付　属　資　料

（1） Terms of Reference

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(1) Terms of Reference

PROJECT DOCUMENT

RURAL TELECOMMUNICATION DEVELOPMENT PROGRAMME

FOREIGN AID MANAGEMENT DIVISION
PAPUA NEW GUINEA DEPARTMENT OF FINANCE
AND THE
PAPUA NEW GUINEA POST AND TELECOMMUNICATION CORPORATION

AUGUST 1988

EXECUTIVE SUMMARY

1. The Post and Telecommunication Corporation (PTC) is a commercial statutory authority, wholy owned by the Papua New Guinea Government. The Corporation operates under its own Act and is charged with the responsibility to provide postal and telecommunication services and to operate on a commercial basis.

2. Based on PTC's Five Year Development Plan and the recently completed World Bank funded consultancy on PTC's Network Development Plan and Management Review, the Corporation plans to undertake major capital investments amounting to K163.0 Million for the period 1989-93. Of these, K43.5 Million are specifically nominated for external aid funding, including a requirement for rural development of K17.5 Million.

3. Grant aid funding of the K17.5 Million Rural Telecommunication Development Programme is specifically requested from the Japanese Government. Major components of the project include:

   a) Village Payphone Programme - refer to the installation of at least 400 village payphones at nominated rural centres or villages throughout Papua New Guinea at an estimated cost of K7.5 Million;

   b) Rural Extension and Expansion Programme - refer to the provision of digital, analogue and High Frequency (HF) radio telecommunication services at nominated rural areas, excluding village payphone applications, at an estimated cost of K10.0 Million.

4. National Government has given the proposed Rural Telecommunication Development Programme a high priority. The principal objectives of the project are as follows:

   a) Village Payphone Programme - to provide two-way telephone communication services to village communities who currently depend on walking, or expensive transport over usually poor roads, to reach the outskirts of the existing telecommunications network;

   b) Rural Extension and Expansion Programme - to improve and augment telecommunication services to the rural sector of the economy and thus provide the means by which rural areas can achieve sustained economic growth, create income generating opportunities and reduce social and economic inequalities.

5. Project costs are summarised as follows:

	K'000					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
A. Village Payphone						
Equipment	1,200	1,200	1,200	1,200	1,200	6,000
Technical Assistance	320	170	170	170	170	1,000
Contingencies	100	100	100	100	100	500
Total	1,620	1,470	1,470	1,470	1,470	7,500
B. Rural Extension						
Equipment	1,620	1,620	1,620	1,620	1,620	8,100
Technical Assistance	560	210	210	210	210	1,400
Contingencies	100	100	100	100	100	500
Total	2,320	1,970	1,970	1,970	1,970	10,000
Total Costs	3,940	3,440	3,440	3,440	3,440	17,500

6. It would be necessary to conduct a detailed project appraisal or a development survey for the above components of PTC's Rural Telecommunications Programme. The draft Terms of Reference for said project appraisal is included in the project document.

7. Whilst Japanese aid funding is subject to annual appraisals or review, the project appraisal will need to cover the overall rural investment programme for the next five years.

8. Equipment and facilities to be installed under the Rural Extension and Expansion Programme of the project are to be directly managed by the PTC. As for the Village Payphone Programme, overall administration will be co-ordinated through a "Rural Payphone Group", including the establishment of a Trust Account, Village Telephone Chief, etc.

9. The Post and Telecommunication Corporation is an executing agency while Foreign Aid Management Division of the Department of Finance and Planning acts a co-ordinating agency.

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1. PROJECT TITLE: RURAL TELECOMMUNICATION DEVELOPMENT PROGRAMME

   SUBPROJECTS: (1) VILLAGE PAYPHONE PROGRAMME
   (2) RURAL EXTENSION AND EXPANSION PROGRAMME

2. PROJECT PERIOD: 1989 TO 1993

3. PROJECT DESCRIPTION

   (1) VILLAGE PAYPHONE PROGRAMME

   Refer to the installation of at least 400 village payphones at nominated rural centres or villages throughout Papua New Guinea at an estimated costs of K7.5 Million.

   (2) RURAL EXTENSION AND EXPANSION PROGRAMME

   Refer to the provision of digital, analogue, and High Frequency (HF) radio telecommunication services at nominated rural areas, excluding village payphone applications, at an estimated cost of K10.0 Million.

4. EXECUTING AGENCY: Post and Telecommunication Corporation (PTC)

5. DONOR ASSISTANCE REQUIRED: Y Million (K17.5 Million)

6. PRIORITY: High

7. NEEDS FOR TECHNICAL CO-OPERATION:

It would be necessary to conduct an independent development survey or project appraisal of the above elements of PTC's Rural Telecommunications Development Programme to assess the acceptable structure of the project and future expansion. Draft Terms of Reference for the development survey are attached as Annex 1.

8. OBJECTIVES

8.1 VILLAGE PAYPHONE PROGRAMME

To provide two-way telephone communication services to village communities who currently depend on walking, or expensive transport over usually poor roads, to reach the outskirts of the existing telecommunications network.

8.2 RURAL EXTENSION AND EXPANSION PROGRAMME

To improve and augment telecommunication services to the rural sector of the economy and thus provide the means by which rural areas can achieve sustained economic growth, create income-earning opportunities and reduce social and economic inequalities.

9. BACKGROUND

9.1 GENERAL

The land area of Papua New Guinea comprises the eastern half of the island of New Guinea and some 600 islands. About 85 per cent of the total land area of 465,000 sq km is on the mainland. The dominant feature is the central mountain range which runs the length of the country and contains a number of broad highland valleys, some at altitudes of 1,500 meters or higher. On either side of the central range, there are low-lying swampy areas drained by the Fly River in the south, and by the Sepik River in the north. The islands are also mountainous, and some contain active volcanoes.

Owing to the topographical structure of the country, about 85 per cent of the total land area is not suitable for cultivation. Human settlement is dispersed and fragmented and the movement of people and goods is difficult.

In 1980, when the land census was taken, 87 per cent of the population of slightly over three million was living in rural areas and 13 per cent in 63 urban centres, 38 of which had a population of 500-1,999 persons, 14 with population of 2,000-4,999 and 10 with a population of 5,000-10,000. Only one urban centre had a population of over 100,000: Port Moresby, the national capital, which had a population of a little over 120,000 but is growing fast. The present population of the country is about 3.7 million, increasing at about 2.3 per cent per year.

The population density varies markedly among districts, being highest in the Highlands region where 37 per cent of the total population was residing in 1980. This region, which contains four of the 16 largest urban centres, is linked by road to Lae (the second largest urban centre), and also with Madang, another of the 16 largest urban centres. The other larger urban centres have road links only with their hinterlands. Port Moresby has no road link with any other urban centre.

9.2 BACKGROUND ON THE POST AND TELECOMMUNICATION CORPORATION

The Post and Telecommunication Corporation (PTC) is a commercial statutory authority established in 1982 from the then Department of Public Utilities.

PTC's objectives are set out in the PTC Act of 1982 and various Government directives and Cabinet decisions. The Corporation's Board of eight part-time members, the Chairman, Deputy Chairman and Managing Director are all appointed by the Head of State in consultation with the National Executive Council or Cabinet.

With the Managing Director as its head, the Corporation's management structure is organised along five divisions: Telecommunications, Postal, Finance, Personnel & Administration and Corporate Division. PTC has a total staffing of around 3,000 employees as of 1988.

The postal services comprise 41 official post offices and 73 agencies with at least one official and two agency post offices in each province. Some 35,000 post office boxes are available for leasing to customers. The international mail network is maintained through agreements with member countries of the Universal Postal Union.

Telecommunication services provided by PTC are discussed in the following section.

9.3 THE TELECOMMUNICATION NETWORK

The backbone of the network is a series of microwave bearers providing communications to the main centres of population. It comprises 115 microwave links with repeaters on mountain tops, normally solar powered, and with access only by helicopter in many cases. The bearers vary in age from obsolescent Italian equipment installed in 1971 to modern Japanese and French equipment commissioned in 1985 and 1987-88. The bearer network is vulnerable due to its star configuration. (See Annex 2 for a network route map).

The bearers provide service through some 52 exchanges, the majority of which are of vintage electro-mechanical design which are no longer manufactured and difficult and expensive to maintain. (See Annex 3 for a listing of local exchanges and their line capacity). It is planned to replace some of these with digital exchanges over the next decade.

These exchanges provide telephone services to over 30,000 subscribers who make about 150 million calls a year producing a revenue of about K54.0 million in 1987. In most urban areas these services are provided by cable and lines to customer premises while in rural areas more use is made of radio concentrator systems and other line bearers. A considerable amount of cabling is of the old paper insulation type and prone to excessive faults in wet weather.

For subscribers beyond the reach of the exchanges, a High Frequency (HF) service exists where subscribers call by radio into a number of control centres around the country where they are manually linked into the network.

Overseas calls are provided by some 120 submarine circuits in the Australia-PNG (A-PNG) cable located in Boroko and 74 satellite circuits through an earth station at Gerehu. In addition, there is a telex network of some 1,300 subscribers with one telex exchange at Lae and a concentrator at Port Moresby. Meanwhile, 550 data circuits are provided to the business community.

The telephone service is 100 per cent automatic. Both national and international subscriber trunk dialling are available at the telephone service system.

PTC undertakes a coastal radio service and provide spectrum management regulatory functions which produce limited revenues at a cost of about K2.0 Million a year.

9.4 FINANCIAL PERFORMANCE OF PTC

PTC is required to provide postal and telecommunication services to as many people as far as is practicable and at the same time operate on a commercial basis.

Over the last few years, PTC's performance has improved quite significantly:

- Profits before tax increased more than two and a half times from K5.1 Million in 1984 to K13.0 Million in 1987. Budgeted profits for 1988 amounts to K14.9 Million;

- the Corporation became a major contributor to Government revenues in the form of dividends and taxes. Dividend payments increased from K700,000 in 1985 to K3.0 Million in 1987 and K4.0 Million budgeted for 1988. Over the same period, taxes increased from a low of K2.1 Million to K3.9 Million;

- PTC now earns one of the highest return on investments among commercial statutory authorities and is able to generate sufficient funds to maintain liquidity, finance most of its capital investments and service its loans and interest repayments. As of 1987, the Corporation has a very healthy debt to equity ratio of 23:77.

Increased profitability was achieved mainly as a result of cost control, expansion into non-traditional services and increased growth and marketing of existing services.

The improvement in PTC's performance becomes even more significant in that these were achieved with minimum tariff increases. On record, PTC's tariffs declined in real terms during this period.

9.5 FIVE YEAR DEVELOPMENT PLANS AND THE PTC NETWORK DEVELOPMENT PLAN AND MANAGEMENT REVIEW

On an annual rolling basis, the Corporation submits to National Government a "Five Year Development Plan" which outline PTC's objectives, plans and strategy.

Details of PTC's revenues, expenses, investments and key operating and financial measures are attached as per PTC 1987-91 Five Year Development Plan and the revised 1988-92 Five Year Development Plan.

In consultation with National Government, PTC undertook an independent World Bank funded consultancy for a Network Development Plan and Management Review. The consultancy had two main objectives. Firstly, to plan for an orderly expansion of the network for the period 1989-1993 with indicators up to the year 2002. Secondly, to review the PTC Management efficiency, effectiveness and abilities. The consultancy commenced on 27 November 1987 and was completed in June 1988.

The firms Deutsche Teleposts Consulting Gmbh (Detecon) and Coopers & Lybrand were selected to undertake the consultancy following a review of 135 companies from 24 countries. The study was funded under World Bank Project Preparation Facility No. P14.

Based on the Five Year Development Plan and the above World Bank funded consultancy on PTC's Network Development Plan, the Corporation plans to undertake major capital investments amounting to K163.0 Million for the period 1989-93, of which K43.5 Million are specifically nominated for external aid funding.

9.6 MAJOR PROJECTS FOR EXTERNAL AID FUNDING AND DETAILED PROJECT APPRAISALS

In consultation with National Government, the following projects and potential sources of external aid funding are proposed for the period 1989-93:

Nominated Projects	Amount	Source
Rural Telecommunications	K17.5	Japanese Grant Aid
Trunk & Junctions	12.0	German Mixed Finance
Exchange and MIS*	14.0	World Bank
Total	K43.5	

* MIS refer to Management Information System Review

Details of the above are shown in the 28th July 1988 Aide Memoire executed between the National Government, PTC and World Bank. (See Annex 4).

A pre-requisite for external aid funding are detailed project appraisals of the above nominated projects. In this regard, the following are noted:

a) Project appraisals will need to be undertaken through a "lead agency" arrangement;

b) Project appraisals will have to be closely co-ordinated to ensure that these do not cause undue administrative difficulties on the part of National Government, PTC, aid agencies and potential donor countries;

c) Detailed Terms of Reference (TOR) for each project appraisal (or combined project appraisals) will need to be clearly established and agreed to by all parties to avoid overlaps and to ensure that they are consistent with the overall PTC Network Development Plan:

   - it may be possible to combine the project appraisals for exchanges, trunk and junction equipment and the management information system review;

   - whilst a "separate" appraisal on rural telecommunication can be undertaken, this will have to be integrated to the project appraisal on exchanges, trunk and junctions and the MIS review.

d) A co-ordinated approach to project appraisals will assist in the review of major issues as well as define clear responsibilities and accountability;

e) Finally, project appraisals are to be reviewed within the overall context of Papua New Guinea's overall telecom sector review.

The proposal for Japanese aid funding and the draft Terms of Reference for a "Master Plan" or detailed project appraisal of the Rural Telecommunications Development Programme was prepared with the above consideration in mind.

The existing rural services provided by PTC is covered under Section 10 and the project outline discussed under Section 11 below.

10. EXISTING RURAL TELECOMMUNICATION SERVICES

In Papua New Guinea, the rural population enjoy fewer and less adequate telecommunication services than the urban population. Access to service and the penetration of service in rural areas are very low.

Clear strategies need to be established to provide a more responsive and affordable services. Specific investment programmes to extend and expand services at village centres and other remote rural centres are required.

The Board and Management of PTC and National Government have clearly stated that the greatest potential for substantial and sustained economic growth is in the rural sector. It is also the area where the greatest benefit could be provided in terms of improved income generating capabilities and higher standards of living.

At present, PTC employs different systems for telephone connections in rural areas. These systems are outlined below:

a) Single Channel Radio Systems

This system operates in a dedicated radio channel mode. The subscriber is directly connected to the telephone exchange via a dedicated VHF/UHF radio channel. The frequencies used are in the range of 150-156 MHz and 450-460 MHz.

The central radio terminal is directly connected to the terminal exchange as a local subscriber, but there are also configurations where the central radio terminal is situated at a microwave repeater site and is connected in the sub-base band. The subscriber radio terminal, including the antenna, is installed at the subscribers premises.

The RF output power of the transceivers are about 10 Watts. With due considerations of the antenna gain and the topographical conditions, distances of about 80-100 km can be covered by single channel systems, and in exceptional cases, distances of up to 160 km have been reached.

b) Telephone Subscriber Connection Unit (TSCU)

Another solution to connect subscribers to the nearest terminal exchange is the utilisation of carrier channels in microwave bearer systems or in low capacity microwave bearer systems.

At the incoming and outgoing end of carrier-derived telephone circuits, telephone subscriber connection units provide the signalling interface and incorporate the 2-wire/4-wire hybrids, because the carrier derived circuits are generally 4-wire circuits.

Microwave systems designed for junctions and trunk purposes may be used to provide subscriber lines to an exchange. This is justified by the circumstances outlined below:

- links in rural areas where a fast telephone expansion is foreseen during the equipment's life expectation;

- several subscriber carrier lines with an exceptional long extension along a common path.

c) Rural Subscriber System (RSS)

The RSS is a radio system where a given number of radio channels are assigned to a given service area and all subscribers located in that area constitute a multi-access radio group, each of them being capable of access on demand any free radio channel in the group.

PTC employs a system with four radio channels and 48 subscribers. However, due to the high telephone traffic of rural subscribers, only 20 to 24 subscribers are being connected to each group of 4 channels. This system is of the analogue type. The base radio station is either located at the terminal exchange site or at a distant site with a trunking line, which is a low capacity microwave system.

This radio system can cover a radius of about 50 km. Typical conditions favouring the application of multi-access radio systems are found when subscriber density is not minimal and when subscribers are more or less uniformly distributed over the service area.

It is relatively easy to connect new subscribers when such a system has been installed.

d) Digital Rural Systems

Digital technology has also stimulated the development of multi-access distribution systems for rural applications using digital TDMA techniques (i.e., time division multiple access).

The system generates a TDM frame with a given number of time slots which is transmitted at a radio frequency to a service area. All subscribers located in that area constitute a multi-access group, each of them being capable of accessing on demand any free time slots in the TDM frame.

Given the plans of PTC to replace analogue exchanges with digital exchanges, these type of applications are expected to have an increasing role in the future.

Existing rural circuits by size and province of Papua New Guinea are shown in Annex 5. Details of line concentrators, TSCUs and RSS systems are shown in Annex 6.

11. PROJECT OUTLINE

11.1 GENERAL

The proposed "Rural Telecommunications Development Programme" comprise two major components:

. Village Payphone Programme; and

. Rural Extension and Expansion Programme.

Whilst both projects are intended to boost rural telecommunication services in Papua New Guinea, the distinction is deliberate given differences in administration, target subscribers and implementation of the projects

The above projects are discussed in detail below.

11.2 VILLAGE PAYPHONE PROGRAMME

The provision of an effective telecommunication service in remote villages has been hampered by inadequate technology, remoteness of villages for maintenance and the cost of provision of the service.

With the advent of dependable radio services, robust coin telephones, effective solar power and the rising willingness in the villages to supervise the telephone, it is now possible, subject to the availability of funds, to provide the service through the "Village Payphone Programme".

This exciting initiative will bring two-way telephone communication to village communities who currently depend on walking, or expensive transport over usually poor roads, to reach the outskirts of the existing telecommunications network.

Under the "Village Payphone Programme", the villages will be asked to form a three-way partnership for their own benefit:

- Government secures through external aid agencies the funds for the initial capital costs of the project;
- PTC administers and installs the system at no charge and free rental;
- the villagers protect the installation, pay a nominal deposit and pay for calls. (Please refer to Annex 7, Schedule 1 for details of the responsibilities of villagers);

As presented, the proposal reflects a move away from the "cargo cult" mentality where services are provided without the active participation or involvement of the recipients of the service.

The major elements of the "Village Payphone Programme" are discussed below:

a) A village payphone will be considered by PTC/National Government for installation in villages:

   - within the radio reach of PTC's Telephone network;
   - where the village has significant population in the immediate area (say 500 or more people);
   - where a Police Station or Bank Agency exists or within easy walking or driving distance for the security of the collections;
   - within the funds set aside by National Government and/or donor Government for this purpose;
   - within the priorities and programme to connect the service (i.e., to include a review of existing support services and expected contribution to the base economy of the villages)

b) The service will be provided by means of Ultra High Frequency or Very High Frequency (UHF or VHF) radio, on a point-to-point basis, or on a shared radio circuit, as determined by the radio path and the need to serve other villages, hospitals, mines, plantations, etc., in the range of the base station equipment;

c) The payphone will allow outward calls, STD and ISD and calls via the manual operator. All types of inward calls will be possible. (Note: the payphone will charge by the insertion of coins at the same rate as telephones within the nearest town, that is, there will not be any additional surcharge for calls from or to the village coin telephones);

d) Costs for installation will vary depending on the most practical installation, and prices will be influenced by tenders received for either digital or analogue remote subscribers. It is estimated that the cost per installation will amount to at least K10,000 per installation and increasing should mountain top repeater sites be required and any trunk upgrades. (Please refer to Annex 7 Schedules 2 and 3 for equipment requirements and details of costs).

e) The administration of the "Village Payphone Programme" will be undertaken via a Committee or a "Village Payphone Group" established for this purpose and supported by a Secretariat who will handle requests for village payphones, undertake technical reviews, maintain a rolling programme for implementation and provide overall administration. (Please refer to Annex 7, Schedule 4 for details on overall administration).

Thus far, PTC has installed two pilot village payphones in remote centres in Papua New Guinea. These are located in Barakau Village and Hula Village, both in the Central Province of PNG. (See Annex 7, Schedule 5 for pictures of the Barakau village payphone pilot scheme).

In consultation with National Government and the donor country, PTC plans to introduce at least 400 village payphones over the next five years:

- at this level, telecommunication services could be extended to at least 200,000 people (i.e., benefit to at least 500 people per village over 400 village payphones);

- effective and efficient services will be extended to essential support services (e.g., schools, missions, clinics and others);

- telecommunication services will be geared toward assisting the base economy of the villages (e.g., fishing, coffee, copra, oil palm and other forms of economic activity);

- each province could avail of at least 20 village payphones.

Submissions are presently being obtained from Provincial Governments on potential village payphone sites under agreed submission formats. This list will be compared with those identified by PTC and a consolidated list prepared following an independent review by the Rural Payphone Group. On average, it is estimated that around 80 public payphones can be installed per year under the programme.

