET	28°07' S / 049°28' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
134,750	TEOFILO OTONI	B	ACC	NAT	OP		OFF-SET	17°53' S / 041°30' W
134,750	SANTA TERESA	B	ACC	NAT	OP		OFF-SET	19°35' S / 040°20' W
134,750	PIEDADE	B	ACC	NAT	OP		OFF-SET	19°29' S / 043°24' W
134,800	FERNANDO DE NORONHA	B	ACC	NAT	OP		OFF-SET	03°51' S / 032°25' W
134,800	NATAL	B	ACC	NAT	OP		OFF-SET	05°54' S / 035°14' W
134,950	JATAÍ	B	ACC	NAT	OP		OFF-SET	17°49' S / 051°46' W
134,950	BARRA DO GARÇAS	B	ACC	NAT	OP		OFF-SET	15°30' S / 052°10' W
134,950	CHAPADA DOS GUIMARÃES	B	ACC	NAT	OP		OFF-SET	15°17' S / 055°29' W
134,950	SORRISO	B	ACC	NAT	OP		OFF-SET	12°53' S / 055°50' W
134,950	TANGARÁ DA SERRA	B	ACC	NAT	OP		OFF-SET	14°39' S / 057°26' W
135,000	GAMA	B	ACC	ICAO	OP		OFF-SET	15°59' S / 047°59' W
135,000	ALTO PARAÍSO	B	ACC	ICAO	OP		OFF-SET	14°18' S / 047°30' W
135,000	TRES MARIAS	B	ACC	ICAO	OP		OFF-SET	18°06' S / 045°16' W
135,000	BURITIS	B	ACC	ICAO	OP		OFF-SET	15°37' S / 046°25' W
135,050	MORRO DA IGREJA	B	ACC	NAT	FORESEEN		OFF-SET	28°07' S / 049°28' W
135,050	CANOAS	B	ACC	NAT	FORESEEN		OFF-SET	29°56' S / 051°08' W
135,050	PASSO FUNDO	B	ACC	NAT	FORESEEN		OFF-SET	28°14' S / 052°19' W
135,100	CATANDUVAS	B	ACC	NAT	FORESEEN		OFF-SET	25°07' S / 053°07' W
135,100	JARAGUARI	B	ACC	NAT	FORESEEN		OFF-SET	22°20' S / 054°24 W
135,100	PONTA PORÃ	B	ACC	NAT	FORESEEN		OFF-SET	22°32' S / 055°42 W
135,100	PORTO PRIMAVERA	B	ACC	NAT	FORESEEN		OFF-SET	21º55' S / 050º14' W
135,100	PORTO MURTINHO	B	ACC	NAT	FORESEEN		OFF-SET	21°42' S / 057°52' W
135,150	TANABI	B	ACC	NAT	OP		OFF-SET	23°21' S / 047°03' W
135,150	UBERABA	B	ACC	NAT	OP		OFF-SET	19°45' S / 047°57' W
135,150	PIRASSUNUNGA	B	ACC	NAT	OP		OFF-SET	21°59' S / 047°20' W
135,250	GUAJARÁ-MIRIM	B	ACC	NAT	FORESEEN		OFF-SET	10°47' S / 065°17' W
135,250	PORTO VELHO	B	ACC	NAT	OP		OFF-SET	08°42' S / 063°53' W
135,250	RIO BRANCO	B	ACC	NAT	OP		OFF-SET	09°51' S / 067°53' W
135,250	JI-PARANÁ	B	ACC	NAT	OP		OFF-SET	10°52' S / 061°50' W
135,350	JARAGUARI	B	ACC	NAT	FORESEEN		OFF-SET	22°20' S / 054°24 W
135,350	PORTO PRIMAVERA	B	ACC	NAT	FORESEEN		OFF-SET	21º55' S / 050º14' W
135,350	URUBUPUNGÁ	B	ACC	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
135,550	PIEDADE	B	ACC	NAT	OP		OFF-SET	19°29' S / 043°24' W
135,550	TRES MARIAS	B	ACC	NAT	OP		OFF-SET	18°06' S / 045°16' W
135,550	MONTES CLAROS	B	ACC	NAT	OP		OFF-SET	16°42' S / 043°49 W
135,550	VARGINHA	B	ACC	NAT	OP		OFF-SET	21°35' S / 045°28' W
135,550	UBERABA	B	ACC	NAT	OP		OFF-SET	19°45' S / 047°57' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
135,600	CAMPOS	B	ACC	NAT	FORESEEN		OFF-SET	21°42' S / 041°18' W
135,600	RIO DE JANEIRO/COUTO	B	ACC	NAT	FORESEEN		OFF-SET	22°27' S / 043°17 W
135,600	SANTA TERESA	B	ACC	NAT	FORESEEN		OFF-SET	19°35' S / 040°20' W
135,900	ALTO PARAÍSO	B	ACC	NAT	OP		OFF-SET	14º17' S / 047º30' W
135,900	PORTO ALEGRE DO NORTE	B	ACC	NAT	FORESEEN		OFF-SET	10°52' S / 051°37' W
135,900	ALTO PARAÍSO	B	ACC	NAT	OP		OFF-SET	14°18' S / 047°30' W
135,900	PORTO ALEGRE DO NORTE	B	ACC	NAT	FORESEEN		OFF-SET	10°52' S / 051°37' W
125,700	SÃO GABRIEL DA CACHOEIRA	B	AFIS	NAT	OP			00°08' S / 067°03' W
125,850	BAGÉ	B	AFIS	NAT	OP			31°23' S / 054°06' W
125,850	IMPERATRIZ	B	AFIS	NAT	OP			05°32' S / 047°27' W
130,250	UNA/COMANDATUBA	B	AFIS	NAT	OP	CIA TRANSAMÉRICA		15°21' S / 038°59' W
130,450	MARÍLIA	B	AFIS	NAT	OP	PANTANAL		22°11' S / 049°55 W
130,850	SÃO JOSÉ DO RIO PRETO	B	AFIS	NAT	OP	DAESP		20°48' S / 049°24' W
130,950	MANAUS/EDUARDO GOMES	B	AFIS	NAT	EXCLUDE	MANAUS AEROTÁXI LTDA		03°02' S / 060°03' W
131,125	HELIPORTO.S.TOMÉ	B	AFIS	NAT	OP	PETROBRAS		22°20' S / 041°45 W
131,250	PASSO FUNDO	B	AFIS	NAT	OP	GOV.EST.RS		28°14' S / 052°19' W
131,300	HELIPONTO-SÃO TOMÉ-P48	B	AFIS	NAT	OP	PETROBRAS		22°02' S / 041°03 W
131,750	JI-PARANÁ	B	AFIS	NAT	OP	FUNDAÇÃO		10°52' S / 061°50' W
131,750	LENCÓIS	B	AFIS	NAT	OP	SINART		12°29' S / 041°16' W
131,850	VARGINHA	B	AFIS	NAT	OP	FLYWAY		21°35' S / 045°28' W
131,850	BAURU/AREALVA	B	AFIS	NAT	OP	DAESP		22°09' S / 049°04 W
131,850	COARI	B	AFIS	NAT	OP	PETROBRAS		04°53' S / 065°21' W
132,150	LAGES	B	AFIS	NAT	OP	PREFEITURA		27°46' S / 050°16' W
132,550	ANGRA DOS REIS	B	AFIS	NAT	OP	PREFEITURA		22°58' S / 044°18 W
119,150	SANTA CRUZ	B	APP	NAT	OP			22°29' S / 043°09' W
119,250	PORTO VELHO	B	APP	ICAO	FORESEEN			08°42' S / 063°53' W
119,300	PIEDADE	B	APP	NAT	FORESEEN			19°29' S / 043°24' W
119,300	PIRASSUNUNGA	B	APP	NAT	OP			21°59' S / 047°20' W
119,350	CAMPO GRANDE	B	APP	ICAO	FORESEEN			20°28' S / 054°40' W
119,350	RIO DE JANEIRO/INTL	B	APP	NAT	OP			20°48' S / 043°15' W
119,450	SÃO PEDRO DA ALDEIA	B	APP	NAT	OP			22°49' S / 042°05 W
119,550	RIBEIRÃO PRETO	B	APP	NAT	OP			21°11' S / 047°48' W
119,600	SÃO PAULO/CONGONHAS	B	APP	ICAO	OP		OFF-SET	23°37' S / 046°39' W
119,600	SÃO JOSÉ DOS CAMPOS	B	APP	NAT	OP		OFF-SET	23°13' S / 045°52' W
119,600	SANTOS	B	APP	NAT	OP		OFF-SET	23°55' S / 046°18' W
119,600	SÃO ROQUE	B	APP	NAT	OP		OFF-SET	23°21' S / 047°03' W
119,650	CAMPO GRANDE	B	APP	NAT	FORESEEN			20°28' S / 054°40' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
119,650	CONFINS	B	APP	NAT	OP			19°22' S / 043°34' W
119,800	CAMPINAS	B	APP	ICAO	OP		OFF-SET	23°00' S / 047°08' W
120,000	MACAÉ	B	APP	NAT	OP	PETROBRAS	Remote ME	22°20' S / 041°45 W
120,050	SÃO PAULO/CONGONHAS	B	APP	ICAO	OP		OFF-SET	23°37' S / 046°39' W
120,050	SÃO JOSÉ DOS CAMPOS	B	APP	NAT	OP		OFF-SET	23°13' S / 045°52' W
120,050	CAMPINAS	B	APP	ICAO	OP		OFF-SET	23°00' S / 047°08' W
120,050	SÃO ROQUE	B	APP	NAT	OP		OFF-SET	23°21' S / 047°03' W
120,200	CAMPO GRANDE	B	APP	NAT	OP			20°28' S / 054°40' W
120,250	SÃO PAULO/CONGONHAS	B	APP	ICAO	OP		OFF-SET	23°37' S / 046°39' W
120,250	CAMPINAS	B	APP	ICAO	OP		OFF-SET	23°00' S / 047°08' W
120,300	SÃO PEDRO DA ALDEIA	B	APP	NAT	FORESEEN			22°49' S / 042°05 W
120,400	SÃO PAULO/GAVIÃO PEIXOTO	B	APP	NAT	FORESEEN			21°45' S / 048°24' W
120,450	GUARATINGUETÁ	B	APP	NAT	OP		OFF-SET	22°47' S / 045°12 W
120,450	SÃO PAULO/GUARULHOS	B	APP	NAT	OP		OFF-SET	23°26' S / 046°28' W
120,450	SÃO JOSÉ DOS CAMPOS	B	APP	NAT	OP		OFF-SET	23°13' S / 045°52' W
120,850	GUARATINGUETÁ	B	APP	NAT	OP		OFF-SET	22°47' S / 045°12 W
120,850	SANTOS	B	APP	NAT	OP		OFF-SET	23°55' S / 046°18' W
120,850	SÃO JOSÉ DOS CAMPOS	B	APP	NAT	OP		OFF-SET	23°13' S / 045°52' W
120,950	SÃO PEDRO DA ALDEIA	B	APP	NAT	FORESEEN			22°49' S / 042°05 W
125,600	SÃO PAULO/CONGONHAS	B	APP	NAT	OP		OFF-SET	23°37' S / 046°39' W
125,600	SANTOS	B	APP	NAT	OP		OFF-SET	23°55' S / 046°18' W
128,950	PORTO ALEGRE	B	APP	NAT	FORESEEN			29°59' S / 051°10' W
129,000	SÃO PAULO/CONGONHAS	B	APP	ICAO	OP		OFF-SET	23°37' S / 046°39' W
129,000	SÃO JOSÉ DOS CAMPOS	B	APP	ICAO	OP		OFF-SET	23°13' S / 045°52' W
129,000	SÃO ROQUE	B	APP	ICAO	OP		OFF-SET	23°21' S / 047°03' W
129,000	SANTOS	B	APP	ICAO	OP		OFF-SET	23°55' S / 046°18' W
129,250	ASSIS	B	ACC	ICAO	OP		OFF-SET	22°38' S / 050°26 W
129,250	JARAGUARI	B	ACC	ICAO	OP		OFF-SET	22°20' S / 054°24 W
129,250	JATAÍ	B	ACC	ICAO	OP		OFF-SET	17°49' S / 051°46' W
129,250	TANABI	B	ACC	ICAO	OP		OFF-SET	23°21' S / 047°03' W
129,250	CORUMBÁ	B	ACC	ICAO	OP		OFF-SET	19°00' S / 057°40' W
129,250	COXIM	B	ACC	ICAO	FORESEEN		OFF-SET	18°28' S / 054°42' W
129,400	SANTA MARIA	B	APP	NAT	FORESEEN			29°42' S / 053°41' W
129,750	SÃO JOSÉ DOS CAMPOS	B	APP	NAT	OP		OFF-SET	23°13' S / 045°52' W
129,800	CORUMBÁ	B	APP	NAT	FORESEEN		OFF-SET	19°00' S / 057°40' W
132,100	SÃO PAULO/CONGONHAS	B	APP	NAT	OP		OFF-SET	23°37' S / 046°39' W
132,100	CAMPINAS	B	APP	NAT	OP		OFF-SET	23°00' S / 047°08' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
132,100	SÃO ROQUE	B	APP	NAT	OP		OFF-SET	23°21' S / 047°03' W
133,000	ANÁPOLIS	B	APP	NAT	OP		PAR	16°08' S / 048°34 W
133,000	FORTALEZA	B	APP	NAT	OP		PAR	03°46' S / 038°31' W
133,850	SÃO ROQUE	B	APP	ICAO	OP		OFF-SET	23°21' S / 047°03' W
134,900	SÃO ROQUE	B	APP	ICAO	OP		OFF-SET	23°21' S / 047°03' W
135,750	SÃO PAULO/CONGONHAS	B	APP	ICAO	OP		OFF-SET	23°37' S / 046°39' W
135,750	CAMPINAS	B	APP	NAT	OP		OFF-SET	23°00' S / 047°08' W
135,750	SÃO ROQUE	B	APP	NAT	OP		OFF-SET	23°21' S / 047°03' W
135,800	RIO DE JANEIRO/COUTO	B	APP	NAT	FORESEEN		OFF-SET	22°27' S / 043°17 W
135,800	SANTOS	B	APP	NAT	FORESEEN		OFF-SET	23°55' S / 046°18' W
127,425	RIBEIRÃO PRETO	B	ATIS	NAT	OP			21°11' S / 047°48' W
127,450	FLORIANÓPOLIS	B	ATIS	NAT	OP			27°40' S / 048°33' W
127,450	BELO HORIZONTE	B	ATIS	ICAO	OP			19°51' S / 043°57' W
127,600	BELÉM/VAL DE CANS	B	ATIS	ICAO	OP			01°24' S / 048°27' W
127,625	NAVEGANTES	B	ATIS	NAT	OP			26°52' S / 048°38' W
127,650	MANAUS	B	ATIS	ICAO	OP			03°02' S / 060°03' W
127,650	SÃO PAULO/CONGONHAS	B	ATIS	ICAO	OP			23°37' S / 046°39' W
127,650	RECIFE	B	ATIS	ICAO	OP			08°07' S / 034°55' W
127,675	LONDRINA	B	ATIS	NAT	FORESEEN			23°19' S / 051°08' W
127,675	GOIANIA	B	ATIS	NAT	OP			16°37' S / 049°13 W
127,700	PIRASSUNUNGA	B	ATIS	NAT	OP			21°59' S / 047°20' W
127,775	MACAÉ	B	ATIS	NAT	OP			22°20' S / 041°45 W
127,800	CURITIBA/BACACHERI	B	ATIS	ICAO	OP			25°24' S / 049°14' W
127,800	TERESINA	B	ATIS	NAT	OP			05°03' S / 042°49' W
127,825	CAMPINAS	B	ATIS	NAT	OP			23°00' S / 047°08' W
127,850	CUIABÁ	B	ATIS	NAT	FORESEEN			15°39' S / 056°07' W
127,875	BAURU	B	ATIS	NAT	OP			22°20' S / 049°03 W
132,650	RIO DE JANEIRO/S.DUMONT	B	ATIS	NAT	OP			22°54' S / 043°10 W
132,700	CORUMBÁ	B	VOLMET	NAT	FORESEEN		OFF-SET	19°00' S / 057°40' W
132,700	COXIM	B	VOLMET	NAT	FORESEEN		OFF-SET	18°28' S / 054°42' W
132,700	JARAGUARI	B	VOLMET	NAT	FORESEEN		OFF-SET	22°20' S / 054°24 W
132,700	PONTA PORÃ	B	VOLMET	NAT	FORESEEN		OFF-SET	22°32' S / 055°42 W
132,700	URUBUPUNGÁ	B	VOLMET	NAT	FORESEEN		OFF-SET	20°20' S / 051°33' W
121,050	RIO DE JANEIRO/S.DUMONT	B	CLRD	ICAO	OP		TRÁFEGO	22°54' S / 043°10 W
121,100	BELO HORIZONTE/PAMPULHA	B	CLRD	ICAO	OP			19°51' S / 043°57' W
121,100	SALVADOR	B	CLRD	NAT	OP			12°54' S / 038°19' W
121,500	ALTO PARAÍSO	B	EMERG	NAT	OP			14°18' S / 047°30' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
121,500	ANÁPOLIS	B	EMERG	NAT	OP			16°08' S / 048°34 W
121,500	ASSIS	B	EMERG	NAT	OP			22°38' S / 050°26 W
121,500	BAGÉ	B	EMERG	NAT	OP			31°23' S / 054°06' W
121,500	BARRA DO GARÇAS	B	EMERG	NAT	OP			15°30' S / 052°10' W
121,500	BARREIRAS	B	EMERG	NAT	OP			12°04' S / 045°00' W
121,500	BAURU	B	EMERG	NAT	OP			22°20' S / 049°03 W
121,500	BELÉM/VAL DE CANS	B	EMERG	NAT	OP			01°24' S / 048°27' W
121,500	BOA VISTA	B	EMERG	NAT	OP			02°50' N / 060°41' W
121,500	B.J.LAPA	B	EMERG	NAT	OP			13°15' S / 043°24' W
121,500	BRASÍLIA	B	EMERG	NAT	OP			15°52' S / 047°55' W
121,500	BURITIS	B	EMERG	NAT	OP			15°37' S / 046°25' W
121,500	CAMPINAS	B	EMERG	NAT	OP			23°00' S / 047°08' W
121,500	CAMPO DE MARTE	B	EMERG	NAT	OP			23°30' S / 046°38' W
121,500	CAMPO GRANDE	B	EMERG	NAT	OP			20°28' S / 054°40' W
