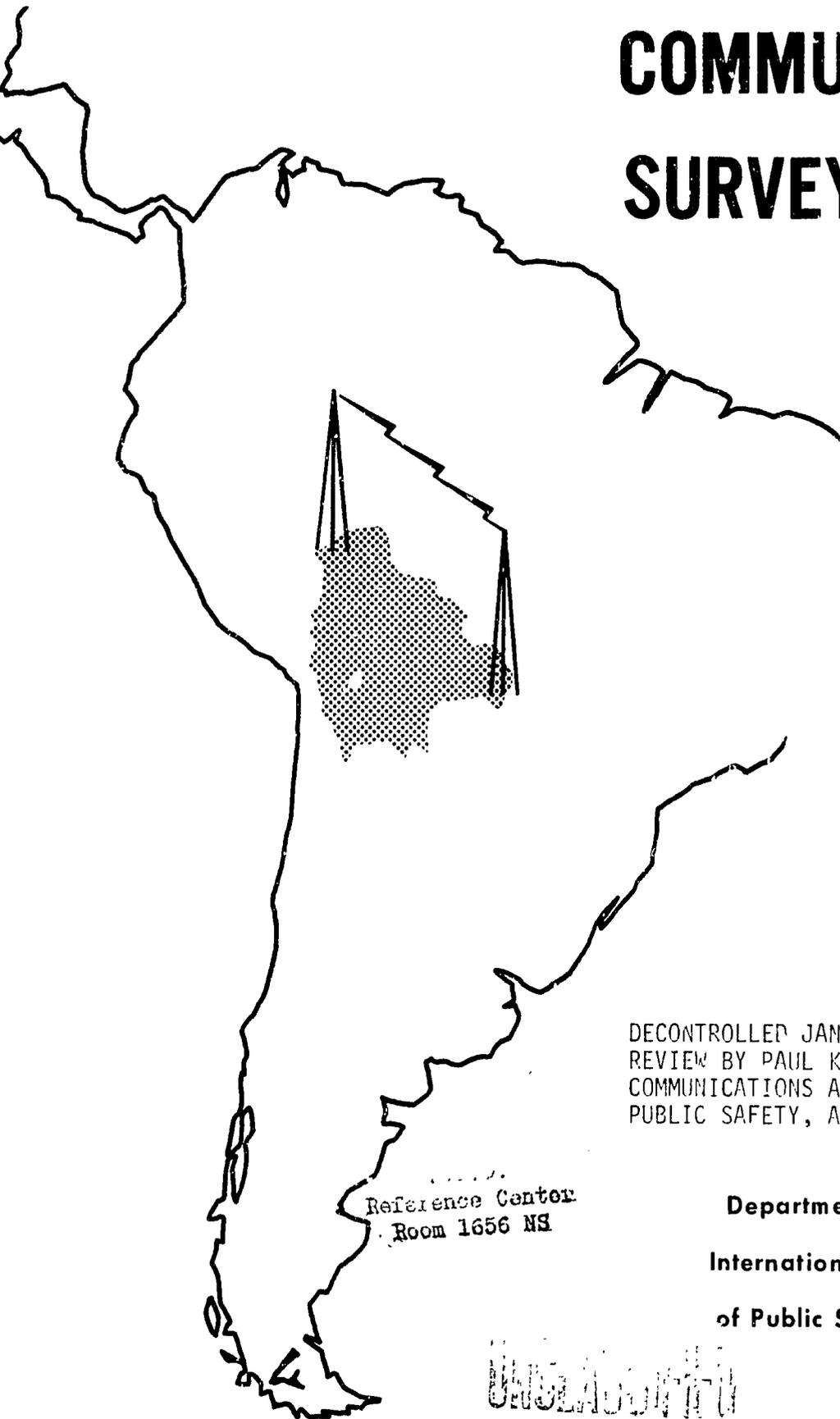


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REPUBLIC OF BOLIVIA POLICE COMMUNICATION SURVEY REPORT



APRIL 1964

DECONTROLLED JANUARY 24, 1975 AFTER
REVIEW BY PAUL KATZ, PUBLIC SAFETY
COMMUNICATIONS ADVISOR, OFFICE OF
PUBLIC SAFETY, AID/W

Reference Center
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Department of State Agency for
International Development Office
of Public Safety Washington D.C.

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SECRET

REPUBLIC OF BOLIVIA POLICE

COMMUNICATIONS SURVEY

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Public Safety Advisors, Communications

Office of Public Safety
Technical Service Division
AGENCY FOR INTERNATIONAL DEVELOPMENT

April 1964

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GLOSSARY

- USAID/B - United States Agency for International Development/Bolivia
- OPS - Office of Public Safety AID, Washington, D. C.
- GOB - Government of Bolivia
- COCC - Combined Operations Communication Center
- CISF/B - Civil Internal Security Forces of Bolivia, which consist of the National Police (Policia Boliviano), the Traffic Police (Transito) and the Customs Police.
- LAL - Lloyd Aerec Boliviano (Bolivian Internal Airline)
- AM - Amplitude variation or modulation of a radio frequency carrier wave with speech or tone in which process two side bands, one above and one below the carrier are produced and contain the intelligence. The entire composite is transmitted simultaneously.
- CW - Telegraphic Code Words (e. g. MORSE)
- FM - Frequency variation or Modulation of the Carrier Wave with Speech
- MCW - Amplitude variation or modulation of an interrupted radio frequency carrier wave with an audio tone
- SSB - Single Side Band. The energy normally contained in the carrier and two sidebands of an AM transmission is concentrated in one sideband. The selected sideband may be either the upper or lower and contains the same intelligence and capabilities as that obtained in AM Transmission.
- VHF - Very High Frequency, 30 to 300 Megacycles

FOREWORD

In response to a request made by USAID/B, with concurrences of the Government of Bolivia, a survey of the telecommunications capabilities of the National Police, Traffic Police, and Customs Police was conducted by OPS representative Donald I. Moermond from February 4, to March 26, 1964, assisted by Mr. Charles Redlin from March 5, to March 22, 1964.

In this report, an effort has been made to evaluate the existing telecommunications facilities, personnel, systems, and organizations of the internal civil security forces to identify areas in which improvements can be made. Suggestions and recommendations, for consideration by the GOB, USAID/B, and AID/W, define technical and administrative assistance needed to assure effective development of the combined telecommunications system for these forces.

The report identifies existing communications systems in Bolivia, such as those for Bolivian Military and civil security forces and commercial facilities, and explains their capabilities as related to the proposed CISF/B telecommunications system.

In addition, an effort has been made to identify the immediate and future communications requirements for equipment, personnel training and logistic support. The report is intended to form a basis for USAID planning for the telecommunications segment of its Public Safety Program in Bolivia.

During the survey in Bolivia the OPS representatives discussed the Public Safety Communications requirements with the Ambassador to Bolivia, the Director of USAID/B and his staff, and worked closely with the Chief of the Public Safety Division. Through the cooperation of the U. S. Military Mission personnel, the OPS representative was able to accompany an inspection team in visits throughout southern Bolivia. The Public Safety Division Customs Advisor, USAID/B, assisted the OPS survey team in reviewing the communications needs of the Customs Police.

Col. German Lena, Commandant of the National Police, and members of his staff gave freely of their time and assisted the survey team in every way possible. Major Rodolfo Tapia, Dr. Antonio Vidaurre, and Professor Carlos Gardenas assisted in developing the curricula for the radio operators and management courses which were initiated by the survey team. The Bolivian Police made available the police airplane to assist in the survey of the northern areas of Bolivia. Col. Jaime Costa of the National Police worked in very close cooperation with the survey team in planning for the development of an integrated operations and communications center as well as a central repair shop in La Paz.

INTRODUCTION

The Republic of Bolivia is bounded on the north and east by the Republic of Brazil, on the southeast by the Republic of Paraguay, on the southwest by the Republic of Chile, on the west by the Republic of Peru and on the South by the Republic of Argentina. The land area is larger than Texas and California combined and contains considerable mountainous and jungle terrain. Bolivia has a population of approximately four million.

