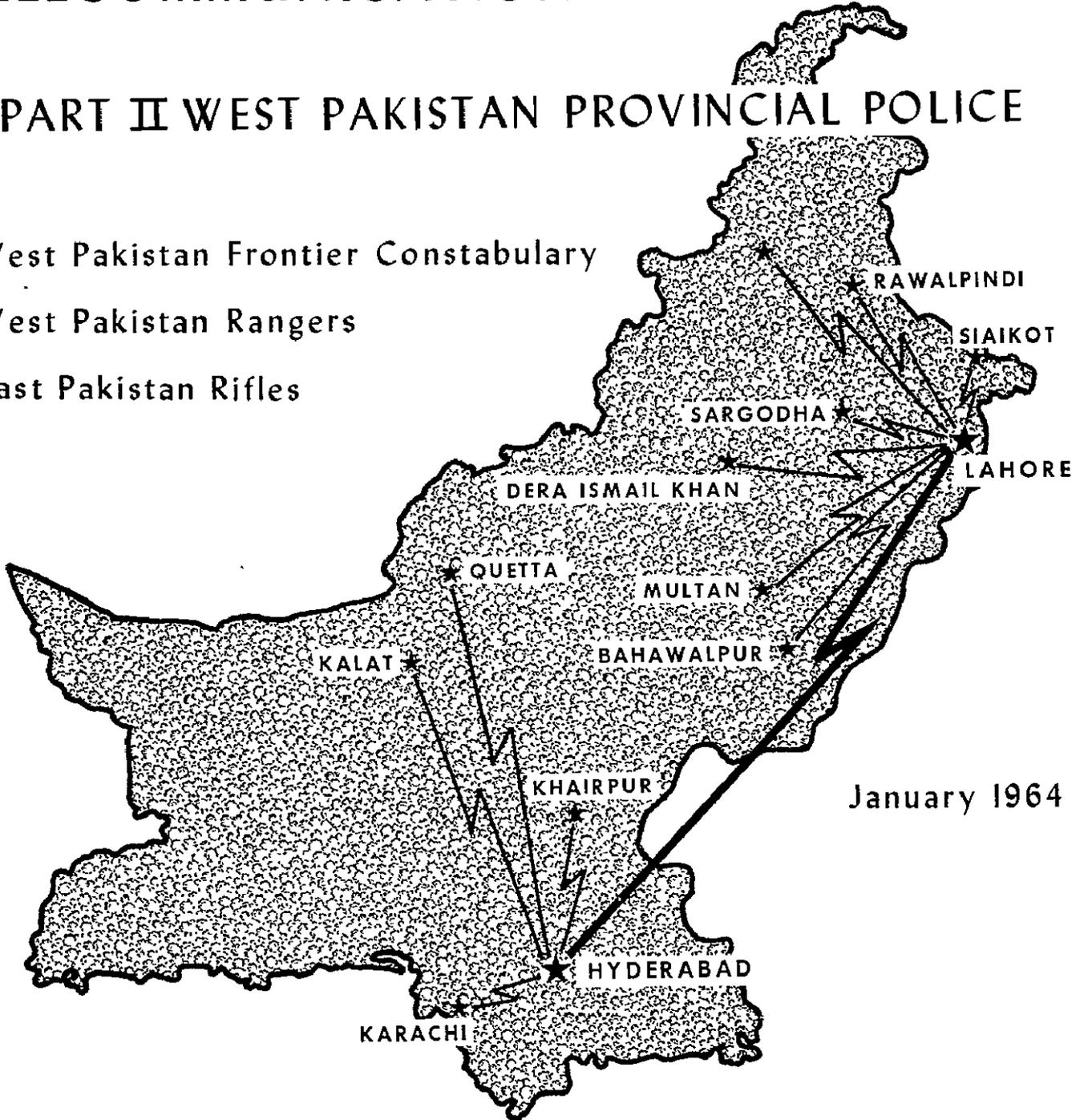


PAKISTAN POLICE TELECOMMUNICATIONS SURVEY REPORT

PART II WEST PAKISTAN PROVINCIAL POLICE

- ★ West Pakistan Frontier Constabulary
- ★ West Pakistan Rangers
- ★ East Pakistan Rifles



AGENCY FOR INTERNATIONAL DEVELOPMENT

OFFICE OF PUBLIC SAFETY

WASHINGTON, D.C.

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PAKISTAN PROVINCIAL POLICE TELECOMMUNICATIONS
SURVEY REPORT

Part 2

West Pakistan Provincial Police

- *Frontier Constabulary
- *West Pakistan Rangers
- *East Pakistan Rifles

Paul Katz

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Agency For International Development

January 1964

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GLOSSARY

AID/W — Agency for International Development - Washington
EPP — East Pakistan Provincial Police
EPR — East Pakistan Rifles
GOP — Government of Pakistan
GOWP — Government of West Pakistan
OPS — Office of Public Safety, AID/W
USAID — United States Agency for International Development/Pakistan
WAPDA — Water and Power Development Agency
WPP — West Pakistan Provincial Police
WPR — West Pakistan Rangers
WPTT — West Pakistan Telephone and Telegraph

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AM — Amplitude Modulation

Modulation of the amplitude of the transmitting wave. The transmitting wave contains a fixed carrier with no intelligence (speech or signal) and two sidebands both above and below the carrier signal. Each sideband produced by the process of modulation has the same intelligence.

CW — Continuous Wave - Radio Telegraph

Interrupting the transmitted carrier at precise intervals permits the use of Morse Code, a telegraphic alphabet or code consisting of dots, dashes and spaces. The transmitting wave contains a fixed carrier with no signal and no sidebands.

FM — Frequency Modulation

Modulation of the frequency of the transmitting wave in accordance with speech or a signal. The transmitting wave contains a variable carrier with the intelligence and no sidebands.

HF — High Frequency

Frequencies from 3 to 30 megacycles
Used for long distance point-to-point communications.

SSB — Single Sideband

The energy normally contained in the carrier and two sidebands of AM transmission is concentrated in one sideband. The selected sideband may be either the upper or the lower and contains the same capabilities as that obtained in AM transmission.

VHF — Very High Frequencies

Frequencies from 30 to 300 megacycles
Used for line of sight communications.

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Simplex — 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 — The operation of radio equipment utilizing two frequencies for the functions of transmission and reception, enables the base station to employ simultaneous operation of the transmitter and receiver.

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FOREWORD

In response to a request from USAID/Pakistan, and with the concurrence of the Government of Pakistan (GOP), a communications survey of five internal security civil forces was conducted by a telecommunications engineer from the Office of Public Safety (OPS), Agency for International Development, Washington (AID/W), from September 6 to October 2, 1963.

The five forces involved are as follows:

1. West Pakistan Provincial Police (WPP)
2. Frontier Constabulary
3. West Pakistan Rangers (WPR)
4. East Pakistan Rifles (EPR)
5. East Pakistan Provincial Police (EPP)

Part 1 of this survey which covered the East Pakistan Provincial Police Communications (NO. 5 above) was published December 1963. Part 2 presented here, covers the first five security forces listed above; their communications systems, organizations and facilities. For a complete evaluation of Pakistan police communication capabilities, both Parts of this survey should be considered.

During this survey in West Pakistan, discussions of the Public Safety communication program were held with the Chief of the Public Safety Division, USAID/Pakistan and his staff. Meetings were held with Brigadier Azar Khan, Joint Director of the Pakistan Intelligence Bureau (PIB) and the Acting Public Safety Project Director for Pakistan. Mr. Anwar Quazi, Assistant Inspector General, Chief of Telecommunications and Transportation for the WPP furnished information relative to the WPP telecommunications service and problems. Mr. Z. H. Qureshi, Superintendent of Police, in charge of the WPP North Zone telecommunication operations, furnished valuable information and accompanied the AID/W representative to all of the North Zone

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telecommunication installations visited. Mr. Bornshin, Superintendent of Police, in charge of the WPP South Zone telecommunication operations, also furnished valuable information and accompanied the AID/W representative to all of the South Zone telecommunication installations visited.

In addition to the above, meetings took place with Lt. Colonel Tirnize, Chief of Signals, West Pakistan Rangers (WPR); Mr. Kamir Alam, Superintendent of Police, Deputy Chief of the Frontier Constabulary; Lt Colonel Kanga, Chief of Signals, Frontier Corps; Lt Colonel Zahid Ali, Chief of Signals, East Pakistan Rifles (EPR). Details regarding these meetings are contained in this report.

In order to evaluate the internal security forces communications requirements, the writer traveled extensively throughout West Pakistan and East Pakistan and visited telecommunication facilities at Karachi, Lahore, Rawalpindi, Peshawar, Dacca, Barisal, Rhulna and Jessore.

In this report an effort is made to evaluate the existing internal security forces' telecommunication facilities, personnel, systems, and organizations and to identify areas therein where improvement can be made.

Suggestions and recommendations are made for consideration by the Government of Pakistan and USAID/Pakistan where technical and administrative assistance is needed to improve the efficiency and effectiveness of the present telecommunication facilities of the internal security forces.

In addition, an effort has been made to identify the immediate and future communications requirements for equipment, personnel, training and logistic support. This may form a basis for USAID planning regarding the communications integral of its Public Safety Program.

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INTRODUCTION

Pakistan is geographically divided into two provinces, West Pakistan and East Pakistan. The country of India separates these two provinces by nearly a thousand miles.

West Pakistan has a population of approximately 42,880,378 and an area of 310,403 square miles. It has a varied topography ranging from level plains and vast deserts in the south, to the mountain ranges of the north, where it is separated from the Soviet Union by a narrow barrier of mountains. It adjoins Iran and Afghanistan on the west and northwest, Kashmir and India on the east and southeast, and the Arabian Sea to the south.

The major cities of West Pakistan are Karachi, Lahore, Rawalpindi, Peshawar and Lyallpur. Karachi, the former capital of Pakistan, is situated along the Arabian Sea and is the major seaport of West Pakistan with a population of over two million people. Rawalpindi the present capital of Pakistan has a population of over 300,000 people. Lahore is the capital of the West Pakistan Province and has a population of over one million persons. Peshawar and Lyallpur both have a population of over 200,000 people.

Transportation facilities of West Pakistan include a railway with mileage of 5,534 miles which connects many of the cities, and 21,573 miles of roads of which 8,772 miles can be described as all weather roads. Road transport plays an important role in the transportation system of West Pakistan, where approximately 12,000 buses are dependent upon these roads.

The three major problems of internal security in West Pakistan reportedly are:

1. Urban crime
2. Rural banditry
3. Civil disturbances

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The West Pakistan Provincial Police, with personnel totaling approximately 60,000, has primary responsibility for the maintenance of law and order in all urban and rural communities throughout the country.

The Frontier Constabulary has primary responsibility for the maintenance of law and order in the settled tribal areas. They operate in the northwest part of West Pakistan.

The West Pakistan Rangers patrol the borders in the eastern part of West Pakistan.

The East Pakistan Rifles has primary responsibility for border patrol operations throughout East Pakistan.

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SUMMARY

WEST PAKISTAN PROVINCIAL POLICE (WPP)

Of necessity, this report describes the deficiencies of the WPP telecommunication systems and organizations that were noted during the survey. However, it should be recognized that while the WPP telecommunication systems and organizations are far from optimum in their capabilities, they do reflect considerable effort on the part of the officials concerned to provide essential communications in support of their overall police mission. The telecommunication officers of the WPP recognize many of the problems discussed in this report and they are taking all possible action to solve them.

The telecommunication system operated and maintained by the WPP consists of both a country-wide radio telegraph (CW) network and several token municipal VHF-FM patrol car systems. The WPP are also utilizing West Pakistan Telephone and Telegraph (WPTT) leased lines to provide a teletype administrative channel from Lahore to the many WPP Range headquarters. In addition the WPP are responsible for the operation and maintenance of a separate radio network for the Water and Power Development Agency (WAPDA) and the Flood Control Agency.