121,500	CAMPOS	B	EMERG	NAT	OP			21°42' S / 041°18' W
121,500	CANARANA	B	EMERG	NAT	OP			13°34' S / 052°16' W
121,500	CANGUÇU	B	EMERG	NAT	OP			31°24' S / 052°41' W
121,500	CANOAS	B	EMERG	NAT	OP			29°56' S / 051°08' W
121,500	CHAPADA DOS GUIMARÃES	B	EMERG	NAT	OP			15°17' S / 055°29' W
121,500	CONCEIÇÃO DO ARAGUAIA	B	EMERG	NAT	OP			08°20' S / 049°18' W
121,500	CONFINS	B	EMERG	NAT	OP			19°22' S / 043°34' W
121,500	CORRENTES	B	EMERG	NAT	OP			10°27' S / 045°08' W
121,500	CRUZEIRO DO SUL	B	EMERG	NAT	OP			07°35' S / 072°45' W
121,500	CUIABÁ	B	EMERG	NAT	OP			15°39' S / 056°07' W
121,500	CURITIBA/BACACHERI	B	EMERG	NAT	OP			25°24' S / 049°14' W
121,500	FERNANDO DE NORONHA	B	EMERG	NAT	OP			03°51' S / 032°25' W
121,500	FLORIANO	B	EMERG	NAT	OP			06°50' S / 043°04' W
121,500	FLORIANÓPOLIS	B	EMERG	NAT	OP			27°40' S / 048°33' W
121,500	FORTALEZA	B	EMERG	NAT	OP			03°46' S / 038°31' W
121,500	FOZ DO IGUAÇU	B	EMERG	NAT	OP			25°36' S / 054°29' W
121,500	RIO DE JANEIRO/INTL	B	EMERG	NAT	OP			22°48' S / 043°15 W
121,500	GAMA	B	EMERG	NAT	OP			15°59' S / 047°59' W
121,500	GOIANIA	B	EMERG	NAT	OP			16°37' S / 049°13 W
121,500	GUARATINGUETÁ	B	EMERG	NAT	OP			22°47' S / 045°12 W
121,500	SÃO PAULO/GUARULHOS	B	EMERG	NAT	OP			23°26' S / 046°28' W
121,500	GURUPI	B	EMERG	NAT	OP			11°44' S / 049°07' W
121,500	IMPERATRIZ	B	EMERG	NAT	OP			05°32' S / 047°27' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
121,500	JACAREACANGA	B	EMERG	NAT	OP			06°14' S / 057°46' W
121,500	JATAÍ	B	EMERG	NAT	OP			17°49' S / 051°46' W
121,500	JI-PARANÁ	B	EMERG	NAT	OP			10°52' S / 061°50' W
121,500	JUAZEIRO DO NORTE	B	EMERG	NAT	OP			07°13' S / 039°16' W
121,500	JUNDIÁ	B	EMERG	NAT	OP			00°13' S / 060°41' W
121,500	MACAÉ	B	EMERG	NAT	OP			22°20' S / 041°45 W
121,500	MACAPÁ	B	EMERG	NAT	OP			00°02' N / 051°05' W
121,500	MACEIÓ	B	EMERG	NAT	OP			09º31' S / 035º47' W
121,500	MANAUS	B	EMERG	NAT	OP			03°02' S / 060°03' W
121,500	MANICORE	B	EMERG	NAT	OP			05°48' S / 061°17' W
121,500	MONTES CLAROS	B	EMERG	NAT	OP			16°42' S / 043°49 W
121,500	NATAL	B	EMERG	NAT	OP			05°54' S / 035°14' W
121,500	PARNAÍBA	B	EMERG	NAT	OP			02°53' S / 041°43' W
121,500	PAULO AFONSO	B	EMERG	NAT	OP			09º24' S/ 038º15' W
121,500	PETROLINA	B	EMERG	NAT	OP			09°22' S / 040°33' W
121,500	RIO DE JANEIRO/COUTO	B	EMERG	NAT	OP			22°27' S / 043°17 W
121,500	PIRASSUNUNGA	B	EMERG	NAT	OP			21°59' S / 047°20' W
121,500	PORTO ALEGRE	B	EMERG	NAT	OP			29°59' S / 051°10' W
121,500	PORTO ALEGRE DO NORTE	B	EMERG	NAT	OP			10°52' S / 051°37' W
121,500	PORTO SEGURO	B	EMERG	NAT	OP			16°26' S / 039°04 W
121,500	PORTO VELHO	B	EMERG	NAT	OP			08°42' S / 063°53' W
121,500	RECIFE	B	EMERG	NAT	OP			08°07' S / 034°55' W
121,500	RIO BRANCO	B	EMERG	NAT	OP			09°51' S / 067°53' W
121,500	RIO DE JANEIRO/S.DUMONT	B	EMERG	NAT	OP			22°54' S / 043°10' W
121,500	SALVADOR	B	EMERG	NAT	OP			12°54' S / 038°19' W
121,500	SANTA MARIA	B	EMERG	NAT	OP			29°42' S / 053°41' W
121,500	SANTA TERESA	B	EMERG	NAT	OP			19°35' S / 040°20' W
121,500	SANTOS	B	EMERG	NAT	OP			23°55' S / 046°18' W
121,500	SÃO FÉLIX DO XINGU	B	EMERG	NAT	OP			06°38' S / 051°57' W
121,500	SÃO GABRIEL DA CACHOEIRA	B	EMERG	NAT	OP			00°08' S / 067°03' W
121,500	SÃO JOSÉ DOS CAMPOS	B	EMERG	NAT	OP			23°13' S / 045°52' W
121,500	SÃO LUÍS/MCAL.CUNHA MACHADO	B	EMERG	NAT	OP			02°35' S / 044°14' W
121,500	SÃO LUIZ DO NORTE	B	EMERG	NAT	OP			14°51' S / 049°19' W
121,500	SÃO PAULO/CONGONHAS	B	EMERG	NAT	OP			23°37' S / 046°39' W
121,500	SÃO PEDRO DA ALDEIA	B	EMERG	NAT	OP			22°49' S / 042°05 W
121,500	SORRISO	B	EMERG	NAT	OP			12°53' S / 055°50' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
121,500	TABATINGA	B	EMERG	NAT	OP			04°14' S / 069°55' W
121,500	TANABI	B	EMERG	NAT	OP			23°21' S / 047°03' W
121,500	TANGARÁ DA SERRA	B	EMERG	NAT	OP			14°39' S / 057°26' W
121,500	TARAUACÁ	B	EMERG	NAT	OP			08°09' S / 070°46' W
121,500	TAUBATÉ	B	EMERG	NAT	OP			23°02' S / 045°30' W
121,500	TEFÉ	B	EMERG	NAT	OP			03°22' S / 064°43' W
121,500	TEOFILO OTONI	B	EMERG	NAT	OP			17°53' S / 041°30' W
121,500	TERESINA	B	EMERG	NAT	OP			05°03' S / 042°49' W
121,500	TRES MARIAS	B	EMERG	NAT	OP			18°06' S / 045°16' W
121,500	UBERABA	B	EMERG	NAT	OP			19°45' S / 047°57' W
121,500	VARGINHA	B	EMERG	NAT	OP			21°35' S / 045°28' W
121,500	VILHENA	B	EMERG	NAT	OP			12°41' S / 060°06' W
121,500	VISEU	B	EMERG	NAT	OP			01°11' S / 046°09' W
121,500	VITÓRIA	B	EMERG	NAT	OP			20°15' S / 040°17' W
121,500	VITÓRIA DA CONQUISTA	B	EMERG	NAT	OP			14°51' S / 040°51' W
121,500	CORUMBÁ	B	EMERG	NAT	OP			19°00' S / 057°40' W
121,500	CATANDUVAS	B	EMERG	NAT	OP			25°07' S / 053°07' W
121,500	MORRO DA IGREJA	B	EMERG	NAT	OP			28°07' S / 049°28' W
121,500	PASSO FUNDO	B	EMERG	NAT	OP			28°14' S / 052°19' W
121,500	SANTIAGO	B	EMERG	NAT	OP			29°13' S / 054°55' W
121,500	CACHIMBO	B	EMERG	NAT	OP			09º20' S/ 054º57' W
121,500	SÃO FÉLIX DO ARAGUAIA	B	EMERG	NAT	OP			11°37' S / 050°41' W
121,500	URUBUPUNGÁ	B	EMERG	NAT	OP			20°20' S / 051°33' W
121,500	PORTO TROMBETAS	B	EMERG	NAT	OP			01°28' S / 056°23' W
121,500	JARAGUARI	B	EMERG	NAT	OP			22°20' S / 054°24 W
121,500	CARAUARI	B	EMERG	NAT	OP			04°53' S / 066°54' W
121,500	TIRIOS	B	EMERG	NAT	OP			02°13' N / 055°56' W
122,500	BOA VISTA	B	GP	NAT	FORESEEN			02°50' N / 060°41' W
122,500	BELÉM/VAL DE CANS	B	GP	NAT	FORESEEN			01°24' S / 048°27' W
122,500	MANAUS	B	GP	NAT	FORESEEN			03°02' S / 060°03' W
122,500	CANOAS	B	GP	NAT	OP			29°56' S / 051°08' W
122,500	PORTO VELHO	B	GP	NAT	OP			08°42' S / 063°53' W
127,350	BRASÍLIA	B	GP	NAT	OP			15°52' S / 047°55' W
127,350	SÃO PAULO/CONGONHAS	B	GP	NAT	OP			23°37' S / 046°39' W
121,600	RIBEIRÃO PRETO	B	SMC	NAT	FORESEEN			21°11' S / 047°48' W
121,650	JUNDIAÍ	B	SMC	NAT	FORESEEN			23°10' S / 046°56' W
121,700	MACAÉ	B	SMC	NAT	OP			22°20' S / 041°45 W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
121,700	GOIANIA	B	SMC	NAT	OP			16°37' S / 049°13 W
121,700	LAGOA SANTA	B	SMC	NAT	FORESEEN			19°39' S / 043°53' W
121,800	SÃO JOSÉ DOS CAMPOS	B	SMC	NAT	FORESEEN			23°13' S / 045°52' W
121,850	CAMPO DOS AFONSOS	B	SMC	NAT	OP			22°52' S / 043°23 W
121,900	CUIABÁ	B	SMC	NAT	FORESEEN			15°39' S / 056°07' W
121,900	CURITIBA/AFONSO PENA	B	SMC	NAT	OP			25°31' S / 049°10' W
121,900	SALVADOR	B	SMC	ICAO	OP			12°54' S / 038°19' W
121,950	PORTO SEGURO	B	SMC	NAT	FORESEEN			16°26' S / 039°04 W
121,950	VITÓRIA	B	SMC	NAT	FORESEEN			20°15' S / 040°17' W
118,000	JOINVILLE	B	TWR	NAT	OP			26°13' S / 048°47' W
118,050	SÃO PAULO/CONGONHAS	B	TWR	NAT	OP			23°37' S / 046°39' W
118,150	SÃO PAULO/GAVIÃO PEIXOTO	B	TWR	NAT	FORESEEN			21°45' S / 048°24' W
118,250	FAROL DE SÃO TOMÉ/MACAÉ	B	TWR	NAT	FORESEEN			22°01' S / 041°04 W
118,300	ANÁPOLIS	B	TWR	NAT	OP			16°08' S / 048°34 W
118,450	BRASILIA/GAMA	B	TWR	ICAO	OP			15°52' S / 047°55' W
118,600	SÃO JOSÉ DOS CAMPOS	B	TWR	NAT	FORESEEN			23°13' S / 045°52' W
118,600	SALVADOR	B	TWR	NAT	FORESEEN			12°54' S / 038°19' W
118,700	FLORIANÓPOLIS	B	TWR	ICAO	OP			27°40' S / 048°33' W
118,750	JUNDIAÍ	B	TWR	NAT	FORESEEN			23°10' S / 046°56' W
118,800	UBERLÂNDIA	B	TWR	NAT	OP			18°53' S / 048°13' W
118,850	SANTA MARIA	B	TWR	NAT	OP			29°42' S / 053°41' W
119,000	ARACAJU	B	TWR	NAT	OP			10°59' S / 037°04' W
119,050	BELÉM/VAL DE CANS	B	APP	ICAO	OP			01°23' S / 048°28' W
119,150	ANÁPOLIS	B	APP	NAT	OP			16°08' S / 048°34 W
132,050	CACHIMBO	B	VOLMET	NAT	OP		OFF-SET	09º20' S/ 054º57' W
132,050	JACAREACANGA	B	VOLMET	NAT	OP		OFF-SET	06°14' S / 057°46' W
132,050	MANAUS	B	VOLMET	NAT	FORESEEN		OFF-SET	03°02' S / 060°03' W
132,050	MANICORE	B	VOLMET	NAT	FORESEEN		OFF-SET	05°48' S / 061°17' W
132,050	ITAITUBA	B	VOLMET	NAT	FORESEEN		OFF-SET	04°14' S / 056°00' W
132,050	SINOP	B	VOLMET	NAT	EXCLUDE		OFF-SET	
132,050	CANGUÇU	B	VOLMET	NAT	FORESEEN		OFF-SET	31°24' S / 052°41' W
132,050	MORRO DA IGREJA	B	VOLMET	NAT	FORESEEN		OFF-SET	28°07' S / 049°28' W
132,050	CANOAS	B	VOLMET	NAT	FORESEEN		OFF-SET	29°56' S / 051°08' W
132,050	SANTIAGO	B	VOLMET	NAT	FORESEEN		OFF-SET	29°13' S / 054°55' W
132,100	ALTAMIRA	B	VOLMET	NAT	OP		OFF-SET	03°15' S / 052°14' W
132,100	PORTO TROMBETAS	B	VOLMET	NAT	OP		OFF-SET	01°28' S / 056°23' W
132,100	SANTAREM	B	VOLMET	NAT	OP		OFF-SET	02°25' S / 054°44' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
132,100	TIRIOS	B	VOLMET	NAT	OP		OFF-SET	02°13' N / 055°56' W
132,100	MACAPÁ	B	VOLMET	NAT	OP		OFF-SET	00°02' N / 051°05' W
132,150	JI-PARANÁ	B	VOLMET	NAT	OP		OFF-SET	10°52' S / 061°50' W
132,150	VILHENA	B	VOLMET	NAT	OP		OFF-SET	12°41' S / 060°06' W
132,150	ARIPUANÃ	B	VOLMET	NAT	FORESEEN		OFF-SET	10°15' S / 059°23' W
132,150	PORTO VELHO	B	VOLMET	NAT	OP		OFF-SET	08°42' S / 063°53' W
132,150	GURUPI	B	VOLMET	NAT	OP		OFF-SET	11°44' S / 049°07' W
132,150	CANARANA	B	VOLMET	NAT	OP		OFF-SET	13°34' S / 052°16' W
132,150	PORTO ALEGRE DO NORTE	B	VOLMET	NAT	OP		OFF-SET	10°52' S / 051°37' W
132,150	SÃO LUIZ DO NORTE	B	VOLMET	NAT	OP		OFF-SET	14°51' S / 049°19' W
132,250	BOA VISTA	B	VOLMET	NAT	OP		OFF-SET	02°50' N / 060°41' W
132,250	JUNDIÁ	B	VOLMET	NAT	OP		OFF-SET	00°13' S / 060°41' W
132,250	SURUCUCU	B	VOLMET	NAT	OP		OFF-SET	02°49' N / 063°39' W
132,250	GAMA	B	VOLMET	NAT	OP		OFF-SET	15°59' S / 047°59' W
132,250	IPAMERI	B	VOLMET	NAT	OP		OFF-SET	17°41' S / 048°09' W
132,250	TRES MARIAS	B	VOLMET	NAT	OP		OFF-SET	18°06' S / 045°16' W
132,250	ALTO PARAÍSO	B	VOLMET	NAT	OP		OFF-SET	14°18' S / 047°30' W
132,250	BURITIS	B	VOLMET	NAT	OP		OFF-SET	15°37' S / 046°25' W
132,300	TABATINGA	B	VOLMET	NAT	OP		OFF-SET	04°14' S / 069°55' W
132,300	EIRUNEPE	B	VOLMET	NAT	OP		OFF-SET	06°40' S / 069°55' W
132,300	CRUZEIRO DO SUL	B	VOLMET	NAT	OP		OFF-SET	07°35' S / 072°45' W
132,300	CARAUARI	B	VOLMET	NAT	OP		OFF-SET	04°53' S / 066°54' W
132,300	RIO BRANCO	B	VOLMET	NAT	OP		OFF-SET	09°51' S / 067°53' W
132,400	TEOFILO OTONI	B	VOLMET	NAT	OP		OFF-SET	17°53' S / 041°30' W
132,400	MONTES CLAROS	B	VOLMET	NAT	OP		OFF-SET	16°42' S / 043°49 W
132,400	PIEDADE	B	VOLMET	NAT	OP		OFF-SET	19°29' S / 043°24' W
132,400	RIO DE JANEIRO/COUTO	B	VOLMET	NAT	OP		OFF-SET	22°27' S / 043°17 W
132,400	SANTA TERESA	B	VOLMET	NAT	OP		OFF-SET	19°35' S / 040°20' W
132,400	BARCELOS	B	VOLMET	NAT	OP		OFF-SET	00°58' S / 062°55' W
132,400	SÃO GABRIEL DA CACHOEIRA	B	VOLMET	NAT	OP		OFF-SET	00°08' S / 067°03' W
132,400	TEFÉ	B	VOLMET	NAT	OP		OFF-SET	03°22' S / 064°43' W
132,450	BELÉM/VAL DE CANS	B	VOLMET	NAT	OP		OFF-SET	01°24' S / 048°27' W
132,450	MACAPÁ	B	VOLMET	NAT	OP		OFF-SET	00°02' N / 051°05' W
132,450	VISEU	B	VOLMET	NAT	OP		OFF-SET	01°11' S / 046°09' W
132,500	BELÉM/VAL DE CANS	B	VOLMET	NAT	OP		OFF-SET	01°24' S / 048°27' W
132,500	CONCEIÇÃO DO ARAGUAIA	B	VOLMET	NAT	OP		OFF-SET	08°20' S / 049°18' W
132,500	IMPERATRIZ	B	VOLMET	NAT	OP		OFF-SET	05°32' S / 047°27' W