There are approximately 1600 miles of railroads including portions of lines which are being operated while under construction. There are about 3000 miles of all weather roads and 9000 miles of roads which are impassable during the rainy season.

There are several thousand miles of navigable river waters in the forest lowlands in the northern regions. These waterways furnish the major means of transportation in this area.

Air transportation plays an important role in Bolivia. Lloyd Aereo Boliviano (LAB), based in Cochabamba, maintains freight and passenger service within Bolivia, linking all the main cities and towns. LAB also provides service to the Beni regions.

The major law enforcement bodies of Bolivia are:

1. The National Police (Policia Boliviana) with an approximate strength of 6000 men is primarily responsible for maintaining law and order in urban as well as rural areas, including control of the nation's borders.
2. The Traffic Police, with an approximate strength of 500 men, is responsible for traffic control in the major cities.
3. The Customs Police, with a strength of approximately 750 men, is primarily responsible for collection of duties, foreigner control, and coordination with the National Police in Border control.

4. The Bolivian Army has an estimated strength of 6000 men and is primarily responsible for the defense of the country but also maintains law and order in many of the smaller communities not represented by the police.

Major problems affecting internal security are:

1. The control of the movement of goods and people across the country's borders.
2. Urban crime.
3. Subversive activities.
4. Civil disturbances and
5. Terrorism.

SUMMARY

In considering police telecommunications requirements, the critical problems can best be illustrated by the fact that less than 7,000 men, with little communications capabilities at the present time, are attempting to maintain law and order and to protect the sovereignty of the state in a large area typified by mountains and jungle.

To equip the civil internal security forces with the necessary telecommunications capability to carry their responsibilities adequately and effectively, it is essential that a national telecommunications network be established. This system must function 24 hours a day and must be controlled jointly by the respective security forces.

At the present time police communications capabilities are limited to: a modest amount of FM two-way mobile radio equipment in the hands of the Traffic Police for use in La Paz, U.S. military type handy-talkie equipment for riot control, and a recently installed voice radio SSB network to connect the six major cities. Additional principal facilities in the country are the Government administrative network, the Military network and that operated by the Lloyd Aero Boliviano airline.

In order to establish the required internal security telecommunications system, it is recommended that:

- A. the SSB system be expanded to form a nation wide coordinated civil internal security force network;
- B. a combined operations control center be established in La Paz,
- C. appropriate organizational changes be made in the National Police to accommodate the requirements for administration of the communications system,
- D. the municipal mobile radio patrol capabilities for La Paz be expanded and that these capabilities be provided to other major cities in the country,

E. facilities for training operational, administrative and technical telecommunications personnel be established,

F. a central radio maintenance facility in La Paz be established; and

G. the U.S. provide a public safety telecommunications advisor to assist the GOB in the planning and implementation necessary in reaching the objectives set forth jointly by the Mission and the GOB.

The estimated cost to the U.S. for the equipment required to support the establishment of the system that is proposed herein is \$126,000 for Fiscal Year 1964 and \$90,000 for Fiscal Year 1965. Costs for technical assistance would be approximately \$20,000 per year.

OBSERVATIONS

Field Observations

Upon examination of the telecommunications capabilities of the internal security forces in light of their mission it was found that these were meager indeed. For all practical purposes these consisted of the following:

A. National Police.

A direct result of U.S. police assistance is the establishment recently of the modest telecommunications network that links La Paz, Oruro, Cochabamba, Santa Cruz, Potosi and Villazon. (See Figure 2) The salient feature of the network is the provision of voice communications by means of 100 watt SSB transceivers. The opportunity for the application of this network to the broad spectrum of security requirements for the National Police is lessened since radio-telegraph (CW) is not provided. Some of the SSB units of this system were providing only marginal voice communications from one station to the other with La Paz. In addition, the National Police are equipped with 40 AN/PRC 6 U.S. military type hardy-talkie transceivers, which are provided with a frequency on the Bolivian Army wavelength. This equipment is intended for use in riot control situations.

B. Traffic Police.

The traffic police force is a separate organizational entity from the National Police. As the name implies this force is charged with the responsibility for traffic control in urban areas. Also as a result of USAID/B assistance, the traffic police for La Paz were provided a limited number of VHF-FM mobile transceivers and a base station. This system is designed for simplex operation and for use on a frequency mode of transmission that is different than those used for the National Police voice system mentioned above or those assigned to the military forces. Traffic Police

force deployment in urban areas other than La Paz has no radio communications capabilities to support its operations.

C. Customs Police.

No telecommunications facilities have been provided the Customs Police. When the need arises the Customs Police attempt to use nearby radio facilities of the military forces. As can be seen by Figure 3, depicting the military communications network, and Figure 4, which presents graphically the proposed telecommunications system.

Military Communications Capabilities.

The Bolivian Army Radio Communications system is comprised of fourteen 1,000 watt SSB transceivers, providing voice and CW facilities for communication. These are situated as indicated on Figure 3. It was reported that these stations were providing suitable contact between one another and with headquarters in La Paz. The problems of logistical support, insufficient numbers of trained maintenance personnel and a lack of spare parts suggests that the system is providing marginal service at this time. However, it appears that, with the assistance of competent U. S. Military Mission personnel, and with a continued and greater contribution to the support of the system on the part of the GOB, these facilities will prove wholly satisfactory for meeting the military force's needs.

The Government Administrative Network.

This system consists of a combination of equipment types which provide certain parts of the country with voice and CW communications, while other areas are serviced solely by CW. The character of this system is reflected in Figure 5. The reliability of this system from a standpoint of it's operational purpose does not lend itself to meeting internal security force requirements. During the period of observation the CW facility at Guayarameria was providing marginal service to points in the northern region and to La Paz.

The National Airlines Network.

The only nation-wide commercial telecommunication system worthy of note is that maintained and operated by the nationally owned Lloyd Aereo Boliviano. This

system is for radio telegraph operation only. Due to the character of the system and its operational purpose it is not suitable for meeting the police requirements as well. This system is shown on Figure 6.

Logistics and Maintenance.

The problems of transportation within the country are acute in many areas, particularly during the rainy season. The only means of travel to the northern region is by aircraft and there are few airstrips. Border patrol forces rely on this means of supply, augmented by river boat transportation from airdrop sites. This accentuates the maintenance problem as it pertains to caring for and repairing the radio equipment that is utilized for any of the systems being used. Factors affecting the logistics problems relative to the function of the police in this region, and the military forces as well, include means for sustenance in the jungle, medical supplies and treatment availability, the need for communications capability, and frequent boat damage caused by debris in the water. The team found that maintenance of the equipment being used by the military forces suffered from a lack of trained manpower and the availability of adequate spare parts. While the National Police network is still new, it can be expected to be out of service at times due to lack of spare parts and the unavailability of properly trained repair personnel. The team observed that there was insufficient training of telecommunications operations personnel and radio technicians.

In an attempt to meet this problem, Technician Moermond, with the assistance of members of the USAID/B Public Safety Division and the National Police developed and initiated a radiocommunications management course and a radio operator's course. These courses commenced during the survey period and are described in detail in Appendices 2 & 3.

AREAS REQUIRING IMPROVEMENTS

A. Coordination.

The survey team identified a lack of inter-agency coordination and planning for telecommunications which is essential to the support of internal security operations. Completely independent systems, such as that for the Traffic Police and the National Police, do not provide the facility for cooperative police efforts that are required in carrying out police responsibilities.

B. National Telecommunications Network.

The police forces of the country are serviced by some form of security telecommunications system in but a few cities and regions at the present time. This limited capability is not sufficient to meet the needs of these forces.

C. Municipal Radio System.

Only La Paz has any form of mobile radio patrol to support the traffic police operations. The survey team found the radio patrol system used for purposes of traffic control was less than that required, and in addition no capability exists for this VHF-FM radio equipment. Several other major cities have little operational communications capability.

D. Training.

The survey team found almost a total lack of communications training facilities for the internal security forces.