Finally, in establishing an overall strategy for providing access to villages via public payphones, the Corporation seeks to avail of the following advantages of this approach:

- revenues from public payphones are generally 3 to 4 times higher than revenues from residential subscribers;
- It provides the opportunity for access to a wide number of people to "keep in touch" as well as secure basic services at an affordable price;
- Payphones generally allow for lower investment cost and maintenance costs per person served;

Detailed cost estimates for the "Village Payphone Programme" are discussed under Section 12. Other than the direct cost of providing village payphone equipment, external aid assistance is required for on-going technical support to install the system; training; the provision of spare parts; and the establishment of tendering procedures, preventive and corrected maintenance procedures, equipment specifications and standards.

11.3 RURAL EXTENSION AND EXPANSION PROGRAMME

Other than the provision of direct telecommunication services to village communities, a concerted effort is required to extend and expand services to rural areas through the use of analogue rural subscriber systems, digital rural subscriber systems and HF radio services.

Instead of providing public payphones to a wide number of users in a village community setting, the objectives of the "rural extension and expansion programme" are as follows:

- to enable individuals and small groups of subscribers, including business and government units (particularly in rural areas), to be linked to a local exchange;
- to bring commercial activities to underdeveloped areas where commercial and government sponsored projects have been identified e.g., oil exploration, gold mining, health, education and agricultural activities such as coffee, rubber, oil palm and others;
- to provide rural areas with rapid access to basic services often needed to preserve life, health and prosperity, and with enhanced contact, to facilitate political, social, economic and cultural integration.

In keeping with the above objectives, the Corporation has identified a number of rural telecommunication projects over the next five years. A phased approach is proposed which would take into account the proposed upgrades in urban exchanges as well as the planned digitalisation programme for a number of exchanges.

The following are the major elements of the proposed "Rural Extension and Expansion Programme" of PTC:

a) Proposed development and investment plan must reflect the planned growth in rural services and take account the judicious and economic use of improved technology (e.g., digitalisation and satellite applications) where applicable;

b) Over the next five years, the total direct investment costs in rural extension and expansion programme comprise the following:

	Million
. major projects using digital technology	K7.735
. major projects using analog technology	4.285
. provision for various RSS	3.155
Total investment cost.	K15.175

c) A review of the capital costs according to major plant accounts indicate that not all of the capital expenses may be eligible for external aid funding:

	Million
. Trunk and Junction expenses	K4.727
. Power Provision	3.724
. VHF Subscriber Instruments	3.394
. Subscriber Cables	0.763
. Local Auto Exchange investments	0.359
Sub-total (potential external aid funding)	K12.972
. Buildings	K 1.917
. Conduits and Other expenses	0.291
Sub-total (internal funding components)	K 2.208
Grand Total	K15.175

d) PTC and National Government may wish to internally fund a number of projects identified in the programme:

. some of the projects identified are quite small and may not warrant their inclusion in the overall request for external aid funding e.g., proposed rural extensions in Aseki, Tomavatur, and Taskul system;

. other projects which are of an urgent nature requiring installation by PTC e.g., the proposed Yapsie/Telefomin system is intended to provide telecom services to areas near the border for national security reasons.

It is re-iterated that whilst the above projects are included in the PTC's overall rural extension and expansion programme, these will most likely be funded by PTC.

e) Subject to a detailed project appraisal of the proposed "rural extension and expansion programme", a ceiling of K10.0 Million has been established for aid funding. This level of expenditure is intended to cover the following major capital costs:

- direct capital expenses in rural trunk and junctions, power provision, VHF subscriber instruments and cables, and costs to be incurred at the local automatic exchanges;

- in addition, costs to be incurred for project management, design costs, mechanical aids, tools and test equipment, training and appropriate provisions for contingencies.

As appropriate, adjustments can be made on the overall request for external aid funding from the Japanese Government.

f) Lastly, PTC's "rural extension and expansion programme" is updated on an annual rolling basis. Delays in undertaking the project appraisal and/or securing final agreement on external funding may result in some projects being undertaken by PTC while new projects are added to the list as these are updated. The final listing which is jointly approved by the Japanese and Papua New Guinea Government will, however, be reserved at the appropriate time.

12. COST ESTIMATES

The expected cost of PTC's Development Programme is estimated to be at least K17.5 Million for the next five years.

- Village Payphone Programme K 7.5 Million
- Rural Extension and Expansion Programme K10.0 Million

Expected aid funding drawdowns are summarised in the following tables:

	K'000					
A. Village Payphone	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Village Equipment	1,050	1,050	1,050	1,050	1,050	5,250
Trunk & Junctions*	150	150	150	150	150	750
Technical Assistance	100	50	50	50	50	300
Design Costs	100	---	---	---	---	100
Tools & Test Equipment	80	80	80	80	80	400
Training	40	40	40	40	40	200
Others (Contingency)	100	100	100	100	100	500
Sub-Total	1,620	1,470	1,470	1,470	1,470	7,500

*includes exchange-related costs

Notes:

1. It is proposed that at least 80 village payphone will be installed per year or a total of 400 for the programme period.

2. Equipment costs at the village level is estimated at K10,000 per unit. However, this would increase should mountain top repeater sites be required. For the above table, an average unit cost of K13,000 has been assumed.

3. Trunk upgrades to connect some of the village payphones will require additional costs budgeted at K150,000 per year to install the programmed 80 village payphones per year.

4. Other than direct equipment costs, aid funding will be required for the provision of technical assistance, design costs, mechanical aids and tool & test equipment and training at the above stated amounts. (N.B. Technical assistance will be required to assist PTC in installing the above programme of installation).

5. Finally, a provision of K500,000 is made for contingencies.

B. Rural Extension & Expansion Programme

	K'000					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Rural Equipment:						
- trunk & radio equip.	500	500	500	500	500	2,500
- power provision	400	400	400	400	400	2,000
- VHF instruments*	400	400	400	400	400	2,000
- subscriber cables	80	80	80	80	80	400
- exchange costs	40	40	40	40	40	200
Network Equipment	200	200	200	200	200	1,000
sub-total	1,620	1,620	1,620	1,620	1,620	8,100
Technical Assistance	200	---	---	---	---	200
Design Costs	150	---	---	---	---	150
Tools & Test Equipment	170	170	170	170	170	850
Training	40	40	40	40	40	200
Others (Contingency)	100	100	100	100	100	500
Sub-Total	2,320	1,970	1,970	1,970	1,970	10,000

* includes base station costs

Notes:

1. Of the total amount of K15.175 Million identified by PTC for the "rural extension and expansion programme", about K10.0 Million will be formally submitted to the Japanese Government for external aid funding over a five year period.

2. A listing of proposed rural extension projects, broken down into their major capital cost components, and their proposed location are attached under Annex 8.

3. Items specifically excluded from the project requests are:

   a) Buildings and costs other than those related to trunk and junctions, power provision VHF subscriber instruments, subscriber cables and investments at the exchanges;

   b) small projects which could be funded internally by PTC (e.g. Aseki, Tomavatur, etc.);

   c) specific projects which are of an urgent nature such as the Yapsie/Telefomin rural extension project.

   (N.B. please refer Section 11.3, items (a) to (f) above.)

4. As with the "village payphone project", specific provisions are made for the interconnection of the rural network to the overall network, technical assistance, design costs, tools and test equipment, training and contingencies for the rural extension and expansion programme.

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ANNEXES

RURAL TELECOMMUNICATIONS DEVELOPMENT PROGRAMME

ANNEX NO.	D E S C R I P T I O N
1	DRAFT TERMS OF REFERENCE FOR A DEVELOPMENT SURVEY OR PROJECT APPRAISAL
2	PAPUA NEW GUINEA TELECOMMUNICATIONS NETWORK ROUTE MAP
3	LISTING OF LOCAL EXCHANGES AND THEIR LINE CAPACITY
4	28TH JULY 1988 AIDE MEMOIRE BETWEEN THE NATIONAL GOVERNMENT, PTC AND WORLD BANK
5	EXISTING RURAL CIRCUITS BY PROVINCE OF PAPUA NEW GUINEA
6	DETAILS OF LINE CONCENTRATORS, TSCUS AND RSS SYSTEMS
7	VILLAGE PAYPHONE PROGRAMME SCHEDULE 1: RESPONSIBILITIES OF VILLAGERS SCHEDULE 2: EQUIPMENT REQUIREMENTS SCHEDULE 3: COSTS SCHEDULE 4: OVERALL ADMINISTRATION SCHEDULE 5: BARAKAU VILLAGE PAYPHONE
8	LISTING OF MAJOR PROJECTS UNDER THE PROPOSED RURAL EXTENSION AND EXPANSION PROGRAMME

DRAFT TERMS OF REFERENCE FOR JAPANESE FUNDING

1. Background. Take note of the recently completed World Bank funded study on PTC's Network Development Plan and Management Review and examine in detail the following rural telecommunications components:

   a) Village Payphone Programme - refer to the installation of at least 400 village payphones throughout Papua New Guinea at an estimated cost of K7.5 Million;

   b) Rural Extension and Expansion Programme - refer to the provision of digital and analogue telecommunication equipment and services at nominated rural centres, excluding the above village payphones, at an estimated cost of K10.0 Million;

   The above projects and their elements are referred to in this Terms of Reference as the "Rural Telecommunications Development Programme".

2. Objective. To undertake a detailed and independent assessment of the Corporation's Rural Telecommunications Programme as identified in PTC's Network Development Plan for the period 1989-93;

3. Scope of the Review. Identify the engineering and technical requirements of PTC's Rural Telecommunications Development Programme as well as assess their financial and economic viability, with specific reference to the following:

   a) Take note of the overall traffic and demand statistics as provided in PTC's Network Development Plan and Management review and undertake and independent assessment of current and potential traffic and subscriber demand at rural areas of Papua New Guinea;

   b) Take note of existing tariffs and proposed tariff structures and components under the PTC's Network Development Plan and undertake an independent review of tariff which may be applicable for rural services. As appropriate, undertake sensitivity analyses;

   c) Equipment specifications and standards for power provision, trunk and junctions, local automatic exchanges, conduits, cables, subscriber instruments and others;

   d) Type(s) and size of equipment and proposed location for installation;

   e) Identify specific manpower, training and maintenance requirements to successfully implement the rural telecommunications programme;

f) Quantify likely revenues and expenses of PTC's Rural Telecommunications Development Programme and expected return on investment. In addition, estimate the likely economic cost and benefits to the Papua New Guinea;

g) Ascertain and assess the impact of telecommunication services on the base economy and support services to which rural telecommunication services are to be extended (e.g., coffee base economy; medical centres, schools, etc. are support services);

h) Recommend clear guidelines for prioritising current and future rural telecommunications programmes;

i) Quantify the extent of direct Government subsidy and alternative ways of funding the programme e.g., cross subsidies from commercial services;

j) Establish performance targets and measures for monitoring and assessing the Rural Telecommunications Development Programme on an on-going basis, together with the establishment of reporting systems;

4. Consistent with the above, identify and quantify the costs of the necessary investment to integrate PTC's rural telecommunications development programme with the Corporation's overall network i.e., urban exchanges, microwave bearer network, and others;

5. In consultation with PTC and National Government, identify specific areas of mutual co-operation to support the Rural Telecommunications Development Programme, to include:

a) Technical support;
b) Provision of spare parts;
c) Preventive and corrective maintenance;
d) Tendering procedures
e) Equipment installation and commissioning

6. Period of Study. It is estimated that the above "Master Plan" or "Project Appraisal" will take no longer than six (6) calendar months.

7. Composition of the Study Team. It is estimated that the study team will comprise of specialists with the following areas of expertise:

1) Team Leader with relevant experience in the design, project management and implementation of rural telecommunications projects. Suitable expertise in network engineering and commercial management is essential;

2) Four (4) specialists in the following areas:

a) Exchange Engineer with analogue and digital exchange expertise, particularly in LME cross-bar;

b) Transmission Engineer with particular expertise in rural radio system design and propagation transmission;

c) Outside Plant Engineer;

d) Financial and Economic Analyst with suitable experience in telecom investment analysis including the review of demand, traffic and tariffs;

8. Project Activities, Manmonth estimates and Costs

PTC and National Government estimate that the development survey or project appraisal will require no longer than 7.5 manmonths to complete. However, the consultants should quote the number of manmonths they consider necessary to properly carry out the terms of reference:

		Manmonths
(1)	Traffic, Demand and Tariff Assessment	
i)	Traffic and demand study	2.0
ii)	Tariff review and options	
iii)	Sensitivity Analyses	
(2)	Rural Network Development Programme	
i)	Design, specifications and Standards	4.0
ii)	Type, size and location of equipment	
iii)	Manpower, training & maintenance requirement	
iv)	Interconnection to the PTC network	
(3)	Financial and Economic Analyses	
i)	Revenue, Expenses and Return on Investments	1.0
ii)	Impact on base economy, support services and estimated economic costs and benefits	
(4)	Review of Policy Options and Performance Monitoring	
i)	Guidelines for establishing priorities	0.5
ii)	Quantify Government subsidy and alternatives	
iii)	Establish performance measures and targets as well as reporting systems	
Total Manmonths		7.5

The cost of the development survey or the project appraisal based on the above project activities and manmonth requirements is estimated at between K120,000 to K150,000.

9. Reports. The following reports will be submitted to the Post and Telecommunication Corporation and the Government of Papua New Guinea, during the course of the development survey or project appraisal:

(1) Inception Report - to be submitted after three weeks field work giving detailed work plans for the consultancy and highlighting potential problem areas and how these might be treated;

(2) Interim Report - approximately halfway through the consultancy, the consultant will submit an interim report which would summarise work progress and update plans to ensure that the consultancy meets its objectives and is completed on schedule;

(3) Draft Final Report - upon completion of the field work, the consultants will submit a Draft Final Report to include specific recommendations on the Rural Telecommunications Development Programme;

(4) Final Report - to be submitted no later than the end of the sixth calendar month. The consultants will discuss this report with PTC and the National Government.

10. Timing

Subject to the agreement of the National Government and the Japanese Government on the project appraisal and terms of reference, the consultancy contract is expected to be awarded no later than December 1988. The consultants are expected to commence the field work by February 1988 and complete their report no later than July 1989.

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(ANNEX—2は省略)

Transmission Systems

(1) Primary Bearers

Route		Capacity
LAE	- Boroko	1,260
	- Goroka'	1,260
	- Rabaul	960
GOROKA	- Madang	960
	- Mt Hagen	1,260
MT HAGEN	- Boroko	1,260
	- Wewak	960
BOROKO	- Gerehu (Satellite Earth Station)	960
	- Mt Lawes	1,800
RABAUL	- Arawa	960

(2) Local Bearers

(2-1) Small Capacity Microwave Bearers

Route		Type	Capacity
MT LAWES	- Alotau	TELETTRA	300
	- Cupola	TELETTRA	120
	- Kwikila	TELETTRA	120
	- Kupiano	TELETTRA	120
	- Popondetta	TELETTRA	300
	- Sogeri	NEC 4M/BIT	120
MT SHUNGOL	- Bululo	TELETTRA	120
MT NAMBAMATI	- Ramu	NEC TRS-FM120	120
MT YANGUTEGA	- Kainantu	STC ML1	24
MT KERIGOMNA	- Kundiawa	TELETTRA	120
MT KAIMUNGA	- Banz	TELETTRA	120
MT IALIBU	- Mendi	TELETTRA	120
MT ROBINSON	- Kiunga	THOMSON-CSF	300
MT ROBINSON	- Tabubil	THOMSON-CSF	300
MT KEGUM	- Wabag	TELETTRA	120
	- Wapenamanda	MSK	10
MT ALBOWAGI	- Angoram	STC ML1	24
MT SAPAU	- Aitape	THOMSON-CSF	120
	- Nuku	THOMSON-CSF	120
	- Green River	THOMSON-CSF	120
	- Amanab	THOMSON-CSF	120
MT SU	- Imonda	THOMSON-CSF	120
MT OPWIN	- Bewani	THOMSON-CSF	120
ANDEWA	- Kandrian	TELETTRA	120
KIMBE		TELETTRA	300
UNA PASABA	- Namatanai	THOMSON-CSF	120
ANEWA	- Kieta	FARINON SS2000	300
KUPARA	- Panguna	FARINON SS2000	120
TAKANIAT	- Tinputz	THOMSON-CSF	120
MT MUSE	- Vanimo	THOMSON-CSF	300
MT KEREWA	- Tari	TELETTRA	120
MT HARAGU	- Kavieng	THOMSON-CSF	300

(2-2) Small Capacity UHF Bearers

Route		Type	Capacity
MT LAWES	- Doa	NEC TR4-PM6	6
	- Memeave	NEC TR4-FM60	60
	- Rouna	NEC TR4-PM6	6
MEMEAVE	- Bereina	MSK	5
	- Tapini	MSK	5
CUPOLA	- Kerema	GRANGER TROPO	24
ALOTAU	- Samarai	NEC TR4-FM60	60
	- Gamadoudou	NEC TR4-PM6	6
MT KAINDI	- Mumeng	GEC	5
	- Wau	GEC	15
MT NAMBAMATI	- Mutzin	NEC TR5-FM120	120
OOMSIS	- Nadzab	NEC TR5-FM120	120
SATTELBURG	- Finschafen	NEC TR4-FM60	60
WAU	- Wau Goldfield	NEC TR4-PM6	6
NADZAB	- Menyamya	NOKIA FM4-430	4
MADANG	- Hansemen	NEC TR5-FM120	120
HANSEMEN	- Dibun	NEC TR5-FM120	120
DIBUN	- Bogia	NEC TR4-FM60	60
	- Kinim	NEC TR4-FM60	60
KINIM	- Miak	NEC TR4-PM6	6
	- Kulili	NEC TR4-PM6	6
YABOB	- Yagaum	MSK	5
AMBUNTI	- Maprik	NEC TR4-FM60	60
GOROKA	- Uritoka	NEC TR4-FM12	12
MT HAGEN	- Kagamuga	NEC TR5-FM120	120
MT KEGUM	- Ialibu	NEC TR4-FM60	60
	- Imi	NEC TR5-FM120	120
MT ROBINSON	- Palomian	NEC TR4-FM60	60
TOMAVATUR	- Kokopo	NEC TR4-PM6	6
NAMATANAI	- Lihir	NOKIA FM4-430	4
LORENGAU	- Lombrum	NEC TR4-PM6	6
TOMAVATUR	- Warangoi	NEC TR4-PM6	6
MT KEREWA	- Porgera	NOKIA FM4-430/160	8
TARI	- Bphides	NOKIA FM4-160	4
MADANG	- Lorengau	GRANGER TROPO	24

Note: AGE of the equipment are as follows:

- Less than 7 - 8 years: NEC TR - FM
  NOKIA FM
  THOMSON-CSF
- About 10 years : FAROMPM SS2000
  TELETTRA
  GEC
  MSK
- More than 14-15 years: GRANGER
  STC ML

Telephone Exchanges

Exchange	Population	Type	Age of Ex.(yr)	Capacity	Full (%)
PORT MORESBY AREA	123,624	-	-	-	-
Boroko	66,457	ARF	19	2,000L	82.3
Ela Beach	37,206	ARE-11	5	5,000L	74.9
Gerehu	14,761	ARE-11	4	1,800L	30.7
Bomana	4,148	ARK-521M	17	400L	53.5
LAE AREA	61,617	-	-	-	-
Lae	45,336	ARF	14	4,600L	84.6
Taraka	16,281	MCR	4	512L	85.3
Hadang	21,335	ARF	19	1,600L	82.7
Wewak	19,890	ARF	14	1,000L	77.3
Goroka	18,511	ARF	13	2,000L	70.3
Rabaul	14,954	ARF	12	2,400L	80.2
Mt Hagen	13,441	ARF	13	2,000L	65.0
Arawa	12,588	ARF	14	2,000L	90.6
Daru	7,128	ARK-522M	10	300L	59.0
Bololo	6,730	ARK-522M	19	200L	44.0
Popondetta	6,429	ARK-521M	12	500L	74.6
Kimbe	4,662	ARK-521M	12	600L	83.3
Kavieng	4,633	ARK-522M	9	400L	72.2
Alotau	4,311	ARK-522M	8	400L	78.7
Kundiawa	4,299	ARK-521M	12	400L	69.0
Mendi	4,130	ARK-521M	12	400L	71.2
Lorengau	3,986	ARK-522M	9	400L	60.0
Kainantu	3,779	ARK-521M	12	300L	71.3
Pauguna	3,566	ARK-521M	14	400L	79.0
Kieta	3,491	ARK-521M	14	500L	89.4
Aitape	3,308	MCR	3	128L	49.2
Kerema	3,389	ARK-521M	12	200L	58.0
Vanimo	3,071	ARK-521M	10	300L	76.3
Wau	2,349	ARK-521M	19	200L	80.0
Kokopo	2,167	MCR	4	256L	66.4
Wabag	1,518	ARK-522M	9	200L	71.0
Angoram	1,846	ARK-521M	14	100L	38.0
Buka	1,518	ARK-522M	9	200L	53.0
Kiunga	1,407	MCR	8	256L	54.0
Sogeri	1,139	RURAX	21	100L	39.0
Maprik	1,121	MCR	2	100L	54.6
Kagamuga	1,117	MCR	4	384L	61.4
Kwikila	1,022	ARK-522M	7	100L	28.0
Kupiano	948	ARK-522M	8	100L	47.0
Banz	913	MCR	4	256L	55.0
Minz	898	RURAX	16	50L	-
Kerevat	894	ARK-521M	1	100L	55.0
Buin	885	ARK-522M	8	100L	51.0
Samarai	864	RURAX	22	100L	32.0
Finschhafen	756	ARK-521M	14	100L	77.0
Nametani	753	MCR	2	128L	41.4
Wapenamanda	739	ARK-521M	9	100L	45.0
Tari	616	MCR	3	128L	58.5
Bereina	583	RURAX	9	50L	36.0
Toleap	280	ARK-521M	14	230L	57.8
Tabubil	211	MCR	2	256L	91.4
Bialla	202	ARK-522M	5	200L	50.0
Nairovi	66	ARK-521M	14	100L	50.0

Note: The order of station name is subjected to the number of population (PNG country statistical data in 1980), and is not subjected to the DELs.
ARF, ARK are cross bar switch (made in LME company) and MCR, ARE11 are electronic automatic exchange (analogue type).