FREQUENCY	LOCATION	COUNTRY	SERVICE	CAT.	IMPL	COMPANY	OBS.	GEOCOORD
132,500	MARABA	B	VOLMET	NAT	OP		OFF-SET	05°21' S / 049°07' W
132,500	SÃO FÉLIX DO XINGU	B	VOLMET	NAT	OP		OFF-SET	06°38' S / 051°57' W
132,500	SÃO FÉLIX DO ARAGUAIA	B	VOLMET	NAT	OP		OFF-SET	11°37' S / 050°41' W
132,500	SÃO LUÍS/MCAL.CUNHA MACHADO	B	VOLMET	NAT	OP		OFF-SET	02°35' S / 044°14' W
132,550	CHAPADA DOS GUIMARÃES	B	VOLMET	NAT	OP		OFF-SET	15°17' S / 055°29' W
132,550	TANGARÁ DA SERRA	B	VOLMET	NAT	OP		OFF-SET	14°39' S / 057°26' W
132,550	SORRISO	B	VOLMET	NAT	OP		OFF-SET	12°53' S / 055°50' W
132,550	JATAÍ	B	VOLMET	NAT	OP		OFF-SET	17°49' S / 051°46' W
132,550	BARRA DO GARÇAS	B	VOLMET	NAT	OP		OFF-SET	15°30' S / 052°10' W
132,600	TANABI	B	VOLMET	NAT	OP		OFF-SET	23°21' S / 047°03' W
132,600	SÃO ROQUE	B	VOLMET	NAT	OP		OFF-SET	23°21' S / 047°03' W
132,600	VARGINHA	B	VOLMET	NAT	OP		OFF-SET	21°35' S / 045°28' W
132,600	UBERABA	B	VOLMET	NAT	OP		OFF-SET	19°45' S / 047°57' W
132,600	BARRA DO GARÇAS	B	VOLMET	NAT	EXCLUDE		OFF-SET	
132,600	BRASÍLIA	B	VOLMET	NAT	EXCLUDE		OFF-SET	