The WPP telecommunications services and facilities are marginal. The lack of adequate technical personnel, maintenance facilities and equipment, which to a large extent is obsolete and in poor condition, contributes to the general unreliability of the WPP telecommunication system.

The WPP has not been provided with sufficient budgetary support to sustain its telecommunication system properly. The make-shift repairs performed in absence of spare parts and test equipment, accompanied by a lack of budgetary planning to assure adequate communications support, has detracted from the WPP telecommunications system's reliability.

The WPP administrative teletype circuits, operating on lines leased from West Pakistan Telephone and Telegraph (WPTT), are overloaded. This administrative channel has numerous GOP and GOWP users who pass ordinary traffic having no relationship to internal security matters. In addition, WPTT has not provided for the simultaneous transmission and reception to distant WPP Range headquarters necessary for internal security operations. The lack of automatic teletype equipment and duplex operation limits the message handling capabilities of this WPP facility.

The additional responsibility to operate and maintain the Water and Power Development Agency (WAPDA) and Flood Control radio networks seriously hampers the ability of the WPP telecommunication service to furnish rapid and reliable police communications.

The lack of technical telecommunications officers to provide technical and operational guidance to the municipal police telecommunications systems results in the minimum utilization of equipment capabilities.

The WPP have been provided some U.S. military type portable radio equipment for controlling civil disturbances. This radio equipment should be compatible with, and operate as an extension of, the existing municipal police radio equipment, but it is not. Therefore, maximum control of the WPP Strike Force elements, essential in internal security operations, is not possible.

An effective police telecommunication system is more than the possession of modern radio equipment. The effective organization and administration of human resources are also necessary to properly utilize this equipment. Sound programs for training, planning and organizing must be developed to most effectively install, maintain and operate a communications system in support of police operations. These are the most immediate problems to be dealt with.

In this regard, the U.S. role will be to cooperate with the efforts of the GOP to treat these problems by providing technical assistance, commodities and participant training.

CONCLUSIONS AND RECOMMENDATIONS

WEST PAKISTAN PROVINCIAL POLICE (WPP)

A. CONCLUSIONS

To best assist the WPP in the field of communications, agreements should be reached with the GOP wherein the U. S. would provide technical assistance as a part of a cooperative development program to correct the deficiencies noted in present WPP telecommunications facilities and organization.

Major deficiencies requiring attention are:

1. The need for suitable telecommunications planning and engineering which is essential in internal security operations.
2. The need for additional, technically trained telecommunications officers to provide technical and operational guidance to the municipal and provincial police telecommunications systems.
3. The insufficient budgetary support to properly sustain the WPP telecommunication system.
4. The improper utilization of existing municipal police telecommunications equipment.
5. The need for municipal police and highway patrol telecommunication systems in West Pakistan's most heavily populated and strategic areas.
6. Numerous GOP and GOWP agencies using the WPP teletype circuits overload this limited facility and seriously affect its overall efficiency.
7. Operating and maintaining the WAPDA and Flood Control communications equipment with the limited facilities, lack of spare parts and number of different makes of equipment which seriously affects the efficiency of the WPP telecommunication system.

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8. The WPP Strike Force portable communications equipment is not compatible with the existing municipal police telecommunications system. Such compatibility is essential for proper control of Strike Force elements.

9. The present WPP telecommunication supply records require improvement. A Kardex type system is essential for proper control over the expenditure of supplies and provides an identification and location file for each item of stock.

10. Single Sideband (SSB) transceivers recently purchased by the WPP to replace obsolete HF-AM equipment were ordered without a radio telegraph (CW) capability, which is essential in internal security operations and should be required.

11. The WPP telecommunication system now includes a quantity of equipment of a number of different manufacturers, European as well as U.S. This creates problems of maintenance and obtaining spare parts.

12. The lack of maintenance and training facilities to provide adequate trained personnel with proper maintenance tools and test equipment.

The reliable life expectancy of most of the WPP telecommunications equipment is seriously limited under these present conditions. The operational capability of the existing telecommunications system will deteriorate rapidly unless proper steps are taken to improve the WPP maintenance capability.

WEST PAKISTAN PROVINCIAL POLICE (WPP)

B. RECOMMENDATIONS

Public Safety planning should be initially directed toward the improvement of the operations, maintenance skills and facilities of the existing WPP telecommunications system. With this regard, the GOP must assess their requirements with consideration to U.S. as well as Pakistan resources in order to establish suitable priorities for a cooperative improvement program.

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1. GENERAL

- a. All subscribers of the WPP telecommunications system and teletype circuits should be re-evaluated, keeping in mind a temporary elimination of those not involved in internal security operations. This should be accomplished until such time as the WPP can efficiently handle the additional traffic imposed by these Government agencies.
- b. Efforts should be made by the WPP to secure automatic teletype machines with tape perforators from the WPTT, in order to increase the traffic capacity over the leased lines.
- c. It is necessary to provide the recently purchased SSB equipment with a means of sending coded messages which is essential to police activities. For this purpose, the police have qualified radio telegraph (CW) operators.
- d. Where it is feasible, existing radio equipment should be redistributed in order to have similar manufacturer's equipment concentrated in a specific area or city. A suitable standardization plan should be made for the gradual and systematic replacement of old and obsolete equipment.
- e. It is recommended that several WPP telecommunications officers be assigned to the major cities where continuous technical and operational supervision over the municipal police telecommunications networks are needed. These telecommunications officers should report to the telecommunications staff in Lahore for technical support and direction.

2. TECHNICAL SERVICES

It is recommended that a USAID Public Safety Communications Advisor be assigned by the Mission to assist the West Pakistan Provincial Police overcome the deficiencies noted in this Survey. An appropriate agreement should be established and formalized to facilitate the cooperative working relationship needed to bring about improvements.

- a. This technician would be responsible to the USAID Mission for the planning, programming and implementing of a cooperative program of assistance to the telecommunications services of the WPP.
- b. He would cooperatively participate with the WPP telecommunications staff in the planning of improvements in training, organization, administration, operations and equipment of the telecommunications services.
- c. He would participate in the actual engineering and installation of networks and their components with the WPP telecommunications staff.
- d. His activities should be limited to West Pakistan so that he can concentrate his attention with the WPP telecommunications staff on the job to be done without absences or distractions.
- e. It is recommended that he arrive in West Pakistan no later than Spring of 1964.

3. COMMODITY SUPPORT

- a. Commodity recommendations are made to permit the more effective utilization of the existing provincial telecommunications system as well as to expand the municipal police telecommunication systems to a level where they can meet current and future WPP needs.

- b. A detailed description and itemized list of material recommended for the proposed WPP telecommunications support program is provided as Annex 1 of this report. A total cost of approximately \$200,000 will be required for implementation of the proposed support project.
- c. A discussion of various radio patrol car frequency ranges and methods of communications available is provided in Annex 2 to assist the WPP staff in selecting suitable frequencies for the USAID proposed Municipal Police and Highway Patrol Telecommunications System.
- d. Factors and information bearing on the development of a commodity plan to implement improvement steps for accomplishing basic objectives are:
 - (1) Radio telegraph (CW) and remote control facilities for the Single sideband (SSB) transceivers recently purchased by WPP should be provided. Equipment recommended will be fully compatible with the SSB transceivers above and cost approximately \$16,000. See Annex 1, paragraph A.
 - (2) To support the WPP provincial and proposed municipal telecommunication systems it is necessary to establish an effective maintenance program. Test equipment and tools at an approximate cost of \$22,000 should be provided to improve the WPP maintenance capabilities and facilities. See Annex 1, paragraph B.
 - (3) The WPP have large quantities of existing serviceable communications equipment in need of immediate repairs. Sufficient spare parts are recommended to permit the repair of this equipment and to assure the sustained operation of the present

WPP telecommunication system. The spare parts recommended will cost approximately \$12,000. See Annex 1, paragraph C.

(4) Municipal Police and Highway Patrol Telecommunications systems are recommended for the major cities in West Pakistan. Such systems in Rawalpindi, Lahore, Hyderabad, Peshawar and Lyallpur should be implemented in this phase of the commodity support plan. The above systems will include compatible walkie-talkie equipment for the Strike Force elements of the WPP. The total cost of the UHF-FM fixed, mobile and portable equipment as well as sufficient spare parts to install and maintain the proposed Municipal Police and Highway Patrol Telecommunications systems will be approximately \$100,000. See Annex 1, paragraph D.

(5) It is recommended that diesel generators be provided at each of the proposed municipal police fixed control stations to provide emergency electrical power in the event of local power failure. These generators will cost approximately \$24,000. See Annex 1, paragraph E.

e. It is recommended that before a contract is awarded by the authorized procurement agent, all bids should be referred to the West Pakistan Provincial Police and USAID/Pakistan for review and concurrence.

4. EMERGENCY FUNDS

Funds should be made available for emergency procurement of miscellaneous items where the need for these items cannot be anticipated. These items will be required for the maintenance and repair of existing police equipment as well as the

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equipment proposed for procurement under the USAID Public Safety project. It is recommended that an "Open-End" type of requisition (PIO/C) be issued providing up to \$5,000 for the procurement of such miscellaneous items over a period of one year. USAID should be designated the authorized agent.

The GOWP should provide \$5,000 in local currency to allow the purchase of locally-available material and services which may be required to support the implementation of the Public Safety communication project.

5. PARTICIPANT TRAINING

- a. It is recommended that additional telecommunication staff officers be trained. USAID should sponsor three participants for Telecommunication Officer Management Course in the U. S. for a period of 10 to 12 months. This course should be similar to the one conducted at Pasadena City College, California.¹
- b. USAID should send one WPP telecommunication officer to the U. S. for radio engineering training for a period of 18 months. This would help provide needed technical support of the police telecommunication system. This officer should also be utilized to formally instruct other telecommunications officers with the knowledge and skills he has obtained.
- c. The WPP telecommunications staff should be given the opportunity to become familiar with modern police telecommunications systems and adapt some of these more advanced techniques to the particular problems encountered in West Pakistan. It is recommended that 2 senior WPP telecommunications officers with appropriate technical

1. AIDTO circular X 1165, June 21, 1963 - Police Telecommunications Management Program.

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background be sent for observation and consultation for two to three months in the U. S. to familiarize themselves with U. S. Police, Border Patrol and Military communications facilities.

- d. USAID should sponsor one high level police officer participant (not a telecommunication specialist) to come to the U. S. for institutional training and observation in how the operational elements of municipal police organizations utilize radio communications facilities in carrying out police tasks. On returning, he should be responsible for participating in the formulating of such operational plans and for establishing a formal program of training in what he has learned.

6. LOCAL TRAINING

- a. Technician training should be established locally so that the technicians can more effectively maintain their existing equipment as well as be able to maintain the new equipment proposed by USAID Public Safety project.
- b. While some training will be conducted by the proposed USAID Public Safety Communications Adviser when he arrives, the police should initiate a program for basic and advanced training for present and new technicians. This can be done at the Police school with added training equipment, or with local manufacturers on a contractual arrangement.