E. Technical Assistance.

The survey team feels that there is a lack of trained manpower to organize effectively and properly the resources necessary to resolve the problems obstructing the development of an effective operational telecommunications system for the combined internal security agencies. Further, it feels that certain kinds of resources will be required that are not locally available to the Government.

RECOMMENDATIONS

In order to improve the telecommunications capabilities of the internal security forces of the GOB, the survey team recommends that the GOB and various segments of the U. S. Government consider the following actions as solutions to the communications problems. A detailed description and itemized list of material recommended for the proposed telecommunications system is provided as Appendix 1 of this report.

1. It is recommended that a combined operations communications center be established in La Paz at which each of the various internal security force commands will be represented.

A major step on the part of the GOB is urged which will allow the implementation of other development plans. A major contribution toward the provision of proper communications facilities would be the coordination of the efforts of the National Police, the Traffic Police and the Customs Police. For operational purposes the center would demonstrate the efficacy of the command post concept. In order to administer effectively the proposed combined operations communications center, a properly proportioned communications staff is essential. Such an organization structure is recommended as shown on Figure 1.

2. It is recommended that the National Telecommunications Network be expanded and modified to provide the Police forces with a minimum communication capability necessary to fulfill their assigned mission.

The National Police are presently employing voice operations. While this mode of transmission satisfies the administrative requirement, single side band (SSB) communications equipment providing a telegraph (CW) capability is required and recommended for internal security operations.

To provide sufficient flexibility for the police field forces, additional portable SSB communications equipment is recommended.

To assure continued operation of the police communications equipment during possible power failures, standby electric power generators are recommended.

It is recommended that an adequate maintenance facility with proper test equipment to support this entire system be provided.

3. It is recommended that the National Police be provided adequate VHF-FM radio equipment to establish a radio patrol car system in La Paz.

Communications equipment provided for this purpose should be compatible with that equipment presently used by the Traffic Police.

To assist the National Police in the control of civil disturbances in La Paz, twelve hand-carried VHF-FM radios fully compatible with the proposed radio patrol car system should be provided.

It is recommended that in fiscal year 1965, phase two of this plan provide a basic municipal type radio patrol system in the larger cities.

4. It is recommended that the training courses recently initiated by the survey team be continued to prepare a sufficient number of police officer personnel to effectively operate and maintain this proposed telecommunications system. (See Appendix 2 & 3)

- a. While some training will be conducted under the guidance of the Public Safety Communications Advisor, the police should also initiate an aggressive program for basic and advanced training for presently assigned and newly recruited personnel.

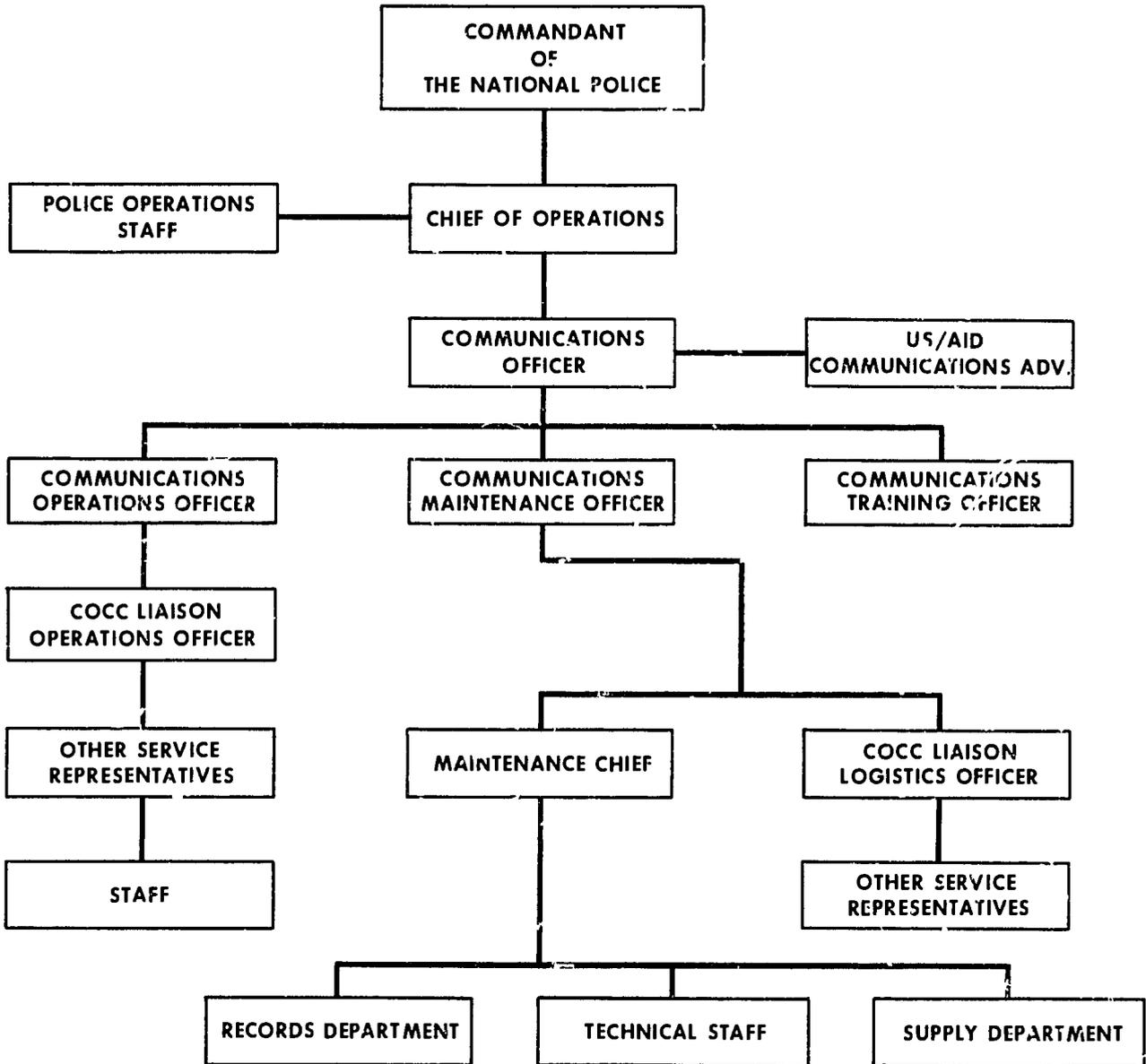
- b. USAID should consider sending one telecommunications officer to the U. S. for junior radio engineering training for eighteen months. This would help provide needed technical support for the police telecommunications system.

- c. USAID should consider sponsoring one participant for the municipal police operations course in the U. S. for approximately six months. The participant should be the Municipal Police operations officer who will be responsible for coordinating the utilization of the radio patrol car systems.

5. It is recommended that a USAID Public Safety Communications Advisor be assigned to the U. S. Public Safety Program in Bolivia.

- a. The communications advisor would be responsible for the necessary USAID administrative procedures to support the telecommunications project and the overall coordination and planning with the police forces telecommunications staff. In addition this advisor would be concerned with actual engineering and installation phases of this project. He would also be responsible for coordinating and advising the National Police, Customs Police and Traffic Police on the proposed integration of their communications facilities.

- b. This advisor should arrive in Bolivia as soon as possible in order to assist in the basic planning of the proposed USAID telecommunications project and carry forward recommendations outlined in this report.



