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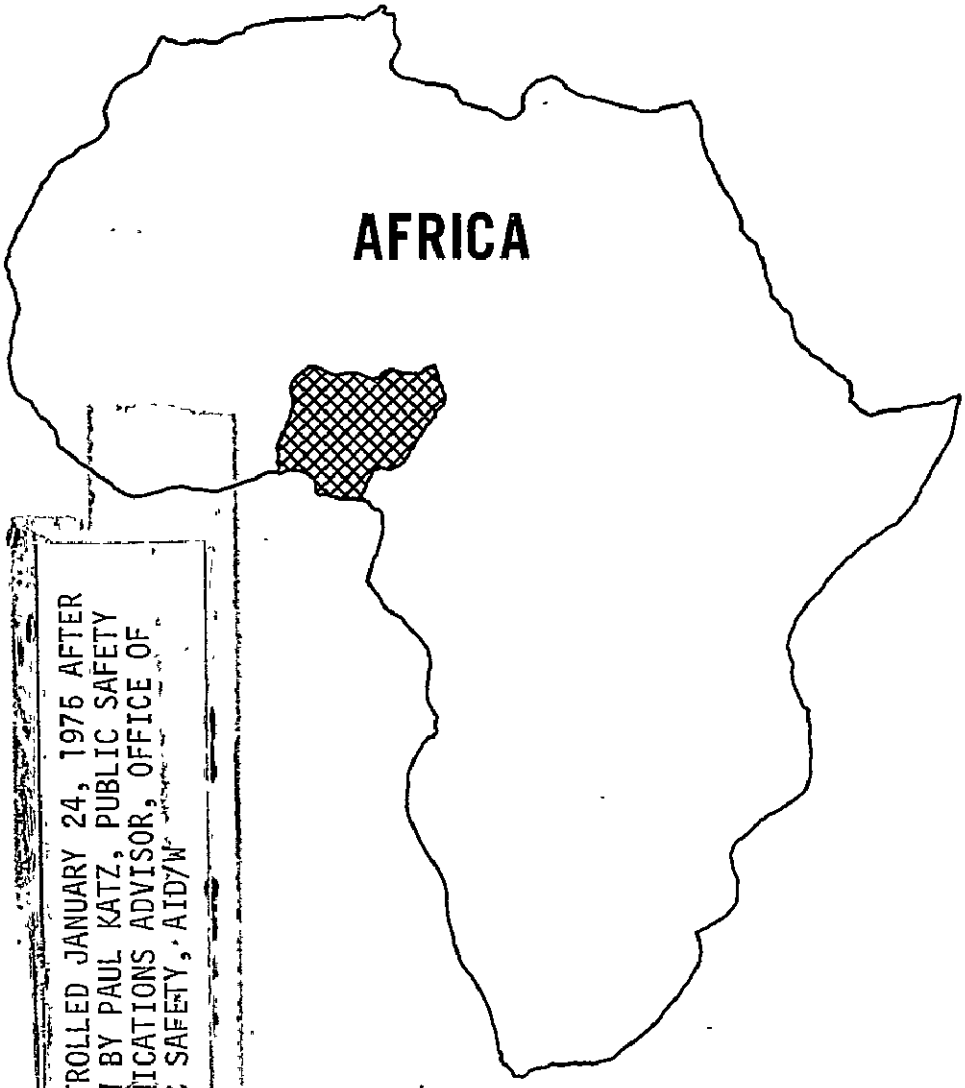
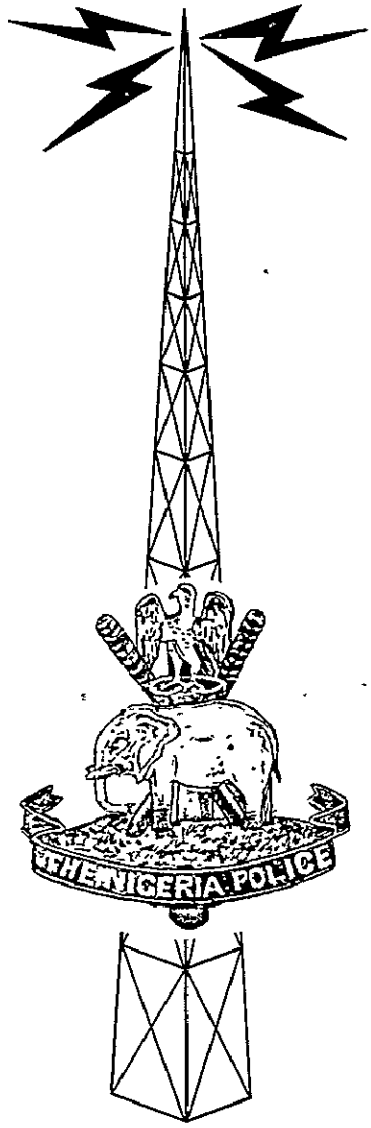
NIGERIA POLICE FORCE COMMUNICATIONS SURVEY REPORT





DECONTROLLED JANUARY 24, 1976 AFTER REVIEW BY PAUL KATZ, PUBLIC SAFETY COMMUNICATIONS ADVISOR, OFFICE OF PUBLIC SAFETY, AID/W

SEPTEMBER 1971

Office of Public Safety
AGENCY FOR INTERNATIONAL DEVELOPMENT
Department of State
Washington, D.C.

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NIGERIA POLICE FORCE

COMMUNICATIONS SURVEY REPORT

September, 1971

PAUL KATZ

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INTRODUCTION

This communications survey of the Nigeria Police Force (NPF) was conducted by a representative from the Office of Public Safety of the Agency for International Development (A.I.D.) of the United States Government, at the request of the Inspector General of Nigeria Police Force. Local arrangements for the survey were completed through the U. S. Embassy and US A.I.D. Mission in Nigeria.

Field work on the survey was started in Nigeria on June 25, 1971, and completed July 10, 1971. The writer traveled extensively and visited communications facilities at Lagos, Ikeja, Ibadan, Enugu, Kaduna, Jos, Kano and Maiduguri. The information contained herein was obtained as a result of field observations and discussions with concerned NPF officials.

By necessity, this report includes noted deficiencies of the Nigeria Police Force Communications Systems and organizations and proposes recommendations for corrective action. While the management and technical competence of the NPF Signals organization is more advanced than most African countries, their systems and organization are far from that needed to satisfy operational requirements of the

force. It should be recognized, however, that the NPF existing communications systems reflect considerable effort on the part of officials concerned to provide essential communications in support of their overall police mission. The NPF number among their members many fine, capable, intelligent and highly motivated men.

The frank definition of communiations problems on the part of the NPF officials substantially assisted the conduct of the survey and the conclusions reached confirm to some extent problems already recognized by NPF officials.

The excellent cooperation received from all ranks of the NPF not only greatly facilitated the completion of the survey, but permitted a more intensive inspection of police communications operations. Special thanks are expressed to Commissioner of Police Lawrence Meme who arranged the schedule and in-country transportation. This writer is particularly appreciative of the assistance provided by the NPS Signals Officer, Chief Superintendent Emman Teru, who furnished needed information and accompanied the writer to all locations visited.

GENERAL INFORMATION

Nigeria comprises some 350,000 square miles on the southwest coast of West Africa, an area as large as the states of Texas and Utah combined. Its coast line is washed by the Bight of Benin and stretches for nearly 500 miles. Nigeria has a common border with Niger on the north, Lake Chad on the northeast, Cameroon on the east and Dahomey on the west.

It has varied topography ranging from a network of lagoons, creeks and mangrove swamps in the coastal areas to a forest belt approximately 50 to 100 miles inland (some of the dense tree coverage is as high as 120 feet) to open terrain in the north where the elevation averages 2,000 feet. In the Jos plateau there are scattered mountains which rise to 2,800 feet above the nearby plains and valleys. The country merges into the Sahara Desert in the extreme north.

The population of Nigeria is approximately 55 million, of which about 50% is concentrated in the north. Lagos State which contains the Federal capital, covers an area of about 27 square miles and has a population of over 700,000. It is located on the southwest coast and is the principal seaport and industrial center.

Ibadan, capital of the western state, is the most populated African city with a population of over a million. Other cities in Nigeria with large populations are Kano, Ogbomosho, Osbogbo and Iwo.

Transportation facilities of Nigeria include a railway with approximately 1,900 miles of tracks which connects many of the major cities and approximately 45,000 miles of roads of which approximately 10,000 miles can be described as all weather roads.

Telecommunications of the civil government and commercial agencies are limited and, in many cases, unreliable. Communications with many of the rural areas is virtually non-existent. A five-year plan to expand and modernize Post and Telegraph (P&T) facilities has been underway for the past few years and improvement in this area is expected.

The Nigeria Police Force (NPF), a uniformed police force with personnel totaling approximately 35,000 has the primary responsibility for maintenance of law and order throughout Nigeria in both urban and rural areas. In addition to routine police functions, they are responsible for the following:

1. Protection of the borders
2. Security of the port areas
3. Security of the railways
4. Presidential protection and escort duties

In terms of police operations, Nigeria is divided into 12 state commands and the Force Headquarters in Lagos. Each state command is divided into police provinces, divisions, districts and stations. While Police problems vary from state to state, the following major problems

affecting police operations throughout Nigeria are:

1. Urban crime, movement of population to urban areas naturally causes additional crime problems.

2. Police emergency operations, floods, forest and structural fires, civil disturbances, etc.

3. Highway security and traffic control.

4. Internal security operations.

SUMMARY

The NPF appears to be a fine disciplined police organization with competent personnel having a determination to do their job well. To a large degree, however, the effectiveness of this organization is being dissipated due to communications problems dealing with planning, logistics, operational procedures, lack of sufficient trained personnel, facilities and equipment. The present communications situation hinders the NPF's ability to fulfill their assigned mission of maintaining law and order.

AREAS REQUIRING IMPROVEMENT

1. An insufficient number of qualified communications officers and technicians limits the NPF capabilities to properly utilize and maintain their existing communications system and equipment. This problem area also hinders the introduction of more sophisticated communications systems and equipment.

2. The present division of communications responsibilities for operation and maintenance in each state prevents proper technical and administrative supervision over state communications facilities and, thus, seriously affects operational capabilities of the NPF network.

3. To pass administrative and operational traffic, the NPF

presently operates a basic point-to-point HF-SSB radio telegraph (CW) network, connecting their force headquarters in Lagos with their 12 subordinate state headquarters and the state headquarters with their provincial subordinate headquarters. The communications system at best provides slow service due to inadequate facilities and systems. An insufficient number of trained supervisory personnel and limited technical capabilities have resulted in a less than optimum employment of existing equipment, with an excessive number of equipment items being utilized as spares (floaters).

4. Teletype circuits leased from the Posts and Telegraphs (P&T) Division of the Ministry of Communications connect the NPF headquarters at Lagos with Kaduna, Benin City, Ilorin and Ibadan. These circuits have proven to be unreliable with outages of over six months reported. At the present time, both the Ibadan and Kaduna circuits are inoperative. P&T teletype circuits are also in use in several states to connect their provincial headquarters; however, many of these are inoperative due to defective lines and, in some cases, poor maintenance of teletype equipment by P&T.

5. The NPF operate several token city and highway radio patrol car systems. A lack of experience regarding police communications planning prevents maximum efficient utilization of the radio patrol car systems and equipment.

6. The administrative telephone systems (manual switchboards) provided by P&T and located at the NPF headquarters in Lagos and several state headquarters are obsolete and inadequate. They do not provide the police officials responsible for directing a National Police Force the reliability and speed essential to satisfy police operations.

7. Police Communications Centers throughout the country are inadequate to satisfy expanded police operational requirements. The emergency telephone reporting service (999) in Lagos is composed of several telephones which are not located in the radio dispatch room. A telephone switching system to permit police personnel to more efficiently direct police action was installed by P&T; however, it has been inoperative for approximately one year. At present, calls to 999 are handled by P&T operators and not directly terminated at the Police headquarters. Display maps to physically identify patrol areas and more efficiently dispatch radio patrol cars are lacking.

8. For the most part, the VHF/AM equipment utilized by the police for fixed and mobile operation in the major cities is operational. Some of the equipment, however, is several years old and the performance is deteriorating. Because of the lack of sufficient trained radio technicians countrywide, an excessive number of mobile radio equipment are stored at the Force Headquarters in Lagos where they are used as floaters (replacements).

9. The lack of sufficient trained personnel has prevented the implementation of a proper maintenance and repair program. The lack of vehicles assigned to signal units at the state level further compounds this problem and has resulted in a decreased reliability of most NPF communications equipment. To counter these deficiencies, the NPF has provided numerous costly HF-SSB transceivers as spares.

10. There is a lack of suitable portable radio transceivers to satisfy tactical police operations. Existing equipment items are few, bulky, and utilize costly nickel cadmium batteries which require recharging after approximately eight hours of use.

11. HF-SSB transceivers utilized for Highway Patrol operations are not deemed suitable. These units are not designed for Police Patrol operations where requirements dictate that the units be rugged, reliable and easy to operate.

RECOMMENDATIONS

At this time, additional new equipment will not increase the efficiency or effectiveness of the NPF communications system other than provide extensions for rural areas not presently serviced. The basic problem is to increase the effectiveness of the present system by more effective utilization of existing equipment, facilities and personnel.

It is believed that by incorporating some relatively simple technical changes in the existing communications systems and minor adjustments in the organizational structure, NPF communications capabilities would be improved. The NPF operational effectiveness would also be improved dramatically by the training of selected officers and men in the areas of communications management, maintenance and city police and highway patrol operations.

To effect an efficient communications capability, the NPF are in need of:

1. Additional trained police officers to effectively plan, organize and administer human resources and establish sound programs for training to assure effective installation, maintenance and operation of a communications system in support of police operations.

2. Technical changes to more fully utilize existing communications systems and facilities and, thereby, provide the reliability and

versatility essential to police operations.

3. Sufficient budgetary support to sustain their existing communications systems.

4. Additional vehicles assigned to state signals personnel to improve maintenance capabilities and assure more effective utilization of existing communications equipments.

5. Additional emphasis at the highest level to obtain improved P&T support for the NPF emergency telephone reporting service provided the civilian population and the administrative teletype circuits and systems supporting police operations countrywide.

The requirements for expansion and modernization of existing NPF communications facilities will require increased budgetary support of the NPF Signals Division. Therefore, recommendations are divided into several phases; those which are dependent upon the ability of the NPF to obtain additional GON funds and those which can be implemented within current budgetary ceilings.

Phase I concerns NPF action required to improve their communications capabilities with existing equipment, systems and in-country resources. U. S. assistance in the training of Signal Officers and men is also defined.

Phase II provides for the modernization of the NPF radio telegraph and administrative communications system and the implementation of administrative and operational telephone service at the National Police

Force Headquarters, NPF Lagos State Headquarters and Police College at Ikeja. Relative costs for the implementation of Phase II recommendations would be approximately 25,000 Nigerian pounds. This figure does not include the cost of leased P&T lines to connect NPF Headquarters with other police activities in Lagos or the construction of a transmitter building at Ikeja.

Phase III provides for the expansion and modernization of city and highway patrol communications systems and explores future needs to satisfy tactical police operations such as Border Patrol and rural areas communications requirements. Since alternative systems are given in Phase III and the number of equipments required will vary according to the extent of coverage desired, total cost data cannot be provided. In absence of this cost data, Phase III recommendations should be adjusted on a cost versus benefit analysis and take into account the availability of funds.

PART I

OBSERVATIONS AND CONCLUSIONS

A. MISSION

1. The Nigeria Police Force Signals Branch is responsible for satisfying communications requirements generated by the multitude of diverse police activities peculiar to National Police type organizations.

2. The Signals Branch is established under the "B" Department (Operations) to provide the following:

a. A rapid and secure countrywide police communications system in support of the overall NPF mission.

b. An effective communications service to support police operations in the major cities and along the highways.

B. ORGANIZATION

1. The Signals Branch is headed by the Force Signal Officer (FSO), a Chief Superintendent of Police. The Branch is divided into two sections, Operations and Maintenance.

2. The Maintenance Section is relatively new having been in operation less than nine years. The P&T were formally responsible for the installation, repair and maintenance of all wireless and ancillary equipment in use by the NPF.

3. The Signals Branch Organization (see figure 1) is fragmented with State Signals Officer responsible to the FSO through the State

EXISTING CHAIN OF COMMAND
NIGERIAN POLICE SIGNAL ORGANIZATION

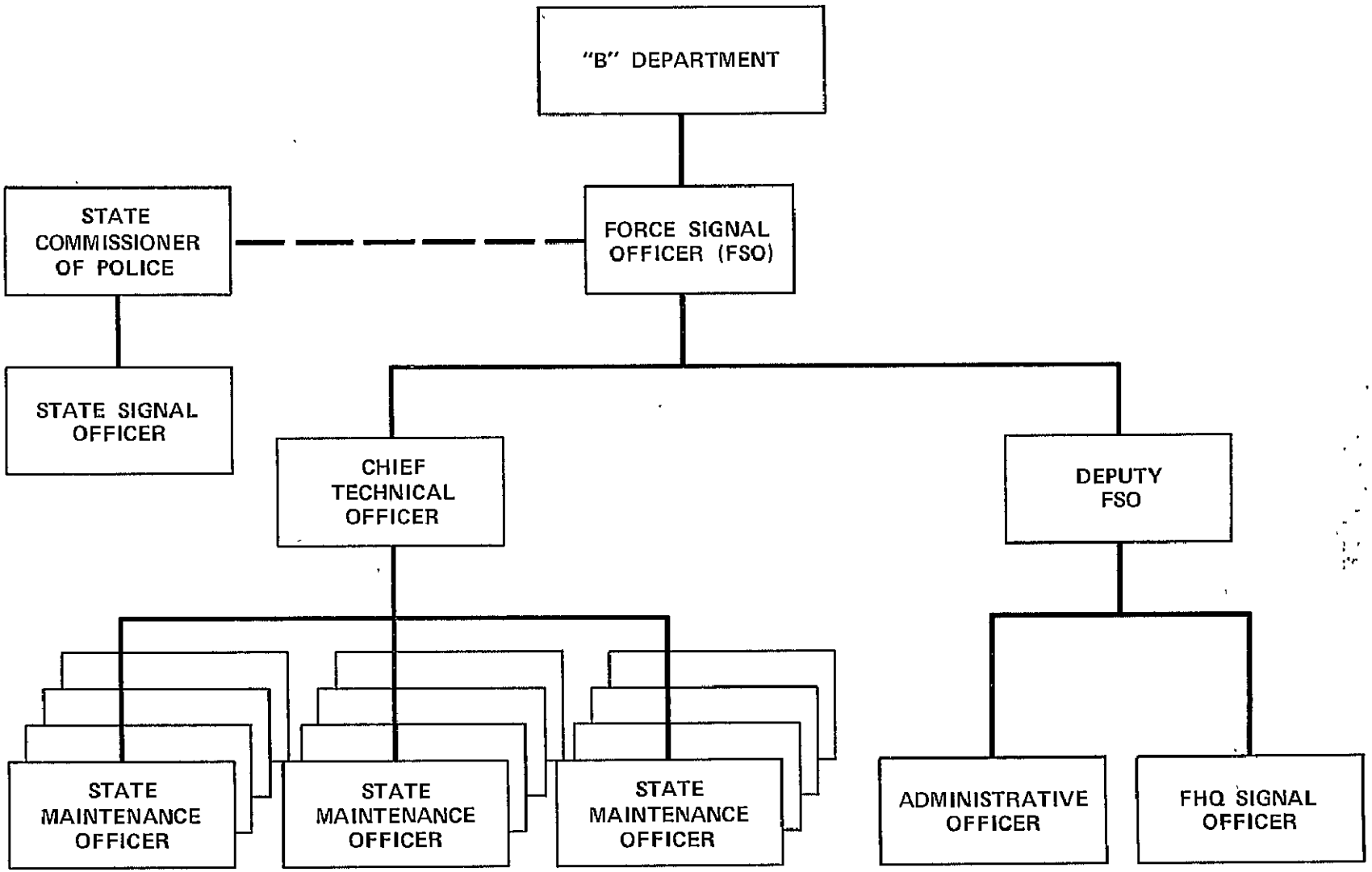


Figure 1

Commissioner of Police and the State Maintenance Officer responsible to the FSO through the Chief Technical Officer.

4. While this arrangement allows the FSO direct control over maintenance and installations, it tends to encourage compartmentalization and introduces problems in the direction and supervision of NPF country-wide communications facilities. The State Commissioner of Police has not been provided an officer on his staff responsible for overall police communications activities.

C. PERSONNEL

The Signals Branch personnel currently number 808. Of this number, 54 are assigned to the Maintenance Section which is authorized 111.

D. NIGERIA POLICE COUNTRY-WIDE RADIO TELEGRAPH (CW) NETWORK

The Nigeria Police radio telegraph (CW) network at this time probably constitutes the country's most extensive radio telegraph communications system. The network extends from the NPF headquarters at Lagos to each of their subordinate headquarters at State and Province levels (see figure 2).

1. Existing radio equipment is High Frequency (HF) Single Sideband (SSB) and of a current design.

2. Communications over this HF-SSB network is limited to certain hours of the day. These hours of operation are dependent upon the following technical factors:

a. Atmospheric and ionospheric conditions

NIGERIA POLICE FORCE

LAGOS TO STATE
HF-SSB RADIO TELEGRAPH NET

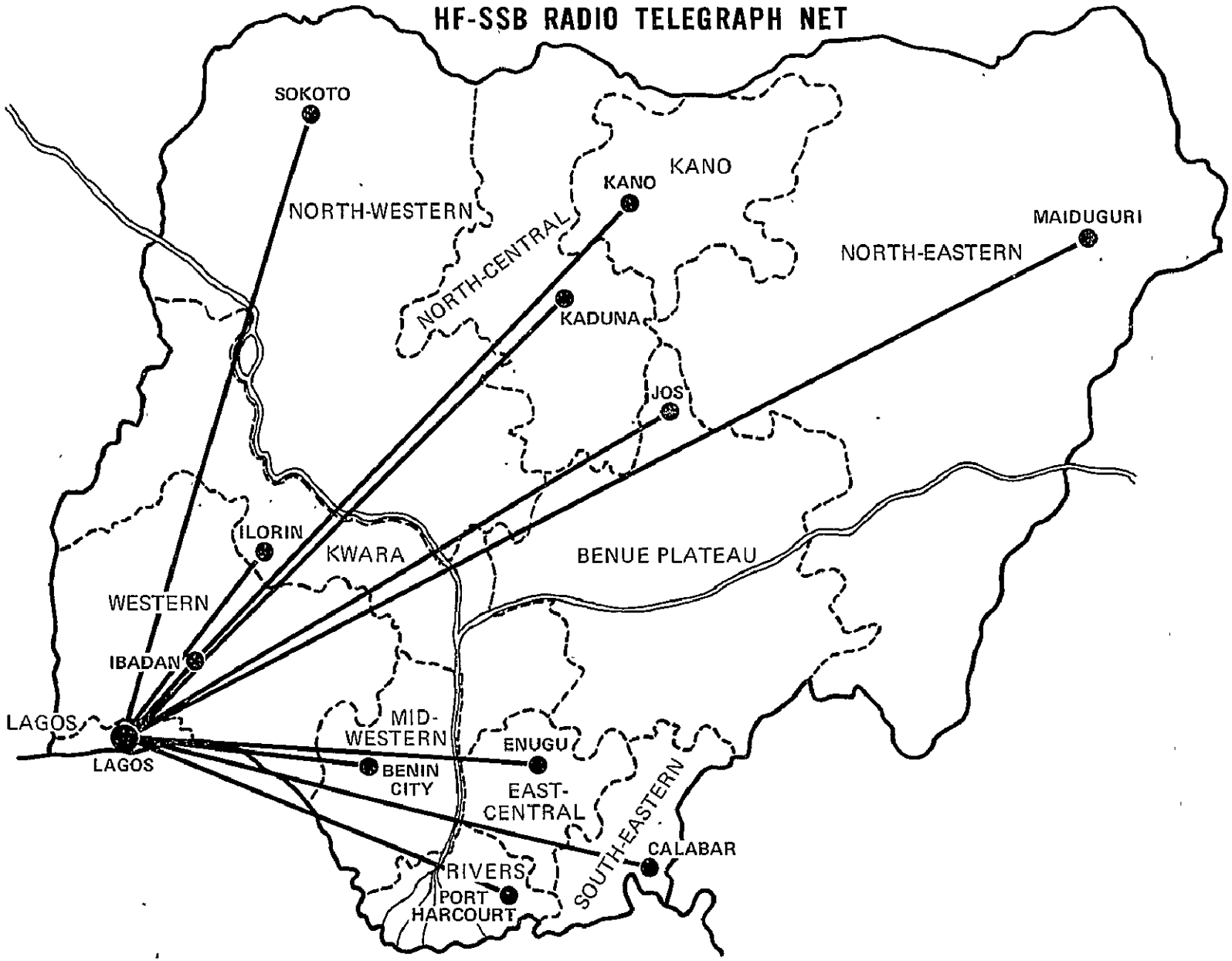


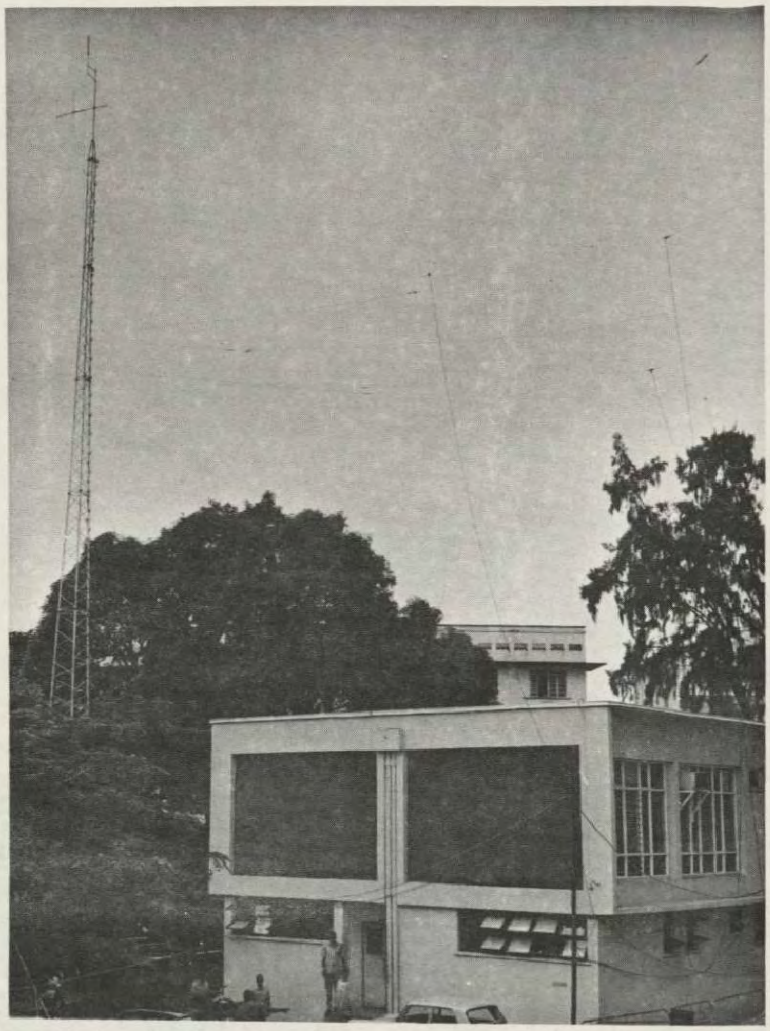
Figure 2

b. Frequency selection

c. Interference from neighboring countries

3. The NPF countrywide radio telegraph network at present provides a limited message handling capability with many states experiencing continued delays of administrative and security traffic. This problem

LAGOS BASE STATION



is due in part to the technical and operational factors outlined below:

a. The NPF are presently utilizing one frequency for day and night operation. This practice restricts the number of hours of network operation, especially on long distance circuits such as from Lagos to Maiduguri.

b. At Lagos the base station receiver site is located at the NPF headquarters building.

c. Transmitters are remotely controlled from the Lagos Signal Operations Center. However, the transmitter site is located a short distance away and does not include sufficient area for the construction of adequate antenna systems.