7. FUTURE COMMUNICATIONS REQUIREMENTS

A detailed study of future communications requirements has not been accomplished to date; however, the following are some of the possibilities which should be considered:

- a. Municipal Police Communications Requirements

- (1) At such time as the Karachi telecommunication section, is under the operational and technical control of the WPP telecommunication staff and proper utilization of existing UHF-FM mobile equipment is implemented, consideration should then be given to the expansion and modernization of existing facilities.
- (2) The present VHF-FM mobile equipment in Karachi should be phased out in the next two to four years. The equipment phased out should be transferred to other cities to establish a training program in radio patrol techniques.
- (3) Consideration should be given to the establishment of an integrated central communication control center in Karachi, with appropriate turret type switchboards for routing incoming calls to the police officials concerned.
- (4) The municipal police telecommunications systems may later be established in Multan, Quetta, Sargodha and Bahawalpur. This installation rate would of course depend upon the extent of USAID Public Safety support and the resources of the Pakistan Government.

b. Provincial Police Communications Requirements

- (1) For better security, it is recognized that reliable communications are required between the WPP District Headquarters and the various district police posts not serviced by commercial facilities. This would provide a greater degree of centralized control and enable subordinate police officials to communicate more readily with their headquarters.
- (2) A communications system of this magnitude should be a joint US/Pakistan effort and coordinated with other interested GOP

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internal security agencies. This system should be an extension of the basic WPP country-wide telecommunication system and be available for civil security communications and possibly normal civil government administrative business.

- (3) The WPP Range Headquarters radio stations need modernization. The radio equipment at most of these stations is either under-powered or obsolete. The WPP have recently purchased SSB transceivers to partially replace and supplement the basic radio network. However, the configuration of the SSB equipment purchased is such that the desirable simultaneous reception and transmission type of operation is not possible.
- (4) Additional SSB receivers will be needed to allow full utilization of the equipment's capabilities. Separate transmitter and receiver facilities are needed as well as adequate areas for the installation of necessary antennae before a proper communications system can be evolved.

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WEST PAKISTAN PROVINCIAL POLICE (WPP)

TELECOMMUNICATIONS SURVEY REPORT

A. MISSION

The WPP telecommunication section was established as a branch of the Telecommunications and Transportation Division to perform a dual function:

1. To provide an essential and reliable telecommunication service by maintaining a province-wide internal security communications system in support of the overall police mission.
2. To provide the police with an effective and efficient communications service to support municipal police operations.

B. SYSTEMS

To accomplish the above assignment, the following WPP telecommunications systems were established:

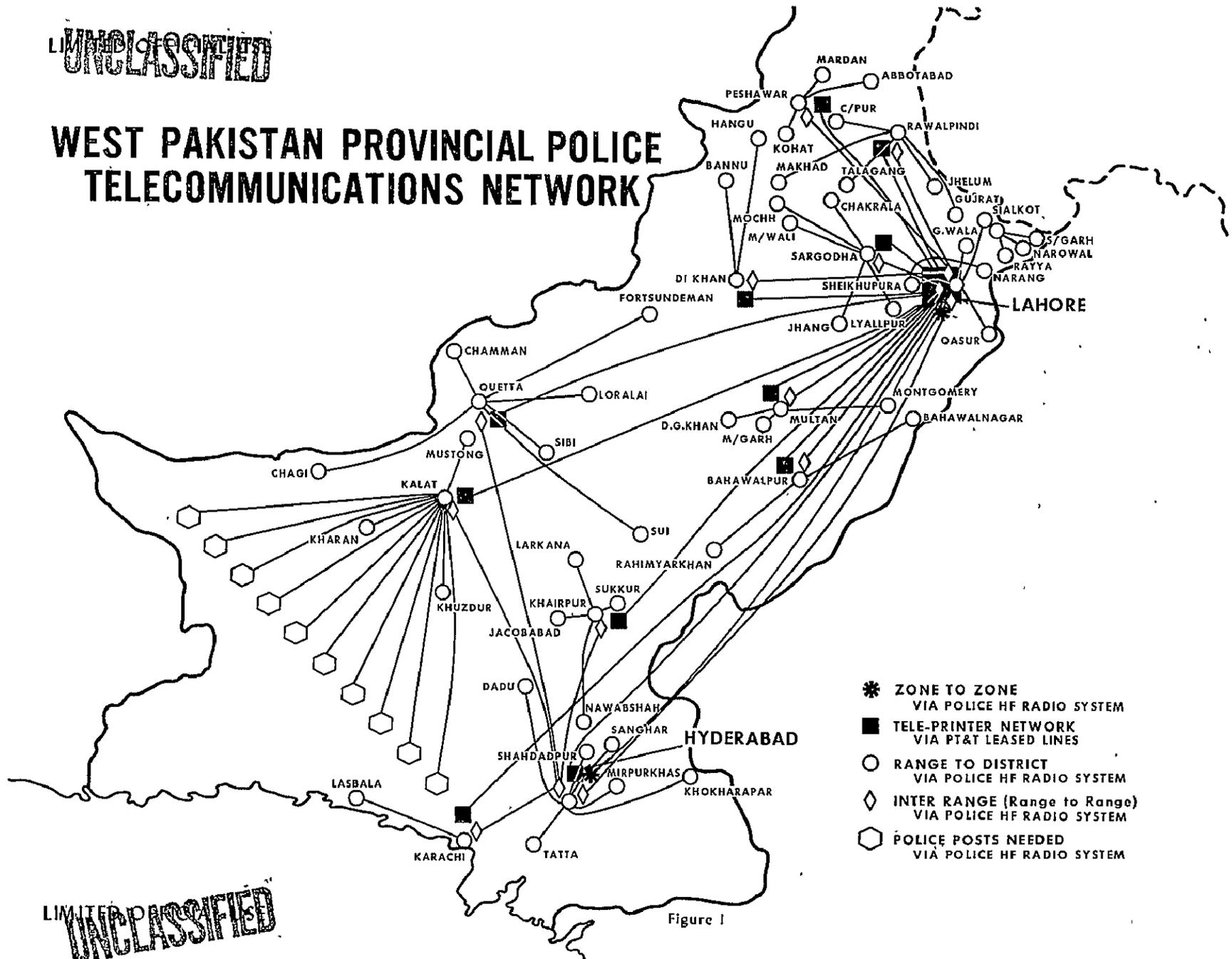
1. A province-wide radio telegraph (CW) system to provide an operational and tactical net. (See figure 1 and 2)
2. Teletype circuits via WPTT leased lines to provide an administrative net from WPP headquarters to the subordinate range headquarters.
3. Municipal police communication systems in Karachi, Lahore and Rawalpindi to provide a radio patrol car operation.

C. ORGANIZATION

1. The system and personnel of the WPP province-wide telecommunications service are under the operational and technical supervision of the headquarters telecommunication staff in Lahore.
 - a. The WPP telecommunication service is divided into two zones; the North Zone and the South Zone. Each zone is under the supervision of a Superintendent of Police. They in turn report to an

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WEST PAKISTAN PROVINCIAL POLICE TELECOMMUNICATIONS NETWORK



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Figure 1

WEST PAKISTAN PROVINCIAL POLICE TELECOMMUNICATIONS NETWORK

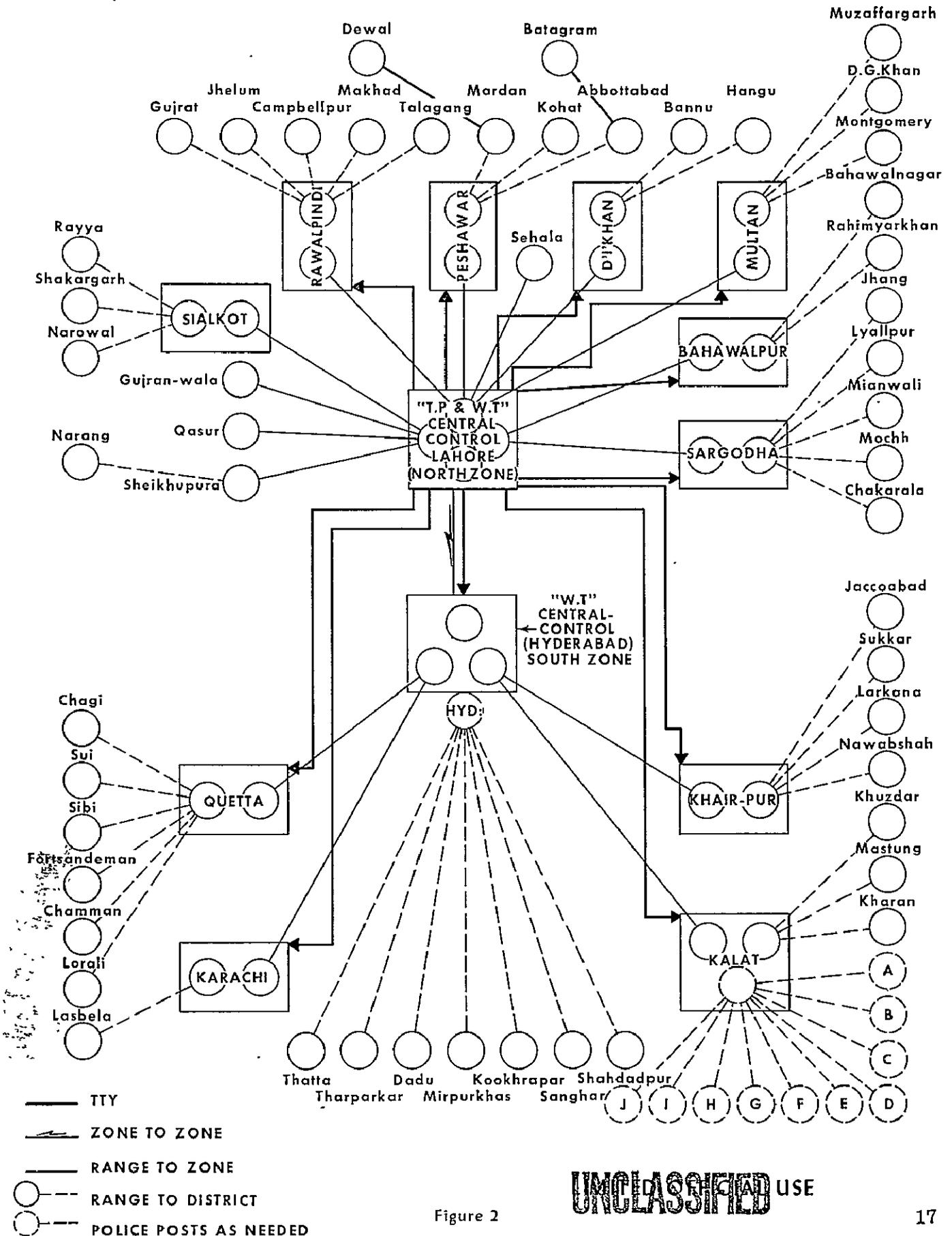


Figure 2

Assistant Inspector General in charge of Telecommunications and Transportation.

- b. The WPP South Zone telecommunication section with headquarters in Hyderabad has 2 officers, 21 non-gazetted (Inspector or lower) officers and 300 constables.
- c. The WPP North Zone telecommunication section with headquarters in Lahore has 4 officers, 45 non-gazetted officers and 500 constables.

2. The Karachi municipal police telecommunication section was formerly under the direct control of the central government and did not report to the WPP headquarters telecommunication staff, therefore, little operational and technical supervision was provided.

- a. The Karachi municipal police telecommunications section has 13 non-gazetted officers, 182 constables and 7 civilian technicians.

D. DISCUSSION

1. WPP COUNTRY-WIDE TELECOMMUNICATION SYSTEM

- a. A study was made of the immediate and future communications requirement of the WPP. The initial phase of improvement to meet immediate requirements was agreed to during recent discussions between USAID and WPP officials. It provides for a Municipal Police and Highway Patrol Telecommunications system consisting of fixed control, mobile and portable radio equipment established in the major cities to give police elements a capability to quickly respond to emergencies.

- b. A chart (figure 3) has been prepared to assist in the planning of the WPP country-wide telecommunication system. It shows airline distances between the various police range headquarters and subordinate district offices and their subdivisions.
- c. The WPP are solely responsible for the operation, maintenance and security of approximately 100 HF-AM radion stations. The maintenance accomplishments of the WPP are remarkably good, as most of this equipment is over 15 years old and yet still operational. However, the aged equipment is unreliable and does not provide optimum performance. Make-shift repairs performed in the absence of proper spare parts and test equipment have also reduced equipment efficiency. In addition, the WPP telecommunication system has a quantity of equipment of several different manufacturers (European as well as U. S.), thus compounding the problems of maintenance and obtaining essential spare parts.

