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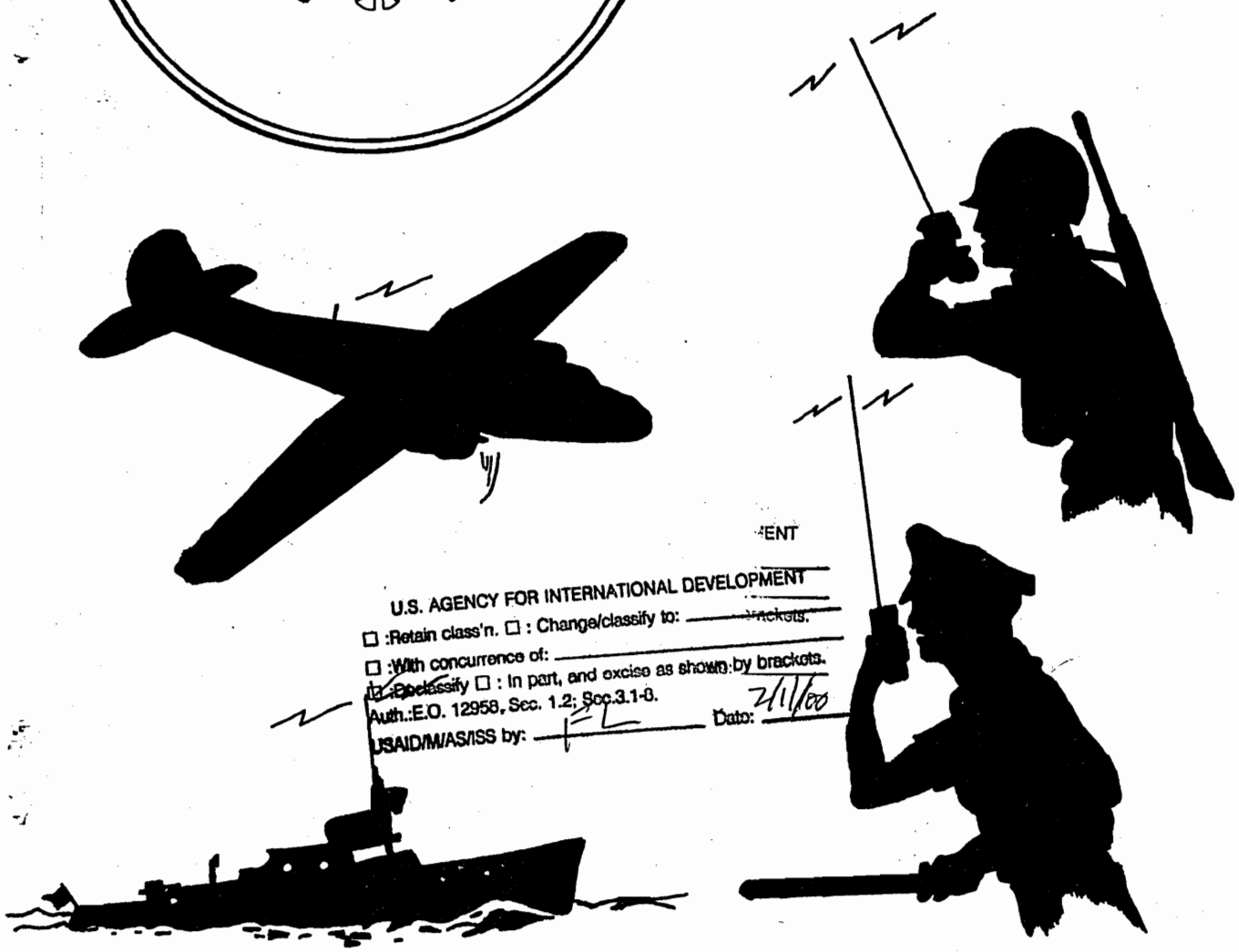
LA REPUBLICA DE BOLIVIA

INTERNAL SECURITY FORCES

BOLIVIA

COMMUNICATION STUDY



UNITED STATES SOUTHERN COMMAND
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DEPARTMENT OF DEFENSE
UNITED STATES SOUTHERN COMMAND
APO NEW YORK 09826

13 FEB 1968

SC(G)

SUBJECT: Letter of Promulgation

TO: See Distribution

1. The accompanying USSOUTHCOM "Bolivia Internal Security Forces Communications Study" is transmitted for use in planning the security communications system in Bolivia. The study includes official information developed by extensive studies and field observations in collaboration with officials of the Government of Bolivia. Therefore, the study is classified CONFIDENTIAL Special Handling Required, Not Releasable to Nationals other than of the United States and Bolivia.

2. COMUSMILGP Bolivia is requested to update this study by submitting appropriate change information and recommendations prior to the annual Military Assistance Program review, beginning with February 1969.

FOR THE COMMANDER IN CHIEF:

THOMAS D. COX
Major, USA
Assistant Secretary Joint Staff

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as

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USSOUTHCOM COMMUNICATIONS STUDY

BOLIVIA

FOREWORD (FOUO)

1. Representatives of the United States Southern Command and the Office of Public Safety, Agency for International Development (OPS/AID) visited Bolivia during September 1967 to conduct a survey of internal security forces' communications. This resulting report reflects extensive studies and field observations of the principal internal security forces of Bolivia, plus discussions with their officers and men and with various governmental officials, military and security force personnel, and representatives of the United States Embassy, the United States Military Group (USMILGP), and the USAID Mission in Bolivia. The study is for the official use of the governments concerned in determining action required for improved coordinated communications programs of the Government of Bolivia, the USMILGP, and USAID Bolivia.

2. This report identifies certain deficiencies of communications systems of the armed force and other internal security forces of Bolivia and it proposes recommendations for corrective action and subsequent coordinated development. It is not intended to be critical of any person or group; while existing internal security communications are far from optimum in their capabilities, it must be recognized that they do reflect considerable effort and ingenuity by Bolivian Government officials concerned to provide essential communications in support of their missions.

3. The open identification of communications problems and frank discussions of ideas for improvement on the part of officials of the Bolivian Government substantially assisted the work of the joint team. The study reflects many deficiencies which Bolivian authorities recognized beforehand, and it incorporates a number of corrective courses of action already initiated by the Bolivian Government.

4. The excellent cooperation accorded by responsible personnel at all levels--both United States and host country representatives--not only facilitated completion of this communications study but permitted realistic inspection of communications facilities in operation. The survey team is particularly appreciative to the Commander and to the Deputy Commander of Telecommunications for the Bolivian Army, LTC Manuel J. Chavez La Serna and Major Jose Montero, for furnishing much needed information and for accompanying the team on many occasions.

5. Detailed recommendations concerning Bolivian security forces which operate under the direction of the Ministry of Government (National Guard of Public Security, the National Traffic Police, the National Department of Criminal Investigation (DNIC), and the National Customs Service) will be covered in a separate report to be published at a later date by OPS/AID.

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GLOSSARY (U)

AASANA	Civil Aviation Communications (Administracion de Aerodromos y Servicios Auxiliares a la Navegacion Aerea).
AM	Amplitude modulated.
CINC	Commander in Chief.
Colegio Militar de Aviacion	Officers training school.
C-E	Communications-Electronics.
CW	Continuous wave.
DNIC	Bolivian National Department of Criminal Investigation.
ENTEL	Commercial communication system Bolivia (Empresa Nacional de Telecomunicaciones).
Escuela de Clases	Bolivian NCO academy.
Estado Mayor General	General Staff.
FAB	Bolivian Air Force (Fuerza Aerea Boliviana).
FM	Frequency modulated.
GAC	Fighter group (Grupo Aereo Combate Boliviano).
GAM	Maintenance group (Grupo Aereo de Mantenimiento).
GWOA	Guerrilla Warfare Operating Area.

ICAO	International Civil Aeronautical Organization.
JCC	Joint Communications Center.
JOC	Joint Operations Center.
LAB	Lloyd Aereo Boliviano (commercial airlines).
Mission Equipment	Key equipment which is necessary or vital for accomplishing the mission or objective of the particular organization.
MOD	Minister of Defense.
MTT	U.S. military training team.
NCS	Net control station.
OPS/AID	Office of Public Safety/U.S. Agency for International Development.
PMA	NCO technical school (Politecnico Militar de Aeronautica).
PSU	Presidential security unit.
RATT	Radio teletype.
SSB	Single sideband.
TAT	Technical assistance team.
Transmisiones y Enlaces	Signal Command of Bolivian Army.
TAM	Military air transport group (Grupo Militar de Transporte Aereo).
TTY	Teletype.
USAID	U.S. Agency for International Development.

USMILGP----------U.S. Military Group Bolivia.

VHF----------Very high frequency (30-300 MHz).

SUMMARY - (FOUO)

1. General. The Bolivian military security forces consist of approximately 22,000 personnel. The Army, Navy, and Air Force provide security for a total population of about four million people and are commanded by a single Commander in Chief who reports directly to the President. The administration of the forces is accomplished by the Ministry of Defense. Each force maintains an individual communication system. The Army Signal Command (Comando de Transmisiones y Enlaces) provides service to the staff of the Commander in Chief and long-haul service to the Navy. The individual force nets are composed primarily of radios with little or no effective long-haul land-lines.

2. Observations. Although communications personnel appear highly motivated, deficiencies were noted in the interdependent areas of management, equipment, maintenance, and training. Effective management cannot be realized without personnel trained to a sufficient degree of expertise and knowledgeable in the fields of equipment, maintenance and training; nor can maintenance achieve maximum equipment availability without management and training support. Specific areas of deficiencies observed are identified below.

a. Management. Lacking a unified communications organization, there is inadequate overall control and direction of national communications resources. Management deficiencies impact in other vital areas by failing to obtain adequate budgets to support equipment updating, maintenance requirements and personnel training. There is insufficient coordinated planning to provide and maintain means to meet recognized requirements. Unified policies do not exist for the use of commercial facilities; procurement of spare parts and supplies; interservice alternate routing of traffic; technical direction to insure timely and reliable processing of traffic among services.

b. Equipment. Bolivian services have succeeded in keeping many 15 to 25 year old radios in operation. However,

newer equipment is of questionable operational effectiveness through lack of adequate maintenance. Troops and aircraft when committed to security operations are not adequately supported in numbers and interface of radios. In the case of ground forces, there is a considerable lack of auxiliary power sources. In nets serving higher headquarters, major bases, and departmental capitals, there are sufficient radio units; however, fragmentation into separate service nets serve to hinder efficient communications.

c. Maintenance. Proper maintenance of older model and new equipment is generally precluded by lack of responsive repair parts procurement, trained technicians, interservice support and adequate test equipment. Lack of a sound maintenance organization either unified or within individual services prevents overall maintenance efficiency.

d. Training. The three services have less than 200 communications specialists in communication operations, maintenance and techniques. This small base of personnel prevents the staffing of a management, maintenance, and training organization necessary to realize full utilization of existing or future resources. The benefits of modern sophisticated systems, such as mobile radio teletype, cannot be realized without the technical competence to support such systems.

3. Recommendations. The recommendations indicated below are generally broad in scope with the objective of providing the rational not only for short term correction of deficiencies; but also to present concepts for improvement in the long term. Specific recommendations may be found in individual sections of the analysis.

a. Management

(1) Organize military communication management on a unified basis under a single head with authority subordinate to the Commander in Chief but capable of coordinating overall military requirements with the various Ministries of Government.

(2) Organize and staff communications management within each service to be responsive to the needs of the service and the guidance of higher authority.

(3) Promote command attention at all levels to material readiness, interservice cooperation, operational reliability, and budgetary support required for system effectiveness.

(4) Continue Army support of Navy long-haul communications requirements until the establishment of a joint communications system. When established, provide naval long-haul requirements through the joint system.

(5) Increase the effectiveness of national frequency management through effective control of frequency assignment, transmission practices and provision of discipline measures. The dependence on radios for most in-country communications dictates the mutual support of frequency management by military as well as civil users of the frequency spectrum.

(6) Implement the communications recommendations contained in the Bolivian Air Force Modernization Study.

b. Equipment

(1) Increase the communications capabilities of forces committed to counter-guerrilla operations. Ensure the availability to engaged forces of the best equipment, personnel and support services present in-country regardless of service.

(2) Position portable VHF/AM radios with forces operating in guerrilla areas to ensure air-ground communications.

(3) Install Bolivian owned radio equipment in all river craft to provide tactical communications in order to ensure mutual support between river craft and forces ashore.

(4) Reduce dependence by troops in the field on vehicular mounted radios where material failure of the vehicle or unfavorable terrain may cause loss of the vehicle and thus loss of communications.

c. Maintenance

(1) Co-locate central maintenance facilities of the Army and Air Force on the Altiplano in order to promote

mutual assistance and coordination in management, technical and training problems.

(2) Institute planning for eventual consolidation of all maintenance functions in order to increase the efficiency of maintenance administration with respect to budgetary and resource allocation problems.

(3) Institute a system to permit the immediate and rapid interchange of repair parts information between services. Encourage interchange of parts between services to ensure accomplishment of the highest priority requirements.

d. Training

(1) Develop training programs with the objective to ensure an adequate number of trained personnel to staff communications management, maintenance, and operational organizations. Select personnel for basic training with the potential and motivation to achieve a high level of technical competence and a desire to accept increasing responsibilities.

(2) Conduct English language training for technicians in or out of country as feasible.

SECTION I - ARMY

A. (C) MISSION. The primary mission of the Army is to defend the country, maintain internal security and perform activities of benefit to the national economy (civic action).

B. (C) ORGANIZATION (Figure 1)

1. Command

(a) The President of Bolivia is the supreme commander (Captain General) and as such presides over a Supreme Council of National Defense. The Commander in Chief of the Armed Forces and the Commanders of the Army, Navy and Air Force are appointed by the President.

(b) The Commander in Chief of the Armed Forces exercises direct control of the General Staff Security Detachment (4th Cavalry Regiment) and all other elements through the commanding generals of the services with the exception of the Presidential Escort (1st Infantry Regiment) which is directly subordinate to the President.

(c) The Minister of Defense does not become involved in operation and control matters but handles the administrative affairs of the Army, Navy and Air Force.

2. Major subordinate units directly subordinate to the Commander of the Army (Figure 2):

(a) Ten divisions (includes regiments of infantry, cavalry, and artillery).

(b) A motorized infantry regiment.

(c) The Engineer Command (4 battalions).

(d) A transportation company.

(e) A maintenance company.

C. (FOUO) PERSONNEL. As of September 1967, the Army strength was reported as being 18,353 with the armed forces total strength at 22,318. The 1967 armed forces budget was estimated to support only 11,300. About 25 per cent of the Army's operating elements are in the La Paz area; the remainder are widely deployed throughout the rest of the country.

