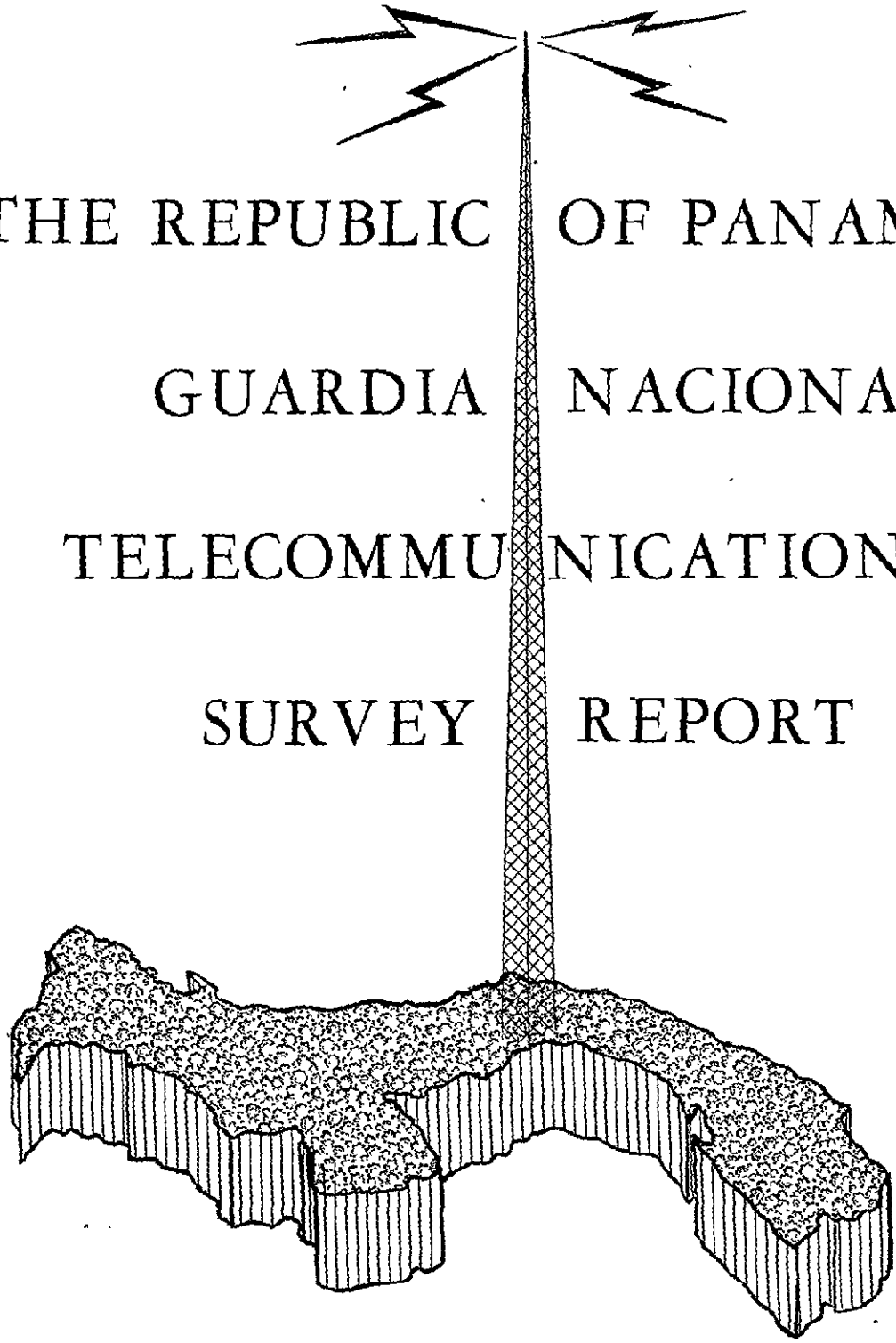
August 1963

THE REPUBLIC OF PANAMA

GUARDIA NACIONAL

TELECOMMUNICATIONS

SURVEY REPORT



AGENCY FOR INTERNATIONAL DEVELOPMENT
OFFICE OF PUBLIC SAFETY
Washington, D. C.

REPUBLIC OF PANAMA GUARDIA NACIONAL

COMMUNICATIONS SURVEY REPORT

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Published: August 25, 1963

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FOREWORD

A general telecommunications survey was made from the 2nd to the 20th of August 1963, of the communications system, of the Guardia Nacional of the Republic of Panama. This was conducted by Thomas L. Moody, Police Advisor Communications, of the Office of Public Safety, AID/Washington, D.C., in response to a request made by the AID Mission to Panama. It was performed to determine the Guardia Nacional's present communications capability and to assist USAID Panama in evaluating the feasibility of assisting the host country with its current problems of internal security telecommunications in the light of existing U.S. objectives. For the purpose of the survey, the OPS representative traveled extensively throughout the Republic and examined Guardia Nacional facilities at Panama City, Colon, El Real, Paya, Payita, La Chorrera, Anton, Penonome, Chitre, Aguadulce, Divisa, Santiago, David, Paso de Canoa, Puerto Armuelles, Puerto Obaldia and Bocas del Toro in order to evaluate the Guardia Nacional's present communications capability and requirements. In this report a detailed discussion is made of the following topics:

a. An evaluation of the Guardia Nacional's communications capability and requirements regarding telecommunications operations, training, maintenance and logistical support.

b. Conclusions made concerning operational capabilities and recommendations for the improvement of present facilities to establish a telecommunications system that adequately will meet the tactical requirements for the Guardia Nacional's internal security mission.

Additional information is given in this report to assist in the formulation of appropriate development plans and for timely implementation of these plans for an adequate Police Communications system for the Republic of Panama under existing or expected conditions.

GLOSSARY OF ALPHABETICAL DESIGNATIONS AND TECHNICAL TERMS

Alphabetical Designations

OPS	Office of Public Safety AID, Washington, D. C.
RPGN	Republic of Panama Guardia Nacional
HQ	Headquarters of the Guardia Nacional
CP	Guardia Nacional Command Post

Technical Terms

AM	Amplitude Modulate Carrier wave radio transmission.
FM	Frequency modulated carrier wave radio transmission.
SSB	Single Side Band Surpressed carrier radio transmission.
ICW	Interrupted carrier wave radio transmission used to send Morse code utilizing a telegraph key or any other interrupting device.
MCW	Modulated carrier wave radio transmission used to send Morse code utilizing an interrupted audio tone signal which is modulated on an uninterrupted radio carrier wave.
Phone	The designation of voice radio communications.
RTTY	The designation for radio teletype communications.
Carrier Wave	A radio wave traveling through space that is utilized to transport the information component of a radio signal from its point of origin to the point of reception so it can be received.

Hetrodyning of carriers	The confliction of two or more radio waves of the same or a closely adjacent frequency causing interference with their legible reception.
HF	High frequency radio waves transmitted and received on radio frequencies from 2 to 30 megacycles.
VHF	Very high frequency radio waves transmitted and received on radio frequencies from 30 to 300 megacycles.
PEP	Designates Peak Envelope Power and is used to denote power output of a Single Sideband Transmitter.
Simplex radio operation	The operation of radio equipment utilizing one frequency to transmit and receive messages permitting only one or the other of these functions to be performed at a given time.
Duplex radio operation	The operation of radio equipment utilizing two frequencies for the functions of transmission and reception permitting the simultaneous operation of the transmitter and receiver.
Multiplex radio operation	The splitting of a radio frequency channel to facilitate the transmission of two or more information components on one carrier wave simultaneously without interference.

INTRODUCTION

The Republic of Panama is located on an Isthmus which connects Central and South America. This Republic is divided by a zone approximately 10 miles wide and 50 miles long which is leased by the United States Government and referred to as the Panama Canal Zone. The Republic of Panama is approximately 360 miles long and about 130 miles wide at its widest point. Panama is bordered on the North and East by the Caribbean Sea, on the Southeast by Columbia, on the South by the Pacific Ocean, and on the West by Costa Rica. The Republic encompasses an area of 28,750 sq. miles, consisting of mostly mountainous terrain with flat lowlands on its Pacific coastal and southeastern regions. Vast areas of its terrain are undeveloped, much of which is still virgin jungle. Panama has a total of 1,347 miles of coast line (857 Pacific and 490 Caribbean) with an additional 191 miles bordering Costa Rica and 175 miles bordering Colombia, the majority of which is unsettled and infrequently patrolled by its security forces.

The Panamanian Republic has a gross population of approximately 1,300,000 inhabitants consisting of 65% mestizo, 14% negro, 10% white, 10% Indian and 1% other. One-half of this gross population resides in its major cities. At present, the three largest cities in the Republic are:

1. Panama City with an approximate population of 300,000.
2. Colon with an approximate population of 60,000.
3. David with an approximate population of 40,000.

Panama City the Capital of the Republic, is located on the Pacific Coast adjacent to the Panama Canal.

Colon is located on the Caribbean Coast and is also adjacent to the Canal. It serves as a governmental and trade center for that coast line of the country. Both these cities are sea ports and serve as entrance and egress points to the Canal, and generally sustain the economy of the Republic.

David is located west of Panama City approximately 30 miles from the Costa Rican border and serves as the governmental center in that area. The balance of Panama's gross population is concentrated along the Pacific Coast line of the isthmus, whose livelihood is derived from agriculture. This region consists of grassy hills and coastal plains. The northeastern coast line and southeastern sections of the country are undeveloped and populated by Indians.

The country has 396 miles of railroad. Its highway system consists basically of 393 miles of paved roads, 562 miles of all weather earth roads, graded and drained, and 410 miles of unimproved roads totaling 1,365 miles. These figures include the new Inter-American Highway which presently extends from the Costa Rican border to Panama City and then to Chepo, a small town about 30 miles east of the Canal. Almost all of this highway system is located along the Pacific coast line of the Isthmus. Most of the travel into undeveloped areas of the country is accomplished by airline, chartered airplanes, power boats and native dugout canoes since undeveloped airstrips and the small rivers provide the only feasible means of entrance and egress to the remote areas of the Republic.

Panama has an internal security force of 3,200 men called the Guardia Nacional which performs the functions of an army, navy and uniformed police force for the Republic. A second force of approximately 200 men called the National Department of Investigations (DENI), is a plain-clothes force under the Ministry of the Presidency and performs investigative functions. This unit does not function as a contingent of the Guardia Nacional.

The Guardia is divided into detachments which are concentrated at its Panama City headquarters, Colon and David, with smaller sections located throughout the Republic. These units perform most of the Police and military functions throughout the nation.

Panama City, Colon and David are the only locations in the country with sufficient available forces to permit them to function as reinforcement points in an

internal security emergency. The bulk of remote area enforcement consists of one or two man details quartered in the villages throughout the Republic, which function with limited supervision but without effective communications.

SUMMARY

The OPS representative observed present operations of the RPGN and determined that the telecommunications capabilities of this force are as briefly summarized below:

The telecommunications system operated and maintained by the RPGN consists of a VHF-FM system, operating on a frequency of 30.8 mcs. with a limited HF-AM backup net, which is operated on the Pacific coast line of the Republic. These facilities permit limited tactical and administrative communications with all major towns and cities in the coastal area. This system furnishes single channel VHF-FM direct communications from Panama City to Chitre and La Chorrera and permits additional emergency direct communications to be made from Panama City to Anton, Las Tablas and several other small police posts. Chitre, having constant direct radio communications capability with Panama City, is used as a relay point to communicate with La Chorrera, Anton, Penonome, Las Tablas, Aguadulce, Divisa, Santiago and several other locations along the Inter-American Highway. Communications traffic via this route permits indirect contact to be made by voice relay methods to all radio equipped locations where direct point to point operations in the area are not practical. The aforementioned system is supplemented by an additional VHF-FM communications net operating on the same frequency channel from David to Paso de Canoa, Cañas Gordas and Puerto Armuelles which allows direct inter-communications between these four points. As direct VHF-FM communications facilities are not available from Panama City to David, the cities of David and the prison Island of Coiba are additionally equipped with HF-AM transmitters and receivers to facilitate their inter-operation and permit direct communications with Panama City. The equipment utilized in HF-AM service consists of amateur transmitters and receivers which were not designed for continuous commercial operation, thus they permit only intermittent contacts to be made when noise and propagation factors are suitable.