LAGOS SIGNALS OPERATIONS CENTER

d. The present arrangement of receiver and transmitter equipment operating on a single frequency (simplex) does not allow full utilization of the equipments' capabilities.

e. To handle an increasing message load, the NPF Lagos to State Radio Telegraph Network is divided into two nets. One simplex frequency is used for Enugu, Port Harcourt, Ibadan, Benin City and Calabar. Another is used for Kaduna, Jos, Kano, Sokoto, Ilorin and

STATE NPF RADIO STATION AT ENUGU

Maidugari. No standby frequency is in use and state radio stations must wait their turn to pass messages.

f. In most states visited, transceivers were used in the State to Province networks and where found installed at or in close proximity to the receiver equipment for the State to Lagos network. The operation of transmitters and receivers for two nets at the same location presents severe operational limitations.

g. The transmission of unauthorized messages of a personal nature and messages which are lengthy and low priority over the NPF system have contributed to delays of routine police traffic. This situation has developed because of the low rank (normally inspector) of the State Signals officer and the excellent discipline inherent in the NPF organization. Messages delivered to the Signals Officer by higher ranking police officers are dispatched without question.

E. NPF ADMINISTRATIVE RADIOPHONE NETWORK

Approximately 14 HF-SSB transceivers at a cost of over 9,000 Nigerian pounds are installed in the offices of each State Commissioner of Police to connect their offices with the NPF headquarters in Lagos. This net was established primarily because of the lack of adequate and reliable telephone service provided by P&T. The equipment is operated at its peak only a few minutes a day.

F. CITY RADIO PATROL CAR SYSTEM

Present NPF communications systems employed to support city police operations have become inadequate due to rapid population growth and related police problems. Lagos is the only major city having sufficient VHF-AM radio equipped patrol cars to support police operations. However, the operational capability of the Lagos City Radio Patrol Car System is far less than that required by the NPF. Several of the other major cities have little operational communications capability. Due to a lack of experience regarding Radio Patrol Car Systems, problems exist with regard to facilities, area coverage, utilization of radio equipped vehicles and control center operations.

1. The Control Center for the radio patrol cars in Lagos City is located in the Lagos State NPF headquarters. The Control Center is the backbone of any communications system with the radio dispatcher responsible for the direction and control of all radio patrol cars.

2. Present facilities do not provide for proper dispatching and controlling of NPF radio equipped vehicles. Maps in use are outdated and no visual method of recording the location of radio patrol cars is employed.

3. Radio message forms now in use are not fully compatible with modern police operations. Tape recorders to record all incoming and outgoing radio traffic as well as telephone calls for assistance are

not presently being used. The recording of all radio transmissions on magnetic tape precludes the requirement of maintaining a written radio log.

4. Incoming calls through the emergency telephone reporting system (999) are handled separately and not by the dispatcher and slows down possible police reaction time. Incoming calls from the general public requesting police assistance are handled by P&T operators initially.

A telephone switching system to permit police personnel to respond more effectively was installed by P&T; however, this system has been inoperative for over one year.

5. There are over 20 radio patrol cars in use in Lagos. The Lagos State NPF officials are reluctant to place these on the street during the daylight hours because of the problems experienced in obtaining replacement vehicles and spare parts. At present radio patrol cars are only placed on patrol during the hours of darkness and are on standby duty at the police stations during the day.

6. In the major cities visited (Ibadan, Kaduna, Enugu, Kano, Jos and Maidugari), the only radio equipped vehicles observed were those employed for Highway Patrol operations and those assigned to senior NPF officials.

G. HIGHWAY PATROL

1. The NPF are presently operating a Highway Patrol communications

system in each state. Because of the distance involved, the NPF decided upon a combination of VHF-AM and HF-SSB radio equipment. This equipment is installed in highway patrol vehicles ranging from Land Rovers to Peugeots.

HIGHWAY PATROL VEHICLES

2. The VHF-AM mobile transceivers in use are, for the most part, in operating condition and provide limited coverage. This coverage varies depending on the local terrain and base station antenna height. Additional limitations are imposed by the unsuppressed ignition systems in many of the highway patrol vehicles.

3. The HF-SSB transceivers installed in highway patrol vehicles are the compact type designed for mobile and base station operations where cost is the major factor. Due to budgetary considerations and lack of experience, the NPF procured the maximum amount of radio equipment for

the funds available rather than ordering equipment which would best satisfy existing and future highway patrol operational requirements. As a result, the equipment procured does not fully provide the reliability, flexibility and simplicity of operation required in NPF highway patrol operations.

4. In addition to the above, the existing method of installation and operation of the HF-SSB transceivers in the highway patrol vehicles imposes the following limitations:

a. Police personnel occupying the front seat of the vehicle are unable to properly operate the transceiver which is installed in the rear of the vehicle since the units have no provision for a dash-mounted control head and microphone.

b. Units are operated on a single frequency thereby restricting operation to one network and limiting communications range and reliability to certain hours of the day. Further, the absence of additional operational frequencies (channels) has required the installation of a VHF-AM unit in the highway patrol vehicles.

5. HF-SSB transceivers utilized as base stations in the highway patrol control center are reliable and adequate. However, these units were found to be improperly operated. A squelch control is not available on these transceivers; consequently, noise is present when a signal is not received. The absence of a squelch control is not detrimental to

the operation of the units, in fact it prevents the operator from inadvertently blocking a weak transmission from the highway patrol vehicles. It was observed that the radio operators are not Signals personnel and because of the presence of noise had adjusted the audio level to a low setting whereby it would have been difficult to hear a transmission from a highway patrol vehicle.

6. Status boards to locate and identify highway patrol vehicles in service or on patrol are not employed.

7. HF-SSB transceivers were found to be installed in Peugeot vehicles not possessing heavy duty batteries or alternators. These transceivers draw approximately 20 amperes of current in the transmit mode and can deteriorate a normal battery in a short period of time.

H. TACTICAL AND RURAL COMMUNICATIONS

1. A lack of an adequate field type communications capability places severe limitations on the NPF in carrying out their assigned responsibilities. Present HF-SSB equipment limits the NPF long distance communications capabilities to fixed and mobile stations.

2. Short range tactical communications requirements in support of NPF mobile forces and other tactical police elements is being met by standard VHF-AM mobile and low powered portable units. These units lack the versatility required and the special nickel cadmium batteries utilized to power these portable units tends to restrict their employment in tactical operations. Nickel cadmium

batteries require recharging after approximately eight hours of operation and replacement batteries are not locally available.

I. INTERPOL RADIO NETWORK

1. The NPF Signals Branch is presently operating an International Criminal Police Organization (INTERPOL) radio station. At present, the NPF are in direct contact with INTERPOL Headquarters in St. Cloud, France. The International Police network has for its purpose the diffusion of police information regarding identification, tracing and arrest of criminals wanted for offenses against common law.

2. The NPF have established separate facilities for the INTERPOL radio network and placed the radio station under the control of the Central Criminal Investigation Department (CID). Since all traffic over this network is conducted in Morse Code (CW) and sensitive police information passed is coded and decoded by CID personnel, the utilization of a separate facility is believed unnecessary. Better utilization of equipment, facilities and personnel could be effected by employing the same facilities as that used for the NPF countrywide radio telegraph network.

J. POSTS AND TELEGRAPHS FACILITIES

The Posts and Telegraphs Division (P&T) of the Ministry of Communications operates and maintains a countrywide communications system.

1. The NPF currently lease teletype circuits on the P&T UHF/VHF

systems to alleviate their heavy administrative traffic. The NPF have budgeted funds for this purpose and teletypewriter circuits and machines have been provided by P&T. Present service provided by P&T is inadequate and unreliable; many of the circuits are inoperative due to defective lines and equipment. Outages of over six month have been reported.

2. NPF officials are currently experiencing delays of several hours when placing long distance telephone calls on the P&T system. This has been attributed to the lack of sufficient circuits.

4. Manual Private Branch Exchanges (PBX) provided by P&T to many NPF facilities are antiquated and unreliable.

TYPICAL MANUAL P&T SWITCHBOARD PROVIDED THE NPF

4. Very little residence telephone service is available to the local populace. This situation coupled with the availability of a maximum of about 150 public pay (coin) telephones limits the number of telephone calls the NPF receive from the general public requesting assistance.

5. Many of the problems outlined above may be solved with the completion of the installation of the new P&T microwave system and telephone expansion program. However, the P&T microwave point-to-point relay system while offering a greater traffic capacity and more dependable service is highly susceptible to sabotage, vandalism and natural disasters (see figure 3). A failure at any one or more points in such a multi-path radio relay system is sufficient to disrupt communications. Therefore, complete dependency by the NPF on a microwave system should be avoided.

K. RECORDS

Present message forms are arranged in a standard commercial format and not fully compatible with police operations.

1. Standard Operating Instructions (SOI) and an efficient record and message handling capability for use with P&T provided teletype circuits has not yet been developed. Over 1,000 messages a month are transmitted via teletype requiring message forms with a capability of providing rapid exchange of police information.

NATIONAL TELECOM. NETWORK PLAN OF NIGERIA

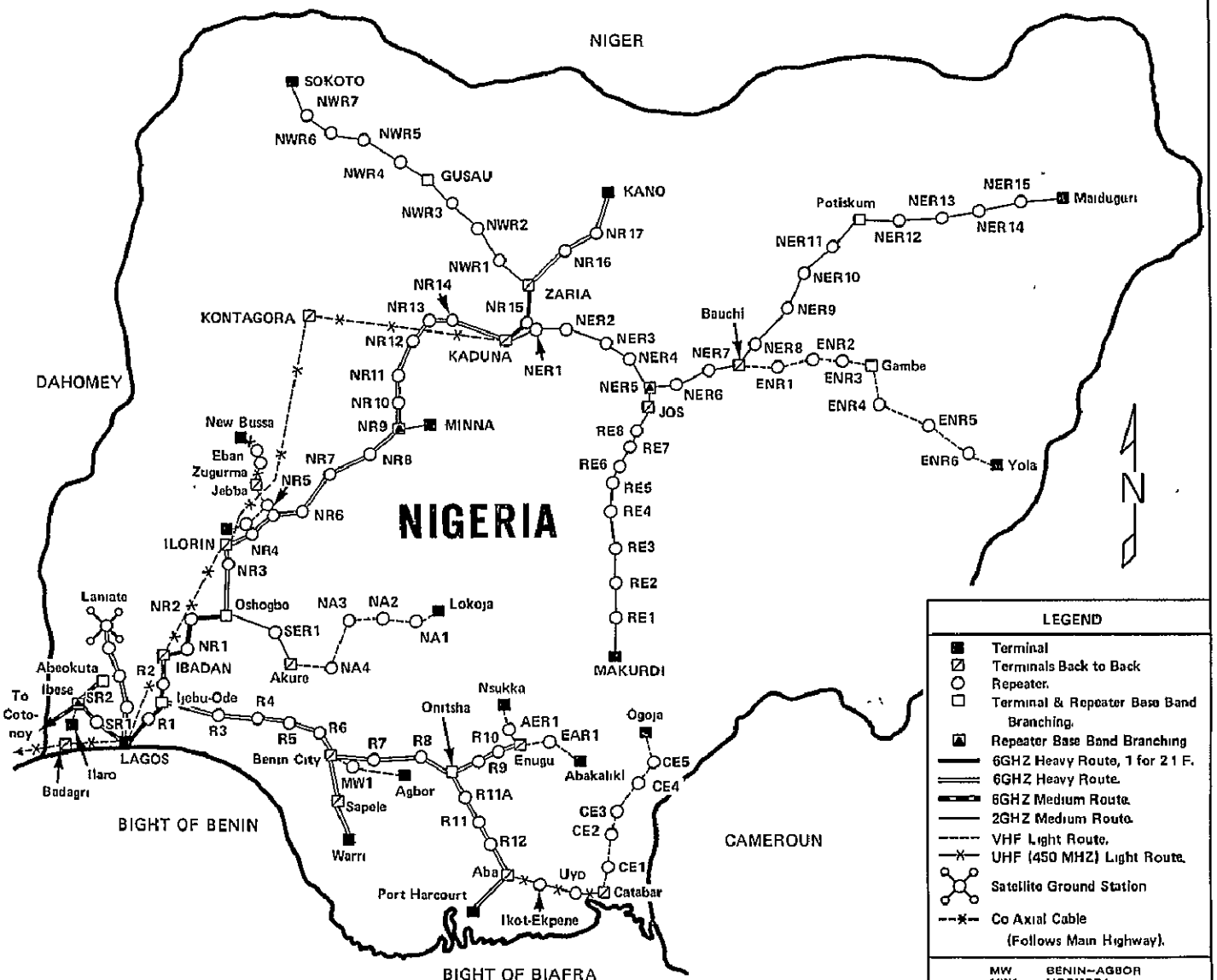


Figure 3

LEGEND

- Terminal
- Terminals Back to Back
- Repeater.
- Terminal & Repeater Base Band Branching.
- Repeater Base Band Branching
- 6GHZ Heavy Route, 1 for 21 F.
- 6GHZ Heavy Route.
- 6GHZ Medium Route.
- 2GHZ Medium Route.
- VHF Light Route.
- UHF (450 MHZ) Light Route.
- Satellite Ground Station
- Co Axial Cable (Follows Main Highway).

MW	BENIN–AGBOR
MW1	UGONOBA
NA	LOKOJA–AKURE
NA1	LOKOJA 'A'
NA2	ADAGI
NA3	IKARE
NA4	OWO

KEY

SR	LAGOS-ABEOKUTA
SR1	OTTA
SR2	IBISE
R	LAGOS–PORTHARCOURT
R1	LIKOSI
R2	ONIPE
R3	ODUTOLA MARKET
R4	ODE–AYE
R5	OTU
R6	IGUOBAZUA
R7	OGAN
R8	ISSELE UKU
R9	ENUGWU UKWU
R10	ABOH
R11A	IGBO UKWU
R11	UMUNANTA EXIACHI
R12	UMU OWA
AER	ENUGU–NSUKKA
AER1	UKEHE
EAR	ENUGU–ABAKALIKI
EAR1	ABOINE
CE	CALABAR–OGOJA
CE1	AWI
CE2	BUNG
CE3	UGEP
CE4	OBUBRA
CE5	MBOK
NR	IBADAN–KANO
NR1	LALUPON
NR2	TOTO
NR3	KAJOLA
NR4	OKEOYI
NR5	IYANA
NR6	LAFIAGI
NR7	KUTIGI
NR8	LEMU
NR9	DEJI
NR10	GARUN GABAS
NR11	KAGARA
NR12	KURAO
NR13	KAMFANIN KWONA
NR14	GANGA
NR15	GIDAN GAYAN
NR16	AUCHAN
NR17	OWARMAI
NWR	ZARIA–SOKOTO
NWR1	UNGWAN DADE
NWR2	SHEMI
NWR3	CHAFE
NWR4	MARU
NWR5	TALATA MAFARA
NWR6	BIMASA
NWR7	JELDU
NER	KADUNA–MAIDUGURI
NER1	GIDAN GAYAN
NER2	DANDAURA
NER3	NUDARU
NER4	RAHAMA
NER5	MATARI
NER6	PANSHANU
NER7	ZARANDA
NER8	GILLERI
NER9	SHADEREKI
NER10	KARI
NER11	LAMBA
NER12	DOGON KUKA
NER13	MURGA
NER14	NGAMDU
NER15	KESAWA
ENR	BAUCHI–YOLA
ENR1	DINDIMA
ENR2	SHARIFURI
ENR3	AKKP
ENR4	MARARABA
ENR5	YOLDE
ENR6	DEMSA
RE	MAKURDI–JOS
RE1	ISHEREV
RE2	AKANGA
RE3	ALIZAGA
RE4	SISSIBAKI
RE5	NUNGU
RE6	CHUNGUN
RE7	ASSOGI
RE8	KASSA HILL
SER	OSHOGBO–AKURE
SER1	EFFON ALAIYE
IBESE – ILARO	

2. An SOI has been developed by the NPF to satisfy their radio telegraph (CW) operations. Over 4,000 messages composed of approximately 160,000 word groups are transmitted monthly over the NPF Radio Telegraph Network.

3. The messages transmitted over the NPF radio telegraph network and leased teletype circuits include many wanted circulars and other police type information where the standard commercial format is not fully compatible and contributes to delays and inaccuracies.

L. MAINTENANCE

The maintenance accomplishments of the NPF are remarkable, in light of the limited number of trained radio technicians available and the number of radio transceivers maintained. To counteract the shortage of trained radio technicians, lack of adequate transportation and availability of replacement parts, the NPF have retained numerous radio transceivers as spares to replace defective units. As a result of this action, cannibalization of equipment, although found in some states, has been held to a minimum. It is believed, however, that the utilization of numberous spare radio transceivers removes the urgency of repairing defective units and has a tendency to retard technicians capabilities and the establishment of an adequate maintenance and repair program.

1. NPF radio maintenance facilities (workshops) are located in Lagos and each of the eleven state capital cities. The capability and

experience of NPF technicians to understand and maintain NPF radio communications equipment varied from state to state. Further upgrading of NPF personnel's technical skills is necessary as related to improved circuit understanding, test instrument usage and general repair procedures.

2. The NPF workshop located in Lagos has an exceptionally well equipped facility compared to other state maintenance shops visited. The availability of necessary electronic test equipment also varied from state to state; however, most states visited were found to have a fairly adequate inventory of needed items. One exception noted was the lack of proper Radio Frequency (RF) Absorption Wattmeters and RF Directional Wattmeters which prevented accurate testing of transmitters RF power output and antennas Standing Wave Ratio (SWR).

3. Transportation other than in the Lagos area to convey radio technicians, their electronic test equipment and accessory material to various NPF radio sites is severely limited due to the lack of assigned vehicles.

M. LOGISTICS

1. NPF Signals personnel should be commended on their supply facilities. Spare parts and equipment were found to be properly stored and stocked at all locations visited. Using a Kardex system, the NPF have established good control over their expenditure of supplies.

2. The NPF Signals Branch experience the following problems in

maintaining an up-to-date inventory of replacement parts and equipment.

a. An operating and maintenance budget is appropriated on an annual basis and, in some cases, is not sufficient to procure required replacement parts and equipment. This problem was identified in several states visited where a number of radio transceivers and test equipment were found to be inoperative and in some cases cannibalization of equipment had begun.

b. The NPF are not excluded from the Government of Nigeria import tax consequently budgetary problems are intensified as most replacement parts and equipment must be imported.

c. The time involved in importing replacement parts and equipment is substantial and procurement must be initiated well in advance of actual requirements.

N. TRAINING

1. A six month course of instruction for wireless (CW) radio operators is being given by the NPF at the Police College in Ikeja and Kaduna. Since 1961, several hundred constables have completed this training.

a. Technical subjects are not a part of the course and the students, upon completion, are not qualified to perform first echelon maintenance.

b. Training aids are limited to those locally fabricated. Magnetic and/or punched tapes normally employed in Morse Code training are not available. The use of magnetic and/or punched tapes in Morse Code training provides students the opportunity to catch up if they fall

behind or to advance more rapidly should they so desire. It also frees the instructor from the tedious task of manually sending Morse Code and allows him to assist students on an individual basis.

2. A wide variation exists in the technical skills of NPF radio technicians. Some apparently have been selected on the basis of knowledge and educational background while others are qualified by reason of many years of association.

a. The NPF have not, as yet, established in-service technical training to assure uniform efficiency among Signals personnel.

b. The average NPF radio technician, needs advanced training in modern communications methods and equipment because, without this knowledge, he cannot hope to install, service or obtain optimum performance from NPF equipment currently in use.

c. Schools are available locally to assist in basic radio theory training on a limited scale. These resources, however, cannot be relied upon to produce finished, competent radio technicians. The NPF have started to conduct basic technical training courses at their Lagos Signals Workshop. The number of students which can be trained in this manner is insufficient to meet NPF needs.

d. The NPF face a critical shortage of well-qualified instructors for training radio technicians.

3. There is a lack of trained Signals management personnel to

properly organize the resources necessary to resolve the problems obstructing the development of an effective NPF operational and administrative communications system. Few members of the Signals Branch have been exposed to formal training in management and administration of police communications systems.

PART II

RECOMMENDATIONS

The planning and subsequent implementation efforts proposed in this report could represent a substantial improvement of the NPF communications capabilities. The following recommendations are proposed in several phases in accordance with NPF priorities and resources.

A. PHASE I OF RECOMMENDED NPF ACTION

1. NPF Signal Organization

a. It is recommended that the NPF Signals Organization be structured as shown in figure 4 to assure proper technical and administrative direction and supervision over state communications facilities.

b. The NPF should assign to each state command staff a State Signals Officer. This officer should have the rank of Superintendent of Police and be directly responsible to the State Commissioner of Police regarding all state police communications activities. The State Signals Officer should receive technical direction and control from the Forces Signals Officer. The State Signals Officer should be responsible for supervising the state wireless and technical officers.

c. Selection of NPF personnel to fill these vacancies should be made on the basis of overall signal managerial talents and capabilities.

RECOMMENDED REORGANIZATION FOR NIGERIAN POLICE SIGNAL ORGANIZATION

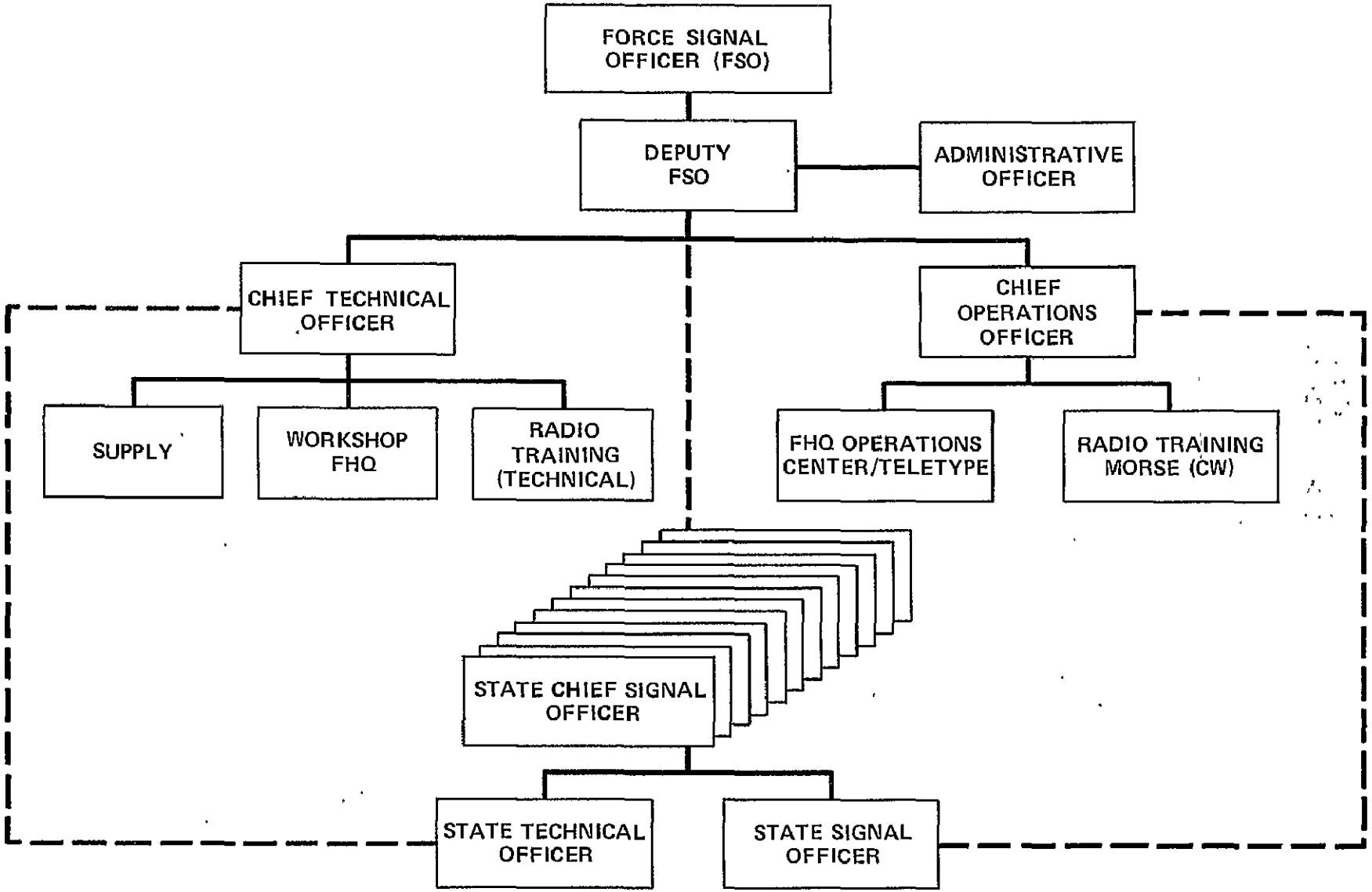


Figure 4

Knowledge of Morse Code (CW) or technical proficiency should not be made the basis for selection.