D. (FOUO) COMMUNICATIONS SYSTEMS

1. Country-wide

(a) Observations

(1) The Army has two country-wide radio networks in Bolivia (Circuit A and Circuit B). The Army High Command Net (Circuit A - Figure 3) connects La Paz (NCS) with the ten divisional headquarters plus four engineer battalions. This circuit handles 70 per cent of all traffic (Figure 4) and each station has a specific time for operations (Figure 5). The radio equipment at all but one location is the Westrex 7000 transceiver, 9002 linear amplifier and the Collins 312B4 control unit (Figure 6). These radios are the four crystal controlled channel types with the added capability of selecting either upper or lower sideband, voice or CW. The engineer battalions will utilize one channel for entry into the High Command Net and the second channel for their own use. The High Command Net is broken down into six Army divisional nets as indicated in Figure 7. At the present time, Rio Colorado is temporarily assigned to the 10th Division net. One divisional net uses Collins S-line equipment and the others are using a mixture of miscellaneous AM/CW radios. A new Army divisional net is to be organized on the receipt of the Collins S-line radios, consisting of Oruru (NCS), Charana, Curahaura, Challapata, and Rio Colorado (Figure 8). AN/GRC-9 radios were recently brought into the country and are being used by the troops fighting the guerrillas in the southeast part of Bolivia.

(2) The second military net (Circuit B) is the Military Regional Network as shown in Figure 9. The radio equipment in this net is mostly the RCA AR-88 receivers, ET-4336 CW transmitters or the Collins 32V2 and operates on a specific time schedule (Figure 10).

(3) Operating positions of Circuit A and B at the Estado Mayor in La Paz are shown in Figure 11.

(4) The Army Signal Command (Comando de Transmisiones y Enlaces) provides communications to the staff of the Commander in Chief, the Army and the Navy. The communications equipment presently in use ranges in age from 15-25 year old AM/CW types to new Collins S-line equipment. The present Army Signal Command strength is 174 persons total, consisting of 28 officers, 130 NCOs and 16 civilians. The Army Signal Command is unable to properly maintain the existing radios due to lack of trained technicians, a low budget (approximately $1600 per year) for repair parts and a lack of proper test equipment and hand tools, and too many different types of radios, which complicates the supply problem. There is no unified communication organization at the national level to obtain adequate budget support and effective utilization of resources. There are insufficient operators, technicians and radios to provide communications to the various units below the division level. As an example, the 7th Division at Cochabamba has no radio communications to any units outside Cochabamba and must rely on commercial telephone and telegraph where and when available. There is no unity among the services in message handling procedures and lack of technical direction to insure timely and reliable processing with no inter-service coordination for alternate routing.

(b) Areas for Improvement. The most important improvement that could be accomplished would be the organization of communications on a unified basis at the governmental level, with the appointment of a single Chief of Communications of the armed forces, followed by the organization of a signal battalion and signal schools. The Chief of Communications should be technical advisor to both the Commander in Chief and the Minister of Defense, have the power to review and defend the communications-electronic budget of the armed forces, and provide for standardization of procedures.

(c) Recommendations

(1) That, in order to alleviate the crowded situation of Circuit A containing too many stations, this

circuit be broken into two distinct nets. (Figures 12 and 13). One Westrex set for use as NCS of second net could be reclaimed from one of the outstations (perhaps Caranavi) and a Collins S-line set provided the outstation. The nets could be formed on a geographical basis. This is just a proposed method of organization into two separate nets and other methods may prove more successful. This reorganization plus use of a message precedence system should eliminate any need for time sharing; all stations can remain in the net for the full period with the exception of time required to divert equipment for operation in their divisional net. All stations in both nets should have the installed capability (crystals and antennas) to check into the opposite net as required. NOTE: If Collins S-line equipment is to be used, frequencies other than 5276.5 and 5300 kHz must be employed because of the 5.0 - 6.5 MHz blind spot in the Collins equipment frequency coverage. Dual-net capability has the further advantage that if radio teleprinter operation is considered feasible and can be provided by host country at some future date, the printer-equipped stations can check into one net while the SSB/CW stations can check into the other, thus permitting a smooth transition into printer operation. One of the Westrex transceivers at Estado Mayor could be provided with keyer, converter, and printers to provide economical phase-in of RATT. NOTE: Use of RATT cannot be considered as a security improvement.

(2) That the introduction of radio teletype should be considered only after the organization of the Signal Battalion and the Communication School at La Paz gains the capacity to teach TTY.

(3) That message centers retain copies of all traffic for at least six months.

(4) That a record copy be delivered to the addressee in addition to a telephone call.

2. Tactical

(a) Observations

(1) Most tactical radio communications are being performed in the guerrilla warfare operating area (GWOA) which the team members were not permitted to visit (Figure 7).

(2) Only the 10th divisional area has modern equipment (Collins S-line) and the remaining areas, fortunate enough to possess any organic radio communications, employ a mixture of obsolete AM/CW equipment.

(3) In the 4th divisional area, AN/GRC-9 equipment with hand-crank generators has been pressed into service to support the anti-guerrilla forces. These sets have not been satisfactory for several reasons--difficulty of tuning and problems associated with the generators are the major complaints but weight and bulk also limit tactical utility.

(4) Vehicular FM tactical radio sets are seldom used, except in urban areas, due to the lack of roads throughout the country and the scarcity of gasoline, yet continue to be programmed under MAP.

(b) Areas for Improvement

(1) The most pressing equipment requirement is for battery-powered manpack long-range equipment for employment in patrol operations. This need will be met by the Stoner radios due for delivery in-country during FY-68.

(2) Additional requirements include installation of the nets in the 2nd, 7th, and 9th divisional areas. NCS of these nets should be the existing divisional stations. The Westrex equipment could utilize one channel for the divisional net and another for the Army High Command Net. Prearranged schedules would be required for this type of operation but this follows current practice. See Figures 5 and 10 (present schedule). After GWOA requirements are met, the divisional nets can be established with the remaining Stoner radios.

(3) An improvement can be made in the radiated signal of all portable and fixed stations by using properly designed antennas.

(c) Recommendations

(1) That one channel of each SSB radio in-country should be common to permit maximum flexibility. This channel would be known as an "emergency frequency channel" for passing emergency traffic during non-scheduled periods.

(2) That ultimately all existing AM/CW radio equipment be replaced by SSB radio equipment.

(3) That every fixed station should use a multiband dipole antenna, carefully cut to frequency(ies) and positioned as high as possible.

(4) That every portable HF set should have a portable half-wave antenna cut for its normal operating frequency for greater reliability of communications. Whip antennas should be used only when radios are operated while in motion.

(5) That vehicular FM sets such as AN/VRC-18 should be deleted from future programming. AN/VRC-( ) equipment appearing in approved programs should be deviated, if possible, to provide more funds for long-range SSB equipment and air-ground sets. All existing AN/VRC-( ) sets should be redistributed to urban areas or engineer construction sites where vehicles and gasoline are available.

3. Joint Scene of Action

(a) There has been virtually no ground-air communication. Attempts have been made, with extremely limited success, to install AN/PRC-10 equipment in FAB aircraft in order to communicate with similarly equipped ground forces.

(b) The four Skycrafter SKY-515 VHF/AM portable transceivers sent into country specifically to provide this communication have not been employed as intended; FAB holds the equipment and states that the trained forward air controllers are available to accompany ground forces. If VHF/AM is determined to be the desired mode for ground-to-air communications (see recommendation in Section III, paragraph E2(b)(2)), then recommend that two or three Army personnel be trained (MTT) in ground-to-air communications, utilizing the existing four SKY-515 radios. These individuals would then act as instructors for all radio operators trained in the Army communications school in tactical communications. Additional SKY-515 radios would then be required for each company in the proposed Signal Battalion. Frequent joint Army-Air Force exercise should be conducted to maintain proficiency in ground-to-air communications.

(c) Until the manpack single sideband radios are available, patrols will continue to suffer from a deficiency of communications. Current equipment consists of AN/GRC-9 and the portable short range FM sets.

4. Operation and Maintenance

(a) Observations (signal structure)

(1) Present strength is 174--28 officers, 130 NCOs and 16 civilians.

(2) Recruiting. No conscriptos are employed within the communication services of the Bolivian Army, only professionals are accepted.

(3) Authority and responsibility seem to be ill defined. It is difficult to determine who has the specific responsibility for a given task.

(4) Maintenance skills. The Director of Transmisiones y Enlaces states that he has about 56 electronic repairmen in the Army, of which 30 can be considered "good." In reality, the results obtained from these maintenance people are limited.

a Westrex equipment apparently remains a mystery to them even though it has been installed for approximately three years. A report originated by maintenance contract personnel dated 23 August 1966 states that five supervisors and 18 maintenance personnel have received training, including use of oscilloscope and troubleshooting equipment and have mastered what they have been taught to date. He further states that more training is required to complete the SSB portion of the instruction and more practical training on repairing Westrex equipment. Even though his class was stripped to provide communications for the GWOA, most of these trainees should still be available within Bolivian Army resources.

b The Army possesses insufficient test equipment to support the various field and depot level shops it maintains.

c Repair parts are not available for many jobs. The limited budget prohibits purchase of even inexpensive items. MAP support is not sufficiently flexible to assist in this area.

d Maintenance techniques and facilities are inadequate. The depot shop at the Centro requires the following test equipment: one additional oscilloscope (Tektronic 535 or AN/USM-81), several portable multimeters similar to AN/PSM-6 or TS-352/U and a transistor tester.

(b) Recommendations

(1) That the three students presently being trained on the Westrex radios be provided accelerated training on this equipment. Upon completion of the training, these soldiers should be permitted to maintain all Westrex equipment for a few months and, upon gaining this experience, should be assigned to instruct additional persons in maintenance of this key equipment.

(2) That maintenance control, materiel control and quality control functions be thoroughly investigated and meaningful procedures instituted. Some of the specific areas where effective management will prove beneficial are listed below.

a Maintenance Control

1 Compile a list of all assigned equipment by type and serial number.

2 Compile a list of all defective equipment by type, serial number, and if known, the specific part or work required.

3 Decide which equipment should continue to be carried as mission equipment.

4 Remove all remaining equipment from the active list.

5 Use this removed equipment as a future source of spare parts.

6 The best qualified maintenance technician should prepare a guide for use by operators to perform first-echelon maintenance on their equipment.

7 Assure that operators actually follow this guide.

8 The best qualified maintenance technician should prepare guides for performance testing and inspection of all assigned mission equipment by maintenance personnel.

9 Assure that maintenance personnel follow the guides.

10 Assure that maintenance personnel have access to necessary technical data. If this technical information is not on hand, order it through the MILGP.

b Materiel Control

1 Coordinate with maintenance control to order the parts necessary to repair the designated mission equipment, maintain a status board showing all defective end items and status of parts and/or work needed to restore the equipment to operation.

2 Assume control of all defective equipment not designated by maintenance control as "mission equipment."

3 Limit cannibalization actions on mission equipment; assure that when a part is cannibalized from mission equipment that a replacement part is ordered immediately and the status board so annotated.

4 Permit cannibalization from non-mission equipment to restore mission equipment to service. This should be done in coordination with maintenance control personnel. Record parts in order to provide input to a "demand system" of spare parts control.

5 Followup frequently (perhaps once weekly) on parts that have been ordered to restore mission equipment to service. Keep a written record of these followups to document complaints about the poor supply service (both of the military assistance program and government owned supply service). Only with such documentation can the system(s) be improved.

6 Designate an individual to check with all other government agencies on the availability of each part that is required to restore mission equipment to service. (Air Force, Navy, Police, and AASANA).

7 All extra equipment should be held under the direct control of the materiel control function to prevent its diversion to use not authorized by the Director, Transmisiones y Enlaces.

c Quality Control

1 Appoint one or more of the best qualified technicians to inspect equipment prior to its return to service. This person should be subordinate only to the Chief of the Maintenance Facility. This inspector should also inspect all installed communications facilities periodically for compliance with technical directives and safety standards (both to be developed by the quality control function).

2 The inspector or an assistant should periodically inspect test equipment for operation, and, insofar as possible, calibration.

3 A periodic inspection of hand tools should be conducted to determine the condition and adequacy.

4 Maintain a technical data library containing information on all assigned mission equipment, test equipment, and basic electronic data.

5 Provide technical assistance to maintenance personnel on such subjects as troubleshooting techniques, parts substitution suggestions, installation problems, and difficult repair jobs.

6 Maintain a list of all modifications performed on all equipment within the inventory by serial number of equipment.

5. Training

(a) Observations

(1) All Army signal training presently is conducted at the Escuela de Clases (NCO Academy) at Cochabamba. The school commandant is directly subordinate to the Commander, 7th Division for discipline and support, and responsible to Direccion de los Institutes Militares for curriculum.

(2) Only individuals willing to serve for extended periods are accepted for NCO training. All enlisted communications people are in this category. The students incur an obligated tour upon graduation equal to their period of training.

(3) Electronic-oriented training normally requires three years of school--most of this time is spent in learning other military subject--only 200-400 hours is devoted to electronic training. Approximately 90 electronic operations and maintenance students are in residence at the school, implying graduation of about 30 per year.

(4) Everyone concerned with the students--School Commandant, Director of Training, the instructors, and the ultimate user (Transmisiones)--agree that the electronic training is deficient.

(5) Two salient facts concerning the school are apparent--the enthusiasm and desire evidenced by the instructors and their supervisors to improve the quality of the graduates, and the lack of equipment and training aids available to the school.

(6) All test equipment (Heathkit) possessed by the school was reported to be inoperative. The four RCA circuit trainers were missing small parts and were not usable. No end items of equipment currently employed by the Army were on hand (AR-88, ET-4336, Collins S-line, Westrex 32V2, etc.) except for VHF/FM sets. No SSB training of any sort is conducted. The school lacks technical data (schematics, theory of operation, operating manuals on this equipment). Only minimal antenna training is given. No practical experience whatsoever is given students until they actually report to their unit of assignment. The school has only an antiquated reproducing machine. They attempt to provide graduates with handout material covering the entire course when they depart, but the reproduction facilities are not capable of keeping up with the

demand. Some of the instructors are graduates of the Canal Zone School of the Americas electronic training. One of these instructors (E-7 equivalent) stated that the level of theoretical training was equal to that provided at the Canal Zone course. From a technical view point, this individual seemed well qualified; further, he demonstrated his familiarity with the shortcomings of the school.

(b) Areas for Improvement

(1) Since the Escuela de Clases, through no fault of its own, has not been able to provide well qualified technicians, the LACE team concurs with the proposal by the Director of Transmisiones y Enlaces to form a new school to conduct electronic training for the Army, Navy and Air Force at La Paz in lieu of that currently provided at the Escuela de Clases.

(2) At the newly formed maintenance course, recommend stress be placed on maintenance of all end items of equipment commonly employed in the Army and common items used by the Air Force and Navy. Familiarity with common equipment of all the services will permit the Army to assist its sister services in maintenance of outlying locations and reduce the requirement for FAB electronic maintenance manning at the remote sites.

(3) Throughout the entire course, stress should be placed on the need for frequent performance checks of assigned mission equipment, use of substitute repair parts where necessary to return equipment to service, antenna construction and placement, relative efficiency of loaded whip antennas versus full-size antennas.