At the present time the RPGN utilizes commercial telephone and telegraph services for remote area communications to its outposts where these facilities are available. The present system does not provide facilities for outpost operations.

The RPGN has no field communications equipment available to meet an emergency in remote areas and in a crisis must accept the loss of time incidental to the use of commercial facilities. The present RPGN system functions without adequate repair facilities or sufficient budgetary support to properly sustain its operations. The training of personnel, maintaining proper records and logistical support are inadequate to support current communications functions. Present RPGN facilities must be supplemented with the installation of additional telecommunications equipment in order to overcome current operational deficiencies. The RPGN system can only be sustained if adequate training, repair, storage and operational facilities are available to insure its existence. The past utilization of sporadic maintenance performed by various methods has detracted from the RPGN telecommunications system's reliability and fostered a lack of budgetary planning to assure adequate communications support for this force.

Measures designed to meet problems identified in the survey are made in the recommendations section of this report. Exterior political circumstances in the Caribbean area make it necessary to improve local current telecommunications capability to minimum security standards.

Finally, it can be stated there is a definite need for assistance in all phases of RPGN telecommunications development to accelerate improvements and to reach goals which will allow the RPGN to carry effectively its responsibility for internal security.

CONCLUSIONS AND RECOMMENDATIONS

This section of the telecommunications report sets forth the OPS representative's conclusions derived from the observations made during the survey. Recommendations are made to overcome problems pertaining to the present RPGN Communications system. Each topic will be discussed separately under a specific heading.

A. Conclusions

Upon completion of the survey, the OPS representative concludes from observations made of existing facilities now being utilized for communications by the RPGN that the present system is inadequate to perform the needed telecommunication functions necessary to properly support the operations of this organization to carry out its primary internal security mission. Shortages were noted in training, maintenance, equipment, field supervision, transportation and logistical support. All equipment, structures and facilities at control points visited were effectively operated within their operating capabilities. Operational areas were neat and well organized but the equipment in use is inadequate to perform the functions necessary to provide proper Police tactical support on a national scope. The OPS representative concluded that several critical aspects in planning a security type communications system were not considered in the establishment of existing facilities. The internal security function of the RPGN is such that this one force performs almost all of Panama's military and police functions. In view of this service's responsibility, the OPS representative is of the opinion that US military and AID assistance in the field of telecommunications for this force should be administered so that the joint assistance will not create parallel or duplicate communication facilities and assistance efforts. It is also concluded that efforts to assist the RPGN in the field of communications can best be achieved by revising established agreements with the host country to allow the U.S. to provide necessary technical resources as a part of a cooperative development program to meet the deficiencies noted in present facilities of the force.

The major communications deficiencies noted are listed according to their importance: At present the RPGN lacks:

1. Proper chain of command staff organization;
2. Reliable inter-communications for tactical and administrative message traffic between Panama, Colon and David;
3. effective fixed and mobile communications along the Inter-American Highway which will provide not only mobile unit control but point to point communications in the Republic's most heavily populated area;
4. reliable communications for harbor and coastal patrol craft needed to support RPGN security operations;
5. portable communications facilities to sustain remote area posts and operations in their anti-banditry, counter-subversion, and anti-guerrilla operations;
6. maintenance and training facilities to sustain needed communications equipment and to provide adequate numbers and kinds of trained personnel.

The aforementioned shortages are deemed vital and must be corrected in order to establish an effective internal security communications system for the Republic of Panama.

B. Recommendations

A national net for Police telecommunications must be established to effect the point to point transmittal of operational information and provide communications tactical support to limited RPGN field units. This net must be direct point to point communications to the three major control points without use of repeaters or unattended relays. Additional recommendations are made to alleviate deficiencies noted in operational capability, maintenance, equipment, training and logistical support of this proposed net and the current VHF system now in use. Recommendations for each of the aforementioned subjects will be discussed in this section under sub-topic headings to facilitate a clear understanding of proposed net implementation and staffing.

1. Proposed National Point to Point RPGN Communications System

It is recommended that a system be established utilizing HF - SSB equipment directly connecting Colon, David and Panama City. The three locations should each be equipped for phone and MCW operation. Provisions for multiplexed RTTY operation should be made available at a later date. These three locations should have inter-communications capability for emergency use. All equipment used at these points should be of first quality communications equipment installed to provide an additional unit at each site to serve as a standby in the event of unit failure. It is recommended that 100 Watt PEP SSB equipment be installed at Colon and David with 1 kilowatt PEP units being utilized for the Panama City headquarters. It may be noted that this net can be used for international police liaison communications also at a later date if so desired. Provision must be made to provide emergency electrical power at each of the aforementioned sites in the event of local power failure. It is recommended that a 10 KW unit be used for the Panama City headquarters with 3 KW units installed at Colon and David. All standby units should be diesel engine driven and air cooled when practical.

Each of these stations will function as the communications control point for its respective area. Each station will act as the traffic control point in each respective area for all portable operations of patrol units, unless special mission control is required from the Panama City headquarters.

The above recommendation is of primary importance to the establishment of effective RPGN communications. It should be implemented as the first phase of system improvement embarked upon for this force.

2. Highway Patrol and Relay Communications

The next planned segment of development evolution in RPGN communications should be the establishment of a highway mobile patrol system for the Inter-American Highway. This will permit reliable mobile patrol and to fix station operations along this route. Existing installations of VHF - FM fixed station radio equipment should be utilized to effect the Base station control of this patrol system. These sites will not only function as mobile control points but will also provide point to point communications by direct or relay means between these points and Panama City. It is recommended that all existing equipment be evaluated at the

time of the implementation of this phase to determine its future service life. All equipment beyond economical repair should be discarded at this time. Upon completion of this evaluation a competent measurement of the requirement for new equipment can be made for replacement of the older units.

It is recommended that initial operations be extended as far as the Panamanian City of Santiago until a functional unit is organized and in operation. The system can then be extended to cover the Inter-American route from the Costa Rican border to Panama City.

3. Outpost and Field Communications

Another planned segment that must be considered for implementation at this time is remote area communications. It is recommended that fully transistorized HF AM equipment of the village radio backpack portable type with 5 Watt output be procured for jungle patrol use. An additional procurement in sufficient quantity of 35 Watt HF AM units should be made at this time to establish operational monitor and control points for the outpost units. It is recommended that limited procurements be made and all equipment of this type be held at points on an issue basis for special use in the Darien and similar operational locations. These units should be utilized for outpost communication to connect remote points to a central location in each area capable of 24 hour monitor coverage of outpost operations. It is the opinion of the OPS representative that ten (10) 35 Watt units and fifty (50) 5 Watt transistorized man-pack units will be sufficient to inaugurate this phase of the project. These units are economical in over-all cost so facilities of this type can be expanded as needed to meet RPGN operational needs.

4. Municipal Communications Facilities

It is recommended that present municipal communications should be evaluated thoroughly and effective operational patterns established with USAID technical assistance prior to the expansion of these facilities. The limitations of RPGN maintenance capability is the governing factor to be considered for expansion of these facilities.

5. RPGN Marine Communications

Provisions for harbor craft to shore base communications must be implemented at Panama and Colon to facilitate communications with marine units operating under direction of these control points. As David is the RPGN post responsible for the Bocas del Toro section of the Caribbean coast line, it is recommended that marine communications be established here in conjunction with the point to point SSB net connecting David, Colon and Panama City. It is further recommended that these communications be restricted to craft of over 30 feet in length as smaller craft usually do not have adequate electrical systems to supply fixed equipment power requirements. Multi-channel crystal controlled SSB mobile units should be utilized for this service. This phase of RPGN communications should be implemented on a limited scale only until justification can be established for marine craft utilization. It is not advisable to equip seldom used craft with telecommunications equipment as the salt air deteriorates inoperable marine equipment rapidly.

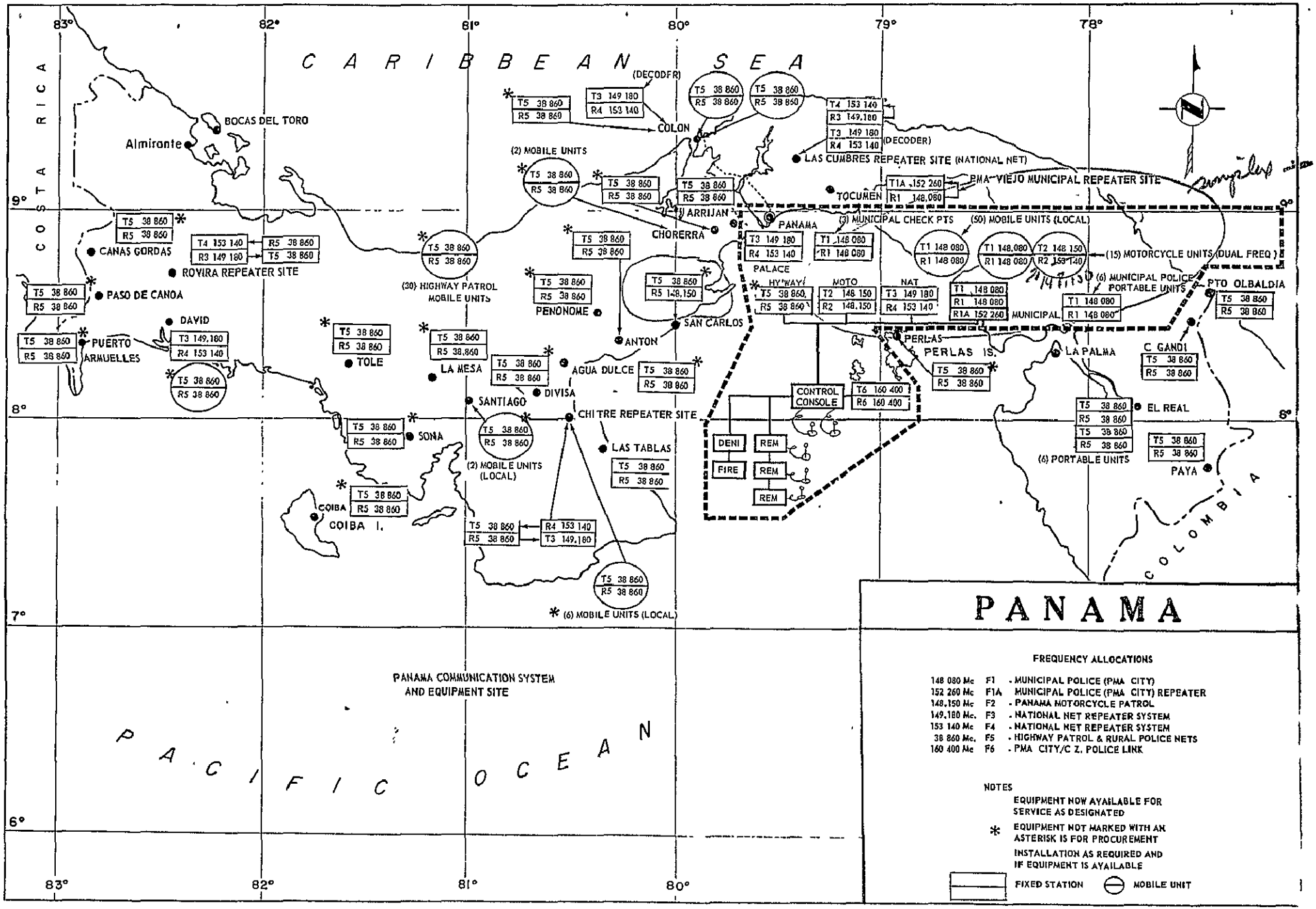
Currently utilized equipment should be phased out as the evaluation of marine utilization is made and new equipment procured and installed.