2. WATER AND POWER DEVELOPMENT AGENCY AND FLOOD CONTROL RADIO STATIONS

- a. The WPP Telecommunication service operates and maintains the Water and Power Development Agency (WAPDA) radio stations. These stations are equipped with Redifon HF-AM equipment manufactured in England. The measured water levels of the rivers are reported over these stations to WAPDA which in turn maintains contact with the WPP control station at

Lahore. At present, there are 21 WAPDA radio stations installed.

- b. The WPP Telecommunication service operates and maintains semi-fixed radio stations for the Flood Commission. All areas not covered by WAPDA are patrolled by the WPP Flood Communications Section. The communications equipment furnished by the Flood Commission for this purpose consists of approximately 45 Phillips SSB and Redifon HF-AM transceivers. The Flood Radio Stations are in operation approximately 4 months a year. The remainder of the time, the communications equipment is on standby for emergencies, such as locust control, etc... These transceivers are owned by and at the disposal of the Flood Commission.
- c. The difficulties of maintaining the WAPDA and Flood Control communications equipment with limited facilities, lack of spare parts and coping with several different makes of equipment further reduces the efficiency of the WPP Telecommunications system.
- d. The West Pakistan Telephone and Telegraph (WPTT) is furnishing the WPP 11 simplex teletype circuits with Siemens teleprinters (made in Germany). The teletype circuits and equipment are maintained by WPTT personnel. The Siemens teleprinter equipment presently in use is manually operated and has no facility for utilizing Automatic Type machines. The amount of traffic these circuits can pass is therefore limited. These teletype circuits are disrupted by line and

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equipment failure for periods of 30 to 60 minutes, 2 or 3 times a day. In addition, numerous GOP and GOWP agencies, which also use this limited facility, overload the circuits which reduces overall efficiency of this WPP telecommunication service.

- e. The WPP have recently purchased 64 SSB transceivers manufactured in the U. S. to augment and replace their obsolete HF-AM equipment. This SSB equipment can provide reliable point-to-point communications over long distances if properly utilized. The SSB equipment purchased will provide a simplex voice channel which is adequate for staff and administrative traffic. However, in certain internal security operations, it is imperative that communications be secure from interception...therefore a means of sending coded messages is needed. The WPP telecommunication staff planners were cognizant of this need but they have not been able to obtain the required radio telegraph (CW) equipment.

3. WPP MUNICIPAL POLICE PATROL CAR TELECOMMUNICATION SYSTEM

The radio equipment and facilities for local coverage in major cities other than Karachi is inadequate and of minimum usefulness. Large cities in West Pakistan, such as Lahore, Rawlpindi, Lyallpur, Peshawar, Hyderabad and others, do not have the required facilities to support police activities.

a. Karachi Municipal Police Telecommunications System

- (1) Karachi operates and maintains a fixed VHF-FM network, in the 80-90 megacycle frequency range. This network connects the WPP Police Posts throughout the Karachi area with the main WPP headquarters in

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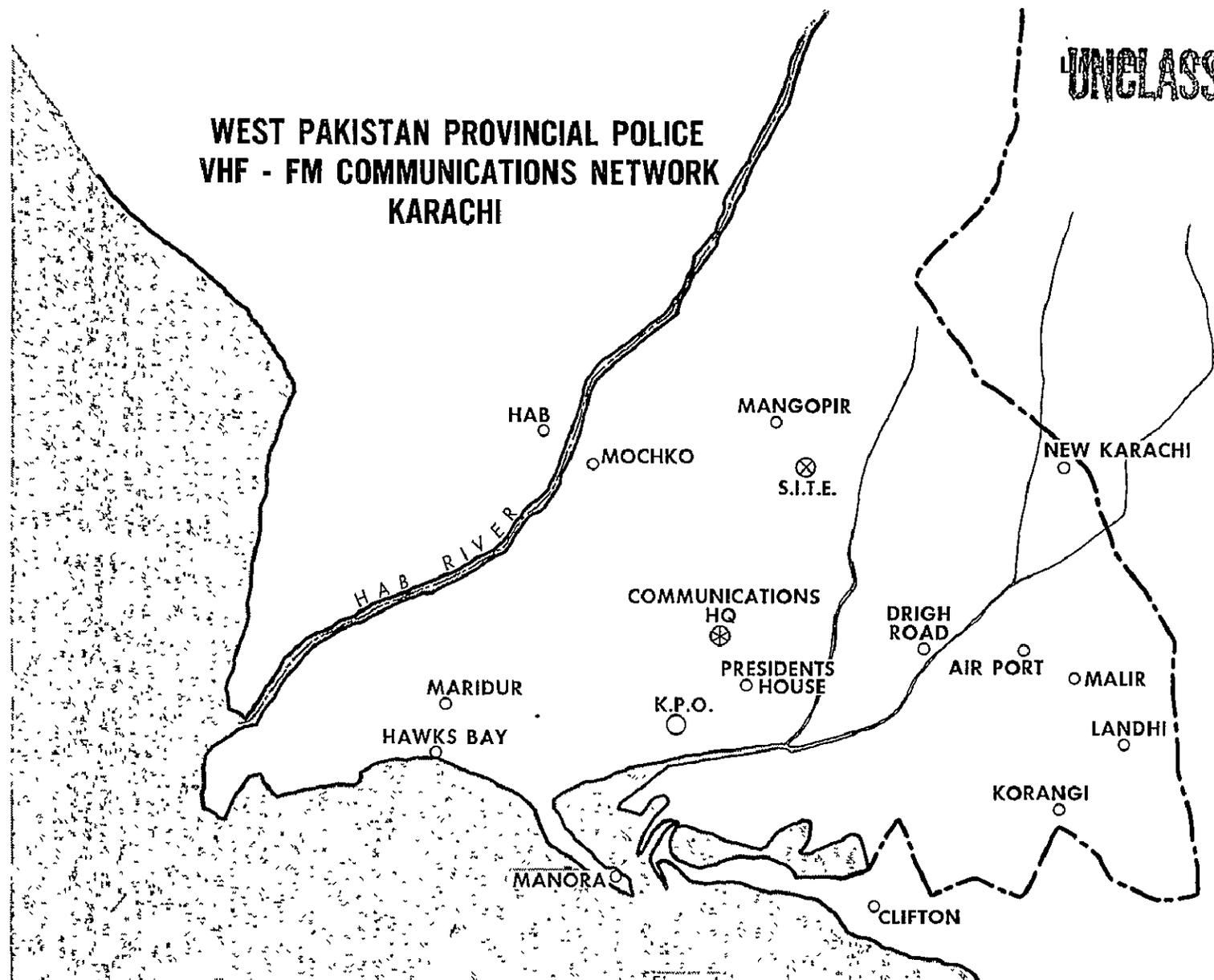
Karachi. (see Figure 4)

In addition, 19 WPP cars are equipped with Phillips VHF-FM transceivers permitting simplex channel communication between the car and the fixed station.

- (2) The WPP radio equipped cars are not being used for patrol operations. They are used by WPP officers above the grade of Deputy Superintendent. In case of an emergency, the cars are dispatched by headquarters to the problem area.
- (3) Karachi, the major sea port of West Pakistan, is growing very rapidly. Its police force needs a radio patrol car system with a capability to respond quickly to emergencies in the urban areas or on the highways.
- (4) Karachi was formerly the capital of Pakistan under Central Government control. For this reason, the WPP Telecommunications Staff had no jurisdiction in Karachi and could give it no technical or operational guidance.
- (5) If uncoordinated expansion and modification of the present Karachi municipal police telecommunications system is allowed to continue without operational and technical guidance, it will not improve its communications capabilities and may lose what efficiency it has.
- (6) Planning for the expansion and modernization of the Karachi municipal police Telecommunications system should be considered only when the WPP Telecommunications service is given operational and technical supervision which is pending.

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WEST PAKISTAN PROVINCIAL POLICE VHF - FM COMMUNICATIONS NETWORK KARACHI



24

ARABIAN SEA

Figure 4

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b. Lahore Municipal Police Telecommunications System

- (1) Four base stations and six radio patrol cars now constitute the Lahore Municipal Police Telecommunications system. Lahore, the capital of West Pakistan, with a population of over one million, is in dire need of more adequate police radio patrol car system. Intelligent and responsible Lahore officials have insured that the Lahore Radio patrol cars are used on actual patrol and are assigned to senior police officers only when a situation makes it imperative.
- (2) Nearby cities completely lack radio communications equipment. When they are faced with periods of extreme emergency, the Lahore communications equipment is transferred to these cities. This transfer involves either moving the radio equipped cars to these cities, or removing the radios from the cars and installing them in the police cars of the cities affected. They may even use the mobile equipment as base stations in those cities, and sometimes move the Lahore base stations to operate in other locations.
- (3) Because of age, lack of spare parts and proper test equipment, the VHF-FM communications equipment used in Lahore by the WPP is in poor condition and requires frequent repairs. The transceivers now in service are several years old. These units draw excessive current,

are less efficient, and frequently run down the car batteries.

- (4) The Strike Force element of the WPP is currently using portable AN/PRC-10 and AN/PRC-6 military radios. This equipment does not operate in the same frequency range as the Municipal Police radios of commercial design. It is therefore impossible to control the Strike Force element of the WPP from mobile or base stations which is essential.

c. Rawalpindi Municipal Police Telecommunications System

- (1) The Rawalpindi Municipal Police Telecommunications System consists of four base stations and six radio patrol cars. Rawalpindi, the capital of Pakistan, needs a much more adequate police radio patrol car system. (See proposed system Figure 5). In Rawalpindi, one of the duties performed by the police is providing escort radio patrol cars for the President of Pakistan and other visiting dignitaries.
- (2) The remarks made in par. b (3) above concerning the VHF-FM equipment in Lahore apply also to the Rawalpindi equipment: obsolete design, lack of reliability, and in general not adequate for the efficient operation of a radio patrol car system.
- (3) The Strike Force element in Rawalpindi uses the same military radio equipment as the Lahore Strike Force. The different frequencies for the Strike Force and for