(4) A few students from FAB and the Navy should be permitted to attend each course.

(5) If possible, the new school should reclaim the defective Heathkit test equipment from the Escuela de Clases, repair it (FAB has two technicians who are experts on this test equipment), and use it in the new course.

(6) The better students should be given an additional short course of instruction in theory and maintenance of electronic test equipment. These students can then be used as the nucleus of a new function--a test equipment repair facility.

(a) Recommendations

(1) That the new school to conduct electronic training for the Army, Navy and Air Force at La Paz be formed.

(2) That stress be placed on maintenance of all end items of equipment commonly employed in the Army and common items used by the Air Force and Navy.

(3) That stress be placed on the need for frequent performance checks of assigned mission equipment.

(4) That a few students from FAB and Navy be permitted to attend the maintenance course.

(5) That the new school reclaim the defective Heathkit test equipment, repair it and use it in the new course.

(6) That electronic instructors presently at Escuela de Clases be transferred to La Paz for duty at the new school.

(7) That better students be given an additional short course in theory and maintenance of electronic test equipment.

E. (FOUO) REORGANIZATION OF ARMY SIGNAL CORPS

1. The Director of Transmisiones y Enlaces presented his plans for reorganization of the Army communication activity to the LACE team. Figure 14 depicts the intended reorganization. The traditional four sections will, among other duties, perform specific functions as follows:

(a) Section I -- Classification, screening, and selection of candidates for training.

(b) Section II -- Cryptographic support to the Army; monitors foreign military communications; conducts direct liaison with other Bolivian intelligence agencies.

(c) Section III -- Operate schools; generate requirements; fulfill all operational tasks.

(d) Section IV -- Acquires, distributes and maintains equipment.

2. Each of the companies (other than the headquarters) is responsible for supporting communications requirements of its assigned divisional areas. Each company will consist of one platoon for each divisional area serviced. Each platoon is to be formed of four sections--one to handle telephone communications, another to operate and maintain Collins S-line equipment, a third to provide support for the Stoner SSB-20M (or PMC-12) and a fourth to communicate with AN/GRC-26 or AN/GRC-46 radio teleprinter.

3. The Army has authorized the Director of Transmisiones to commence recruiting personnel for the signal effort after January 1968.

4. Approximately 30 trained NCOs and several officers will be available as cadre to train this greatly expanded communications organization.

5. The LACE team considers the basic reorganization as a far reaching step forward in improving Army and High Command communications subject to the following reservations:

(a) The Military Assistance Program cannot support the introduction of radio teleprinter equipment into Bolivia at present. Top priority must be given to manpack SSB and ground-to-air equipment and to improving quality of maintenance and training.

(b) A maximum of initial training should be accomplished at a central location before the companies actually assume support responsibilities--all Stoner training should given to the entire Stoner maintenance group; all Collins equipment training to the Collins group, etc. but with cross training at a later date. The ground-air maintenance group should be the fourth group in place of the AN/GRC-26/46 group.

(c) Once established, central training should be continued for replacement personnel prior to assignment of their units.

(d) Once trained in their own specialty at the central school, cross training should be accomplished at the unit level. That is, those trained on Stoner equipment should be cross trained on Collins equipment and telephone installation. If teleprinter equipment eventually is employed, the same people can be cross trained to maintain the RATT equipment.

(e) If the Army electronic schooling activity is moved from the Escuela de Clases to La Paz, it should appear within the organization chart, perhaps under a fifth company.

(f) Westrex maintenance is not reflected--the Bolivian Army should develop an organic capability for this equipment with the idea of phasing out the Westrex TAT.

(g) Rather than force the Navy into construction and support of costly shore installations, the Army should provide this service.

(h) As the largest military communications organization in Bolivia, the Army should have the responsibility for operation of a JOC. If Company A is to operate and maintain this installation, the organizational chart should so reflect. Navy and Air Force should also provide needed skills to the JOC in their specialized areas both for planning and operations.

(i) Consideration should be given to use of the proposed FAB measuring equipment repair and calibration section.

(j) Although most of this report has dealt with maintenance, training, and supply as a strictly Army problem, it is equally applicable to the FAB and the Navy. It would, therefore, be most desirable to establish a joint facility to provide cross service information on parts available and arrange for exchange of parts between services.

(k) One further step would greatly assist the Bolivian services in maintenance of their electronic equipment--a small fund made available for local purchase of small repair parts. Some equipment remains inoperative for long periods for lack of inexpensive small parts. These parts are frequently available in Bolivia but no money is available for their procurement. A fund of only $100 per year would be helpful, but $1000 per year would go a long way toward better maintenance and greatly enhanced operational capability.

SECTION II - AIR FORCE

A. (C) INTRODUCTION

1. The need for a more effective air arm has long been recognized by both Bolivia and its military advisors. To this end, a joint Bolivian - U.S. Air Force team produced a study recommending a time-phased improvement program which is well within the anticipated capabilities of the Bolivian Government. The document describing the proposals entitled "A Study for Modernization of the Bolivian Air Force," dated 1 May 1967, has since been approved by responsible members of both governments.

2. The LACE document, which concerns only electronic communications, serves to supplement and update the modernization program and to emphasize the need for implementation of the recommendations contained therein.

B. (C) MISSION. The primary mission of the Air Force (Fuerza Area Boliviana - FAB) is to maintain internal security by application of military air power in order to counter insurgent activity and to effect a viable civic action program of country development.

C. (C) ORGANIZATION. The President of Bolivia is the supreme commander of all the armed forces. As such, he heads the Supreme Council of National Defense and appoints the Commander in Chief of the Armed Forces and the heads of the military components. The organization of the FAB is depicted in Figure 15.

1. The FAB consists of five major operational/training commands, all headquartered at El Alto with the exception of the Colegio Militar de Aviacion, which is located at Santa Cruz.

(a) GAC (Grupo Aereo de Combate) - Fighter Group.

(b) TAM (Grupo Militar de Transporte Aereo) - Transport Group.

(c) GAM (Grupo Aereo de Mantenimiento) - Maintenance Group.

(d) PMA (Politecnico Militar de Aeronautica) - NCO Technical School.

(e) Colegio Militar de Aviacion (Officer Training School).

2. Four air detachments are located at Cochabamba, Tarija, Caranavi, and Riberalta. These units provide dispersal support, an Air Force presence in the areas, and serve as local training centers for conscriptos. Although not specifically tasked, these units are capable of performing airfield maintenance, providing additional links in the country communications and weather reporting system, and aiding civil aviation and other local governmental agencies.

3. The Grupo Aereo de Combate is currently the sole tactical unit of the Bolivian Air Force. When the proposals contained in the Study for Modernization have been fully implemented, TAM and the proposed Liaison and Search and Rescue Squadron will supplement the GAC activities.

4. The aircraft currently included in the inventory are listed below. This is expected to change as the modernization proposals are applied.

(a)	Transports	17	C-47
		1	C-45
(b)	Helicopter	2	H-19
		3	SL-4
(c)	Fighter	7	F-51D
		2	T-28D
(d)	Fighter Trainer	16	T-6
(e)	Trainer	8	T-28A
		9	PT-19
(f)	Utility	10	U-17
		1	Cessna 206

D. (FOUO) PERSONNEL

1. The authorized FAB strength is 1440, but actual strength was 1656 as of September 1967. This figure breaks down to: 265 officers, 414 NOCs (professionals), 864 airmen and 115 civilians.

2. Recruiting of professional airmen and officers is accomplished by annual distribution of a brochure which describes the prerequisites: a medical certification of health, ten (enlisted) or twelve (officer) years formal education and successful completion of an entrance examination. Actual acceptance rate depends on the current requirement and the budget. All NCOs receive four years of training at PMA. The first two years are academic in nature while the remaining years are oriented toward the specialties.

3. Conscriptos serve two years and perform in airfield security roles. Requirements for such duty are attainment of age 18 and a successful physical examination.

E. (FOUO) FAB COMMUNICATIONS SYSTEMS

1. Country-wide

(a) The FAB "Red Net" (Figure 16) is the Collins KWM-2A system which was hastily placed into operation in only a few days in order to meet the guerrilla threat. This installation was completed on 30 March 1967. Stations operational in the net include:

(1) HQ FAB (Ministry of Defense Building).

(2) HQ GAC (El Alto).

(3) Detachment #1 (Cochabamba).

(4) Detachment #2 (Tarija).

(5) Detachment #4 (Riberalta).

(6) Colegio Militar (Santa Cruz).

(7) TAM Operations (El Alto).

(b) The FAB "Blue Net" (Figure 17) consists of a heterogenous combination of obsolete AM/CW equipment. These units, mostly AR-88 receivers and ET-4336 transmitters, have been kept operational only through the imagination and ingenuity of the FAB maintenance personnel. Many of these stations are co-located with "Red Net" stations and thus provide backup, a "hard-copy" capability and an alternate channel. Stations in this net are located at:

(1) HQ FAB (Ministry of Defense Building).

(2) HQ TAM (TAM Building, La Paz).

(3) HQ GAC (El Alto).

(4) Detachment #1 (Cochabamba).

(5) Detachment #2 (Tarija).

(6) Detachment #3 (Caranavi).

(7) Detachment #4 (Riberalta).

(8) Colegio Militar (Santa Cruz).

(9) TAM Detachment (Tipuani).

(c) The FAB HF Voice Net links Commander FAB with Commanders of TAM, GAC, and TAM Operations. This is the net which, if the recommendations in the Modernization Study are followed, will be replaced by a VHF/FM net.

2. Areas for Improvement and Recommendations

(a) The KWM-2A installations should be improved. Specific examples of discrepancies noted are:

(1) Antennas atop TAM building not cut to operating frequency.

(2) KWM-2A antenna atop Ministry of Defense Building physically too close to other antennas.

(3) Directional wattmeter at Cochabamba tower is not used. It is unknown whether the remainder of the 312B4 is used, but the phone patch should be tied into the commercial Cochabamba exchange to provide phone patch service for all Bolivian Government agencies.

(4) Although not a discrepancy as such, a tape dipole is being used for the permanent installation at Cochabamba. These tape dipoles cost in excess of $100 each and are intended for use in cases where stations and frequencies are moved frequently and a simple antenna is required. These dipoles should be removed and replaced by locally fabricated dipoles. If multi-frequency operation is planned, multi-element dipoles such as those used by the Bolivian Army should be used.

3. Tactical and Joint Scene of Action

(a) FAB has limited tactical communications capability. The Red Net provides command and control as well as administrative service. The recommendations in the Modernization Study concerning flyaway packages and SSB installations in the U-17 aircraft will provide a nucleus for tactical communications development.

(b) Recommendations

(1) That one channel of each of the SSB sets to be installed in the U-17 aircraft be crystallized (or synthesized) on "Army common" frequency (recommended in Section I, paragraph D2(c)(1)). A second SSB channel should be common with the Army divisional net in the area containing the scene of action (Figure 7).

(2) That the Army and Air Force Sections of the USMILGP in conjunction with their host country counterparts determine if VHF/AM, VHF/FM, or HF/SSB is to be used for primary ground-to-air communication between Army patrols and aircraft. The LACE team recommends the use of VHF/AM but recognizes that other considerations may require use of one of the other systems. If the decision is to employ VHF/AM, Army should plan to provide the necessary man-pack radios. In order to minimize logistic problems, Army should standardize on the same set currently employed by FAB for its flyaway packages, the SKY-515 ( ). This

will permit direct communication with all FAB aircraft within range. FAB should provide the qualified flying officers to accompany the Army ground patrols and act as the forward air controllers, using the Army-provided SKY-515 () radios. This employment of air officers in a ground role will prove beneficial since it will result in an increased awareness by both services of the problems faced by their sister component.

4. Operations and Maintenance

(a) Organization

(1) The communications organization is portrayed in Figure 18. The Communications Staff Officer reports to the Director in Section IV. All operations personnel including those at outlying locations are directly subordinate to this officer. Distribution of operators is currently:

a La Paz--23

b Santa Cruz--5

c Cochabamba--3

d Tarija--2

e Camiri--2

f Riberalta--1

g San Matias--1

h Caranavi--1

i Tipuana--1

Twenty-three of the electronic maintenance personnel of FAB are stationed at El Alto while the remaining ten are assigned to Santa Cruz.

(2) Strength of the FAB communications organization is maintained at the authorized level of 72 with attrition replaced by five to eight PMA graduates annually.

(3) The maintenance squadron at El Alto seems to be well organized and capable. Mockups for existing equipment appear to be adequate; no large backlog of defective equipment exists. Test equipment and limited spare parts are available. The facility at Santa Cruz; however, does not enjoy the same advantages. Test equipment, replacement parts, and tools are scarce. A large quantity of radios awaiting repair and/or parts is on hand.

(4) The grade of the staff communications officer (Captain) does not appear to be commensurate with his responsibilities and is two grades below his Army counterpart. Further, the position is far down the organizational chart.

(b) Recommendations

(1) The staff communications officers should be relieved of the onerous task of direct supervision of operations personnel. These people should be integrated into the two maintenance squadrons. Perhaps the units could be redesignated as "communications squadrons" to reflect their changed status.

(2) The backlog of defective equipment at Santa Cruz should be eliminated. To this end, each set should be checked to determine what, if anything, is needed for its repair. A consolidated list of all parts needed should be given to the staff communications officer who can have FAB stocks searched. If the parts are not available in FAB, the staff communications officer should contact his Army counterpart to determine if they are on hand with Army resources. If the parts still cannot be found, the staff communications officer should budget for them or, if the money is not available, should take action to drop the unneeded sets from the inventory and use them for cannibalization.

5. Training

(a) In-country and Canal Zone

(1) In-country electronic training is conducted by PMA. The first two years of training are spent on general military knowledge. In the third year, 12 hours per week is devoted to technical training--in the final year this is increased to 16 hours per week. Thus the electronics graduate

receives the equivalent of nearly a year of specialty training (30 hours per week).

(2) Inter-American Air Forces Academy has graduated 14 aircraft radio repairmen; 18 students have successfully completed the C-E fundamentals course and 11 of these have attended the aircraft communications/navigation equipment repair course. Two more enlisted men are graduates of a flight facilities equipment repair course at Keesler AFB.

(3) Two airmen are currently attending electronic courses in Argentina and Brazil.

(4) Two officers are graduates of a Keesler AFB officers electronic course.

(b) In general, electronic maintenance training has been adequate to meet FAB needs. Future requirements include training on:

(1) Skycrafter 515( ) VHF/AM.

(2) HRT-2A MF Beacon.

(3) KWM-2A HF/SSB.

(4) Precision measuring equipment.

(c) Recommend that maintenance responsibilities for Stoner PMC-12 radios be assigned to the Bolivian Army. Although two of these sets will be included in the Air Force flyaway packages, the Bolivian Army, a much larger user of the same equipment, should be tasked to maintain them. In return, FAB is equipped to maintain VHF/AM and therefore can maintain any SKY-515( ) sets procured in the future for ground-air communications.