6. Air Support Communications

It is recommended that crystals be provided for the existing HF unit of the aircraft for two of the common ground support frequencies to facilitate its use, not only for routine flight communications but ground to air operations also. This would facilitate operations of the aircraft with ground forces without the need for additional communications equipment other than that required for normal flight operations in the area.

7. Maintenance

It is recommended that a repair facility be established and equipped in Panama City, capable of first through fourth echelon maintenance to meet the total needs of the RPGN system. The establishment of this operation will require training and management resources now non-existent in the RPGN organization. Spare parts should be stocked in such manner as to facilitate one year's operational spares being on hand for utilization at all times allowing for procurement and delivery lead times.


CARIBBEAN SEA
COSTA RICA
COLOMBIA
PACIFIC OCEAN
83°
82°
81°
80°
79°
78°
9°
8°
7°
6°
BOCAS DEL TORO
Almirante
CANAS GORDAS
ROVIRA REPEATER SITE
PASO DE CANOA
DAVID
PUERTO ARMUELLES
TOLE
SONA
COIBA
COIBA I.
LA MESA
SANTIAGO
DIVISA
(30) HIGHWAY PATROL MOBILE UNITS
(2) MOBILE UNITS (LOCAL)
(6) MOBILE UNITS (LOCAL)
PENONOME
ANTON
AGUA DULCE
CHITRE REPEATER SITE
LAS TABLAS
SAN CARLOS
CHORERRA
ARRIJAN
COLON
(DECODER)
(2) MOBILE UNITS
PANAMA
PALACE
TOCUMEN
LAS CUMBRES REPEATER SITE (NATIONAL NET)
PMA VIEJO MUNICIPAL REPEATER SITE
(3) MUNICIPAL CHECK PTS
(50) MOBILE UNITS (LOCAL)
(15) MOTORCYCLE UNITS (DUAL FREQ)
(6) MUNICIPAL POLICE PORTABLE UNITS
MUNICIPAL
HY'WAY
MOTO
NAT
PERLAS
PERLAS IS.
LA PALMA
PTO OLBALDIA
C GANDI
EL REAL
PAYA
(6) PORTABLE UNITS
CONTROL CONSOLE
DENI
FIRE
REM
PANAMA COMMUNICATION SYSTEM AND EQUIPMENT SITE
PANAMA
FREQUENCY ALLOCATIONS
148 080 Mc F1 - MUNICIPAL POLICE (PMA CITY)
152 260 Mc F1A MUNICIPAL POLICE (PMA CITY) REPEATER
148.150 Mc F2 - PANAMA MOTORCYCLE PATROL
149.180 Mc. F3 - NATIONAL NET REPEATER SYSTEM
153 140 Mc F4 - NATIONAL NET REPEATER SYSTEM
38 860 Mc. F5 - HIGHWAY PATROL & RURAL POLICE NETS
160 400 Mc F6 - PMA CITY/C Z. POLICE LINK
NOTES
EQUIPMENT NOW AVAILABLE FOR SERVICE AS DESIGNATED
* EQUIPMENT NOT MARKED WITH AN ASTERISK IS FOR PROCUREMENT
INSTALLATION AS REQUIRED AND IF EQUIPMENT IS AVAILABLE
FIXED STATION
MOBILE UNIT

8. Training

It is recommended that to insure sufficient trained personnel for the operation and maintenance of the proposed system a small school be established with a 15-man training capability. Local training facilities, both Panamanian and U.S. military, should be utilized for Basic Communications Theory with participant training as a part of the USAID Public Safety Program used to prepare students for advanced communications capabilities. It is estimated that this system will function with ten first class technicians and twenty less skilled personnel to change units in the field. The above figures should cover illness, vacations and other situations resulting in a temporary reduction of staff.

9. Logistical Support

It is recommended that efforts be made to facilitate the expeditious re-supply of field forces with batteries and spare units in the event of equipment failure to prevent deterioration of non-operational equipment and to facilitate needed communications support for field operations.

10. Staff Organization

It is essential that an organization be established to afford an effective chain of command. Many inadequacies reported herein are aggravated because of the lack of a proper organizational structure for administering the telecommunications system. Such an organization would (a) allow the proper assignment of responsibilities and delegation of authority accordingly, (b) facilitate the implementation of development measures recommended heretofore, (c) assure the maximum effectiveness of human resources, and (d) allow the expansion of the system in response to demonstrated needs.

Thorough details of the organizational structure may be the subject of subsequent study. It is recommended that it be changed to conform with the organizational block diagram RECOMMENDED COMMUNICATIONS SUPPORT CONTROL attached to this report under enclosures.

REPUBLIC OF PANAMA GUARDIA NACIONAL COMMUNICATIONS SURVEY REPORT

The following survey was conducted of the RPGN communications facilities on 2nd through the 20th of August 1963, by Thomas L. Moody, Police Advisor Communications, AID/OPS, in company with Lt. Thomas Natera, RPGN Communications Officer, and Mr. Richard D. Biava, Public Safety Advisor Training of USAID Panama. During the course of the survey, trips were made by automobile, native canoe and airplane to the following locations: Panama City, Colon, El Real, Paya, Payita, La Chorrera, Anton, Penonome, Chitre, Aguadulce, Divisa, Santiago, David, Paso de Canoa, Puerto Armuelles, Puerto Obaldia and Bocas del Toro.

The inspection of existing radio facilities revealed the operational pattern of the present RPGN communications system and allowed an evaluation to be made of its capabilities. Thus, it was possible to evaluate accurately the equipment, personnel, structures, maintenance facilities and logistical support capabilities currently used by the RPGN telecommunications section in terms of its assigned mission. The present telecommunications system of the RPGN internal security force is organized and functions as a separate 150 man unit of this force under the supervision of Lt. Natera and Lt. Berenguer, who are jointly responsible for its operation to the Guardia Nacional Commander, Bolivar E. Vallarino. Under this joint command, fixed operations are under one lieutenant and mobile operations under the other. The RPGN performs all police tasks and is organized as military force with paramilitary duties. This unit is reinforced by a reserve contingent of undeterminable size with unknown support capability. It is used as an honorary group for the various citizenry who have assisted or supported the Guardia in its mission either politically or otherwise. This reserve unit has no need for telecommunications capability and is excluded from consideration in this study.

1. RPGN Communications Operations

The following brief description of present telecommunications operations is given so an evaluation can be made regarding current operational capabilities. This is presented by cities so that each station's communicating capability can be comprehended in terms of physical locations. (see Map B)

A. Panama City (Central Cuartel) Radio Communications

The Panama City installation serves as the control headquarters of the RPGN telecommunications system. This installation is equipped to effect limited control over all national RPGN communications. Its present facilities permit mobile dispatch control over Panama City's municipal police radio communications. The Panama City Municipal Patrol system consists of 54 mobile units operating as patrol cars and auxiliaries in the city. The auxiliary equipment is utilized in police commanders' cars, the ministers of government and other functionaries vehicles. The majority of this equipment is current General Electric VHF FM 30-40 mc. wide band type supplemented by a few Motorola units that are old and rapidly reaching the point of being beyond economical repair.

Additional VHF FM wide band fixed station equipment of the same frequency range and manufacture is utilized from this location to contact the Chitre relay station. This permits the HQ station to contact the point to point fixed system installed along the Pacific coast line of the isthmus.

Present Panama City VHF facilities at this location permit direct contact with Tocumen, La Chorrera and the Chitre relay point.

Additional AM HF facilities are available in the form of amateur radio transmitters and receivers used to contact the Prison Island of Coiba and the city of David to the west which cannot be contacted by the VHF connecting links. HF AM operations can only be conducted at certain hours of the day because of the limited output power of the equipment and the frequent propagation problems created by noise and adjacent channel interference. At the present time only one frequency is utilized for AM operation. Both transmitters and receivers in this service are not of suitable quality to permit reliable sustained operations.

An additional HF AM station is installed at RPGN HQ using similar equipment for communications with the marine units used to patrol the harbor and supply Pacific coast port locations of the RPGN that are inaccessible by any other means.

The Presidencia is equipped with an auxiliary 50 Watt VHF FM wide band unit permitting emergency contact to be made from this location in Panama City to Central RPGN Radio Control in emergencies.

B. Colon Radio Communications

The City of Colon is equipped with one 50 Watt base station and 5 mobile units operating on wide band VHF FM in the 30-40 mc. frequency range. These units are utilized to patrol the city and perform municipal police patrol functions in this area. It was noted that no direct police radio communications facilities connect this city with the Panama City headquarters control point. All RPGN information is transferred by telephone or telegraph through commercial or public services between Colon and the Panama City HQ. This prevents direct supervision or utilization of these mobile radio units in coordinated police operations with Panama City.

Colon is the headquarters for two radio equipped boats for harbor and coastal patrol of the Caribbean coast line but has no radio equipment installed to facilitate contacting these marine units.

C. David Radio Communications

The City of David Municipal System consists of one base station and 3 mobile units operating on VHF wide band 30-40 mc. FM which perform municipal and highway patrol functions in that area. David communicates with the Border Posts, Costa Rica, Cañas Gordas, Paso de Canoa and Puerto Armuelles through this mobile dispatch facility.

All cars with mobile radio equipment in the area can be utilized by any of these points as they all have inter-communications capability on the same frequency.

David is equipped for additional communications with Coiba and Panama City using HF AM equipment of a similar, previously mentioned, amateur variety to accomplish these contacts. The communications capabilities of this

link is limited as only intermittent daily contacts can be made. Therefore it is unsatisfactory for RPGN national operational control.

D. Chitre Radio Communications

Chitre serves as the connecting relay point for the RPGN VHF FM system. It serves as a relay point to all area stations along the coast except David. Previous VHF contacts have been made with David but present equipment will not facilitate reliable communications with Chitre. Chitre has direct communication capability with all points VHF equipped in its vicinity on the Pacific coast of the Republic as far west of Panama City as Santiago.

The Municipality of Chitre at present has a small municipal mobile patrol force of six vehicles which it dispatches and controls. These units perform municipal and highway patrol functions in the area.

E. Additional Fixed Station Communications

The following locations have fixed station VHF facilities installed capable of both fixed and mobile communications with other units in the area:

(1) Tocumen communicates with Panama City - HQ and mobiles in the area.

(2) La Chorrera communicates directly with Panama City HQ, Chitre and one patrol car in the area.

(3) Anton communicates directly with Penonome, Aguadulce, Divisa, Santiago, Las Tablas, Chitre, and any patrol cars in the area.

(4) Penonome communicates directly with Anton, Aguadulce, Divisa, Santiago, Las Tablas, Chitre, and any patrol cars in the area.

(5) Aguadulce communicates directly with Penonome, Anton, Divisa, Santiago, Las Tablas, Chitre, and any patrol cars in the area.

(6) Divisa communicates directly with Chitre, Santiago, Las Tablas, Aguadulce, and patrol cars in the area.

(7) Las Tablas communicates directly with Chitre, Santiago, Divisa, Aguadulce, Penonome and adjacent mobile patrols.

(8) Santiago communicates directly with Divisa, Chitre, Aguadulce, Penonome, Las Tablas and adjacent mobile patrols.

The aforementioned inter-communication capability permits effective mobile control and message transmission directly between all points as given. The preceding system, however, does not have an accurate message record system to facilitate complete station evaluation or determining operational

costs. Joint supervision of fixed and mobile station operations further complicates the management and record keeping problems encountered in RPGN communications.