WEST PAKISTAN PROVINCIAL POLICE PROPOSED "RAWALPINDI" MUNICIPAL POLICE AND HIGHWAY PATROL SYSTEM

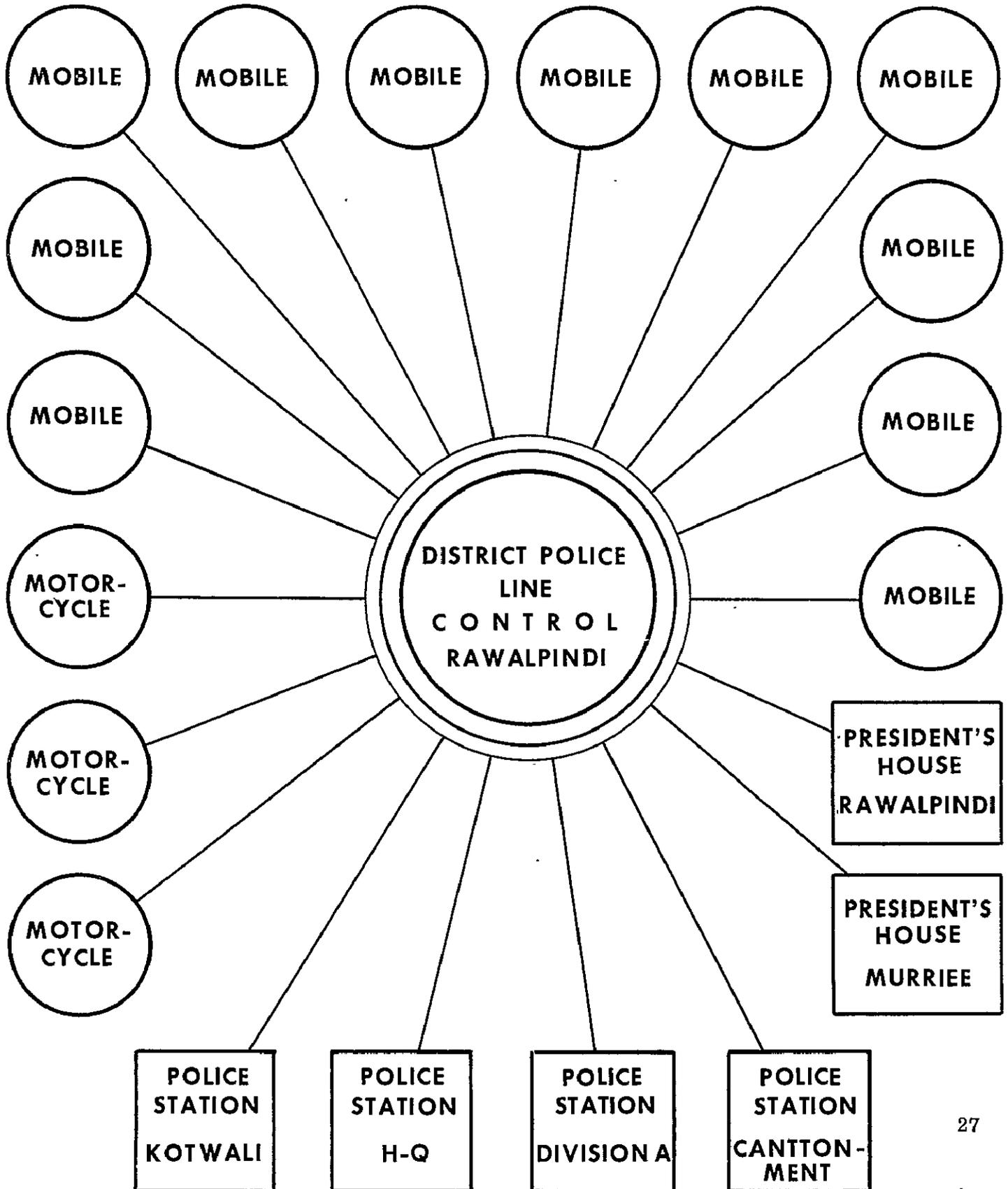


Figure 5

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the Municipal Police in Rawalpindi also prevent the communication of messages between the two, thus crippling operational effectiveness.

MAINTENANCE

The WPP have marginal facilities for maintaining their existing communication equipment. Repair shops have been established, but extremely limited test equipment, tools and spare parts are available. The existing system is kept operational by make-shift repairs. Large quantities of existing inoperable but serviceable equipment are in need of immediate repairs.

The reliable life expectancy of most of this equipment is seriously limited under present conditions. The operational capability of the existing telecommunications system will deteriorate rapidly unless proper steps are taken to remedy the shortcomings in WPP maintenance capability.

SUPPLY FACILITIES AND ORGANIZATION

Spare parts and equipment are properly stored at the WPP telecommunications facilities. Police audit regulations require keeping books for communications equipment and spare parts. The present method does not provide the advantages offered by a Kardex system which would establish a control over the expenditure of supplies, with an identification and location file for each item in stock.

While the communications equipment is properly stored, dehumidifiers are needed to prevent the deterioration of equipment during the summer months.

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FRONTIER CONSTABULARY

The Frontier Constabulary is a tactical internal security civil organization, officered by West Pakistan Provincial Police officers and responsible for the maintenance of law and order in the settled tribal area of West Pakistan.

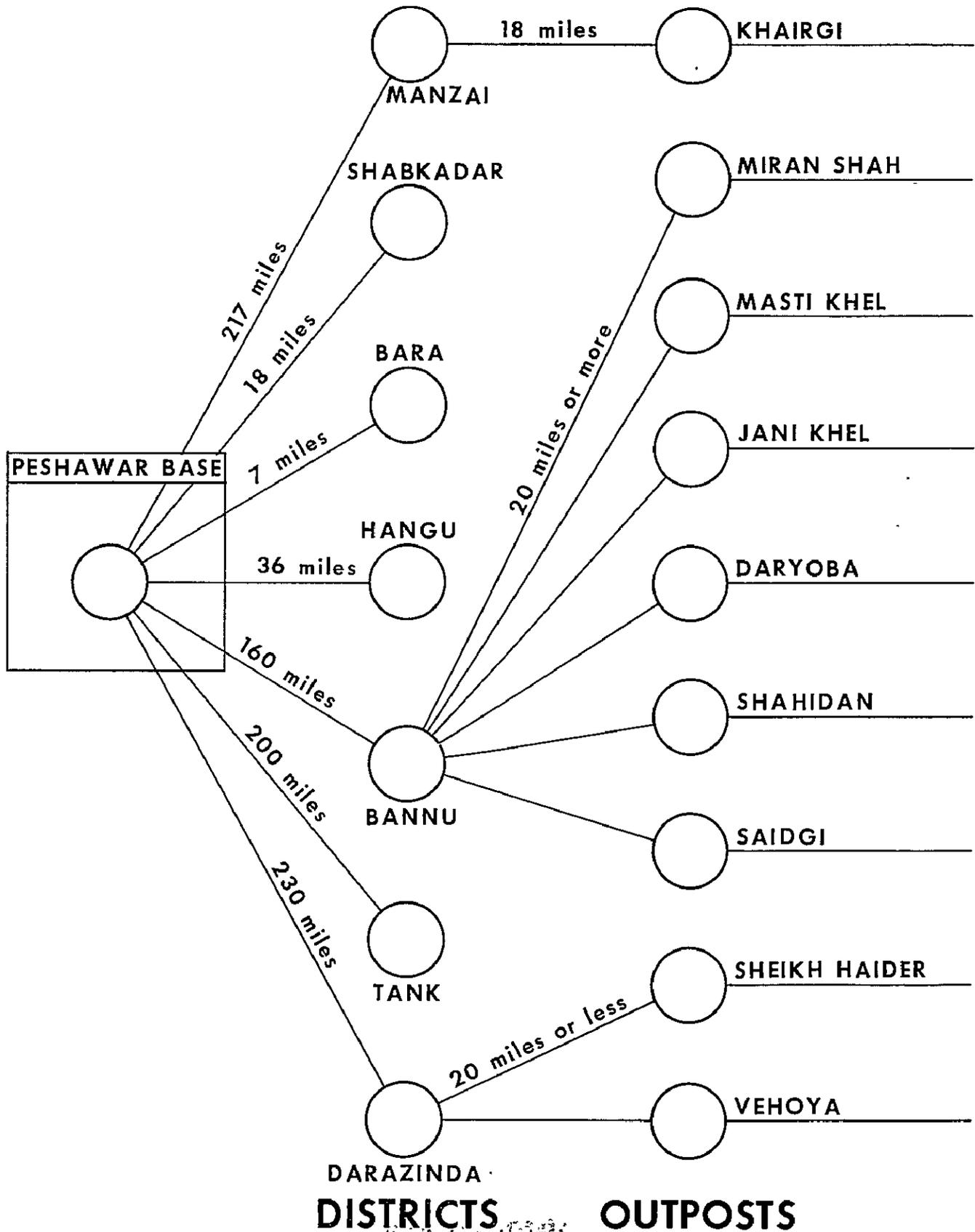
The Frontier Constabulary communications organization and equipment is similar to that of a tactical army unit. Their communications networks, operated and maintained by the Frontier Constabulary, consists of a HF-AM network as shown in figure 6. This network utilizes equipment which to a large extent is obsolete and in poor condition. The lack of adequately trained technical personnel, maintenance facilities and poor equipment contributes to the general unreliability of the Frontier Constabulary communications network.

The Frontier Constabulary have no communications officers and are dependent upon the Frontier Corps for technical assistance. A technical officer should be assigned to the Frontier Constabulary in order to overcome the above deficiencies. This officer would be responsible for the implementation of improvement plans in maintenance, training, operations, and other support functions needed to sustain the Frontier Constabulary communication network.

The Frontier Constabulary, West Pakistan Provincial Police and West Pakistan Rangers cannot operate as an integrated communications system because of their particular mission and the area of operations assigned to them. However, expanded coordination of these independent security communications systems will assure maximum backup capability in time of emergency.

It is recommended that U.S. military type communications equipment be provided the Frontier Constabulary to fulfill their (particular) operational communications requirements. Approximately \$42,000 would be required to furnish the Frontier Constabulary with a minimum communication capability. A detailed cost estimate of recommended communications equipment is included in annex 3 of this report.

WEST PAKISTAN FRONTIER CONSTABULARY COMMUNICATIONS NETWORK



DISTRICTS OUTPOSTS

Figure 6

CONCLUSIONS AND RECOMMENDATIONS

FRONTIER CONSTABULARY

A. CONCLUSIONS

The OPS representative concludes from observations made of existing facilities now being utilized for communications by the Frontier Constabulary that the present system is inadequate and does not provide the reliability necessary to properly support the operations of an internal security organization.

Major deficiencies requiring attention are:

1. The lack of a telecommunication officer to supervise and provide technical and operational guidance to the Frontier Constabulary communication network.
2. The inadequate maintenance facilities and lack of technical personnel require the Frontier Constabulary to be dependent upon the Frontier Corps.
3. The radio equipment presently utilized is in poor condition and of minimum usefulness.

B. RECOMMENDATIONS

Public Safety project planning should be directed to insure more reliable operation of the Frontier Constabulary communication network and to improve their maintenance capabilities and facilities.

1. It is recommended that a telecommunications officer be assigned to the Frontier Constabulary headquarters in Peshawar where continuous technical and operational supervision of the communications network is needed.
2. It is recommended that the U.S. Public Safety Communications Advisor assist the West Pakistan Provincial Police to provide technical assistance to the Frontier Constabulary.
3. Communications equipment is required to replace and supplement existing obsolete equipment, because of the Frontier Constabulary's tactical operational

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requirements, it is recommended that U.S. military type communications equipment be provided.

4. It is recommended that tools and test equipment be procured to improve maintenance capabilities and facilities.

5. The Frontier Constabulary should initiate a program for training present and new technicians. This can be done in cooperation with the West Pakistan Provincial Police, the Frontier Corps and the Pakistan Army.

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SUMMARYWEST PAKISTAN RANGERS

The WPR is a tactical internal security civil organization, officered by Pakistan Army officers and responsible for the border patrol operations in the eastern part of West Pakistan.

The OPS representative was unable to visit any of the West Pakistan Rangers (WPR) communications facilities, therefore no evaluation or concrete recommendations could be made of the existing WPR communications system, equipment, personnel or maintenance capability.

Discussions were held with Lt. Colonel S. M. I. Tirmizi, Chief of Signals, WPR to determine the extent of the existing communications system and its immediate requirements. The WPR had prepared a list of their communications equipment needs. This list was reviewed and revised by the writer in light of stated WPR communications requirements.

The OPS representative found that the WPR communications organization and equipment is similar to that of a tactical army unit. There is little duplication of the WPR and West Pakistan Provincial Police communications networks. Although the WPR operate a few fixed stations at their Wing Headquarters, the majority of their operations is in the field, requiring portable radio equipment.

The precise supporting role of the WPR to the WPP in emergency situations is rather vague. Consequently, innovations to establish mutually compatible communications equipment in the two forces is not recommended.

OPS does not normally recommend that civil police agencies in host countries be provided U.S. military type communications equipment under the USAID Public Safety Program. It is recognized, however, that the WPR operational requirements are such that commercial communications equipment would be unsuitable.