SECTION III - NAVY

A. (C) MISSION. The mission of the Bolivian Naval Forces is divided into three areas: the Military Area, the National Civil Area, and the International Area.

1. Military Area

(a) Effect the patrolling of the 5,000 kms of navigable rivers.

(b) Maintain the sovereignty and security of the frontiers and borders.

(c) Assist in Joint Operations and provide logistic support.

(d) Aid in the prevention of importation of contraband.

(e) Constitute the nucleus of the National Navy.

(f) Represent Bolivia in the multiple Naval conference of Navy and merchant fleet type.

(g) Coordinate with the other two forces and with civilian authorities for transportation by air and water.

2. National Area

(a) Regulate the traffic on navigable rivers.

(b) The cleaning and conditioning of navigable rivers.

(c) Maintenance of ports.

(d) Navigation of river routes on a permanent schedule for the support of river population and economic development.

(e) Control of floods.

(f) Connection of river navigation with other transportation lines.

(g) Hydrographic surveys.

(h) Control and regulation of merchant navigation.

(i) Maintenance and repositioning of owned vessels and maintenance of civil vessels.

(j) Assistance to the health and Healthfulness Departments in the regions of the navigable rivers.

3. International Area

(a) Represent the Bolivian Navy with the navies of the rest of the world, especially with the bordering countries.

(b) Foreign transportation.

B. (C) ORGANIZATION (Figure 19)

1. The Bolivian Navy is commanded by an admiral who is the Commander of the Navy. The Commander of the Navy reports to the Commander in Chief of the Armed Forces.

2. The naval shore establishment is composed of three naval districts and numerous small river commands, all of which report directly to the Commander of the Navy.

3. The naval afloat forces are composed of 12 large river boats (approximately 40 to 65 feet in length) and 28 smaller boats. The 12 large river boats report directly to the Commander of the Navy while the smaller boats are assigned to the naval districts and smaller river commands.

C. (FOUO) PERSONNEL. The authorized strength of the Bolivian Navy is 1800 persons, of which 1200 are conscripts. The present strength is 126 officers, 216 petty officers and 1200 conscripts.

D. (FOUO) COMMUNICATION SYSTEMS

1. Country-wide

(a) The Bolivian Navy does not have a Navy owned and operated communication net, but relies on the Bolivian

Army Signal Command to operate and maintain six fixed stations for the Navy's use (see Figure 20). The Navy does not have any communication equipment, operators or technicians, nor has the Navy the capability to acquire them at the present time, but must depend on the Army for continued communication support.

(b) The Bolivian Army Signal Command is in the process of reorganizing to provide a single integrated Armed Forces Communication System. Future plans call for expanding the present Navy's six fixed stations by an additional nine stations for a total of fifteen stations (Figure 20). These fifteen stations will be operated by an integrated service and maintained by Army technicians. Logistic support will be provided by the Bolivian Army Signal Command and included in the annual Bolivian Army budget.

(c) In view of the above it is recommended that:

(1) All country-wide (shore-to-shore) communications for the Bolivian Navy be provided by the Army Signal Command.

(2) The present net be expanded to include the additional nine fixed stations shown in Figure 20.

(3) The Bolivian Army Signal Command provide a school to train Navy communication operators in preparation for Navy participation in an integrated communication system.

2. Tactical Communications

(a) The Bolivian Navy has one boat (the Santa Cruz) with a two-way radio installed. This allows the Santa Cruz to communicate with the existing fixed stations and to Naval Headquarters through the fixed stations; however, the remaining 11 boats are without any radios and are thus handicapped by lack of rapid communications.

(b) Future planning calls for providing radios for the remaining boats; however, the source of the radios has not been determined.

(c) Since the Bolivian Army Signal Command is assuming the communication responsibility for the Bolivian Navy it is recommended that:

(1) The Army Signal Command provide radio equipment for installation in the remaining large river boats.

(2) The Army train Navy personnel as operators and technicians to operate and maintain equipment installed in the boats.

(3) The Army operate and maintain equipment installed in the boats until Navy personnel can be trained.

(4) The Army provide maintenance parts and depot repair service for the equipment installed in the boats until such time as the Bolivian Navy can support and maintain the installed equipment.

SECTION IV - PRESIDENTIAL SECURITY UNIT

A. (C) MISSION, ORGANIZATION and PERSONNEL. The Presidential Security Unit (PSU) has the primary mission of protecting the President of Bolivia and his family. The entire unit consists of 5 officers and 29 enlisted personnel. Personnel of the PSU were selected on the basis of personal loyalty to the government and to the President. There are no specific subcomponents of the PSU since the size of the protective force depends on the particular mission and the area to be covered. The entire PSU has recently received in-country training by a U.S. MTT on sound security techniques and protection procedures.

B. (FOUO) COMMUNICATION SYSTEM. The communications equipment used by the PSU is designed for maximum flexibility and control. The following VHF/FM dual-channel equipments are used: 12 Motorola Handi-Talkies, 2 watts output; 7 Motorola vehicular transceivers, 60 watts output; 2 Motorola base stations, 110 watts output. All transceivers are new; however, even though the equipment has a one year warranty, the local Motorola representative does not have adequate test gear or spare parts to perform repairs in-country. It would appear that costly delays will result when PSU equipment requires repairs.

C. (U) RECOMMENDATIONS

1. That close liaison be maintained between the Commander of the PSU and the local Motorola dealer to ensure timely repair of the new equipment, especially during the one year warranty period.

2. That coordination be made with key defense forces communications officers prior to departing for protective missions outside the capital city. Such coordination would establish procedures which would permit relay of messages to and from the President in the most expeditious manner via long distance defense radio systems.

3. That all communications equipment be thoroughly checked by a competent technician prior to each major mission.

SECTION V - CIVIL AVIATION COMMUNICATIONS

A. (FOUO) OBSERVATIONS

1. A presidential decree signed 31 August 1967 established an entity to be known as AASANA (Administracion de Aerodromos y Servicios Auxiliares a la Navegacion Aerea) which will be formed from Lloyd Aereo Boliviano (LAB). AASANA will have the responsibility for operating ground communications for civil aviation in Bolivia. Maintenance of airborne communication equipment will remain under the jurisdiction of LAB.

2. LAB possesses sufficient mission equipment, including approximately 100% backup for its point-to-point circuits. Most equipment is obsolete but still performing adequately. Major equipments in common use are: Wilcox 99A, BC-446, BC-1100, HT-9, BC-779, 51J-3, SCR-522, and AN/ARC-3. A Siemens radio printer link is operating between La Paz and Cochabamba.

3. Transmitter antennas used at Cochabamba are fairly well designed--two large three-wire rhombics and numerous folded dipoles fed with coaxial balanced-to-unbalanced transformers dominate the transmit field. Some maintenance such as additional antennas, rehabilitation of transmission lines, etc., is required but will not be accomplished until AASANA is a reality and actually allocates funds.

4. The VOR at Santa Cruz still is lacking power cable and test equipment. It has not, as of 20 September 1967, been successfully flight checked.

5. The existing LAB communications maintenance shops and personnel at Cochabamba will serve AASANA. LAB currently employs nine technicians, all trained outside Bolivia (Argentina, Mexico, USA). LAB does not presently conduct any electronic training; AASANA, however, plans to institute in-country maintenance courses. The LAB technicians perform

high quality depot level maintenance. Their facilities include even a small transformer rewinding shop. Spare parts are in short supply but equipment is kept operational by cannibalization and through the ingenuity of the maintenance personnel. LAB also operates a gasoline generator rebuilding shop which support electronic requirements of the remote stations.

B. (U) RECOMMENDATIONS

1. That, if and when AASANA starts in-country training of electronic maintenance personnel, FAB and Army attempt to procure student spaces in the course.

2. That AASANA communications not be integrated into other state-operated nets. In the interest of air safety and to ensure compliance with ICAO regulations, AASANA must remain a separate entity.

3. That AASANA stations have standing instructions to pass emergency messages on a priority basis for any military or paramilitary individual.

4. That, when FAB weather reporting becomes a reality, AASANA and FAB provide full interchange of data. When the AN/TKR-1 becomes operational, AASANA should be offered the opportunity to assist in manning and operating the satellite intercept facility.

5. That, if workload permits, AASANA perform a limited amount of transformer rewinding and generator repairs.

SECTION VI

JOINT OPERATIONS/JOINT COMMUNICATIONS CENTER (JOC/JCC)

A. (FOUO) OBSERVATIONS. The Bolivian Government structure does not, at present, lend itself to the establishment of a single JOC/JCC with representation from each division of government concerned with national security, as recommended in the Air Force Modernization Study.

B. (C) RECOMMENDATIONS

1. That a separate operations center/central communication facility for the National Guard, National Traffic Police, the National Department of Criminal Investigation (DNIC) and the National Customs Service, be established under the Ministry of Government.

2. That a JOC/JCC be established at the Estado Mayor with representation from the Army, Navy, and Air Force. This could be established almost immediately, on a very austere basis, as the Army/Navy radio net control stations are located in the Estado Mayor. Immediately adjacent to the radio room a small room with two or three desks, typewriters, and a file cabinet could serve as a message center. The organization and procedures of the message center required to ensure timely delivery of messages is, by far, more important than expensive reproduction equipment. Likewise, the JOC with a few desks, telephones and locally fabricated status board would serve for the initial organization. Again, organization, plans and procedures should be of primary importance. More sophisticated equipment (i.e., call directors, teletype, etc.) can be added later after the Signal Battalion and School have been organized. The Air Force SSB radio net control station is located at the Altiplano and at present there is no interface between Air Force radio systems and the Army radio nets. The Army Westrex has a capability of four channels, one of which could be used for JCC entry into the Air Force network. Later, on receipt of the 28 programmed Collins S-line radios one could be used for this purpose.

3. That the Army networks presently handling the Navy traffic from La Paz to river stations continue to do do since this would require no immediate additional equipment for the immediate organization of the JOC/JCC.

4. That the Army NCS (Westrex SSB), which has a phone-patch, be switched into a JOC hot-line for voice traffic on the Army, Air Force or Navy radio systems.

5. That the existing radio equipment be utilized for the immediate organization of the JCC; however, considerable time, effort, and training will be required to produce a workable JOC/JCC.

5. That the MILGP show the Spanish language film "Joint Operations" to the President, the Supreme Council of National Defense, the Commander in Chief, and the Commanders of the Army, Air Force, and Navy.

7. The MILGP should assist in the preparation of a plan for the organization of the JOC/JCC to the Supreme Council for approval. This plan should stress the use of existing radio equipment, an austere JOC, the personnel required and the need for regular exercises.

SECTION VII - COMMERCIAL COMMUNICATIONS

A. (U) OBSERVATIONS

1. Current commercial communications facilities are extremely limited in Bolivia. Much of the equipment in use is antiquated and should have been replaced long ago. Lack of adequate commercial means have forced many of the larger private businesses to install their own systems.

2. Empresa Nacional de Telecomunicaciones (ENTEL) was established as a government organ in December 1965 for the purpose of developing an efficient national communications system. Included in ENTEL's responsibilities were telephone, telex, broadcasting, television and other areas in the public communications field. Specifically excluded from ENTEL's mission were: international circuitry already being handled by existing companies; certain urban systems and interconnecting urban systems already efficiently operating under private concerns; and defense and security systems normally operated by military/police forces.

3. The Inter-American Development Bank is expected to grant a loan to modernize the commercial communication systems of Bolivia. The first phase of modernization will be the establishment of a multi-channel radio relay network to interconnect the cities of La Paz, Sucre, Cochabamba, and Santa Cruz. Additional telephone exchanges and local subscriber accommodations are planned for all locations. Although improvement in toll switching for international service is also included in phase one of the modernization program, little improvement can be expected until local distribution systems are revitalized and become responsive to customer requirements. At least several years will be required before any marked improvement in overall national systems can be realized; therefore, it is a bit premature to predict the support which internal security forces could expect from commercial communications resources.

B. (U) RECOMMENDATIONS

1. When modernization of the national commercial communications systems has been accomplished, that the armed forces and the police forces make maximum use of these commercial systems wherever feasible especially to satisfy long distance requirements. Leasing modern circuits will result in sizeable savings to security forces, and excessive costs required for maintenance of separate systems can be reduced accordingly.

2. That armed forces and police forces make maximum use of commercial training facilities in-country particularly in the area where electronic maintenance skills are being developed and taught. (As the national commercial facilities are expanded and modernized, the commercial training facilities should proportionally expand and improve thereby creating a valuable in-country capability for developing electronic technicians.)

SECTION VIII - JOINT SERVICE/HIGH COMMAND

A. (FOUO) OBSERVATIONS

1. Although this study specifically addresses the communications needs of Bolivia at the national level, it is considered appropriate and necessary to examine and comment on many of the tangibles and intangibles which influence the design of the required communications systems.

2. The Commander in Chief (CINC) of the Bolivian Armed Forces deals directly with the Chiefs of the Army, Navy and Air Force on all important issues. The joint staff, of conventional makeup, assists the CINC but must depend on limited manpower, office space, and communications. As a result, staff coordination must be accomplished on a reduced scale with staff contacts handled via the public telephone system, by personal messenger service, or by direct confrontations.

3. The armed forces and the police forces have played active roles in the political history of Bolivia. The regular military forces, the police forces, and the civilian militias have jointly and separately been marshalled to support political parties. The armed forces and the police forces have been politically applied in balance of power roles to establish equilibrium during government upheavals. The military has traditionally provided the stabilizing power required in the settlement of national crises. Political unrest has frustrated cooperation among the security forces of Bolivia and has fostered the maintenance of separate autonomus entities. Today the armed forces as an institution has no overtly acknowledged political goals. However, traditions are often difficult to break completely. Thus, it can be expected that the forces will not always be content with a passive role in political affairs.

4. With these reflections on traditional and historical roles of the security forces it is obvious that it will be a slow and difficult task to organize a functional command and control system with an effective Joint Staff at the apex. Current leaders have endeavored to restructure the armed forces and logical plans in many areas have been initiated. A modernization study for the Bolivian Air Force was recently completed by a joint team consisting of U.S. and Bolivian officers and a similar study for the Bolivian Army is planned for the near future. The effectiveness of any plan or study which is adopted will depend on the willingness of the current leaders to strive toward the establishment of truly apolitically structured security forces.

5. The practical approach to developing effective cooperation and coordination among the various security forces appears to be to establish, at least initially, separate operations centers for the police and for the armed forces and to interconnect these operations centers with hot lines. At a later date it may be possible to merge the operations centers; however, first priority should be the development of adequate operational procedures which foster harmonious actions among like forces. Joint Operation Centers will produce an environment where the need for proper staff actions becomes obvious. Officials from one service will gain an appreciation of the problems of the other services and hopefully a permanent spirit of cooperation will be developed among the services. Harmony created at the top levels could quickly spread throughout the ranks.