2. Equipment and Buildings

The RPGN Communications System in operation utilizes equipment manufactured by General Electric, Motorola and Dumont for VHF FM communications. Most of this equipment is several years old and in need of minor adjustments and repairs. It operates on wide band FM in the 30-40 mc frequency range. The aforementioned equipment can be categorized as follows:

a. General Electric - good condition and usable.
b. Motorola - antiquated and must be replaced.
c. Dumont - new and usable.

The above-mentioned Dumont units were supplied to equip the 12 new jeeps recently procured by USAID/Panama with USAID funds. These units are presently operating compatibly with the GE Base equipment installed at various locations.

The following list itemizes equipment types and locations in the Republic to facilitate an accurate evaluation of existing facilities.

Colon Equipment

One (1) Transmitter-Receiver

Model: 4ET-7250
Power: 50 Watt
Frequency: 30-40 Mc
Make: General Electric

Four (4) Patrol Cars with Equipment

Make: Motorola
Model: 4ET6F2
Type: ER-6-B
Six (6) Watts

One (1) Patrol Car with Equipment

Make: General Electric
Twelve (12) Watts
Serial: AT-6945

Two (2) Boats Equipped with Radio Communication

Receiver:	Collins Make	Transmitter:	Collins Make
Type:	46159	Type:	52245
Serial:	8951	Serial:	8951
Frequency:	1.5-12.0 Mc	Frequency:	1.5-12.0 Mc

Panama Equipment

Two (2) Transmitter-Receiver

Model:	4EF2A2
Power:	250 Watt
Type:	EF-2A2
Frequency:	30-40 Mc
Make:	General Electric

Two (2) HF AM Transmitters and Receivers

Two (2) 75 Watt VHF FM Transmitters and Receivers

Fifty-four (54) VHF FM Mobile Units

Tocumen Equipment

One (1) Transmitter-Receiver

Model:	4ET7250
Power:	50 Watt
Frequency:	30-40 Mc
Make:	General Electric

La Chorrera Equipment

One (1) Transmitter-Receiver

Model:	4ET7250
Power:	50 Watt
Frequency:	30-40 Mc
Make:	General Electric

One (1) Patrol Car

Anton Equipment

One (1) Transmitter-Receiver

Model:	4EP4A1
Power:	75 Watt
Frequency:	30-40 Mc
Make:	General Electric

Penonome Equipment

One (1) Transmitter-Receiver

Model: 43523A2
Power: 50 Watt
Frequency: 30-40 Mc
Make: General Electric

Aguadulce Equipment

One (1) Transmitter-Receiver

Power: 50 Watt

Divisa Equipment

One (1) Transmitter-Receiver

Model: ET 23-A
Power: 16 Watt
Frequency: 30-40 Mc
Make: General Electric

Chitre Equipment

One (1) Transmitter-Receiver

Model: 4EF2A2
Power: 250 Watt
Frequency: 30-40 Mc
Make: General Electric

One (1) Transmitter-Receiver

Model: 4EF2A2
Power: 250 Watt
Frequency: 30-40 Mc
Make: General Electric

One (1) Transmitter-Receiver

Model: 4EP 4A1
Power: 74 Watt
Frequency: 30-40 Mc
Make: General Electric

Six (6) Patrol Cars

Las Tablas Equipment

One (1) Transmitter-Receiver

Model: 4ET23A2

Power: 50 Watt
Frequency: 30-40 Mc
Make: General Electric

Santiago Equipment

One (1) Transmitter-Receiver

Model: 4ET 23A2
Power: 50 Watt
Frequency: 30-40 Mc
Make: General Electric

David Equipment

One (1) Transmitter-Receiver

Model: 4ET 7250
Power: 50 Watt
Frequency: 30-40 Mc
Make: General Electric

Coiba Penal Colony Equipment

One (1) Transmitter-Receiver A.M.

Model: 160
Power: 100 Watt
Make: Sonar

Cañas Gordas Equipment (Costa Rican Border)

One (1) Transmitter-Receiver

Power: 75 Watt
Frequency: 30-40 Mc
Make: General Electric

Paso de Canoa Equipment (Costa Rican Border)

1/R Transmitter-Receiver

Power: 75 Watt
Frequency: 30-40 Mc
Make: General Electric

Permanent Central Station (Panama and David)

One (1) Transmitter-Receiver A.M.

Make:	Globe King
Model:	500
Power:	250 Watt

Permanent Central Station (Panama)

One (1) Transmitter-Receiver

Make:	General Electric
Model:	4EF 2A2
Power:	250 Watt
Frequency:	30-40 Mc

All buildings and structures observed were adequate to shelter presently utilized equipment. The Guardia also has adequate antennae towers on hand to operate its existing VHF facilities. All of these were in an excellent state of repair and guy wire cables in good condition. Most of these towers have recently been painted and showed other evidence of limited maintenance to prevent their deterioration from the natural elements.

3. Maintenance

The RPGN has very little facility for maintaining its existing communications equipment. A repair shop has been established but no test equipment or spare parts are available. The existing system is kept operable by local radio technicians and U.S. Army facilities on a gratis basis. Thus large quantities of existing equipment are in need of immediate repair.

It is considered that the reliable life expectancy of most of this equipment will be limited to a maximum of two years under present conditions. Unless steps are taken to remedy the shortages in police maintenance capability, the operational capability of the existing system will deteriorate rapidly.

4. Training

At present the RPGN does not have training facilities nor instructors for adequate instruction of its telecommunications personnel. Several of its officers have attended training courses at Canal Zone military installations but in the opinion of the OPS representative they do not have sufficient

competency to instruct trainees in advanced communications theory. Their efforts cannot supply the additional personnel necessary to meet present and future communications needs of the RPGN.

Local commercial resources are available to assist in basic radio theory training on a limited scale. These cannot, however, be relied upon to produce finished, competent technicians as they are inadequately equipped to do so.

The aforementioned condition is one of the RPGN's most critical current shortages in the field of telecommunications.

5. Supply and Logistical Support

The supply and logistical support of present RPGN communications facilities are inadequate to properly sustain the system. The problems of transportation, lack of properly managed budgetary support and trained manpower are basically responsible for this deficiency. The Guardia is forced to depend on inadequate commercial facilities for the simplest of maintenance and repair requirements. Problems are encountered in obtaining transportation and adequate vehicles for travel by land, water and air needed for logistical support. These are available only on a pay-as-you-go basis. Without adequate financial support to meet immediate needs, communications equipment deteriorates and is inoperable for periods of time jeopardizing its potential for use in a time of crisis.

The present communications section functions on an annual budget of $22,000 for salaries of personnel and $5,000 for maintenance and spare parts. Present governmental debts incurred are paid eight to nine months in arrears of their obligation which does not help improve RPGN relations with commercial concerns.

6. Commercial Communication Facilities

The Republic of Panama has many commercial communication facilities in operation throughout the country available for RPGN utilization. These services consist of telephone, telegraph and radio available on a limited basis to give ditional private plantation systems are available on a limited basis to give additional communication modes to this force in time of a crisis. A current

multi-channel micro-wave system is utilized for telephone communications, channels of which could be utilized with the installation of terminal equipment for routine police communications traffic. These systems do not, however, provide direct tactical or operational support for efficient operations of RPGN forces nor provide the required traffic security. The need for fixed terminals limits this system's utilization and does not provide the versatility a tactical force needs in communications support. These facilities, however, should be considered as available supporting elements to an already established tactical system and which can be utilized to alleviate heavy administrative traffic. Therefore, it cannot be construed that this commercial equipment would be a parallel or duplicating element of an RPGN communications system and should not be so classified. Remote area communications from one and two man detachments or patrols can utilize these facilities effectively where available. They, however, cannot be deemed as adequate for all operations as distances to points of transmission are often great and message transmittal cannot be effected under Police supervision of traffic originating from these locations.

ADDENDUM

Special Internal Security Communications

The scope of the study undertaken has not included an evaluation of the telecommunications requirements of two organizations that are part of the Republic of Panama's Internal Security Forces. In the event public safety assistance plans include this subject in the future a brief discussion of observations made incidental to this survey is included below.

1. National Department of Investigations (DENI) Communications

This organization is a 200 man investigative plainclothes force that performs all the tasks of records, identification, criminal and security investigation for the Republic. At this time, it is limited in its capabilities as a true investigative unit due to political involvements and implications. This force is handicapped by the lack of effectively trained personnel and staffing to sustain a communications facility that would cover all of its operations. In view of the fact that budgetarily and operationally many of its functions as well as lines of communications would parallel the RPGN proposed system, it is recommended that this organization utilize the communications facilities of the larger unit. This would forestall the dual expenditure of governmental funds for parallel telecommunications installations.

2. Public Order Service Companies' Communications (COP)

The above units comprise two 100 men companies which were established to perform para-military functions for Panama. Responsibilities for this force and its role in emergency situations are vague. Consequently, concrete recommendations for developing telecommunications capabilities to support its operations can not be made.

There is a definite communications need for tactical and operational coordination between the field units performing police functions in combating organized civil disturbance, in anti-banditry, country subversion and anti-guerrilla operations. It must be resolved in staff planning as to how the (COP) units would function in the above emergency operations with police units or existing RPGN forces. Once a definite mode of operation is established, communications facilities can be provided to give either direct Panama HQ control through an independent system or through the RPGN proposed National Net. Inner unit communications problems in the field can be resolved in several ways but it is suggested that only after a definite over-all organization and operational table has been established for the unit should communications support be provided. There is a definite need for a mobile para-military unit capable of rapidly supporting RPGN static units in the various areas throughout the country. The mobile forces should be equipped with communications facilities compatible to those utilized by the RPGN static units so that coordinated operations can be realized. It is also recommended that any mobile field force utilized to perform para-military duties be equipped with similar communications support equipment to that specified for remote area RPGN communications. Further it is essential that the mobile forces are equipped at the CP (command post) and field levels to permit direct operation into the RPGN net control facilities. This would enable the unit to function with direct Panama City Control through the Guardia communications system and prevent the duplication of equipment, maintenance facilities, training and budgetary support needed to sustain separate main link facilities.

The OPS representative is of the opinion that communications planning should only be undertaken for such a para-military force after its mission and organization are established to prevent communications operational problems at a later date.

PROPOSED FREQUENCY ALLOCATION SHEET

High Frequency
3 - 15 mcs.

Frequency #1	SSB National
Frequency #2	SSB National
Frequency #3	SSB National
Frequency #4	SSB National
Frequency #5	AM Field Emergency
Frequency #6	AM Field Routine
Frequency #7	AM Field Routine
Frequency #8	Spare
Frequency #9	Spare
Frequency #10	Spare

VHF
30-50 mcs.
Duplex Operation

Frequency #1	Highway mobile patrol
Frequency #2	Highway mobile patrol

Duplex Operation

Frequency #3	UHF Point to Point
Frequency #4	UHF Point to Point

Duplex Operation
VHF Control
Simplex Car to Car

Frequency #5	Simplex car to car highway patrol
Frequency #6	Panama City Municipal
Frequency #7	Panama City Municipal

Duplex Operation

Frequency #10	David Municipal
Frequency #11	David Municipal

Simplex Operation

NOTE: Frequency #5	David and common car to car highway patrol

NOTE: It is proposed all operations should be duplex except car to car on channel 2 of mobile units to facilitate uninterrupted base and car operation without system tie-ups.

Each municipality should operate on an independent frequency to prevent inter-mixing of equipment, thus facilitating accurate unit accounting. Joint operations can be conducted on car to car frequencies which can be shifted to duplex operation if traffic is heavy enough to warrant same.

PROPOSED EQUIPMENT LISTS FOR IMPLEMENTATION OF RECOMMENDED SYSTEMS

Communication Equipment

Five (5) Single side band multi-channel, crystal controlled dual SSB TRANSCEIVERS, 2 complete units mounted in one rack, one for operations the other to act as a standby capable of 110-220 volt AC operation 50-60 cycles, 100 watt PEP output, for phone and MCW operation on 3-15 mcs. Units must be equipped to facilitate installation of a phone and RTTY multiplixing unit at future date to facilitate simultaneous phone and RTTY operation on a single channel without interference. These units shall be of a type equal to or better than 1st line equipment manufactured by Westrex, RCA, CAI or Motorola. Current specifications of the above equipment shall be used as minimum standards acceptable for procurement.