AIDE MEMOIRE

A World Bank mission comprising Mr. E. Vidal and Mrs. C. Ramsay visited Papua New Guinea from July 17 to 28, 1988, and met with representatives from the Government of Papua New Guinea (GOPNG) and the Posts and Telecommunications Corporation (PTC) as listed in Annex 1. The following summarizes the main findings of and agreements reached during the mission.

1. Objectives of the mission. The mission's main objectives were:

a) To present to GOPNG and PTC a Telecommunications Policy Options Paper, and agree an action plan for implementation of necessary policy changes.

b) To review the recently completed Consultants report "PTC Network Plan and Management Review" which contains the proposed telecommunications project for the 1990-1994 period and to give comments to PTC and GOPNG.

2. Policy Options Paper. The annex "Forum on Telecommunications Policy Options - summary of the meetings" details the results of the meetings, as well as the areas of agreement between GOPNG and PTC. The "Action Plan" identifies the next steps and the parties responsible for implementation.

3. Telecommunications Project. The review of the Consultants report was carried out with PTC and GOPNG. The project components include the expansion and replacement of the telecommunications network, and institutional development components to increase PTC effectiveness and efficiency to respond to subscriber's demand for services. A discussion with GOPNG on the possible sources of financing for the Project is summarized in the annex "Assumptions on Financing".

4. Next Steps. The GOPNG will write to the Bank to advise its decision with respect to financing of the Télecommunications Project. Subject to approval by Bank's management of the inclusion of the Telecommunications Project in the lending program, the GOPNG, PTC and the Bank will agree on the next steps for project processing.

For the Government of Papua New Guinea

For Posts and Telecommunications Corporation

For the World Bank mission

PAPUA NEW GUINEA

PLAN OF ACTION FOR TELECOMMUNICATION POLICY

Policy Objective/ Action	Time scale	Resp.
1. Expansion of telecommunication Services		
a) Agree provisional strategy for rural development to support 5-year development program	Oct.88	GOPNG/PTC
b) Specify medium and long term targets for extending access	Jan 89	PTC
c) Agree long term strategy for network expansion	Mar 89	GOPNG/PTC
2. Improved Tariff Policy		
a) Agree policy for establishing tariffs levels and structure	Oct 88	GOPNG/PTC
3. Improved investment and sector financing		
a) Expand investment criteria	Jan 89	GOPNG
b) Establish subsidy Policy	Oct 88	GOPNG
c) Agree strategy for sector financing	Oct 88	GOPNG/PTC.
4. More commercial orientation for PTC		
a) Agree Standards for key performance indicators	Oct 88	GOPNG/PTC
b) Agree framework for new organization structure and implementation schedule	Jan 89	PTC
c) Agree changes in SCHC to permit incentives to PTC staff based on performance	June 89	GOPNG
d) Review relationship between Government, PTC's Board and PTC's management	June 89	GOPNG/PTC
e) Confirm policy on private participation in certain segments of the telecommunication sector	Oct 88	PTC

ANNEX 1

LIST OF PERSONS MET

GOVERNMENT OF PAPUA NEW GUINEA

Morea Vele	Secretary for Treasury
Ereman Ragi	First Assistant Secretary, Commercial Investments Division
Robert Igara	First Assistant Secretary, Aid Management Division
Rupa Mulina	First Assistant Secretary, Economic Policy
Thomas Ume	Deputy Price Controller
Baluwe Umetrifo	CSA Branch, Investment Division
Clement Kote	Assistant Secretary, Fiscal Policy
Gabriel Pepson	Assistant Secretary, International Development Institutions

POSTS AND TELECOMMUNICATIONS CORPORATION

Ron Elias	Managing Director
F. Danny Coyle	Advisor, PIC Board
Dale Kamara	Director, Corporate Relations
John Kamblijambi	Corporate Secretary
Jim Bautegui	Executive Manager, Corporate Planning
Peter Simpson	Executive Manager, Marketing and Customer Services
Roger Occomore	Divisional Manager, Personnel and Administration
Ed Milland	Divisional Manager, Finance
James Uraru	General Manager Telecom.
Allan Olden	Executive Manager, Engineering Planning
S.Siva	Manager, Telecom Finances
B. Sekar	Manager, Accounting

ASSUMPTIONS ON FINANCING

1. At this stage, the following potential sources of aid funding have been identified for PTC's investment programme for the next five years:

a) Japanese Funding - As of 31st May 1988, the Japanese Government through their aid agencies have expressed interest in providing grant aid funding of rural telecommunications projects of up to K17.5 Million. These include the K7.5 Million "Village Payphone" Project and a K10.0 Million "Rural Development" component;

b) German Funding - Following the Consultative Group Meeting of 19-20th May and the 23-25th meeting with the delegation from Germany, PTC and the PNG Department of Finance were advised that it is not possible for the German Government to fund the whole PTC's public investment programme but will consider co-financing arrangements with both the Japanese Government, and World Bank. German Government input may be in the form of "mixed finance" comprising a fixed grant element, soft loans and export credit. In accordance with German Government policy, commitments for aid funding are made on an annual basis and that this is likely to be in the form of tied aid. Whilst detailed discussions are scheduled for September 1988, both the PNG Government and PTC representatives understand that German Aid funding could amount to K12.0 Million. Further, German aid funds could be used to finance PTC's digitalisation programme and other non-rural development projects;

c) World Bank Funding - both PTC and the Department of Finance view World Bank as a lender of last resort. This is consistent with Government's policy to expand and secure more concessional funding from donor countries such as Japan and Germany. In close consultation with both PTC and the PNG Department of Finance, World Bank is expected to take a lead role in progressing co-financing arrangements; provide technical support in reviewing institutional issues; and assist in establishing equipment specifications and standards. Preliminary indication show World Bank involvement of up to K14.0 Million.

2. Taking into account the above considerations, the following table summarises potential sources and applications of external aid funding for PTC:

Component	Amount	Source
Rural Telecommunications	K17.5	Japanese Grant Aid
Trunk and Junctions	12.0	German mixed finance
Exchanges and MIS*	14.0	World Bank loan
Total	K43.5	

*Management information system

Details of the above plan are shown in Annex 1.

3. The following points are additionally noted by way of clarification to Annex 1:

a) Proposed external aid funding of K43.5 Million is higher than the K35.9 Million specified under Government's Public Investment Programme. An adjustment was made to take into account physical and price contingencies and the recommendations of the consultants of the recently completed World Bank funded consultancy for PTC's network development plan and management review;

b) Potential difficulties may arise with respect to securing German Government funding. Firstly, annual commitments would conflict with the need to establish funding requirements for the life of the investment programme. Secondly, Government and PTC have stated its preference for untied aid. In the event that German funding cannot be secured under satisfactory terms for future years, alternative means for continued funding of the programme will need to be considered. This could include "price and terms" competitive bidding or commercial funding. Government concerns on tied aid will need to be addressed soonest;

c) Government guidelines on external aid funding have been taken into account in preparing the above schedule. PTC is expected to fund a minimum of 20% of the total project cost from internal resources. In addition, local costs such as buildings and taxes will need to be funded entirely by PTC. For these reasons, PTC's internal funding requirement is currectly estimated at K39.6 Million;

d) Investment and funding requirements of projects included in Annex 1 are limited to those which could avail of external aid funding. This does not, in any way, suggest that the Annex represent PTC's overall investment programme in the next five years. (Investments in postal services, rehabilitation of the network and others are not included in the Annex).

4. Annex 1 and accompanying assumptions are intended to provide the framework for more detailed discussions between the National Government, PTC and proposed aid agencies and donor countries, and has not received formal comments or endorsement of the various parties concerned.

PAPUA NEW GUINEA
POSTS AND TELECOMMUNICATIONS CORPORATION
FINANCING PLAN (KINA MILLION)

		Total w/o Conting.	Total with Conting.	Source: W.Bank	Japan	Germany	P.T.C.	Total With Contingencies US$, MILLION 1/
LOCAL TELEPHONE NETWORK								
Exchanges	F	10.8	11.7	11.7	0.0	0.0	0.0	13.7
	L	1.8	2.0	0.0	0.0	0.0	2.0	2.3
	T	12.6	13.7	11.7	0.0	0.0	2.0	16.0
Cable Plant	F	1.3	1.2	0.0			1.2	1.5
	L	0.7	0.8	0.0			0.8	0.9
	T	1.8	2.0	0.0			2.0	2.3
Subscriber Terminal Equipment	F	0.5	0.5	0.0			0.5	0.6
	L	0.5	0.5	0.0			0.5	0.6
	T	1.0	1.1	0.0			1.1	1.3
TRUNK AND JUNCTION NETWORK								
Microwave bearers, multiplex, dom.satellite,fiber optic	F	15.0	16.3	0.0	1.8	12.0	2.5	19.0
	L	6.0	6.5	0.0	0.0	0.0	6.5	7.6
	T	20.9	22.7	0.0	1.8	12.0	8.9	26.6
RURAL TELEPHONE SYSTEM								
Rural RSS and single channel radios	F	14.4	15.6	0.0	15.6		0.0	18.3
	L	8.6	9.3	0.0	0.0		9.3	10.9
	T	23.0	25.0	0.0	15.6		9.3	29.2
INTERNATIONAL TELEPHONE SERVICE								
Exchange and circuit expansion	F	2.2	2.4		0.0		2.4	2.8
	L	0.4	0.4		0.0		0.4	0.5
	T	2.6	2.8		0.0		2.8	3.3
BUILDINGS								
Buildings, Air Cond., Power Systems	F	0.0	0.0	0.0			0.0	0.0
	L	7.5	8.1	0.0			8.1	9.5
	T	7.5	8.1	0.0			8.1	9.5
DATA AND TELEX SERVICE								
Data and Telex equipment	F	3.0	3.3				3.3	3.8
	L	1.8	1.9				1.9	2.3
	T	4.8	5.2				5.2	6.1
SERVICES								
Management Information System	F	2.0	2.2	2.2			0.0	2.5
	L	0.2	0.2	0.0			0.2	0.3
	T	2.2	2.4	2.2			0.2	2.8
	F	0.0	0.0				0.0	0.0
	L	0.0	0.0				0.0	0.0
	T	0.0	0.0		0.0		0.0	0.0
TOTAL COST, KINA,M	F	49.9	53.3	13.9	17.4	12.0	9.9	62.3
	L	27.5	29.7	0.0	0.0	0.0	29.7	34.8
	T	76.5	83.0	13.9	17.4	12.0	39.6	97.1
TOTAL COST,US$,M	F	57.3	62.3	16.2	20.4	14.0	11.6	62.3
	L	32.2	34.8	0.0	0.0	0.0	34.8	34.8
	T	89.5	97.1	16.2	20.4	14.0	46.4	97.1

Note: 1/ Exchange rate assumed 1.0 Kina = 1.17 U.S.$

PAPUA NEW GUINEA

POST AND TELECOMMUNICATION CORPORATION

DRAFT TELECOMMUNICATIONS POLICY RECOMMENDATIONS

The policy options paper prepared previously reviewed major sector issues and constraints as well as outlined policy options to improve the efficiency of the telecommunication sector and its ability to perform in line with Government and the Post and Telecommunication Corporation (PTC) objectives.

The principal sector issues were identified as follows:

a) the need to expand telecommunication services to increase penetration among PNG nationals and rural subscribers;

b) the high costs of PTC's operations and resulting high tariffs which suppress demand for services, particularly from lower income national subscribers;

c) the need to improve current procedures for Government control and monitoring of PTC to ensure PTC operates in line with Government objectives but also has sufficient operational autonomy;

d) the need to increase the commercial orientation of PTC.

Following discussions with Government and PTC, the recommended approach for overcoming existing constraints which should be incorporated in a telecommunications sector policy paper are as follows:

1) Expansion and Extension of Telecommunications Services

Targets for Access and Penetration of Services

While Government has set PTC an explicit target for meeting its financial objectives, i.e. a 16% return on assets, this has not been the case for other objectives. In particular, clear targets have not been set by Government for the expansion and extension of services. A necessary prerequisite to establishing targets is to define clearly what is meant by:

a) access to services
b) penetration of services

PTC defines rural areas as those areas which are outside the main exchange areas which are outside the main exchange area and generally use radio communication systems.

In PNG an appropriate definition of access, particularly in rural areas, include:

a) size of villages served
b) distance to the nearest telephone
c) time required to travel to the nearest telephone.

PTC needs to review:

a) data on population distribution
b) the existing transportation network and
c) topographical data
d) base economy and support services available to the villages

and agree with Government on how access will be defined.

In relation to penetration of services, there are major concerns with respect to the low number of national subscribers in relation to the total subscribers and the total population.

Clear strategies will need to be established to provide a more responsive and affordable service to national subscribers in both urban and rural areas.

Specific medium and long term targets for access and penetration of services needs to be agreed to by Government and PTC based on an analysis of the cost of provision of services and available financial resources.

Strategy for the Extension and Expansion of Services

To achieve targets for access to service in rural areas and increased access by PNG 'nationals, it is proposed that greater emphasis should be placed by PTC on the provision of public telephones (i.e., coin operated telephones and leased payphones). This approach is recommended for the following reasons:

a) Revenues from public telephones are generally 3 to 4 times higher than revenue from residential telephones;

b) Payphone charges can be adjusted to stimulate demand among PNG nationals wishing to maintain contact with their villages by effectively reducing the cost of long distance calls;

c) Payphones generally allow for lower investment cost and maintenance costs per person served.

To increase penetration which require the connection of a greater number of national subscribers, PTC will need to revise the current structure of tariffs and the review the cost of providing services (see relevant sections on tariffs and costs).

A major constraint affecting the ability of PTC to extend or expand services relate to difficulties in securing land for telecommunication development. This will need to be addressed by National Government and clear policies established to ensure access.

2) Tariffs - Policy and Structure

Tariff Policy

Existing telecommunications tariffs of PTC are high in comparison with other countries. Furthermore, the average telephone bill represents a significant percentage of the wages or disposable income of PNG nationals. There is a need to make telecommunication services more affordable without adversely affecting the financial viability of PTC.

Tariffs are high because of the high cost of PTC's operations. These can be attributed to higher maintenance and investment costs due to adverse topographical conditions; the small subscriber base over which to distribute costs; low productivity; high indirect costs due to in-house provision of ancillary services; and, in the case of telephone rentals, the effect of the telephone tax which is equivalent to nearly 50% of PTC's current rental charges.

PTC must address the above issues of low productivity and high indirect costs. At the same time, the National Government needs to review the telephone tax policy, particularly with respect to residential subscribers as high rentals combined with high call charges effectively suppress demand for telecommunication services.

Current tariff policies which link increases in tariffs to historical increases in costs weaken PTC's incentives to reduce costs. Tariff adjustments be determined not on the basis of historical costs but should be linked to future cost trends and the planned performance of PTC agreed in their Five Year Development Plans. PTC should agree with the Price Controller the tariff assumptions which will underline the projections of financial performance. Expected increases in efficiency should be passed on to the subscribers in the form of lower tariffs. For example, a 3% decline in costs in real terms should be reflected in a similar decline in tariffs in real terms. The expected tariff changes should be incorporated in PTC's financial projections. This approach would provide the Price Controller with a benchmark against which to measure performance each year. Effectively, approval of price increases would become conditional upon agreed improvements in performance being achieved.

Investments which do not meet the required internal rate of return criterion but are nonetheless deemed appropriate for social or political reasons should qualify for subsidies or Government support.

For example, with respect to the proposal for village payphones in rural centres, these can be expected to be less profitable than those in urban centres and will require explicit Government subsidies. The subsidy, if any, should be such that the internal rate of return to PTC of the investment is equivalent to the hurdle rate. Other socially and politically desirable projects may be similarly considered.

Government subsidies may take many forms:

a) Direct grants through Government budgetary allocations or direct transfer of external aid funds as equity;

b) On-lending to PTC under preferred terms and conditions;

c) re-investment of dividends

It is understood that the preferred option is direct transfer of external aid funds as equity.

A condition of such subsidy is a requirement for PTC to establish separate accountability and reporting for costs, revenues and status of implementation of eligible projects.

Sector Financing

The current financial position of PTC suggests that it has the capacity to undertake increased borrowing through commercial sources or external aid.

Major projects which could vie for external aid funding and are incorporated in PTC's approved Five Year Development Plans could be considered for external aid funding under guidelines already established by National Government. A degree of flexibility may be warranted for rural related projects.

Where appropriate, commercial borrowing should be encouraged for commercially viable projects independent of Government guarantees.

Finally, PTC's dividend policy should be flexible to take into account PTC's investment programmes and cash position.

4) Commercialization

Relationships between Government, Board and Management

Commercialization requires a clear delineation of the relationships between Government, the Board and Management.

The Government should rely, principally, upon the Board to ensure that PTC operates in line with Government objectives. Board appointments are made by National Government. It is essential that its members are predominantly persons of high calibre and relevant experience and are not political appointees.

As far as possible, Government objectives and concerns should be communicated to the Board which translate these information to broad alternative strategies and targets for management to pursue. Development of detailed plans, investment programs, budgets and operational activities would then be the responsibility of Management who would provide regular status reports on the achievement or non-achievement of the objectives, detailed plans and budgets, and communicate these to Government through the Board.

Performance Indicators

Current Government controls are focused on financial targets. PTC's non-financial performance is not currently monitored. As in the case for other CSAs, Government reviews most procurement contracts and the terms and conditions of employment of staff. The controls exercised by Government over PTC emphasize seeking prior approval for action from various levels of authority within National Government and so tend to discourage initiative. These controls impose excessive restraints on management and weaken managerial responsibility.

Government can better ensure that PTC operates in line with its objectives through more comprehensive performance monitoring. Recommended indicators with medium term targets are shown in Annex 1. PTC and Government should agree on medium term targets and monitor performance against these targets on a regular basis. In addition, these should be published in PTC's annual reviews and Five Year Development Plans, alongside the financial statements.

Performance Incentives

To further increase the commercial orientation of its staff and to meet its objectives, PTC needs the ability to provide performance incentives. The objective is to have sufficient flexibility to reward staff based on performance and not to secure across the Board increases. Adjustments need to be made in the SCHC Act to permit this.

Cost and Profit Centres

In recent years, PTC has made significant improvements in its capacity to collect and analyze management information. These information systems need to be developed further to allow the Corporation to establish internal profit and cost centres for its principal functions. The aim would be to improve PTC's ability to monitor and control costs and to establish accountability of managers for their activities and so provide a more effective system to identify areas that contribute to overall profitability.

Private Sector Participation

Increased private sector participation should be encouraged in the supply of customer premises equipment (e.g. telephone instruments, PABX) and enhanced services (e.g. information services) to allow the subscriber the benefit of competition in the provision of these services.

PTC should continue to have a monopoly or common carrier status of basic telephone services. Interconnection and pricing policies need to be carefully regulated if private sector participation is encouraged.

Options for Structural Changes

To further increase the commercial orientation of PTC, various options are available for PTC which entail structural changes within the organisation and how the organisation is to be managed or controlled. These include the establishment of PTC as a separate private company; formal separation of posts and telecommunication services; establishing various services currently done in-house as separate subsidiaries; and the separation of regulatory and commercial functions of PTC. Organizational changes will need to be further reviewed by PTC.