2. NPF Country-Wide Radio Telegraph (CW) Network

a. To obtain maximum reliability in long distance radio circuit, it is recommended that new operating frequencies be selected according to the time of the day in accordance with propagation predictions provided in Annex I.

b. The NPF should inspect antenna installations to assure that orientation of antennas is in accordance with information provided in Annex I.

c. Two duplex nets should be established. State stations in the net should monitor Lagos and Lagos should monitor both state nets simultaneously. A third simplex net should be established whereby all states would pass traffic to Lagos when their primary net is busy and given permission from Lagos (net control) inter-state traffic could be passed.

d. To prevent interaction between transmitters and receivers, the transmitter site should be located a minimum of 500 meters, preferably further, from the receiver site at all NPF State facilities. The spare TA-83C remote single sideband transmitter should be utilized for the State-Province network and the HF-SSB transceivers currently used for this purpose redeployed.

3. P&T Facilities

a. Discussions at the highest level between NPF and P&T officials should be held regarding the necessity of improving present P&T telephone and teletype service to the police.

b. The NPF should request P&T to replace old manual PBX equipment with new automatic and dial (PABX) replacements.

c. The NPF should require P&T to adhere to the 999 (emergency telephone reporting) principle and provide proper termination of 999 circuits at Lagos and other State Police Headquarters.

d. The NPF should request P&T to provide a teletype manual patch panel (PBX) to permit simultaneous transmissions of Law Enforcement traffic to all states. Teletype patch panels should be installed at Lagos and NPF State headquarters to allow inter-state and intra-state transmissions of general police information messages.

4. City Radio Patrol Car System

a. Efforts should be focused toward maximum utilization of existing NPF equipment to effect more efficient city radio patrol car operations.

b. The NPF should develop a radio patrol car schedule so that a more effective utilization of radio equipped vehicles can be realized. Operating hours of the existing radio patrol cars in Lagos and other major cities should be rescheduled. Sufficient funds should be allocated for vehicle spare parts, tires, etc., to maintain vehicle

operational capability with increased operating hours.

c. A city mapboard equipped with lights or magnets for the instant recording of the in-service or out-of-service status of each radio car should be fabricated locally. This mapboard should show the areas of individual police patrol responsibilities and be installed in a position convenient to the radio dispatcher.

5. INTERPOL Radio Network

To achieve better utilization of existing NPF communications equipment, personnel and facilities the INTERPOL radio station and Force Signal Branch personnel should be relocated to the Signals operation center at Force Headquarters.

6. Records

To establish an efficient NPF records and message handling capability in conjunction with P&T provided teletype circuits, the Standard Operation Instructions contained in Annex II should be reviewed and utilized where applicable.

7. Maintenance

a. Vehicles should be assigned to each state signal unit to permit the implementation of an inspection and preventive maintenance program.

b. Given the above action the NPF should reduce the number of radio transceivers presently allocated for replacement purposes.

c. Test equipment presently in use at State workshops should

be returned to Lagos for inspection, repair and calibration. Calibration of this test equipment and that at the Lagos workshop should be conducted on a time scheduled basis. Where calibration of test equipment requires standards not available at the Lagos workshop, assistance from other sources (P&T, manufacturers, etc.) should be obtained.

d. Radio equipment which has been cannibalized at various NPF State workshops should be returned to Lagos and appropriate orders issued to prevent future occurrences.

8. Training

a. Magnetic tapes should be employed in Morse Code training. Given these training aids, the length of the (CW) radio operator instruction course should be reduced.

b. In-service technical training should be implemented to assure uniform efficiency among Signals personnel.

c. Selected personnel should be provided advanced technical training in modern communications methods and equipment. The U. S. should sponsor a minimum of four (4) participants for the Advanced Police Radio Communications course in the U. S. for a period of 26 weeks. Two (2) participants in calendar year (CY) 1971 and two (2) in CY 1972.

d. In consort with the proposed changes in the NPF Signals Organization structure, selected Signal officers should receive training in the field of Police Telecommunications Management. The U. S. should sponsor a minimum of four (4) participants for the Police Telecommunications

Management course in the U. S. for a period of 26 weeks. Two (2) participants in CY 1971 and two (2) in CY 1972.

e. The U. S. should sponsor two (2) participants to attend the General Course at the International Police Academy in the U. S. with a two week specialization in city and highway radio patrol car operations. One (1) participant in CY 1971 and one (1) in CY 1972. The officers selected for this training should be those responsible for coordinating the utilization of a radio patrol car system.

B. PHASE II OF RECOMMENDED NPF ACTION

1. NPF Countrywide Radio Telegraph (CW) Network

a. The NPF headquarters transmitter site should be relocated from Lagos to Ikeja. The location selected should be in or close to the Police College and contain sufficient area to permit the installation of necessary antenna systems.

b. To control the remote transmitters placed in Ikeja, consideration should be given to the establishment of a UHF wideband multiplex radio circuit between Ikeja and the NPF headquarters at Lagos (see figure 5). The approximate cost for this system would be 15,000 Nigerian pounds.

2. NPF Administrative Telephone System

a. To satisfy administrative and operational telephone requirements, Private Automatic Branch Exchanges (PABX's) should be installed at the NPF headquarters and the Police College. These units, if not available from P&T, should be procured with NPF funds. The established cost for an 80 line PABX is approximately 3,500 Nigerian pounds.

b. These PABX's should be connected to the proposed UHF wideband multiplex radio circuit to permit

BLOCK DIAGRAM
PROPOSED UHF WIDE BAND MULTIPLEX RADIO CIRCUIT

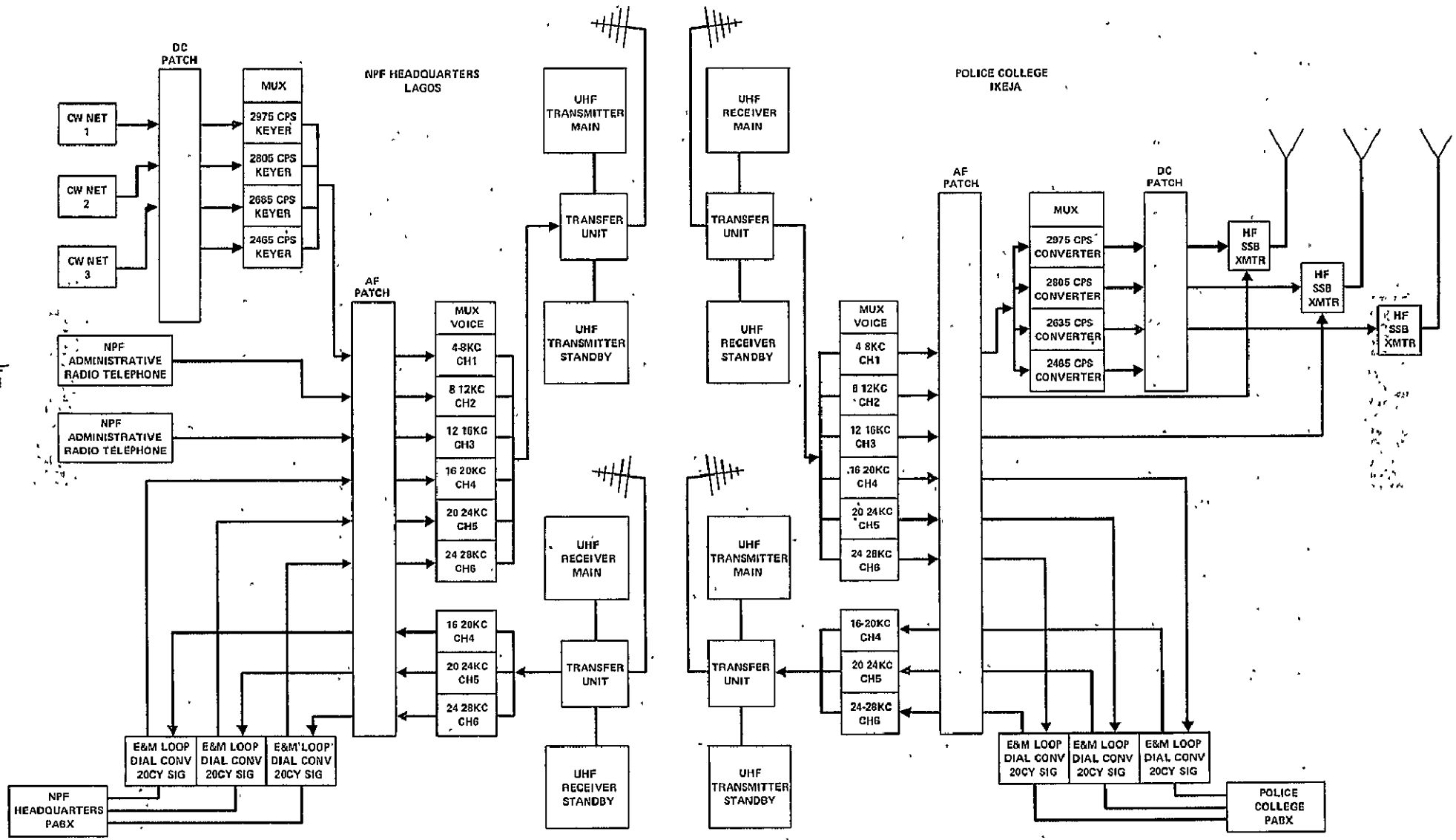


FIGURE 5

direct telephone dialing between NPF headquarters and the Police College at Ikeja over NPF controller circuits (see figure 5).

c. In conjunction with the recommended installation of police PABX's, the NPF should obtain appropriate leased P&T telephone lines to connect the NPF headquarters directly with other police activities located throughout the city. The leased lines should make it possible for the NPF to rapidly place calls from one office to others in different police buildings throughout the city without depending upon the normal city public telephone exchange service.

3. NPF Administrative Radio Telephone System

a. The present practice of maintaining HF-SSB transceivers (Racal TRA-355) in the offices of the State Commissioner's of Police to provide the necessary administrative radio telephone backup to P&T service should be discontinued.

b. To satisfy this requirement, the NPF should utilize existing high power HF-SSB transmitters (Racal TA-83C) in conjunction with compatible voice operated switching units (Racal LA-313B). The voice operated switching units are available at a cost of approximately 180 Nigerian pounds each.

c. Present police manual PBX's should be connected to the proposed voice operated switching units to provide NPF officials the capability of communicating over the NPF radio system from their office or residence P&T telephone.

d. The costly HF-SSB transceivers (TRA-355) released by the actions taken above should be redistributed to satisfy other police requirements.

C. PHASE III OF RECOMMENDED NPF ACTION

1. City Radio Patrol Car Systems

a. Consideration should be given to the expansion and moderization of existing communications facilities, at such time as the NPF are able to obtain sufficient budgetary support to operate and sustain their patrol cars and effect proper utilization of existing VHF-AM mobile radio equipment.

b. Radio patrol car control centers in the major cities should be provided appropriate cordless turret type switchboards for routing incoming calls requesting police assistance to the police officials concerned. This action should be taken in concert with the implementation of the P&T telephone expansion plan.

c. To assure maximum coverage of radio patrol cars and portable units, the NPF should explore the possibility of installing NPF radio equipment, consisting of remote transmitters, receivers and repeaters in selected P&T facilities. Given this action and the utilization of high P&T antenna towers, the NPF should improve their communications capabilities substantially.

d. Consideration should be given to the employment of voice actuated tape recorders in the radio patrol

car control centers of major cities to record all incoming and outgoing radio traffic, as well as emergency telephone calls (999) requesting police assistance. Statistics regarding police activities should be extracted from these tapes on a periodic basis and provided senior NPF officials.

2. Police Call-Box Telephone System

a. The NPF should consider the employment of police call-box telephones in the major cities. Call-boxes should be strategically located to compensate for the small number of existing public pay (coin) telephones (approximately 150 countrywide).

b. Because of the numbers of call-boxes required and the cost of such a program (approximately 180 Nigerian pounds for each call-box), it should be phased over a period of several years. Before a call-box system is procured, sufficient budget must be allocated for the reccuring expense related to leasing of trunk telephone lines from P&T.

c. The NPF should assure that the following features are incorporated in any call-box systems they procure:

(1) The call-box telephone should be accessible to the general public whereby they can request police

assistance while offering maximum security against vandalism and theft. The call-box should be contained in a locked weather-proof metal box. Police personnel should be able to open the door of the call-box by means of a key. The public can gain access to the call-box in cases of emergency by turning a door knob or some similar locking device.

(2) Call-box should provide for routing reporting by foot patrolmen through a call-box switchboard located at the local NPF headquarters.

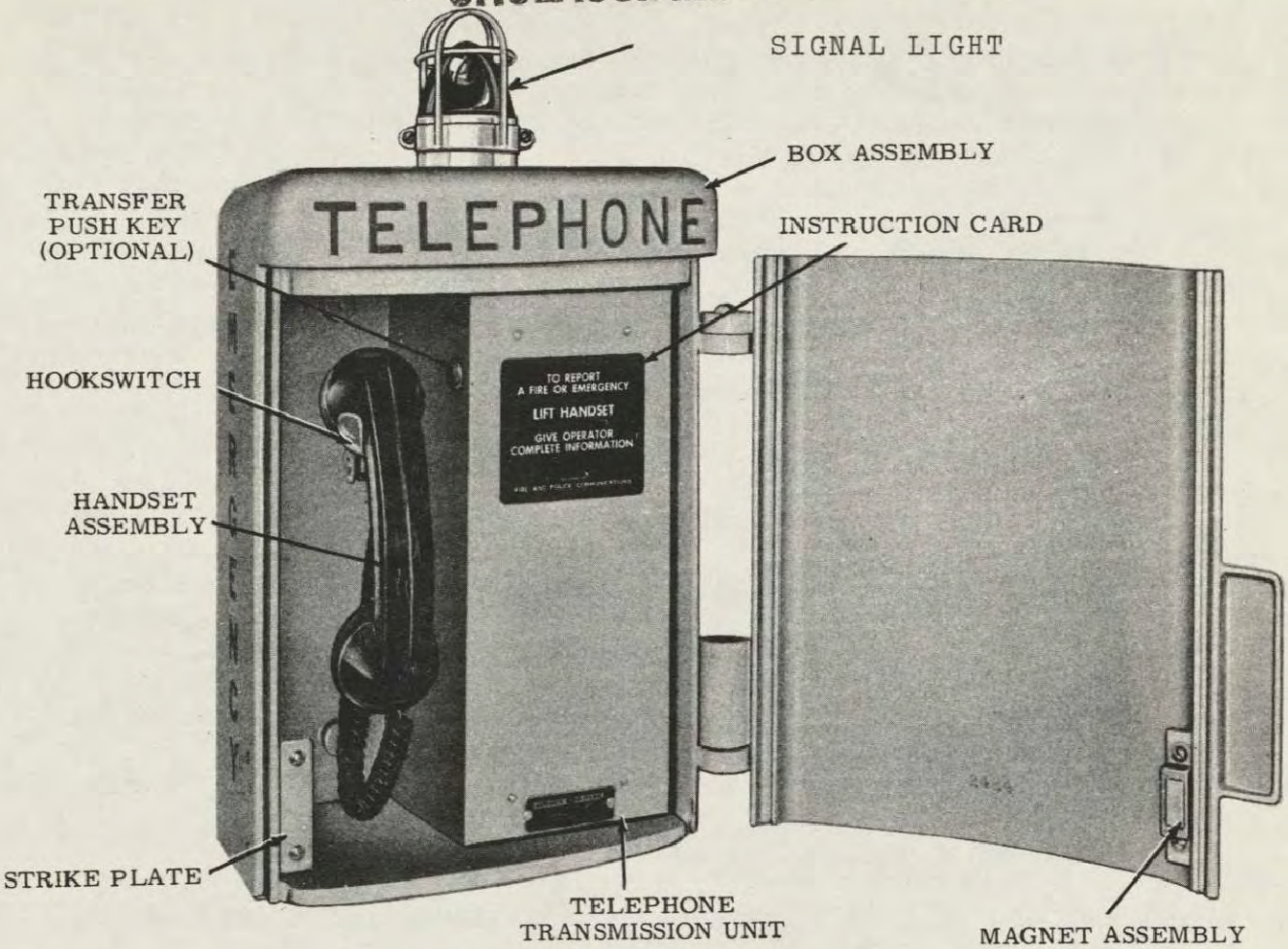
(3) A provision should be incorporated to permit the police call-box switchboard operator at the local NPF headquarters to contact the foot patrolmen in the call-box area by visual (flashing light) and audible signaling.

(4) The call box system should contain auxiliary batteries to power the system in case of electrical power failure.

d. Problems are sometimes experienced in the continued vandalism and theft of police call-box telephones when they are made available to the public. To resolve this problem alternative call-box configurations are available. Two of these are as follows:

(1) Call-box which operates on an inter-com principle, containing an enclosed speaker in place of the easily removable telephone.

(2) Call-box which utilizes an externally mounted push button or lever to summon police assistance. This allows the public to signal for help without using the call-box telephone.



Emergency reporting telephone (door open).

e. Prior planning with P&T regarding installation, cable requirements and call-box locations should be initiated. Planning should include requirements for spare wire pairs to be installed to each call-box and direct connections to the local NPF headquarters (not through telephone exchanges). Call-box telephones should

not be connected to the public telephone system so that they cannot be used by the police or the public to make personal telephone calls.

3. Highway Patrol Radio System

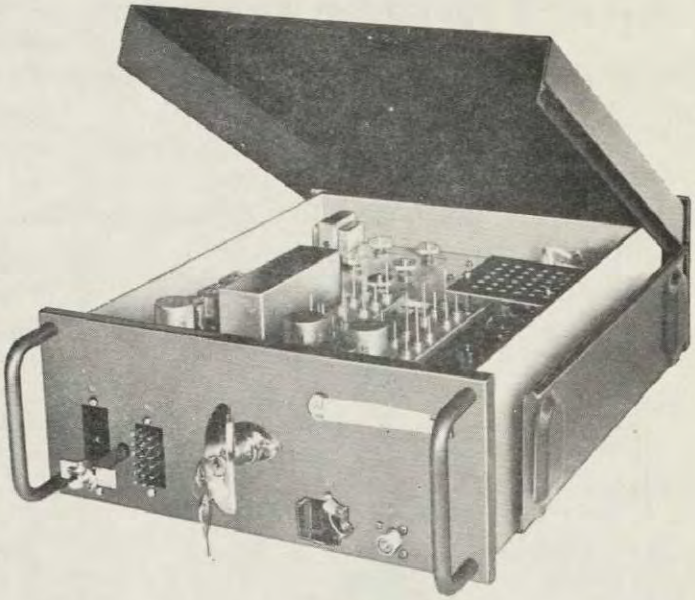
a. The NPF should replace present HF-SSB transceivers (SSB 125) in the highway patrol vehicles with units that are more rugged and flexible. Consideration should be given to replacement units similar to that shown in figure 6. These units, including multifrequency antennas shown in figure 7, cost approximately 900 Nigerian pounds.

b. HF-SSB transceivers replaced should be utilized as base stations in remote areas where electric power is not available on a continuing basis. These units can be operated on a 12 volt storage battery which can be charged when electric power is restored. If electrical power is not available, gasoline or diesel generators can be used to charge the storage battery.

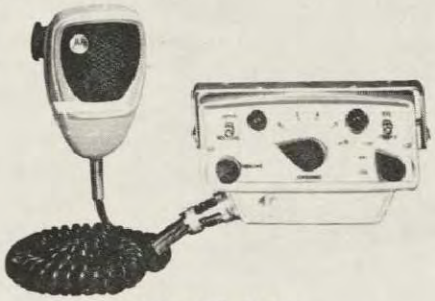
c. An alternate means of extending the range of VHF-AM units presently installed in highway patrol vehicles should be considered. It would require the utilization of high P&T towers and facilities strategically located (see figure 3) and the procurement of VHF-AM repeaters. An example is given in figure 8 for the possible extension of VHF-AM communications to highway patrol vehicles from Kano to Zario to Kaduna.

Mobile HF-SSB 100 Watt Transceiver

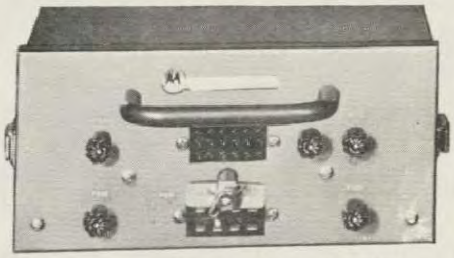
SPEAKER



TRANSCEIVER



CONTROL HEAD
SHOWN WITH MICROPHONE



DC POWER SUPPLY

RELIABLE PERFORMANCE—All transistorized circuits (up to the drivers and final amplifier) insures minimum power consumption as well as long-term reliability and reserve gain for long lasting performance.

SIMPLE OPERATION—A control system is employed with all operating controls located on a control head to permit ease of operation and use by non-technical personnel. Operation is "Press-to-Talk" with automatic transfer of the receive/transmit function.

RUGGED, PRACTICAL DESIGN—A ruggedly constructed housing protects the radio circuitry from dirt, dust, and splashing water. Cover of housing is easily removable for access to all circuits.

NETTING—A netting circuit is included in the transceiver so that, when several sets are used to form a system, all units may be set to precisely the same frequency as the primary station.

METERING & TESTING—Facilities are built-in for fast, accurate checking and alignment of all key circuits of the radio set.

LOW BATTERY DRAIN—Radio may be operated in "Receive" position with only 1.5 amperes average current drain. No more engine idling required to provide power. Saves gasoline expenses, engine wear and cost of battery charging.

LOUD CLEAR MESSAGES—Four watt audio output assures operator receipt of the message in noisy environments or when working outside the vehicle. Sharp filter selectivity reduces adjacent channel interference and operator fatigue.