Two (2) Multi-channeled SSB units 1,000 watt PEP output procured for net control operations with technical specifications equal to or better than the aforementioned units having the same operating capabilities.

NOTE: All units complete with antennae and hardware ready for installation and operations.

Total C & F Fixed SSB Cost $32,000.

Five (5) Single side band 100 watt PEP output crystal controlled multi-channel mobile transceivers 12 volt DC operation complete with hardware and antennae ready for mounting and operation. These units must be built to above specifications with provision for

phone and MCW operation for marine use but without the future RTTY multiplixing capability.
Total cost C & F $13,000.

Ten (10) HF-AM 35 Watt Transceivers TR-35 equivalent complete for installation and operation.
Total cost C & F $6,000.

Fifty (50) Fully transistorized 5 Watt man-pack units TR-10 equivalent or better complete for operation with provision for flashlight D cells power supply built in.
Total cost C & F $25,000.

Thirty-four (34) UHF-FH 30-50 mc. wide band, 2 channel, 25 watt mobile transceivers built to general specifications of RCA, Motorola or General Electric first line equipment or equivalent for highway patrol. All units are to operate from 12 volt DC power source and come complete with all equipment and hardware necessary for mounting and operation. All above units must be capable of duplex operation on both channels if desired by changing crystals and tuning.
$800 each. Total cost C & F $29,000.

RPGN Control Room Equipment

One (1) VHF-FM frequency monitor and modulation deviation meter.
$1000.00

One (1) Frequency standard and frequency measuring device 3-15 mc. range and 30-50 mc. range to be used to check frequencies in this range and zero SSB equipment.
$1,500

Two (2) Single side band monitor receivers for use with SSB equipment.
$2,000

Five (5) VHF-FM monitor receivers for frequency monitoring 30-50 mc. range.
$2,500

MAINTENANCE SHOP TEST EQUIPMENT

1. (One) Oscilloscope, commercial grade Dumont or better for SSB alignment and communications use complete with test leads.
   $1,000

2. (One) VHF-FM Signal generator, standard measurements or better for operation from 3 to 50 megacycles. Calibrated output, metered, from .5 to 10,000 micro volts. Complete with test leads and probes for communications equipment alignment.
   $800

3. (Two) Byrd Watt meters complete with test cells for 3 to 50 megacycle use in 10 - 100 - 1000 watt power ratings.
   $275

4. (One) Millen grid dip meter complete with coils with 2 to 250 megacycle operating capability.
   $50

5. (Five) Tripplet 630 volt ohm milliamper multimeters complete with test leads and a leather carrying case.
   $250

6. (One) Hickock tube tester for commercial communications and industrial use.
   $395

7. (One) Transistor Checker Hickock or the equivalent.
   $150

8. (Five) Weller soldering guns 250 watt with 500 spare tips.
   $90

9. (Three) Weller soldering guns 150 watt with 500 spare tips.
   $80

10. (Two) Vacuum tube voltmeters of 13 meg ohm input impedance complete with test leads and probes.
$160

11. (One) 1000 watt expanded coaxial load antenna for portable use from 3 to 500 mcs. functioning as a 50 to 72 ohm resistive load.
$150

12. (Five) Complete sets of radio repair hand tools consisting of insulated screw drivers, pliers, diagonal cutters, long nosed pliers, spin tite wrenches, tuning tools for set alignment, etc.
$500

13. Additional miscellaneous test equipment for repair facility equippage procurable locally.
$3,100

TOTAL $7,000

TRAINING SCHOOL EQUIPMENT

1. Regular classroom equipment such as blackboards, chalk, desks, etc.
   $1,000

2. Ten (10) Perforated VECTOR Boards complete with solderless lugs and all electronic components for construction of classroom breadboarded circuits of amplifiers, oscillators, power supply receiver and transmitter circuits. Packaged in steel storage cabinet.
   $2,000

3. Instruction materials on communications theory in Spanish to include all texts, examinations and printed matter needed to conduct a class of 25 students. Philco texts or equivalent complete with training aids.
   $2,000

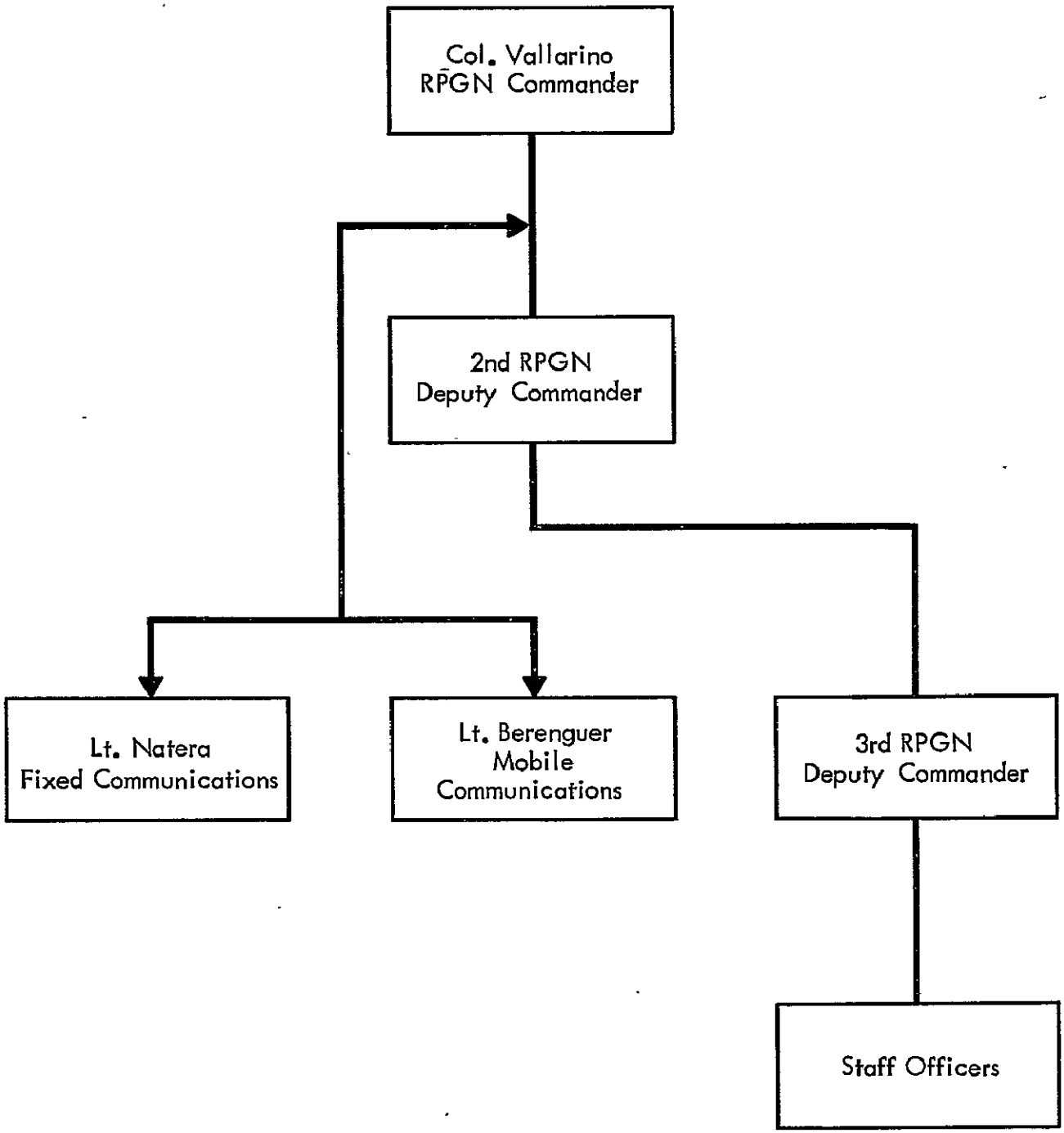
TOTAL TRAINING EXPENDITURE $5,000

NOTE: The USAID Program for Panama does not have a means of generating counterpart funds. As this type funding is not available to assist in implementation of the proposed communications program, the OPS representative recommends that a U.S. dollar fund be set aside in the amount of $5,000 to meet unforeseen contingencies. This fund will facilitate the obtaining of locally procurable items to assist in implementing all phases of this project.

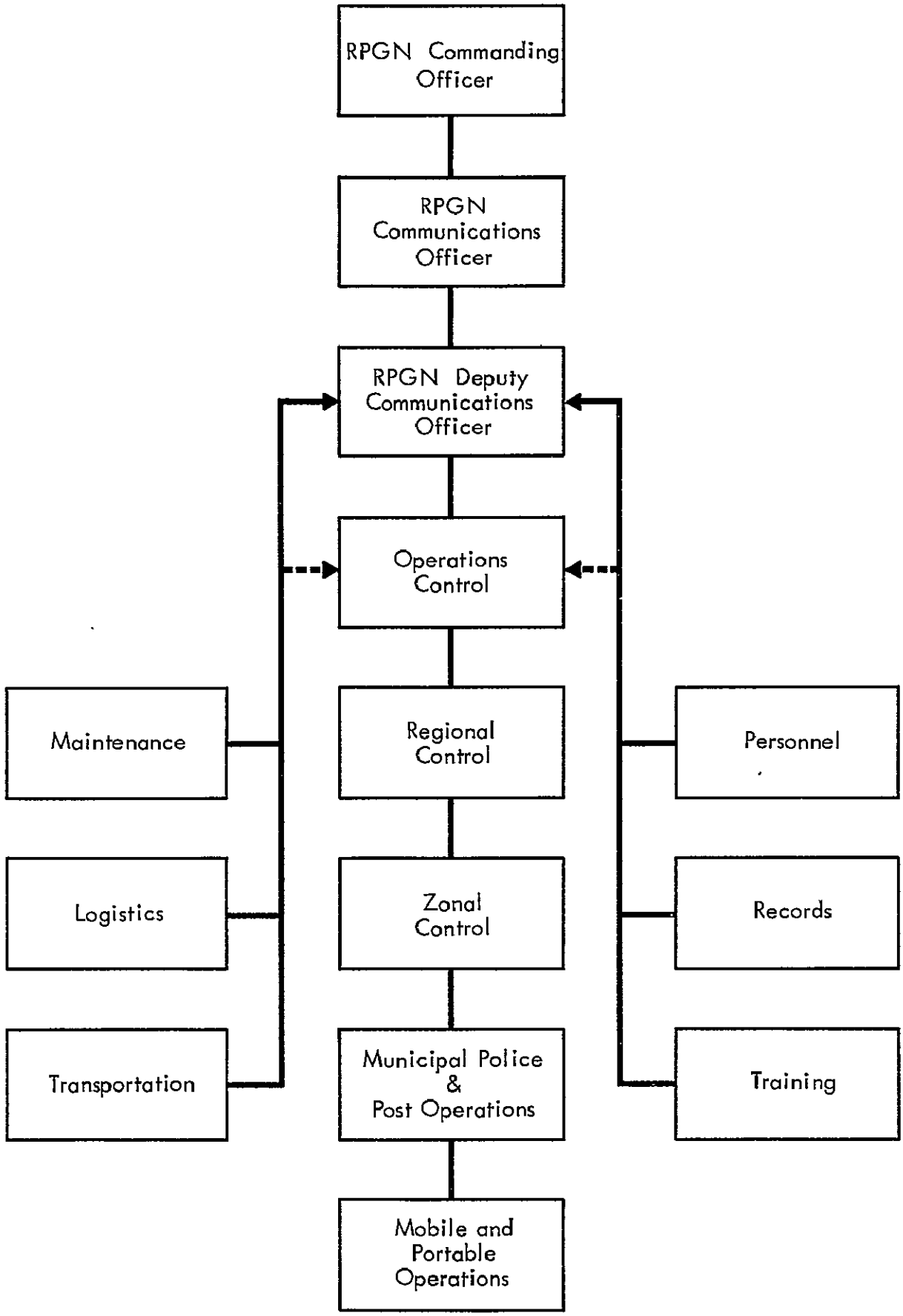
TOTAL COST SHEET

Communications equipment	$105,000
HQ Control Room equipment	7,000
Shop Maintenance Test equipment	7,000
Training School equipment	5,000
Dollar Emergency fund	5,000
Total Project Cost figure	$129,000