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ANNEX B / ANNEX B

BROADCASTING SERVICES (ATIS/VOLMET) /
SERVICOS DE RADIOFUSIÓN (ATIS / VOLMET)

LOCATION	FREQUENCY	SERVICE	CAT.	IMPL.	OBS.
ANAPOLIS/TMA	127.675	ATIS	NAT	OP	
BAURU/TMA	127.875	ATIS	ICAO	OP	
BELEM/TMA	127.600	ATIS	ICAO	OP	
BELO HORIZONTE/TMA	127.850	ATIS	ICAO	OP	CONFINS
BELO HORIZONTE/TMA	127.450	ATIS	NAT	OP	PAMPULHA
BRASILIA	127.800	ATIS	ICAO	OP	
FLORIANOPOLIS/TMA	127.450	ATIS	ICAO	OP	
FORTALEZA/TMA	127.700	ATIS	ICAO	OP	
LONDRINA/TMA	127.675	ATIS	ICAO	OP	
MACAE	127.775	ATIS	ICAO	OP	
MANAUS/TMA	127.650	ATIS	ICAO	OP	
NATAL/TMA	132.650	ATIS	ICAO	OP	
NAVEGANTES/TMA	127.625	ATIS	ICAO	OP	
PORTO ALEGRE/TMA	127.850	ATIS	ICAO	OP	
RECIFE/TMA	127.650	ATIS	ICAO	OP	
RIBEIRAO PRETO/TMA	127.425	ATIS	NAT	OP	
RIO DE JANEIRO/TMA	127.600	ATIS	ICAO	OP	GALEAO
RIO DE JANEIRO/TMA	132.650	ATIS	NAT	OP	SANTOS DUMONT
SALVADOR/TMA	127.750	ATIS	ICAO	OP	
SÃO PAULO/TMA	127.650	ATIS	NAT	OP	CONGONHAS
SÃO PAULO/TMA	127.825	ATIS	ICAO	OP	CAMPINAS
SÃO PAULO/TMA	127.750	ATIS	ICAO	OP	GUARULHOS
TERESINA/TMA	127.800		NAT	OP	
VITORIA	127.575	ATIS	ICAO	OP	
AMAZONICA/FIR	132.005	VOLMET	ICAO	OP	
	132.100	VOLMET	ICAO	OP	
	132.150	VOLMET	ICAO	OP	
	132.250	VOLMET	ICAO	OP	
	132.300	VOLMET	ICAO	OP	
	132.400	VOLMET	ICAO	OP	
	132.500	VOLMET	ICAO	OP	
BRASILIA/FIR	132.150	VOLMET	ICAO	OP	
	132.250	VOLMET	ICAO	OP	
	132.400	VOLMET	ICAO	OP	
	132.550	VOLMET	ICAO	OP	
	132.600	VOLMET	ICAO	OP	
CURITIBA/FIR	132.050	VOLMET	ICAO	OP	
	132.450	VOLMET	ICAO	OP	
RECIFE/FIR	123.950	VOLMET	ICAO	OP	
	124.900	VOLMET	ICAO	OP	

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ANNEX C/ ANNEX C

RADIOAIDS OPERATING WITHIN THE LF/MF BAND (190-1750 KHZ)
RADIOAYUDAS QUE OPERAN CON FRECUENCIAS DENTRO DE LA BANDA LF/MF (190-1750 KHZ)

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
AFONSOS (RJ)	270.00	AFS	NDB	22°52’ S 043°22’ W	NAT	50	200	1998
ALAGOINHAS	310.00	AGN	NDB	12°09’ S 038°23 W	NAT	80	200	1983
ALCANTARA	230.00	ALC	NDB	02°23’ S 044°24 W	NAT	70	200	1988
ALDEIA	345.00	ADA	NDB	22°49’ S 042°06’ W	ICAO	80	100	1992
ALMEIRIM	305.00	MDD	NDB	00°53’ S 052°36’ W	NAT	100	1000	1998
ALPINOPOLIS/FURNAS	390.00	FUR	NDB	20°42’ S 046°20’ W	NAT	50	200	1992
ALTA FLORESTA	245.00	ATF	NDB	09°52 S 056°06’ W	ICAO	100	1000	1986
ALTAMIRA	295.00	ATM		03°16’ S 052°15’ W	NAT	120	1000	1998
AMAPA	275.00	AMP	NDB	02°04 N 050°52’ W	ICAO	100	200	1998
ANAPOLIS	415.00	ANP	NDB	16°19’ S 049°02’ W	NAT	50	1000	1980
ANAPOLIS	325.00	PP	NDB	16°08’ S 048°54’ W	NAT	25	200	1990
ARACAJU/STA. MARIA	355.00	ACJ	NDB	10°59’S 037°04’ W	ICAO	75	200	1998
ARACATUBA	265.00	ARA	NDB	21°08’ S 050°26’ W	NAT	75	400	1985
ARAGUAINA	205.00	AGI	NDB	07°12’ S 048°14’ W	NAT	50	1000	1998
ARARAQUARA	205.00	AAQ	NDB	21°49’ S 048°08’ W	NAT	50	1000	1985
ARAXA	210.00	ARX	NDB	19°34’ S 046°58’ W	NAT	100	200	2003
ASSIS	275.00	ASS	NDB	22°39’ S 050°27’ W	NAT	25	200	1990
BACACHERI	300.00	BCH	NDB	25°24’ S 049°14’ W	NAT	50	100	1988
BAGE	235.00	BGE	NDB	31°23’ S 054°07’ W	ICAO	50	100	1997

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
BARBACENA	285.00	BBC	NDB	21°16’ S 043°46’ W	NAT	60	100	2005
BARCELOS	225.00	BRL	NDB	00°58’ S 062°55’ W	NAT	200	1000	1989
BARRA DO GARCAS	320.00	BAG	NDB	15°51’ S 052°23’ W	NAT	75	1000	1986
BARRA DO PIRAI	355.00	PAI	NDB	22°27’S 034°51’ W	ICAO	150	200	1999
BARREIRAS	375.00	BRR	NDB	12°04’S 045°00’ W	NAT	150	1000	1992
BARRETOS	360.00	BRT	NDB	20°35’ S 048°36’ W	NAT	50	200	1984
BAURU	380.00	BRU	NDB	22°19’ S 049°06’ W	ICAO	50	100	2003
BELEM/VAL DE CAES	250.00	BEL	NDB	01°23’ S 048°28’ W	ICAO	150	1000	1997
BELEM/VAL DE CAES	395.00	IE	L	01°24’ S 048°29’ W	ICAO	50	200	1976
BELO HORIZONTE/PAMPULHA	520.00	BHZ	NDB	19°51’ S 043°57’ W	NAT	100	1000	2003
BELO HORIZONTE/TANCREDO NEVES	245.00	IC	L	19°33’ S 044° 02’ W	ICAO	75	1000	1982
BELO HORIZONTE/TANCREDO NEVES	215.00	IF	L	19°37’ S 043°59’ W	ICAO	25	50	1982
BOA VISTA/INTL.	405.00	BVI	NDB	02°50’ N 060°41’ W	ICAO	200	1000	1986
BOCA DO ACRE	305.00	BDA	NDB	08°54’ S 067°29’ W	NAT	75	1000	2003
BOM JESUS DA LAPA	320.00	LAP	NDB	13°16’ S 043°25’ W	ICAO	75	200	1981
BRAGANCA	385.00	BGC	NDB	22°59’ S 046°32’ W	NAT	50	100	1986
BRASILIA/INTL.	340.00	BRS	NDB	15°52’ S 048°01’ W	ICAO	150	1000	1983
BRASILIA/INTL.	240.00	CH	NDB	15°51’ S 047°53’ W	ICAO	50	200	1985
BRASILIA/INTL.	280.00	IR	L	15°51’ S 047°56’ W	ICAO	50	50	1985

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
CABO DE SANTA MARTA	310.00	SW	NDB	28°36’ S 048° 49’ W	NAT	85	500	2002
CABO FRIO	200.00	BFR	NDB	22°55' S 042° 04' W	NAT	25	50	2007
CACADOR	400.00	CAD	NDB	26°47' S 050°56' W	NAT	15	120	2005
CALDAS NOVAS	290.00	CAL	NDB	17°43' S 048° 36' W	NAT	27	200	2007
CAMPINA GRANDE	230.00	CPG	NDB	07°16’ S 035°53’ W	NAT	60	100	2000
CAMPINAS/VIRACOPOS	515.00	CPN	NDB	23°03’ S 047°04’ W	ICAO	50	200	2007
CAMPINAS/VIRACOPOS	370.00	IK	L	22°57’ S 047°12’ W	ICAO	50	50	2003
CAMPINAS/VIRACOPOS	300.00	IP	L	22°59’ S 047°09’ W	ICAO	50	50	1987
CAMPO GRANDE/INTL.	270.00	CGR	L	20°32’ S 054°44’ W	ICAO	100	1000	1992
CAMPO GRANDE/INTL.	395.00	IG	L	20°29’ S 054°41’ W	ICAO	200	45	1995
CAMPO GRANDE/INTL.	215.00	PP	NDB	20°25’ S 054°38’ W	ICAO	50	100	1995
CAMPOS/B. LISANDRO	225.00	CPO	NDB	21°42’ S 041°18’ W	ICAO	80	100	2004
CANA BRAVA	305.00	CNB	NDB	13°32’ S 048°12’ W	NAT	50	200	2006
CANOAS	250.00	OAS	NDB	29°56’ S 051° 08’ W	NAT	50	100	2005
CARAJAS	1700.00	CRJ	NDB	06°07’ S 050°00’ W	NAT	130	1000	1998
CARAUARI	285.00	CUA	NDB	04°53’ S 066°54’ W	ICAO	120	1000	2005
CARAVELAS	365.00	CVL	NDB	17°39’ S 039°15 W	ICAO	100	1000	1981
CAROLINA	330.00	CNA	NDB	07°19’ S 047°27’ W	ICAO	80	1200	1998
CASCAVEL	220.00	CAV	NDB	25°00’ S 053°30’ W	NAT	60	200	1981
CAXIAS DO SUL	1690.00	CXS	NDB	29°08’ S 051°14’ W	ICAO	200	200	1997

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
CHAPECO	1734.00	XPC	NDB	27°08’ S 052°39’ W	NAT	70	200	1984
CHUI	312.00	UI	NDB	33°44’ S 053°22’ W	NAT	200	500	1988
COARI/URUCU	355.00	URC	NDB	04°53' S 065°20' W	NAT	130	200	2004
CONCEICAO DO ARAGUAIA	230.00	ARG	NDB	08°21’ S 049°18’ W	NAT	50	1000	1988
CORUMBA	375.00	CUB	NDB	19°01’ S 057°40’ W	ICAO	100	1200	1991
COXIM	205.00	CXM	NDB	18°30’ S 054°45’ W	NAT	50	100	2001
CRICIUMA/FORQUILHINHA, SC	405.00	CRY	NDB	28°43’ S 049°25’ W	NAT	50	200	1985
CRUZEIRO DO SUL/INTL.	260.00	CZS	NDB	07°36’ S 072°46’ W	ICAO	150	1000	1989
CUCUI	345.00	CCI	NDB	01°11’ S 066°50’ W	NAT	100	1000	1977
CUIABA	380.00	CIA	NDB	15°39’ S 056°06’ W	ICAO	150	1000	1997
CURITIBA/AFONSO PENA	390.00	CRT	NDB	25°32’ S 049°11 W	ICAO	165	1000	1993
CURITIBA/AFONSO PENA	370.00	IC	L	25°27 S 049°15’ W	ICAO	25	50	1980
CURITIBA/AFONSO PENA	325.00	IT	L	25°30’ S 049°11’ W	ICAO	25	25	1980
CURITIBA/AFONSO PENA	255.00	PNH	NDB	25°36’ S 049°05’ W	ICAO	60	200	1985
DOURADOS	285.00	DOU	NDB	22°12’ S 054°56’ W	NAT	70	200	2004
DUQUE DE CAXIAS	400.00	CAX	NDB	22°46’ S 043°20’ W	NAT	200	1000	2000
EIRUNEPE	265.00	ERP	NDB	06°40’ S 069°52’ W	NAT	115	1000	2002
EMBUGUACU	525.00	EMB	NDB	23°51’ S 046°48’ W	NAT	50	200	2003
FERNANDO DE NORONHA	300.00	NOR	NDB	03°51’ S 032°25’ W	NAT	300	1000	1989
FIGUEIRAS	275.00	FGR	NDB	29°60’ S 050°59’ W	NAT	50	100	2002