PROPOSED COMMUNICATIONS STAFFING PATTERN

Figure - 1

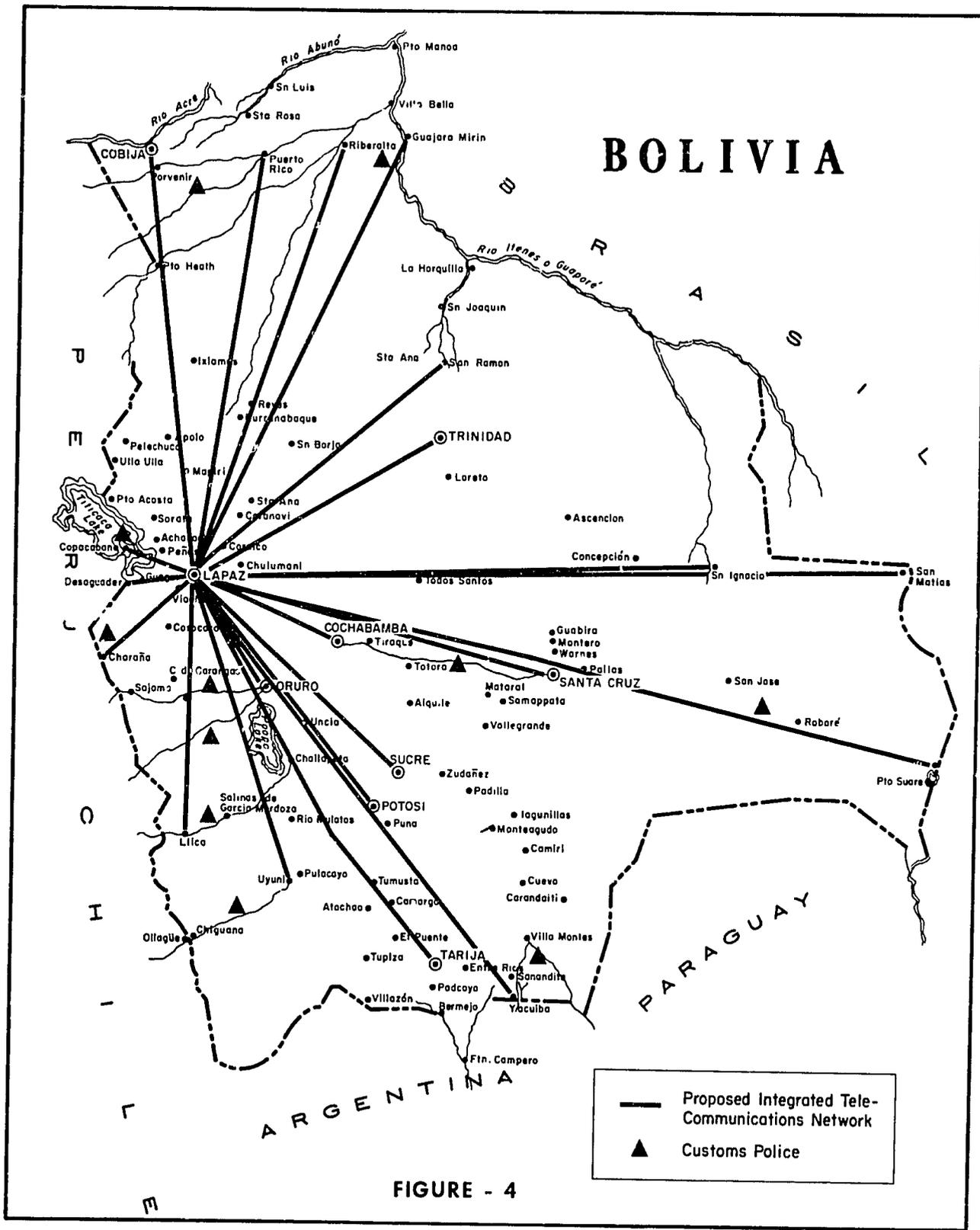


Figure - 4

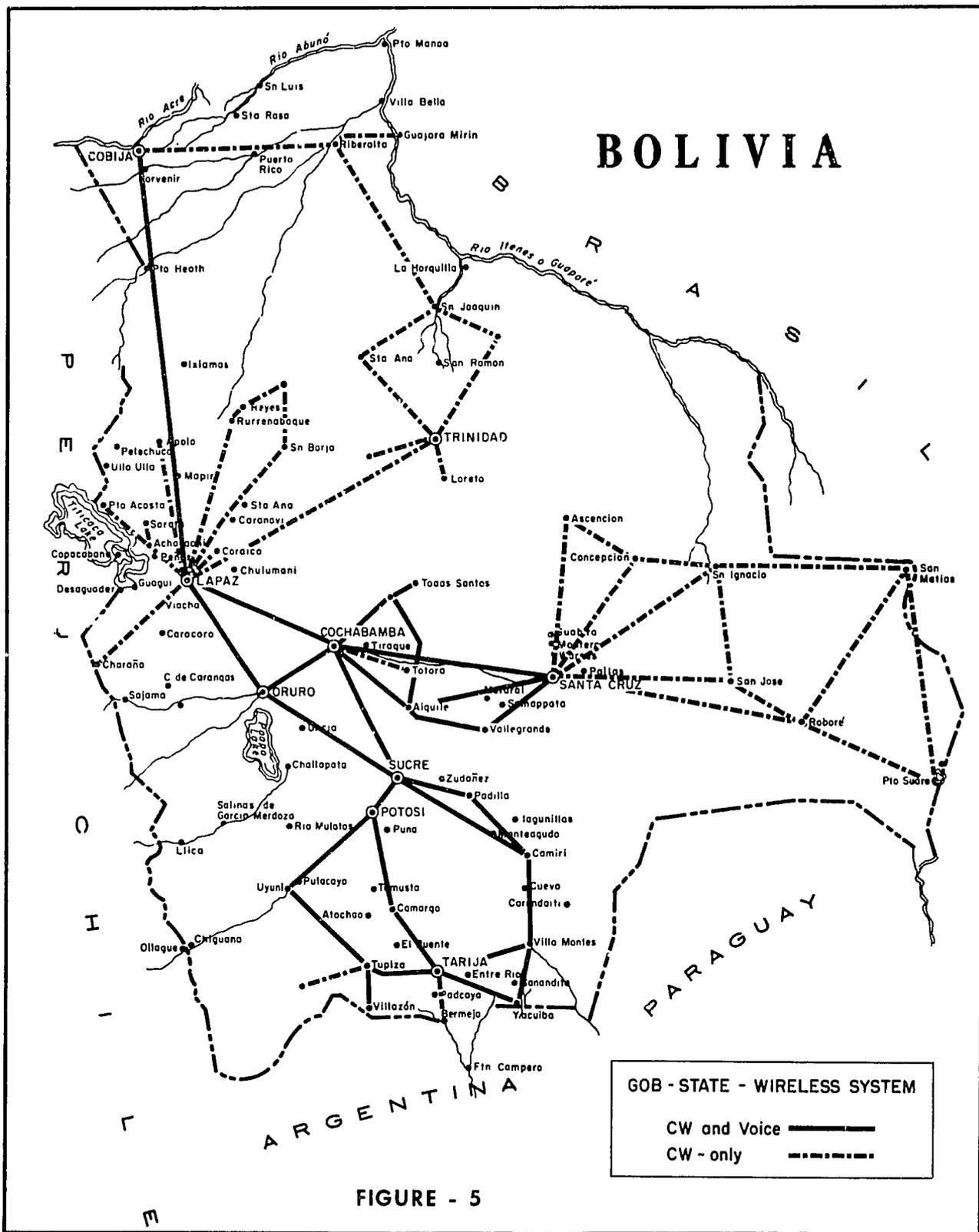


Figure - 5

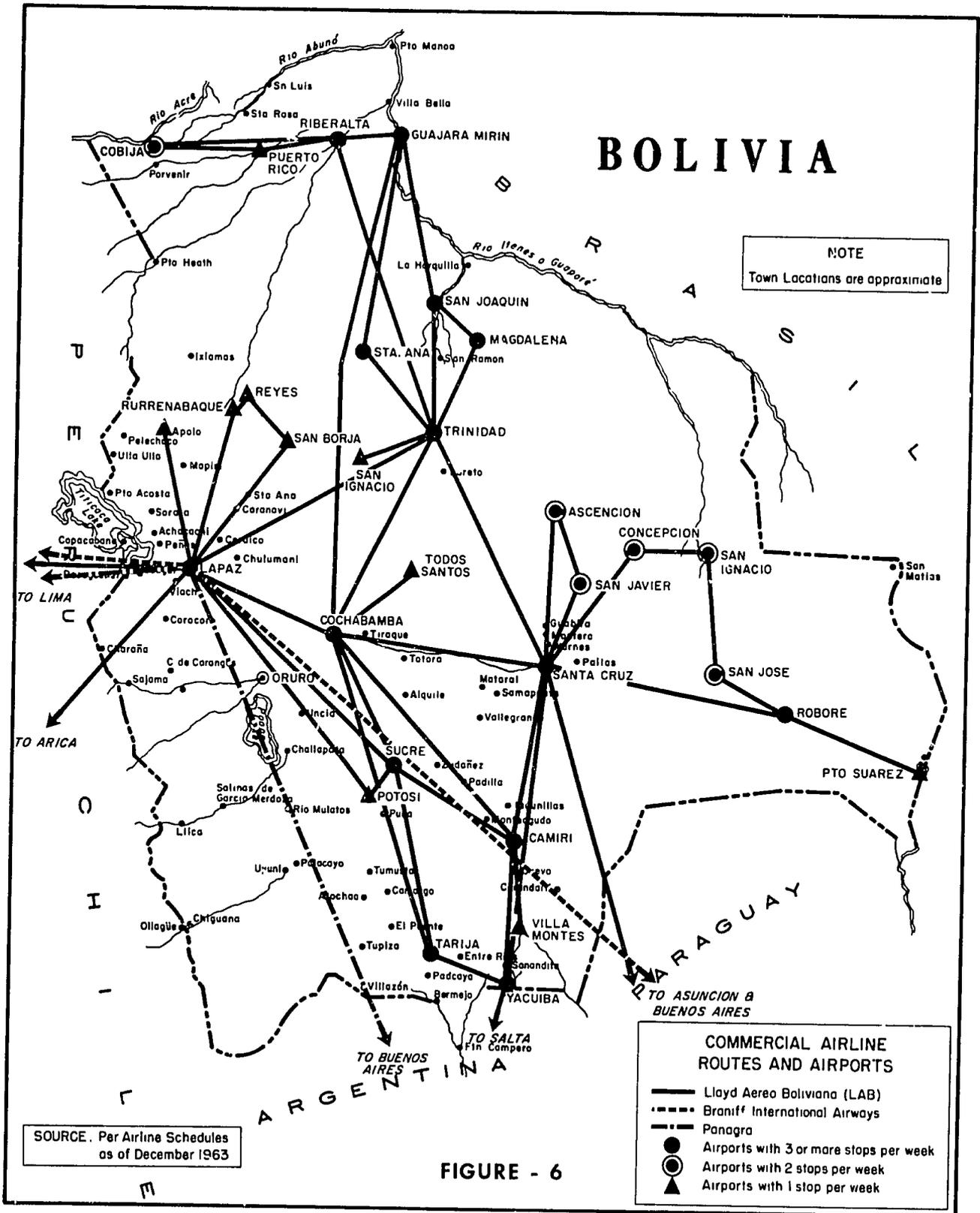


Figure - 6

APPENDIX 1

PUBLIC SAFETY COMMUNICATIONS COST ESTIMATE FOR THE NATIONAL AND MUNICIPAL RADIO NETWORKS OF THE CIVIL INTERNAL SECURITY FORCES OF BOLIVIA. PHASE 1, FISCAL YEAR 1964 AND PHASE 2, FISCAL YEAR 1965

The following cost estimates are given to assist USAID/B to adequately fund for telecommunications commodities. The equipment listed herein meets the immediate needs for minimum communications support to these forces in accomplishing its internal security mission. The equipment supports the recommendations of this survey and are written to assist in future system planning for the expansion of existing facilities. The spare parts listed are needed to assure the sustained operation of the system.

COMMODITY EXPENDITURE FOR FISCAL YEAR 1964	\$126,000.00
COMMODITY EXPENDITURE FOR FISCAL YEAR 1965	<u>90,000.00</u>
TOTAL	\$216,000.00

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A. FY 64 Expenditure \$126,000 for Commodities as follows:

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	30	Single Sideband Transmitter/Receivers, 100 watt PEP minimum output to antenna feeder, capable of upper and lower sideband operation—all components included and selectable by a convenient front panel switch. Unit to have a frequency range of 3 to 15 megacycles, a minimum of four crystal controlled channels with frequency change accomplished by a channel selector switch. Equipment supplied must be capable of local or remote operation with provisions for 600 ohm phone patch input and output in addition to regular operating requirements. Units shall be capable of voice, MCW and VOX operation from either a remote or local operating position. All modes of operation specified shall be accomplished utilizing integral circuits without the use of modular attachments. The receiver section shall be of the double conversion type. Equipment to be packaged in an integral cabinet containing all functional circuits with provisions for operation from 110/220 volt 50/60 cycle power source without the use of an external line transformer. Equipment to be supplied complete with crystals, microphone, CW key, doublet antenna, coaxial feeder with all accessories and hardware for a complete fixed installation. Each unit shall be provided with a set of spare tubes, depot spare parts kit and instruction manual.	\$ 54,000.00