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Approximately \$58,000 would be required to cover the cost of the WPR requested U.S. military type communications equipment. A detailed cost estimate is provided in Annex 4 of this report.

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SUMMARY

EAST PAKISTAN RIFLES (EPR)

The EPR is a civil tactical internal security organization officered by Pakistan Army Officers and responsible for border patrol operations throughout East Pakistan. Its communications network is a field type operation with their stations frequently changing locations.

The communication network operated and maintained by the EPR consists of both fixed and portable radio equipment. Although radio telegraph (CW) is used throughout this system, radio telephone is also employed by officials at the various Wing headquarters to pass administrative traffic to the EPR headquarters in Dacca. Outposts are for the most part utilizing VHF-AM equipment to contact their next higher headquarters.

The EPR communications organization and equipment is similar to that of a tactical Army Unit. There is no duplication of the EPR and of the proposed East Pakistan Provincial Police communication network. None of the EPR radio stations can be described as fixed base stations since Wing Headquarters fixed radio stations are also moved into the field to control operations during emergency situations.

The EPR could be called upon to support the EPP in emergency situations, consequently some mutually compatible communications equipment for the two forces is recommended.

U. S. military type radio equipment has been recommended only where commercial communication equipment could not meet the EPR operational requirement.

In the event Public Safety assistance plans include the EPR, approximately \$295, 000.00 would be required to cover the cost of the equipment needed. As a result of the magnitude of commodities required, it is recommended that the EPR consider the equipment recommended in Annex 5 and establish priorities with consideration to U. S. and Pakistan resources. It is felt that this equipment meets the immediate needs for minimum communications support to this force in accomplishing it's vital internal security mission.

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CONCLUSIONS AND RECOMMENDATIONS

EAST PAKISTAN RIFLES

A. CONCLUSIONS

The following conclusions were derived from the observations made during the survey by the OPS representative.

1. Equipment and facilities visited were effectively operated within their operating capabilities. Operational areas were neat and well organized but the equipment for the most part is obsolete and in poor condition.
2. A lack of proper test equipment and tools prevent the EPR technicians from obtaining optimum performance of their existing radio equipment.
3. The EPR telecommunications staff should be commended on their supply facilities and organization. Spare parts and equipment are properly stored and stocked. However, a Kardex type system is essential for proper control over the expenditure of supplies and would provide a needed identification and location file for each item of stock.
4. The EPR is burdened by a number of different makes of radio equipment which seriously affects their supply and maintenance problems.

B. RECOMMENDATIONS

Public Safety project planning should be directed to insure more reliable operation of the existing EPR communication system and to improve its maintenance capabilities and facilities. Since this planning and subsequent implementation efforts could represent the initial phase of U. S. support in the improvement of the EPR communications capabilities, the GOP must fully assess its requirements and establish suitable priorities for improvement measures in concert with U. S. and Pakistan resources.

1. Reliable point-to-point communications equipment to connect the EPR headquarters with its wing and sector headquarters is required. To replace and augment

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old and obsolete radio equipment, 36 Single Sideband (SSB) transceivers are recommended. In addition this equipment is compatible with that proposed for the East Pakistan Provincial Police. Specifications of this equipment are outlined in annex 5.

2. It is recognized that greater communication coverage and reliability is required for outpost and border patrol operations. Because of the operational requirement, particular type of terrain and distances involved, the AN/GRC 87 U. S. military type radio is recommended.

3. To support the EPR communications system it is necessary to establish an effective maintenance capability. It is recommended that test equipment and tools be provided.

4. It is recommended that 50 UHF-AM transceivers be provided to supplement the existing UHF-AM network connecting the EPR outposts with sector headquarters.

5. To protect the electronic equipment in storage from deterioration due to the humid climate of East Pakistan, dehumidifiers are recommended.

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ANNEX 1

PUBLIC SAFETY COMMUNICATIONS COST ESTIMATE
FOR THE WEST PAKISTAN PROVINCIAL POLICE

The following cost estimates are given to assist USAID/Pakistan and the West Pakistan Police to adequately fund for telecommunications commodities in FY 64. The equipment listed herein meets the immediate needs for minimum communications support to this force in accomplishing it's vital 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.

A. Single Sideband Accessories

Supplementary items needed to allow radio-telegraph (CW) and remote operation of the Single Sideband equipment currently purchased by the West Pakistan Provincial Police with GOWP funds. To be compatible with this equipment, these items should be obtained from the same manufacturer.

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>		
1	32	Remote handset adapters, #RF-1218 to facilitate the use of handsets with existing units.	@ 80.00	\$ 2560.00
2	32	Telephone type handsets, #RF-1207 complete with cord and plug.	@ 64.00	\$ 2048.00
3	32	SB-6F-CW Radio-telegraph adapters to permit (CW) SSB operation of the equipment mentioned above.	@ 57.00	\$ 1824.00

Limited Official Use

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>		
4	32	SB-6FV (VOX) voice operation modulator to permit voice activated remote operation of the equipment mentioned above.	@22.00	\$ 704.00
5	32	SB-6M/CW radio-telegraph (CW) adapters which facilitate a keyed modulating tone for Morse code transmission, using the equipment mentioned above.	@ 88.00	\$ 2816.00
6	64	UG-88/W coaxial cable connectors	@ 2.00	\$ 128.00
7	20	Vertical whip antennae, # SB-V9, complete.	@ 26.00	\$ 520.00
8	20	Antenna couplers, complete with main assemblies, for operation with item 7.	@ 120.00	\$ 2400.00
9	120	Type SB-6CL antenna coupler modules to function with item 8, complete.	@ 24.00	\$ <u>2880.00</u>
			Total	\$15,860.00

B. Tools and Test Equipment

Tools and Test equipment, for main repair shop in Lahore and principal cities:

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost (per lot)</u>
1	7	ThruLine Radio Frequency Wattmeters MC JONES or equivalent for operation 10 to 1000 watts, 2 to 225 mcs, with scales for 10 watts, 100 watts and 1000 watts	\$ 630.00
2	1	Byrd Termaline wattmeter, complete with test cells for 50 to 100 mc use, in 20 - 50 - 100 watt power ratings	\$ 200.00
3	15	Transistor analyzers, complete with all operating data and leads	\$ 750.00
4	4	Tube testers for American and foreign tubes, Hickok Model 752 or equivalent	\$1200.00
5	4	5" Oscilloscopes, Dumont or equivalent	\$2000.00
6	2	Hewlett-Packard RF Signal generators, model 606A or equivalent, 2-100 mcs	\$3000.00
7	20	Vacuum Tube Voltmeters type RCA Junior Voltohmist or equivalent	\$1000.00
8	25	Simpson Multimeters Model 260 series III with case and test leads, or equivalent	\$1250.00
9	4	Vacuum Tube Voltmeters Hewlett-Packard 410B	\$ 800.00
10	1	Millen grid dip meter complete with coils with 2 to 250 mcs operating capability	\$ 50.00
11	3	Audio frequency signal generators	\$ 600.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost (per lot)</u>
12	6	FM signal generators, standard measurements for operation from 3 to 250 mcs. Calibrated output, metered, from .5 to 10,000 microvolts. Complete with test leads and probes for communications equipment alignment.	\$5400.00
13	15	Battery chargers, operating from 115 volts A. C. power lines, output 6 volts 20 amps or 12 volts 10 amps, ATR model 620C-ELIT or equal.	\$1000.00
14	30	Complete sets of radio repair hand tools, consisting of insulated screw drivers, pliers, diagonal cutters, long nose pliers, spin-tite wrenches, tuning tools for set alignment, etc.	\$3000.00
15	20	Weller soldering guns, 250 watts, with 500 spare tips.	\$ 250.00
16	20	12 volt soldering irons	\$ 60.00
17	5	Electric drills (2 1/2", 3 1/4")	\$ 200.00
18	5 sets	Drill bits from 1/16" to 1/2" in 1/16 steps	\$ 100.00
19	2 sets	Greenleaf punches 5/8" to 1 3/4" diam.	\$ 50.00
20	1 set	Technical books	\$ <u>100.00</u>
Total for tools and test equipment			\$21,640.00

C. Spare Parts

Replacement parts and spare parts for overhaul and maintenance of existing generators which are inoperable because of lack of spare parts. Items can be procured

from Outboard Marine Corp., Waukegan, Ill.

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost (for lot)</u>
1	50	Crank Shaft	\$1265.00
2	100	Cam Shaft	630.00
3	100	Pistons	225.00
4	200	Connecting Rods	555.00
5	100	Carburetor Assembly	608.00
6	48	Fly Wheel	516.00
7	150	Piston Pins	101.00
8	400	Oil Seal Generator Side	105.00
9	700	Oil Seal Magneto Side	26.00
10	48	Magnetos	1400.00
11	300	Breaker Base Plate	<u>480.00</u>
Total.....			\$5911.00

Spare parts for operation support and maintenance of existing communications equipment in the hands of WPP:

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost (not unit cost, lot cost for each item)</u>
1	24	6K7 tube	\$ 53.52
2	62	6F22 tube	65.10
3	50	12AT7 tube	61.00
4	50	6BA6 tube	40.00
5	50	6AM6 tube	64.50
6	50	6AK5 tube	83.00
7	50	6CQ6 tube	111.00
8	50	6BE6 tube	44.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost (not unit cost, lot cost for each item)</u>
9	50	6B28 tube	\$ 77.00
10	50	6X4 tube	33.00
11	50	6AQ6 tube	43.00
12	50	6AU6 tube	42.00
13	50	6SJ7 tube	83.00
14	50	5Y3 tube	35.00
15	24	6BJ6 tube	28.08
16	24	6SC7 tube	48.72
17	24	6SN7 tube	28.08
18	24	6J7 tube	53.52
19	24	6K6 tube	28.56
20	12	811 tube	82.80
21	24	813 tube	27.20
22	12	5763 tube	25.56
23	24	OD3 tube	27.84
24	24	6Q7 tube	<u>57.36</u>
Total.....			\$1642.84

The following spare parts are needed to sustain operation and for maintenance of the Collins Type 30K5 transmitter now in operation:

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>	
1	2	High plate voltage power transformers with primary windings 1 and 2 to operate from 115 volts 50/60 cycles A. C., and high voltage secondaries 1 and 2 operating at 2365 to 2950 volts output. (Collins # 662-0015-00)	
		@ 180.00	\$ 360.00

<u>Item #</u>	<u>Quantity</u>	<u>Description</u>		
2	2	Relay voltage supply transformers, primary voltage 115 volts 50/60 cycles A. C. Secondary 72/67/62 volts at .58 amps (Collins # 674-0153000)	@ 24.00	\$ 48.00
3	6	Plate transformer series resistors, 660 watts, 115 volts for use with 220 volts primary supply (Collins # 771-0003-00)	@ 1.50	\$ 9.00
4	12	75 TH, medium mu triode modulator tubes (Collins # 256-0071-00)	@ 24.00	\$288.00
5	24	5R4 full wave high vacuum voltage rectifier tubes (Collins # 257-0020-00)	@ 1.50	\$ 36.00
6	24	866 A half wave mercury-vapor rectifier tubes (Collins # 256-0059-00)	@ 120.00	\$2880.00
Total.....				\$3621.00

D. Proposed Municipal Police and Highway Patrol Telecommunications System

Note

Spare parts and shipping charges will be covered by the 20% discount the U. S. Government normally receives on the manufacturers list prices.