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
FLORIANOPOLIS/HERCILIO LUZ	380.00	BKO	L	27°37’ S 048°37’ W	ICAO	25	200	1984
FLORIANOPOLIS/HERCILIO LUZ	295.00	FLN	NDB	27°42’ S 048°30’ W	ICAO	150	200	2005
FLORIANOPOLIS/HERCILIO LUZ	350.00	IL	L	27°39’ S 048°33’ W	ICAO	15	50	1981
FORMOSA	210.00	FRM	NDB	15°33’ S 047°21’ W	NAT	50	1000	1985
FORTALEZA/PINTO MARTINS	260.00	FLZ	NDB	03°46’ S 038°32’ W	ICAO	150	1000	1985
FORTALEZA/PINTO MARTINS	205.00	PCI	NDB	03°45’ S 038°37’ W	ICAO	50	200	1986
FOZ DO IGUACU/CATARATAS	410.00	FOZ	L	25°32’ S 054°34’ W	ICAO	150	1000	1986
FOZ DO IGUACU/CATARATAS	395.00	QQ	L	23°35’ S 054°30’ W	ICAO	25	50	1983
FRANCA	405.00	FRC	NDB	20°35’ S 047°23’ W	NAT	50	200	1982
GOIANIA/STA. GENOVEVA	370.00	GOI	NDB	16°38’ S 049°13’ W	NAT	150	1000	1983
GOV. VALADARES	380.00	VAL	NDB	18°54’ S 041°59’ W	NAT	150	400	1998
GUAJARA□MIRIM	400.00	GJM	NDB	10°47’ S 065°17’ W	ICAO	75	1000	2002
GUARAPUAVA	230.00	GRU	NDB	25°23' S 051°31' W	NAT	25	200	1997
GUARATINGUETA	275.00	GGT	NDB	22°47’ S 045°13 W	NAT	50	100	1998
IAUARETE	380.00	YAU	NDB	00°36’ S 069°11’ W	NAT	100	1000	1989
ILHEUS	305.00	YLH	NDB	14°49’ S 039°02’ W	ICAO	100	100	1985
IMPERATRIZ	390.00	YTZ	NDB	05°32’ S 047°27’ W	ICAO	40	200	1998
IPATINGA/USIMINAS	1618.00	YPT	NDB	19°28’ S 042°29’ W	NAT	25	200	1992

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
ITACOATIARA	320.00	YTC	NDB	03°07’ S 058°28’ W	ICAO	125	1000	1991
ITAITUBA	250.00	YUB	NDB	04°14’ S 056°00’ W	NAT	50	1000	1998
ITAPEVI	270.00	TPV	NDB	23°34’ S 046°55’ W	NAT	25	200	1985
ITUMBIARA	245.00	YBA	NDB	18°16’ S 049°13’ W	NAT	50	200	1982
JACAREACANGA	360.00	JAC	NDB	06°14’ S 057°46’ W	ICAO	75	1000	1998
JACAREPAGUA	205.00	JPG	NDB	22°59’ S 043°22’ W	NAT	50	100	1994
JI□PARANA	255.00	RON	NDB	10°53’ S 061°55 W	ICAO	150	1000	1990
JOAO PESSOA/C. PINTO	320.00	JPS	NDB	07°09’ S 034°57’ W	NAT	50	200	1981
JOINVILLE	245.00	GAB	NDB	26°22’ S 048°43’ W	NAT	25	200	1982
JUAZEIRO DO NORTE	205.00	JZR	NDB	07°13’ S 039°16’ W	NAT	50	200	1982
JUIZ DE FORA	1730.00	FRA	NDB	21°46’ S 043°23’ W	NAT	50	200	1999
LABREA	295.00	LBR	NDB	07°15’ S 064°47’ W	NAT	75	1000	2002
LAGOA SANTA	295.00	LST	NDB	19°40’ S 043°54’ W	NAT	50	200	1998
LAJES	240.00	LJS	NDB	27°47’ S 050°16’ W	ICAO	120	400	1984
LENCOIS	235.00	LEN	NDB	12°29' S 041°16' W	NAT	30	200	2003
LONDRINA	365.00	LON	NDB	23°20’ S 051°08’ W	ICAO	50	1000	1995
LONDRINA	305.00	PP	NDB	23°20’ S 051°09’ W	ICAO	15	50	1984
LUZIANIA	400.00	LUZ	NDB	16°15’ S 047°57’ W	ICAO	50	100	1985
MACAE	240.00	MAC	NDB	22°21’ S 041°46’ W	ICAO	50	200	1999
MACAE	280.00	PPM	NDB	22°47’ S 040°46’ W	NAT	105	100	1999

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
MACAÉ/ MARLIM P□20	375.00	MAR	NDB	22°21' S/040°05' W	NAT	27	100	1999
MACAE/PLATAFORMA P□15	335.00	PNQ	NDB	22°40' S 040°36' W	NAT	50	25	1999
MACAE/PLATAFORMA P□25/ALBACORA	210.00	LBA	NDB	22°06' S 039°54' W	NAT	25	100	2003
MACAE/TMA	275.00	FLU	NDB	22°38' S 040º25' W	NAT	24	25	2004
MACAE/TMA P□18	390.00	BCP	NDB	22°25' S 040°01' W	NAT	26	50	1999
MACAPA/INTL.	215.00	MCP	NDB	00°03’ N 051°04’ W	ICAO	50	1000	1996
MACEIO	340.00	MCO	NDB	09°31’ S 035°48’ W	ICAO	70	200	1982
MANAUS/EDUARDO GOMES INTL.	340.00	MAN	NDB	03°20’ S 060°03’ W	ICAO	100	1000	2004
MANAUS/PONTA PELADA	410.00	PEL	NDB	03°08’ S 059°59’ W	NAT	150	1000	1986
MANICORE	310.00	MCR	NDB	05°48’ S 061°17’ W	NAT	75	1000	1998
MARABA	370.00	MRB	NDB	05°22’ S 049°07’ W	NAT	130	1000	1998
MARILIA	415.00	MRA	NDB	22°12’ S 049°56’ W	NAT	54	375	1974
MARINGA	320.00	MRN	NDB	23°29’ S 052°00’ W	NAT	50	375	2001
MARTE	260.00	MAE	NDB	23°31’ S 046°38’ W	NAT	50	200	1984
MAXARANGUAPE	205.00	MXN	NDB	05°23’ S 035°32’ W	NAT	50	200	1982
MONTES CLAROS	310.00	MCL	NDB	16°42’ S 043°49’ W	ICAO	50	200	1999
MOSSORO	275.00	MSS	NDB	05°12’ S 037°22’ W	ICAO	125	100	1986
NATAL/AUGUSTO SEVERO	400.00	NTL	NDB	05°54’ S 035°15’ W	ICAO	75	1000	1986
NATAL/TMA	220.00	UBA	NDB	04°55' S 036°20' W	NAT	25	25	2005
NAVEGANTES	235.00	NVG	NDB	26°52’ S 048°39’ W	NAT	50	100	2003

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
NAVIO AVARÉ/FIR CW	265.00	AVA	NDB	26°38' S 046°53' W	NAT	25	100	2006
NOVA	215.00	NOA	NDB	22°43’ S 043°28’ W	NAT	50	1000	1992
NOVO PROGRESSO/CACHIMBO	215.00	CXB	NDB	09°20' S 054°58' W	NAT	27	1000	1998
OIAPOQUE	340.00	OIA	NDB	03°52’ N 051°48’ W	NAT	70	100	1986
ORIXIMINA/TROMBETAS	205.00	PTT	NDB	01°29’ S 056°24’ W	NAT	50	200	1998
OURINHOS	315.00	ORH	NDB	22°58’ S 049°55’ W	NAT	50	100	1987
PALMAS	385.00	PMS	NDB	18°40' S 046°29' W	NAT	54	200	2001
PARACATU	300.00	PKT	NDB	17°13’ S 046°56’ W	NAT	65	100	1985
PARANAGUA	320.00	NX	NDB	25°30’ S 048°19’ W	ICAO	100	500	1984
PARANAGUA	340.00	PNG	NDB	25°32’ S 048°32’ W	ICAO	100	100	1980
PARICACHOEIRA, AM	325.00	PCR	NDB	00°16’ N 069°47’ W	NAT	50	1000	1989
PARNAIBA	365.00	PNB	NDB	02°54’ S 041°44’ W	ICAO	50	1000	1993
PASSO FUNDO	370.00	PFD	NDB	28°15’ S 052°20’ W	NAT	100	200	1980
PATOS DE MINAS	385.00	PAT	NDB	18°40' S 046°29' W	NAT	67	200	1998
PAULO AFONSO	325.00	PAF	NDB	09°24’ S 038°15’ W	ICAO	50	100	2003
PELOTAS	340.00	PTS	NDB	31°43’ S 052°20’ W	ICAO	130	100	1980
PETROLINA	345.00	PTL	NDB	09°22’ S 040°34’ W	ICAO	150	200	1982
PIRACUNUNGA	345	IS	L	22°00’ S 047°20’ W	NAT	25	200	1989
PIRACUNUNGA	215.00	IY	L	22°04’ S 047°20’ W	NAT	35	200	1989
PIRACUNUNGA	310.00	PSN	NDB	21°59’ S 047°20’ W	NAT	70	200	1984

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
POCOS DE CALDAS	415.00	PCL	NDB	21°50’ S 046°34’ W	ICAO	90	100	1999
PONTA PORA/INTERNACIONAL	340.00	PTP	NDB	22°30’ S 055°42’ W	ICAO	70	100	1996
PORT ALEGRE/SALGADO FILHO	395.00	IA	L	29°59’ S 051°11’ W	ICAO	25	50	1992
PORT ALEGRE/SALGADO FILHO	345.00	IP	L	29°59’ S 051°16’ W	ICAO	50	100	1992
PORT ALEGRE/SALGADO FILHO	315.00	PA	NDB	29°59’ S 051°08 W	ICAO	50	50	1980
PORT ALEGRE/SALGADO FILHO	330.00	PAG	NDB	29°59’ S 051°10’ W	ICAO	160	1000	1992
PORTO DE MOZ	285.00	MOZ	NDB	01°45’ S 052°14’ W	ICAO	50	1000	1998
PORTO NACIONAL	395.00	PNC	NDB	10°43’ S 048°24’ W	ICAO	200	1000	1988
PORTO SEGURO	385.00	SGR	NDB	16°26’ S 039°05’ W	ICAO	50	200	1994
PORTO VELHO	385.00	PVH	NDB	08°42’ S 063°54’ W	ICAO	50	1000	1995
PRESIDENTE PRUDENTE	225.00	PRR	NDB	22°11' S 051°22' W	NAT	50	200	1982
PRINCIPE DA BEIRA	240.00	FPB	NDB	15°25’ S 064°26’ W	NAT	100	200	1980
QUARI	265.00	KRI	NDB	29°47’ S 051°50’ W	NAT	60	200	1983
RASA	315.00	IH	NDB	23°03’ S 043°08’ W	NAT	100	500	1992
RECIFE/GUARARAPES	380.00	OLD	L	08°02’ S 034°57’ W	ICAO	150	1000	1983
RIBAS DO RIO PARDO	245.00	RIB	NDB	20°28’ S 053° 45’ W	NAT	70	100	1983
RIBEIRAO PRETO	330.00	RPR	NDB	21°08’ S 047°46’ W	NAT	50	200	1984
RIO BRANCO/PTE. MEDICI, AC	355.00	RBC	NDB	09°52’ S 067°54’ W	ICAO	100	1000	1999