Figure 6

MOBILE ANTENNAS 2-18 MHz 100 watts

SH-16M/SH-4A

HF-SSB MOBILE ANTENNA FEATURES:

MULTI-FREQUENCY PRE-SET ANTENNAS AUTOMATICALLY SWITCHED—by companion transceiver to preset channels

RUGGED CONSTRUCTION—for operation in all weather conditions over unpaved roads. Coil and tuner fully protected

EFFICIENT DESIGN—Over the entire frequency range the antenna performance equals or exceeds a center loaded whip

SIMPLIFIED INSTALLATION—Includes hardware, brackets and cables for standard truck or automobile installation

VERSATILE—The antenna may be bumper or side mounted to accommodate a variety of installations

MODEL	SH-16M	SH-4A
FREQ. RANGE MHz	3-15	2-18
CHANNELS	4	6
OVERALL HEIGHT	10′ 5″ 317.5 CM	10′ 5″ 317.5 CM
MOUNTING	Bumper or Side Mounting	

Figure 7

EXAMPLE OF UTILIZATION OF P&T TOWERS AND FACILITIES FOR HIGHWAY PATROL VHF/AM RADIO SYSTEM

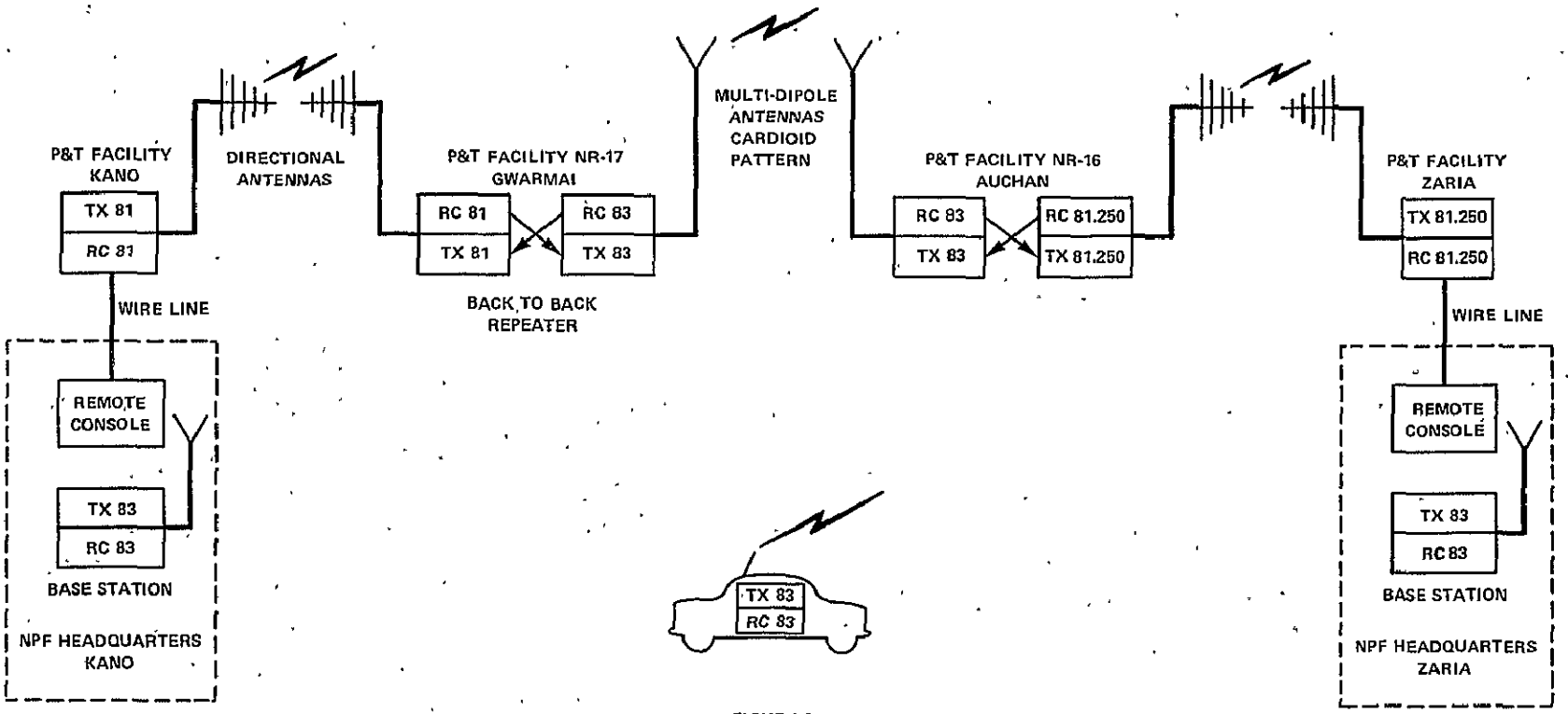


FIGURE 8

4. Tactical and Rural Communications

a. The NPF should consider the utilization of multi-purpose VHF-FM transceivers to satisfy their present and future requirements for tactical and rural communication.

b. One NPF future requirement is to provide the Northern Native Authority Police a communications capability when this force is taken over by the NPF. Multi-purpose VHF-FM transceivers described in figure 9 should be considered to satisfy this requirement. This type of low cost equipment, approximately 160 Nigerian pounds each, would provide the NPF the equipment versatility required since this equipment can be utilized as a man pack, portable, mobile, base station and repeater.

c. These units should also be considered to satisfy existing NPF mobile forces requirements for a tactical communications capability. Where required, complete compatibility of the recommended VHF-FM transceivers with existing VHF-AM equipment can be effected through the installation of back-to-back repeaters.

d. To assist the NPF in their communications planning, figure 10 was prepared showing the air line distances between various police state headquarters, subordinate provincial offices and many of their district stations.

OFFICE OF PUBLIC SAFETY
MULTIPURPOSE VHF/FM TRANSCEIVERS

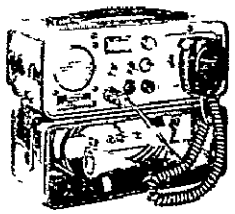
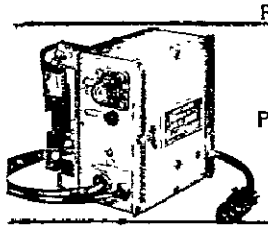
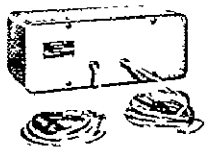
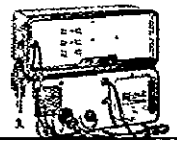
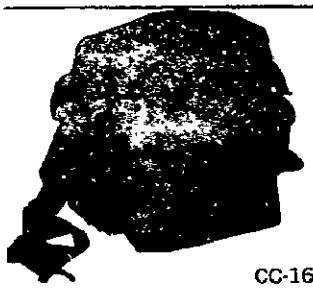
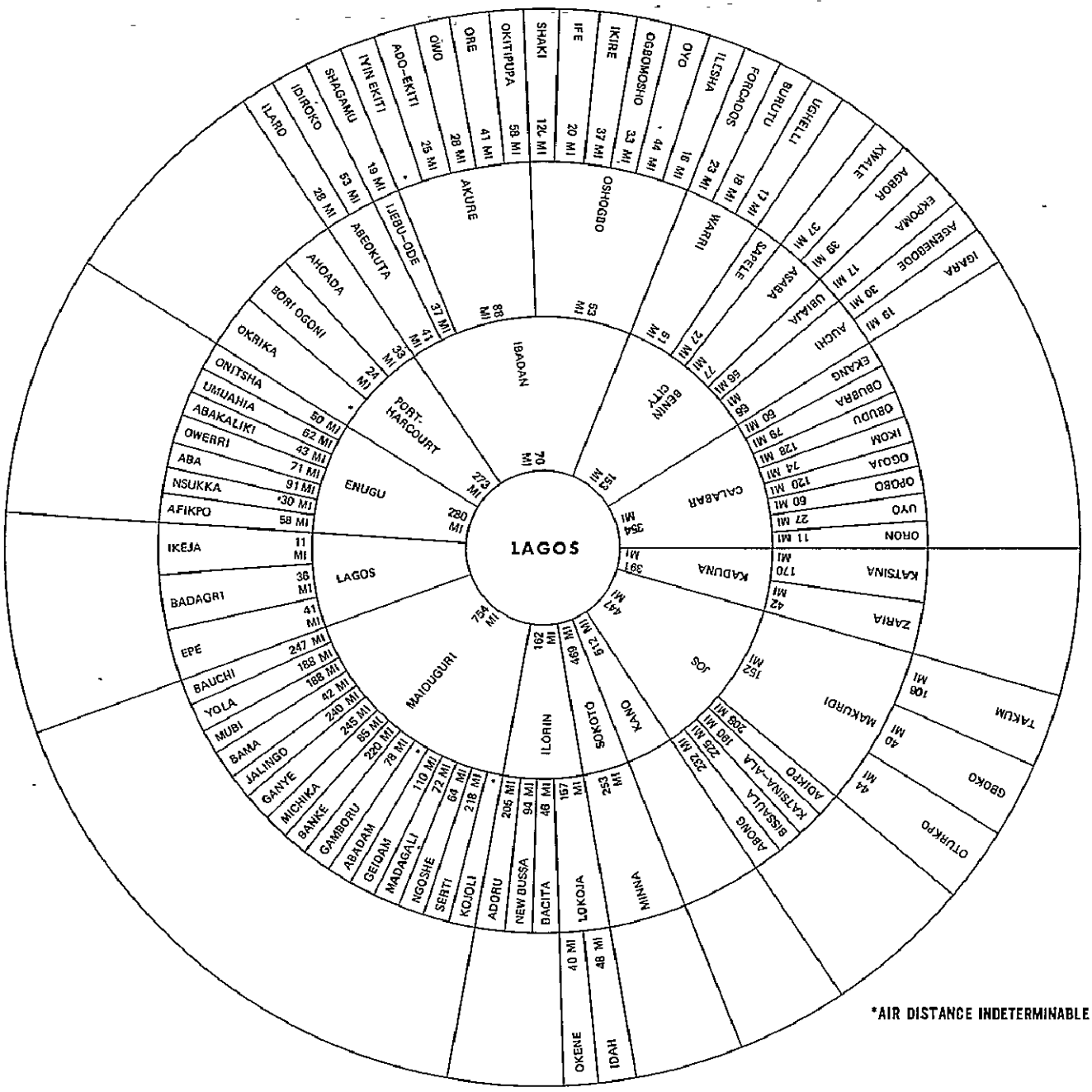
MODEL	DESCRIPTION
FM-1	Hand held, 1½ watts, 148-170 MHz, wide band (±15 KHz) or narrow band (±5 KHz), single or dual channel, completely transistorized, rugged, light weight, battery operated, requires eight (8) "D" cells or two (2) BS-25, 6 volt nickel cadmium batteries Compatible with FM-5, PA-20, RU-5A, and RU-6A to form a complete communications system Conversion from wide to narrow band or narrow to wide band may be accomplished in the field. Requires AE-1 Whip Antenna and AE-2 Adapter connector for operations. CC-1 Carrying Strap optional. Size: 2⅞ x 2⅞ x 1½ inches Weight. 4.35 pounds (1 97 Kilos). Single Channel with Crystals — Wide Band . . . . . . Single Channel with Crystals — Narrow Band . . . . . . Dual Channel with Crystals — Wide Band . . . . . . Dual Channel with Crystals — Narrow Band . . . . .
 FM-5	Manpack/Portable/Mobile/Base. A 5 watt 148-170 MHz, wide band (±15 KHz) or narrow band (±5 KHz), single or dual channel, completely transistorized, rugged, lightweight transceiver. Unit is complete with cover which is also battery holder. Cover protects operating controls and is used for storage of battery cable, spare fuses, and microphone. May be operated with eleven (11) "D" cells or two (2) BS-25 nickel cadmium or 12 VDC vehicle battery, or from 110/220, 50 60 cycles by using a PS/A-16 Power Supply/Battery Charger. A PA-20 may be used to increase power output to 20 watts when using a PS/A-16 or 12 VDC vehicle battery Size. 4 x 5½ x 10½ inches. Weight: 11 pounds including batteries. (5 Kilos). Single Channel with Crystals — Wide Band . . . . . . Single Channel with Crystals — Narrow Band . . . . . . Dual Channel with Crystals — Wide Band. . . . . . Dual Channel with Crystals — Narrow Band . . . . .
 PA-20	20 watt Power Amplifier for use with FM-5. All solid state, broad band device that clips on to the exterior of FM-5 to increase power output to 20 watts. Completely self contained in a weather proof housing with all necessary cables and connectors for quick, easy installation. For use with FM-5 when operated from PS/A-16 Power Supply or 12 VDC vehicle battery. Size 4¾ x 4⅛ x 3½ inches Weight: 1 8 pounds. (82 Kilos).
 RU-6A	Back-to-Back two way repeater kit Provides the means to reach isolated areas or couple two isolated communications systems. RU-6A kit plus two standard FM 5's provide a fully operational two way repeater remotely located to overcome terrain obstacles or connect two separate FM radio systems Receptacles on the front panel of FM-5 permit rapid hook-up. Requires two FM-5's, two antennas and coaxial cables. Unit is supplied with connecting cables to permit rapid installation. Size. 4 x 5⅛ x 10½ inches Weight 4 pounds. (1.8 Kilos).
 PS/A-16	Power Supply and Battery Charger, operates from 110/220 VAC, 50-60 cycles. Provides 12 VDC to operate FM-5 and has nickel cadmium/lead acid battery charging receptacles to charge batteries while operating as a power supply. A battery charging rack is contained in the cover to accommodate 2, 4, or 6 BS-25 nickel cadmium batteries, complete with cable and matching connector. A special power cord plug may be converted to fit continental outlets as well as others without tools 12 lbs. (5.4 Kilos).
KA-8A	Telegraph (MCW) Assembly. Provides the means to transmit modulated continuous wave (MCW) signal through the FM-5. Assembly consists of a transistorized tone module and telegraph key. Tone output is applied to the audio circuits of the transmitter. This provides a tone modulated FM signal which may be received by other FM-1 and FM-5 equipment. Unit is complete with necessary cable and connector. Includes phone jack for monitoring transmitted signal and received signal.
 CC-16	Canvas Carrying Case for FM-5

Figure 9

CC-1 Shoulder Strap for FM-1.

NIGERIAN NATIONAL POLICE FORCE COMMUNICATIONS AIR LINE DISTANCE CHART



*AIR DISTANCE INDETERMINABLE

Figure 10

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ANNEX I

LONG TERM RADIO PROPAGATION PREDICTIONS

FOR

SELECTED HIGH FREQUENCY CIRCUITS IN NIGERIA

At the request of the Office of Public Safety, a table of high frequency performance predictions was prepared by the Institute for Telecommunications Sciences utilizing their high speed electronic computers.

A. It is normally necessary to change the operating frequency as ionospheric conditions change between night and day or between night transition and day because of changing ionization conditions. These predictions facilitate the selection of frequencies needed to obtain maximum reliability of the following NPF long distance radio circuits: Lagos to Maidugari, Lagos to Kano, Lagos to Sokoto, Lagos to Kaduna and Lagos to Enugu.

B. Communications performance of a given high frequency radio path can be predicted from theoretical and empirical information. However, such predictions should be qualified, particularly where police traffic is involved. Local noise, variations in transmitter output, antenna performance, receiving system characteristics and many other factors could affect the computed circuit performance.

C To obtain the predicted circuit reliability, the characteristics

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of the NPF communications equipment, the Racal TA-83C and RA-87, was utilized as well as half-wave horizontal antennas 10 meters high (32 feet) at both terminals. The type of service was single channel radio telegraph (CW) (Single Sideband). The required signal-to-noise ratio assumed for this service was 36 db.

D. To utilize the attached computer print-out, a general description of the heading and examples of frequency selection is provided. Starting at the top of the computer print-out and reading left to right, the heading may be described as follows:

Line 1: Circuit from Lagos to State.

Line 2: Power output of transmitter (mode of operation), antenna type and height, computer catalog number.

Line 3: Numerical sequence in which the computation was made; the month for which prediction applies; the solar activity level and average sunspot number; a numerical code showing bearing of transmitter location in tens of degrees before the decimal and the distance in hundreds of nautical miles following the decimal.

Lines 4 and 5: The transmitter location to the nearest hundredth of a degree; the receiver location to the nearest hundredth of a degree; the bearing of the receiver at the transmitter; the bearing of the transmitter at the receiver and the great circle distance in nautical miles.

Line 6: The transmitting antenna type and height in meters,

-12 indicates a half wave length, tilt angle, the receiver antenna type and height in meters, etc.

Line 7: Computer program information.

Line 8: Transmitter RF power output; number 3 indicates man-made noise in the receiving area at -148 DBW, the required signal-to-noise ratio associated with the type of service.

Line 9: The operating frequency caption above the increments of frequencies in Megahertz (MH) at which probable modes, vertical angles and reliabilities are calculated.

Line 10: Greenwich Mean Time (GMT), Maximum Usable Frequency (MUF) in majority of cases is the highest frequency that will be reflected by the ionospheric during a specific time period on 50 percent of the days a month, increment of frequencies in Megahertz.

E. At long distances, transmission in the High Frequency bands depends on sky waves reflected from the ionosphere. The dominant mode of propagation corresponds to the path having the least loss during transmission and is expressed as 1F for 1 hop via F layer reflection and 2F for 2 hops via F layer reflection. The vertical angle of departure and return in degrees is tabulated directly below the mode of propagation. Delay tabulated below the angle is the time in tenths of milliseconds a transmission is delayed. F-Days is the percentage of days that any skywave is expected to exist. SN/DB denotes the available Signal-to-Noise ratio for the days skywaves exist. REL (reliability)

is the percentage of days within the month that the required S/N ratio is expected to be equaled or exceeded.

F. An example of the usefulness of the attached data can be seen when comparing the present NPF frequency (over 7 Megahertz) for the Lagos/Enugu circuit with the Maximum Usable Frequency (MUF) listed. The September prediction shows this NPF frequency to be unreliable from 0200 GMT to 0800 hours. The December prediction shows this frequency to be unreliable from 2400 hours GMT to 0800. The June 1972 prediction shows this frequency to be unreliable from 2200 hours GMT to 0800 hours.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 SEP LONG TERM SSN = 61. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	
PWR= 0.5000KW	3 MC/S MAN. NOISE = -148 DBW	REQ.S/N= 36DB	

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	7.2														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	58	48	53	58	58	-	-	-	-	-	-	-	-	-	ANGLE
	30	23	26	30	30	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.89	.55	.21	-	-	-	-	-	-	-	-	-	F.DAYS
	71	54	64	70	75	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.89	.54	.21	-	-	-	-	-	-	-	-	-	REL.
4	4.3														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	57	52	57	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	29	25	29	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.88	.29	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	65	61	69	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.87	.29	-	-	-	-	-	-	-	-	-	-	-	REL.
6	7.0														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	58	51	54	58	-	-	-	-	-	-	-	-	-	-	ANGLE
	30	25	26	30	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.51	-	-	-	-	-	-	-	-	-	-	F.DAYS
	76	63	73	76	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.99	.51	-	-	-	-	-	-	-	-	-	-	REL.
8	10.4														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	62	-	55	57	61	62	-	-	-	-	-	-	-	-	ANGLE
	33	-	27	29	33	33	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.89	.24	-	-	-	-	-	-	-	-	F.DAYS
	73	-	63	71	73	72	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.88	.24	-	-	-	-	-	-	-	-	REL.
10	9.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	65	-	60	62	65	65	-	-	-	-	-	-	-	-	ANGLE
	38	-	32	34	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.85	.14	-	-	-	-	-	-	-	-	F.DAYS
	69	-	55	65	68	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.85	.14	-	-	-	-	-	-	-	-	REL.
12	9.8														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	66	-	62	63	66	66	-	-	-	-	-	-	-	-	ANGLE
	40	-	34	36	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.82	.11	-	-	-	-	-	-	-	-	F.DAYS
	68	-	53	64	67	67	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.99	.82	.11	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 SEP LONG TERM SSN = 61. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.0														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	66	-	61	62	66	66	-	-	-	-	-	-	-	-	ANGLE
	39	-	32	34	39	39	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.78	.25	-	-	-	-	-	-	-	-	F.DAYS
	68	-	57	66	69	67	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.99	.78	.25	-	-	-	-	-	-	-	-	REL.
16	9.9														
	1F	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	65	74	58	61	65	65	-	-	-	-	-	-	-	-	ANGLE
	38	56	30	33	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.77	.24	-	-	-	-	-	-	-	-	F.DAYS
	67	24	63	68	68	66	-	-	-	-	-	-	-	-	S/N..DB
	.50	.10	.99	.99	.76	.24	-	-	-	-	-	-	-	-	REL.
18	9.8														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	63	54	56	60	63	63	-	-	-	-	-	-	-	-	ANGLE
	35	27	28	31	35	35	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.97	.71	.25	-	-	-	-	-	-	-	-	F.DAYS
	66	56	65	67	67	66	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.99	.96	.70	.25	-	-	-	-	-	-	-	-	REL.
20	9.0														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	61	52	54	59	61	61	-	-	-	-	-	-	-	-	ANGLE
	33	25	27	31	33	33	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.92	.51	.11	-	-	-	-	-	-	-	-	F.DAYS
	67	53	63	66	67	68	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.99	.92	.50	.11	-	-	-	-	-	-	-	-	REL.
22	8.8														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	60	49	52	58	60	-	-	-	-	-	-	-	-	-	ANGLE
	31	24	25	30	31	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.89	.43	-	-	-	-	-	-	-	-	-	F.DAYS
	68	51	61	67	69	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.91	.99	.89	.43	-	-	-	-	-	-	-	-	-	REL.
24	8.0														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	58	48	52	58	58	-	-	-	-	-	-	-	-	-	ANGLE
	30	23	25	30	30	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.77	.18	-	-	-	-	-	-	-	-	-	F.DAYS
	70	52	62	68	72	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.98	.77	.18	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP. NR 1098

2 SEP LONG TERM SSN = 61. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	9.3														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	28	19	20	22	27	28	28	-	-	-	-	-	-	-	ANGLE
	49	45	46	46	49	49	49	-	-	-	-	-	-	-	DELAY
	.50	.99	.97	.84	.56	.28	.10	-	-	-	-	-	-	-	F.DAYS
	73	39	52	62	72	75	77	-	-	-	-	-	-	-	S/N..DB
	.50	.62	.90	.84	.55	.28	.10	-	-	-	-	-	-	-	REL.
4	5.8														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	28	20	24	28	-	-	-	-	-	-	-	-	-	-	ANGLE
	49	46	47	49	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.97	.71	.24	-	-	-	-	-	-	-	-	-	-	F.DAYS
	63	46	58	68	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.78	.69	.24	-	-	-	-	-	-	-	-	-	-	REL.
6	10.6														
	1F	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	28	44	24	22	24	28	-	-	-	-	-	-	-	-	ANGLE
	50	60	47	47	47	50	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.92	.35	-	-	-	-	-	-	-	-	F.DAYS
	74	35	55	63	69	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	.49	.96	.99	.92	.35	-	-	-	-	-	-	-	-	REL.
8	13.7														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	32	-	46	27	26	28	32	32	-	-	-	-	-	-	ANGLE
	52	-	63	49	48	49	52	52	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.99	.96	.67	.13	-	-	-	-	-	-	F.DAYS
	73	-	29	55	63	69	72	74	-	-	-	-	-	-	S/N..DB
	.50	-	.15	.96	.99	.96	.67	.13	-	-	-	-	-	-	REL.
10	15.4														
	-	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	-	-	52	32	32	36	37	-	-	-	-	-	-	-	ANGLE
	-	-	72	52	52	55	56	-	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.99	.79	.16	-	-	-	-	-	-	-	F.DAYS
	-	-	16	52	61	67	69	-	-	-	-	-	-	-	S/N..DB
	-	-	. 0	.95	.99	.79	.16	-	-	-	-	-	-	-	REL.
12	15.7														
	-	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	-	-	54	34	34	37	38	-	-	-	-	-	-	-	ANGLE
	-	-	75	53	53	56	57	-	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.99	.75	.13	-	-	-	-	-	-	-	F.DAYS
	-	-	13	51	61	66	69	-	-	-	-	-	-	-	S/N..DB
	-	-	. 0	.94	.99	.74	.13	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 SEP LONG TERM SSN = 61. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S. MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	14.5														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	37	-	52	32	32	34	37	37	-	-	-	-	-	-	ANGLE
	56	-	71	52	52	54	56	56	-	-	-	-	-	-	DELAY
	.15	-	.99	.99	.99	.84	.40	.10	-	-	-	-	-	-	F.DAYS
	68	-	23	54	63	67	69	67	-	-	-	-	-	-	S/N..DB
	.15	-	. 2	.97	.98	.83	.40	.10	-	-	-	-	-	-	REL.
16	12.6														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	35	-	48	28	29	32	35	35	-	-	-	-	-	-	ANGLE
	54	-	66	49	50	52	54	54	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.99	.85	.42	.11	-	-	-	-	-	-	F.DAYS
	69	-	40	59	64	68	69	69	-	-	-	-	-	-	S/N..DB
	.50	-	.64	.98	.98	.84	.42	.11	-	-	-	-	-	-	REL.
18	12.4														
	1F	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	34	24	24	25	27	30	34	34	-	-	-	-	-	-	ANGLE
	53	47	47	48	49	51	53	53	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.96	.77	.39	.12	-	-	-	-	-	-	F.DAYS
	71	43	54	61	66	69	71	73	-	-	-	-	-	-	S/N..DB
	.50	.72	.95	.99	.95	.76	.39	.12	-	-	-	-	-	-	REL.
20	11.4														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	32	23	23	24	26	32	32	-	-	-	-	-	-	-	ANGLE
	52	47	47	47	49	52	52	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.91	.58	.21	-	-	-	-	-	-	-	F.DAYS
	71	39	51	60	65	70	74	-	-	-	-	-	-	-	S/N..DB
	.50	.61	.94	.99	.90	.58	.21	-	-	-	-	-	-	-	REL.
22	11.3														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	30	21	21	22	24	30	30	-	-	-	-	-	-	-	ANGLE
	51	46	46	46	47	51	51	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.90	.57	.15	-	-	-	-	-	-	-	F.DAYS
	73	36	48	59	66	72	77	-	-	-	-	-	-	-	S/N..DB
	.50	.52	.88	.98	.89	.57	.15	-	-	-	-	-	-	-	REL.
24	10.4														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	28	19	20	21	24	28	-	-	-	-	-	-	-	-	ANGLE
	50	45	45	46	47	50	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.98	.80	.35	-	-	-	-	-	-	-	-	F.DAYS
	74	35	48	59	68	75	-	-	-	-	-	-	-	-	S/N..DB
	.50	.47	.88	.97	.79	.35	-	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 SEP LONG TERM SSN = 61. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3.MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	7.7														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	40	29	32	38	40	40	-	-	-	-	-	-	-	-	ANGLE
	38	33	34	37	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.92	.63	.28	. 8	-	-	-	-	-	-	-	-	F.DAYS
	71	49	60	69	76	78	-	-	-	-	-	-	-	-	S/N..DB
	.50	.87	.91	.63	.28	. 7	-	-	-	-	-	-	-	-	REL.
4	4.6														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	40	32	40	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	38	34	38	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.92	.40	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	65	56	67	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.88	.39	-	-	-	-	-	-	-	-	-	-	-	REL.
6	8.1														
	1F	2F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	40	53	33	37	40	-	-	-	-	-	-	-	-	-	ANGLE
	38	48	34	36	38	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.89	. 9	-	-	-	-	-	-	-	-	-	F.DAYS
	75	44	65	72	76	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.78	.99	.88	. 9	-	-	-	-	-	-	-	-	-	REL.
8	11.4														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	44	-	39	37	39	44	-	-	-	-	-	-	-	-	ANGLE
	41	-	38	37	38	41	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.97	.62	-	-	-	-	-	-	-	-	F.DAYS
	74	-	54	64	71	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.95	.99	.97	.61	-	-	-	-	-	-	-	-	REL.
10	11.5														
	1F	-	2F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	49	-	62	44	48	49	-	-	-	-	-	-	-	-	ANGLE
	46	-	64	41	44	46	-	-	-	-	-	-	-	-	DELAY
	.11	-	.99	.99	.92	.23	-	-	-	-	-	-	-	-	F.DAYS
	70	-	23	60	67	69	-	-	-	-	-	-	-	-	S/N..DB
	.11	-	. 2	.99	.92	.23	-	-	-	-	-	-	-	-	REL.
12	11.8														
	1F	-	2F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	50	-	64	45	49	50	-	-	-	-	-	-	-	-	ANGLE
	47	-	67	42	45	47	-	-	-	-	-	-	-	-	DELAY
	. 5	-	.99	.99	.91	.21	-	-	-	-	-	-	-	-	F.DAYS
	69	-	19	59	66	68	-	-	-	-	-	-	-	-	S/N..DB
	. 5	-	. 0	.99	.91	.21	-	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 SEP LONG TERM SSN = 61. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L	0DEG
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH	0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	11.1														
	1F	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	49	-	62	43	46	49	49	-	-	-	-	-	-	-	ANGLE
	46	-	64	41	43	46	46	-	-	-	-	-	-	-	DELAY
	.42	-	.99	.99	.90	.44	. 9	-	-	-	-	-	-	-	F.DAYS
	70	-	27	62	68	70	68	-	-	-	-	-	-	-	S/N..DB
	.42	-	. 9	.99	.90	.43	. 9	-	-	-	-	-	-	-	REL.
16	10.9														
	1F	3F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	48	70	40	41	44	48	48	-	-	-	-	-	-	-	ANGLE
	44	85	38	39	41	44	44	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.92	.47	.10	-	-	-	-	-	-	-	F.DAYS
	69	2	59	67	69	69	69	-	-	-	-	-	-	-	S/N..DB
	.50	. 0	.98	.99	.91	.47	.10	-	-	-	-	-	-	-	REL.
18	10.8														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	46	35	36	38	42	46	46	-	-	-	-	-	-	-	ANGLE
	43	36	36	37	40	43	43	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.86	.46	.13	-	-	-	-	-	-	-	F.DAYS
	71	52	62	67	70	70	71	-	-	-	-	-	-	-	S/N..DB
	.50	.91	.99	.98	.85	.45	.13	-	-	-	-	-	-	-	REL.
20	9.8														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	44	34	35	38	44	44	-	-	-	-	-	-	-	-	ANGLE
	42	35	36	37	41	42	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.97	.70	.24	-	-	-	-	-	-	-	-	F.DAYS
	71	49	60	66	70	72	-	-	-	-	-	-	-	-	S/N..DB
	.50	.89	.99	.96	.69	.24	-	-	-	-	-	-	-	-	REL.
22	9.3														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	42	31	33	36	42	42	-	-	-	-	-	-	-	-	ANGLE
	40	34	34	36	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.93	.58	.10	-	-	-	-	-	-	-	-	F.DAYS
	72	46	58	66	71	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	.84	.98	.93	.57	. 9	-	-	-	-	-	-	-	-	REL.
24	8.5														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	40	29	31	35	40	-	-	-	-	-	-	-	-	-	ANGLE
	38	33	34	36	38	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.86	.34	-	-	-	-	-	-	-	-	-	F.DAYS
	72	46	58	67	73	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.83	.98	.85	.34	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 SEP LONG TERM SSN = 61. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	
PWR= 0.5000KW	3 MC/S MAN. NOISE = -148 DBW	REQ.S/N= 36DB	