ANNEX 1

RECOMMENDED PERFORMANCE INDICATORS

Indicator	Actual value	Medium Term Objective 3/
Network Expansion		
Telephone Lines/100 population	1	2
Rural public telephones	450 1/	1500
Quality of Service		
Call Completion rates (STD)	45%	55%
Fault Clearing in less than two working days	n.a. 2/	80%
Productivity		
Employees/1000 lines	98	70
Financial		
Change in telecom operating cost/line	--	5% decline per year in real terms.
Rate on return on assets	16%	18%

Notes:

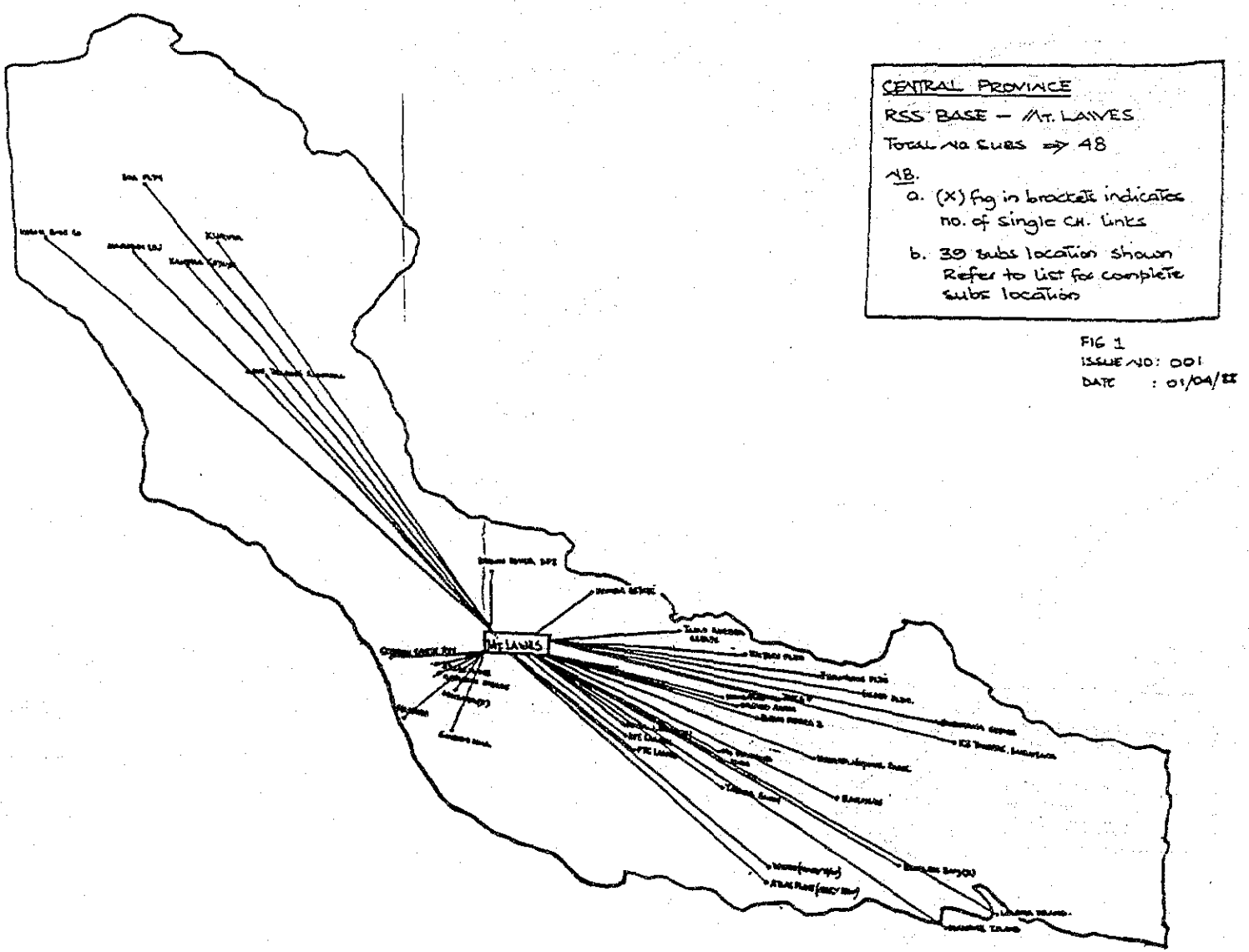
1/ This number is the total rural single channel and RSS subscribers, including private and public telephones for end 1986.

2/ The aggregate number for the total of PNG is not available

3/ The achievement of some targets will depend on other targets. For example, the rate of return objective will depend on the expansion program which affects the number of telephones per 100 population. The Government and PTC would have to agree on a set of attainable targets which represents a compromise.

EXISTING RURAL SUBSCRIBERS.

CENTRAL	FIG 1, 2
CHIMBU	FIG 3
EAST NEW BRITAIN	FIG 4, 5, 6
EASTERN HIGHLANDS	FIG
EAST SEPIK	FIG 9
GULF	FIG 10
MADANG	FIG 11, 12
MANUS	FIG 13
MILNE BAY	FIG 14
MOROBE	FIG 15, 16
NEW IRELAND	FIG 17
NORTHERN	FIG 18, 19
NORTH SOLOMONS	FIG 20, 21
WESTERN HIGHLANDS	FIG 22, 23
WESTERN & SOUTHERN HIGHLANDS	FIG 24
WEST NEW BRITAIN	FIG 25, 26
WEST SEPIK	FIG 27



CENTRAL PROVINCE

RSS BASE – //MT. LAVES

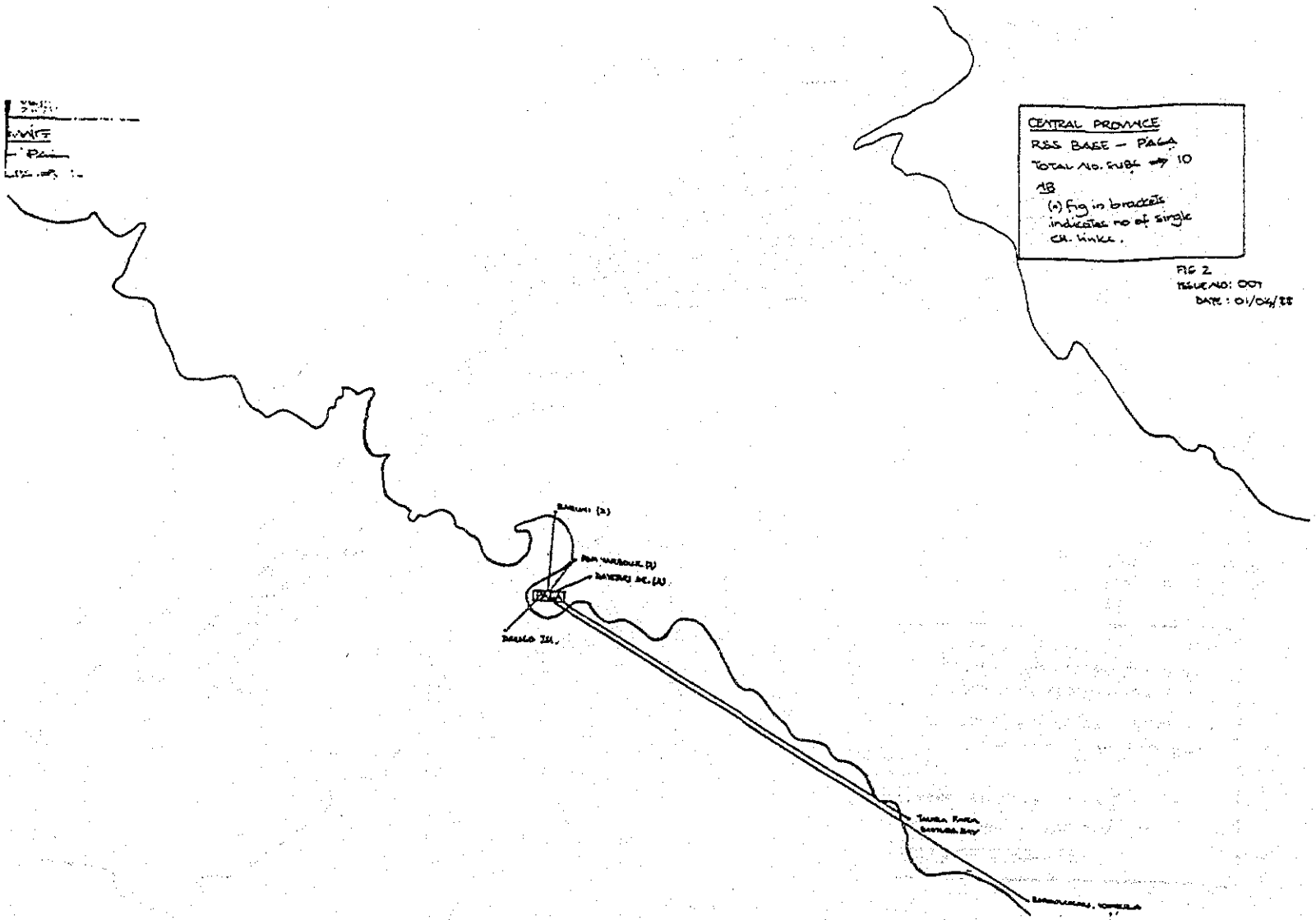
Total No subs ⇒ 48

NB.

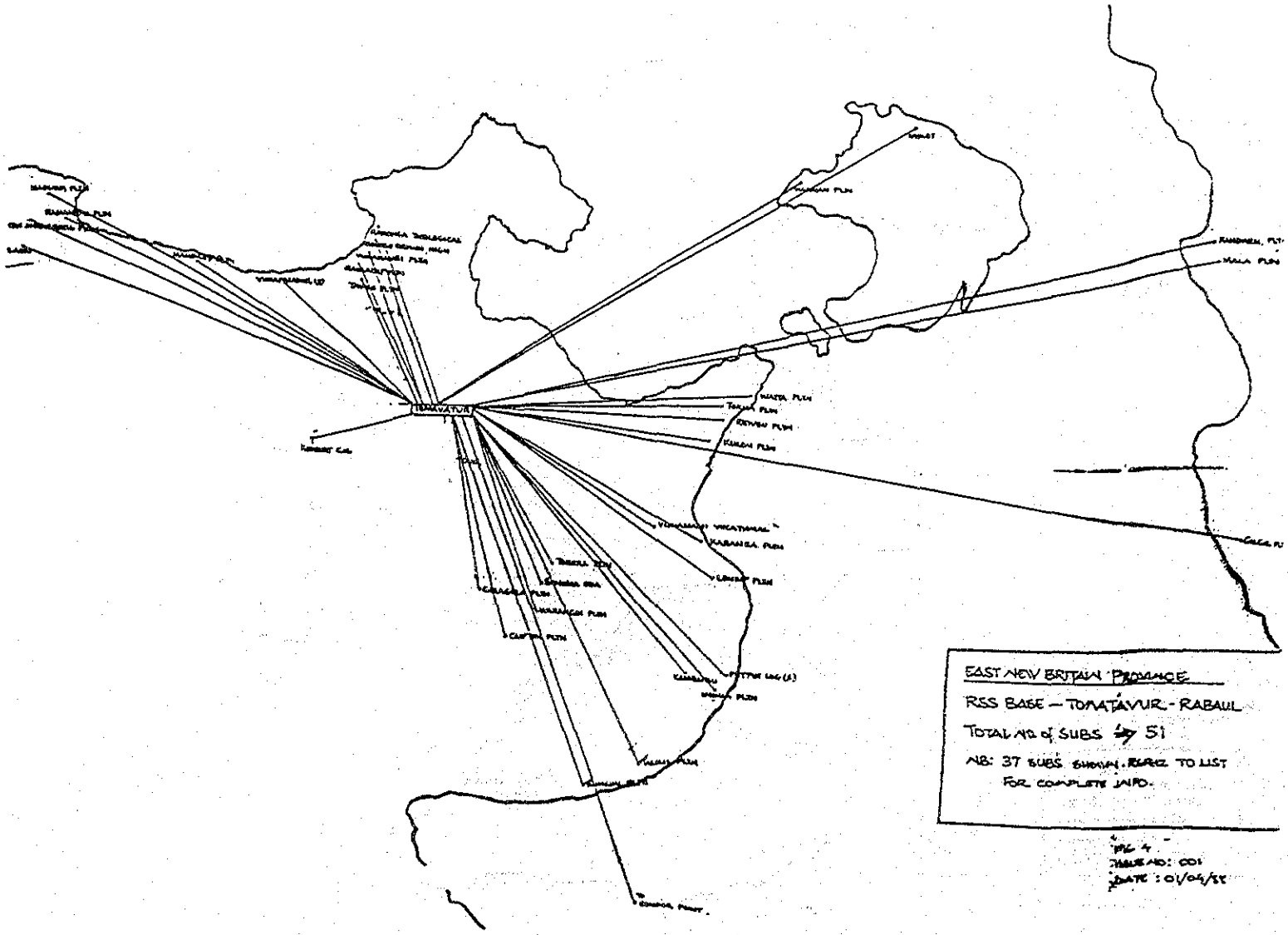
a. (X) fig in bracket indicates no. of single CH. links

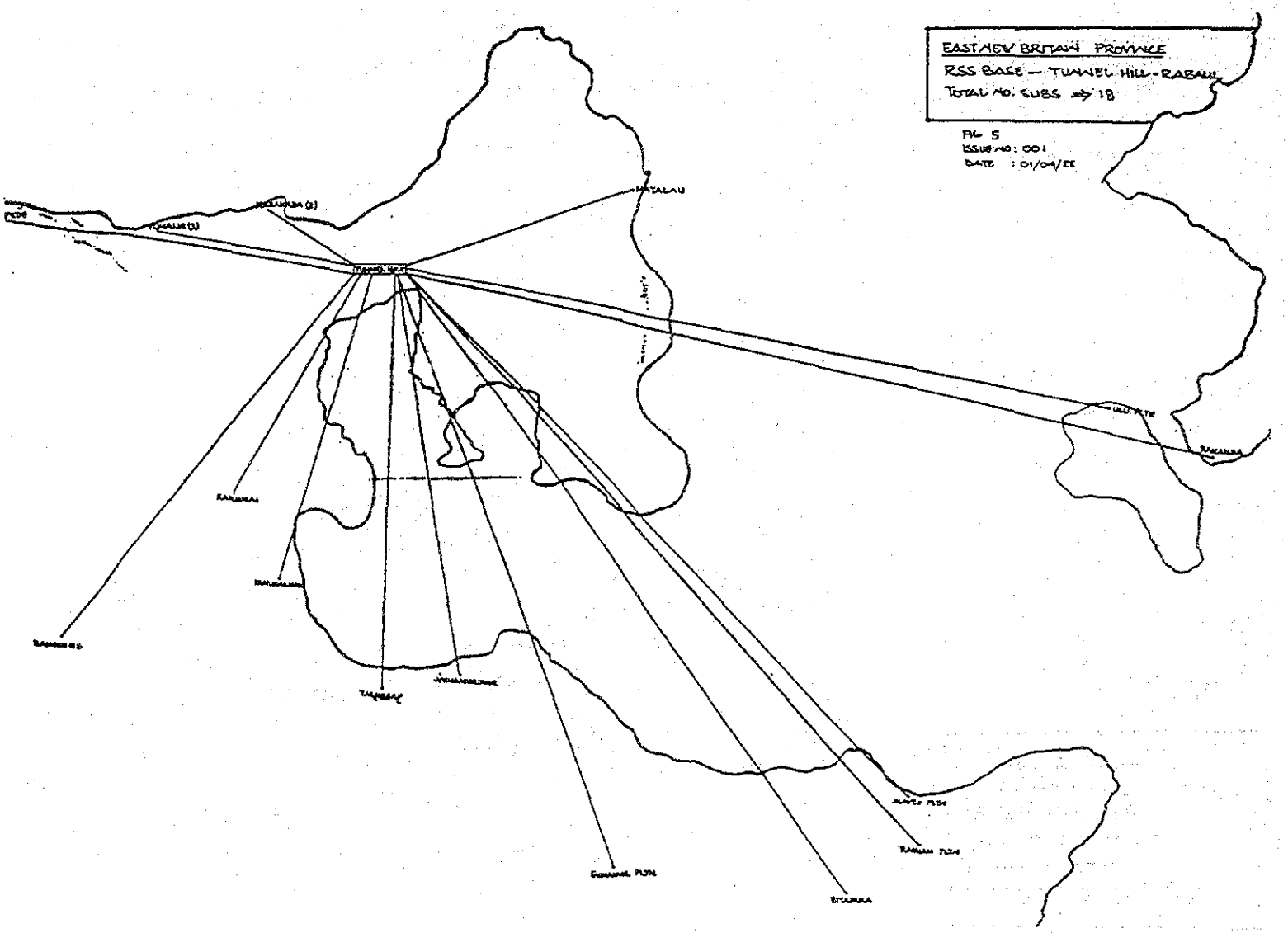
b. 39 subs location shown Refer to list for complete subs location

FIG 1
ISSUE NO: 001
DATE : 01/04/88

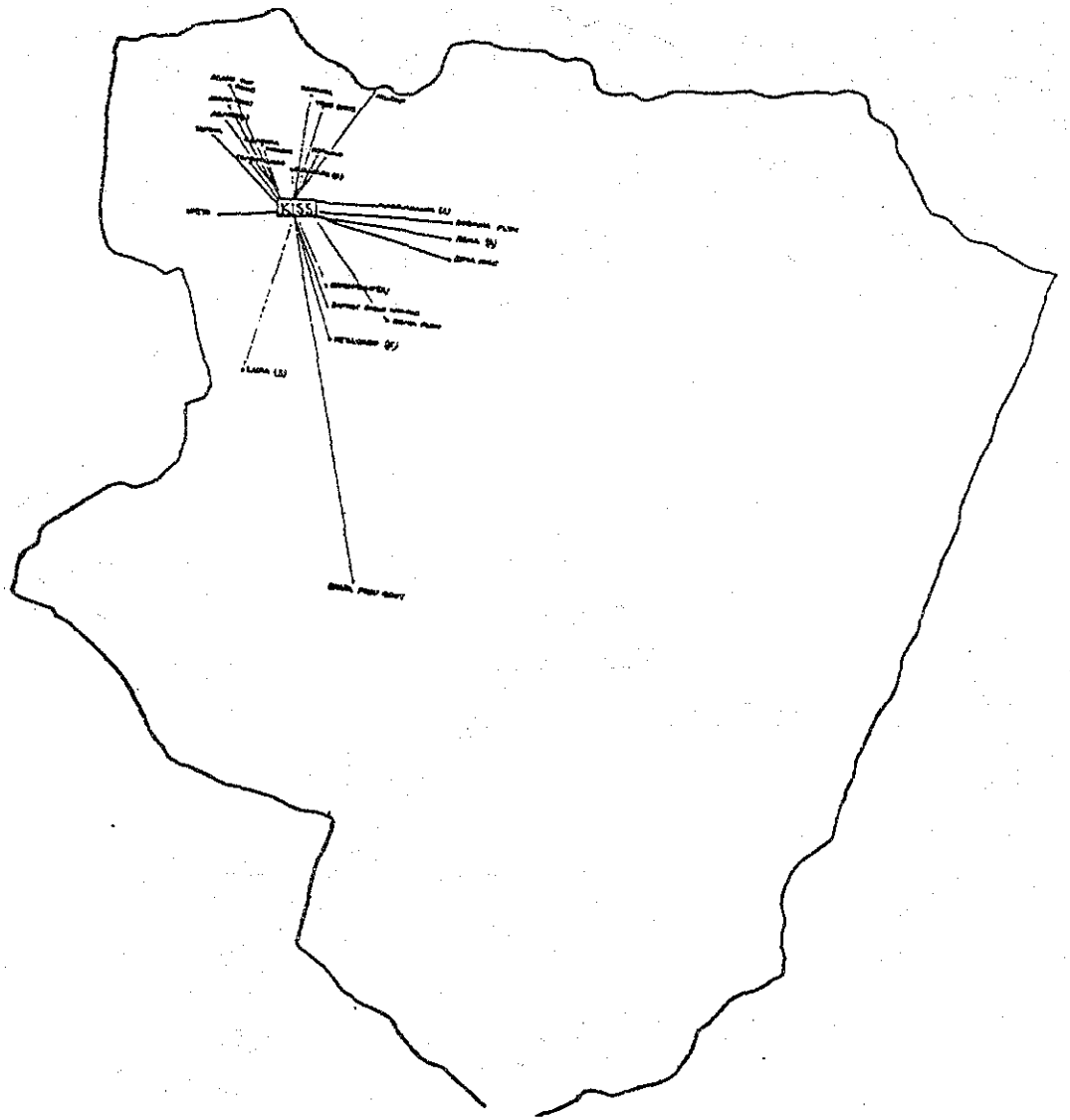

CENTRAL PROVINCE
RSS BASE – PAGA
TOTAL NO. SUBS = 10
18
(a) fig in brackets indicates no of single ckt. links.
FIG 2
ISSUE NO: 001
DATE : 01/04/88

KWADIAWA


TOMATAVUR
EAST NEW BRITAIN PROVINCE
RSS BASE — TOMATAVUR - RABAUL
TOTAL NO of SUBS → 51
NB: 37 SUBS SHOWN. REFER TO LIST FOR COMPLETE INFO.
FIG 4
DRAWN NO: 001
DATE: 01/05/88


EAST NEW BRITAIN PROVINCE
RSS BASE — TUNNEL HILL - RABAUL
TOTAL NO. SUBS = 18
FIG 5
ISSUE NO: 001
DATE : 01/04/88
MATALAU
RAKANDA

EAST NEW BRITAIN PROVINCE
SINGLE CH. SUBS
TOTAL NO. SUBS → 8
NB. 7 shown + 1 PTC
(x) fig in brackets indicates no of single ch. lines
FIG 6
ISSUE NO: 001
DATE : 01/04/92