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
RIO CLARO	280.00	RCL	NDB	22°26’ S 047°34’ W	NAT	50	100	1985
RIO DE JANEIRO/INTL.	290.00	IT	L	22°50’ S 043°22’ W	ICAO	50	200	1999
RIO DE JANEIRO/INTL.	330.00	YLA	NDB	22°47’ S 043° 10’ W	ICAO	60	200	1999
RIO DE JANEIRO/SANTOS DUMONT	415.00	PP	NDB	22°52’ S 043°10’ W	NAT	25	50	1998
RIO GRANDE	290.00	RG	NDB	32°09’ S 052°06’ W	NAT	100	500	1987
SALINOPOLIS	315.00	BL	NDB	00°37’ S 047°22’ W	NAT	150	500	1989
SALVADOR/DOIS DE JULHO	220.00	IS	L	12°55’ S 038°25’ W	ICAO	50	200	1983
SALVADOR/DOIS DE JULHO	240.00	IV	L	12°54’ S 038°20’ W	ICAO	25	100	1986
SALVADOR/DOIS DE JULHO	275.00	SVD	NDB	12°55’ S 038°20’ W	ICAO	200	1000	1999
SANTA CRUZ/RIO DE JANEIRO	255.00	SCR	NDB	22°57’ S 043°44’ W	ICAO	80	200	2001
SANTA MARIA	365.00	SMA	NDB	29°42’ S 053°42’ W	NAT	100	100	1984
SANTA MARIA	215.00	SMR	NDB	29°42’ S 053°46’ W	NAT	100	1000	1984
SANTAREM/INTL.	350.00	STM	NDB	02°26’ S 054°47’ W	ICAO	150	1000	1998
SANTO ANGELO	280.00	SAN	NDB	28°16’ S 054°10’ W	NAT	50	400	1987
SANTOS/GUARUJA	360.00	RR	NDB	23°57’ S 046°17’ W	NAT	50	50	1999
SANTOS/GUARUJA	375.00	SAT	NDB	23°59’ S 046°16’ W	NAT	130	200	1999
SAO GABRIEL DACACHOEIRA	215.00	SGC	NDB	00°08’ S 066°59’ W	ICAO	50	1000	1991
SAO JOAO	320.00	AI	NDB	01°17 N 044°54’ W	NAT	300	500	1984
SAO JOSE DO RIO PRETO	420.00	JRP	NDB	20°49’ S 049°25’ W	NAT	100	370	1985

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
SAO JOSE DOS CAMPOS	365.00	IJ	L	23°13’ S 045°53’ W	NAT	25	200	1984
SAO JOSE DOS CAMPOS	230.00	SJC	NDB	23°14’ S 045°52’ W	NAT	50	200	2004
SAO LUIS/MCAL. CUNHA MACHADO	280.00	SLI	NDB	02°35’ S 044°14’ W	ICAO	50	1000	2001
SAO PAULO/CONGONHAS	200.00	DAD	NDB	23°42’ S 046°36’ W	ICAO	25	200	1984
SAO PAULO/CONGONHAS	290.00	IS	L	23°33’ S 046°43’ W	ICAO	50	100	1985
SAO PAULO/CONGONHAS	330.00	PP	NDB	23°39’ S 046°39’ W	ICAO	60	100	1996
SAO PAULO/CONGONHAS	250.00	SPO	L	23°37’ S 046°40’ W	ICAO	50	1000	1990
SAO PAULO/GUARULHOS INTL.	240.00	IB	L	23°24’ S 046°45’ W	ICAO	50	200	1984
SAO PAULO/GUARULHOS INTL.	410.00	IG	L	23°28’ S 046°34’ W	ICAO	50	100	1983
SAO PAULO/GUARULHOS INTL.	220.00	PER	NDB	23°25’ S 046°45’ W	ICAO	25	200	1984
SÃO TOMÉ	360.00	STG	NDB	22°01' S 041°04' W	NAT	50	100	2000
SOROCABA	350.00	SCB	NDB	23°29' S 047°29' W	NAT	60	200	1996
TABATINGA	230.00	TBT	NDB	04°15’ S 069°56’ W	ICAO	50	1000	1997
TAPURUQUARA	365.00	TPQ	NDB	00°25’ S 065°02’ W	NAT	75	1000	2005
TAQUARA, RS	360.00	TQA	NDB	29°40’ S 050°47’ W	NAT	50	200	1988
TAUBATE	430.00	TBE	NDB	23°02’ S 045°31’ W	NAT	25	200	1991
TEFE	300.00	TFE	NDB	03°23’ S 064°43’ W	ICAO	50	100	1990
TELEMACO BORBA	285.00	TLB	NDB	24°19’ S 050°39’ W	NAT	50	200	1994
TERESINA	215.00	TRS	NDB	05°04’ S 042°49 W	NAT	60	1000	1993
TIRIOS	240.00	TIR	NDB	02°13’ N 055°56’ W	NAT	50	1000	1993

B	FREQ	ID	EQUIP.	COORDINATES	CAT.	COVERAGE	POT.	Year installed
TOLEDO	385.00	TOL	NDB	24°41' S 053°42' W	NAT	37	100	2003
TORRES	230.00	TOR	NDB	29°24' S 049°48' W	NAT	40	125	2004
TUCURUI	220.00	TUI	NDB	03°47’ S 049°43’ W	NAT	200	1000	1998
UBATUBA	295.00	UBT	NDB	23°27’ S 045°04’ W	NAT	50	1000	1999
UBERABA	235.00	URB	NDB	19°46’ S 047°57’ W	ICAO	50	150	1999
UBERLANDIA	350.00	ULD	NDB	18°53’ S 048°14’ W	NAT	50	100	1999
UNA	335.00	COM	NDB	15°21' S 038°59' W	NAT	60	200	2000
URUBUPUNGA/CASTILHO	335.00	URP	NDB	20°46’ S 051°34’ W	NAT	95	1000	1995
URUBURETAMA	235.00	URT	NDB	03°35’ S 039°26’ W	ICAO	80	1000	1983
URUGUAIANA/RUBEM BERTA, RS	275.00	URG	NDB	29°47’ S 057°02’ W	ICAO	100	400	1993
VARGINHA	325.00	VGH	NDB	21°35’ S 045°28’ W	NAT	75	100	1999
VILHENA	395.00	VLH	NDB	12°42’ S 060°06’ W	NAT	50	1000	1985
VITORIA DA CONQUISTA	260.00	VCO	NDB	14°52’ S 040°52’ W	NAT	50	200	1979
VITORIA DE SANTO ANTAO	285.00	VSA	NDB	08°06’ S 035°21’ W	NAT	100	100	1979
VITORIA/GOIABEIRAS	350.00	VTR	NDB	20°12’ S 040°15’ W	ICAO	60	1000	1997

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ANNEX D / ANNEX D

VHF FREQUENCIES ASSIGNED TO VOR AND ILS RADIO NAVIGATION AIDS
FRECUENCIAS VHF ASIGNADAS A LAS AYUDAS PARA LA RADIONAVEGACION VOR E ILS

BRAZIL	FREQ.	ID.	CHANNEL	EQUIP.	COORDINATES	CAT	ILS CAT /COB	RWY	Year installed
AFONSOS (RJ)	109.700	IAF	34X	LLZ/DME	22°52′ S 043°22′ W	NAT	1	26	2002
ANAPOLIS	111.100	IAN		ILS	16°14′ S 048°58′ W	NAT	1	24	2000
BELEM/VAL DE CAES	109.300	IBE	30X	ILS/DME	01°22′ S 048°28′ W	ICAO	1	6	1991
BELO HORIZONTE /TANCREDO NEVES	109.700	ICF		ILS	19°39′ S 043°57′ W	ICAO	1	16	2008
BOA VISTA	109.300	IBV	30X	ILS/DME	02°51′ N 060°40′ W	ICAO	1	8	2001
BRASILIA/INTL.	109.300	IND	30X	ILS/DME	12°52′ S 047°54′ W	ICAO	1	29	1993
BRASILIA/INTL.	110.300	IBR		ILS	12°52′ S 047°54′ W	ICAO	1	11	1993
CAMPINAS/VIRACOPOS	110.300	IKP		ILS	23°01′ S 047°07′ W	ICAO	1	15	1998
CAMPO GRANDE/INTL.	110.300	ICG	40X	ILS/DME	20°28′ S 054°40′ W	ICAO	1	6	1989
CARAJAS	109.300	ICJ	30X	ILS/DME	06°07' S 049°51' W	ICAO	1	10	2004
CUIABA	109.300	ICB	30X	ILS/DME	15°38′ S 056°07′ W	ICAO	1	35	2002
CURITBA/AFONSO PENA	109.300	ICT		ILS	25°32′ S 049°10′ W	ICAO	2	15	2002
FLORIANOPOLIS / HERCILIO LUZ	110.300	IFL		ILS	27°41′ S 048°32′ W	ICAO	1	14	1991
FORTALEZA	109.300	IFZ		ILS	03°46′ S 038°31′ W	ICAO	1	13	2000
FOZ DO IGUACU	109.100	IFI		ILS	25°36' S 054°29' W	ICAO	1	14	1993
JUIZ DE FORA	109.100	IJF	28X	LLZ/DME	21°47′ S 043°23′ W	NAT	1	3	1996
MACEIO	109.300	IMO	30X	ILS/DME	09°31′ S 035°47′ W	ICAO	1	12	2006
MANAUS/INTL.	110.300	IEG	40X	ILS/DME	03°02′ S 060°02′ W	ICAO	1	10	1997
MANAUS/PONTA PELADA	109.300	IPE	30X	LLZ/DME	03°08′ S 059°58′ W	NAT	1	9	1999
NATAL/AUGUSTO SEVERO	109.300	INT	30X	ILS/DME	05°55′ S 035°14′ W	ICAO	1	16L	2008
PIRACUNUNGA	109.300	IYS		ILS	21°59′ S 047°20′ W	NAT	1	02C	1989
PORTO ALEGRE/SALGADO FILHO	110.300	IPA		ILS	29°60′ S 051°09′ W	ICAO	1	10	1993
PORTO VELHO	109.300	IPV	30X	ILS/DME	08°43′ S 063°54′ W	ICAO	1	19	2003
RECIFE/GUARARAPES	110.300	IRF	40X	ILS/DME	08°08′ S 034°55′ W	ICAO	1	18	1985
RIO BRANCO	109.300	IRB	30X	ILS/DME	09°52' S 067°53' W	ICAO	1	6	2003
RIO DE JANEIRO/INTL.	109.300	ITB		ILS	22°48′ S 043°13′ W	ICAO	2	10	1998
RIO DE JANEIRO/INTL.	110.300	IGL	40X	ILS/DME	22°50′ S 043°14′ W	ICAO	1	15	1999
RIO DE JANEIRO/INTL.	111.500	ILM	52X	ILS/DME	22°48′ S 043°15′ W	ICAO	1	28	1999
RIO DE JANEIRO/SANTOS DUMONT	111.100	IRJ	48X	ILS/DME	22°55′ S 043°10′ W	ICAO	1	20L	1996
SALVADOR/INTL.	109.300	ISV		ILS	12°54′ S 038°18′ W	ICAO	1	10	2006
SANTA MARIA	110.300	ISM		ILS	29°42′ S 053°40′ W	NAT	1	11	2005
SANTAREM	109.300	ISN	30X	ILS/DME	02°25′ S 054°47′ W	ICAO	1	10	2003
SAO JOSE DOS CAMPOS	110.300	ISJ	40X	ILS/DME	23°14′ S 045°51′ W	NAT	1	15	1997
SAO LUIS	109.300	ISL	30X	ILS/DME	02°35′ S 044°40′ W	ICAO	1	6	2006