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	7.1														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	48	38	42	48	48	-	-	-	-	-	-	-	-	-	ANGLE
	33	27	29	33	33	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.89	.53	.20	-	-	-	-	-	-	-	-	-	F.DAYS
	70	53	63	70	76	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.93	.88	.53	.19	-	-	-	-	-	-	-	-	-	REL.
4	4.2														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	48	42	48	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	33	29	33	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.88	.28	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	65	60	68	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.86	.28	-	-	-	-	-	-	-	-	-	-	-	REL.
6	7.3														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	48	42	42	48	-	-	-	-	-	-	-	-	-	-	ANGLE
	33	29	29	33	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.64	-	-	-	-	-	-	-	-	-	-	F.DAYS
	75	59	70	75	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.99	.63	-	-	-	-	-	-	-	-	-	-	REL.
8	10.6														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	52	-	45	46	50	52	-	-	-	-	-	-	-	-	ANGLE
	37	-	31	32	35	37	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.92	.34	-	-	-	-	-	-	-	-	F.DAYS
	73	-	59	68	73	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.99	.91	.34	-	-	-	-	-	-	-	-	REL.
10	9.8														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	57	-	52	53	57	57	-	-	-	-	-	-	-	-	ANGLE
	42	-	36	37	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.83	.12	-	-	-	-	-	-	-	-	F.DAYS
	69	-	52	63	68	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.95	.99	.83	.12	-	-	-	-	-	-	-	-	REL.
12	9.7														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	58	-	54	54	58	58	-	-	-	-	-	-	-	-	ANGLE
	43	-	38	39	43	43	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.81	.10	-	-	-	-	-	-	-	-	F.DAYS
	68	-	50	62	67	68	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.93	.99	.80	.10	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 SEP LONG TERM SSN = 61. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.1														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	57	-	52	53	57	57	-	-	-	-	-	-	-	-	ANGLE
	42	-	36	37	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.80	.27	-	-	-	-	-	-	-	-	F.DAYS
	69	-	54	65	69	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.79	.27	-	-	-	-	-	-	-	-	REL.
16	10.1														
	1F	3F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	56	75	48	51	56	56	-	-	-	-	-	-	-	-	ANGLE
	40	84	33	35	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.81	.29	-	-	-	-	-	-	-	-	F.DAYS
	69	3	62	68	69	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	. 0	.99	.99	.81	.29	-	-	-	-	-	-	-	-	REL.
18	10.1														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	54	44	46	49	54	54	54	-	-	-	-	-	-	-	ANGLE
	38	30	31	33	38	38	38	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.97	.75	.30	. 5	-	-	-	-	-	-	-	F.DAYS
	69	56	64	68	69	69	68	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.99	.97	.75	.30	. 5	-	-	-	-	-	-	-	REL.
20	9.1														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	53	42	44	48	53	53	-	-	-	-	-	-	-	-	ANGLE
	37	30	31	33	37	37	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.93	.53	.12	-	-	-	-	-	-	-	-	F.DAYS
	69	52	62	67	69	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	.93	.99	.93	.53	.12	-	-	-	-	-	-	-	-	REL.
22	8.8														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	51	40	42	47	51	-	-	-	-	-	-	-	-	-	ANGLE
	35	28	29	32	35	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.89	.44	-	-	-	-	-	-	-	-	-	F.DAYS
	70	50	60	68	71	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.99	.89	.43	-	-	-	-	-	-	-	-	-	REL.
24	8.0														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	49	38	41	48	49	-	-	-	-	-	-	-	-	-	ANGLE
	34	27	29	33	34	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.77	.17	-	-	-	-	-	-	-	-	-	F.DAYS
	71	50	61	68	73	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.89	.98	.76	.17	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 SEP LONG TERM SSN = 61. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	7.4														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	43	32	35	43	43	43	-	-	-	-	-	-	-	-	ANGLE
	36	31	32	36	36	36	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.90	.58	.23	. 5	-	-	-	-	-	-	-	-	F.DAYS
	72	51	63	70	77	78	-	-	-	-	-	-	-	-	S/N..DB
	.50	.91	.89	.57	.23	. 5	-	-	-	-	-	-	-	-	REL.
4	4.4														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	43	35	43	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	36	32	36	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.90	.34	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	66	59	68	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.87	.34	-	-	-	-	-	-	-	-	-	-	-	REL.
6	7.3														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	43	38	36	43	-	-	-	-	-	-	-	-	-	-	ANGLE
	36	34	33	36	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.66	-	-	-	-	-	-	-	-	-	-	F.DAYS
	74	56	67	74	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.96	.99	.66	-	-	-	-	-	-	-	-	-	-	REL.
8	10.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	46	-	40	40	43	46	-	-	-	-	-	-	-	-	ANGLE
	39	-	35	35	37	39	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.94	.45	-	-	-	-	-	-	-	-	F.DAYS
	73	-	56	66	72	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.94	.45	-	-	-	-	-	-	-	-	REL.
10	10.7														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	52	-	47	47	52	52	-	-	-	-	-	-	-	-	ANGLE
	44	-	40	39	44	44	-	-	-	-	-	-	-	-	DELAY
	.19	-	.99	.99	.83	.12	-	-	-	-	-	-	-	-	F.DAYS
	69	-	49	61	67	69	-	-	-	-	-	-	-	-	S/N..DB
	.19	-	.91	.99	.83	.12	-	-	-	-	-	-	-	-	REL.
12	11.0														
	1F	-	2F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	53	-	66	48	52	53	-	-	-	-	-	-	-	-	ANGLE
	46	-	66	41	45	46	-	-	-	-	-	-	-	-	DELAY
	.14	-	.99	.99	.87	.15	-	-	-	-	-	-	-	-	F.DAYS
	68	-	20	60	66	68	-	-	-	-	-	-	-	-	S/N..DB
	.14	-	. 0	.99	.86	.15	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 SEP LONG TERM SSN = 61. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.5														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	52	-	47	46	50	52	52	-	-	-	-	-	-	-	ANGLE
	44	-	40	39	42	44	44	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.87	.38	.6	-	-	-	-	-	-	-	F.DAYS
	70	-	51	63	68	70	68	-	-	-	-	-	-	-	S/N..DB
	.50	-	.94	.99	.87	.38	.6	-	-	-	-	-	-	-	REL.
16	10.8														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	50	-	42	44	47	50	50	-	-	-	-	-	-	-	ANGLE
	43	-	36	37	40	43	43	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.91	.44	.9	-	-	-	-	-	-	-	F.DAYS
	70	-	60	69	71	70	68	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.90	.44	.9	-	-	-	-	-	-	-	REL.
18	10.7														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	49	38	39	41	45	49	49	-	-	-	-	-	-	-	ANGLE
	41	34	34	36	38	41	41	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.85	.45	.12	-	-	-	-	-	-	-	F.DAYS
	71	55	64	69	70	70	70	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.99	.98	.85	.44	.12	-	-	-	-	-	-	-	REL.
20	9.7														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	47	37	38	41	47	47	-	-	-	-	-	-	-	-	ANGLE
	40	33	34	36	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.67	.22	-	-	-	-	-	-	-	-	F.DAYS
	71	51	62	68	71	72	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.99	.96	.67	.22	-	-	-	-	-	-	-	-	REL.
22	9.1														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	46	34	36	40	46	46	-	-	-	-	-	-	-	-	ANGLE
	39	32	33	35	39	39	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.92	.52	.6	-	-	-	-	-	-	-	-	F.DAYS
	71	49	60	67	71	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	.89	.99	.91	.52	.6	-	-	-	-	-	-	-	-	REL.
24	8.3														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	43	32	34	40	43	-	-	-	-	-	-	-	-	-	ANGLE
	37	31	32	35	37	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.82	.26	-	-	-	-	-	-	-	-	-	F.DAYS
	72	49	60	69	75	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.89	.98	.82	.26	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 DEC LONG TERM SSN = 56. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	6.3														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	59	50	56	59	-	-	-	-	-	-	-	-	-	-	ANGLE
	31	24	28	31	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.98	.80	.29	-	-	-	-	-	-	-	-	-	-	F.DAYS
	71	58	67	72	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.96	.80	.29	-	-	-	-	-	-	-	-	-	-	REL.
4	4.9														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	58	51	58	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	29	25	29	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.95	.47	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	72	66	73	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.47	-	-	-	-	-	-	-	-	-	-	-	REL.
6	6.1														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	58	51	57	58	-	-	-	-	-	-	-	-	-	-	ANGLE
	30	25	29	30	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.96	. 8	-	-	-	-	-	-	-	-	-	-	F.DAYS
	75	65	73	77	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.95	. 8	-	-	-	-	-	-	-	-	-	-	REL.
8	9.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	62	-	56	59	62	62	-	-	-	-	-	-	-	-	ANGLE
	34	-	28	31	34	34	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.70	. 8	-	-	-	-	-	-	-	-	F.DAYS
	74	-	65	71	73	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.70	. 7	-	-	-	-	-	-	-	-	REL.
10	9.2														
	1F	-	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	66	-	61	63	66	-	-	-	-	-	-	-	-	-	ANGLE
	39	-	33	36	39	-	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.98	.57	-	-	-	-	-	-	-	-	-	F.DAYS
	69	-	58	67	69	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.98	.56	-	-	-	-	-	-	-	-	-	REL.
12	9.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	67	-	62	64	67	67	-	-	-	-	-	-	-	-	ANGLE
	41	-	34	37	41	41	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.68	. 6	-	-	-	-	-	-	-	-	F.DAYS
	68	-	56	65	68	68	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.99	.68	. 6	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 DEC LONG TERM SSN = 56. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0

H-DIPOLE 10H -12L ODEG H-DIPOLE 10H -12L ODEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	9.7														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	66	-	61	63	66	66	-	-	-	-	-	-	-	-	ANGLE
	39	-	32	35	39	39	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.73	.12	-	-	-	-	-	-	-	-	F.DAYS
	71	-	60	68	70	70	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.72	.12	-	-	-	-	-	-	-	-	REL.
16	10.1														
	1F	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	64	72	57	60	64	64	-	-	-	-	-	-	-	-	ANGLE
	36	52	29	32	36	36	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.82	.22	-	-	-	-	-	-	-	-	F.DAYS
	70	33	68	73	72	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	.38	.99	.99	.82	.22	-	-	-	-	-	-	-	-	REL.
18	9.6														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	63	55	57	60	63	63	-	-	-	-	-	-	-	-	ANGLE
	36	27	28	32	36	36	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.94	.63	.20	-	-	-	-	-	-	-	-	F.DAYS
	71	63	71	72	71	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.99	.93	.63	.20	-	-	-	-	-	-	-	-	REL.
20	8.6														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	63	54	57	61	63	63	-	-	-	-	-	-	-	-	ANGLE
	35	27	29	33	35	35	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.86	.40	. 6	-	-	-	-	-	-	-	-	F.DAYS
	71	60	69	71	71	70	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.99	.86	.40	. 6	-	-	-	-	-	-	-	-	REL.
22	8.2														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	60	51	54	60	60	-	-	-	-	-	-	-	-	-	ANGLE
	32	25	27	32	32	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.79	.27	-	-	-	-	-	-	-	-	-	F.DAYS
	72	58	67	70	73	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.98	.78	.27	-	-	-	-	-	-	-	-	-	REL.
24	7.2														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	59	50	54	59	59	-	-	-	-	-	-	-	-	-	ANGLE
	31	24	27	31	31	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.96	.57	. 7	-	-	-	-	-	-	-	-	-	F.DAYS
	71	57	66	71	74	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.95	.56	. 6	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 DEC LONG TERM SSN = 56. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	8.1														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	29	21	22	25	29	-	-	-	-	-	-	-	-	-	ANGLE
	50	46	46	48	50	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.94	.72	.30	-	-	-	-	-	-	-	-	-	F.DAYS
	72	48	59	68	73	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.86	.93	.72	.30	-	-	-	-	-	-	-	-	-	REL.
4	6.4														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	28	20	23	28	-	-	-	-	-	-	-	-	-	-	ANGLE
	49	46	47	49	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.81	.31	-	-	-	-	-	-	-	-	-	-	F.DAYS
	68	48	61	69	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.88	.81	.31	-	-	-	-	-	-	-	-	-	-	REL.
6	9.1														
	1F	2F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	29	42	23	24	29	-	-	-	-	-	-	-	-	-	ANGLE
	50	58	47	47	50	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.55	-	-	-	-	-	-	-	-	-	F.DAYS
	72	40	57	65	72	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.68	.97	.98	.55	-	-	-	-	-	-	-	-	-	REL.
8	12.8														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	33	-	47	27	28	30	33	33	-	-	-	-	-	-	ANGLE
	53	-	64	49	49	50	53	53	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.99	.92	.45	.6	-	-	-	-	-	-	F.DAYS
	73	-	34	58	66	70	73	74	-	-	-	-	-	-	S/N..DB
	.50	-	.39	.98	.99	.91	.44	.6	-	-	-	-	-	-	REL.
10	14.5														
	-	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	-	-	52	32	33	36	37	-	-	-	-	-	-	-	ANGLE
	-	-	72	52	52	55	56	-	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.98	.73	.16	-	-	-	-	-	-	-	F.DAYS
	-	-	23	54	63	68	70	-	-	-	-	-	-	-	S/N..DB
	-	-	.2	.97	.98	.73	.16	-	-	-	-	-	-	-	REL.
12	14.9														
	-	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	-	-	54	33	34	37	38	-	-	-	-	-	-	-	ANGLE
	-	-	74	53	53	56	57	-	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.98	.73	.16	-	-	-	-	-	-	-	F.DAYS
	-	-	20	54	63	68	70	-	-	-	-	-	-	-	S/N..DB
	-	-	.0	.97	.98	.73	.16	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 DEC LONG TERM SSN = 56. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	13.6														
	1F	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	36	-	51	31	31	34	36	-	-	-	-	-	-	-	ANGLE
	55	-	70	51	51	53	55	-	-	-	-	-	-	-	DELAY
	.14	-	.99	.99	.99	.79	.27	-	-	-	-	-	-	-	F.DAYS
	72	-	29	57	65	69	72	-	-	-	-	-	-	-	S/N..DB
	.14	-	.15	.98	.98	.78	.27	-	-	-	-	-	-	-	REL.
16	12.7														
	1F	3F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	34	59	28	26	28	30	34	34	-	-	-	-	-	-	ANGLE
	53	85	50	48	49	51	53	53	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.99	.87	.41	.6	-	-	-	-	-	-	F.DAYS
	75	11	54	62	69	73	74	75	-	-	-	-	-	-	S/N..DB
	.50	.0	.95	.99	.99	.86	.41	.6	-	-	-	-	-	-	REL.
18	11.8														
	1F	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	33	24	24	25	27	32	33	33	-	-	-	-	-	-	ANGLE
	53	47	47	48	49	52	53	53	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.92	.65	.29	.7	-	-	-	-	-	-	F.DAYS
	76	50	61	68	73	75	76	77	-	-	-	-	-	-	S/N..DB
	.50	.92	.99	.99	.91	.65	.28	.7	-	-	-	-	-	-	REL.
20	10.7														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	33	24	24	26	29	33	33	-	-	-	-	-	-	-	ANGLE
	53	47	47	48	50	53	53	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.98	.82	.43	.11	-	-	-	-	-	-	-	F.DAYS
	75	50	62	68	73	75	76	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.99	.97	.82	.43	.11	-	-	-	-	-	-	-	REL.
22	10.3														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	31	22	22	24	27	31	31	-	-	-	-	-	-	-	ANGLE
	51	46	47	47	49	51	51	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.76	.33	.5	-	-	-	-	-	-	-	F.DAYS
	74	49	58	66	73	75	77	-	-	-	-	-	-	-	S/N..DB
	.50	.87	.97	.96	.75	.33	.5	-	-	-	-	-	-	-	REL.
24	9.1														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	29	21	21	23	29	29	-	-	-	-	-	-	-	-	ANGLE
	50	46	46	47	50	50	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.90	.53	.11	-	-	-	-	-	-	-	-	F.DAYS
	73	47	58	67	73	75	-	-	-	-	-	-	-	-	S/N..DB
	.50	.84	.98	.90	.53	.11	-	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 DEC LONG TERM SSN = 56. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	6.7														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	41	31	35	41	-	-	-	-	-	-	-	-	-	-	ANGLE
	39	34	35	39	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.85	.40	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	57	67	74	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.96	.84	.40	-	-	-	-	-	-	-	-	-	-	REL.
4	5.2														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	40	31	40	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	38	34	38	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.96	.57	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	70	58	70	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.95	.56	-	-	-	-	-	-	-	-	-	-	-	REL.
6	7.0														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	41	35	34	41	-	-	-	-	-	-	-	-	-	-	ANGLE
	39	35	35	39	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.50	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	56	67	73	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.99	.50	-	-	-	-	-	-	-	-	-	-	REL.
8	10.6														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	45	-	39	38	42	45	-	-	-	-	-	-	-	-	ANGLE
	42	-	37	37	39	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.93	.37	-	-	-	-	-	-	-	-	F.DAYS
	74	-	57	66	72	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.93	.37	-	-	-	-	-	-	-	-	REL.
10	10.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	49	-	45	44	47	49	-	-	-	-	-	-	-	-	ANGLE
	46	-	42	41	44	46	-	-	-	-	-	-	-	-	DELAY
	.27	-	.99	.99	.87	.23	-	-	-	-	-	-	-	-	F.DAYS
	70	-	51	62	68	70	-	-	-	-	-	-	-	-	S/N..DB
	.27	-	.94	.99	.86	.23	-	-	-	-	-	-	-	-	REL.
12	11.2														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	50	-	46	45	48	50	-	-	-	-	-	-	-	-	ANGLE
	47	-	43	42	45	47	-	-	-	-	-	-	-	-	DELAY
	.17	-	.99	.99	.87	.23	-	-	-	-	-	-	-	-	F.DAYS
	70	-	49	61	68	69	-	-	-	-	-	-	-	-	S/N..DB
	.17	-	.91	.99	.86	.23	-	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 DEC LONG TERM SSN = 56. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	49	-	43	43	46	49	-	-	-	-	-	-	-	-	ANGLE
	45	-	41	40	43	45	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.89	.34	-	-	-	-	-	-	-	-	F.DAYS
	71	-	53	64	70	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.99	.88	.34	-	-	-	-	-	-	-	-	REL.
16	10.9														
	1F	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	46	60	38	39	42	46	46	-	-	-	-	-	-	-	ANGLE
	43	58	37	38	40	43	43	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.93	.47	.5	-	-	-	-	-	-	-	F.DAYS
	74	31	61	69	74	74	74	-	-	-	-	-	-	-	S/N..DB
	.50	.27	.99	.99	.93	.47	.5	-	-	-	-	-	-	-	REL.
18	10.1														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	45	35	36	38	44	45	45	-	-	-	-	-	-	-	ANGLE
	42	35	36	37	41	42	42	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.73	.31	.5	-	-	-	-	-	-	-	F.DAYS
	77	59	69	74	77	77	76	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.99	.96	.73	.30	.5	-	-	-	-	-	-	-	REL.
20	9.0														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	45	35	36	40	45	45	-	-	-	-	-	-	-	-	ANGLE
	42	35	36	38	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.90	.49	.10	-	-	-	-	-	-	-	-	F.DAYS
	76	59	68	73	76	77	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.99	.89	.49	.10	-	-	-	-	-	-	-	-	REL.
22	8.5														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	43	33	34	38	43	-	-	-	-	-	-	-	-	-	ANGLE
	40	34	35	37	40	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.84	.37	-	-	-	-	-	-	-	-	-	F.DAYS
	76	57	67	73	77	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.96	.98	.84	.37	-	-	-	-	-	-	-	-	-	REL.
24	7.6														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	41	31	33	40	41	-	-	-	-	-	-	-	-	-	ANGLE
	39	34	35	38	39	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.97	.66	.13	-	-	-	-	-	-	-	-	-	F.DAYS
	75	57	66	73	77	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.96	.97	.66	.12	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 DEC LONG TERM SSN = 56. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	6.2														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	49	40	45	49	-	-	-	-	-	-	-	-	-	-	ANGLE
	34	28	31	34	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.98	.79	.27	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	60	69	75	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.79	.27	-	-	-	-	-	-	-	-	-	-	REL.
4	4.9														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	48	40	48	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	33	29	33	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.94	.46	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	71	63	71	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.45	-	-	-	-	-	-	-	-	-	-	-	REL.
6	6.3														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	49	41	45	49	-	-	-	-	-	-	-	-	-	-	ANGLE
	34	29	31	34	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.17	-	-	-	-	-	-	-	-	-	-	F.DAYS
	75	61	71	76	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.98	.17	-	-	-	-	-	-	-	-	-	-	REL.
8	9.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	53	-	46	48	54	53	-	-	-	-	-	-	-	-	ANGLE
	38	-	32	33	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.82	.16	-	-	-	-	-	-	-	-	F.DAYS
	73	-	62	70	73	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.81	.15	-	-	-	-	-	-	-	-	REL.
10	9.6														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	57	-	52	53	57	57	-	-	-	-	-	-	-	-	ANGLE
	42	-	36	37	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.70	. 7	-	-	-	-	-	-	-	-	F.DAYS
	70	-	55	65	69	70	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.70	. 7	-	-	-	-	-	-	-	-	REL.
12	9.6														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	58	-	53	54	58	58	-	-	-	-	-	-	-	-	ANGLE
	43	-	37	38	43	43	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.72	. 8	-	-	-	-	-	-	-	-	F.DAYS
	69	-	53	64	68	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.99	.72	. 8	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 DEC LONG TERM SSN = 56. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	9.8														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	57	-	51	53	57	57	-	-	-	-	-	-	-	-	ANGLE
	42	-	35	37	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.77	.16	-	-	-	-	-	-	-	-	F.DAYS
	71	-	57	67	70	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.99	.76	.16	-	-	-	-	-	-	-	-	REL.
16	10.2														
	1F	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	55	66	47	49	54	55	-	-	-	-	-	-	-	-	ANGLE
	39	54	32	34	38	39	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.85	.26	-	-	-	-	-	-	-	-	F.DAYS
	74	32	65	72	74	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	.32	.99	.99	.84	.26	-	-	-	-	-	-	-	-	REL.
18	9.5														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	54	44	45	49	54	54	-	-	-	-	-	-	-	-	ANGLE
	38	30	31	34	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.94	.62	.19	-	-	-	-	-	-	-	-	F.DAYS
	75	64	72	75	75	75	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.99	.93	.62	.19	-	-	-	-	-	-	-	-	REL.
20	8.4														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	54	44	46	51	54	-	-	-	-	-	-	-	-	-	ANGLE
	38	30	32	35	38	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.84	.35	-	-	-	-	-	-	-	-	-	F.DAYS
	75	64	70	74	76	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.99	.83	.35	-	-	-	-	-	-	-	-	-	REL.
22	8.0														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	51	41	44	50	51	-	-	-	-	-	-	-	-	-	ANGLE
	36	29	30	35	36	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.76	.22	-	-	-	-	-	-	-	-	-	F.DAYS
	75	60	68	73	77	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.98	.75	.22	-	-	-	-	-	-	-	-	-	REL.
24	7.1														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	50	40	43	50	-	-	-	-	-	-	-	-	-	-	ANGLE
	34	28	30	34	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.95	.52	-	-	-	-	-	-	-	-	-	-	F.DAYS
	74	60	68	74	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.94	.52	-	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 DEC LONG TERM SSN = 56. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	6.4														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	43	34	38	43	-	-	-	-	-	-	-	-	-	-	ANGLE
	37	32	34	37	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.82	.32	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	59	68	75	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.81	.32	-	-	-	-	-	-	-	-	-	-	REL.
4	4.9														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	43	35	43	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	37	32	37	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.95	.48	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	71	60	71	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.48	-	-	-	-	-	-	-	-	-	-	-	REL.
6	6.4														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	43	36	38	43	-	-	-	-	-	-	-	-	-	-	ANGLE
	37	33	34	37	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.21	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	58	69	75	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.98	.21	-	-	-	-	-	-	-	-	-	-	REL.
8	10.1														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	47	-	40	41	45	47	-	-	-	-	-	-	-	-	ANGLE
	40	-	35	35	38	40	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.86	.21	-	-	-	-	-	-	-	-	F.DAYS
	73	-	59	68	73	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.99	.86	.21	-	-	-	-	-	-	-	-	REL.
10	10.1														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	51	-	46	46	50	51	-	-	-	-	-	-	-	-	ANGLE
	44	-	39	39	42	44	-	-	-	-	-	-	-	-	DELAY
	.49	-	.99	.99	.83	.17	-	-	-	-	-	-	-	-	F.DAYS
	70	-	53	64	69	70	-	-	-	-	-	-	-	-	S/N..DB
	.48	-	.96	.99	.82	.17	-	-	-	-	-	-	-	-	REL.
12	10.4														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	52	-	48	48	51	52	-	-	-	-	-	-	-	-	ANGLE
	45	-	41	40	44	45	-	-	-	-	-	-	-	-	DELAY
	.30	-	.99	.99	.80	.14	-	-	-	-	-	-	-	-	F.DAYS
	70	-	51	62	68	69	-	-	-	-	-	-	-	-	S/N..DB
	.29	-	.94	.99	.79	.14	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 DEC LONG TERM SSN = 56. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.4														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	51	-	45	46	49	51	-	-	-	-	-	-	-	-	ANGLE
	44	-	38	39	42	44	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.87	.30	-	-	-	-	-	-	-	-	F.DAYS
	71	-	54	65	70	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.86	.30	-	-	-	-	-	-	-	-	REL.
16	10.8														
	1F	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	49	62	40	42	46	49	-	-	-	-	-	-	-	-	ANGLE
	41	57	35	36	39	41	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.92	.42	-	-	-	-	-	-	-	-	F.DAYS
	74	30	62	70	74	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	.22	.99	.99	.91	.42	-	-	-	-	-	-	-	-	REL.
18	9.9														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	48	37	38	41	47	48	-	-	-	-	-	-	-	-	ANGLE
	40	33	34	35	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.70	.27	-	-	-	-	-	-	-	-	F.DAYS
	77	60	70	75	77	77	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.99	.95	.70	.27	-	-	-	-	-	-	-	-	REL.
20	8.7														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	48	37	39	43	48	48	-	-	-	-	-	-	-	-	ANGLE
	40	33	34	37	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.88	.43	.7	-	-	-	-	-	-	-	-	F.DAYS
	76	61	70	74	77	77	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.99	.87	.43	.7	-	-	-	-	-	-	-	-	REL.
22	8.3														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	46	35	37	42	46	-	-	-	-	-	-	-	-	-	ANGLE
	39	32	33	36	39	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.81	.31	-	-	-	-	-	-	-	-	-	F.DAYS
	76	59	68	74	77	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.98	.81	.31	-	-	-	-	-	-	-	-	-	REL.
24	7.4														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	44	34	36	44	44	-	-	-	-	-	-	-	-	-	ANGLE
	37	32	33	37	37	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.96	.61	.9	-	-	-	-	-	-	-	-	-	F.DAYS
	75	59	68	74	77	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.96	.61	.9	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 MAR LONG TERM SSN = 52. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	7.6														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	57	47	51	57	57	57	-	-	-	-	-	-	-	-	ANGLE
	29	23	25	29	29	29	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.92	.63	.28	.7	-	-	-	-	-	-	-	-	F.DAYS
	69	54	62	68	72	74	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.91	.63	.28	.7	-	-	-	-	-	-	-	-	REL.
4	4.7														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	57	50	57	57	-	-	-	-	-	-	-	-	-	-	ANGLE
	29	24	29	29	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.93	.43	.6	-	-	-	-	-	-	-	-	-	-	F.DAYS
	66	60	66	70	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.43	.6	-	-	-	-	-	-	-	-	-	-	REL.
6	5.9														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	58	52	57	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	30	25	28	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.92	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	72	64	70	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.92	-	-	-	-	-	-	-	-	-	-	-	REL.
8	9.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	62	-	56	58	62	62	-	-	-	-	-	-	-	-	ANGLE
	34	-	28	29	34	34	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.80	.10	-	-	-	-	-	-	-	-	F.DAYS
	73	-	63	71	73	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.80	.10	-	-	-	-	-	-	-	-	REL.
10	9.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	65	-	60	62	65	65	-	-	-	-	-	-	-	-	ANGLE
	38	-	32	34	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.72	.6	-	-	-	-	-	-	-	-	F.DAYS
	69	-	56	66	69	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.99	.71	.6	-	-	-	-	-	-	-	-	REL.
12	9.8														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	66	-	61	63	66	66	-	-	-	-	-	-	-	-	ANGLE
	40	-	33	35	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.82	.11	-	-	-	-	-	-	-	-	F.DAYS
	68	-	54	64	68	68	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.82	.11	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