2	25	Gasoline Electric Generators - 1.5 KW - 115/230, 50 cycles AC, single phase - Air cooled. Each unit shall be supplied with one set of depot spare parts.	17,000.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
3	60	40' towers (2 per location) with gin pole erection kits and all necessary hardware for installation	\$ 6,500.00
4	5000'	#12 copper stranded antenna wire	200.00
5	10,000'	Galvanized guy wire, stranded -3/16"	1,500.00
6	350	Guy wire clamps 3/16" galvanized	35.00
7	350	Antenna insulators, porcelain, 1" x 3"	350.00
8	2,000'	Coaxial Cable RG/11U - 72 ohm. - Mil Standards	300.00
9	100 ea. Type	Coaxial adapters as follows: PL-259 PL-258 and SO-239	250.00
10	200 ea.	Type 6146 Vacuum Tubes	650.00
11	88	Toggle Switches - 24 each DPDT - 64 each SPST - General Cement or equal	100.00
12	64	Panel Indicators, Herman H. Smith Inc. Open Type - 1" Jewel type 1918 .. Jewel colors 24 red, 10 green, 15 amber and 15 blue .. provided with two bulbs each.	125.00

ESTIMATED TOOLS REQUIRED FOR ONE RADIO EQUIPMENT MAINTENANCE CENTER TOGETHER WITH ONE TECHNICAL TRAINING FACILITY

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	25	UNGAR - soldering #776 Handles - with one each of the following furnished with each handle. One #4033 tip 47 1/2 watts; One 4036 tip 47 1/2 watt; One 4039 tip 47 1/2 watt; One 4045 tip with 3/16" tap for use with the 800 series tiptlets. With 800 series tiptlets (one each) #PL834, PL823 and PL824. Ungar Elec. Tools Inc. , 4101 Redwood Ave. , Los Angeles 66, Calif.	\$ 300.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
2	40	Pounds Multicore - Five Core Solder Erison Savbit 60/40 Alloy SWG-18	\$ 125.00
3	6 ea.	Boxes of 12 tins each - Minnesota Mining Co. Scotch #88 Plastic Electrical Tape. 3/4" x 66' rolls - No Substitute	140.00
4	12 ea.	Soldering Aid Kits - Norseman #ALSA-4	60.00
5	12 ea.	Handicraft Knife Chests No. 32 - (Handi- craft Tools, Inc., Long Island City, N. Y.)	100.00
6	25 ea.	Needle Point Diagonal Cutting Pliers Chrome Plated Mirror Polish - 5"	100.00
7	25 ea.	Chain Nose Pliers, 6", Chrome Plated Mirror polish	100.00
8	8 ea.	Tongue-Groove Joint Pliers - Chrome Plated Mirror Polish - 10"	35.00
9	6 ea.	Combination Pattern Snip - 12"	25.00
10	10 ea.	Nut Driver Sets - Exelite #127 - Numbers 6 through 12 inclusive	75.00
11	10 ea.	Sets - Exelite Round Blade Screwdrivers As Follows: No. R-3324 - 3/32" x 4" No. R-186 - 1/8 x 6" No. R-5328 - 5/32 x 6" No. R-3168 - 3/16 x 8" No. R-148 - 1/4 x 8" No. R-5168 - 5/16 x 8"	85.00
12	8 ea.	Sets - Xcelite Phillips Screwdrivers As Follows: No. SX-101 No. SX-102	