6. To support the above concepts for joint high level coordination an effective communications organization is required. The ultimate goal should be the establishment of a joint communications command. Being the largest service, the Army could lead the way by organizing a signal command with adequate manpower to accomplish nationwide responsibilities (see section on Army communications); however, all services should share proportionally in the planning and in the manning of a unified signal command. For example, the Air Force has ample talent in the communications field and has shown great initiative in establishing its communications systems. A Chief of Communications for the Armed Forces should be appointed along with a tri-service staff to coordinate the creation of a unified communication system at the

governmental level. Such a chief, supported by his joint staff, would be technical advisor to both the CINC and the MOD and would be empowered to review and defend the C-E budget of the armed forces. The C-E budget should be ample enough to promote the following concepts:

(a) Adequate C-E staff for planning and coordinating the modernization and expansion of government communication systems to include operations centers as appropriate.

(b) Increased salaries for technicians.

(c) Career programs designed to attract and retain critical skills.

(d) Centralized procurement of equipment and spare parts.

(e) Adequate funds for extensive technical training.

(f) Lease of commercial circuits when feasible for use by security forces.

(g) Increased emphasis on frequency control and assignment.

B. (U) RECOMMENDATIONS

1. The following resume is considered to be a list of key recommendations that are pertinent to all of the major objectives outlined throughout this study. These recommendations are purposely over simplified in the hope that key words and phrases will generate interest and stimulate full investigations into vital problems which affect the economic progress of the Republic of Bolivia.

(a) Appoint a Chief of Telecommunications for the Armed Forces of Bolivia.

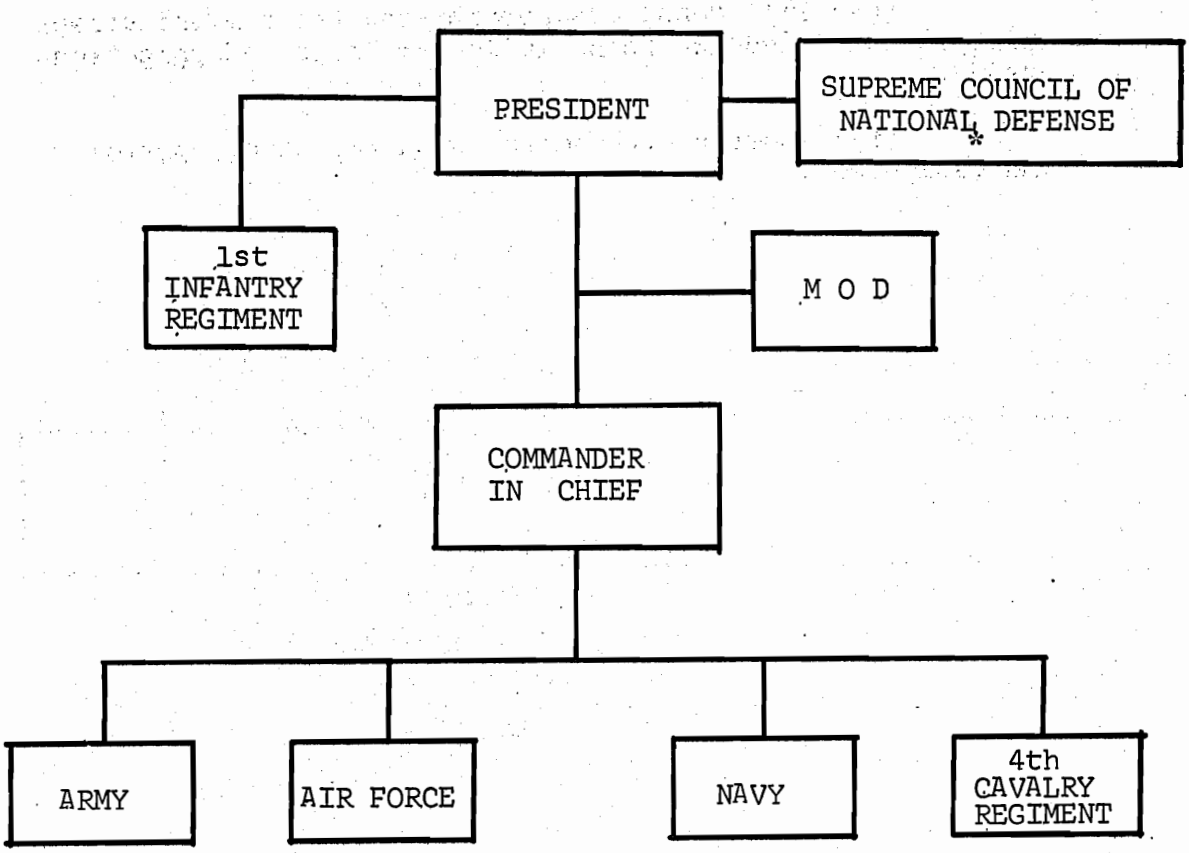
(b) Establish an adequate budget for national telecommunications which will permit the modernization and expansion of national telecommunications systems.

(c) Establish national operation centers with appropriate communications facilities for the armed forces and for the police forces.

(d) When established, interconnect the Police and Armed Forces Operation Centers.

(e) Implement, as appropriate, the communications concepts contained in the Bolivian Air Force Modernization Study.

(f) Increase the emphasis on frequency control and assignment.



* Advisory Only. Composition and authority determined by the President

Figure 1

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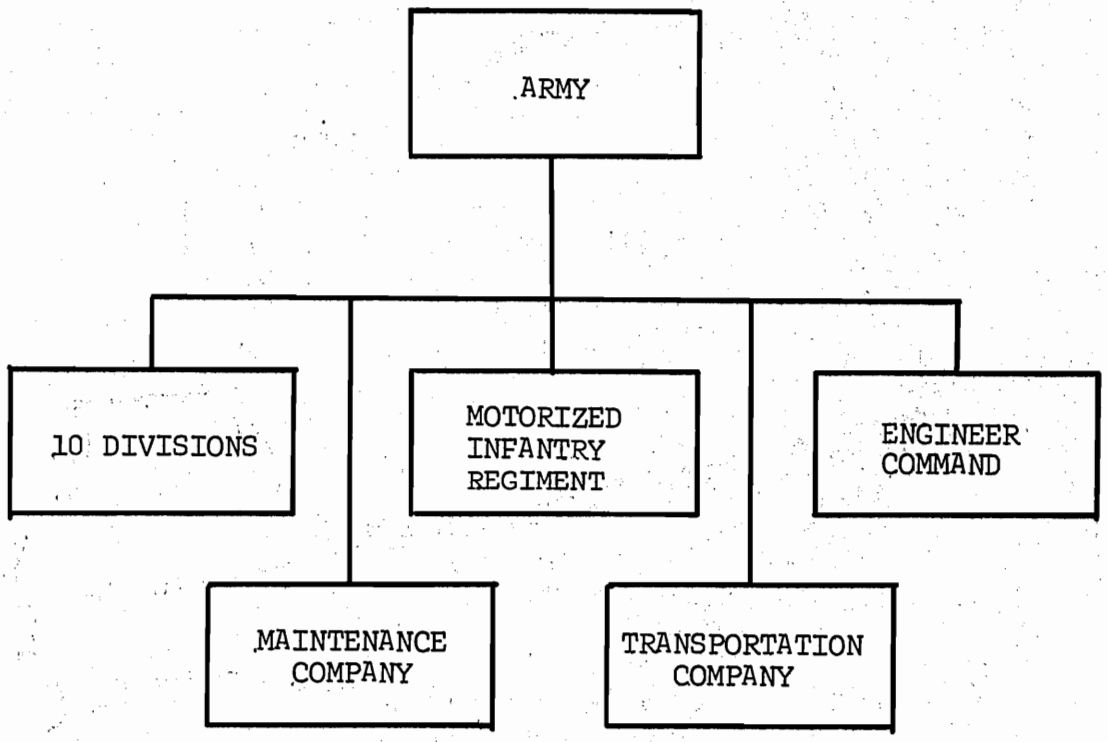

FIGURE 2

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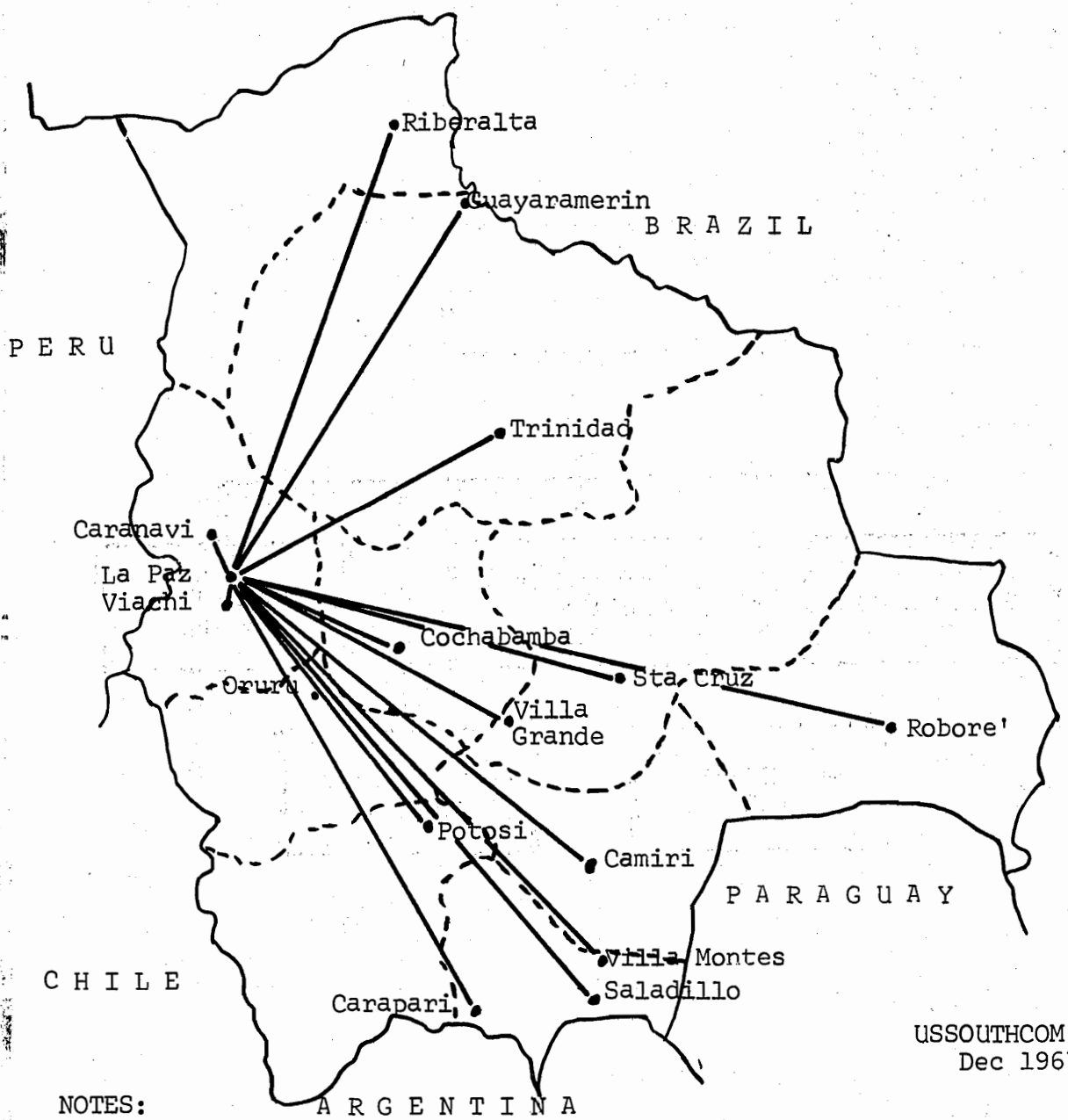
Army High Command

Radio Communication Net



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NOTES:

1. Equipment is Westrex SSB/CW transceivers.
2. Unit Locations:

1st Division - Viachi	8th Division - Santa Cruz
2nd Division - Oruru	9th Division - Trinidad
3rd Division - V. Montes	10th Division - Potosi
4th Division - Camiri	Engr Bn - Caranavi
5th Division - Robore'	Engr Bn - V. Grande
6th Division - Riberalta	Engr Bn - Carapari and Saladillo
7th Division - Cochabamba	Engr Bn - Guayaramerin (Equipment but no operator available)

FIGURE 3

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BOLIVIAN ARMY RADIO NETS

Message Traffic

Send, Army and Navy	1500/month
Send, Navy	500/month
Receive, Army and Navy	2500/month
Receive, Navy	500/month
Circuit "A"	70% of Traffic
Circuit "B"	30% of Traffic
Send Daily, Army	50/day
Receive Daily, Army	80/day
Send Daily, Navy	20-25/day
Receive Daily, Navy	20/day

FIGURE 4

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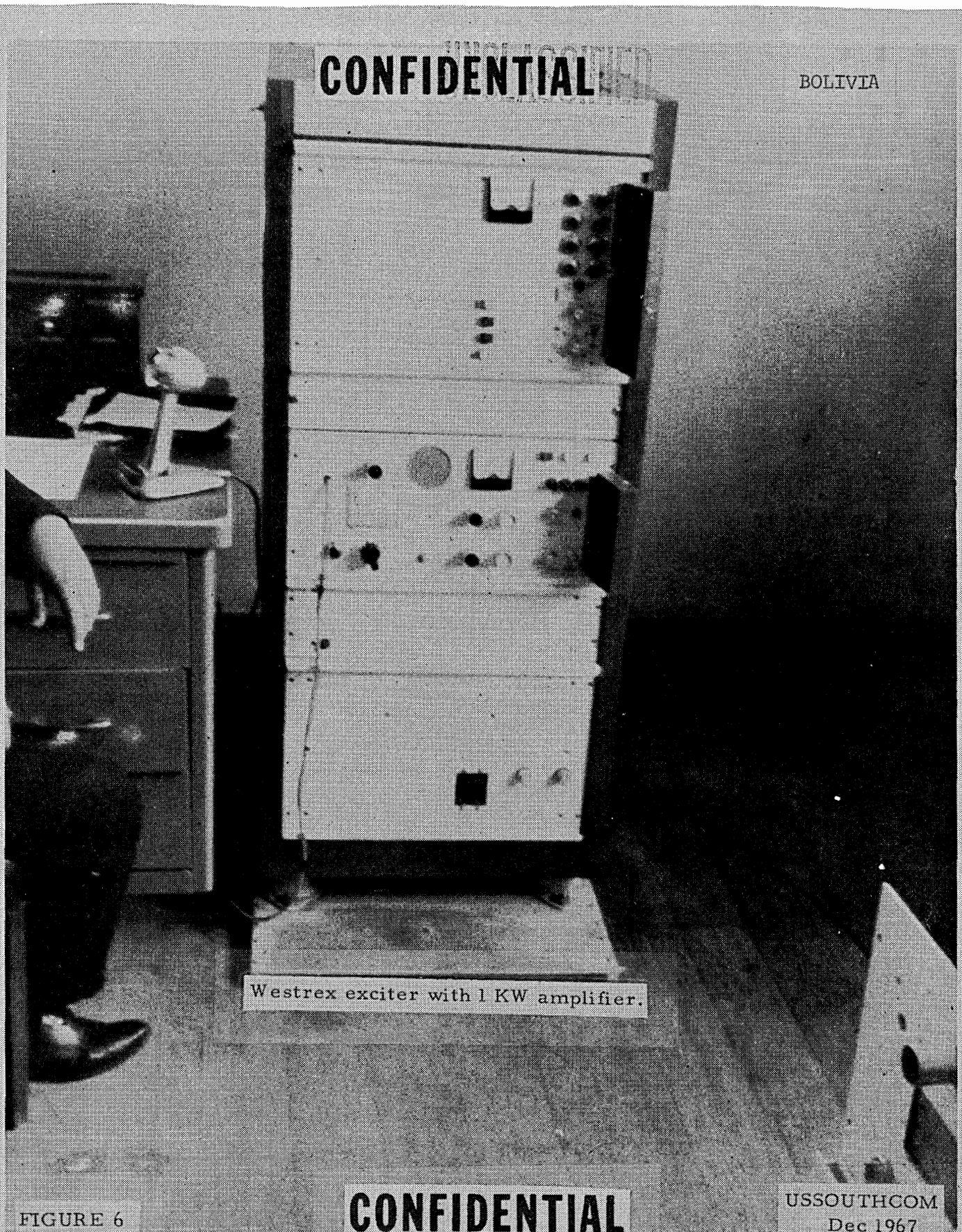
Circuit "A" Operating Schedule

TIME		STATION	FREQUENCY (Kz)
0800-1200		Viachi	5276.5/5300
0800-1200		Oruro	5276.5/5300
0800-1200		Camiri	5276.5
1400-1800		Villa Montes	5276.5/5300
1400-1800		Cochabamba	5276.5/5300
1900-2200		Santa Cruz	5276.5/5300
1900-2200		Potosi	5276.5
0845-0900	1600-1630	Robore	5276.5
1700-1730	1900-1930	Riberalta	5276.5/5300
1030-1100	1600-1630	Trinidad	5276.5
1100-1115	1700-1715	Valle Grande	5276.5/5300
1115-1130	1715-1730	Caranav	5276.5
1000-1015	1500-1515	Carapari	5276.5

BOLIVIA



Westrex exciter with 1 KW amplifier.