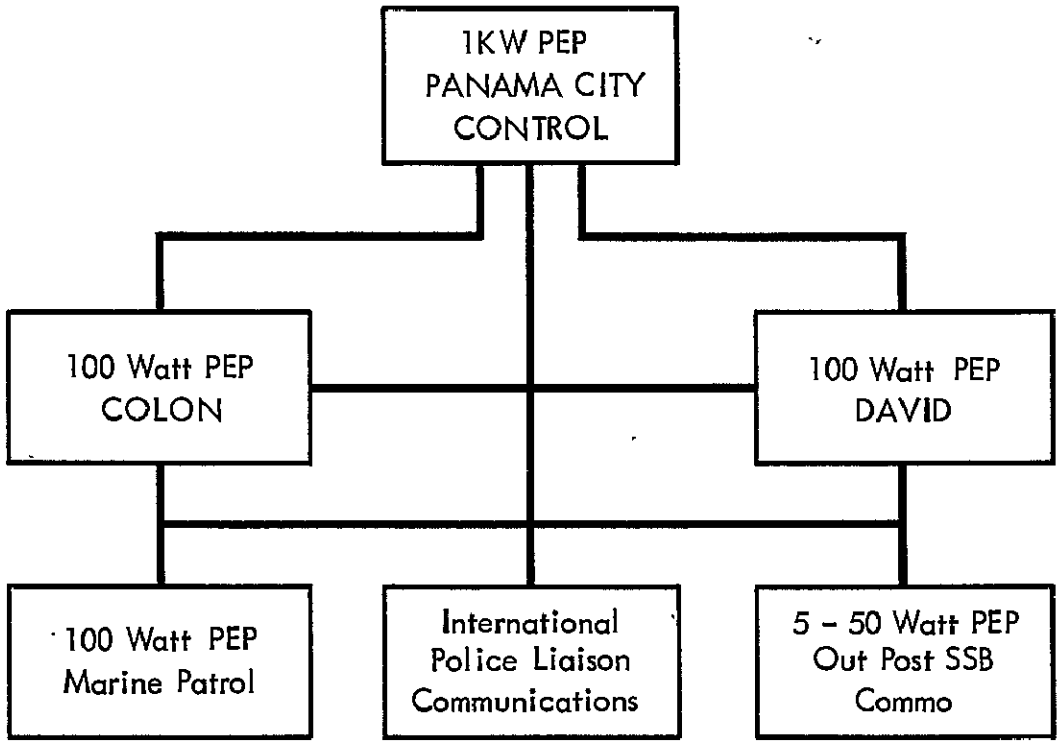
CURRENT RPGN COMMUNICATIONS STAFFING



RECOMMENDED COMMUNICATIONS SUPPORT CONTROL



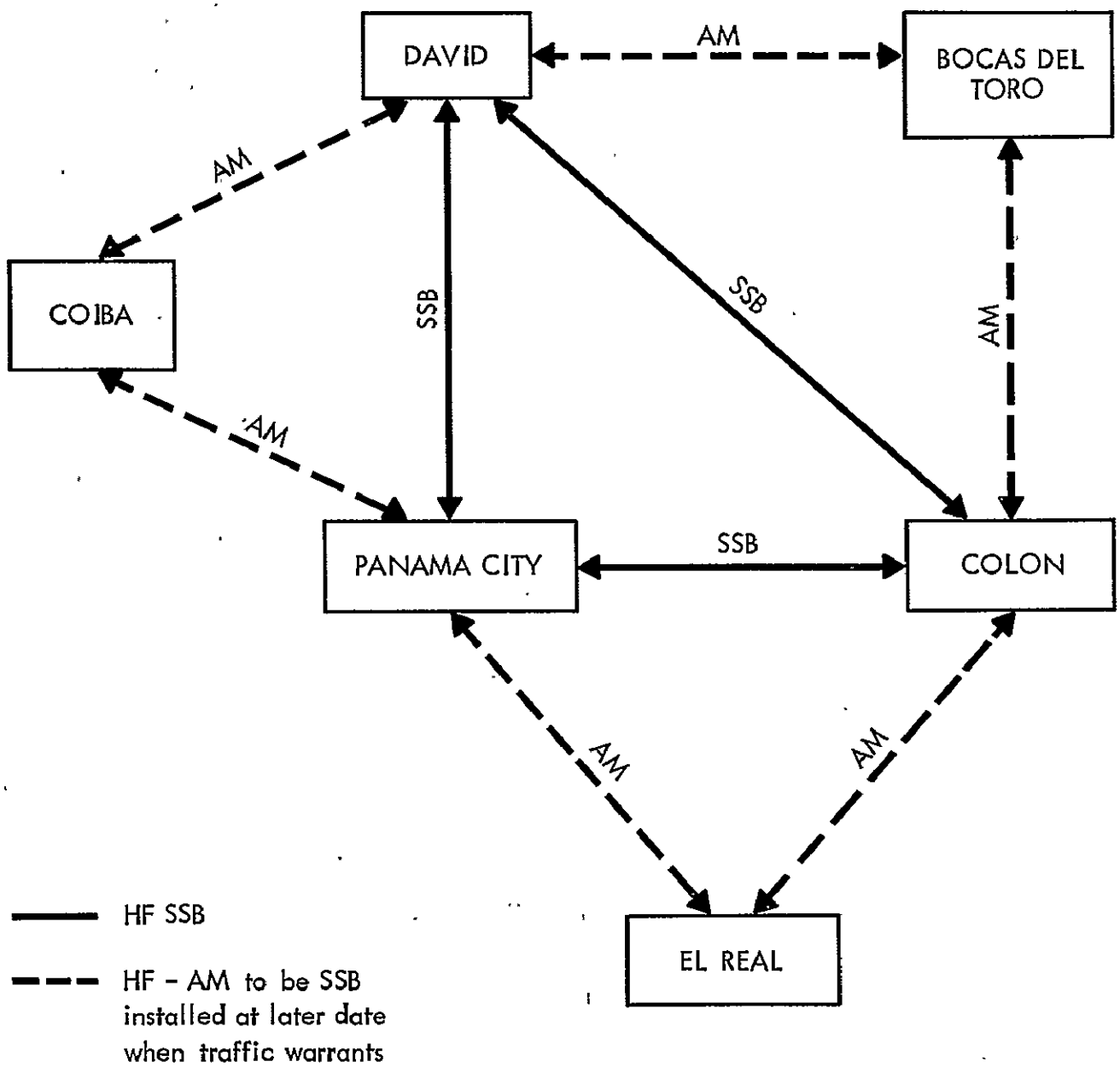
PROPOSED SINGLE SIDE BAND COMMUNICATIONS TRAFFIC CONTROL



Note: Direct contact can be made from any of the operation locations or inter-communication capability utilized. All operations are under the control of Panama City using monitors on all traffic and 1 KW Transmitters.

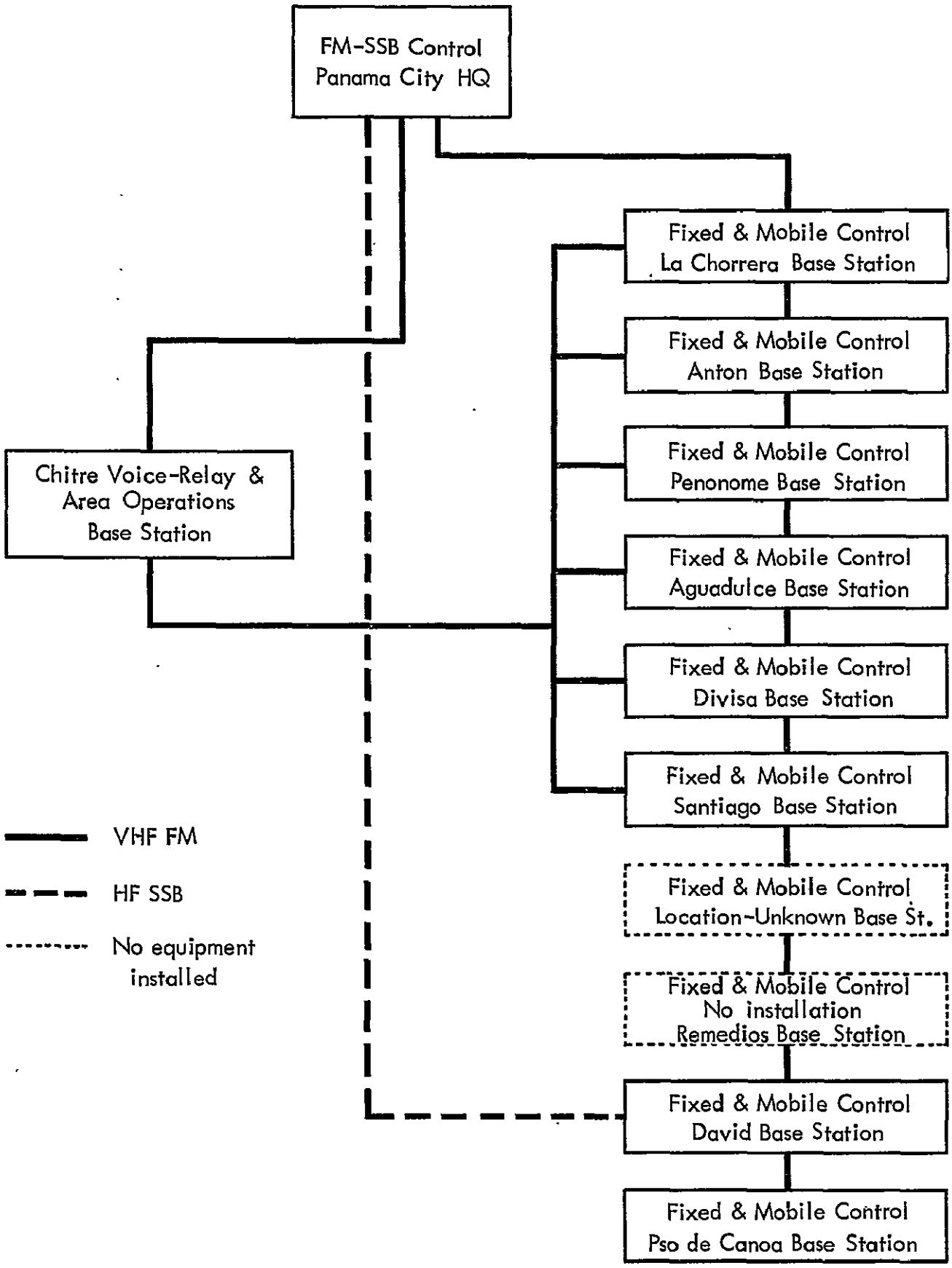
The above facilities can be utilized to coordinate operation with other nations or units through use of monitor receivers using duplex operation utilizing the daily used frequencies of inter-communication units.