EASTERN HIGHLANDS PROVINCE

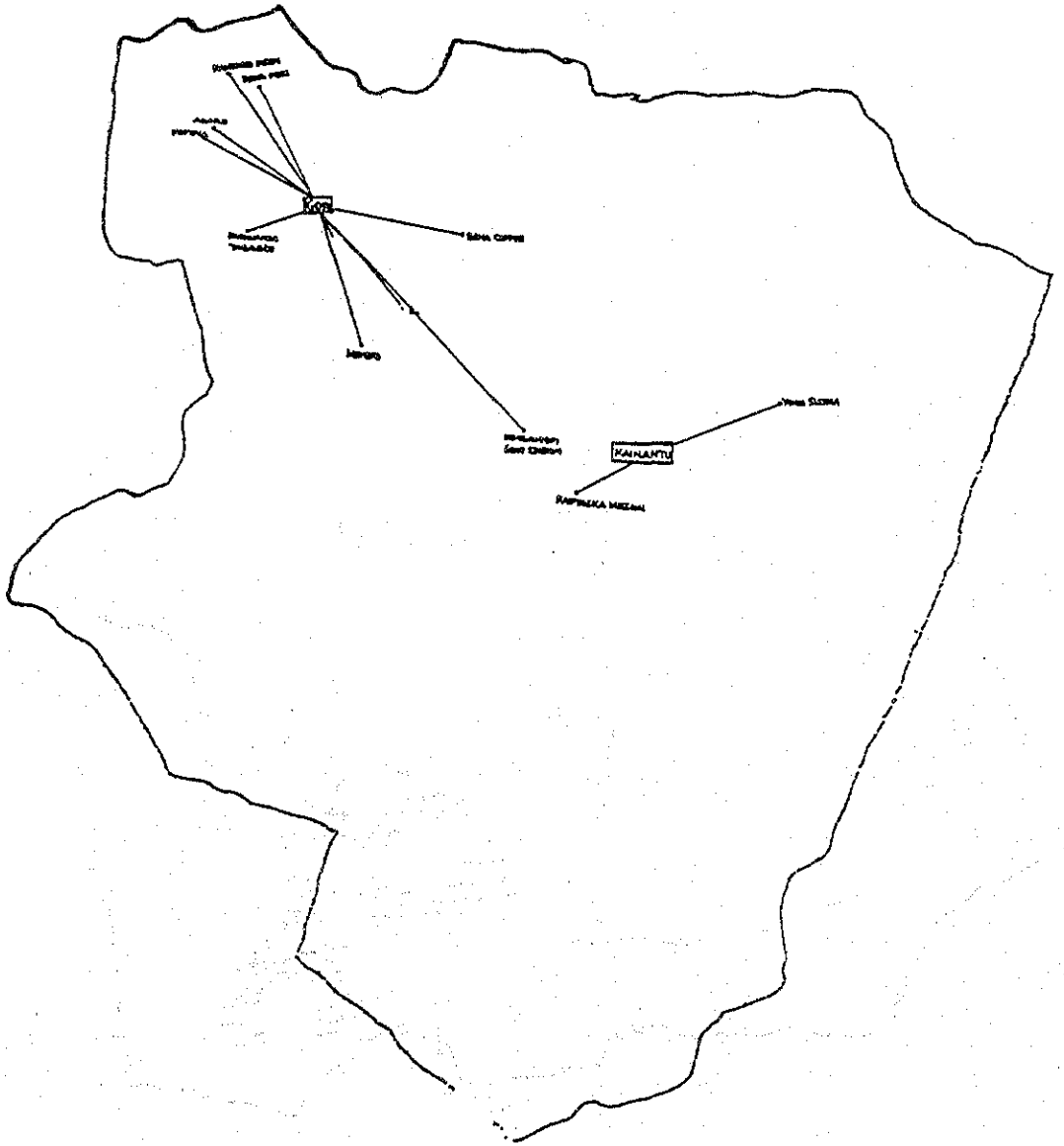
RSS BASE – GOROKA - AUT. KISS

TOTAL NO. SUBS ⇒ 43

NB

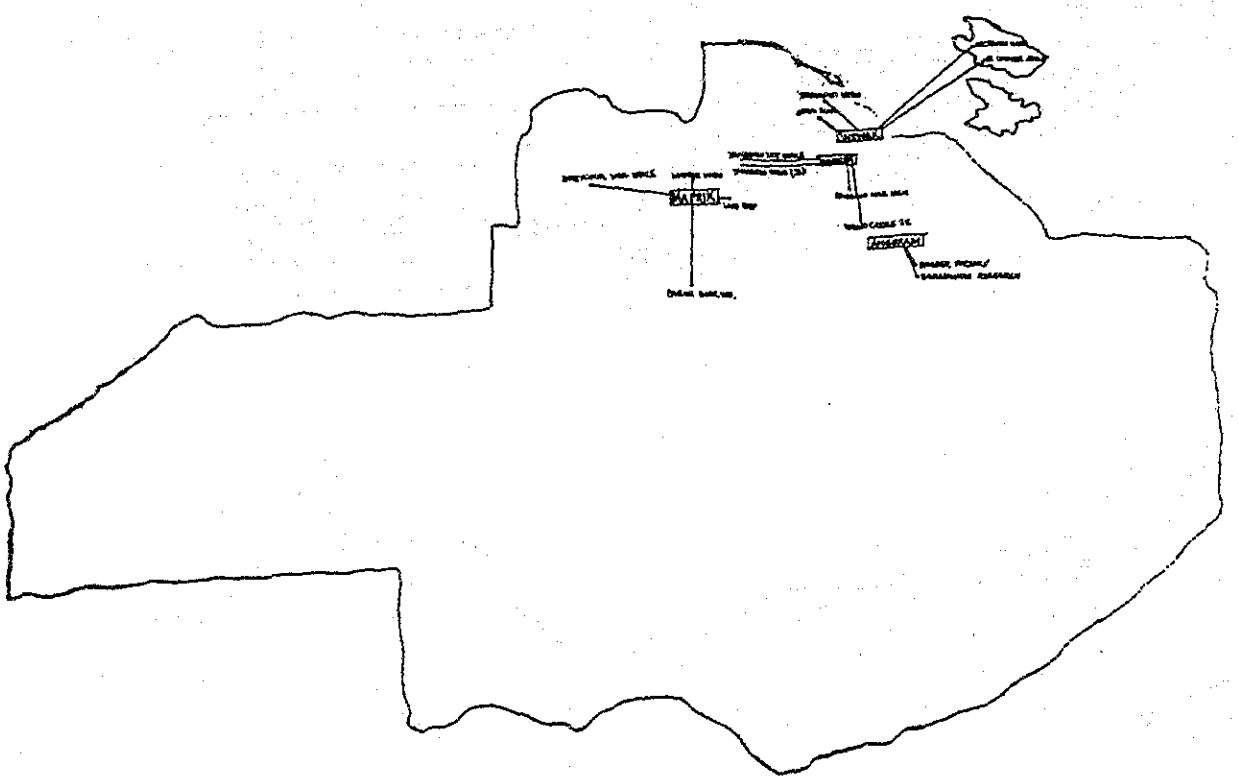
1. 39 SUBS LOCATION SHOWN. REFER TO LIST FOR MORE COMPLETE INFORMATION.
2. NO. IN BRACKET INDICATES NO. OF SINGLE CH. LINKS.

FIG 7
ISSUE NO: 001
DATE : 01/04/88



EASTERN HIGHLANDS PROVINCE
SINGLE CH. SUBS
TOTAL NO. SUBS ⇒ 8

FL 8
[illegible] : 001
DATE : 01/04/98

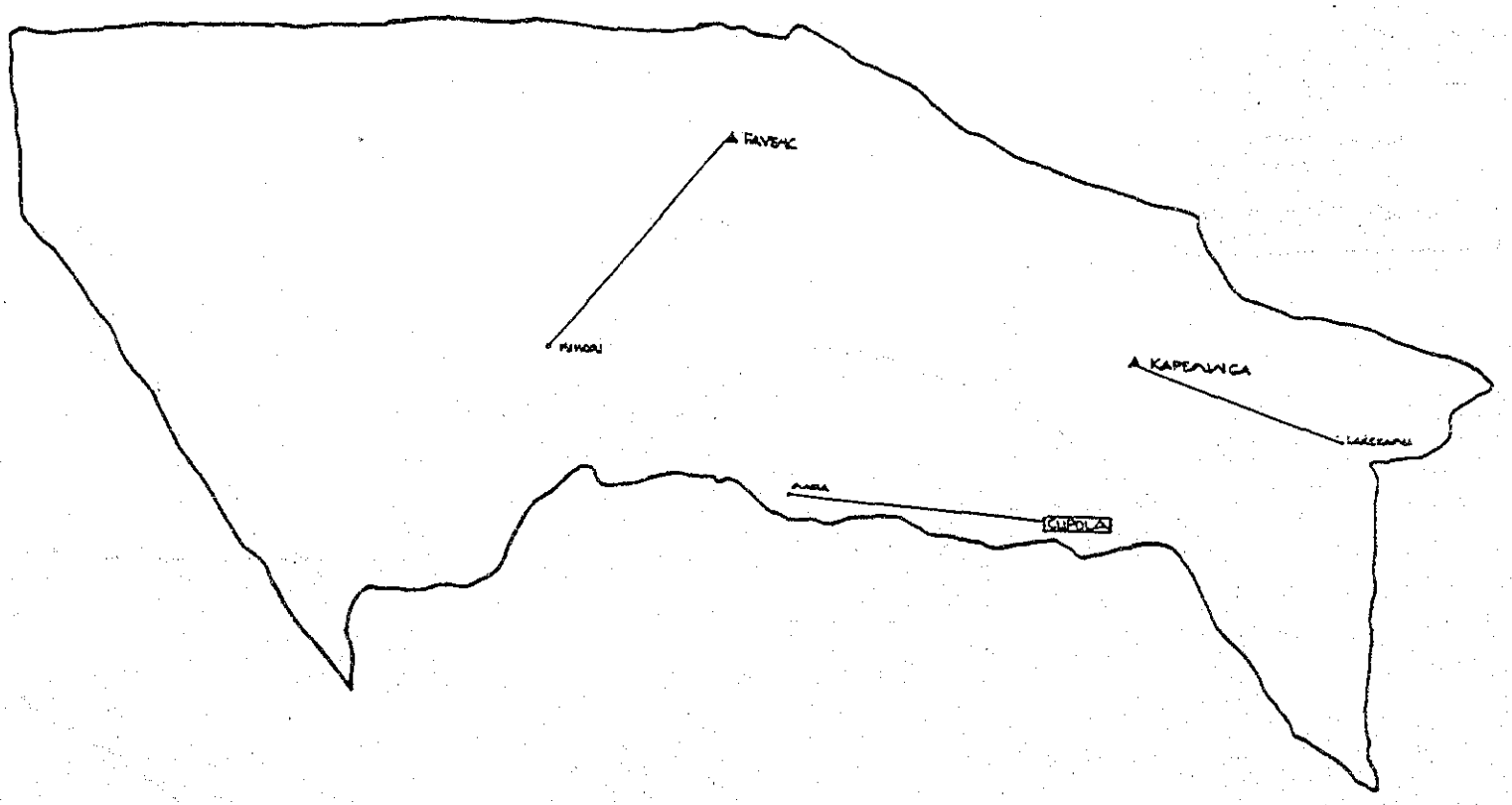


SINGLE CHANNEL SUBSCRIBERS

EAST SEPIK

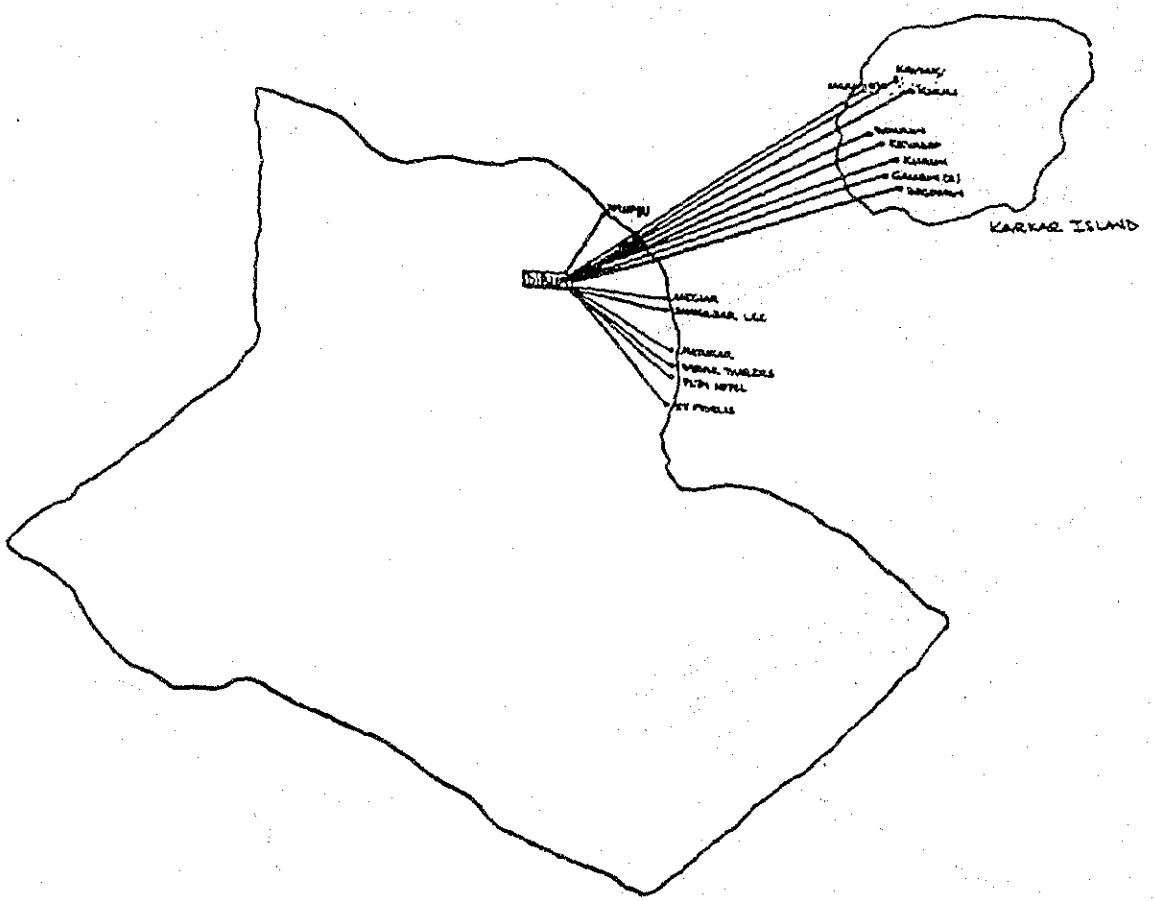
TOTAL NO. SUBS ⇒ 15

Fig 9
Issue No: 001
DATE : 01/04/92



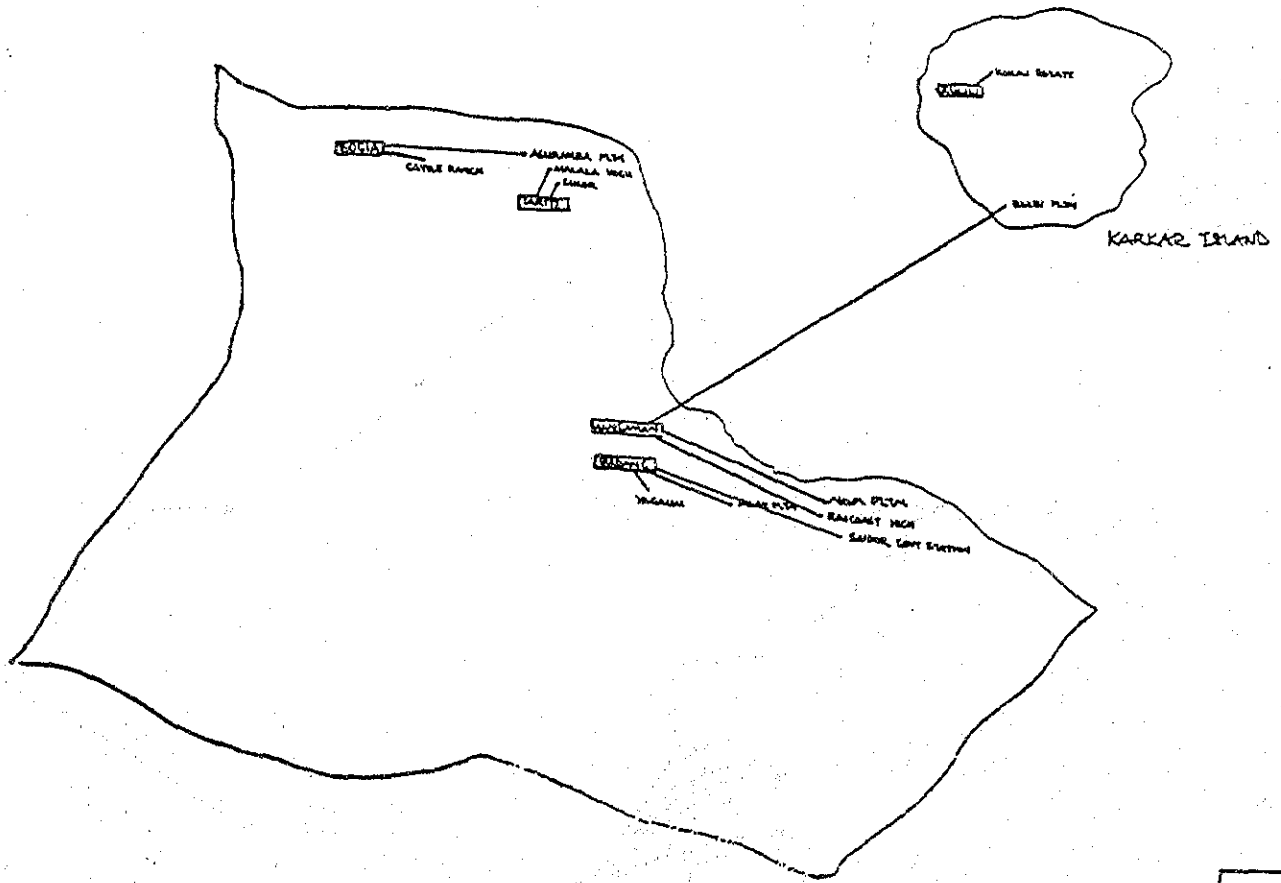
SINGLE CH. SUBS
GULF PROVINCE
Total no. subs ⇒ 3
▲ indicates Repeater

PLUMER '10
ISSUE NO: 001
DATE 101/04/99



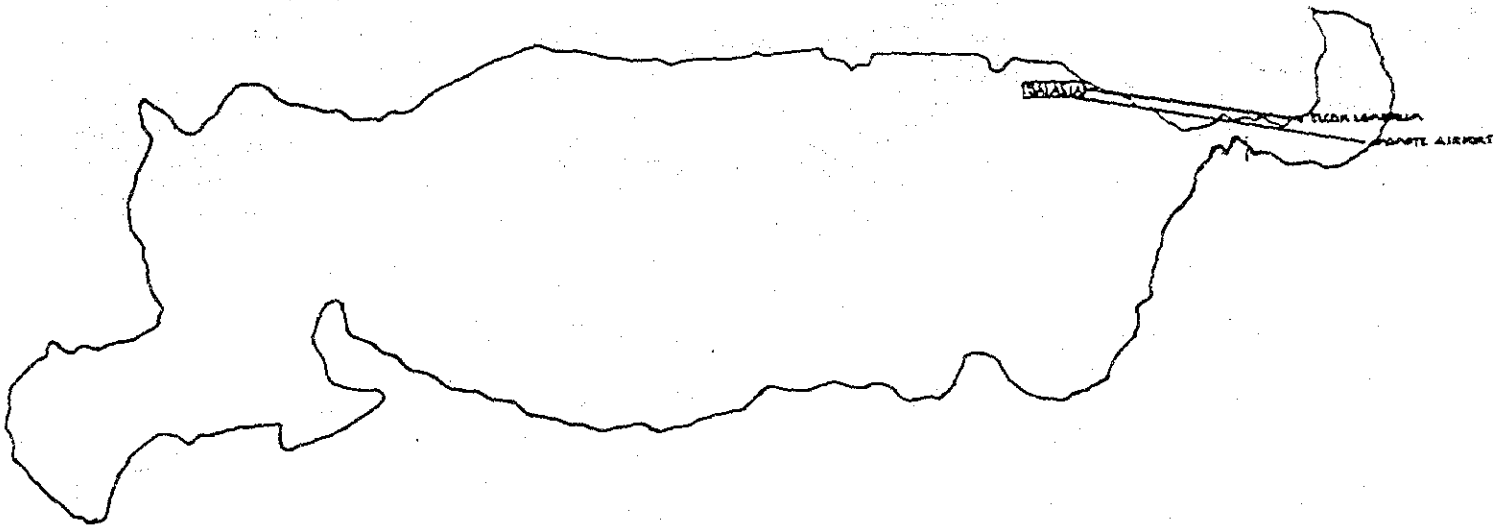
MADANG PROVINCE
RSS BASE – [illegible]
TOTAL NO. SUB[illegible] → 21
18: 18 SUBS [illegible]
REFER TO [illegible] FOR DETAIL

FIG 11
ISSUE NO: 001
DATE : 01/04/22



MADANG PROVINCE
SINGLE OIL OBS
TOTAL NO. SUBS → 11

12
BLOCKS: 001
DATE : 01/04/88



SINGLE CH. SUBS.