Lahore

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
1.	1	VHF-FM master base station, 100 watt RF output power. Frequency range 66 - 88* megacycles, transceiver, transmitter output impedance 50 ohms; $x \pm 15$ kc deviation. Push-to-talk operation. 2 channels. Unit capable of operation from 110/220 volt 50/60 cycle power supply. Unit shall be supplied complete with 5.5 db gain coaxial skirt antenna with mounting brackets, crystals and all accessories for installation and operation. Main unit to connect with desk type remote control console providing essential facilities for operation of a two frequency base station with four wire control line, front mounted speaker, volume control, squelch control, indicator lights, clock, desk type microphone.	\$1,500.00
2.	5	VHF-FM fixed base stations, transceivers 50-60 watts RF output power, 66-88 mc, 2 channels, push-to-talk operation, capable of operating from a 110/220 volt 50/60 cycle power source. Units to be desk top type, with front panel controls and speaker; dynamic type desk microphone.	

* Frequency range and frequency to be determined by WPP. (See Annex 2).

<u>Item</u>	<u>Quantity</u>	<u>Description</u>		
		Units shall be supplied complete with 5.5 db gain coaxial skirt antenna with mounting brackets, crystals and all accessories for complete installation and operation.		
			@ 1,014	\$5,070.00
3.	12	VHF-FM mobile units, transceivers, 25-30 watts RF output power, 66-88*mc, 2 channels. Units shall be transistorized, capable of operating from a 12 volt D.C. power source with negative or positive ground; push-to-talk operation. Front panel controls, palm type dynamic microphone. Units shall be designed for 24 hour operation in tropical climate, self-contained in a fully enclosed weather-proof case. Unit shall be supplied complete with omnidirectional antenna, whip type, for rear mounting. Crystals and all mounting hardware and accessories for complete installation and operation shall be supplied with the units.		
			@ 950	\$11,400.00
4.	4	VHF-FM motorcycle radiophones, transceivers, 2 channels, 7-12 watt RF output power; completely transistorized receiver. Frequencies compatible with items 1 and 2 above. Rear fender installation for 2-wheel motorcycles. Units to be supplied complete with antenna and crystals; speaker, microphone		

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
		and controls only in front of rider; all mounting hardware and accessories for complete installation and operation shall be supplied with units.	
			@ 890 \$3560.00
5.	6	VHF-FM Walkie-talkies, portable transceivers, 2 channels, 1 watt RF output power, completely transistorized, frequencies compatible with items 1 and 2 above; crystal controlled oscillator, squelch control. Units powered by rechargeable Nickel-cadmium batteries; leather case; max. weight with batteries 3 lbs. Batteries to be supplied with units.	
			@ 675 \$4050.00
6.	1	Remote Control Console Base Station, 2 channels, capable of operation from a 110/220 volt 50 cycle power source, including clock and complete control facilities to allow dispatch point in addition to the master Control Point. Unit to be supplied complete with desk microphone, speaker, 600 ohm line termination and all accessories ready for operation.	
			\$ 500.00
7.	3	VHF-FM Monitor receivers, designed for aural monitoring. Crystal controlled for operation on 2 channels in the 66-88 mc band*.	
			@ 500 \$1,500.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
8.	6	40 ' antenna towers complete with erecting kits, guy wires and all hardware for installation.	
		@ 100	\$ 600.00
9.	2	Field test sets as recommended by equipment manufacturer to include test alignment oscillator peaking generator.	
		@ 250	\$ 500.00
10.	1	Portable frequency and deviation meter, direct frequency readout, designed for operation from 110/220 50/60 cycle operation.	
			\$ <u>900.00</u>
		Total Cost for Lahore.....	\$29,580.00

Rawalpindi

<u>Item</u>	<u>Quantity</u>	<u>Description</u>
1.	1	VHF-FM master base station, 100 watt RF output power. Frequency range* 66-88 megacycles, transceiver, transmitter output impedance 50 ohms; ± 15 kc deviation. Push-to-talk operation. 2 channels. Unit capable of operation from 110/220 volt 50/60 cycle power supply. Unit shall be supplied complete with 5.5 db gain coaxial skirt antenna with mounting brackets, crystals and all accessories for installation and operation. Main unit to connect with desk type remote control console providing essential facilities for operation of a two frequency

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
		base station with four wire control line, front mounted speaker, volume control, indicator lights, clock and desk microphone.	\$1,500
2.	9	VHF-FM fixed base stations, transceivers, 50-60 watts RF output power, 66-88 mc, * 2 channels, push-to-talk operation, capable of operating from a 110/220 volts 50/60 cycle power source. Units to be desk top type, with front panel controls and speaker; dynamic type desk microphone. Units shall be supplied complete with 5.5 db gain coaxial skirt antenna with mounting brackets, crystals and all accessories for complete installation and operation.	@1,014 \$9,126.00
3.	12	VHF-FM mobile units, transceivers, 25-30 watts RF output power, 66-88 mc, * 2 channels. Units shall be transistorized, capable of operating from a 12 volt D. C. power source with negative or positive ground; push-to-talk operation. Front panel controls, palm type dynamic microphone. Units shall be supplied complete with omnidirectional antenna, whip type, for rear mounting. Crystals and all mounting hardware and accessories for complete installation and operation shall be supplied with the units.	@ 950 \$11,400.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
4.	4	VHF-FM motorcycle radiophones, transceivers, 2 channels, 7-12 watt RF output power; completely transistorized receiver. Frequencies compatible with items 1 and 2 above. Rear fender installation for 2-wheel motorcycles. Units to be supplied complete with antenna and crystals; speaker, microphone and controls only in front of rider; all mounting hardware and accessories for complete installation and operation shall be supplied with the units.	
		@ 890	\$3,560.00'
5.	9	VHF-FM Walkie-talkies, portable transceivers, 2 channels, 1 watt RF output power, completely transistorized, frequencies compatible with items 1 and 2 above; crystal controlled oscillator, squelch control. Units powered by rechargeable nickel-cadmium batteries; leather case; max. weight with batteries 3 lbs. Batteries to be supplied with units.	
		@ 675	\$6,075.00
6.	1	Remote Control Console Base Station, 2 channels, capable of operation from a 110/220 volt 50 cycle power source, including clock and complete control	

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
		facilities to allow dispatch point in addition, to the master Control Point. Unit to be supplied complete with desk microphone, speaker, 600 ohm line termination and all accessories ready for operation.	\$ 500.00
7.	10	40' antenna towers complete with erecting kits, guy wires and all hardware for installation.	
		@ 100	\$ 1,000.00
8.	2	VHF-FM Monitor Receivers, designed for a rural monitoring. Crystal controlled for operation on 2 channels in the 66-88 mc band. *	
		@ 500	\$ 1,000.00
		Total cost for Rawalpindi	\$33,161.00

HYDERABAD

1.	4	VHF-FM fixed base stations, transceivers, 50-60 watts RF output power, 66-88 mc*, 2 channels, push-to-talk operation, capable of operating from a 110/220 volts 50/60 cycle power source. Units to be desk top type, with front panel controls and speaker; dynamic type desk microphone. Units shall be supplied complete with 5.5 db gain coaxial skirt antenna with mounting brackets, crystals	
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<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
		and all accessories for complete installation and operation.	
			@ 1,014 \$ 4,056.00
2.	6	VHF-FM mobile units, transceivers, 25-30 watts RF output power, 66-88 mc*, 2 channels. Units shall be transistorized, capable of operating from a 12 volt D.C. power source with negative or positive ground; push-to-talk operation. Front panel controls, palm type dynamic microphone. Units shall be supplied complete with omnidirectional antenna, whip type, for rear mounting. Crystals and all mounting hardware and accessories for complete installation and operation shall be supplied with the units.	
			@ 950 \$ 5,700.00
3.	6	VHF-FM Walkie-talkies, portable transceivers, 2 channels, 1 watt RF output power, completely transistorized, frequencies compatible with items 1 and 2 above; crystal controlled oscillator, squelch control. Units powered by rechargeable nickel-cadmium batteries 3 lbs. Batteries to be supplied with units.	
			@ 675 \$ 400.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>		
4.	4	40' towers, complete with erection kits, hardware, guy wires and accessories for installation.		
			@ 100	\$ 400.00
<u>LYALLPUR</u>			Total Cost.	\$14,286.00
1.	4	VHF-FM fixed base stations, transceivers, 50-60 watts RF output power, 66-88 mc*, 2 channels, push-to-talk operation, capable of operating from a 110/220 volts 50/60 cycle power source. Units to be desk top type, with front panel controls and speaker; dynamic type desk microphone. Units shall be supplied complete with 5.5 db gain coaxial skirt antenna with mounting brackets, crystals and all acces- sories for complete installation and operation.		
			@ 1,014.00	\$ 4,056.00
2.6		VHF-FM mobile units, transceivers, 25-30 watts RF output power, 66-88 mc*, 2 channels. Units shall be transistorized, capable of operating from 12 volt D. C. power source with negative or positive ground; push-to-talk operation. Front panel controls, palm type dynamic microphone. Units shall be supplied complete with omnidirectional antenna, whip type, for rear mounting. hardware and		

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
		accessories for complete installation and operation shall be supplies with the units.	
		@ 950	\$ 5,700.00
3.	6	VHF-FM Walkie-talkies, portable transceivers, 2 channels, 1 watt RF output power, completely transistorized, frequencies compatible with items 1 and 2 above; crystal controlled oscillator, squelch control. Units powered by rechargeable nickel-cadmium batteries; leather case; max. weight with batteries 3 lbs. Batteries to be supplies with units.	
		@ 675	\$ 4,050.00
4.	4	40' towers, complete with erection kits, hardware, guy wires and accessories for installation.	
		@ 100	\$ 400.00
		Total Cost.	\$14,286.00

PESHAWAR

1. 4 VHF-FM fixed base stations, transceivers, 50-60 watts RF output power, 66-88 mc, 2 channels, push-to-talk operation, capable of operating from a 110/220 volts 50/60 cycle power source. Units to be desk top type, with front panel controls and speaker; dynamic type desk microphone. Units shall be supplied complete with 5.5 db

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
		gain coaxial skirt antenna with mounting brackets, crystals and all accessories for complete installation and operation.	
		@ 1,014	\$ 4,056.00
2.	6	VHF-FM mobile units, transceivers, 25-30 watts RF output power, 66-88 mc*, 2 channels. Units shall be transistorized, capable of operating from a 12 volt D. C. power source with negative or positive ground; push-to-talk operation. Front panel controls, palm type dynamic microphone. Units shall be supplied with omnidirectional antenna, whip type, for rear mounting. Crystals and and all mounting hardware and accessories for complete installation and operation shall be supplied with the units.	
		@ 950	\$ 5,700.00
3.	6	VHF-FM Walkie-talkies, portable transceivers, 2 channels, 1 watt RF output power, completely transistorized, frequencies compatible with items 1 and 2 above, crystal controlled oscillator, squelch control. Units powered by rechargeable nickel-cadmium batteries;	

<u>Items</u>	<u>Quantity</u>	<u>Description</u>	
		leather case; max. weight with batteries	
		3 lbs.. Batteries to be supplied with units.	
		@ 675	\$ 4,050.00
4.	4	40' towers, complete with erection kits, hardware, guy wires and accessories for installation.	
		@ 100	\$ 400.00
		Total Cost	\$14,286.00

E. Emergency Generators

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
1.	20	3 KVA generators, diesel powered, 115/240 volts, single phase, 50 cycle output, air-cooled, similar to Oran model 12D7A-3R.	
		@ 1,000	\$20,000.00
2.	2	10 KVA generators, diesel powered, 115/240 volts, single phase, 50 cycle output, air-cooled with auto start, similar to Oran model 12DJC-3R.	
		@ 2,000	\$ 4,000.00
		Total Cost of Generators.	\$24,000.00

F. Accessories

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
1.	5,000'	RG8/U coaxial cable for antenna lead-in	\$ 500.00
2.	5,000'	RG58/U coaxial cable	\$ 200.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	
3.	200 sets	Amphenol PL series coax connectors, complete including male, female, ells, tees, straight adapters, cable adapters for RG58/U cable.	\$ 1,700.00
		Total Cost of Accessories.....	\$11,700.00

ANNEX 2

MUNICIPAL POLICE AND HIGHWAY PATROL TELECOMMUNICATION SYSTEM

A discussion of the various frequency ranges and methods of communication employed in radio patrol car systems is included to assist the WPP staff select equipment that can provide sufficient communications coverage in face of physical and economic limitations.