.500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 MAR LONG TERM SSN = 52. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.4														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	66	-	60	62	65	66	66	-	-	-	-	-	-	-	ANGLE
	39	-	32	34	39	39	39	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.85	.35	.5	-	-	-	-	-	-	-	F.DAYS
	70	-	58	67	70	69	63	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.85	.34	.5	-	-	-	-	-	-	-	REL.
16	10.7														
	1F	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	64	73	57	60	64	64	64	-	-	-	-	-	-	-	ANGLE
	37	54	29	31	37	37	37	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.89	.42	.8	-	-	-	-	-	-	-	F.DAYS
	69	30	66	71	70	68	64	-	-	-	-	-	-	-	S/N..DB
	.50	.28	.99	.99	.89	.42	.8	-	-	-	-	-	-	-	REL.
18	10.2														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	63	54	56	59	63	63	63	-	-	-	-	-	-	-	ANGLE
	35	26	28	31	35	35	35	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.98	.78	.34	.7	-	-	-	-	-	-	-	F.DAYS
	69	58	66	69	69	68	64	-	-	-	-	-	-	-	S/N..DB
	.50	.95	.99	.97	.78	.34	.7	-	-	-	-	-	-	-	REL.
20	9.0														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	62	53	55	60	62	62	-	-	-	-	-	-	-	-	ANGLE
	34	26	28	32	34	34	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.92	.51	.11	-	-	-	-	-	-	-	-	F.DAYS
	67	53	62	66	67	66	-	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.99	.92	.50	.11	-	-	-	-	-	-	-	-	REL.
22	8.8														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	60	49	53	59	60	-	-	-	-	-	-	-	-	-	ANGLE
	32	24	26	31	32	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.89	.42	-	-	-	-	-	-	-	-	-	F.DAYS
	66	50	59	64	67	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.98	.88	.42	-	-	-	-	-	-	-	-	-	REL.
24	8.3														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	58	47	51	58	58	-	-	-	-	-	-	-	-	-	ANGLE
	30	23	25	29	30	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.84	.29	-	-	-	-	-	-	-	-	-	F.DAYS
	69	51	61	66	70	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.99	.83	.28	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 MAR LONG TERM SSN = 52. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	10.1														
	1F	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	27	19	19	20	24	27	27	27	-	-	-	-	-	-	ANGLE
	49	45	45	46	47	49	49	49	-	-	-	-	-	-	DELAY
	.50	.99	.98	.89	.66	.38	.17	. 5	-	-	-	-	-	-	F.DAYS
	72	40	50	60	68	75	77	78	-	-	-	-	-	-	S/N..DB
	.50	.63	.89	.88	.66	.38	.17	. 5	-	-	-	-	-	-	REL.
4	6.1														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	26	19	21	27	27	-	-	-	-	-	-	-	-	-	ANGLE
	48	45	46	49	49	-	-	-	-	-	-	-	-	-	DELAY
	.50	.98	.77	.32	. 6	-	-	-	-	-	-	-	-	-	F.DAYS
	63	46	57	66	71	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.77	.74	.32	. 6	-	-	-	-	-	-	-	-	-	REL.
6	9.4														
	1F	2F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	28	44	24	23	28	-	-	-	-	-	-	-	-	-	ANGLE
	50	60	47	47	49	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.65	-	-	-	-	-	-	-	-	-	F.DAYS
	71	37	56	64	71	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.57	.97	.99	.65	-	-	-	-	-	-	-	-	-	REL.
8	13.5														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	33	-	47	27	27	28	33	33	-	-	-	-	-	-	ANGLE
	52	-	63	49	49	50	52	52	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.99	.95	.63	.10	-	-	-	-	-	-	F.DAYS
	73	-	30	56	64	69	73	74	-	-	-	-	-	-	S/N..DB
	.50	-	.19	.97	.99	.95	.63	.10	-	-	-	-	-	-	REL.
10	15.1														
	-	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	-	-	52	32	32	36	36	-	-	-	-	-	-	-	ANGLE
	-	-	71	52	52	55	55	-	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.99	.78	.15	-	-	-	-	-	-	-	F.DAYS
	-	-	18	52	61	67	70	-	-	-	-	-	-	-	S/N..DB
	-	-	. 0	.95	.99	.77	.15	-	-	-	-	-	-	-	REL.
12	15.5														
	-	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	-	-	53	33	32	35	37	-	-	-	-	-	-	-	ANGLE
	-	-	73	52	52	55	56	-	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.99	.84	.21	-	-	-	-	-	-	-	F.DAYS
	-	-	15	51	61	67	69	-	-	-	-	-	-	-	S/N..DB
	-	-	. 0	.94	.99	.83	.21	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 MAR LONG TERM SSN = 52. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8

H-DIPOLE 10H -12L ODEG H-DIPOLE 10H -12L ODEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	14.3														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	36	-	51	31	31	33	36	36	-	-	-	-	-	-	ANGLE
	55	-	69	51	51	53	55	55	-	-	-	-	-	-	DELAY
	.25	-	.99	.99	.99	.88	.48	.15	-	-	-	-	-	-	F.DAYS
	71	-	24	55	63	68	71	72	-	-	-	-	-	-	S/N..DB
	.25	-	. 4	.97	.99	.88	.48	.15	-	-	-	-	-	-	REL.
16	13.3														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	35	-	47	27	28	30	35	35	-	-	-	-	-	-	ANGLE
	54	-	64	49	49	51	54	54	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.99	.92	.58	.21	-	-	-	-	-	-	F.DAYS
	71	-	42	61	66	69	71	72	-	-	-	-	-	-	S/N..DB
	.50	-	.72	.99	.99	.91	.57	.21	-	-	-	-	-	-	REL.
18	12.8														
	1F	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	33	24	24	25	26	29	33	33	-	-	-	-	-	-	ANGLE
	53	47	47	48	48	50	53	53	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.97	.81	.46	.16	-	-	-	-	-	-	F.DAYS
	71	45	55	62	66	70	72	74	-	-	-	-	-	-	S/N..DB
	.50	.77	.95	.99	.96	.81	.46	.16	-	-	-	-	-	-	REL.
20	11.2														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	33	23	23	24	27	33	33	-	-	-	-	-	-	-	ANGLE
	52	47	47	47	49	52	52	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.89	.54	.18	-	-	-	-	-	-	-	F.DAYS
	70	40	52	59	66	69	72	-	-	-	-	-	-	-	S/N..DB
	.50	.65	.94	.99	.89	.53	.18	-	-	-	-	-	-	-	REL.
22	11.4														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	30	20	21	22	24	30	30	-	-	-	-	-	-	-	ANGLE
	50	46	46	46	47	50	50	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.90	.58	.16	-	-	-	-	-	-	-	F.DAYS
	71	36	48	57	65	70	75	-	-	-	-	-	-	-	S/N..DB
	.50	.50	.88	.98	.89	.58	.15	-	-	-	-	-	-	-	REL.
24	11.1														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	28	19	19	20	22	28	28	-	-	-	-	-	-	-	ANGLE
	49	45	45	46	47	49	49	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.88	.53	.11	-	-	-	-	-	-	-	F.DAYS
	73	36	48	57	66	73	77	-	-	-	-	-	-	-	S/N..DB
	.50	.51	.88	.97	.87	.52	.11	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 MAR LONG TERM SSN = 52. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	8.4														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	39	28	30	34	39	39	-	-	-	-	-	-	-	-	ANGLE
	37	33	33	35	37	37	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.95	.74	.40	.15	-	-	-	-	-	-	-	-	F.DAYS
	71	48	59	67	73	78	-	-	-	-	-	-	-	-	S/N..DB
	.50	.86	.93	.74	.40	.15	-	-	-	-	-	-	-	-	REL.
4	5.3														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	38	29	38	38	-	-	-	-	-	-	-	-	-	-	ANGLE
	37	33	37	37	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.96	.60	.15	-	-	-	-	-	-	-	-	-	-	F.DAYS
	67	56	65	70	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.91	.59	.15	-	-	-	-	-	-	-	-	-	-	REL.
6	7.2														
	1F	2F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	40	53	34	40	-	-	-	-	-	-	-	-	-	-	ANGLE
	38	48	35	38	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.58	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	45	66	73	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.80	.99	.58	-	-	-	-	-	-	-	-	-	-	REL.
8	11.3														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	44	-	39	38	40	44	-	-	-	-	-	-	-	-	ANGLE
	41	-	38	37	38	41	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.97	.61	-	-	-	-	-	-	-	-	F.DAYS
	74	-	55	65	71	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.99	.96	.60	-	-	-	-	-	-	-	-	REL.
10	11.3														
	1F	-	2F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	48	-	62	43	47	48	-	-	-	-	-	-	-	-	ANGLE
	45	-	62	40	43	45	-	-	-	-	-	-	-	-	DELAY
	.12	-	.99	.99	.90	.20	-	-	-	-	-	-	-	-	F.DAYS
	71	-	25	60	67	70	-	-	-	-	-	-	-	-	S/N..DB
	.12	-	. 5	.99	.90	.20	-	-	-	-	-	-	-	-	REL.
12	11.7														
	1F	-	2F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	49	-	63	44	47	49	-	-	-	-	-	-	-	-	ANGLE
	46	-	64	41	44	46	-	-	-	-	-	-	-	-	DELAY
	.13	-	.99	.99	.95	.30	-	-	-	-	-	-	-	-	F.DAYS
	.69	-	21	59	67	69	-	-	-	-	-	-	-	-	S/N..DB
	.13	-	. 1	.99	.94	.30	-	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 MAR LONG TERM SSN = 52. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	11.0														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	49	-	44	42	45	49	49	-	-	-	-	-	-	-	ANGLE
	45	-	41	40	42	45	45	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.93	.51	.13	-	-	-	-	-	-	-	F.DAYS
	70	-	51	62	69	70	70	-	-	-	-	-	-	-	S/N..DB
	.50	-	.94	.99	.92	.51	.13	-	-	-	-	-	-	-	REL.
16	11.3														
	1F	3F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	47	69	38	39	42	47	47	-	-	-	-	-	-	-	ANGLE
	43	82	37	38	40	43	43	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.95	.57	.16	-	-	-	-	-	-	-	F.DAYS
	71	6	59	68	72	72	70	-	-	-	-	-	-	-	S/N..DB
	.50	. 0	.98	.99	.94	.57	.16	-	-	-	-	-	-	-	REL.
18	11.0														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	46	34	35	38	42	46	46	-	-	-	-	-	-	-	ANGLE
	42	35	36	37	39	42	42	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.88	.50	.15	-	-	-	-	-	-	-	F.DAYS
	71	55	64	68	71	71	71	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.98	.99	.87	.49	.15	-	-	-	-	-	-	-	REL.
20	9.6														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	45	33	35	38	45	45	-	-	-	-	-	-	-	-	ANGLE
	42	35	35	37	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.66	.22	-	-	-	-	-	-	-	-	F.DAYS
	70	50	60	66	69	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.99	.95	.66	.21	-	-	-	-	-	-	-	-	REL.
22	9.4														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	42	31	32	35	42	42	-	-	-	-	-	-	-	-	ANGLE
	40	34	34	36	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.94	.61	.12	-	-	-	-	-	-	-	-	F.DAYS
	70	46	57	64	69	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	.84	.97	.94	.61	.12	-	-	-	-	-	-	-	-	REL.
24	9.2														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	40	28	30	33	40	40	-	-	-	-	-	-	-	-	ANGLE
	38	33	33	35	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.93	.56	. 9	-	-	-	-	-	-	-	-	F.DAYS
	72	46	57	66	71	76	-	-	-	-	-	-	-	-	S/N..DB
	.50	.81	.97	.92	.56	. 9	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 MAR LONG TERM SSN = 52. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	7.7														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	47	36	39	47	47	47	-	-	-	-	-	-	-	-	ANGLE
	32	27	28	32	32	32	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.92	.65	.30	. 8	-	-	-	-	-	-	-	-	F.DAYS
	71	53	62	69	74	78	-	-	-	-	-	-	-	-	S/N..DB
	.50	.93	.92	.64	.29	. 8	-	-	-	-	-	-	-	-	REL.
4	4.9														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	47	39	47	47	-	-	-	-	-	-	-	-	-	-	ANGLE
	32	28	32	32	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.94	.48	. 8	-	-	-	-	-	-	-	-	-	-	F.DAYS
	67	60	67	72	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.47	. 8	-	-	-	-	-	-	-	-	-	-	REL.
6	6.4														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	48	42	44	48	-	-	-	-	-	-	-	-	-	-	ANGLE
	33	29	31	33	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.12	-	-	-	-	-	-	-	-	-	-	F.DAYS
	74	59	70	74	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.97	.12	-	-	-	-	-	-	-	-	-	-	REL.
8	10.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	53	-	46	47	51	53	-	-	-	-	-	-	-	-	ANGLE
	37	-	32	32	35	37	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.90	.28	-	-	-	-	-	-	-	-	F.DAYS
	74	-	60	69	73	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.99	.90	.28	-	-	-	-	-	-	-	-	REL.
10	9.6														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	56	-	51	52	56	56	-	-	-	-	-	-	-	-	ANGLE
	41	-	35	36	41	41	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.78	. 8	-	-	-	-	-	-	-	-	F.DAYS
	70	-	53	64	69	70	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.99	.78	. 8	-	-	-	-	-	-	-	-	REL.
12	9.8														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	58	-	53	53	58	58	-	-	-	-	-	-	-	-	ANGLE
	42	-	37	37	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.84	.12	-	-	-	-	-	-	-	-	F.DAYS
	68	-	51	63	67	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.94	.99	.84	.12	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 MAR LONG TERM SSN = 52. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.4														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	57	-	51	52	56	57	57	-	-	-	-	-	-	-	ANGLE
	41	-	35	36	40	41	41	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.86	.35	. 5	-	-	-	-	-	-	-	F.DAYS
	71	-	55	65	70	70	69	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.85	.35	. 5	-	-	-	-	-	-	-	REL.
16	10.7														
	1F	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	55	67	47	49	54	55	55	-	-	-	-	-	-	-	ANGLE
	39	56	32	34	38	39	39	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.90	.42	. 8	-	-	-	-	-	-	-	F.DAYS
	71	28	64	71	73	71	68	-	-	-	-	-	-	-	S/N..DB
	.50	.15	.99	.99	.89	.42	. 8	-	-	-	-	-	-	-	REL.
18	10.3														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	54	43	45	48	54	54	54	-	-	-	-	-	-	-	ANGLE
	38	30	31	33	38	38	38	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.98	.80	.36	. 7	-	-	-	-	-	-	-	F.DAYS
	70	58	66	69	70	70	69	-	-	-	-	-	-	-	S/N..DB
	.50	.95	.99	.97	.79	.36	. 7	-	-	-	-	-	-	-	REL.
20	9.0														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	53	42	45	50	53	53	-	-	-	-	-	-	-	-	ANGLE
	37	30	31	34	37	37	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.92	.51	.11	-	-	-	-	-	-	-	-	F.DAYS
	69	53	62	67	69	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	.93	.99	.92	.50	.11	-	-	-	-	-	-	-	-	REL.
22	8.8														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	51	39	42	47	51	-	-	-	-	-	-	-	-	-	ANGLE
	35	28	29	32	35	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.89	.44	-	-	-	-	-	-	-	-	-	F.DAYS
	69	50	60	66	69	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.98	.89	.43	-	-	-	-	-	-	-	-	-	REL.
24	8.5														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	48	37	39	45	48	-	-	-	-	-	-	-	-	-	ANGLE
	33	27	28	31	33	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.86	.33	-	-	-	-	-	-	-	-	-	F.DAYS
	71	50	61	68	71	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.99	.85	.33	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 MAR LONG TERM SSN = 52. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	8.2														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	41	30	32	38	41	41	-	-	-	-	-	-	-	-	ANGLE
	36	30	31	34	36	36	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.94	.72	.37	.13	-	-	-	-	-	-	-	-	F.DAYS
	72	50	61	68	74	79	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.93	.71	.37	.13	-	-	-	-	-	-	-	-	REL.
4	5.2														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	41	32	41	41	-	-	-	-	-	-	-	-	-	-	ANGLE
	35	31	35	35	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.96	.57	.14	-	-	-	-	-	-	-	-	-	-	F.DAYS
	68	58	67	71	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.57	.13	-	-	-	-	-	-	-	-	-	-	REL.
6	6.6														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	43	37	37	43	-	-	-	-	-	-	-	-	-	-	ANGLE
	36	33	33	36	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.25	-	-	-	-	-	-	-	-	-	-	F.DAYS
	73	57	68	74	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.98	.25	-	-	-	-	-	-	-	-	-	-	REL.
8	11.0														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	47	-	40	40	43	47	-	-	-	-	-	-	-	-	ANGLE
	40	-	35	35	37	40	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.95	.50	-	-	-	-	-	-	-	-	F.DAYS
	73	-	57	67	72	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.99	.95	.49	-	-	-	-	-	-	-	-	REL.
10	10.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	51	-	46	45	50	51	-	-	-	-	-	-	-	-	ANGLE
	43	-	39	38	42	43	-	-	-	-	-	-	-	-	DELAY
	.34	-	.99	.99	.89	.18	-	-	-	-	-	-	-	-	F.DAYS
	70	-	50	62	68	70	-	-	-	-	-	-	-	-	S/N..DB
	.34	-	.93	.99	.89	.18	-	-	-	-	-	-	-	-	REL.
12	10.9														
	1F	-	2F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	52	-	65	47	50	52	-	-	-	-	-	-	-	-	ANGLE
	44	-	63	39	43	44	-	-	-	-	-	-	-	-	DELAY
	.29	-	.99	.99	.93	.24	-	-	-	-	-	-	-	-	F.DAYS
	69	-	22	61	67	69	-	-	-	-	-	-	-	-	S/N..DB
	.28	-	. 2	.99	.92	.24	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 MAR LONG TERM SSN = 52. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	
PWR= 0.5000KW	3 MC/S MAN. NOISE = -148 DBW	REQ.S/N= 36DB	

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.8														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	51	-	46	45	48	51	51	-	-	-	-	-	-	-	ANGLE
	44	-	39	38	41	44	44	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.91	.45	. 9	-	-	-	-	-	-	-	F.DAYS
	70	-	52	63	69	70	70	-	-	-	-	-	-	-	S/N..DB
	.50	-	.95	.99	.90	.44	. 9	-	-	-	-	-	-	-	REL.
16	11.1														
	1F	3F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	49	71	41	42	45	49	49	-	-	-	-	-	-	-	ANGLE
	42	81	35	36	38	42	42	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.93	.52	.13	-	-	-	-	-	-	-	F.DAYS
	73	4	60	69	73	73	71	-	-	-	-	-	-	-	S/N..DB
	.50	. 0	.99	.99	.93	.52	.13	-	-	-	-	-	-	-	REL.
18	10.9														
	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	48	37	38	40	45	48	48	-	-	-	-	-	-	-	ANGLE
	41	33	34	35	38	41	41	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.99	.86	.47	.14	-	-	-	-	-	-	-	F.DAYS
	72	58	65	70	71	72	70	-	-	-	-	-	-	-	S/N..DB
	.50	.94	.99	.98	.86	.47	.14	-	-	-	-	-	-	-	REL.
20	9.6														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	48	36	38	41	48	48	-	-	-	-	-	-	-	-	ANGLE
	40	33	34	36	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.65	.20	-	-	-	-	-	-	-	-	F.DAYS
	70	52	62	67	70	72	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.99	.95	.64	.20	-	-	-	-	-	-	-	-	REL.
22	9.3														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	45	33	35	39	45	45	-	-	-	-	-	-	-	-	ANGLE
	38	32	32	34	38	38	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.94	.58	.10	-	-	-	-	-	-	-	-	F.DAYS
	70	48	59	66	70	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	.87	.98	.93	.58	.10	-	-	-	-	-	-	-	-	REL.
24	9.0														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	42	31	33	36	42	42	-	-	-	-	-	-	-	-	ANGLE
	36	31	31	33	36	36	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.92	.51	. 6	-	-	-	-	-	-	-	-	F.DAYS
	72	48	59	67	72	76	-	-	-	-	-	-	-	-	S/N..DB
	.50	.87	.98	.91	.51	. 6	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 JUN LONG TERM SSN = 48. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	4.9														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	59	52	59	59	-	-	-	-	-	-	-	-	-	-	ANGLE
	30	25	30	30	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.98	.48	. 7	-	-	-	-	-	-	-	-	-	-	F.DAYS
	61	54	62	68	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.93	.48	. 7	-	-	-	-	-	-	-	-	-	-	REL.
4	3.2														
	1F	1F	-	-	-	-	-	-	-	-	-	-	-	-	MODE
	57	57	-	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	29	29	-	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.62	-	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	63	62	-	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.62	-	-	-	-	-	-	-	-	-	-	-	-	REL.
6	6.4														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	58	52	55	58	-	-	-	-	-	-	-	-	-	-	ANGLE
	30	25	27	30	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.92	.16	-	-	-	-	-	-	-	-	-	-	F.DAYS
	75	62	72	76	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.99	.91	.16	-	-	-	-	-	-	-	-	-	-	REL.
8	9.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	62	-	56	58	62	62	-	-	-	-	-	-	-	-	ANGLE
	33	-	28	30	33	33	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.96	.64	. 5	-	-	-	-	-	-	-	-	F.DAYS
	73	-	63	71	73	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.95	.64	. 5	-	-	-	-	-	-	-	-	REL.
10	9.9														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	65	-	60	62	65	65	65	-	-	-	-	-	-	-	ANGLE
	38	-	32	33	38	38	38	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.75	.32	. 9	-	-	-	-	-	-	-	F.DAYS
	70	-	57	66	69	69	66	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.98	.75	.31	. 9	-	-	-	-	-	-	-	REL.
12	9.3														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	66	-	62	64	66	66	-	-	-	-	-	-	-	-	ANGLE
	40	-	34	36	40	40	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.97	.60	.22	-	-	-	-	-	-	-	-	F.DAYS
	68	-	55	65	68	68	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.96	.59	.22	-	-	-	-	-	-	-	-	REL.