MANUS PROVINCE

TOTAL NO. SUBS ⇒ 2

FIG 13
ISSUE NO: 001
DATE : 01/04/88

FIG. 14
ISSUE NO: 001
DATE: 01/04/

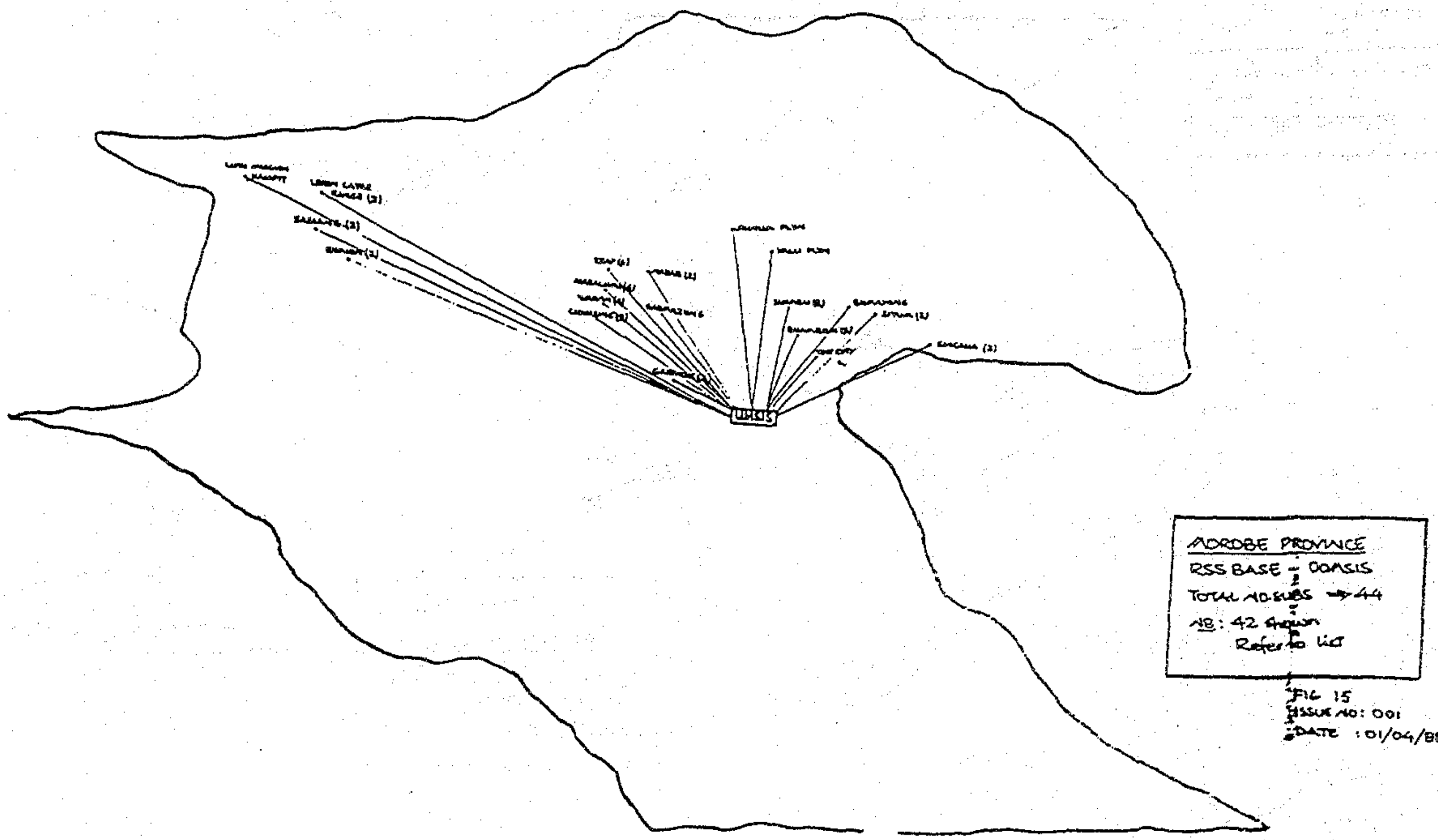


FIG 15
ISSUE NO: 001
DATE : 01/04/88

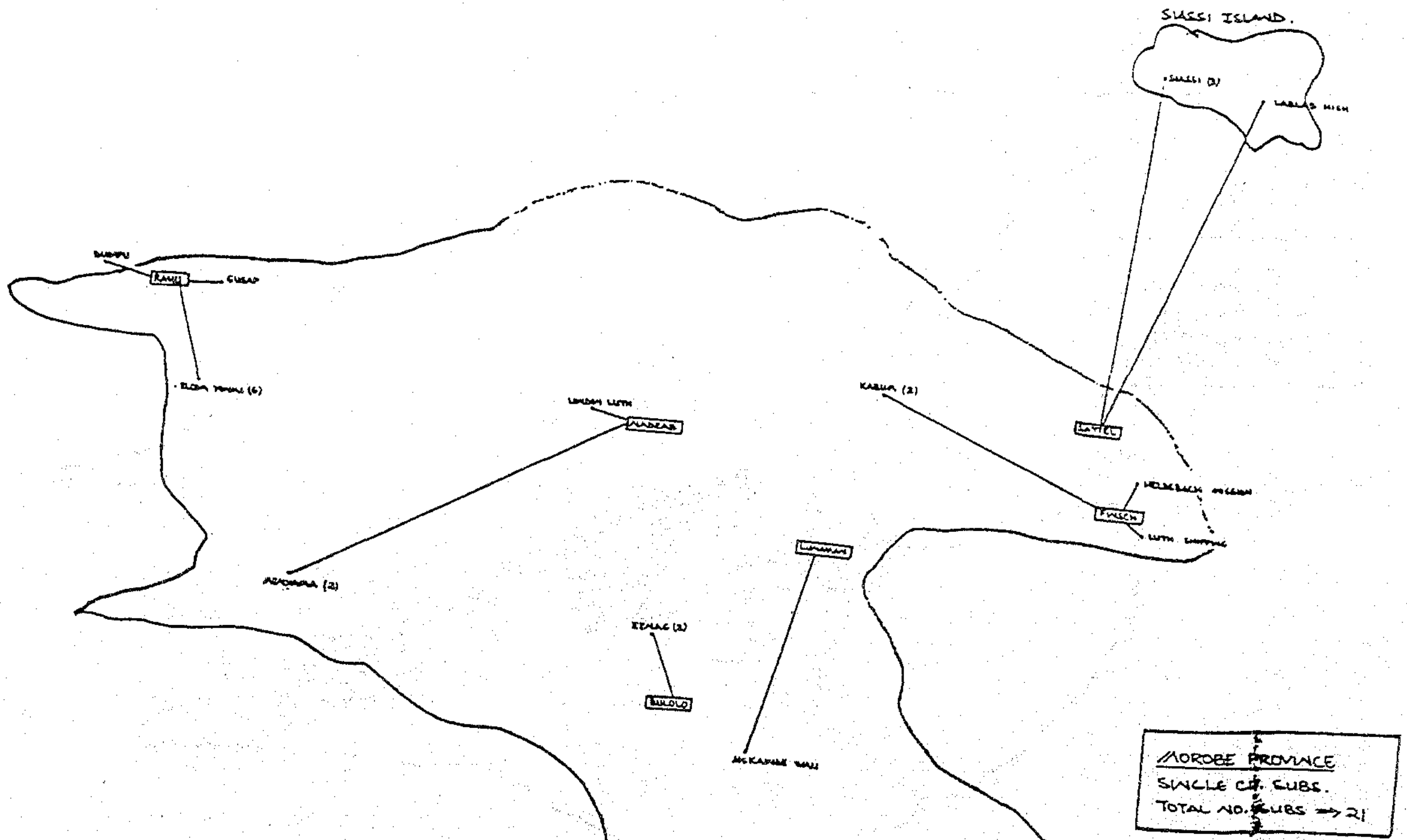
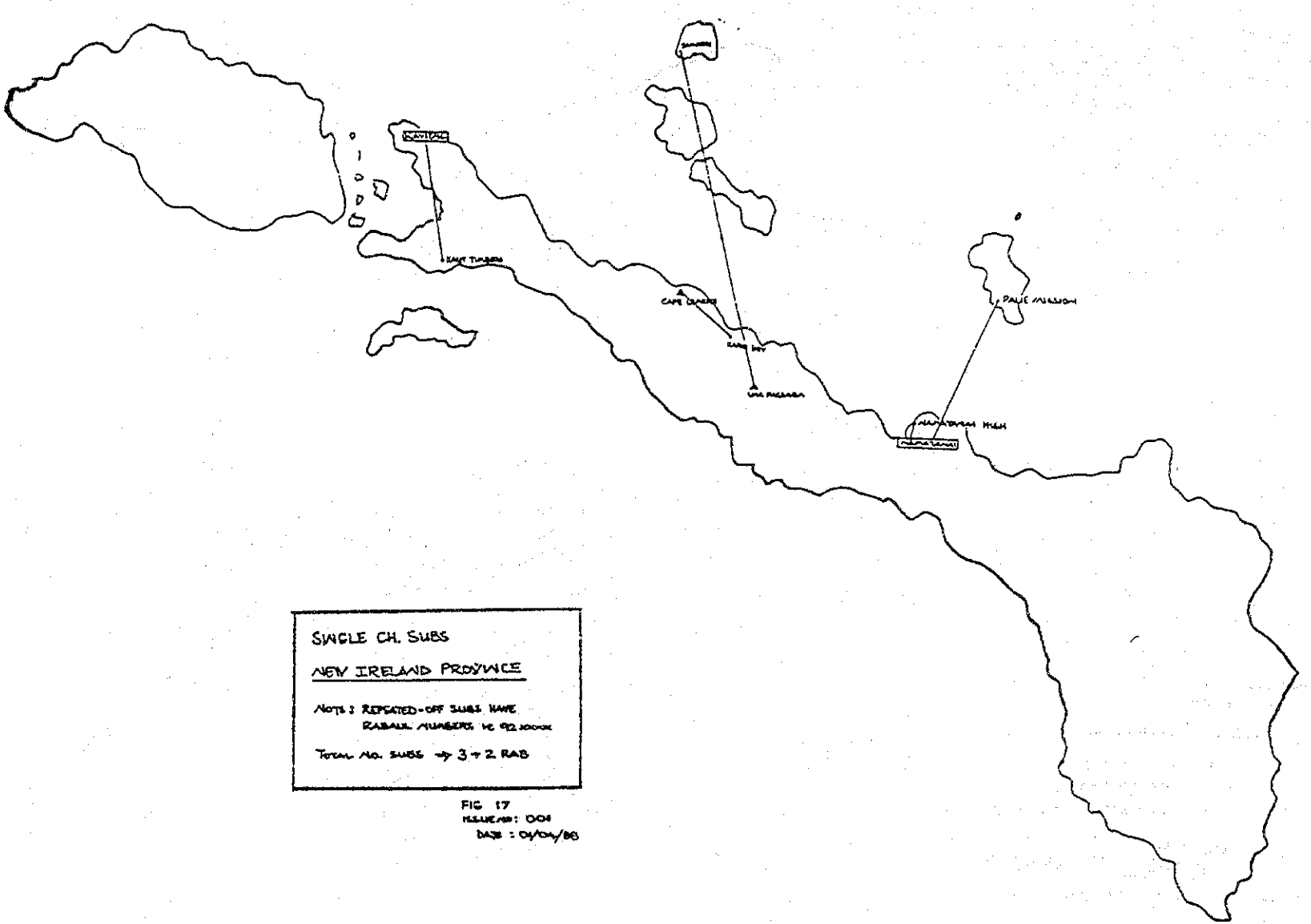


FIG. 16
ISSUE NO: 001
DATE: 01/04/88



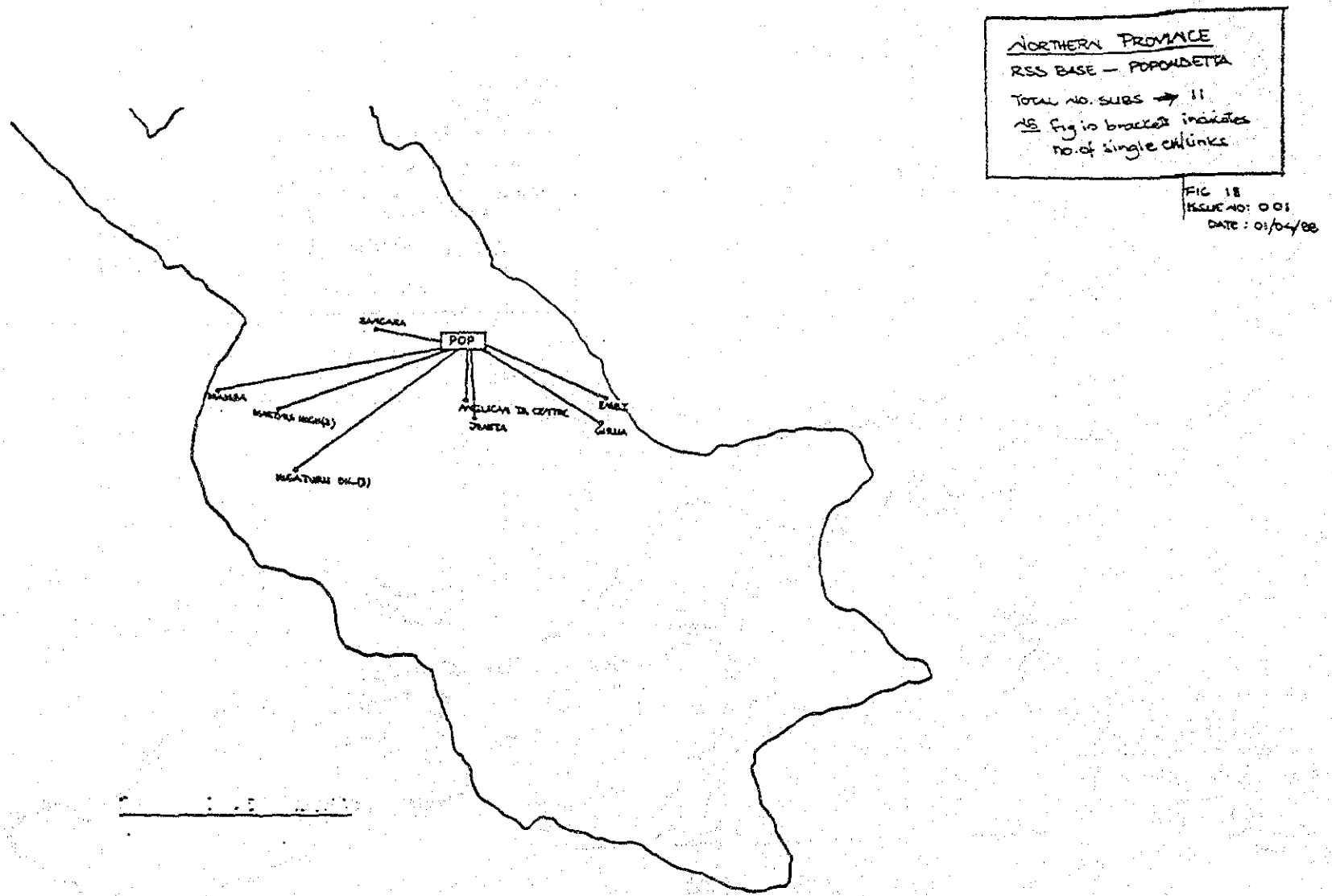
SINGLE CH. SUBS

NEW IRELAND PROVINCE

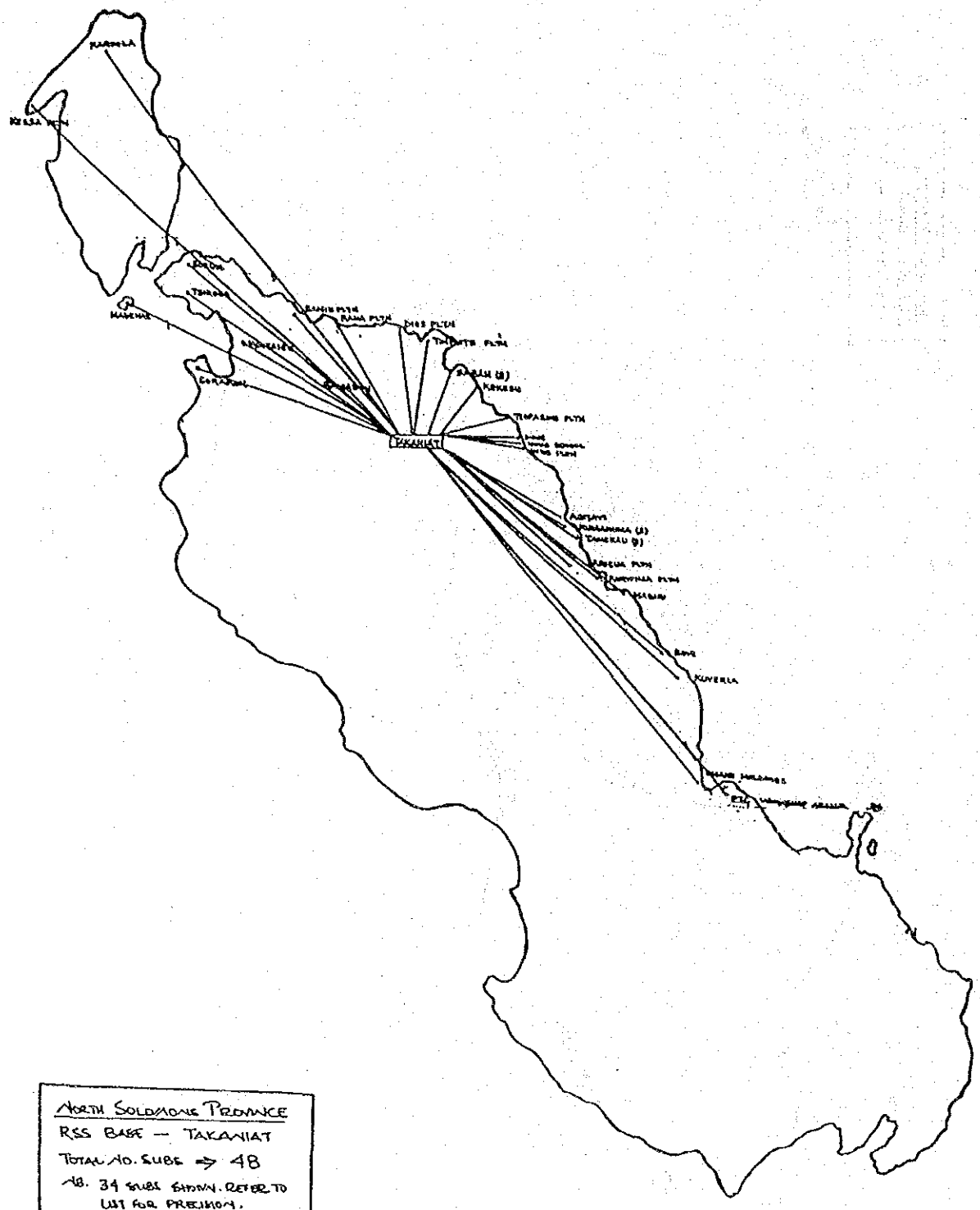
NOTE : REPEATED-OFF SUBS HAVE RABAUL NUMBERS IN BRACKETS

Total No. subs → 3 + 2 RAB

FIG 17
ISSUE/01: 001
DATE : 01/04/88


NORTHERN PROVINCE
RSS BASE — POPONDETTA
TOTAL NO. SUBS → 11
NB fig in bracket indicates no. of single ch/links
FIG 18
ISSUE NO: 001
DATE : 01/04/88
POP

NORTHERN PROVINCE
SINGLE CH. RUBS
TOTAL NO RUBS → 3
FIG 19
ISSUE NO: 001
DATE : 01/04/88
POP



NORTH SOLOMONS PROVINCE
RSS BASE — TAKANIAT
TOTAL NO. SUBS ⇒ 48
NB. 34 SUBS SHOWN. REFER TO LIST FOR PRECISION.
(x) indicates no of single