PROPOSED SSB NET WITH SUPPLEMENTAL AM INSTALLATIONS

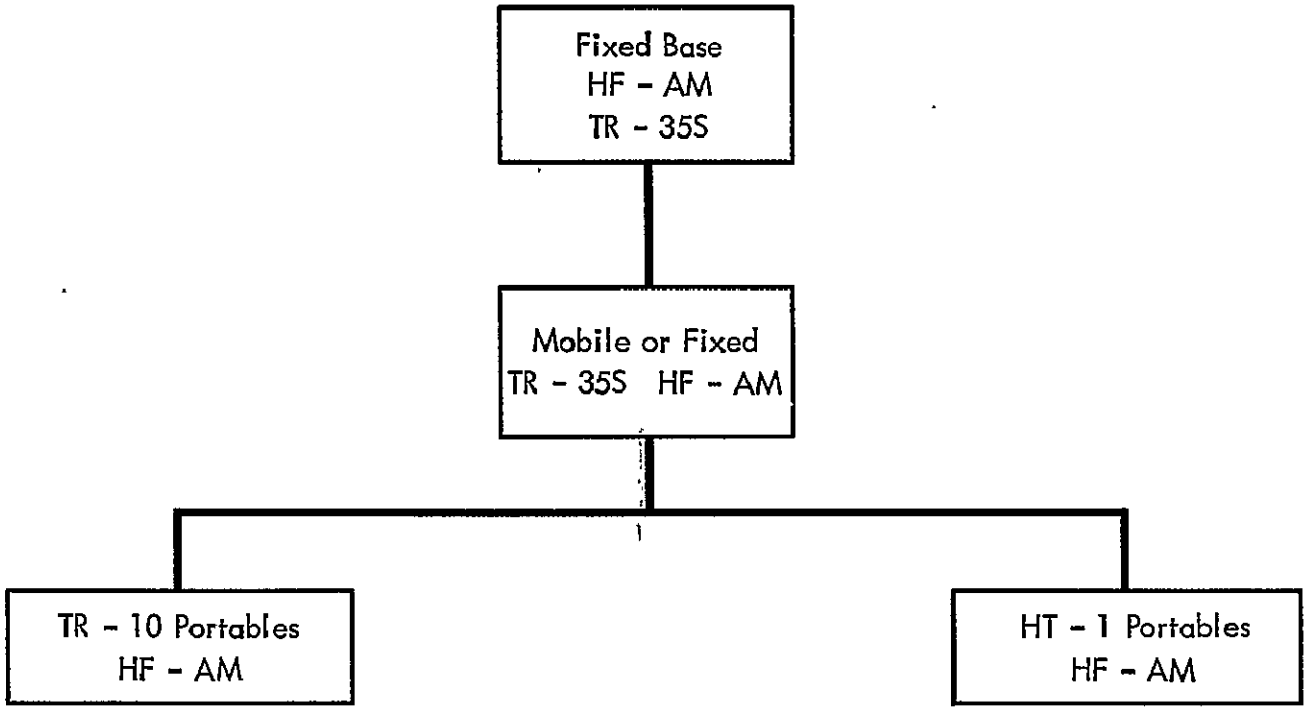


NOTE: All broken lines denote AM communications to be installed with TR 35 HF AM equipment. These links can be equipped with SSB at a future date if traffic is sufficient to warrant cost of SSB equipment. Each point on the diagram will act as a direct AM portable terminal for field traffic in its area in an emergency field operation utilizing TR-10 portable radio communications.

PROPOSED HIGHWAY PATROL CONTROL NET UTILIZING EXISTING INSTALLATIONS



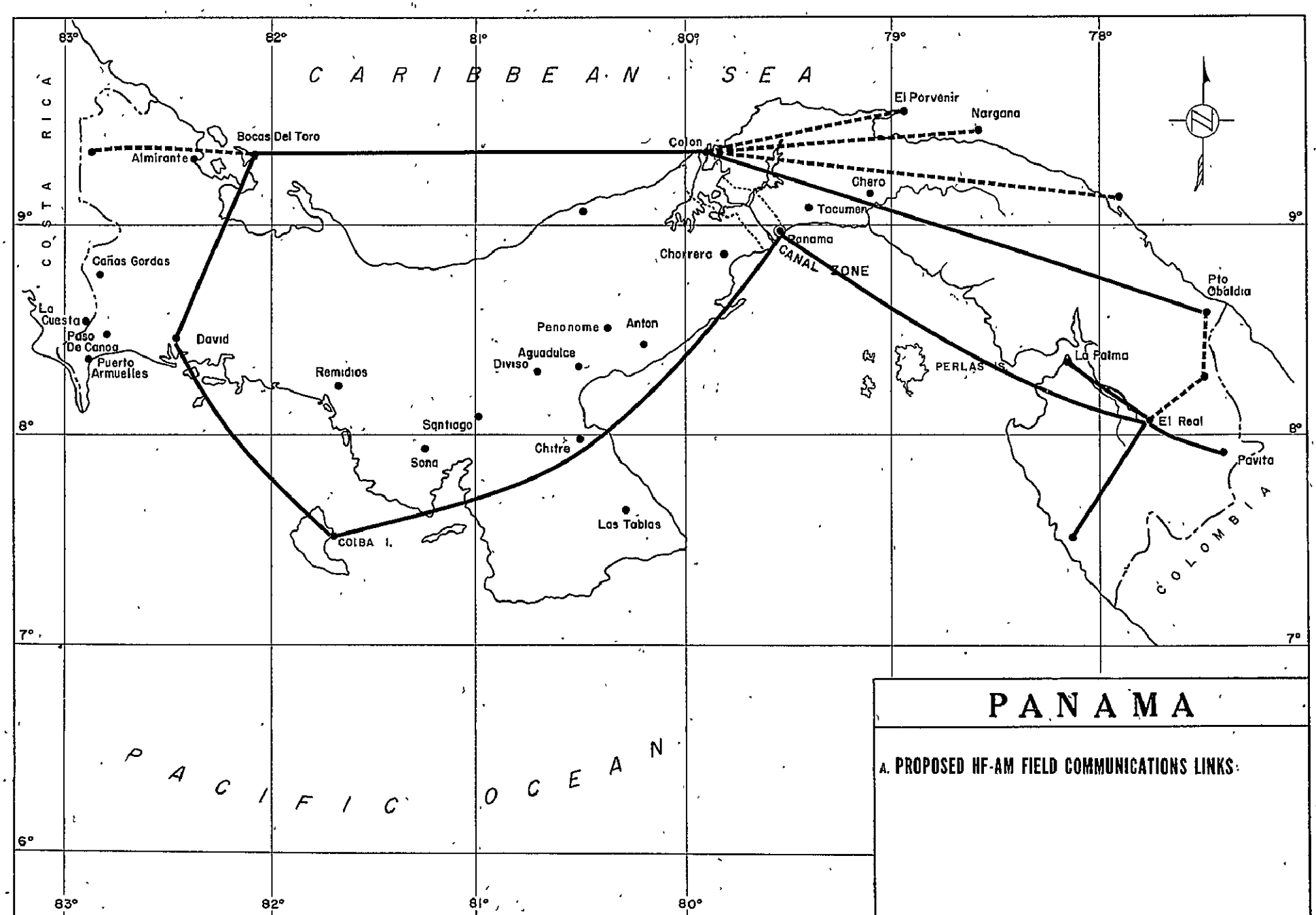
PROPOSED REMOTE AREA COMMUNICATIONS



HF operation	3 - 15 mcs.
VHF operations	30 - 50 mcs.

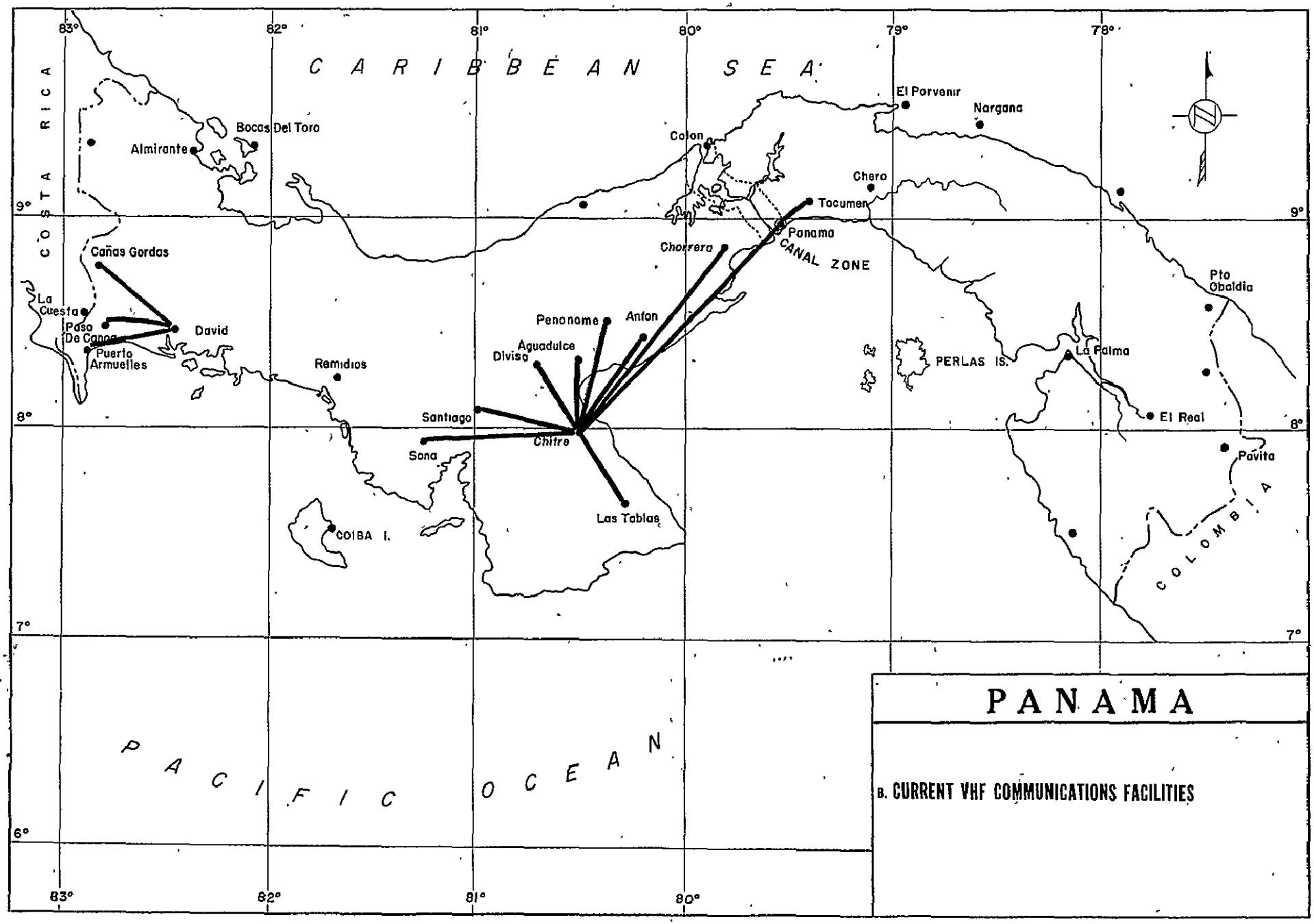
NOTE: Above communicate to mobile or directly as needed to accomplish the Mission.

The above can be accomplished with either HF AM or VHF-AM equipment. The HF-AM permits coverage of greater distances without relay points but is more prone to interference.