LAGOS TO ENUGU

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

1 JUN LONG TERM SSN = 48. 27.003

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	6.33N - 7.48E	91.5 271.9	276.0
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	9.3														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	66	-	61	63	66	66	-	-	-	-	-	-	-	-	ANGLE
	39	-	33	35	39	39	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.96	.58	.19	-	-	-	-	-	-	-	-	F.DAYS
	69	-	58	67	70	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.99	.95	.58	.19	-	-	-	-	-	-	-	-	REL.
16	9.7														
	1F	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	63	73	58	60	63	63	63	-	-	-	-	-	-	-	ANGLE
	36	55	29	32	36	36	36	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.98	.70	.26	. 5	-	-	-	-	-	-	-	F.DAYS
	74	28	66	72	73	73	69	-	-	-	-	-	-	-	S/N..DB
	.50	.15	.99	.97	.69	.26	. 5	-	-	-	-	-	-	-	REL.
18	9.4														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	61	51	53	57	61	61	-	-	-	-	-	-	-	-	ANGLE
	32	25	26	29	32	32	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.97	.86	.57	.14	-	-	-	-	-	-	-	-	F.DAYS
	73	65	71	74	73	72	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.97	.85	.57	.14	-	-	-	-	-	-	-	-	REL.
20	7.8														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	59	50	53	59	59	-	-	-	-	-	-	-	-	-	ANGLE
	31	24	26	31	31	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.93	.67	.17	-	-	-	-	-	-	-	-	-	F.DAYS
	72	60	67	70	72	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.98	.93	.67	.17	-	-	-	-	-	-	-	-	-	REL.
22	6.8														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	60	51	56	60	-	-	-	-	-	-	-	-	-	-	ANGLE
	32	25	28	32	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.91	.44	-	-	-	-	-	-	-	-	-	-	F.DAYS
	67	56	64	68	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.97	.90	.43	-	-	-	-	-	-	-	-	-	-	REL.
24	6.1														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	60	52	58	60	-	-	-	-	-	-	-	-	-	-	ANGLE
	31	25	30	31	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.81	.17	-	-	-	-	-	-	-	-	-	-	F.DAYS
	65	54	61	67	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.95	.80	.16	-	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 JUN LONG TERM SSN = 48. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	6.4														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	29	22	24	29	29	-	-	-	-	-	-	-	-	-	ANGLE
	50	46	47	50	50	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.87	.38	. 8	-	-	-	-	-	-	-	-	-	F.DAYS
	54	32	45	57	64	-	-	-	-	-	-	-	-	-	S/N..DB
	.48	.30	.71	.37	. 8	-	-	-	-	-	-	-	-	-	REL.
4	4.5														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	28	21	28	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	49	46	49	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.96	.36	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	51	38	53	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.47	.55	.34	-	-	-	-	-	-	-	-	-	-	-	REL.
6	9.5														
	1F	3F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	29	55	25	24	27	-	-	-	-	-	-	-	-	-	ANGLE
	50	75	48	47	49	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.95	.64	-	-	-	-	-	-	-	-	-	F.DAYS
	72	18	53	61	69	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	. 3	.93	.95	.63	-	-	-	-	-	-	-	-	-	REL.
8	13.3														
	1F	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	33	-	48	29	28	30	33	-	-	-	-	-	-	-	ANGLE
	53	-	66	50	50	50	53	-	-	-	-	-	-	-	DELAY
	.34	-	.99	.99	.97	.82	.44	-	-	-	-	-	-	-	F.DAYS
	73	-	30	56	64	69	72	-	-	-	-	-	-	-	S/N..DB
	.34	-	.19	.97	.97	.81	.44	-	-	-	-	-	-	-	REL.
10	15.2														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	37	-	54	33	33	36	37	37	-	-	-	-	-	-	ANGLE
	56	-	74	53	53	55	56	56	-	-	-	-	-	-	DELAY
	.12	-	.99	.99	.97	.72	.35	.13	-	-	-	-	-	-	F.DAYS
	71	-	18	53	62	67	70	71	-	-	-	-	-	-	S/N..DB
	.12	-	. 0	.96	.96	.71	.35	.13	-	-	-	-	-	-	REL.
12	15.4														
	-	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	-	-	55	35	35	39	39	39	-	-	-	-	-	-	ANGLE
	-	-	77	54	54	57	57	57	-	-	-	-	-	-	DELAY
	-	-	.99	.99	.92	.51	.22	. 6	-	-	-	-	-	-	F.DAYS
	-	-	16	52	62	67	69	70	-	-	-	-	-	-	S/N..DB
	-	-	. 0	.95	.91	.51	.22	. 6	-	-	-	-	-	-	REL.

LAGOS TO MAIDUGARI

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

2 JUN LONG TERM SSN = 48. 24.008

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	11.88N - 13.26E	60.0 241.5	765.8
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	14.4														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	37	-	53	33	33	37	37	37	-	-	-	-	-	-	ANGLE
	56	-	73	52	53	56	56	56	-	-	-	-	-	-	DELAY
	.10	-	.99	.99	.93	.59	.25	. 6	-	-	-	-	-	-	F.DAYS
	72	-	24	55	64	68	71	71	-	-	-	-	-	-	S/N..DB
	.10	-	. 4	.97	.93	.59	.25	. 6	-	-	-	-	-	-	REL.
16	12.2														
	1F	-	2F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	34	-	48	28	29	32	34	34	-	-	-	-	-	-	ANGLE
	53	-	65	49	50	52	53	53	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.97	.76	.38	.14	-	-	-	-	-	-	F.DAYS
	70	-	36	57	64	68	71	72	-	-	-	-	-	-	S/N..DB
	.50	-	.52	.96	.96	.75	.37	.14	-	-	-	-	-	-	REL.
18	12.2														
	1F	1F	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	MODE
	31	25	23	23	25	28	31	31	-	-	-	-	-	-	ANGLE
	51	48	47	47	48	49	51	51	-	-	-	-	-	-	DELAY
	.50	.99	.99	.96	.86	.66	.33	. 7	-	-	-	-	-	-	F.DAYS
	71	40	50	58	64	68	72	75	-	-	-	-	-	-	S/N..DB
	.50	.63	.88	.94	.86	.65	.33	. 7	-	-	-	-	-	-	REL.
20	10.3														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	31	22	22	24	27	31	-	-	-	-	-	-	-	-	ANGLE
	51	46	46	47	49	51	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.91	.69	.32	-	-	-	-	-	-	-	-	F.DAYS
	67	33	46	56	64	68	-	-	-	-	-	-	-	-	S/N..DB
	.50	.35	.86	.89	.69	.32	-	-	-	-	-	-	-	-	REL.
22	8.8														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	31	23	23	26	31	31	-	-	-	-	-	-	-	-	ANGLE
	51	47	47	48	51	51	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.85	.46	. 6	-	-	-	-	-	-	-	-	F.DAYS
	63	31	45	55	63	69	-	-	-	-	-	-	-	-	S/N..DB
	.50	.23	.81	.83	.45	. 6	-	-	-	-	-	-	-	-	REL.
24	7.8														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	31	23	24	27	31	-	-	-	-	-	-	-	-	-	ANGLE
	51	47	47	49	51	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.96	.70	.17	-	-	-	-	-	-	-	-	-	F.DAYS
	59	29	44	55	63	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.18	.75	.68	.17	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 JUN LONG TERM SSN = 48. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0

H-DIPOLE 10H -12L 0DEG H-DIPOLE 10H -12L 0DEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	5.3														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	42	33	41	42	-	-	-	-	-	-	-	-	-	-	ANGLE
	39	35	39	39	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.61	.13	-	-	-	-	-	-	-	-	-	-	F.DAYS
	54	40	53	61	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.48	.66	.58	.13	-	-	-	-	-	-	-	-	-	-	REL.
4	3.6														
	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	-	MODE
	40	36	40	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	38	36	38	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.79	. 8	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	52	48	59	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.47	.67	. 8	-	-	-	-	-	-	-	-	-	-	-	REL.
6	7.3														
	1F	2F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	40	54	34	40	-	-	-	-	-	-	-	-	-	-	ANGLE
	38	49	35	38	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.61	-	-	-	-	-	-	-	-	-	-	F.DAYS
	70	38	60	69	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.58	.96	.60	-	-	-	-	-	-	-	-	-	-	REL.
8	10.5														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	45	-	40	39	42	45	-	-	-	-	-	-	-	-	ANGLE
	42	-	39	38	40	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.98	.82	.31	-	-	-	-	-	-	-	-	F.DAYS
	73	-	55	65	71	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.98	.82	.31	-	-	-	-	-	-	-	-	REL.
10	11.4														
	1F	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	50	-	64	45	48	50	50	-	-	-	-	-	-	-	ANGLE
	46	-	67	42	45	46	46	-	-	-	-	-	-	-	DELAY
	.29	-	.99	.99	.79	.35	.11	-	-	-	-	-	-	-	F.DAYS
	70	-	24	61	67	69	69	-	-	-	-	-	-	-	S/N..DB
	.29	-	. 4	.98	.78	.34	.11	-	-	-	-	-	-	-	REL.
12	11.7														
	1F	-	2F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	51	-	65	47	51	51	51	-	-	-	-	-	-	-	ANGLE
	48	-	70	44	48	48	48	-	-	-	-	-	-	-	DELAY
	.16	-	.99	.97	.64	.24	. 5	-	-	-	-	-	-	-	F.DAYS
	69	-	21	60	66	68	68	-	-	-	-	-	-	-	S/N..DB
	.16	-	. 1	.97	.64	.24	. 5	-	-	-	-	-	-	-	REL.

LAGOS TO KANO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

3 JUN LONG TERM SSN = 48. 22.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	12.00N - 8.51E	41.6 222.4	515.0
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	50	-	46	45	49	50	-	-	-	-	-	-	-	-	ANGLE
	46	-	43	42	46	46	-	-	-	-	-	-	-	-	DELAY
	.26	-	.99	.97	.68	.25	-	-	-	-	-	-	-	-	F.DAYS
	70	-	51	62	68	70	-	-	-	-	-	-	-	-	S/N..DB
	.26	-	.94	.97	.68	.25	-	-	-	-	-	-	-	-	REL.
16	10.2														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	47	-	40	41	44	47	47	-	-	-	-	-	-	-	ANGLE
	43	-	38	39	42	43	43	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.99	.80	.36	.10	-	-	-	-	-	-	-	F.DAYS
	70	-	57	66	69	70	70	-	-	-	-	-	-	-	S/N..DB
	.50	-	.95	.98	.79	.35	.10	-	-	-	-	-	-	-	REL.
18	10.2														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	43	34	34	36	41	43	-	-	-	-	-	-	-	-	ANGLE
	41	35	35	36	39	41	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.90	.69	.32	-	-	-	-	-	-	-	-	F.DAYS
	70	48	58	65	69	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	.82	.96	.90	.69	.31	-	-	-	-	-	-	-	-	REL.
20	8.6														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	43	32	34	38	43	-	-	-	-	-	-	-	-	-	ANGLE
	40	34	35	37	40	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.96	.78	.38	-	-	-	-	-	-	-	-	-	F.DAYS
	67	43	56	63	68	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.77	.94	.77	.38	-	-	-	-	-	-	-	-	-	REL.
22	7.2														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	43	34	36	43	43	-	-	-	-	-	-	-	-	-	ANGLE
	40	35	36	40	40	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.94	.56	. 6	-	-	-	-	-	-	-	-	-	F.DAYS
	62	41	53	61	67	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.69	.90	.56	. 6	-	-	-	-	-	-	-	-	-	REL.
24	6.5														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	43	34	37	43	-	-	-	-	-	-	-	-	-	-	ANGLE
	40	35	37	40	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.87	.30	-	-	-	-	-	-	-	-	-	-	F.DAYS
	58	39	52	60	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.49	.64	.82	.29	-	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 JUN LONG TERM SSN = 48. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5

H-DIPOLE 10H -12L ODEG H-DIPOLE 10H -12L ODEG

OFF AZIMUTH 0 DEG. MIN. ANGLE= 2 DEG. OFF AZIMUTH 0 DEG.

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	4.9														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	50	42	50	50	-	-	-	-	-	-	-	-	-	-	ANGLE
	34	30	34	34	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.98	.47	. 7	-	-	-	-	-	-	-	-	-	-	F.DAYS
	55	45	56	63	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.48	.77	.46	. 7	-	-	-	-	-	-	-	-	-	-	REL.
4	3.2														
	1F	1F	-	-	-	-	-	-	-	-	-	-	-	-	MODE
	48	48	-	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	33	33	-	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.64	-	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	54	53	-	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.48	.60	-	-	-	-	-	-	-	-	-	-	-	-	REL.
6	6.6														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	48	44	44	48	-	-	-	-	-	-	-	-	-	-	ANGLE
	33	30	30	33	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.94	.26	-	-	-	-	-	-	-	-	-	-	F.DAYS
	70	54	65	71	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.93	.93	.26	-	-	-	-	-	-	-	-	-	-	REL.
8	9.8														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	53	-	47	48	52	53	-	-	-	-	-	-	-	-	ANGLE
	37	-	33	33	37	37	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.97	.69	. 9	-	-	-	-	-	-	-	-	F.DAYS
	73	-	59	68	72	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.98	.96	.69	. 9	-	-	-	-	-	-	-	-	REL.
10	9.6														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	57	-	53	53	57	57	57	-	-	-	-	-	-	-	ANGLE
	42	-	37	38	42	42	42	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.98	.69	.27	. 7	-	-	-	-	-	-	-	F.DAYS
	69	-	53	64	68	69	68	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.97	.69	.27	. 7	-	-	-	-	-	-	-	REL.
12	9.3														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	59	-	55	56	59	59	-	-	-	-	-	-	-	-	ANGLE
	44	-	39	40	44	44	-	-	-	-	-	-	-	-	DELAY
	.45	-	.99	.96	.52	.18	-	-	-	-	-	-	-	-	F.DAYS
	67	-	51	63	67	68	-	-	-	-	-	-	-	-	S/N..DB
	.44	-	.94	.95	.51	.18	-	-	-	-	-	-	-	-	REL.

LAGOS TO KADUNA

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

4 JUN LONG TERM SSN = 48. 22.004

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	10.47N - 7.42E	44.0 224.6	387.5
H-DIPOLE 10H -12L ODEG		H-DIPOLE 10H -12L ODEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	9.1														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	58	-	53	54	58	58	-	-	-	-	-	-	-	-	ANGLE
	42	-	37	38	42	42	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.95	.55	.17	-	-	-	-	-	-	-	-	F.DAYS
	69	-	55	65	69	70	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.95	.54	.17	-	-	-	-	-	-	-	-	REL.
16	9.6														
	1F	3F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	55	75	48	50	55	55	-	-	-	-	-	-	-	-	ANGLE
	39	84	33	35	39	39	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.99	.97	.67	.24	-	-	-	-	-	-	-	-	F.DAYS
	71	2	62	69	71	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	.0	.98	.97	.66	.24	-	-	-	-	-	-	-	-	REL.
18	9.5														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	52	42	43	46	52	52	-	-	-	-	-	-	-	-	ANGLE
	36	29	30	32	36	36	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.86	.59	.16	-	-	-	-	-	-	-	-	F.DAYS
	71	55	64	68	70	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	.92	.97	.86	.59	.16	-	-	-	-	-	-	-	-	REL.
20	8.0														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	51	41	43	49	51	-	-	-	-	-	-	-	-	-	ANGLE
	35	29	30	34	35	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.94	.70	.21	-	-	-	-	-	-	-	-	-	F.DAYS
	68	50	60	65	69	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.90	.93	.69	.21	-	-	-	-	-	-	-	-	-	REL.
22	6.8														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	51	42	46	51	-	-	-	-	-	-	-	-	-	-	ANGLE
	36	29	32	36	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.90	.43	-	-	-	-	-	-	-	-	-	-	F.DAYS
	63	45	56	63	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.83	.89	.43	-	-	-	-	-	-	-	-	-	-	REL.
24	6.0														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	51	42	48	51	-	-	-	-	-	-	-	-	-	-	ANGLE
	35	30	33	35	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.80	.14	-	-	-	-	-	-	-	-	-	-	F.DAYS
	59	44	55	62	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.78	.77	.14	-	-	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 JUN LONG TERM SSN = 48. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
2	5.1														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	45	37	45	45	-	-	-	-	-	-	-	-	-	-	ANGLE
	38	33	38	38	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.98	.53	.10	-	-	-	-	-	-	-	-	-	-	F.DAYS
	54	42	54	61	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.48	.70	.51	.10	-	-	-	-	-	-	-	-	-	-	REL.
4	3.4														
	1F	1F	-	-	-	-	-	-	-	-	-	-	-	-	MODE
	43	40	-	-	-	-	-	-	-	-	-	-	-	-	ANGLE
	36	35	-	-	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.71	-	-	-	-	-	-	-	-	-	-	-	-	F.DAYS
	52	49	-	-	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.46	.63	-	-	-	-	-	-	-	-	-	-	-	-	REL.
6	6.6														
	1F	2F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	43	56	37	43	-	-	-	-	-	-	-	-	-	-	ANGLE
	36	48	33	36	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.94	.29	-	-	-	-	-	-	-	-	-	-	F.DAYS
	68	39	61	69	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.61	.93	.28	-	-	-	-	-	-	-	-	-	-	REL.
8	9.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	47	-	42	42	46	47	-	-	-	-	-	-	-	-	ANGLE
	40	-	36	36	39	40	-	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.97	.72	.12	-	-	-	-	-	-	-	-	F.DAYS
	72	-	57	66	72	73	-	-	-	-	-	-	-	-	S/N..DB
	.50	-	.97	.96	.72	.12	-	-	-	-	-	-	-	-	REL.
10	10.6														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	52	-	49	48	52	52	52	-	-	-	-	-	-	-	ANGLE
	45	-	41	41	45	45	45	-	-	-	-	-	-	-	DELAY
	.32	-	.99	.98	.66	.26	. 6	-	-	-	-	-	-	-	F.DAYS
	70	-	50	62	68	69	69	-	-	-	-	-	-	-	S/N..DB
	.32	-	.93	.97	.66	.25	. 6	-	-	-	-	-	-	-	REL.
12	10.9														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	54	-	50	50	54	54	-	-	-	-	-	-	-	-	ANGLE
	47	-	43	43	47	47	-	-	-	-	-	-	-	-	DELAY
	.20	-	.99	.96	.53	.18	-	-	-	-	-	-	-	-	F.DAYS
	68	-	49	61	66	68	-	-	-	-	-	-	-	-	S/N..DB
	.20	-	.91	.95	.52	.18	-	-	-	-	-	-	-	-	REL.

LAGOS TO SOKOTO

500WATTS (CW) HALF WAVE DIP. 10 METER FP NR 1098

5 JUN LONG TERM SSN = 48. 20.005

TRANSMITTER	RECEIVER	AZIMUTHS	SM.
6.45N - 3.46E	13.03N - 5.25E	14.9 195.2	470.4
H-DIPOLE 10H -12L 0DEG		H-DIPOLE 10H -12L 0DEG	
OFF AZIMUTH 0 DEG.	MIN. ANGLE= 2 DEG.	OFF AZIMUTH 0 DEG.	

PWR= 0.5000KW 3 MC/S MAN. NOISE = -148 DBW REQ.S/N= 36DB

OPERATING FREQUENCIES

GMT	MUF	3	5	7	9	11	13	15	17	19	21	23	26	30	
14	10.3														
	1F	-	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	52	-	48	48	52	52	-	-	-	-	-	-	-	-	ANGLE
	45	-	41	41	45	45	-	-	-	-	-	-	-	-	DELAY
	.31	-	.99	.96	.59	.19	-	-	-	-	-	-	-	-	F.DAYS
	69	-	52	63	68	70	-	-	-	-	-	-	-	-	S/N..DB
	.30	-	.95	.95	.58	.19	-	-	-	-	-	-	-	-	REL.
16	9.8														
	1F	-	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	MODE
	50	-	43	44	49	50	50	-	-	-	-	-	-	-	ANGLE
	42	-	37	38	41	42	42	-	-	-	-	-	-	-	DELAY
	.50	-	.99	.98	.73	.29	. 6	-	-	-	-	-	-	-	F.DAYS
	70	-	59	66	70	71	70	-	-	-	-	-	-	-	S/N..DB
	.50	-	.96	.97	.72	.29	. 6	-	-	-	-	-	-	-	REL.
18	10.0														
	1F	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	MODE
	46	37	37	40	45	46	-	-	-	-	-	-	-	-	ANGLE
	39	33	33	35	38	39	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.98	.89	.66	.26	-	-	-	-	-	-	-	-	F.DAYS
	70	49	60	67	69	71	-	-	-	-	-	-	-	-	S/N..DB
	.50	.85	.96	.89	.66	.26	-	-	-	-	-	-	-	-	REL.
20	8.5														
	1F	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	MODE
	45	35	37	41	45	-	-	-	-	-	-	-	-	-	ANGLE
	38	32	33	36	38	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.95	.76	.34	-	-	-	-	-	-	-	-	-	F.DAYS
	67	46	57	64	68	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.83	.94	.76	.34	-	-	-	-	-	-	-	-	-	REL.
22	7.0														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	46	37	40	46	-	-	-	-	-	-	-	-	-	-	ANGLE
	39	33	35	39	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.92	.49	-	-	-	-	-	-	-	-	-	-	F.DAYS
	62	43	54	62	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.50	.76	.89	.49	-	-	-	-	-	-	-	-	-	-	REL.
24	6.2														
	1F	1F	1F	1F	-	-	-	-	-	-	-	-	-	-	MODE
	46	37	41	46	-	-	-	-	-	-	-	-	-	-	ANGLE
	39	33	36	39	-	-	-	-	-	-	-	-	-	-	DELAY
	.50	.99	.83	.20	-	-	-	-	-	-	-	-	-	-	F.DAYS
	58	41	54	61	-	-	-	-	-	-	-	-	-	-	S/N..DB
	.49	.71	.80	.20	-	-	-	-	-	-	-	-	-	-	REL.

ANNEX II

STANDARD OPERATING INSTRUCTIONS

FOR

NPF TELETYPE CIRCUITS

The following is offered as an outline in brief form of standard operating instructions intended to assist the NPF Signals personnel in preparing an adequate procedure to pass police information over a teletype circuit. Although, this SOI was prepared to assist the teletype circuit operation, consideration should be given to the adoption of pertinent sections for the NPF radio telegraph (CW) network.

I. ASSIGNMENT AND RESPONSIBILITY OF NET CONTROL

A. It shall be the duty of the NET CONTROL (HEADQUARTERS) station at Lagos to monitor all stations on the net and enforce the operational rules and regulations as set forth in this manual.

1. NET CONTROL is responsible for:

a) General net operating procedure and discipline.

b) The elimination of superfluous and unnecessary traffic.

c) The control of operating schedules.

d) Monitoring the use of message priority classifications.

e) Network traffic routing and message routing precedence.

2. Any station on the network not able to respond shall contact NET CONTROL through the radio telegraph system.

II. MESSAGE NUMBERING, DATE AND TIME INDICATORS

A. The ORIGINATING STATIONS assume the responsibility for correct numbering of their messages.

1. The message number shall always be transmitted as the first character of characters of the teletype message. The originating station call letters shall always be the first characters of the message number.

2. The date and time shall always follow the message in sequence on the first line.

3. The message number, date and time group sequence shall be used as reference when any station desires to check the originator for accuracy or additional information.

4. Individual station message numbering is dictated by the traffic load of that station. Normally, message re-numbering can be done on a monthly basis.

III. ORDER OF MESSAGE PRIORITY

A. URGENT

1. This classification is to be used ONLY in event of extreme emergency and only if the purpose of the message would be defeated if the transmission were delayed by the use of a lower classification.

B. PRIORITY

1. This classification is to be used for messages requiring immediate broadcast to maintain MAXIMUM SECURITY and only if the purpose of the message would be defeated with the use of a lower classification.

C. ROUTINE

1. Most messages will fall into this category and can normally be used to maintain effective security.

2. All business messages (messages other than Law Enforcement and the maintenance of civil security) and service messages (messages requesting repeats and corrections or circuit difficulties) are to use this classification EXCLUSIVELY.