FIGURE 6

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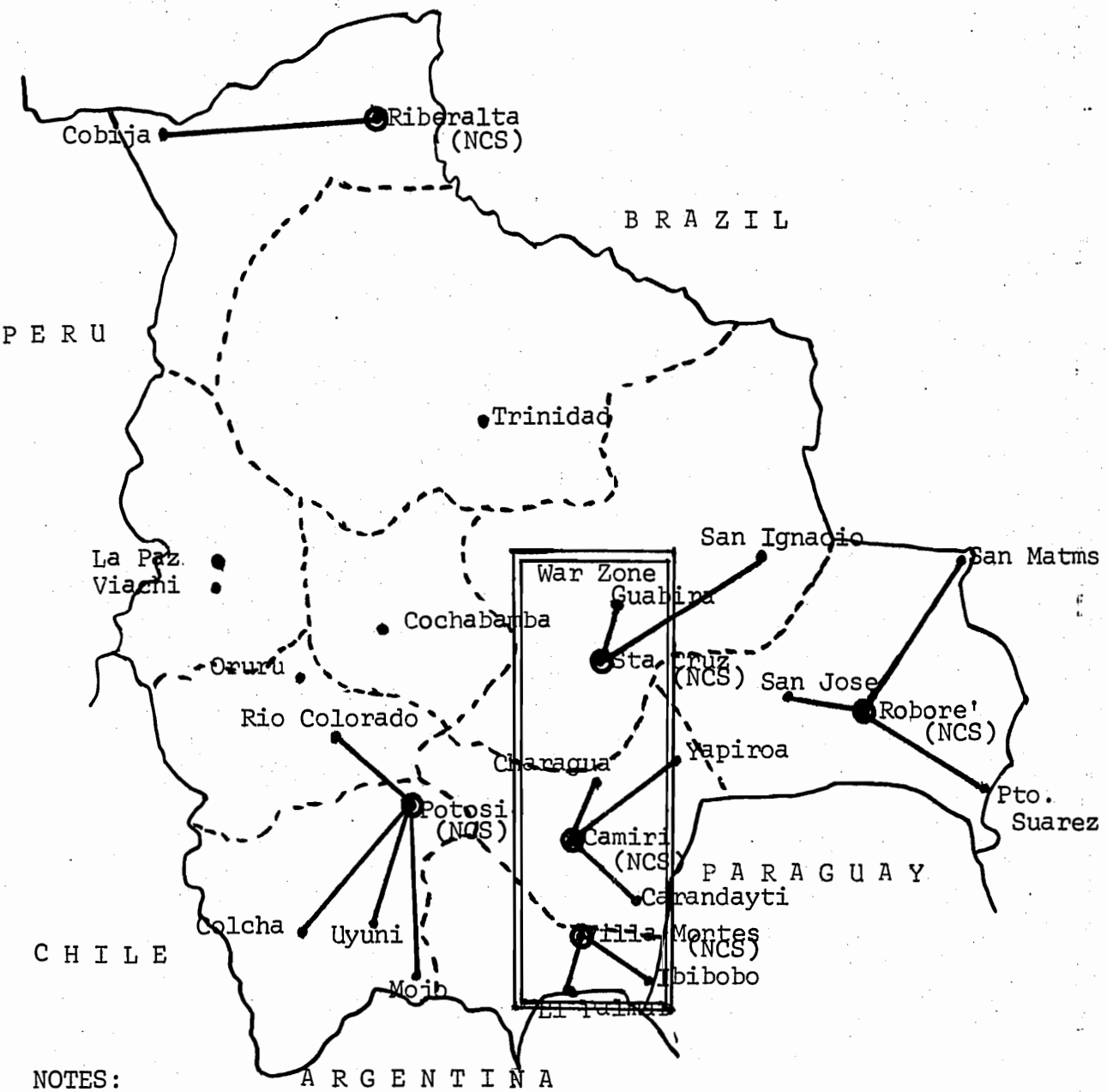
Army Divisional Nets



NOTES:

1. Rio Colorado temporarily assigned to 10th Division Net. This net uses Collins S-Line equipment. As soon as Oruru, Hqs 2nd Division, receives Collins S-Line equipment a new 2nd Division net will be established as shown in Figure 8.
2. Nets other than the 10th Division Net uses miscellaneous amplitude modulated or CW equipment.
3. AN/GRC-9 equipment is being used in the War Zone (rectangular area)

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FIGURE 7

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Proposed New

Army Divisional Net Organization

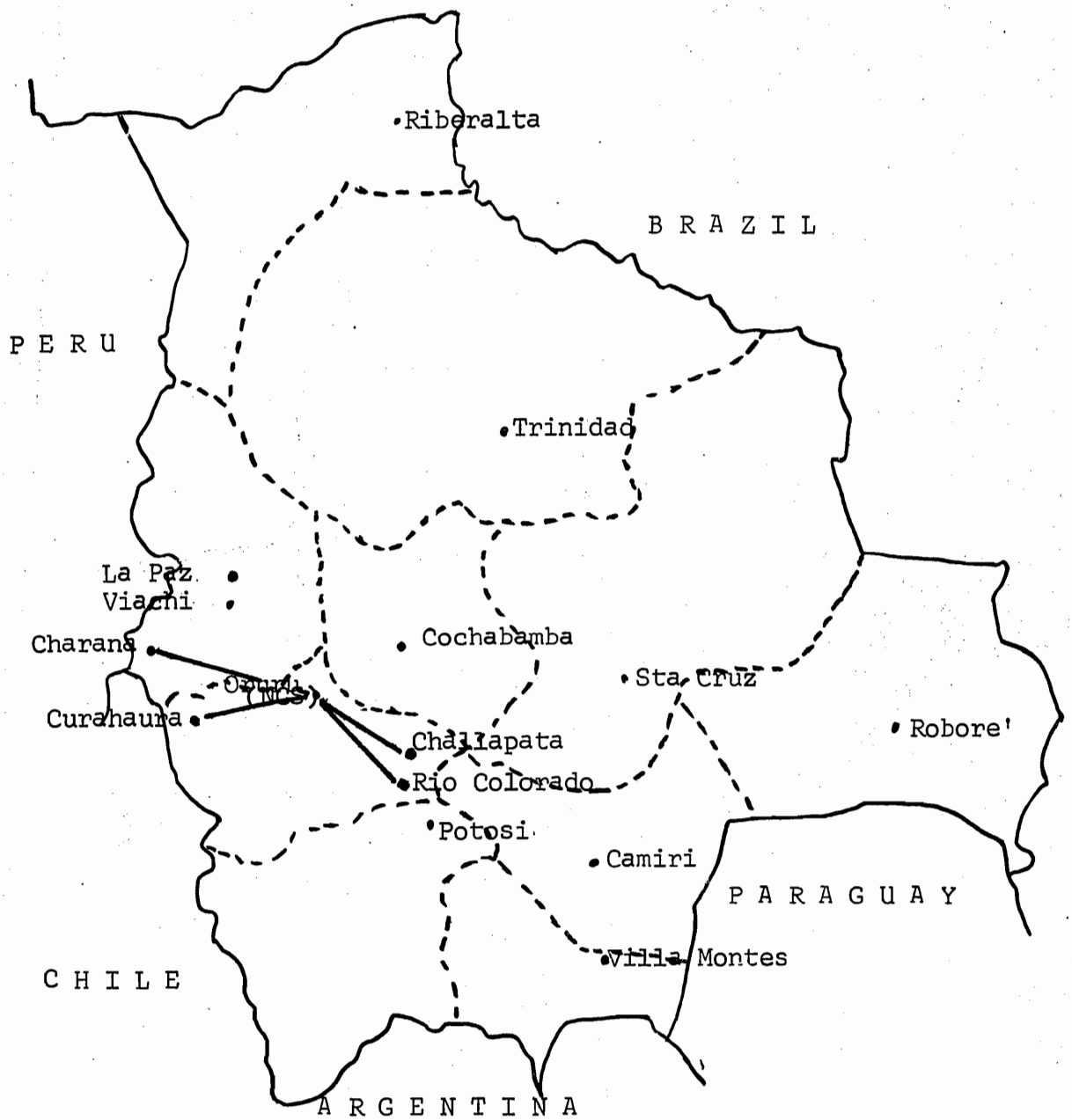

FIGURE 8

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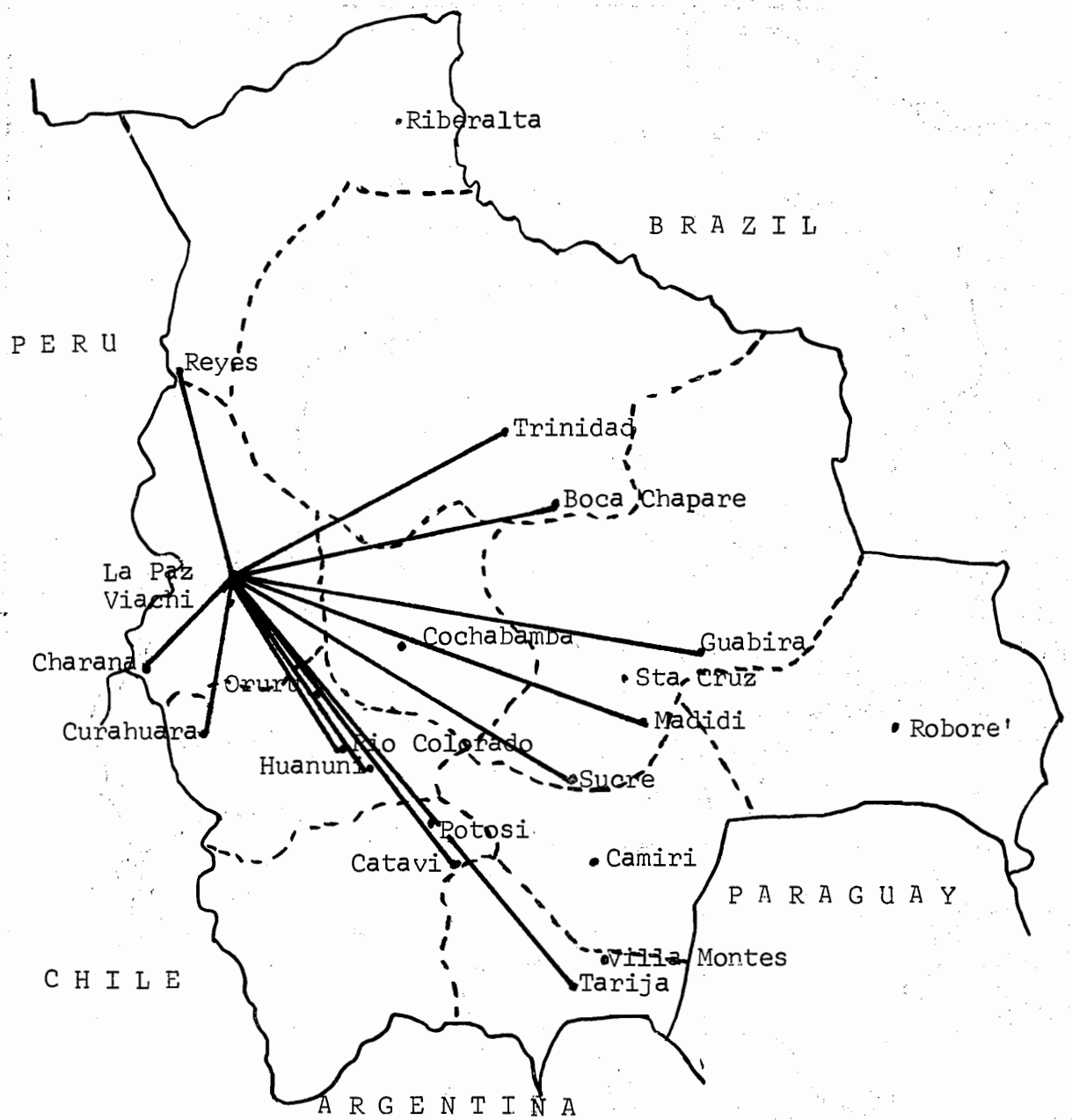
Military Regional Net

Headquarters Armed Forces



NOTES:

1. Equipment mostly RCA AR-88 receivers/ET 4336 or Collins 32V2 CW transmitters.

2. Schedules are assigned in 15-minute segments.

3. Outstation frequencies are all different since crystals are not available for single frequency operation of the net.

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FIGURE 9

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Circuit "B" Operating Schedule

TIME	STATION	FREQUENCY (Kz)
0800-0815	Local Garrison	
0815-0830	Tarija	8769, 8400, 4890
0930-0945	Rio Colorado	7360
0945-1000	Charana	5800, 9814
1000-1015	Guabira	7500, 5600
1015-1030	Madidi	5500
1015-1030	Reyes	6840
1030-1100	Trinidad	5670, 5314
1100-1115	Sucre	7360
1115-1130	Tarija	5720
1400-1415	Sucre	7300
1415-1430	Tarija	
1500-1515	Catavi	
1515-1530	Guabira	5600
1530-1545	Huanuni	7750
1530-1545	Charana	5800
1545-1600	Rio Colorado	
1600-1630	Trinidad	
1645-1700	Sucre	
1700-1715	Tarija	
1730-1800	Official Conf and Madidi	

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FIGURE 10

BOLIVIA

Operating positions of Circuit "A" (right) and Circuit "B" (left) at Estado Mayor, La Paz. Two civilian operators are employed.