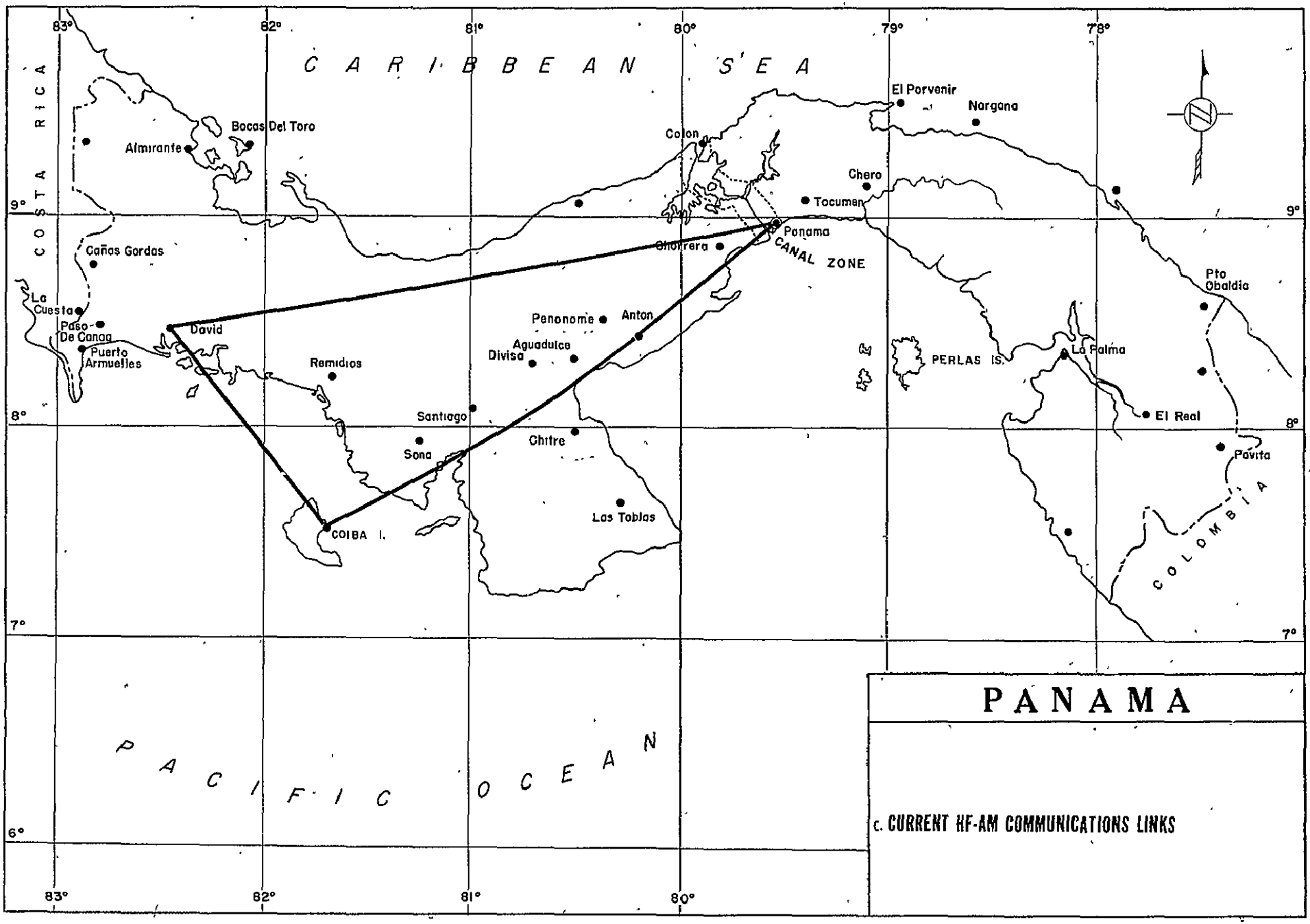
PANAMA

A. PROPOSED HF-AM FIELD COMMUNICATIONS LINKS



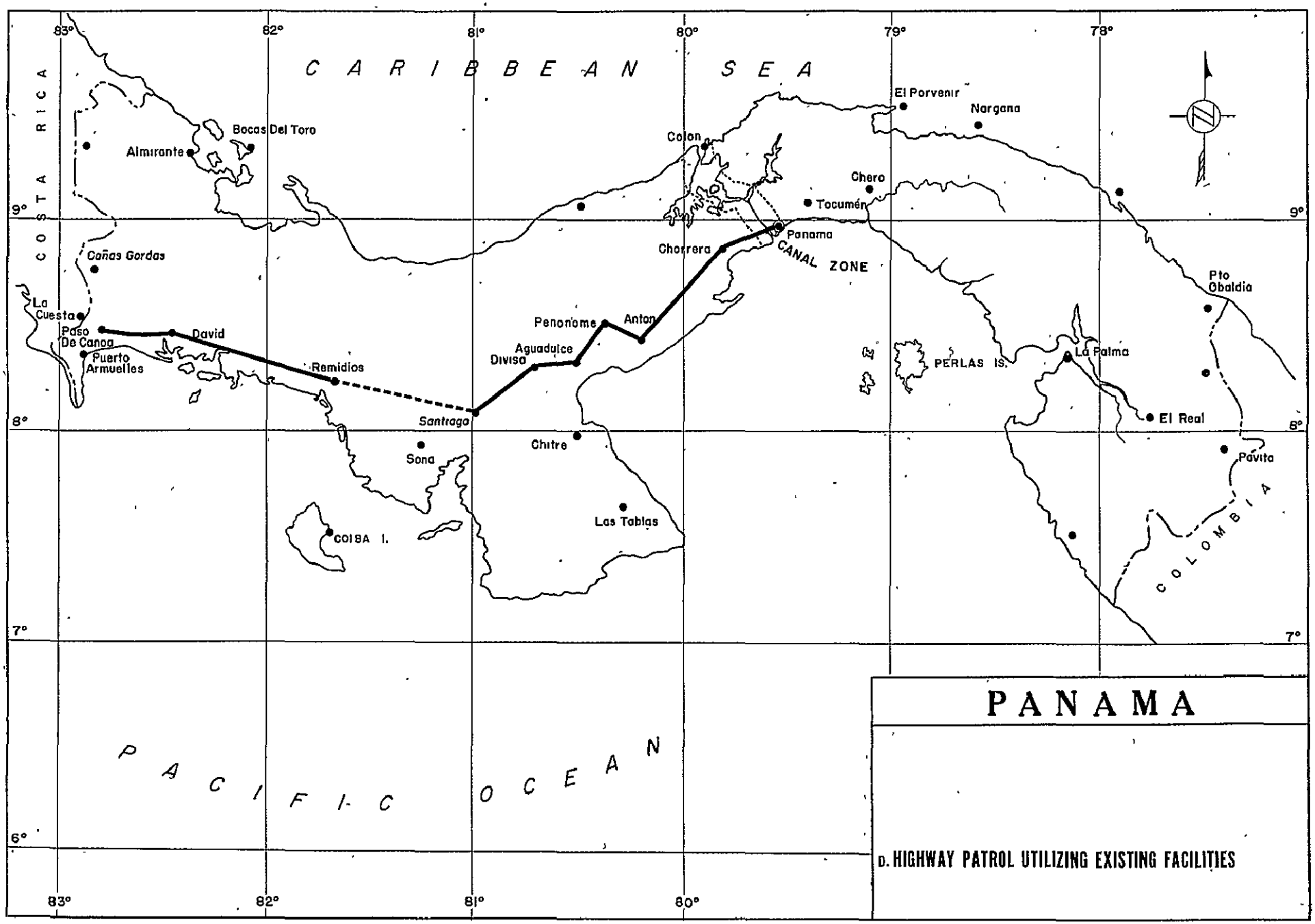
PANAMA

B. CURRENT VHF COMMUNICATIONS FACILITIES



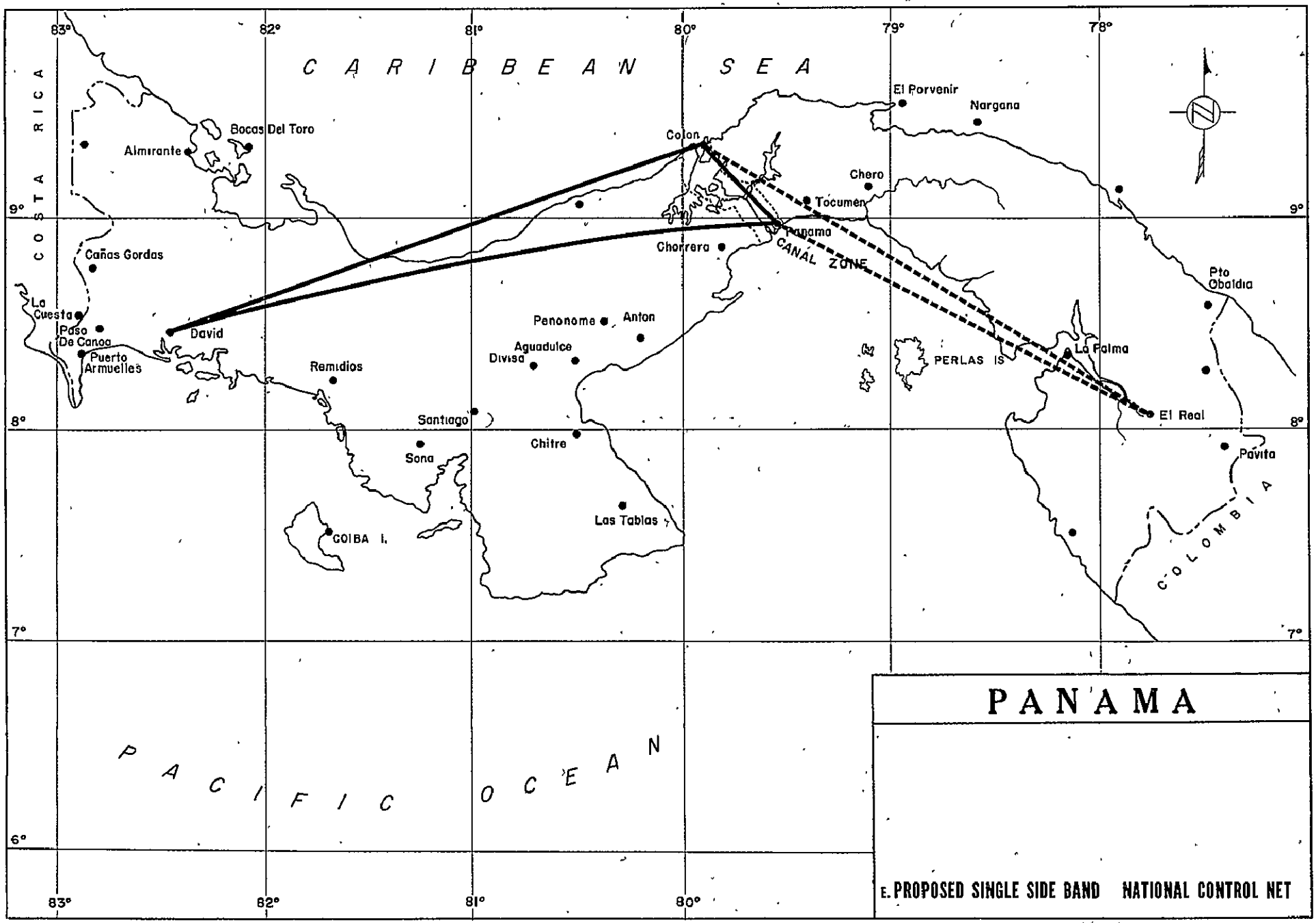
PANAMA

c. CURRENT HF-AM COMMUNICATIONS LINKS



PANAMA

D. HIGHWAY PATROL UTILIZING EXISTING FACILITIES


PANAMA
E. PROPOSED SINGLE SIDE BAND NATIONAL CONTROL NET
CARIBBEAN SEA
PACIFIC OCEAN
COSTA RICA
COLOMBIA
CANAL ZONE
PERLAS IS
83°
82°
81°
80°
79°
78°
9°
8°
7°
6°
Almirante
Bocas Del Toro
Cañas Gordas
La Cuesta
Paso De Canoa
Puerto Armuelles
David
Remidios
Santiago
Sona
COIBA I.
Chitre
Las Tablas
Divisa
Aguadulce
Penonome
Anton
Chorrera
Colon
Panama
Tocumen
Chepo
El Porvenir
Nargana
La Palma
El Real
Pto Obaldia
Pavita

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