Technical Factors Influencing the Application of Mobile Radio

When a police administration makes its judgment as to what kind of equipment will best do a particular communications job, it must consider a few very simple but important technical factors. Its choice will be right or wrong based on its understanding of the advantages of different radio frequency ranges and methods of communications commonly employed.

DISCUSSION

The broad choice of frequency bands has been determined primarily by international agreement.

Generally, four frequency ranges are considered most practical for public safety activities. They are:

- 1. Low band 25 - 54 mc
- 2. Mid band 66 - 88 mc
- 3. High band..... 144 - 174 mc
- 4. Ultra High Frequency 450 - 470 mc

A. 25-54 mc (Low-band)

1. Favorable Factors

- a. VHF (low, mid and high-bands) are used for line of sight communications. However, the low band, unlike mid and high-band, can bend over mountains or over the horizon to permit greater range.

2. Unfavorable Factors

- a. This frequency band is most susceptible to range reduction due to high noise levels and long distance (skip) interference.

B. 66-88 mc (Mid-band)

1. Favorable Factors

- a. Probable distance of communications is greater than other high frequency bands but less than low-band.

2. Unfavorable Factors

- a. This band is also susceptible to range reduction due to high (man made and atmospheric) noise levels.
- b. Possibility of short distance (skip) interference, depending on such things as terrain and atmospheric conditions.
- c. This frequency range is not normally used in the U.S. , therefore, it should be recognized that considerable delay will occur while U.S. standard production type equipment is modified to this frequency range.

C. 144-174 mc (High-band)

1. Favorable Factors

- a. This band is moderately susceptible to high (man made and atmospheric) noise levels.
- b. High-band offers nearly complete freedom from long distances (skip) interference. Short distance interference as in the Mid-band is still a possibility.
- c. Because the base station High-band antenna is small, you can economically "stack" them (use more with one set). This increases the range of transmission and reception without requiring more power in the radio set.

2. Unfavorable Factors

- a. Mobile to mobile operation is seriously limited due to the small size of the antenna.

D. 450-470 mc (UHF)

1. Favorable Factors

- a. UHF frequencies have the greatest penetration into buildings and through other man made objects, ideal for dense municipal areas.
- b. This frequency range is least susceptible to high noise levels.
- c. The UHF band offers complete freedom for skip interference.
- d. Because the base station High-band antenna is small, you can economically "stack" them (use more with one set). This increases the range of transmission and reception without requiring more power in the radio set.

2. Unfavorable Factors

- a. Probable distance of communications is less than any of the other frequency bands. To obtain adequate range it is necessary to have the base station elevated well above the average ground level in a tall building or on a mountain top.
- b. Dense, moist foliage will reduce range.
- c. Mobile to mobile operation is seriously limited due to the small size of the antenna.

SUMMARY

- 1. Low-band provides longest range but it can be reduced by high noise levels and skip interference. It is most applicable to systems requiring large area coverage in rural locations, particularly in systems requiring maximum range and

direct car-to-car communication. Low-band may be classed as a "rural" band.

2. High-band systems can be designed to approach low-band ranges except for direct car-to-car communication. However, car-to-car communication may be provided by a mobile relay system. High-band systems are free of skip interference and are less vulnerable than the low-band to range reduction due to high noise levels. High-band is ideal for municipal systems and may be considered a "suburban" band.

3. UHF systems are normally installed in urban areas where high base station locations are available. The short range of this band makes it mandatory to have a mobile relay station for direct car-to-car communication. The UHF band is free of skip interference and less susceptible than any other band to high noise levels. It also can penetrate buildings and other such obstacles.

METHODS OF COMMUNICATIONS

The following are three possible methods of communications which may be employed in the radio patrol car system:

a. Simplex

In a simplex system both the base radio station and the radio patrol cars operate on the same frequency. This enables the operations center dispatcher to communicate with all radio patrol cars. It also allows the radio patrol cars to communicate with each other. This type of system is considered undesirable by some authorities as inter-mobile traffic can interfere with headquarters transmittals.

b. Duplex

In this type of system, all radio patrol cars receive instructions from the operations center radio dispatcher on one frequency and report back to the dispatcher on a different frequency. This type of system has been recommended by most authorities as it enables the operations center to retain full control of the radio patrol car system at all times. Intercommunication between radio patrol car crews is not possible in this system.

c. Triplex

In certain operations such as mobile surveillance where two or more cars are assigned, intercommunication between radio patrol cars is highly desirable. In this case, two channel transceivers are installed in the radio patrol cars of a duplex system. This permits a duplex operation on channel 1 and a car-to-car operation on channel 2. Channel 2 transmitter could operate on the same frequency as the operations center radio dispatcher, or a separate frequency assigned for car-to-car operations.

ANNEX 3

PUBLIC SAFETY COMMUNICATIONS COST ESTIMATE FOR THE FRONTIER
CONSTABULARY

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost</u>
1.	30	AN/GRC 87 HF Transceiver Field Type . . .	\$31,800.00
2.	10	AN/PRC10 VHF Transceiver Portable	2,700.00
3.	2	Tool kits	200.00
4.	1	TV-7/U tube tester	179.00
5.	2	Multimeters TS-352	94.00
		<input type="checkbox"/> Total cost	\$34,973.00
		10% to cover needed spare parts	3,497.00
		10% to cover shipping charges	3,497.00
		<input type="checkbox"/> Total cost	\$41,967.00

ANNEX 4

PUBLIC SAFETY COMMUNICATIONS COST ESTIMATE FOR THE WEST PAKISTAN RANGERS.

<u>Item</u>	<u>Quantity</u>	<u>Description</u>		<u>Cost</u>
1.	10	HF Transceiver AN/GRC 87 Field Type	@1060	\$10,600.00
2.	50	VHF Transceiver AN/PRC 10 Portable	@ 270	\$13,500.00
3.	3	AN/GRR 5	@ 935	\$ 2,805.00
4.	12	Wire Splicers MK 356-G	@20.50	\$ 246.00
5.	80 lbs.	Copper Sleeves for Wire Joints		\$ 240.00
6.	5	Telephone Repeaters 5805-164-8052-EE89A	@ 15	\$ 75.00
7.	20	BA-40 Batteries	@3.50	\$ 70.00
8.	150 Miles	Cable WD1/TT	@ 70	\$10,500.00
9.	3	Manual Switchboards SB18-5805	@ 14	\$ 42.00
10.	5	Switchboards 8505-708-2202-SB-993/gt	@ 12	\$ 62.00
11.	10	Switchboards -SB-22	@602	\$ 6,020.00
12.	1	Hand Reeling Machine 3895-252-6896-RL-31	@ 70	\$ 70.00
13.	1	Hand Reeling Machine 3895-356-3987-RL-27D	@ 18	\$ 18.00
14.	1	Switchboard SB-86	@2641	\$ 2,641.00
15.	2	Test Set TS-26/TSM	@ 73	\$ 146.00
16.	2	Test Set TS-27/TSM	@211	\$ 422.00
17.	3	Multimeter TS-352	@ 47	\$ 141.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>		<u>Cost</u>
18.	4	Tool Kits TE-21	@ 38	\$ 154.00
19.	20	Tool Kits TE-73	@ 7	\$ 142.00
20.	2	Tube Tester	@179	\$ 358.00
Total Cost ---				\$48,254.00
10% to cover needed spare parts				4,825.00
10% to cover shipping charges				4,825.00

Total Cost ---				\$57,904.00

ANNEX 5

PUBLIC SAFETY COMMUNICATIONS COST ESTIMATE FOR THE
EAST PAKISTAN RIFLES.

<u>Item</u>	<u>Quantity</u>	<u>Description</u>		<u>Cost</u>
1.	100	HF Transceiver AN/GRC 87 Field Type	@1060	\$106,000.00
2.	60	UHF Transceiver AN/PRC 10 Portable	@270	\$ 16,200.00
3.	16	SSB Base Stations, 100 watt PEP, upper and lower sidebands operation to be supplied, transmit and receive, 4 channels, double conversion receiver, 3-15 mc, with provisions for remote operation, VOX and CW to be an integral part of the equipment. Unit must be capable of operation from 110/220 volt 50/60 cycle A. C. source. Power supply, transmitter-receiver sections and all components to achieve the above operation to be mounted in a common cabinet with no exterior attachments required to operate in the modes described. Each station to be supplied with speech clarifier, crystals, handset, key, transmission line, 75' long wire antenna kit and all necessary hardware for complete installation.	@1800	\$ 28,800.00
4.	20	SSB Mobile Stations, 100 watt PEP, upper and lower sidebands operation to be supplied, transmit and receive, 4 channels, double		

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost</u>
		conversion receiver 3-15 mc, with provision for CW operation. Unit must be capable of operating from a 12 volt D. C. power source with either a positive or negative ground. Self contained in fully enclosed weatherproof case. Unit shall be supplied complete with omnidirectional antenna, whip type, for optional side or bumper mounting. Crystals and all mounting hardware and accessories for complete installation shall be supplied with the units.	@2,000 \$ 40,000.00
5.	50	UHF-AM Transceivers, power output 20 watts, frequency range 70-88mc, crystal controlled, 1 channel, receiver transistorized, push-to-talk operation. Unit capable of operating from a 12 volt D. C. power source. Unit to be supplied with palm type dynamic microphone, complete with power cables, transmission line and omnidirectional antenna.	@400 \$ 20,000.00
6.	12	SB-22 Telephone Switchboards, complete with patch cords, jacks and keys.	@602 \$ 7,224.00
7.	100	TA 264 Telephones, handsets with accessories for field installation.	@65 \$ 6,500.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost</u>
8.	18	Radio Technician's tools, portable tool box complete with all electronic repair hand tools. @100	\$ 1,800.00
9.	45	Simpson multimeters, model 260 series III with case and test leads, or equivalent. @40	\$ 1,800.00
10.	5	Oscilloscopes 5 inch, Dumont 401 or equivalent, to operate from 110/220 50/60 cycle A. C. source. @400	\$ 2,000.00
11.	20	Thru-line Radio Frequency Wattmeters, Jones or equivalent, for operation 10 to 1000 watts, 2 to 225 mc, with scales for 10 watts, 100 watts and 1000 watts. @90	\$ 1,800.00
12.	1	RF Signal Generator, Hewlett-Packard model 606 or equivalent, 0-60 mc.	\$ 1,800.00
13.	2	Vacuum tube voltmeters, type RCA Junior Voltohmist or equivalent @50	\$ 100.00
14.	1	Automatic voltage regulator, input voltage 220 volts 50 cycles, rated output 10 KVA, with variable voltage adjustment, Stabiline model IE5210 or equal	\$ 1,200.00
15.	20	Automatic voltage regulators, input 220 volts, 50 cycles, single phase, rated output 1 KVA, Sola model 23-26-210 or equivalent. @175	# 3,500.00
16.	10	Dehumidifiers, floor type, operating from 220 volts 50 cycle power supply, with sufficient capacity to reduce moisture content in 10,000 square foot storage area, 10' ceiling. @300	\$ 3,000.00

<u>Item</u>	<u>Quantity</u>	<u>Description</u>	<u>Cost</u>
18.	10	Standard typewriters, 12" carriage @150	\$ 1,500.00
19.	1	Manual telephone switchboard, 20 pair line, with 20 desk sets	2,000.00
20.		Assorted technical books	100.00
		Total Cost	\$245,324.00
		10% to cover needed spare parts	\$ 24,532.00
		10% to cover shipping charges	<u>24,532.00</u>
		Total Cost	\$294,388.00