FIGURE 11

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Proposed Circuitry, A1

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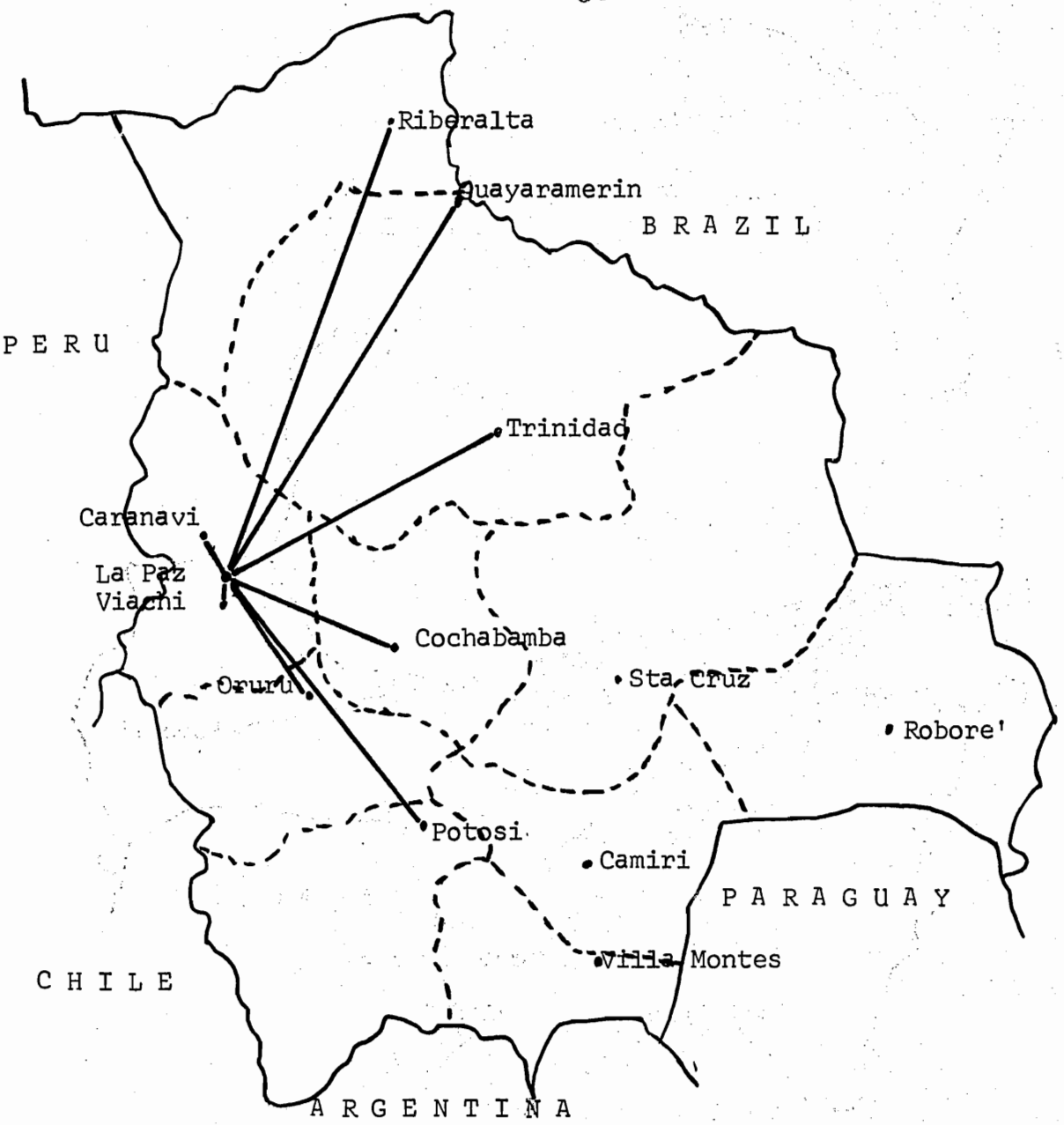

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FIGURE 12

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Proposed Circuitry A2

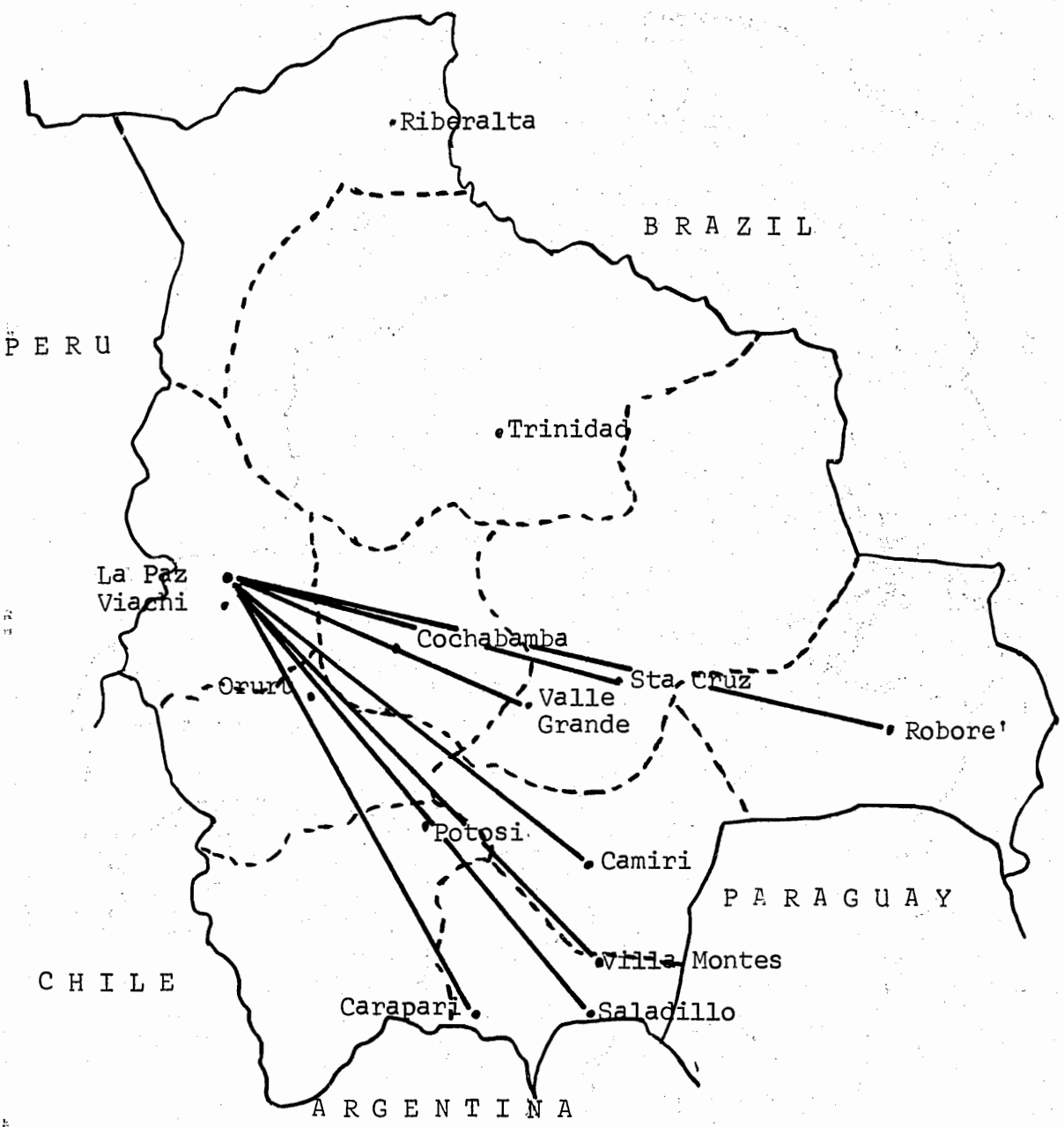

FIGURE 13

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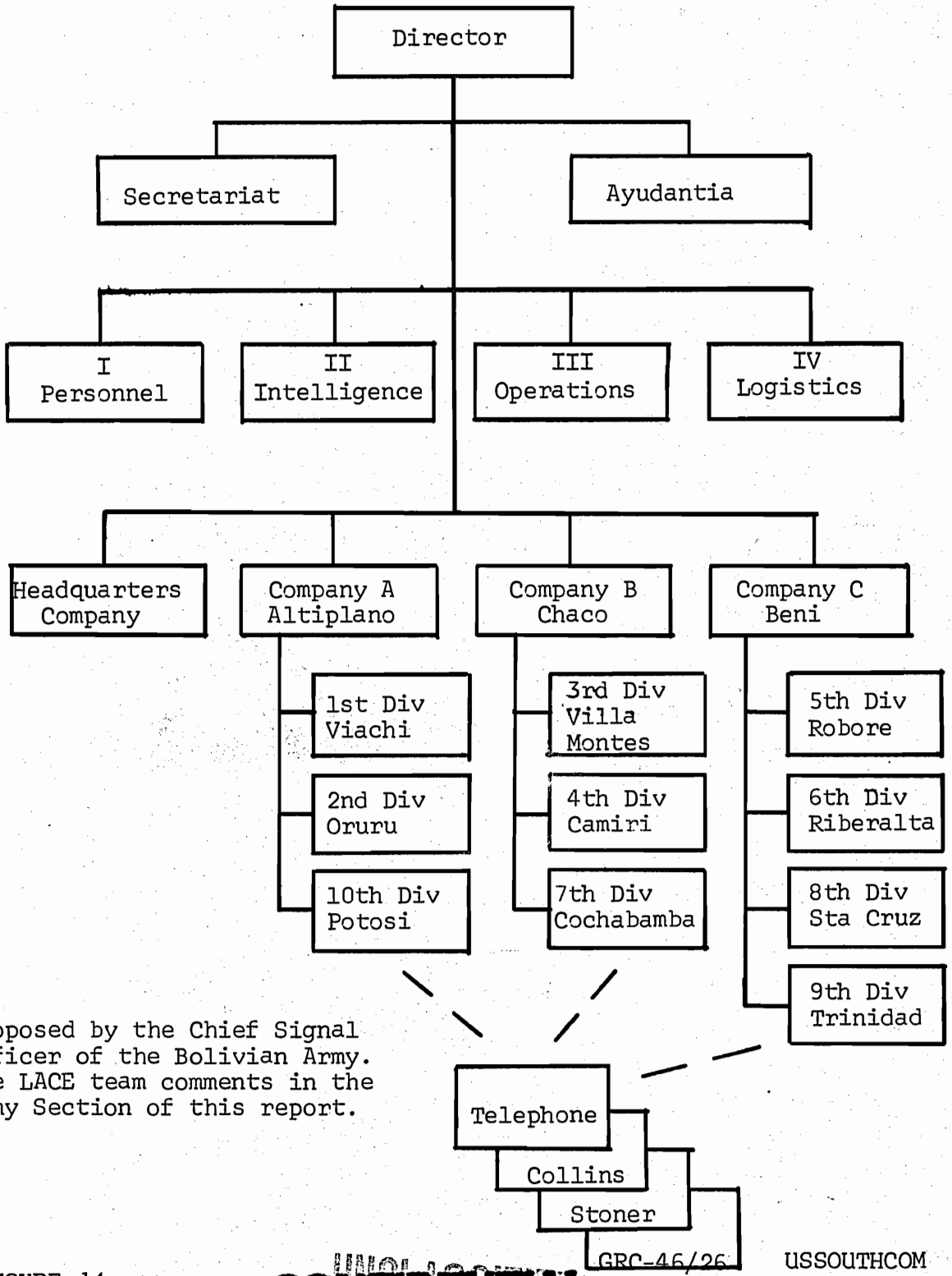
BOLIVIAN SIGNAL STRUCTURE

Proposed Organization *



* Proposed by the Chief Signal Officer of the Bolivian Army. See LACE team comments in the Army Section of this report.