BRAZIL	FREQ.	ID.	CHANNEL	EQUIP.	COORDINATES	CAT	ILS CAT /COB	RWY	Year installed
SAO PAULO/CONGONHAS	109.300	ISP	30X	ILS/DME	23°38′ S 046°39′ W	ICAO	1	17R	1986
SAO PAULO/CONGONHAS	110.100	ICO	38X	ILS/DME	23°37′ S 046°39′ W	ICAO	1	35L	2002
SAO PAULO/GUARULHOS INTL.	110.700	IUC		ILS	23°25′ S 046°27′ W	ICAO	2	09L	1984
SAO PAULO/GUARULHOS INTL.	111.100	IBC		ILS	23°26′ S 046°29′ W	ICAO	1	27L	1986
SAO PAULO/GUARULHOS INTL.	111.500	IGR		ILS	23°26′ S 046°27 W	ICAO	2	09R	2002
SAO PAULO/GUARULHOS INTL.	111.900	IGS		ILS	23°26′ S 046°29′ W	ICAO	1	27R	2002
ALTA FLORESTA	113.400	ATF	81X	VOR/DME	09°52′ S 056°06′ W	ICAO	200	45	1986
ALTAMIRA	113.200	ATM		VOR	03°15′ S 052°15′ W	NAT	200	45	2008
AMAZONICA	117.500	LET	122X	VOR/DME	04°11′ S 069°56′ W		200	45	
ANAPOLIS	115.400	ANP	101X	VOR/DME	16°15′ S 049°00′ W	NAT	200	45	1994
ARACAJU/STA. MARIA	112.000	ACJ	57X	VOR/DME	10°59′ S 037°04′ W	ICAO	200	45	1983
ARAXA	117.000	ARX	117X	VOR/DME	19°41′ S 047°04′ W	NAT	200	45	2003
BAGE	115.300	BGE		VOR	31°23′ S 054°07′ W	ICAO	200	45	2006
BARRA DO GARCAS	113.300	BAG	80X	VOR/DME	15°15′ S 052°23′ W	NAT	200	45	1995
BARRA DO PIRAI	115.000	PAI	97X	VOR/DME	22°27′ S 043°51 W	ICAO	200	45	1977
BARREIRAS	114.300	BRR	90X	VOR/DME	12°05′ S 045°00′ W	ICAO	200	45	1998
BELEM/VAL DE CAES	117.300	BEL	120X	VOR/DME	01°23′ S 048°29′ W	ICAO	200	45	1983
BELO HORIZONTE/PAMPULHA	117.700	BHZ	124X	VOR/DME	19°50′ S 044°00′ W	NAT	200	45	1990
BELO HORIZONTE/TANCREDO NEVES	114.400	CNF	91X	VOR/DME	19°33′ S 044°03′ W	ICAO	200	45	1982
BOA VISTA	113.100	BVI	78X	VOR/DME	02°51′ N 060°41′ W	ICAO	200	45	1989
BOM JESUS DA LAPA	113.700	LAP	84X	VOR/DME	13°16′ S 043°25′ W	ICAO	200	45	1983
BRAGANCA	116.200	BGC	109X	VOR/DME	22°57′ S 046°34′ W	ICAO	200	45	1984
BRASILIA/INTL.	115.900	BRS	106X	VOR/DME	15°52′ S 048°01′ W	ICAO	200	45	1986
BRASILIA/INTL.	117.300	XMA		VOR	15°53′ S 047°55′ W	ICAO	200	45	2005
CACHIMBO/NOVO PROGRESSO	115.100	CBO	98X	VOR/DME	09°20′ S 054°58′ W	NAT	200	45	2007
CAMPINAS/VIRACOPOS	112.000	CPN	57X	VOR/DME	23°00′ S 047°08′ W	ICAO	200	45	1993
CAMPO GANDE/INTL	115.700	CGR	104X	VOR/DME	20°28′ S 054°40′ W	ICAO	200	45	1994
CARAJAS	112.400	CRJ	71X	VOR/DME	06°07′ S 050°00′ W	ICAO	200	45	1982
CARAVELAS	116.000	CVL		VOR	17°39′ S 039°15′ W	ICAO	200	45	2003
CAROLINA	115.300	CNA		VOR	07°19′ S 047°27′ W	ICAO	200	45	2007
CAXIAS DO SUL	112.300	CXS	70X	VOR/DME	29°12′ S 051°11′ W	ICAO	200	45	2000
CHAPECO	116.100	XPC	108X	VOR/DME	27°08′ S 052°40′ W	NAT	200	45	2002
CRICIUMA	114.400	CRY	91X	VOR/DME	28°43′ S 049°25′ W	NAT	200	45	2007
CRUZEIRO DO SUL/INTL.	112.00	CZS	57X	VOR/DME	07°36′ S 07246′ W	ICAO	200	45	1976
CUIABA	113.700	CIA	84X	VOR/DME	15°39′ S 056°07′ W	ICAO	200	45	1986
CURITIBA/AFONSO PENA	116.500	CTB	112X	VOR/DME	25°32′ S 049°10′ W	ICAO	200	45	1986
FERNANDO DE NORONHA	113.700	FNO	84X	VOR/DME	03°52′ S 032°26′ W	NAT	200	45	2005
FLORIANOPOLIS/HERCILIO LUZ	113.400	FLN	81X	VOR/DME	03°52′ S 032°25′ W	ICAO	200	45	2008
FORMOSA	114.100	FRM	88X	VOR/DME	15°33′ S 047°20′ W	NAT	200	45	2000

BRAZIL	FREQ.	ID.	CHANNEL	EQUIP.	COORDINATES	CAT	ILS CAT /COB	RWY	Year installed
FORTALEZA/PINTO MARTINS	114.100	FLZ	88X	VOR/DME	03°46′ S 038°32′ W	ICAO	200	45	2008
FOZ DO IGUACU/CATARATAS	112.100	FOZ	58X	VOR/DME	25°35′ S 054°30′ W	ICAO	200	45	1981
GOIANIA/STA. GENOVEVA	112.700	GOI	74X	VOR/DME	16°38′ S 049°13′ W	NAT	200	45	1982
IMPERATRIZ	112.700	YTZ	74X	VOR/DME	05°31′ S 047°27′ W	ICAO	200	45	1986
JACAREACANGA	112.200	JAC	59X	VOR/DME	06°14′ S 057°46′ W	ICAO	200	45	2005
JOINVILLE	115.100	JNV	98X	VOR/DME	26°13′ S 048°48′ W	NAT	200	45	1998
LONDRINA	112.400	LON	71X	VOR/DME	23°20′ S 051°07′ W	ICAO	200	25	1984
LUZIANA	113.100	LUZ	78X	VOR/DME	16°16′ S 047°58′ W	ICAO	200	45	2000
MACAE	112.700	MAC	74X	VOR/DME	22°21′ S 041°46′ W	ICAO	200	45	1984
MACAPA/INTL.	112.000	MCP	57X	VOR/DME	00°03′ S 051°04′ W	ICAO	200	45	2005
MACEIO	115.100	MCE	98X	VOR/DME	09°30′ S 035°47′ W	ICAO	200	45	2007
MANAUS/EDUARDO GOMES INTL.	115.800	MNS	105X	VOR/DME	03°02′ S 060°03′ W	ICAO	200	45	2008
MARABA	113.700	MRB	84X	VOR/DME	05°22′ S 049°08′ W	NAT	200	45	1984
MARICA	114.000	MRC	87X	VOR/DME	22°58′ S 042°53′ W	ICAO	200	45	1999
MOSSORO	112.400	MSS	71X	VOR/DME	05°12′ S 037°22′ W	ICAO	200	45	1983
NATAL/AUGUSTO SEVERO	114.300	NTL	90X	VOR/DME	05°54′ S 035°14′ W	ICAO	200	45	1976
PALMAS	112.200	PMS	59X	VOR/DME	10°17' S 048°21' W	ICAO	200	45	2002
PARINTINS	114.100	PRI	88X	VOR/DME	02°40' S 056°46' W	NAT	200	45	2002
PASSO FUNDO	112.700	PFD		VOR	28°14' S 052°20' W	NAT	200	45	2000
PAULO AFONSO	113.300	PAF		VOR	09°24′ S 038°15′ W	ICAO	200	45	2009
PELOTAS	113.300	PTS		VOR	31°43′ S 052°19′ W	ICAO	200	45	1990
PETROLINA	112.100	PTL	58X	VOR/DME	09°22′ S 040°34′ W	ICAO	200	45	1983
PIRACUNUNGA	115.800	PIR	105X	VOR/DME	21°59′ S 047°21′ W	NAT	200	45	2008
PORTO ALEGRE/CANOAS	113.600	COA	83X	VOR/DME	29°57′ S 051°09′ W	NAT	200	45	2005
PORTO ALEGRE/SALGADO FILHO	114.000	POR	87X	VOR/DME	29°60′ S 051°10′ W	ICAO	200	45	2001
PORTO DAS CAIXAS	114.600	PCX	93X	VOR/DME	22°43′ S 042°51′ W	NAT	200	45	1999
PORTO NACIONAL	113.000	PNC	77X	VOR/DME	10°43′ S 048°24′ W	ICAO	200	45	1986
PRESIDENTE PRUDENTE	113.500	PRR	82X	VOR/DME	22°10′ S 051°25′ W	NAT	200	45	1984
RECIFE/GUARARAPES	116.900	REC	116X	VOR/DME	08°08′ S 034°56′ W	ICAO	200	45	1994
REDE	116.700	RDE	114X	VOR/DME	23°54′ S 046°32′ W	ICAO	200	45	1984
RIEIRAO PRETO	115.600	RPR	103X	VOR/DME	21°08′ S 047°46′ W	NAT	200	45	1999
RIO BRANCO	114.200	RBC	89X	VOR/DME	09°52′ S 067°54′ W	ICAO	200	45	1999
RIO DE JANEIRO/INTL.	113.000	CAX	77X	VOR/DME	22°46′ S 043°20′ W	ICAO	200	45	1976
SANTA CRUZ/RIO DE JANEIRO	113.600	SCR	83X	VOR/DME	22°57′ S 043°43′ W	ICAO	200	45	1977
SALVADOR/DOIS DE JULHO	116.500	SVD	112X	VOR/DME	12°54′ S 038°19′ W	ICAO	200	45	2006
SANTA MARIA	112.000	SMA	57X	VOR/DME	29°43′ S 053°43′ W	NAT	200	45	2000
SANTAREM/INTL.	112.300	STM	70X	VOR/DME	02°25′ S 054°49′ W	ICAO	200	45	1982
SAO GABRIEL DA CACHOEIRA	115.400	SGC	101X	VOR/DME	00°08′ S 066°59′ W	ICAO	200	45	1995
SAO JOSE DOS CAMPOS	112.800	SJC	75X	VOR/DME	23°15′ S 045°51′ W	NAT	200	45	1998

BRAZIL	FREQ.	ID.	CHANNEL	EQUIP.	COORDINATES	CAT	ILS CAT /COB	RWY	Year installed
SAO LUIS/MCAL. CUNHA MACHADO	113.500	SLI	82X	VOR/DME	02°35′ S 044°14′ W	ICAO	200	45	1984
SAO PAULO/CONGONHAS	116.900	CGO	116X	VOR/DME	23°37′ S 046°39′ W	ICAO	200	45	1984
SAO PAULO/GUARULHOS INTL.	116.000	BCO	107X	VOR/DME	23°24′ S 046°23′ W	ICAO	200	45	1984
SÃO PAULO/TMA	114.300	STN	90X	VOR/DME	23°29' S 046°55' W	NAT	200	45	1985
SAO PEDRO DA ALDEIA	112.100	ADA	58X	VOR/DME	22°49′ S 042°06′ W	NAT	200	45	1998
SOROCABA	115.200	SCB	99X	VOR/DME	23°30′ S 047°23′ W	ICAO	200	45	1984
TEFE	112.900	TFE	76X	VOR/DME	03°23′ S 064°44′ W	ICAO	200	45	1976
TERESINA	112.300	TRS	70X	VOR/DME	05°04′ S 042°49′ W	NAT	200	45	1984
TRES MARIAS	114.700	TRM	94X	VOR/DME	18°12′ S 045°27′ W	ICAO	200	45	1998
TUCURUI	112.900	TUI	76X	VOR/DME	03°48′ S 049°43′ W	NAT	200	45	1979
UBERLANDIA	116.100	ULD	108X	VOR/DME	18°52′ S 048°13′ W	NAT	200	45	2004
URUBUPUNGA/CASTILHO	114.200	URP	89X	VOR/DME	20°46′ S 051°33′ W	ICAO	200	45	1985
VILHENA	112.100	VLH	58X	VOR/DME	12°42′ S 060°05′ W	NAT	200	45	1985
VITORIA/GOIABEIRAS	115.500	VTR	120X	VOR/DME	20°15′ S 040°17′ W	ICAO	200	66	2003

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ANNEX E / ANNEX E

SURVEILLANCE SYSTEMS / SISTEMAS DE VIGILANCIA

State (Territory)/Location Estado (Territorio)/Ubicación	PSR			SSR				Remarks	
	Function Función	Coverage Cobertura (NM)	Status of impl./ Estado de impl.	Function Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status of impl. /Estado de impl.	Type Tipo	Remarks/ Observaciones
ANÁPOLIS	T	60	I	T	A/C	220	I *		* MSSR
ATLÂNTICO									ADS-C
BARCELOS			NI	E	A/C	220	I *		* MSSR
BARRA DO GARÇAS	E	180	I	E	A/C	220	I *		* MSSR
BELÉM	E	180	I	E	A/C	220	I *		* MSSR
BELÉM	T	60	I	T	A/C	220	I *		* MSSR
BOA VISTA	E	180	I	E	A/C	220	I *		* MSSR
BOM JESUS DA LAPA			NI	E	A/C	220	I *		* MSSR
BRASÍLIA	T	60	I	T	A/C	220	I *		* MSSR
CACHIMBO			NI	E	A/C	220	I *		* MSSR
CAMPINAS	T	60	I	T	A/C	220	I *		* MSSR
CAMPO GRANDE	T	60	I	T	A/C	220	I *		* MSSR
CANGUÇU	E	180	I	E	A/C	220	I *		* MSSR
CATANDUVAS	E	180	I	E	A/C	220	I *		* MSSR
CHAPADA DOS GUIMARÃES	E	180	I	E	A/C	220	I *		* MSSR
CONCEIÇÃO DO ARAGUAIA	E	180	I	E	A/C	220	I *		* MSSR
CONFINS	T	60	I	T	A/C	220	I *		* MSSR
CONGONHAS	T	60	I	T	A/C	220	I *		* MSSR
CRUZEIRO DO SUL	E	180	I	E	A/C	220	I *		* MSSR
CUIABÁ	T	60	I	T	A/C	220	I *		* MSSR
CURITIBA	T	60	I	T	A/C	220	I *		* MSSR
EDUARDO GOMES	T	60	I	T	A/C	220	I *		* MSSR
EIRUNEPÉ	E	180	I	E	A/C	220	I *		* MSSR
FERNANDO DE NORONHA			NI	E	A/C	220	I *		* MSSR
FLORIANÓPOLIS	T	60	I	T	A/C	220	I *		* MSSR
FORTALEZA	E	180	I	E	A/C	220	I *		* MSSR
FORTALEZA	T	60	I	T	A/C	220	I *		* MSSR
FOZ DO IGUAÇU	T	60	I	T	A/C	220	I *		* MSSR
GALEÃO	T	60	I	T	A/C	220	I *		* MSSR