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
12 (cont'd)		No. X-102	
		No. X-103	\$ 72.00
13	8 ea.	New Combination Pliers -GSA specification 5120 - 223 - 7396	15.00
14	4 ea.	Electric Drills - 1/4" "Quarter Inch" - 220 volt 50 cycle -W/Standard equipment, GSA 51-30- 293-1846	160.00
15	4 ea.	Drill sets - in folding metal case. One each straight shank wire gauge drill from No. 1 through 60 inclusive.	48.00
16	8 ea.	Sets - adjustable wrench (Crescent) 4", 6", 8", 10" inclusive - fed spec. GGG-W-63lb	125.00
17	8 ea.	Tool chests - suggested type reference - McMaster - Carr Co. No. 6578A1, or Craftsman	325.00
18	8 ea.	Combination Square Fed. Spec. GGG-S-656a	12.00
19	8 ea.	Heavy Duty Hacksaw - W/6 each packs of 12" medium tooth spare blades. GSA Spec.	20.00
20	12 ea.	Gripso Triggermatic Vise Pliers GSA #5120-494-1911 (Sept. 1960 Cat.)	35.00
21	8 ea.	Center Punch - Automatic GSA 5120-293-3466	25.00
22	8 ea.	Crimping tool - Champ - Lafayette Radio HD-66 (Cat. 590-1959) GSA Spec.	35.00
23	4 ea.	Sets Files - Each set shall contain one flat, one half round, one triangular, one square, one round and one mill file.	

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
23 (cont'd)		10" - Flat - GSA 5110-249-2850	
		10" - Half Round 5110-233-7683	
		8" - Triangular 5110-156-0208	
		8" - Square 5110-238-9660	
		8" - Round 5110-234-6553	
		10" - Mill 5110-241-9138	
24	200 ea.	Alligator Clips - W/flexible insulators for each 100 Red, 100 Black - to fit above clips	\$ 25.00
25	3 ea.	Sets - Greenlee Chassis Punches - No. 730 Round - Each set to contain one each of the following sizes -- 1/2", 9/16", 5/8", 3/4", 7/8", 1-1/8", 1-3/16", 1-1/4" and 1-1/2".	60.00
26	4 ea.	Bench Vise - Swivel Base - GSA 5120 - 118 - 1182.	125.00
27	2 ea.	Bench Grinder - 6" Standard Ball Bearing - W/two grinding wheels, 1 medium, 1 fine, - 220 volt - 50 cycle AC Motor. Furnished with Wire (Stain- less Steel) Buffing Wheel and fitted with Safety Grinder Shields.	200.00
28	1 ea.	Floor Type Drill with Motor & V Belts - 220 volt 50 cycle single phase - suggested reference - Atlas #1060 . . provided with 29 piece drill set (bits). . Range of sizes 1/16" through 1/2" by 64ths. With stand and each bit receptacle clearly marked for size. Atlas Press Co., Kalamazoo, Michigan	225.00
29	1 ea.	36" Metal Shear - suggested type reference - Wysong #163E 18 Gauge capacity Wysong & Miles Co., Greenboro, N. C.	450.00
30	1 ea.	Box Brake (Universal Box and Pan Bending Brake) Bench Model Size BP-2-suggested reference - Dreis and Krump Mfg. Co., Chicago 38, Ill.	380.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
31	1 ea.	Notching Shear - suggested type reference - Whitney Model 100 - Whitney Metal Tool Co. Rockford, Ill.	\$ 240.00
32	1000 ea.	AMP - Solderless Terminals - to fit #6 stud - Spade type - for #16 to 22 wire - Crimp end plastic covered.	60.00
33	1000 ea.	AMP - Solderless Terminals - to fit #8 stud - Spade type - for #16 to 22 wire - Crimp end plastic covered.	60.00
34	1000 ea.	AMP - Solderless Terminals - to fit #4 stud - Closed type - to fit #16 to 22 wire - Crimp end plastic covered.	60.00
35	1000 ea.	AMP - Solderless Terminals - to fit #10 stud - Spade type - to fit #12 to 14 wire - Crimp end plastic covered.	75.00
36	1000 ea.	AMP - Solderless Terminals - to fit #1/4 x 20 stud . . . Closed type to fit #10 to 12 wire - Crimp end plastic covered.	75.00
37	24 ea.	Gross Self Tapping Screws - Cadmium plated Sheet Metal - All Pan Head - as follows:	
		a. Gage 4 - 1/4" Long	
		b. Gage 4 - 3/8" Long	
		c. Gage 4 - 1/2" Long	
		d. Gage 6 - 1/4" Long	
		e. Gage 6 - 1/2" Long	
		f. Gage 6 - 3/4" Long	
		g. Gage 8 - 1/2" Long	
		h. Gage 8 - 3/4" Long	
		i. Gage 8 - 1" Long	

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
37 (cont'd)			
		j. Gage 10 - 1/2" Long	
		k. Gage 10 - 3/4" Long	
		l. Gage 10 - 1" Long	
		m. Gage 12 - 3/4" Long	
		n. Gage 12 - 1-1/4" Long	
		o. Gage 14 - 1-1/4" Long	\$ 360.00
38	24 ea.		
	Gross	Machine Screws - With Nuts - Cadmium Plated - All Pan Head - as follows:	
		a. # 4-40 - 1/4" Long	
		b. # 6-32 - 1/4" Long	
		c. # 6-32 - 1/2" Long	
		d. # 6-32 - 3/4" Long	
		e. # 6-32 - 1" Long	
		f. # 8-32 - 1/2" Long	
		g. # 8-32 - 1" Long	
		h. #10-32 - 3/4" Long	
		i. #10-32 - 1-1/4" Long	
		j. #1/4x20 - 1" Long	
		k. #1/4x20 - 1-1/2" Long	350.00
39	1 ea.	500 foot spool - heavy duty Cable - Rubber sheathed - 600 volt double conductor - Fed. Spec. J-C-90a - GSA 6145-188-3653 #14 AWG stranded	40.00
40	8 ea.	Heavy Duty Step Down Transformers - 230 to 115 V - suggested type reference, MacMaster-Carr-Cat. #66 Page 991 - <u>UIX - Capacity 3000 VA.</u>	650.00
41	8 ea.	Sets - Plug Taps - Carbon Steel - For Machine screw sizes 4-40, 6-32, 10-24, 10-32, 8-32, 12-24, 1/4 x 20, 5/16 x 18, 3/8 x 16, 1/4 x 28, 5/16 x 24, 3/8 x 24.	95.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
42	4 ea.	1000' spools - Two conductor Twisted Pair Shielded cable - Belden #8737 or equal	\$ 260.00
43	10 ea.	1000' spools - Hook-up wire. Tinned copper vinyl insulated, cotton braid lacquered. #20 stranded. as follows: 2 spools - black, 2 spools red, 2 spools - blue, 2 spools yellow, and 2 spools green (200° C temperature insulation).	350.00
44	2 ea.	1000' spools - Test Prod Wire - one red - one black belden #8899	160.00
45	30 ea.	Sheets - Aluminum - 18 Gauge - 3' x 4' - (for radio chassis construction and other radio uses)	150.00
46	8 ea.	Tap wrenches - for use with item 41.	17.00
47	1 ea.	2000' Spool - 12 conductor - 6 pair - <u>Each pair shielded</u> #16 stranded wire, <u>Direct burial Cable</u> .	1,400.00
48	25 ea.	Pliers, Extra long nose - (2 and 3/4" nose) without cutters . . Insulated handles. . Mirror finish chrome or cadmium plated . . high grade steel . . total length no more than 7".	100.00
49	10 ea.	Electronics Tweezers. GSA 5120-288-9685	15.00
50	20 ea.	Files - Tungsten Point - Contact Dressing, suggested type reference, . . 5-1/4" long - Width 4/16" and .044" Thick.	20.00