FIGURE 14

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BOLIVIA

FAB ORGANIZATION

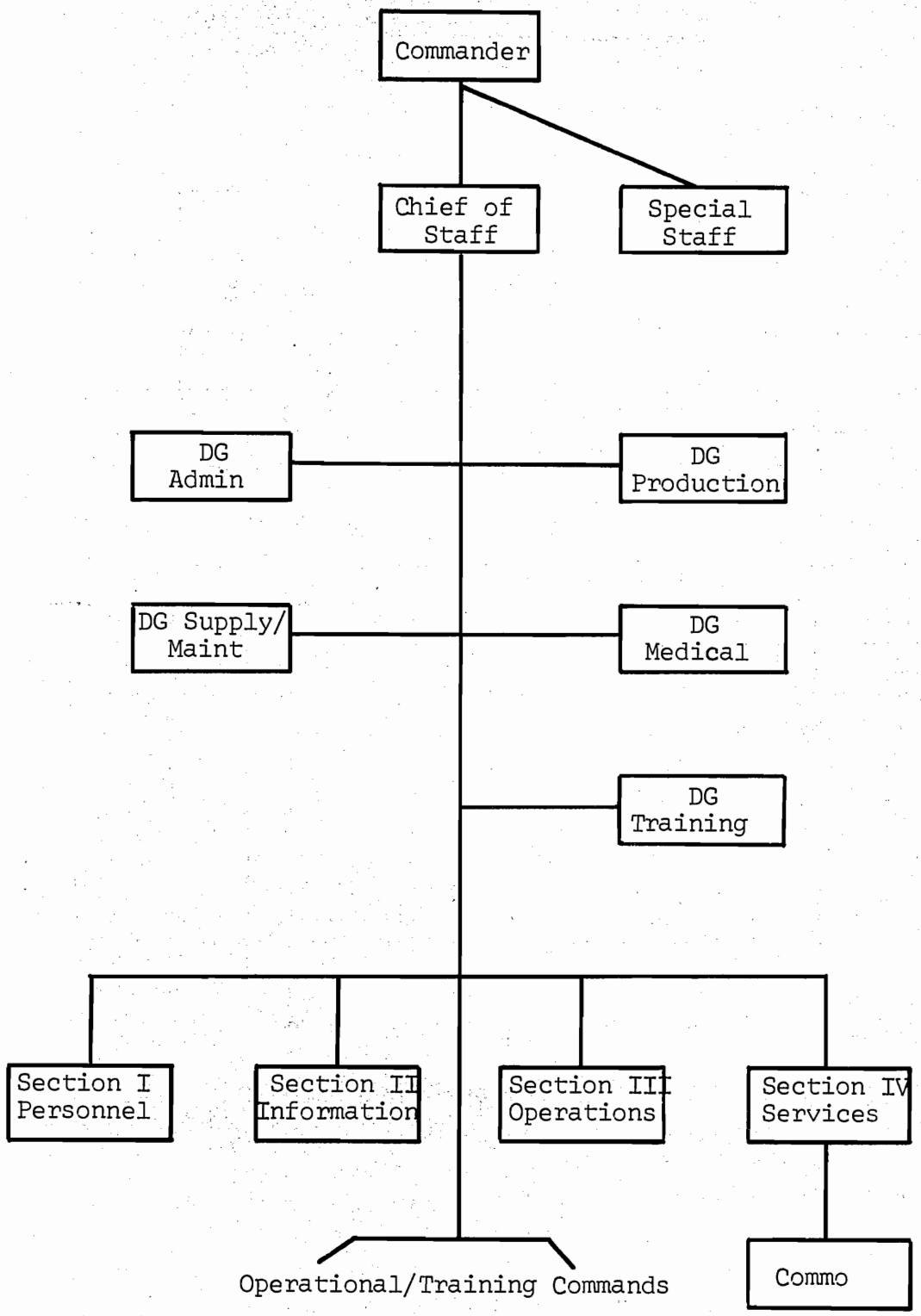

FIGURE 15

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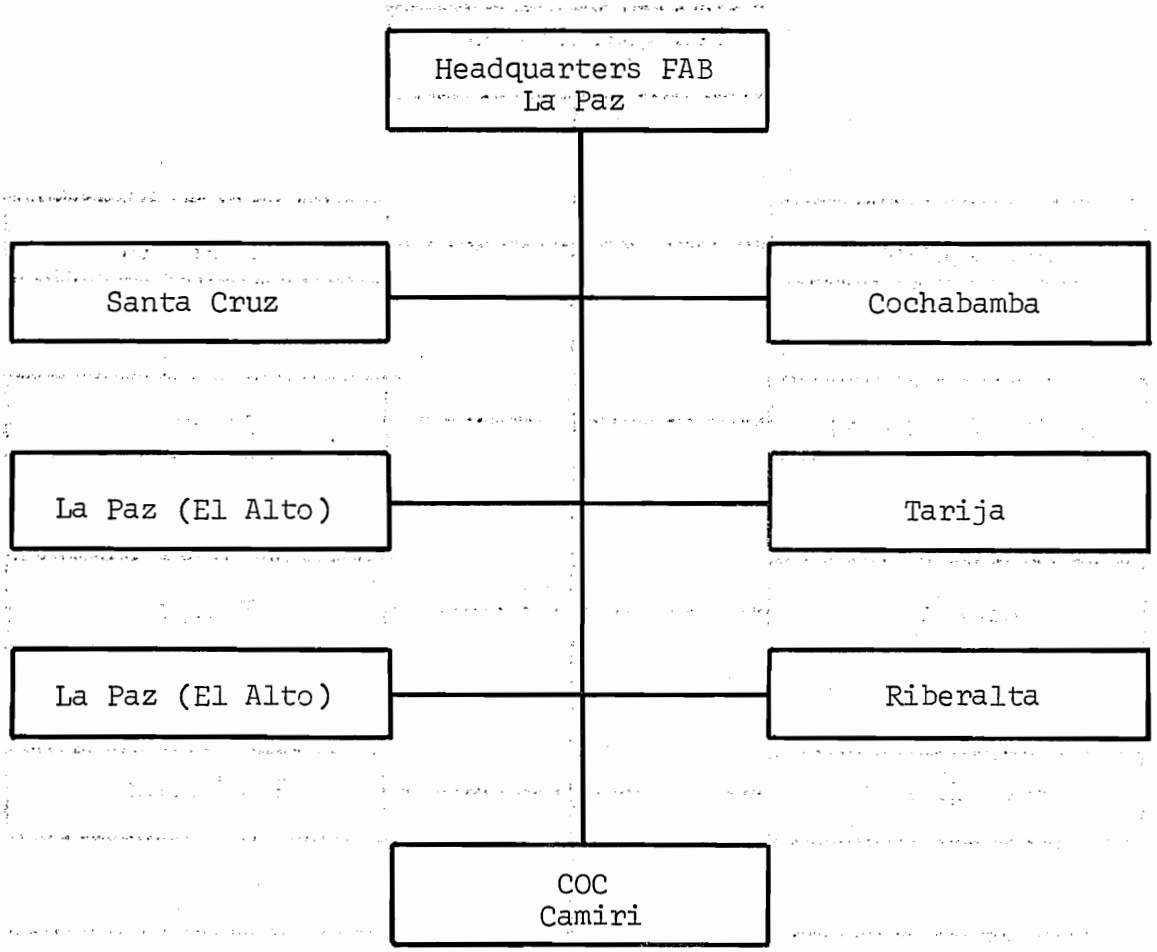

FIGURE 16

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BOLIVIAN BLUE NET

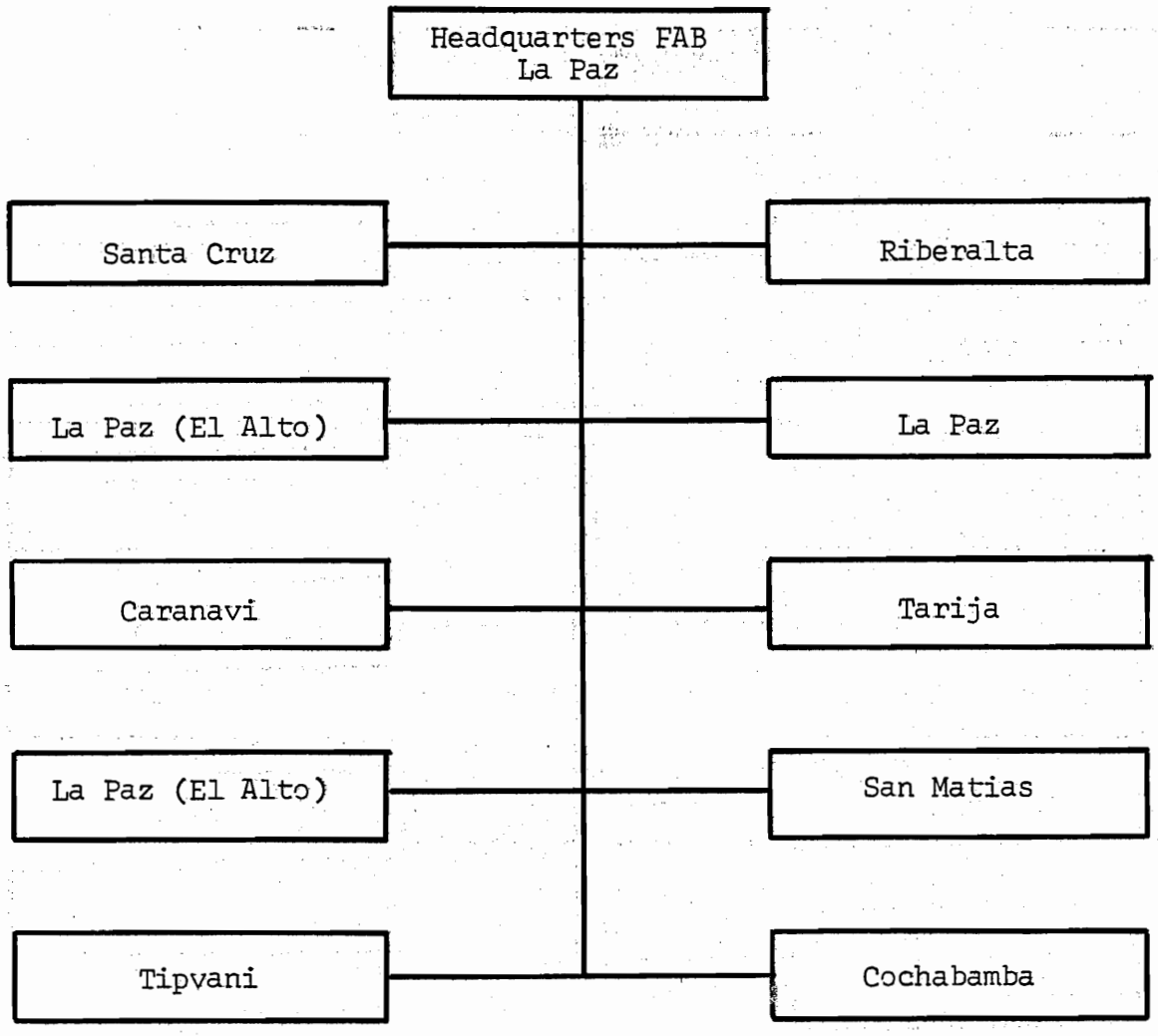

FIGURE 17

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Bolivian FAB Communication Organization

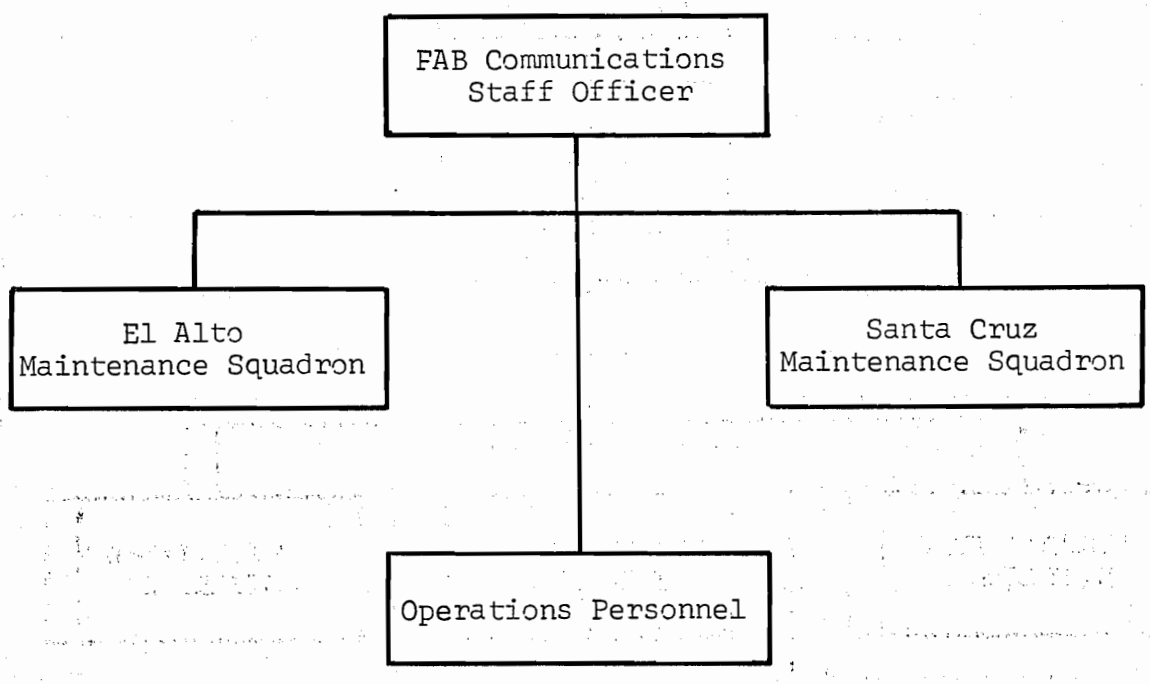

FIGURE 18

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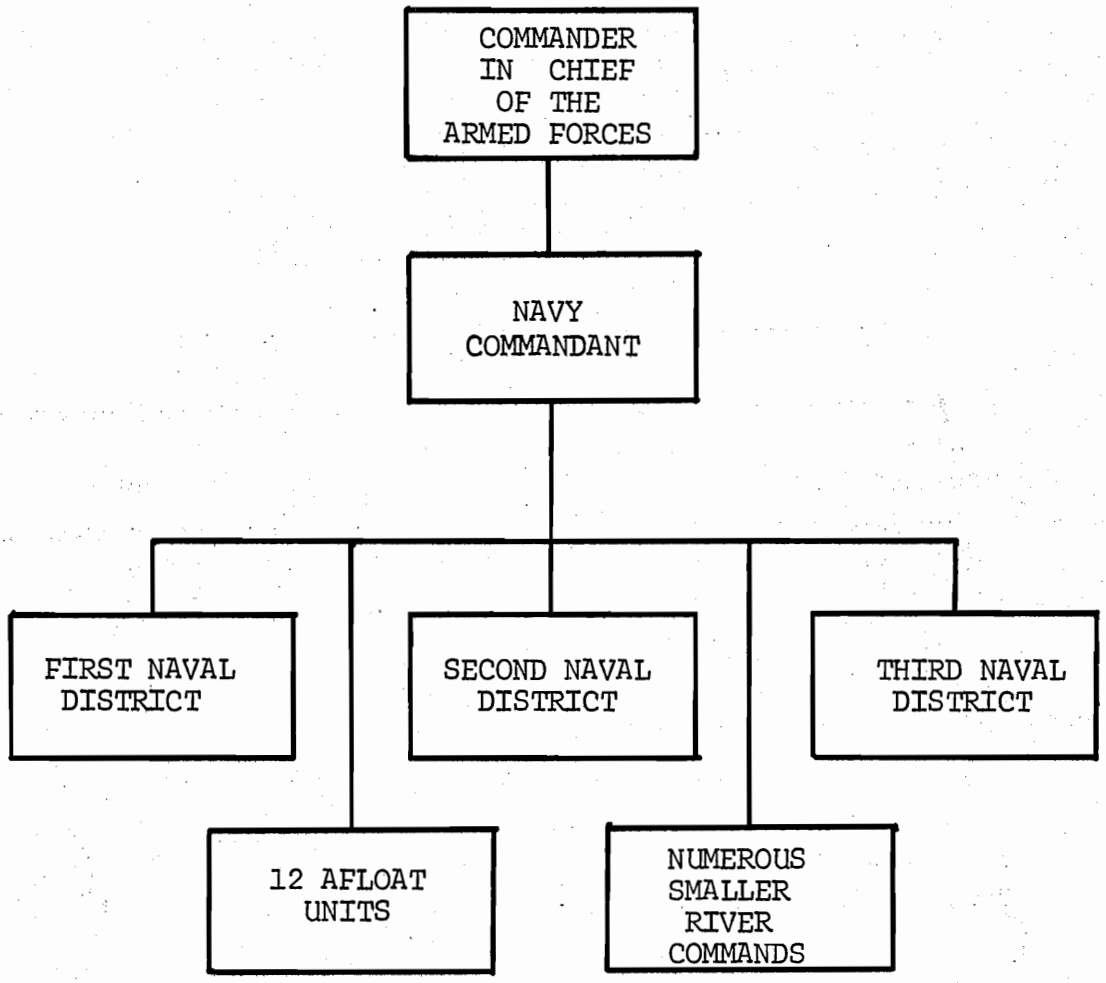

Figure 19

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● Existing Navy Fixed Stations

⊙ Proposed additional Navy Fixed Stations

Figure 20

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