State (Territory)/Location Estado (Territorio)/Ubicación	PSR			SSR				Remarks	
	Function Función	Coverage Cobertura (NM)	Status of impl./ Estado de impl.	Function Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status of impl. /Estado de impl.	Type Tipo	Remarks/ Observaciones
GAMA	E	180	I	E	A/C	220	I *		* MSSR
GAMA	T	60	I	T	A/C	220	I *		* MSSR
GUAJARAMIRIM	E	180	I	E	A/C	220	I *		* MSSR
GUARULHOS	T	60	I	T	A/C	220	I *		* MSSR
IMPERATRIZ			NI	E	A/C	220	I *		* MSSR
JACAREACANGA			NI	E	A/C	220	I *		* MSSR
JARAGUARI	E	180	I	E	A/C	220	I *		* MSSR
MACAÉ	T	60	I	T	A/C	220	I *		* MSSR
MACAPÁ	E	180	I	E	A/C	220	I *		* MSSR
MACEIÓ	E	180	I	E	A/C	220	I *		* MSSR
MANAUS	E	180	I	E	A/C	220	I *		* MSSR
MANICORÉ			NI	E	A/C	220	I *		* MSSR
MOMBAÇA	T	60	I	T	A/C	220	I *		* MSSR
MORRO DA IGREJA	E	180	I	E	A/C	220	I *		* MSSR
NATAL	E	180	I	E	A/C	220	I *		* MSSR
NATAL	T	60	I	T	A/C	220	I *		* MSSR
NAVEGANTES	T	60	P	T	A/C	220	P *		* MSSR
PALMAS	E	180	P	E	A/C	220	P *		* MSSR
PETROLINA			NI	E	A/C	220	I *		* MSSR
PICO DO COUTO	E	180	I	E	A/C	220	I *		* MSSR
PIRASSUNUNGA	T	60	I	T	A/C	220	I *		* MSSR
PORTO ALEGRE	T	60	I	T	A/C	220	I *		* MSSR
PORTO ESPERIDIÃO	E	180	I	E	A/C	220	I *		* MSSR
PORTO SEGURO	T	60	I	T	A/C	220	I *		* MSSR
PORTO VELHO	E	180	I	E	A/C	220	I *		* MSSR
RECIFE	T	60	I	T	A/C	220	I *		* MSSR
RIBEIRÃO PRETO	T	60	I	T	A/C	220	I *		* MSSR
RIO BRANCO	E	180	I	E	A/C	220	I *		* MSSR
RIO DE JANEIRO 2	T	60	P	T	A/C	220	I *		* MSSR
SALVADOR	E	180	I	E	A/C	220	I *		* MSSR
SALVADOR	T	60	I	T	A/C	220	I *		* MSSR
SANTA CRUZ	T	60	I	T	A/C	220	I *		* MSSR

State (Territory)/Location Estado (Territorio)/Ubicación	PSR			SSR				Remarks	
	Function Función	Coverage Cobertura (NM)	Status of impl./ Estado de impl.	Function Función	Modes Modos (A,C& S)	Coverage Cobertura (NM)	Status of impl. /Estado de impl.	Type Tipo	Remarks/ Observaciones
SANTA MARIA	T	60	I	T	A/C	220	I *		* MSSR
SANTA TERESA	E	180	I	E	A/C	220	I *		* MSSR
SANTARÉM	E	180	I	E	A/C	220	I *		* MSSR
SANTIAGO	E	180	I	E	A/C	220	I *		* MSSR
SÃO FÉLIX DO ARAGUAIA			NI	E	A/C	220	I *		* MSSR
SÃO FÉLIX DO XINGU			NI	E	A/C	220	I *		* MSSR
SÃO GABRIEL DA CACHOEIRA	E	180	I	E	A/C	220	I *		* MSSR
SÃO JOSÉ DOS CAMPOS	T	60	I	T	A/C	220	I *		* MSSR
SÃO LUÍZ	E	180	I	E	A/C	220	I *		* MSSR
São Pedro da Aldeia	T	60	I	T	A/C	220-	I *		* MSSR
SÃO ROQUE	E	180	I	E	A/C	220	I *		* MSSR
SINOP	E	180	I	E	A/C	220	I *		* MSSR
TABATINGA	E	180	I	E	A/C	220	I *		* MSSR
TANABI	E	180	I	E	A/C	220	I *		* MSSR
TEFÉ	E	180	I	E	A/C	220	I *		* MSSR
TERESINA	E	180	P	E	A/C	220	P *		* MSSR
TIRIÓS			NI	E	A/C	220	I *		* MSSR
TRÊS MARIAS	E	180	I	E	A/C	220	I *		* MSSR
VILHENA	E	180	I	E	A/C	220	I *		* MSSR

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ANNEX F / ANNEX F

IMPLEMENTATION AND REPLACEMENT OF TELEPHONE SWITCHES / IMPLANTACIONES Y SUSTITUCIONES DE CENTRALES TELEFONICAS

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
SUSTITUIR CENTRAL TELEFÔNICA	PORTO SEGURO								
	MACEIÓ								
	CONFINS								
	F. DE NORONHA								
	B. J. DA LAPA								
	PETROLINA								
	SALVADOR								
	MACEIÓ								
	NATAL								
	PETROLINA								
	PORTO SEGURO								
SUSTITUIR CENTRAL TELEFÔNICA	SALVADOR								
	BRASÍLIA								
	RECIFE								
	GALEÃO								
	RECIFE								
	SÃO PAULO								
	SÃO PAULO								
	GALEÃO								
	RIO DE JANEIRO								
	CANOAS								
	BELÉM								

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
SUSTITUIR CENTRAL TELEFÔNICA	BELÉM								
	MANAUS								
	MANAUS								
	RIO DE JANEIRO								
	SÃO PAULO								
	GALEÃO								
	GALEÃO								
	RIO DE JANEIRO								
	S. J. DOS CAMPOS								
	VILA HELENA								
	AFONSOS								
SUSTITUIR CENTRAL TELEFÔNICA	SÃO PAULO								
	GALEÃO								
	GALEÃO								
	S. J. DOS CAMPOS								
	GUARATINGUETÁ								
	PIRASSUNUNGA								
	CANOAS								
	BARBACENA								
	DIVERSAS AFONSOS								
	GALEÃO SANTA CRUZ								
SUSTITUIR CENTRAL TELEFÔNICA	B. DO GARÇAS								
	CUIABÁ								
	CANGUÇÚ								
	CATANDUVAS								
	FOZ DO IGUAÇÚ								
	ANÁPOLIS								
	FLORIANÓPOLIS								
	BOA VISTA								
	ALCÂNTARA								

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
SUSTITUIR CENTRAL TELEFÔNICA	LAGOA SANTA								
	CAMPO GRANDE								
	BELO HORIZONTE								
	BRASÍLIA								
	CURITIBA								
	CACHIMBO								
	BRASÍLIA								
	FLORIANÓPOLIS								
	CHAPADA DOS GUIMARÃES								
	MORRO DA IGREJA								
	SANTA MARIA								
	SANTIAGO								

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
SUSTITUIR CENTRAL TELEFÔNICA	PORTO ALEGRE								
	CAMPO GRANDE								
	CURITIBA								
	GALEÃO								
	CACHIMBO								
	PIEDADE								
	EDUARDO GOMES								
	JACAREACANGA								
	S. F. DO ARAGUAIA								
	GALEÃO								
	SANTA CRUZ								
	TEFÉ								
	TIRIÓS								

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
SUSTITUIR CENTRAL TELEFÔNICA	RECIFE								
	CONFINS								
	F. DE NORONHA								
	FORTALEZA								
	B. J. DA LAPA								

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ANNEX G / ANNEX G

CONVENTIONAL SERVICES – VHF STATIONS / SERVICIOS CONVENCIONALES - ESTACIONES VHF

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
IMPLANTAR ESTACIONES VHF	NAVEGANTES								
	SANTA MARIA								
	PORTO VELHO								
	SORRISO								
	COXIM								
	GUARAPUAVA								
	PORTO MURTINHO								
	PORTO PRIMAVERA								
	S. FRANCISCO DO SUL								
	TRÊS LAGOAS								
SUSTITUIR ESTACIONES VHF	CUIABÁ								
	ANÁPOLIS								
	PONTA PORÂ								
	CANOAS								
	PASSO FUNDO								
	OIAPOQUE								

ANNEX H / ANNEX H

IMPLEMENTATION OF BROADCASTING SERVICES / IMPLANTACIONES DE SERVICIOS DE RADIODIFUSION

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
IMPLANTAR D-VOLMET	RECIFE								
	BRASÍLIA								
	EDUARDO GOMES								
	CURITIBA								
IMPLANTAR D-ATIS	GALEÃO								
	SÃO PAULO								
	SALVADOR								
	CONFINS								
	RECIFE								
	CONGONHAS								
	RIO DE JANEIRO								
	VITÓRIA								
	CURITIBA								
	PORTO ALEGRE								
	FORTALEZA								
	BELO HORIZONTE								
	CAMPINAS								
	EDUARDO GOMES								
	CAMPO GRANDE								
	CUIABÁ								
	FOZ DO IGUAÇÚ								
	BELÉM								

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
SUSTITUIR VOR/DME POR DVOR/DME	BELÉM								
	BOA VISTA								
	FOZ DO IGUAÇÚ								
	ANÁPOLIS								
	CONFINS								
	RECIFE								
	SÃO PAULO								
	CAXIAS								
	F. DE NORONHA								
	S. J. DOS CAMPOS								
	CUIABÁ								
	CAMPO GRANDE								
	SÃO LUÍS								
	TRÊS MARIAS								
	BRAGANÇA PAULISTA								
	CAMPINAS								
	SERRA MAR								
	SOROCABA								
IMPLANTAR DVOR/DME	S. G. DA CACHOEIRA								
	GALEÃO								
	ALCÂNTARA								

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ANNEX I / ANNEX I

IMPLEMENTATION AND REPLACEMENT OF NAVIGATION AID SYSTEMS /
IMPLANTACIONES Y SUSTITUCIONES DE SISTEMAS DE AYUDA A NAVEGACION

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
IMPLANTAR ILS CAT I	UBERLÂNDIA								
	VITÓRIA								
	CONFINS								
	CACHIMBO								
SUSTITUIR ILS CAT I	RECIFE								
	CAMPO GRANDE								
	FLORIANÓPOLIS								
	BELÉM								
	JOINVILLE								
	LONDRINA								
IMPLANTAR ILS CAT II	EDUARDO GOMES								
	FOZ DO IGUAÇÚ								
IMPLANTAR ILS CAT III	GALEÃO								
IMPLANTAR GBAS	GALEÃO								

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ANNEX J / ANNEX J

IMPLEMENATION AND REPLACEMENT OF SURVEILLANCE SYSTEMS / IMPLANTACIONES Y SUSTITUCIONES DE SISTEMAS DE VIGILANCIA

PROYECTO / ACTIVIDAD	LOCALIDAD	2011	2012	2013	2014	2015	2016	2017	2018
IMPLANTAR ADS-B EN EL ESPACIO AÉREO BRASILEÑO	DIVERSAS								
IMPLANTAR RADAR SSR - VIGILÂNCIA EN RUTA	BARCELOS								
	PICO DO COUTO								
	LONDRINA								
IMPLANTAR RADAR PSR+SSR - VIGILÂNCIA EN TMA	NAVEGANTES								
IMPLANTAR RADAR PSR+SSR - VIGILÂNCIA EN RUTA	PALMAS								
	TERESINA								
	CORUMBÁ								
	UMUARAMA								
	CHAPECÓ								
IMPLANTAR SISTEMA DE MULTILATERACIÓN DE GRAN ÁREA (WAM)	VITÓRIA								
SUSTITUIR RADAR EXISTENTE POR PSR+SSR - VIGILÂNCIA EN RUTA	SINOP								
	TEFÉ								
	CHAPADA DOS GUIMARÃES								
	SANTA TEREZA								
	TANABÍ								
	TRÊS MARIAS								
	CANGUÇÚ								
	CATANDUVAS								
	GAMA								
	JARAGUARI								
	SANTIAGO								