FIG 20
ISSUE NO: 001
DATE : 01/04/88

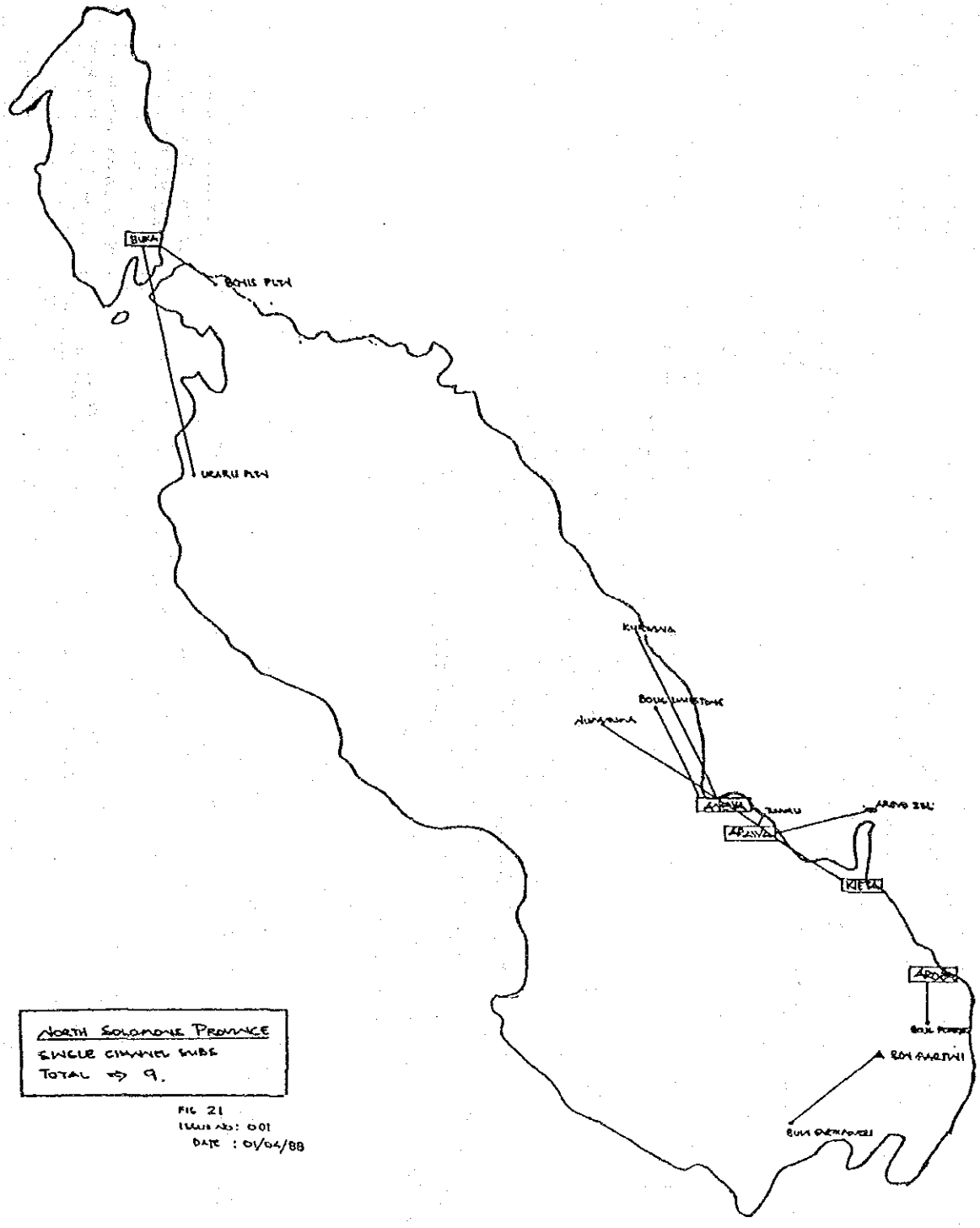
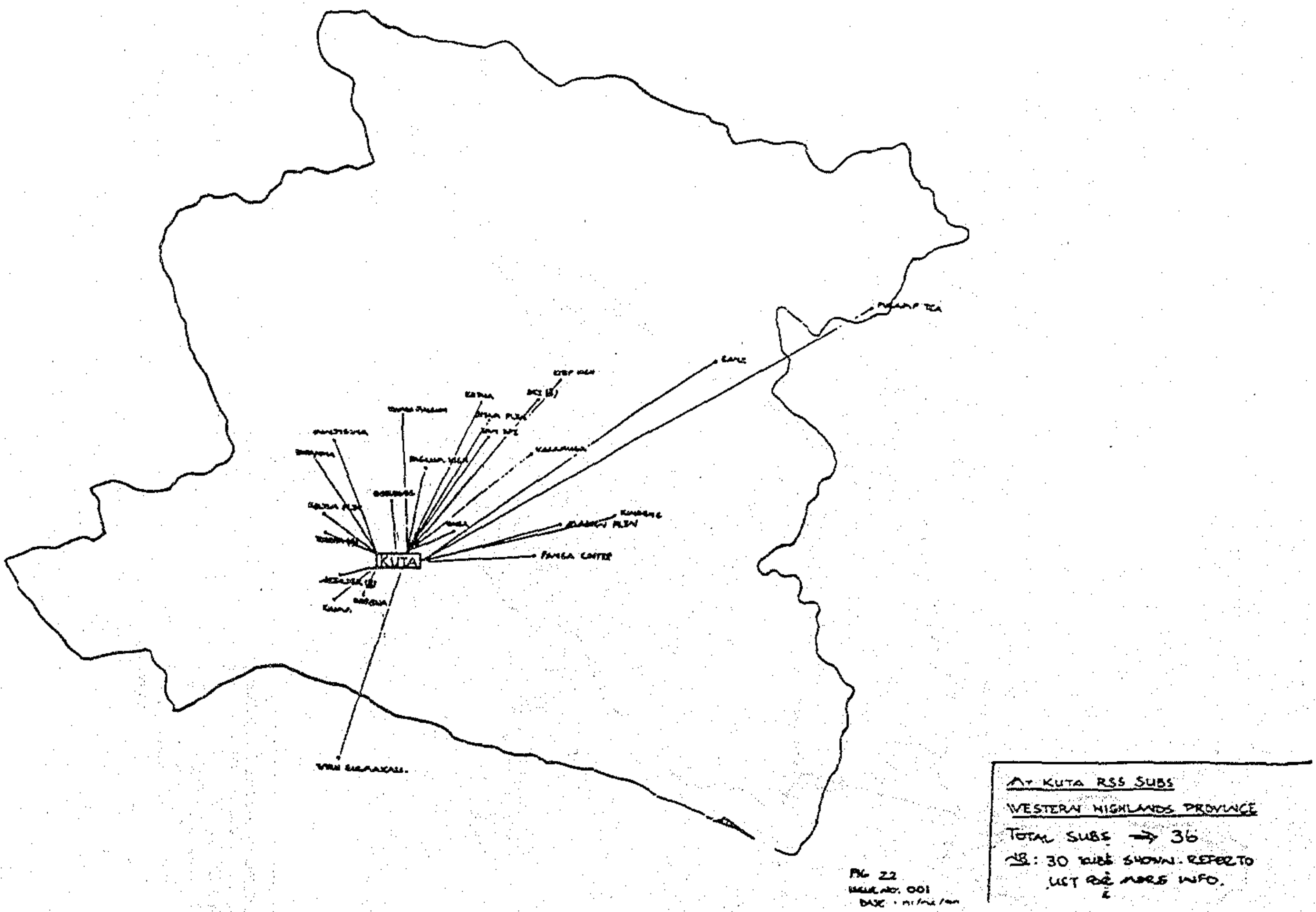
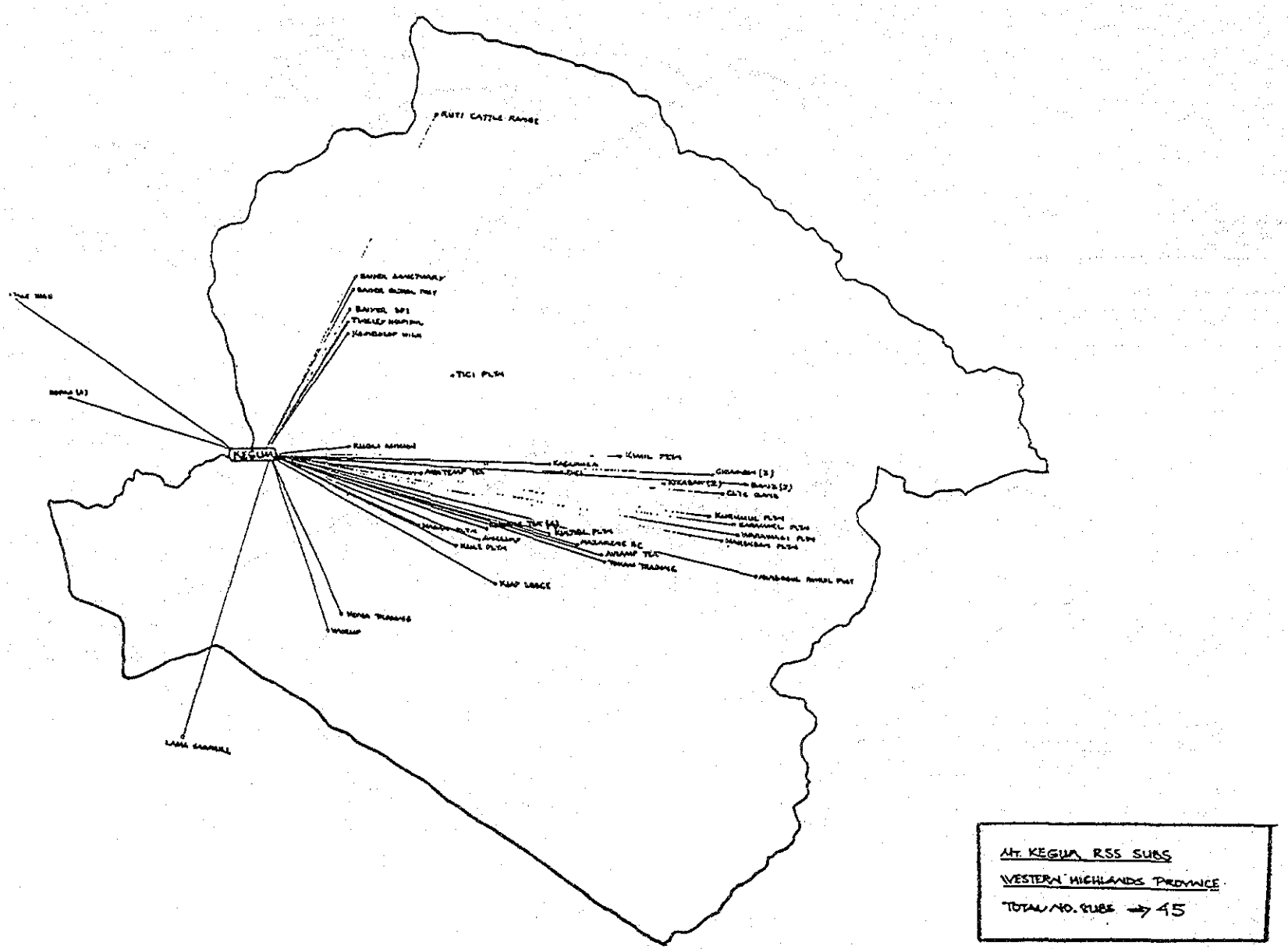
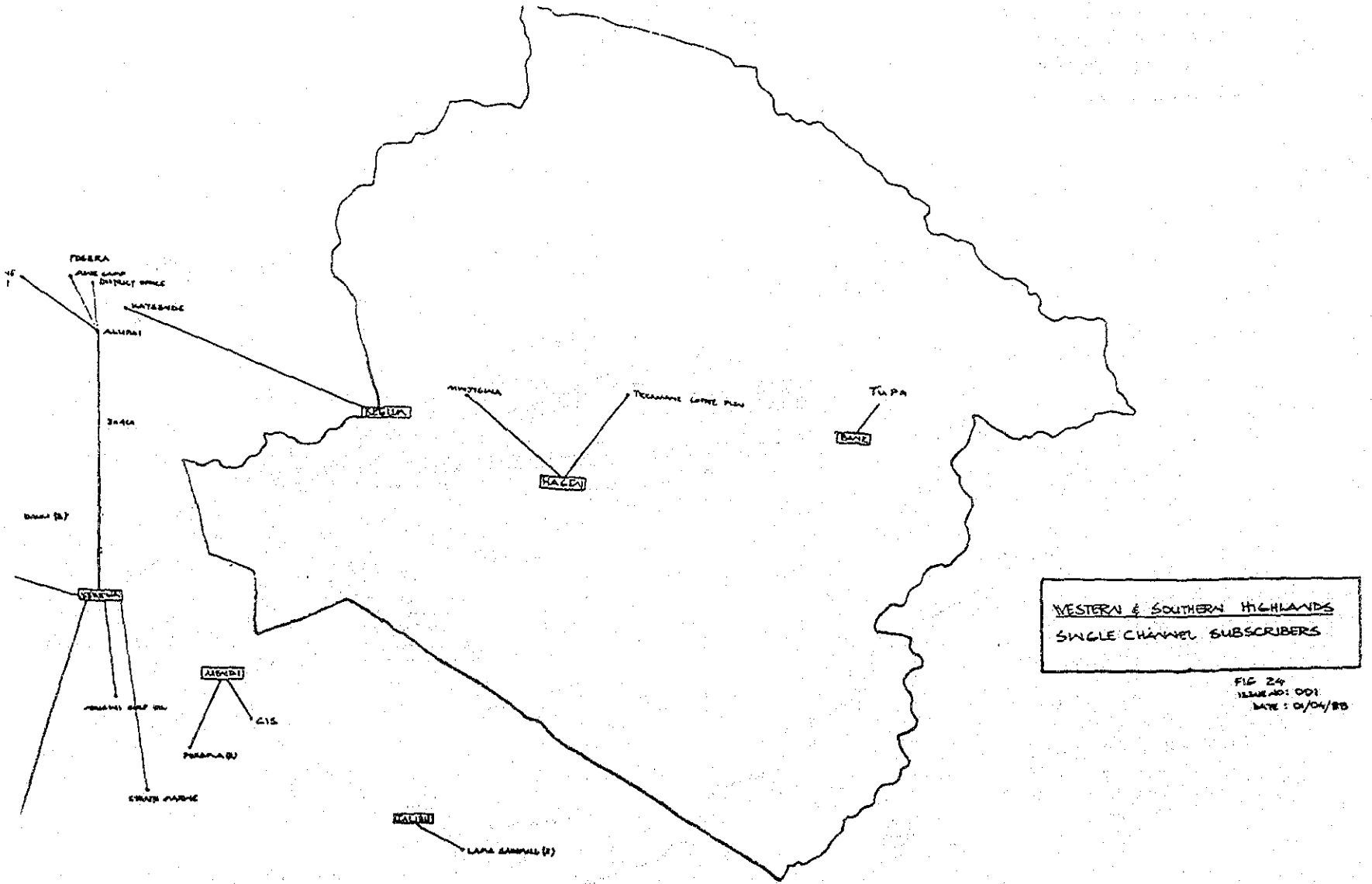


FIG 21
ISSUE NO: 001
DATE : 01/04/88


KUTA
AT KUTA RSS SUBS
WESTERN HIGHLANDS PROVINCE
TOTAL SUBS → 36
NB: 30 SUBS SHOWN. REFER TO
LIST FOR MORE INFO.


KEGUA
TICI PLTN
KAP LODGE
LAMA SAWMILL
Mt. KEGUA RSS SUBS
WESTERN HIGHLANDS PROVINCE
TOTAL NO. SUBS → 45


TUPA
WESTERN & SOUTHERN HIGHLANDS
SINGLE CHANNEL SUBSCRIBERS
FIG 24
ISSUE NO: 001
DATE : 01/04/93

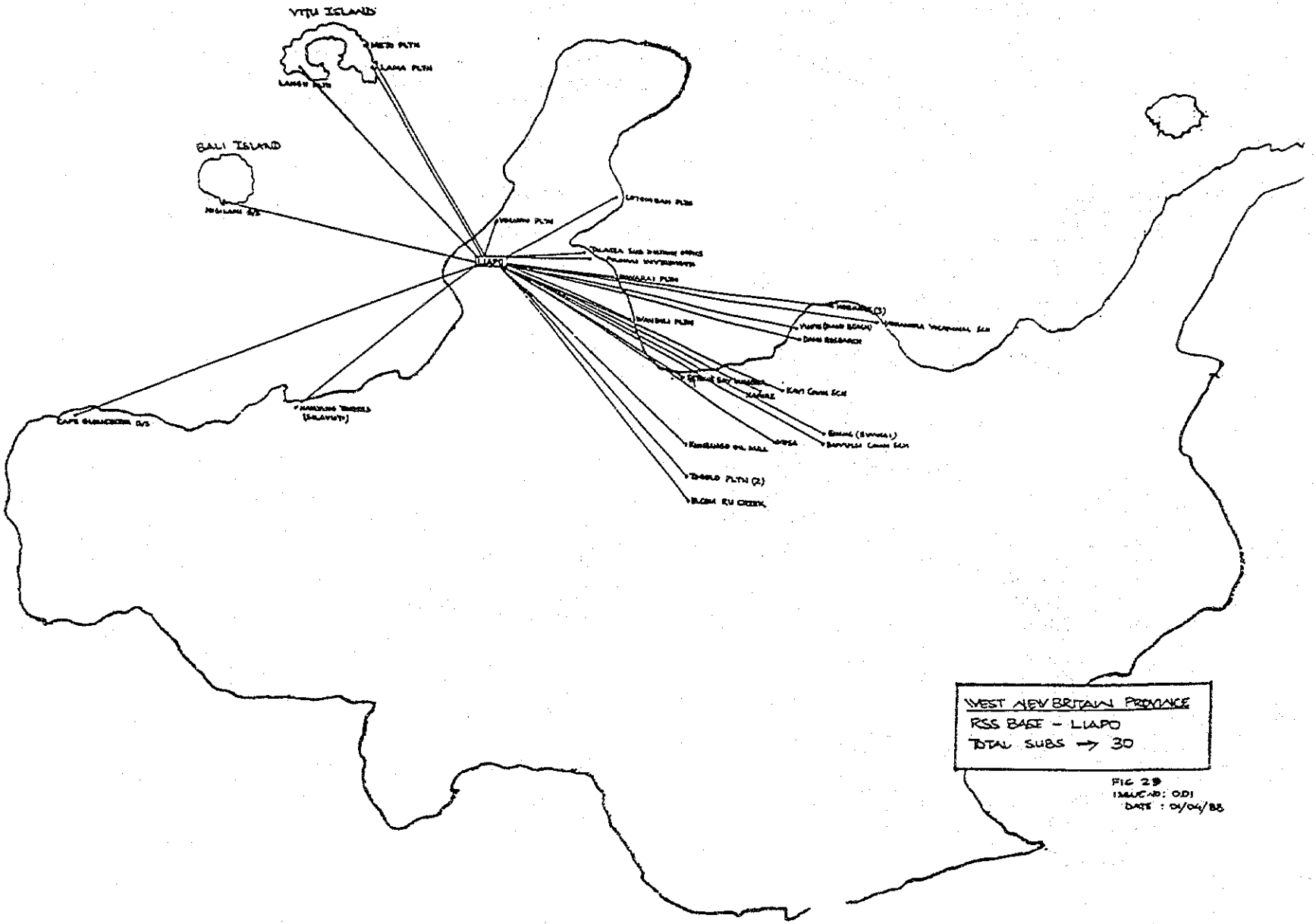
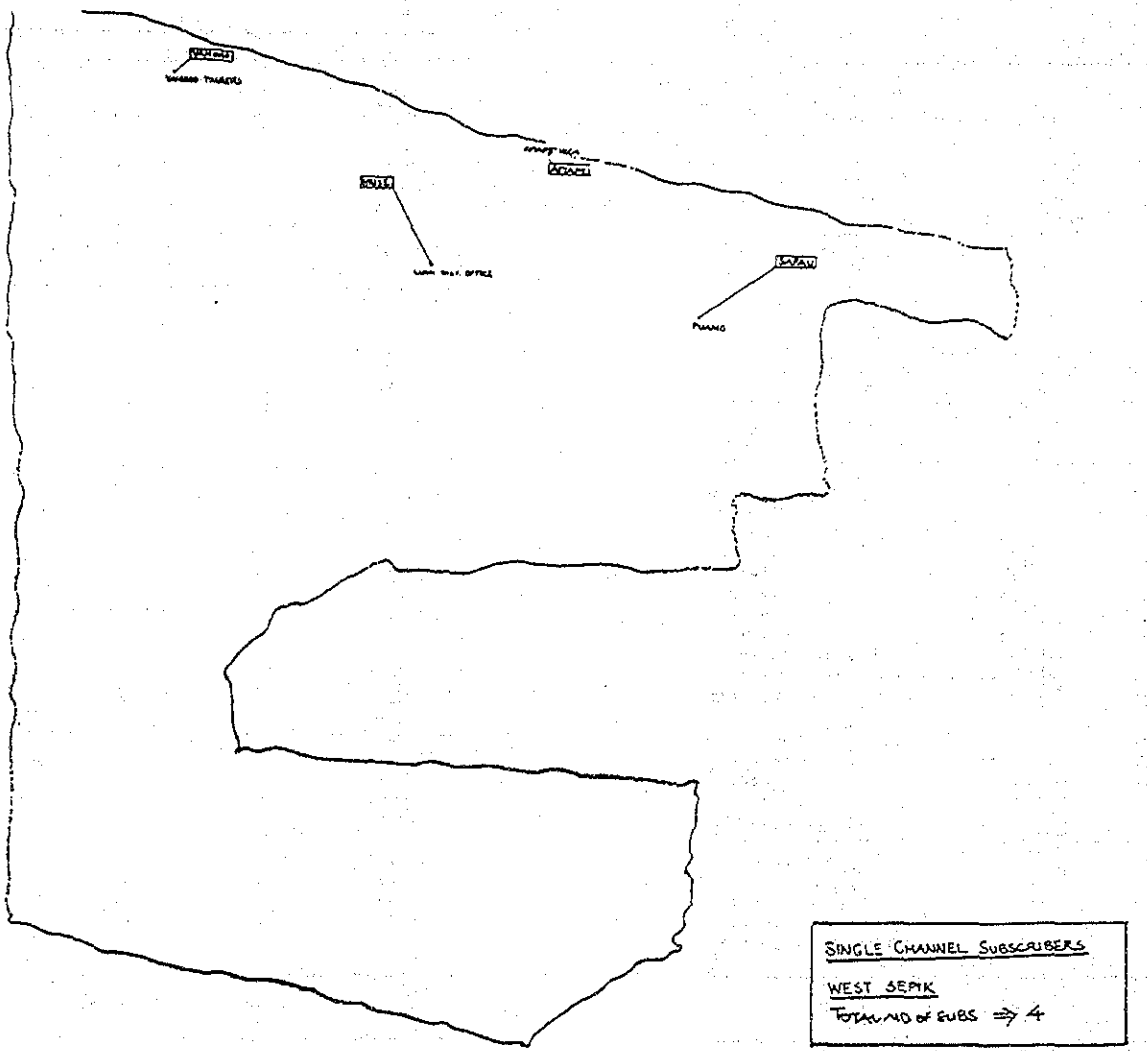