3. All traffic (except the required calling traffic) appearing on the circuit shall be in message form, be properly numbered and bear a classification

IV. ABBREVIATIONS AND TERMS USED IN LAW ENFORCEMENT MESSAGES

A. Abbreviations and terms used shall be uniform throughout the network. The use of uncommon abbreviations in actual message construction should be avoided. However, abbreviations, known, understood and acceptable to the profession are appropriate.

EXAMPLES

Word	Abbreviation	Word	Abbreviation
Acknowledge	ACK	Company	CO
Affirmative	AFFR	Conference	CONF
All Points Bulletin	APB	Convertible	CV
All Right	OK	Coroner	COR
Also Known as	AKA	Correction	CORR
Also Known Aliases	AKA	Coupe	CPE
Answer	ANS	Court	CT
Approximate(ly)	APPRX	Criminal	CRIM
Assault With Deadly Weapon	ADW	Criminal Investigation	CI
Attempt to Contact	ATC		
Attempt to Locate	ATL	Customs	CUS
Attention	ATTN		
Barrel	BBL	Dark	DK
Brown	BRN	Date of Birth	DOB
Bulletin	BUL	Delay	D
Bureau	BUR	Deliver	DLR
Burglary	BURG	Detail	DET
Business	BUS	Detective	DETV
Busy	BSY	Disposition	DISP
Circular	CIRC	District	DIST
Club Coupe	CL CP	Division	DIV

Word	Abbreviation	Word	Abbreviation
Drivers License	DL	Had Been Drinking	HBD
Emergency	EMERG	Hard Top	HT
Escape	ESCP	Have	HV
Felony	FEL	Headquarters	HQS
Felony Warrant	F/W	Here	HR
Female	F	Hold	HLD
Fictitious	FICT	Holding	HLDG
Fingerprints	FPTS		
Fingerprint Classification	FPC	In Connection With	ICW
For Your Information	FYI	Informant	INFT
Found	FND	Information	INFO
Four Door	4D	In Regards	in RE
From	FM	Instruction(s)	INST
Go Ahead	GA	Insufficient Funds	NSF
Go Ahead With	GAW		
Grand Theft	GT	Juvenile	JUV
Grand Theft Auto	GTA		
Green	GRN	Laboratory	LAB
Grey, Gray	GRY	Latent	LAT

Word	Abbreviation	Word	Abbreviation
Letters	LTRS	Negative	NEG
License (No.)	LIC	No Middle Initial	NMI
Line Feed	LF	Not Received	NR
Location	LOC	No Further Description	NFD
Male	M	Number	NO
Medium	MED		
Message	MSG	Obtaining Money Under False Pretenses	OMUFP
Millimeter	MM		
Minute Please	MINPLS	Occupation	OCC
Minute(s)	MIN	Official, Office	OFC
Misdemeanor	MISD	Operator	OPR
Missing	MSNG	Order	ORD
Missing Person	MP	Originate	ORGNT
Modus Operandi	MO		
Motor	MTR	Payroll	PYRL
Motorcycle	MC	Petit Theft	PT
Motor Scooter	MSCTR	Petit Theft with Prior	PTPR
Motor Vehicle Registration	MVS		
Municipality	MUN	Phone	PH
Nigeria Police Force	NPF	Police Department	PD

Word	Abbreviation	Word	Abbreviation
Possible	POSS	Serial	SER
Ready	RDY	Service	SVC
Received	RECD	Shot Gun	SGUN
Recovered	RCYD	Special	SPCL
Referred	RED	Soon As Possible	SAP
Regarding	RE	Station Wagon	ST W
Relay	RLY	Store	STR
Repeat-Report	RPT	Subject	SUBJ
Reply	RPY	Suspect	SUSP
Reply only if Record	ROIR		
Reporting Person	RP	Teletype	TT
Request	REQ	Temporary	TEP
Return	RET	Their or There	THR
Revolver	REV	Through	THRU
Robbery	ROBB	Traffic	TRFC
Routine	ROUT	Try Again	AG
Section	SEC	Trailer	TRLR
Sedan	SED	Truck	TRK
Sergeant	SGT	Two Door	2DR
Sending	SNDG		

Word	Abbreviation	Word	Abbreviation
Unable to Locate	UTL	Warrant Issued Will Pickup	WARPIC
Unemployed	UNEPD		
Unknown	UNK	Witness	WIT
Unsatisfactory	UNSAT	Would	WLD
Urgent	URG		
Victim	VIC	You or Unattended	U
Waiting	WTG	Your	UR
Warrant	WARR	Your Date	YD

V. GENERAL NETWORK OPERATING PROCEDURE

A. SENDING AND RECEIVING PROCEDURE

1. Any station in the net having traffic for NET CONTROL at Lagos or any other station in the network shall signal NET CONTROL for clearance to proceed. Clearance being granted, the station shall proceed to send the traffic.

2. A station having a multiple addressee message shall signal the NPF Control who will then decide if the other addressee will be patched simultaneously or the message relayed by perforated tape.

3. NET CONTROL having a multiple addressee message shall signal the net stations involved, receive their acknowledgement to go ahead, then proceed with the traffic.

4. Any station called by NET CONTROL shall immediately indicate their readiness to receive by transmitting GA (Go-Ahead) together with their call sign.

B. METHOD OF CORRECTING SENDING AND RECEIVING FAULTS AND ERRORS

1. An operator making a typing error shall indicate so by typing a group of not less than seven "X" marks, then continue typing the message by beginning again with the last word typed correctly.

2. The operator shall continuously observe his machine to note particularly paper supply and proper paper feed.

3. An operator noting obvious errors in his copy of a message being received shall immediately check his machine adjustments to determine if the fault is at the receiving end.

4. An operator noting errors in his copy not corrected by the sender during the course of a transmission shall request the incorrect portions of the message repeated.

5. An operator not able to obtain a correct copy during the course of a transmission shall so advise the sending station. The receiving station shall call NET CONTROL when he believes conditions have improved enough to proceed with clearing traffic.

6. An operator shall send a signal when he has completed sending a message or series of messages, such as the word "FIN" for finished — clearing the network.

VI. TRAFFIC ROUTING AND PRECEDENCE

A. LAW ENFORCEMENT MESSAGES

1. Law enforcement messages shall take precedence over all other types of traffic.

2. It is the responsibility of the originating station to properly route their messages.

3. It is the responsibility of NET CONTROL to clear network traffic; first, that which is dictated by priority classification; and, second, that which is dictated by message content.

4. The State Signal Officers staff at each station shall distribute without delay message copies received as dictated by the message instructions. The officer shall normally retain one copy for his own file.

5. Since it is imperative that absolute uniformity of station logs be maintained, it is mandatory that distribution of log books be controlled by Headquarters. Further, station logs should be available for instant inspection and forwarded to Lagos for staggered semi-annual inspections as to quality and conformity.

VII. MESSAGE FILING

A. Teletype messages are normally filed by number on a monthly basis:

1. by the originating office,

2. by the Signal officer,

3. by any office receiving an ACTION copy, and

4. by any office receiving a copy for information only.

VIII. STATION LOGS

A. All teletype messages are to be entered in a Station Log by:

1. the date and time of each transmission;

2. all messages and transmissions made (whether two-way contacts resulted or not)

3. the time of sending each message and the operator's identifying signature.

LOG BOOK

Station Identification _____ Hour and date Opening of Station _____

Name of Operator Entering on duty _____ Name of Operator Going off duty _____

Message Number	Hour	Station Called	Hour Trans.	Message From	Message To	Class.

Date _____ Page No. ____ Signature _____
Chief Signal Officer

STANDARD TELETYPE MESSAGE FORM

MESSAGE NUMBER: DATE: TIME: CLASSIFICATION

FROM: TO:

SUBJECT POLICE BUSINESS

SERVICE OTHER

OTHER COMMENTS

AUTHORIZED BY:

SENT BY: TIME SENT: TIME RECEIVED:

NPF TELETYPE MESSAGE FORM

DATE: TIME: APPROVED

MESSAGE CLASSIFICATION	AREA BROADCASTS (APB)			CRIM	BUS	OTHER PROVINCE NETWORK			CRIM	BUS
	EMERG	PRIORITY	ROUTINE			EMERG	PRIORITY	ROUTINE		
	#	#	#	#	#	#	#	#	#	#

TO: 1 3
2 4

PRIMARY CATEGORY	SECONDARY CATEGORY	REFERENCE: (Previous APBs, Subjs., Officers, File #)

DATE AND TIME OF CRIME | EXACT LOCATION OF CRIME

(If more than one subject/suspect – use reverse or separate form and attach.)

IDENTITY (INCLUDE ALIASES) No. _____ First Middle Last

DESCRIPTION: Sex (M) (F) RACE _____ Age _____ D. of B. _____ Ht. _____ Wt. _____
Hair _____ Eyes _____

F/P Class: _____ NPF # _____

Province _____ City _____ District _____
(Specify name of province) (Specify name of city) (Specify name of DISTRICT

PHYSICAL ODDITIES. Build _____ Marks/Scars _____ (Normally visible)

Tattoos _____ Amputations _____

Glasses, Denture, Mustache & Other _____

CLOTHING: Head Covering ____ Shirt _____ Tie _____ Coat _____

Trousers _____ Sox _____ Shoes _____ Jewelry or Other _____

VEHICLE: Color _____ Year _____ Make _____ Body Style _____

Lic. No. _____ Ser. or Eng. No. _____ Noteworthy Damages or Oddities _____

MESSAGE TEXT = BE BRIEF = If more space needed, use reverse or separate sheet and attach.

BE BRIEF

Include such information as – M.O., Check data, habits, travel direction, warrant information, hangouts, etc.

REFER:	UNIT	FILE #	VICTIM

(AUTHORITY) (TITLE) (LOCATION OR DEPARTMENT)	OPR SENDING	DATE & TIME SENT

IX. MESSAGE CONSTRUCTION

I. MESSAGE HEADING

A. DATE REAL TIME CLASSIFICATION GROUP

1. Message Number

2. Sending station call letters

3. Date

4. Time (time shown should be actual time of start of transmission)

5. Classification of message (Emergency, Priority, Routine) (Crim - Bus - Svc)

B. ADDRESSEE GROUP

1. Addressee (PB - Name if necessary)

2. Title, rank, or office of addressee (if necessary)

3. Location of addressee

C. CATEGORY GROUP

1. Message subject (primary and secondary) refer to division, case number, etc.

D. SUBJECT OR VEHICLE IDENTITY GROUP

1. Name of person wanted

2. License number of vehicle stolen or in question.

(a) Where damaged if hit and run, etc.

(b) Condition of vehicle (driveable - wrecked - etc.)

(c) With or without keys

(d) Owner may regain custody at _____ by producing _____.

(e) Number of occupants, etc.

II. MESSAGE TEXT

A. MESSAGE FORM

The text of the message should contain, briefly and concisely, all available information to enable the recipient TO CLEARLY UNDERSTAND THE ACTION TO BE TAKEN. Construction of all messages should follow a uniform pattern. Use of standardized primary and secondary subjects is highly desirable. (Refer to APB Guide for recommended subjects).

1. Personal descriptions should follow this sequence:

   Race; sex; age; height; weight; build; hair; eyes; complexion; physical - such as scars, marks, limp, etc.

2. Clothing description should follow this sequence:

   Head covering; shirt; tie; coat; trousers; socks; shoes. Always give direction and means of flight if known.

3. In describing a vehicle, the description should follow this sequence:

   Color (describe from top downward and/or front to back); year make; body; license; motor number; other

information to further assist in identification. Always give direction of flight if known.

4. Cancellations, supplements, and replies must contain sufficient information to readily identify related message.

III. MESSAGE CONCLUSION

Each message should be ended as follows:

Reference to file; case number; detail; bureau; or division Authority (such as NPF Enugu, etc.) of sender; the call letters of the originating station; and the transmitting operator's initials.

INSTRUCTION FOR USE OF NPF TELETYPE MESSAGE FORM

A. DATE and TIME message is submitted or composed should be indicated on top line.

B. If desired APPROVAL for control purposes may be indicated on top line. This approval should be made by a supervising senior officer.

C. Proper MESSAGE CLASSIFICATION should be checked in the appropriate box. Space is provided to record the message number after transmittal.

D. Proper message CATEGORY (PRIMARY and SECONDARY) should be indicated in the appropriate box. This information aids materially in expediting messages to the specialized details and functions in other agencies. If a previous message (APB or LOCAL BROADCAST) is to be

cancelled, supplemented, or corrected, indicate in secondary box. When referring to a crime, write it out, do not use Code numbers.

E. When referring to a previous BROADCAST, either APB or LOCAL, indicate its number and date and, when possible, the name of the subject/suspect or Category.

F. The subject's name in full, including all known recent aliases, should be placed in the IDENTITY box, in First, Middle and Last order. If the subject has no middle name or initial, indicate this fact by use of NMN or NMI. If a message concerns more than one subject, indicate No. 1 and so on in the space provided. Use a separate sheet for each individual and attach with staple. The name and aliases is the first item scrutinized by all persons concerned in establishing identity or crime connection. It is the best policy and practice to obtain all locally available information concerning the description of an individual prior to sending an APB or LOCAL broadcast.

G. The DESCRIPTION of an individual should be as complete and as accurate as the officer can furnish. This includes not only the usual physical description, but also NPF reference numbers, oddities, habits, clothing style preferences, hangouts and Modus Operandi characteristics. If you have the information the "FORM" lists, it should be included.

H. CLOTHING worn by a subject at the time of the crime is very important, but this information "ages" rapidly. Persons change clothing

often for many reasons other than a desire to avoid apprehension or detection. If a message is to be sent several days after an incident has occurred and there is reason to believe the subject may have changed clothing, do not include. Rather indicate in the MESSAGE TEXT the type of clothing the individual favors or habitually wears.

I. Vehicle information and description should also be as complete as the officer can furnish. Do not overlook NOTEWORTHY DAMAGES OR ODDITIES.

J. MESSAGE TEXT is the body of the message, the portion where the officer indicates the unusual aspects of the message not already covered by the CLASSIFICATION, MESSAGE CATEGORY, DESCRIPTION, etc. In this part of the message should be included such information as Modus Operandi, Check data, Warrant information, direction of travel, habits, handouts, clothing styles favored by suspects, etc. This is the area to include any bid of information that may be of use to others in conducting further investigation. The most important point to remember in the MESSAGE TEXT is to BE BRIEF. Unessential words take time, not only to write but to transmit and read as well. Should more space be needed, use the reverse side of the "FORM."

K. All messages should have a person designated for reply or referral purposes. In most cases, it will be the person or persons conducting the investigation, or, it may be the name of the supervising

officer in charge of a detail. The case FILE number is a "must," in order that any replies or further investigation or correspondence taking place may be directed to a positive destination, even though a case may have been placed in inactive status. The victim's name, if other than the subject mentioned in IDENTITY, should be included as the last item in the REFER line. This is of additional aid to the Records Bureaus and sections in file work.

L. All messages must bear an authority's name, title and location. This will be the Commissioner of Police for State and Officer in Charge of Province, etc.

These FORMS should be completed either in longhand or by typewriter. It is as flexible as can be designed, considering the numerous crimes, offenses, police responsibilities, national, city, highway, and the legal requirements that must be met. It also incorporates the requisite information that is desirable toward the best communications STANDARDS.

X. REFINEMENT OR REVISION OF PROCEDURES

A. The Signals officer in charge of communications in each state should meet with his superiors as regularly as is necessary in order to discuss possible revision of procedures. Problems arising should be discussed and resolved in these meetings in an effort to insure the continued efficiency and conformity of the NPF teletype system operation.

The NPF Teletype Network will permit and facilitate rapid and

efficient communications between states on matters of police and security interst. In the process of communicating information it will be necessary to follow an established procedure utilizing standard message forms. This will permit orderly and controlled operations.

The following represent examples of All Point Bulletins:

APB - Stolen Vehicles

This refers to automobiles stolen or vehicles and/or occupants involved in the perpetration of a serious crime. Message should include description of the vehicle, such as model, make, license number, motor number, color and other identifying characteristics.

APB - Robbery

To qualify, message must have obvious content of:

a. Suspects used a gun.

b. There is reason to believe bandits are operating in more than one zone.

c. When the M.O. (Modus Operandi) is distinctive or similar to that previously reported in other states or jurisdictions.

d. When over $1,000 in stolen property is taken and may cross the country.

APB - Burglary or Theft

To qualify, messages must have obvious content of:

a. A large amount of property, which could connect a

suspect with a crime, is stolen.

b. Gun, explosives, or narcotics are stolen.

c. When the M.O. is distinctive or similar to that previously reported in other states and when there is reason to believe the perpetrators may be operating in more than one state.

d. When a large amount of property has been stolen, part of the whole of which is identifiable.

APB - Subject Wanted

To qualify, message must have obvious content of:

a. When there is reason to believe the subject may be traveling across the country.

b. A warrant has been issued for his arrest.

APB - In Custody

To qualify, message must have obvious content of:

a. Known criminal in the area.

b. There is reason to believe he has committed crimes outside the local jurisdiction.

APB - Crime Warning

When it may be possible to prevent crime by alerting authorityies within the country.

APB - Missing Persons

When circumstances indicate the missing person is the

victim of a serious crime, including kidnapping or possible kidnapping.

APB - Miscellaneous

XI. SPECIAL INSTRUCTIONS

COMPILATION OF ALL POINTS BULLETINS

AN ALL POINTS BULLETIN SHOULD ONLY BE ISSUED WHEN A POINT TO POINT OR DIRECTED MESSAGE TO SEVERAL POINTS, WIDELY SEPARATED BUT SPECIFIC STATIONS OR CIRCUITS, WILL NOT SERVE THE PURPOSE OF AN ALL POINTS BULLETIN.

ROBBERY — Include in the text of message the method of Operation "MO": victim, i.e., individuals, store, school, etc,; recovered burglary tools; list major identifiable items only; description of suspects; description of car and other pertinent facts.

CANCELLATIONS (Regular APBs) — Cancellations, other than Motor Vehicles, will include "CANCEL" or "PARTIAL CANCEL" as secondary part of the subject. The body of the message will show the date and number of the APB, names, aliases in original APB. (Agencies originating APBs will be responsible for their cancellation.)

CANCELLATIONS (Motor Vehicles)	Cancellations of Motor Vehicles must be reported in the following sequences: year, make, license, engine, date, and agency of origin. A single consolidated APB will be used to cover all stolen or recovered cars rather than an individual APB for each motor vehicle. (Agencies originating APBs will be responsible for their cancellation.)
FALSIFICATION	Report all available information in following sequence: name, aliases, description, identification number, such as NPF, prison, state and city, payee, maker, endorsers, type checks, i.e., payroll or personal, how issued - check-writing, longhand, rubber, serial number, banks involved, etc., warrant number, bail, mode of operation, description of auto or other pertinent facts. (Description of individual may conform to that shown under "PERSONAL DESCRIPTION" or "SUSPECTS". Description of Vehicle may conform to that shown under "VEHICLES.")
EMERGENCY APBS	EMERGENCY bulletins will be broadcast when received and take precedence over all other traffic.
ESCAPEE	Report in following sequence: name, number, description

ESCAPEE (Cont'd)

of individual, date and time of escape, name of institution of confinement, city or area committed from, offense, probable destination or other pertinent facts. (Description of individual should conform to that shown under "PERSONAL DESCRIPTION" and "SUSPECT".

EXTRANEOUS WORDS AND PHRASES

Omit extraneous words and brief all phrases in text of message as follows:

1. The following described subjects - (name and description of individuals is self-evident.)
2. Following is a list of items that were stolen - (List of items is self-evident.)
3. Please arrange to supplement or cancel. - (Cover in subject of APB as "SUPL" or "CANCEL.")
4. If you have any information regarding the above described subject please advise - (Use of applicable APB subject such as "ROBBERY - WANTED" is usually sufficient to obtain desired information.)
5. Omit long lists of miscellaneous or minor items of stolen property - (List only major identifiable items.)
6. Omit miscellaneous qualifying adjectives that are

EXTRANEOUS WORDS AND PHRASES (Cont'd)

not pertinent to the facts.

7. Hold and notify - (self evident in text of message.)

LENGTH OF BROADCAST

Outlying stations will be notified of the number of bulletins in each country-wide broadcast at the start of transmission - (Upon receipt of this information, all stations will check the availability of sufficient teletype paper to avoid interruption of the broadcast.)

PERSONAL DESCRIPTIONS

Individuals involved may be described as follows: name, aliases, race, sex, age, height, weight, hair, eyes, complexion, physical: such as mark, scars, limp, etc. Clothing description should follow this sequence: head covering; shirt; tie; coat; trousers; socks; shoes.

SUPPLEMENTS

The supplemental APB will include the word "SUPL" as a secondary part of the basic subject, the date and number of the supplemented APB and other pertinent information to permit quick association with the original APB.

SUSPECTS

Include, if known, all or part of the following information: Description of suspects, fingerprint classification

SUSPECTS (Cont'd)

NPF number, prison number and if warrant issued. Description of suspects should follow the pattern described under "PERSONAL DESCRIPTION."

THEFT (Stolen Property)

Include in text of message the Mode of Operation "MO": victim, i.e., individual bar, cafe, etc.; description of probable suspects including references to any previous APBs, files, etc., other pertinent facts and list of identifiable major items of stolen property. Omit miscellaneous and minor items.

REFERENCES IN APBs

1. To expedite references to files and office records and in routing bulletins to the departments, the officer originating an All Points Bulletin shall include his last name, organization, department, case number, etc.
2. Replies to bulletins in "1" above shall include a reference to the APB number, date, officer's name, organization, department, case number, etc.

VEHICLES

In reporting Vehicles - stolen, the information will be listed in the following sequence: color, year, make, body, license, engine number and PD of origin.

WARRANTS When issued, show crime, type of warrant (less grave, felony, etc.), warrant number and amount of bail.

UNCLASSIFIED
LIMITED OFFICIAL USE

ALL POINTS BULLETINS GUIDE

STANDARDIZED SUBJECTS

Primary Subject	Secondary Subject
PHYSICAL INJURIES (whether frustrated or attempted)	IN CUSTODY WANTED DEADLY WEAPON INTENT TO MURDER INTENT TO RAPE INTENT TO BODILY HARM SUPL CANCEL
FALSIFICATION	IN CUSTODY WANTED FORGERY STOLEN FICTITIOUS NSF SUPL CANCEL

NOTE: Two primary subjects may be used for purposes of clarification.

EXAMPLE: ROBBERY - KIDNAPPING
RAPE - KIDNAPPING

ESCAPEE	IN CUSTODY WANTED SUPL CANCEL
MURDER AND HOMICIDE	IN CUSTODY WANTED SUPL CANCEL

UNCLASSIFIED
LIMITED OFFICIAL USE

INFORMATION	WANTED ATTEMPT TO LOCATE PROPERTY FOUND ANNOUNCEMENT SUPL CANCEL
KIDNAPPING	IN CUSTODY ROBBERY RAPE SUPL CANCEL
MISSING ADULT OR MISSING JUVENILE	IN CUSTODY WANTED SUPL CANCEL
NARCOTICS	IN CUSTODY WANTED ADDICT PEDDLING SUPL CANCEL
ROBBERY	IN CUSTODY KIDNAPPING WANTED BANK ARMED STRONG ARM RESIDENCE WAREHOUSE - JEWELRY STORE, ETC. DRUG STORE SAFE CHECKS HOTEL SUPL CANCEL

SEX	IN CUSTODY WANTED RAPE STATUTORY RAPE SUPL CANCEL
STOLEN PROPERTY	(Show under Primary Subject "THEFT" and report only major identifiable items.)
THEFT	FROM VEHICLE (UNLOCKED) PROPERTY JEWELRY CHECKS SUPL CANCEL

NOTE: When subjects other than those listed above are employed, they should conform to the Primary-Secondary subject arrangement as closely as possible.

ANNEX III

GLOSSARY

Channel

A means of one-way transmission. Each channel is allocated a particular frequency band which is reserved to it.

Circuit

A means of both-way communication between two points, comprising associated "go" and "return" channels.

Duplex Operation

A type of operation in which simultaneous two-way conversations, messages, or information may be passed between any two or more given points.

High Frequency (HF)

Frequencies from 3 - 30 megahertz. Used for long distance communications.

Modulation, Amplitude (AM)

The form of modulation in which the amplitude of the carrier is varied in accordance with the instantaneous value of the modulating signal.

Modulation, Continuous Wave (CW)

Interrupting the 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 intelligence and no sidebands.

Modulation, Frequency (FM)

The form of modulation in which the instantaneous frequency of a sine wave carrier is caused to depart from the carrier frequency by an amount proportional to the instantaneous value of the modulating signal.

Multiplex

A multiplex system combining a number of voice channels for instantaneous transmission over a wide band system.

Patch

Electrically connecting two or more circuits together.

Private Automatic Branch Exchange (PABX)

Telephone switchboard requiring no operator. Provides automatic dial service for incoming and outgoing telephone calls.

Private Branch Exchange (PBX)

Telephone switchboard requiring an operator to handle incoming and outgoing calls.

Repeater

Used to increase mobile-to-mobile and mobile-to-base communications range and extend the range of a VHF or UHF radio system over greater distances and obstruction such as mountains, buildings, etc. Back-to-back two way repeater can be used to link two different communications systems.

Simplex

That type of operation which permits the transmission of signals in either direction alternately.

Single Sideband (SSB)

That method of communication in which the frequencies produced by the process of amplitude modulation on one side of the carrier are transmitted and those on the other side are suppressed. The carrier frequency may be either transmitted or suppressed.

Very High Frequency (VHF)

Frequencies from 30 - 300 megahertz used for line-of-sight communications.

Wideband System

A system with a multichannel bandwidth of 20 kilohertz or more.

Ultra High Frequency (UHF)

Frequencies from 300 - 3000 megahertz used for line-of-sight communications.