FM BASE STATION, MOBILE AND PORTABLE EQUIPMENT
REQUIRED FOR THE LA PAZ MUNICIPAL DEVELOPMENT

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>
1.	1 ea.	FM base station - 25-50 Mcs range, 100 watts RF output. Transmitter/Receiver Units to be in

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1. (cont'd)		accordance to standard OPS specifications; <u>Dual Channel</u> , with desk top remote control console and appropriate inter-connecting cable; Frequency of operation to be - Channel 1 - 47 Mcs; Channel 47.33Kcs. To be provided with depot spares and two sets of spare tubes. With 5.5 db gain coaxial skirt antenna.	\$ 2,100.00
2.	10 ea.	FM Mobile Transceivers - 25-30 watts RF output - <u>Dual Channel</u> - 25-50 Mc range. Trunk Mount - Carrier Squelch, body mount ant. Channel 1 to be 47 Mcs and Channel 2 to be 47.33 Mcs. All mobile accessories shall be included with each unit - plus or minus 15 Kc deviation. To be provided with 5 each depot spare parts kits and two sets spare tubes with each unit. Units to conform with standard OPS specifications.	14,500.00
3.	12 ea.	FM Radiophone - Portable - Transisterized - 1.4 watt RF power output, tuned and tested ready for use on two channels - channel 1-47 Mcs., and channel 2 - 47.33 Mcs. To net with items 1 and 2 above. Each to be provided with a Nickel Cadmium rechargeable battery supply...plus and minus 15 Kcs deviation... To be provided with telescoping antenna for use on above frequencies. The unit shall meet the standard OPS technical specifications. Complete with the following accessories: a. Carrying cases, leather b. Depot spare parts kits c. Dummy load antenna (2 only) and power output indicator accessory.	

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
3. (cont'd)			
		d. 12 spare Nickel-Cadmium batteries.	
		e. Test Jig. (one only)	
		f. The only, battery charger unit, complete to recharge the nickel-cadmium storage batteries.	
		g. Each set complete with tuning tools	\$ 6,000.00

ESTIMATED TEST EQUIPMENT REQUIRED FOR ONE RADIO EQUIPMENT MAINTENANCE FACILITY TOGETHER WITH ONE TECHNICAL TRAINING FACILITY

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	6	Volt-Chm-Milliammeter - Simpson 260 - AC-DC - with carrying case - with test leads	\$ 300.00
2	6	VTVM Tester - 12 megaohm input impedance (assembled) with RF <u>probe test lead</u> and other standard test leads provided with each unit.	200.00
3	1	RF Signal Generator, suggested type reference - Hewlett-Packard model 606A. O-60 Mc range with test leads and 50 ohm termination pad cabinet type.	1,800.00
4	6	Thru-line radio frequency wattmeters, M. C. Jones or equivalent, for operation 2 through 225 Mcs. with scales 10, 100 and 1000 watts. Provided with appropriate leads, plugs and coaxial adapters (assembled)	540.00
5	6	Tube Testers - suggested type reference - Hickock Model 6000A, portable model - with up to date roll chart -	1,250.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
6	1	Battery Eliminator - suggested type reference OPAD - KM93B or Christie BC030-50, with special variation 220 volt - 50 cycle single phase input, 0-32 volt DC output at 0-50 amp.	500.00
7	1	Deviation Meter - Provided with all appropriate test leads. Measurements Model 140. or equal.	695.00
8	10	Voltage Adjusters, manually operated. 50-60 cycle single phase. Output voltage 115 volts. 750 to 1000 watt capacity - suggested type reference - McMaster-Carr supply co. Chicago, Ill. No. HO3X09 - in compliance with MCM specifications page 991 Cat. #68 - or STACO ADJUST-A-VOLT.	500.00
9	10	Automatic voltage regulators, <u>Input 220 volts 50 cycles</u> , single phase - rated output 1KVA	1,750.00
10	1	Electronic Counter - suggested type reference - Hewlett-Packard Model 524C as specified and described in HP electronic instruments 1960 catalog Pages 90 and 91. Frequency ranges 10 Cps to 10 Mcs and 10 Mcs to 100 Mcs. With standard AC-16D cable assembly, Instruction manual, with high impedance, low capacitance Probe, Cabinet Mount.	2,500.00
11	1	FM Signal Generator - with standard test leads - portable model - with protective cover. Frequency ranges in six bands (25-32) (32-41) (41-54) (132-175) (400-470) (890-960) Mcs. Measurements Model 560.	900.00
12	2	General purpose Oscilloscope - with standard test leads - plus the high impedance test probe.	350.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
13	1	Audio Test Oscillator - suggested type reference Hewlett-Packard Model 650A with the 65A-16D voltage divider, the AC-16A cable assembly, and the AC11GB cable assembly - Cabinet mount.	\$ 350.00
14	2	Transistor analyzer complete with all operating data and test leads.	150.00
15	1	Bird Termaline wattmeter, complete with test cells for 50 to 100 Mc use, in 20-50 and 100 watt power ratings.	200.00
16	1	Millen grid dip meter complete with coils. 2 to 250 Mcs operating capability.	50.00
17	1	RF Load Resistor - Power output indicator - with RF Meter. Bird Termaline 8201 - or equal. W/Connectors.	100.00
18	1	Power supply - suggested type reference - Hewlett-Packard 711A as specified in the HP electronic test instrument 1960 catalog page 119. To be provided with test leads - two red and two black, complete with banana plugs and clips. . Cabinet Mount.	200.00
19		Miscellaneous Technical school equipment, books and supplies. Items to be specified following more detailed study of facilities available and number of students attending.	2,000.00

B. FY 65 Expenditures \$90,000.00 For Commodities as Follows:
FM BASE STATION AND MOBILE EQUIPMENT FOR OTHER
MUNICIPALITIES AND ADDITIONAL RADIO TEST EQUIPMENT
PHASE II

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	5 ea.	FM Base Station - Single Channel - Transmitter/Receivers. 25-50 Mcs range. To be in accordance to OPS Standard specifications. Each unit to be supplied with one set of depot spare parts and two each sets of spare tubes. Frequency of operation to be specified.	\$ 9,000.00
2	30 ea.	FM Mobile Transceivers to comply with standard OPS specifications - single channel - 25-30 watts RF output. 25 - 50 Mcs range. Trunk Mount, body mount antenna, All mobile accessories shall be included with each unit. Provided with 15 depot spare parts kits and 15 sets of spare tubes. Frequency of operation to be specified. Instruction manuals (2 each with each unit) shall be provided for items 1 and 2 above.	33,000.00

LA PAZ REMOTE OPERATION SITE DEVELOPMENT FY 65

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1		VHF Wireless Control Equipment - Remote site La Paz - Detailed equipment to be specified FY 65 following the determination of exact sites and extent of equipment required.	30,000.00
2	2	Electric Power Plants - 115/230 volt - 50 cycles AC Single Phase - 10 KW. With 2 spare parts kits. With automatic line transfer panels and dual heavy duty starting batteries. (Air Cooled)	4,500.00

EXPANSION OF THE RIVER AND MOUNTED PATROL
PORTABLE RADIO SSB TRANSCEIVER NEEDS

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	15	SSB "Back Pack" units - Standard OPS specifications. --- provided with one depot spare parts kit each unit, together with one spare NC rechargeable battery with each unit.	\$ 13,500.00

ADDITIONAL RADIO TEST EQUIPMENT REQUIRED IN FY 65, PHASE II

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	3	Volt-Ohm-Milliammeter - suggested type reference - Simpson 260 AC-DC, with carrying case - or equal with test leads.	150.00
2	3	VTVM Tester - 12 megaohm input impedance (assembled) with RF Probe Test Lead and other standard leads provided each unit.	100.00
3	1	Byrd Termaline wattmeter, complete with test cells for 50 to 100 Mc use, in 20-50 and 100 watt power ratings.	200.00
4	1	RF Load Resistor - with RF Meter - Power output indicator. Bird Termaline 8201	100.00
5	1	Power Supply - suggested type reference - Hewlett-Packard 711A or equal. . Provided with test leads two red and two black, complete with banana plugs and clips, Cabinet Mount.	200.00
6	1	FM Signal Generator - . .with standard test leads - Portable Model - with protective cover. Measurements Model 560.	900.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
7	1	Battery Eliminator - suggested type reference - OPAD - KM93B - or Christie BC030-50, with Special variation 220 volt - 50 cycle single phase input.	\$ 500.00
8	1	Deviation Meter - ...provided with all appropriate test leads. . Measurements Model 140	695.00
9	2	Automatic Voltage Regulators, <u>Input 220 volt 50 cycle AC single phase</u> - Rated at 5000 watts capacity, sola	1,655.00

Appendix 2

RADIO OPERATORS COURSE

GENERAL	TYPE OF COURSE							Total Hours
	Lessons	Practice	Field Trips	Problems	Films	Summary	Tests	
1. Administration and Nation-Wide Police Radio Communications	3							3
2. Rules for the Receipt of Radio Messages	1							1
3. Priority Classification of Police Radio Messages	1							1
4. The Phonetic Alphabet	1	2						3
5. Message Routing	1							1
6. General Radio Regulations—National and International	2						1	3
7. Radio Telephone Procedure	5	3						8
8. Radio Telegraph Procedure	5	3						8
9. Radio Message Records Management	1	1					1	3
10. Propagation of Radio Waves (Fundamentals of Radio Communication)	6				2			8
11. Preventive Maintenance of Radio Equipment	2						1	3

GENERAL	TYPE OF COURSE							
	Lessons	Practice	Field Trips	Problems	Films	Summary	Tests	Total Hours
12. Familiarization with Equipment used in Police Radio System	4	10	1		1	1		17
13. International "Q" Codes	2	2					2	6
<p>COURSES IN INTERNATIONAL MORSE CODE AND TYPEWRITING</p> <p>Taught by three instructors, each one working with ten students in a coordinated method with the above schedule.</p>								
1. Five Lessons in Typewriting	5	25						30
2. International Morse Code—Reception	10	150						160
3. International Morse Code—Transmission	15	60						75
4. Exercises in Morse Code Operation with Actual Radio Stations	5	65						70
<p>First Class of 30 Students to Commence April 1964.</p> <p>Radio Operations Course Developed and Established by:</p> <p style="padding-left: 40px;">Professor Carlos Gardenas, Public Safety Staff USAID/B - and -</p> <p style="padding-left: 40px;">OPS Representative Donald I. Moermond</p>								

4 Calendar Months—TOTAL HOURS

393

Appendix 3

RADIO-COMMUNICATIONS MANAGEMENT COURSE

Objective: The purpose of this course is to prepare the radio-communications personnel, so the General Command of the Bolivian Police can have optimum communications between units and maintain an efficient radio-communications system.

To this purpose the participants will be trained in:

1. Organization of the radio-communications service.
2. Duties and responsibilities of the communications service personnel.
3. Security of operation in the radio net. What is the responsibility of each member in performing their duties.
4. Technical supervision and administration of communications.
5. Radiotelegraphic and radiotelephonic procedure.

Length: 180 work-hours (6 weeks). From March 9, 1964.

Participants: 20 police officers with basic knowledge in communications.

Subjects: The subjects which are indicated in the attached program, will be developed simultaneously by 3 professors, as follows:

Mr. Carlos Cardenas:

1. Organization and mission of the communication service.
2. Security system in communications in the radio net.

3. Maintenance and operation of the radio-communications equipment.

Mr. Mario Vargas:

1. Radiotelegraphic procedure.
2. Radiotelephonic procedure.

Mr. (Professor named by the General Command of the Bolivian Police)

1. Cryptography.

In this course the emphasis has been placed on the practical knowledge, so that at the end of the 6 weeks the participants will be prepared to be communications chiefs. For this reason, theoretical subjects not pertinent to the purpose of the course have been minimized.

Study Material:

1. Communications booklet (20 ea.) prepared by the Training Section of Public Safety Division with Mr. Carlos Cardenas' cooperation.
2. Portable transceivers (4 ea.) with batteries for 50 hours of operation.
3. Fixed transceivers (2 ea.) capable of operating on four pre-tuned channels.
4. The different forms used by radio administration.
5. Installation material (antennas, tape, cables, etc.)
6. Telegraphic keys with buzzers (2 ea.).
7. Headphones (2 sets).
8. Miscellaneous material as required (plugs, sockets, etc.).
9. Crystals for item 3 (4 channels).

10. Filing folders (20 ea.).
11. Carbon papers (20 ea.).
12. Two-color pencils (20 ea.).
13. 30 cms. rulers (20 ea.).
14. Negro pencils (20 ea.).
15. Erasers (20 ea.).
16. Catalogs.

SUBJECTS	TYPE OF COURSE								
	Lesson	Practice	Visits	Problems	Film	Recapitulation	Other assistance	Tests	Total Hours
Subject in charge of Professor Mr. C. Cardenas 1. <u>Mission and Organization of the Communication Service</u> a. Lecture and graphic demonstration about general aspects (introduction and guiding) b. Duties and responsibilities of the communication personnel. c. Forms, use and purpose. d. Permanent rules of communication. e. Instruction and orders for the communication service.	1								
	1				1				
	1	1							
	1								
	2	1						1	
									10
Subject in charge of Professor Mr. 2. <u>Cryptography</u> a. Basic b. Handling									
	3	5						1	
	2	7						1	
									19

SUBJECTS	TYPE OF COURSE								
	Lesson	Practice	Visits	Problems	Film	Recapitulation	Other assistance	Tests	Total Hours
Subject in charge of Professor Mr. Mario Vargas 3. <u>Radio Telephonic Procedure</u> a. Generalities. How messages are originated. b. Description of the message; message forms. c. Technique and speed of the message transmission. d. Phonetic alphabet and writing. e. Messages of procedure and services. f. Power of the signals and its intelligibility. g. Signals of procedure. h. Signals of precedence. i. Use of the forms in the net operation.	1								
	1	1							
	1								
	1	5						1	
	1								
	1		1						
	1	1			1				
	1							1	
	2	5						1	
									26
NOTE - This part of the course should have two portable transceivers and forms.									

SUBJECTS	TYPE OF COURSE								
	Lesson	Practice	Visits	Problems	Film	Recapitulation	Other assistance	Tests	Total Hours
Subject in charge of Professor Mr. Mario Vargas 4. <u>Radio Telegraphic Procedure</u> a. Generalities and differences from other procedures. b. Complete Morse alphabet. c. "Z" and "Q" code of service signals. Lecture and practice.	1							1	
	1	2						1	
	1	3	1					1	
									11
Subject in charge of Professor Mr. C. Cardenas 5. <u>Security of Communication in the Radio Net</u> a. Different ways to protect the communication. Effective, preventive and defensive ways. b. Physical security, cryptographic communication. c. Authentication procedure. d. Different types of interference. e. Different types of transmission. f. The radio-transmission effectivity.	2								
	1	2						1	
	1								
		3							
		2						1	
		3							

SUBJECTS	TYPE OF COURSE								
	Lesson	Practice	Visits	Problems	Film	Recapitulation	Other assistance	Tests	Total Hours
5. <u>Security of Communication in the Radio Net</u> (continued) g. Command, connection, cooperation and administration of radio communication.	3	6			2			1	
									28
Subject in charge of Professor Mr. C. Cardenas 6. <u>Maintenance and Operation of the Radio Communication</u> a. Lectures about radio operation. b. Installation and handling of the radio communication area center. c. Handling of the different frequency channels of frequencies, working with messages by groups and in a rotary way. d. Definition of the maintenance grades of the system. e. Handling of the files, and administration and technique registration.	2				3				
	3	11		4		1		1	
	3	8	3	3				2	
	2							1	
	3	8	1					1	
									60

Number of classes	153 hours
Inauguration	1 hour
Final examination	2 hours
Demonstration	3 hours
Final General Examinations	6 hours
Closing (Graduation)	3 hours
Holidays	12 hours
	<hr/>
	TOTAL - 180 hours - Six weeks