FIG 29
ISSUED: ODI
DATE : 01/04/88

WEST NEW BRITAIN PROVINCE
SINGLE CH SUBS = 7 8
FIG 2.6
ISSUE NO: 001
DATE : 01/04/98



SINGLE CHANNEL SUBSCRIBERS

WEST SEPIK

TOTAL NO of SUBS ⇒ 4

FIG 27
ISSUE NO: 001
DATE : 01/04/88

Small Systems (1)
TSCU's and Line Concentrators

Exchange	Type	Capacity	Connected	Full (1)
ARAWA DISTRICT				
Arawa Bay	TSCU	45	36	80.0
Arope	TSCU	25	20	80.0
Birempa	L/C	80	67	83.7
Birempa	TSCU	20	20	100.0
Nairovi	TSCU	5	2	40.0
Panguna	TSCU	5	5	100.0
Tinputz	TSCU	20	20	100.0
District Total		200	170	
COROKA DISTRICT				
Goroka	TSCU	10	10	100.0
Yonki	TSCU	5	5	100.0
District Total		15	15	
MT HAGEN DISTRICT				
Jalibu	TSCU	21	19	90.4
Imi	TSCU	24	18	87.5
Minj	TSCU	59	42	77.9
District Total		104	79	
LAE DISTRICT				
Gusap	TSCU	10	8	90.0
Gusap	L/C	40	17	42.5
Menyamya	TSCU	10	5	50.0
Mumeng	TSCU	5	3	80.0
Mutzin	TSCU	10	7	100.0
District Total		75	40	
MADANG DISTRICT				
Bogia	TSCU	12	12	100.0
Dibun	TSCU	5	2	40.0
Hanseman	TSCU	5	5	100.0
Kaviak	TSCU	5	5	100.0
Kinim	TSCU	12	12	100.0
Kulili	TSCU	5	5	100.0
Lombrum	TSCU	5	5	100.0
Tarite	TSCU	5	3	60.0
District Total		54	49	
PORT MORESBY DISTRICT				
Tapini	TSCU	5	5	100.0
Waigani	L/C	80	17	21.2
District Total		85	22	
RABAUL DISTRICT				
Kandrian	TSCU	24	18	75.0
Rabaul	TSCU	24	22	91.6
Tomavatur	L/C	40	18	45.0
Warongoi	L/C	40	18	45.0
District Total		128	76	
WEWAK DISTRICT				
Amanab	TSCU	10	8	100.0
Ambunti	TSCU	19	19	100.0
Bewani	TSCU	10	2	100.0
Green River	TSCU	10	7	100.0
Imonda	TSCU	10	2	100.0
Nuku	TSCU	10	9	100.0
District Total		69	47	
PNG TOTAL		730	498	

Note: TSCU is a subscriber line SW/4W converter
L/S is a line concentrator.

Small Systems (3)
RSS, FM880, SR10, TR4E1 & TR3E1

Exchange	Type	Capacity	Connected	Full (%)
ARAWA DISTRICT				
Anewa Bay	FM880	4	4	100.0
Arawa	FM880	1	1	100.0
Bom Martini	SR10	1	1	100.0
Bom Martini	FM880	1	1	100.0
Buka	FM880	2	2	100.0
Kieta	FM880	1	1	100.0
Takaniat	RSS	48	48	100.0
District Total		58	58	
GOROKA DISTRICT				
Goroka	FM880	6	6	100.0
Kainantu	FM880	5	5	100.0
Kainantu	TR4E1	1	1	100.0
Kundiawa	FM880	9	9	100.0
Mt Cua	FM880	1	1	100.0
Mt Elao	RSS	48	36	89.5
District Total		71	59	
MT HAGEN DISTRICT				
Banz	FM880	1	1	100.0
Kuta Ridge	RSS	48	33	68.8
Mandi	FM880	1	1	100.0
Mt Hagen	FM880	2	2	100.0
Mt Kegum	RSS	48	44	91.6
Mt Kegum	FM880	2	2	100.0
Mt Korowa	FM880	3	3	100.0
Tari	FM880	3	3	100.0
District Total		108	88	
LAE DISTRICT				
Bulolo	FM880	1	1	100.0
Finschhafen	SR10	2	2	100.0
Finschhafen	FM880	1	1	100.0
Lae	SR10	1	1	100.0
Mt Lunaman	FM880	1	1	100.0
Mt Settlebury	SR10	2	2	100.0
Nadzab	SR10	1	1	100.0
Oomsis	RSS	48	43	91.7
Saamu	FM880	4	4	100.0
District Total		61	58	
MADANG DISTRICT				
Bogia	FM880	2	2	100.0
Kanseman	FM880	2	2	100.0
Kanseman	TR4E1	1	1	100.0
Kulili	SR10	1	1	100.0
Lorengau	FM880	2	2	100.0
Madang	RSS	48	19	39.5
Madang	FM880	1	1	100.0
Madang	TR3E1	1	1	100.0
Tarite	SR10	1	1	100.0
Tarite	FM880	1	1	100.0
District Total		60	31	

Exchange	Type	Capacity	Connected	Full (%)
PORT MORESBY DISTRICT				
Aletau	FM880	8	8	100.0
Aletau	TR4E1	6	6	100.0
Bomana	FM880	1	1	100.0
Burns Peak	FM880	2	2	100.0
Cupola	FM880	1	1	100.0
Kapimpinga	FM880	1	1	100.0
Kupiano	SR10	1	1	100.0
Kwikila	SR10	2	2	100.0
Nomeave	SR10	2	2	100.0
Mt Lawes	RSS	48	47	97.9
Mt Lawes	FM880	1	1	100.0
Mt Lawes	SR10	2	2	100.0
Mt Tule	FM880	2	2	100.0
Paga Hill	RSS	24	10	41.6
Paga Hill	FM880	3	3	100.0
Popondetta	RSS	48	8	16.6
Popondetaa	SR10	1	1	100.0
Samarai	FM880	5	5	100.0
Segeri	TR4E1	1	1	100.0
District Total		159	104	
RABAUL DISTRICT				
Bialla	FM880	5	4	80.0
Bialla	SR10	1	1	100.0
Kavieng	FM880	3	3	100.0
Kimbe	FM880	2	2	100.0
Kimbe	SR10	1	1	100.0
Lisipo	RSS	48	30	62.5
Namatanai	SR10	1	1	100.0
Rabaul	RSS	60	51	85.0
Rabaul	FM880	9	9	100.0
Rabaul	SR10	1	1	100.0
District Total		129	101	
WEWAK DISTRICT				
Aitape	SR10	1	1	100.0
Angoram	FM880	2	2	100.0
Maprik	FM880	4	3	75.0
Mt Hagen	FM880	1	1	100.0
Mt Sapau	FM880	1	1	100.0
Navsan	FM880	4	4	100.0
Vanimo	FM880	1	1	100.0
Wewak	FM880	2	2	100.0
Wewak	SR10	1	1	100.0
District Total		17	16	
PMG TOTAL		663	515	

Note: RSS, FM880, SR10 are single channel radio system.
TR4E1, TR3E1 are 4 CH and 3 CH radio systems, and are commonly used not only for telephone but also telegram.

SCHEDULE 1

VILLAGE RESPONSIBILITIES

The village will be asked to form a three way partnership, for their own benefit:

1. PTC provides the installation

2. Government secures and provides fund, and

3. The village protects the installation.

Details of the village contributions are:

1. The village eldlers are to nominate one person, the "Village Telephone Chief", who will have the authority to deal with PTC on the details of the installation. That person will remain responsible for supervising the telephone against misuse or vandalism, answering inward calls, maintaining the battery, and replacing the coin tin. These services will be given without charge to PTC.

2. The village will provide a suitable weatherproof location for the coin box and telephone equipment, a site for the aerial, and a secure area for the battery and radio equipment, without charge to PTC.

3. PTC will not charge a connection fee, nor rental, and will provide normal maintenance, including reasonable wear and tear, without charge.

4. The village will pay a deposit of K200.00, which will be held by PTC to cover the cost of any deliberate damage, vandalism, theft of coins, removal of battery, etc. A charge will be made to cover the restoration and/or repairs, including travel costs, and if payment is not made in a reasonable time, the telephone installation will be withdrawn and the balance of deposit will be forfeited.

5. All cash deposits in the cash tin will be delivered to a nominated place, by the "Village Telephone Chief" or a trustworthy villager, on a regular or satisfactory basis, as approved by the District Telecommunication Manager, without charge to PTC.

SCHEDULE 2

EQUIPMENT REQUIRED

In some cases the village payphone service will use base station radio equipment already in operation for the Radio Subscribers Service (R.S.S). However, most installations are expected to require new base station equipment, as a very high calling rate (in and out) is expected on this Village Payphone, as the villagers become confident in the use of the service.

In the simplest form, the system consists of:

At the telephone exchange

1. Radio Transmitter/receiver and aerial;

2. Interface equipment between the radio transmitter or receiver and public switched network.

At the Village

3. Aerial

4. Solar power collector, and battery

5. Radio transmitter and receiver

6. Coin operated public telephone

SCHEDULE 3

CAPITAL COST

The following are estimates based on the cost of analogue equipment purchased for pilot project at Barakau Village in Central Province:

For Each Installation:

Village Equipment:	approx. K 6,500
Plus Channel Equipment, either:	
Single Channel Equipment (maximum 5 per exchange)	approx. K 1,600
OR	
A twentieth share of R.S.S Service * K65,000 (1984 prices	approx. K 3,200
If needed:	
Mountain top remote site (to repeat signals over difficult radio path)	approx. K 4,800

* Installation costs are not included

SCHEDULE 4

ADMINISTRATION

Details of how the " village payphone" is to be administered has yet to be finalised and agreed upon between PTC and National Government.

The following are noted for consideration:

1. For a "Rural Payphone Group" or Committee to be established to administer the system ie. similar to the "Power Development Group" established in the PNG Electricity Commission.

   Membership to said group or committee to comprise PTC representatives, Department of Finance representatives, and Ministry for Communication.

   The Managing Director of PTC to be the Chairman of the Committee and a working Secretariat established to handle requests for village payphones, undertake technical reviews, maintain a rolling programme for implementation and provide assistance on overall administration.

   The Group or Committee is not intended to have policy making powers. Policy decisions are to be referred to the appropriate organisation i.e. PTC or the Government authorities.

2. A trust account to be established in order to maintain control and accountability of the "village payphone" scheme.

   Funds secured or provided by the National Government for the project are to be deposited to the trust account. . Drawings from the trust account will be made from time to time for equipment purchases.

3. Periodic reports from the Group or Committee are to be made at agreed dates.

As stated earlier, detailed discussions on the above will need to be made. Other issues related to administration may be raised.

ANNEX 8

RURAL NETWORKS AND SYSTEMS

Project Description	KINA THOUSANDS YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Rural Subscriber Network (Digital Programme)						
1026 - Mt-Kerewa Digital RSN	650	650				1300
1066 - East Sepik Digital RNS		500	300			800
1146 - Southern Highlands Digital RSN				500	300	800
1216 - Kulsimau Digital RSN			500	300		800
1246 - Bereina/Tapini Digital RSN	345					345
1286 - Cape Rodney Digital RSN			500	300		800
1968 - Huon Peninsula Digital RSN				500	300	800
1978 - Upper Ramu Digital RSN					800	800
1988 - Eastern Highlands Digital RSN	615	375	300			900
TOTAL DIGITAL	1610	1525	1600	1600	1400	7735
Rural Subscriber Network (Analog Programme)						
1086 - Mt-Sulen RSS	235					235
1106 - Mt-Karoma System				200	185	385
1116 - Western Province Network				400	400	800
1126 - Taskul System	130					130
1136 - Gulf Province Network	330					330
1166 - East Pomio System	150					150
1186 - Kokoda System	165					165
1206 - Yapsie/Telephomin System	440					440
1226 - Aseki System	45					45
1387 - Kulsimau RSS (Interim)	435					435
1407 - Tomavatur RSS	50					50
1788 - Saidor System	155					155
1808 - Balimo System	115					115
1998 - Milne Bay Network (Phase 2)		250	350			600
2008 - Huon Peninsula System (Interim)		250				250
TOTAL ANALOG SYSTEM	2250	500	350	600	585	4285
Various Rural Subscriber Systems						
1838 - Various RSS Systems	755	600	600	600	600	3155
TOTAL DIGITAL NETWORK	1610	1525	1600	1600	1400	7735
TOTAL ANALOG SYSTEM	2250	500	350	600	585	4285
VARIOUS RSS SYSTEM	755	600	600	600	600	3155
TOTAL RURAL PROJECTS	4615	2625	2550	2800	2585	15175

EXECUTIVE SUMMARY

PLANT ACCOUNT/DESCRIPTION	TOTAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Trunk and Junctions	4727	878	765	1041	1073	970
Power Provision	3724	1242	658	499	730	595
VHF Subscriber Instruments	3394	1554	535	435	435	435
Buildings	1917	413	344	310	440	410
Subscriber Cables	763	130	131	205	122	175
Local Auto. Exchange	359	239	60	60	0	0
Conduits	81	9	72	0	0	0
Others	210	150	60	0	0	0
	15175	4615	2625	2550	2800	2585

RURAL DEVELOPMENT PROGRAMME

PLANT ACCOUNT/DESCRIPTION	TOTAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
BGP - Buildings	1917	413	344	310	440	410
LLP - Power Provision	3724	1242	658	499	730	595
SUP - Town Cabling	105	0	0	105	0	0
TGP - Trunk and Junctions (T)	69	63	0	1	0	5
TPP - T & J Channeling Equipments	495	170	90	105	65	65
TRP - Trunk and Junction	4101	633	675	885	1008	900
TRR - Equipment/Recovery	50	0	0	50	0	0
TXP - Trunk and Switching Equipments	12	12	0	0	0	0
VAR - Various Assets	210	150	60	0	0	0
VCP - VHF Subscriber Equipments	3394	1554	535	435	435	435
XAP - Local Auto Exchange Equipments	359	239	60	60	0	0
XCP - Conduit	81	9	72	0	0	0
XUP - Subscriber Cables	658	130	131	100	122	175
	15175	4615	2625	2550	2800	2585

RURAL DEVELOPMENT PROGRAMME - YEAR 1

PLANT ACCOUNT/DESCRIPTION	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
BGP - Buildings	413	39	169	205	0	0
LPP - Power Provision	1242	172	258	805	7	0
TGP - Trunk and Junctions (T)	63	17	46	0	0	0
TPP - T & J Channeling Equipments	170	34	132	4	0	0
TRP - Trunk and Junction	633	63	212	348	10	0
TXP - Trunk and Switching Equipments	12	0	0	12	0	0
VAR - Various Assets	150	0	0	150	0	0
VOP - VHF Subscriber Equipments	1554	134	428	986	6	0
XAP - Local Auto Exchange Euipments	239	0	0	222	17	0
XCP - Conduit	9	1	8	0	0	0
XUP - Subscriber Cables	130	6	43	81	0	0
	4615	466	1296	2813	40	0

YEAR 1 - DIGITAL SYSTEMS

1. PROJECT: 1206 - KEREWA DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	320	15	50	250	5	0
. LPP - Power Provisions	175	0	0	175	0	0
. XUP - Subscriber Cables	0	0	0	0	0	0
. BGP - Buildings	155	10	70	75	0	0
SUB TOTAL	650	25	120	500	5	0

2. PROJECT: 1246 - BEREINA/TAPINI DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	107	12	40	50	5	0
. TGP - Trunk and Junctions (T)	9	2	7	0	0	0
. LPP - Power Provisions	155	35	28	89	3	0
. XUP - Subscriber Cables	48	2	7	39	0	0
. BGP - Buildings	17	2	5	10	0	0
. XCP - Conduit	9	1	8	0	0	0
SUB TOTAL	345	54	95	188	8	0

3. PROJECT: 1988 - EASTERN HIGH'D DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. XCP - Conduit	0	0	0	0	0	0
. XUP - Subscriber Cables	0	0	0	0	0	0
. TGP - Trunk and Junctions (T)	15	3	12	0	0	0
. LPP - Power Provisions	134	17	34	80	3	0
. BGP - Buildings	17	4	13	0	0	0
. TRP - Trunk and Junctions	136	29	92	15	0	0
. TPP - Trunk & Junction Channeling Equipment	62	15	47	0	0	0
. XAP - Local Auto Exchange Equipment	239	0	0	222	17	0
. TXP - Trunk and Switching Equipments	12	0	0	12	0	0
SUB TOTAL	615	68	198	329	20	0

4. PROJECT: 1086 - MT. SULEN RSS	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	118	13	26	79	0	0
. LPP - Power Provisions	86	16	30	40	0	0
. BGP - Buildings	31	3	8	20	0	0
SUB TOTAL	235	32	64	139	0	0

5. PROJECT: 1126 - TASKUL SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	70	7	30	33	0	0
. LPP - Power Provisions	51	8	8	35	0	0
. XUP - Subscriber Cables	9	0	4	5	0	0
SUB TOTAL .	130	15	42	73	0	0

6. PROJECT: 1136 - GULF PROVINCE NETWORK	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	123	14	55	54	0	0
. TGP - Trunk and Junctions (T)	18	5	13	0	0	0
. XUP - Subscriber Cables	19	1	8	10	0	0
. LPP - Power Provisions	105	10	20	75	0	0
. BGP - Buildings	65	4	21	40	0	0
SUB TOTAL	330	34	117	179	0	0

7. PROJECT: 1166 - EAST POMIO SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VAP - Various Assets	150	0	0	150	0	0
SUB TOTAL	150	0	0	150	0	0

8. PROJECT: 1186 - KOKODA SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TGP - Trunk and Junctions (T)	12	5	7	0	0	0
. XUP - Subscriber Cables	10	1	4	5	0	0
. LPP - Power Provisions	40	10	10	20	0	0
. BGP - Buildings	21	2	9	10	0	0
. VOP - VHF Subscriber Equipment	82	7	30	45	0	0
SUB TOTAL	165	25	60	80	0	0

9. PROJECT: 1206 - YAPSIE/TELEPHONIN SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. LPP - Power Provisions	201	26	53	122	0	0
. VOP - VHF Subscriber Equipment	131	14	45	72	0	0
. XUP - Subscriber Cables	18	0	8	10	0	0
. BGP - Buildings	90	12	38	40	0	0
SUB TOTAL	440	52	144	244	0	0

10. PROJECT: 1226 - ASEKI SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	22	10	10	2	0	0
. XUP - Subscriber Cables	5	0	4	1	0	0
. LPP - Power Provisions	18	9	6	2	1	0
SUB TOTAL	45	19	20	5	1	0

11. PROJECT: 1387 - KULSIMAU RSS (INTERIM)	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	370	24	60	280	6	0
. LPP - Power Provisions	65	10	15	40	0	0
SUB TOTAL	435	34	75	320	6	0

12. PROJECT: 1407 - TOMAVATUR RSS	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TPP - Trunk & Junction Channeling Equipment	15	5	10	0	0	0
. VOP - VHF Subscriber Equipment	35	10	25	0	0	0
SUB TOTAL	50	15	35	0	0	0

13. PROJECT: 1788 - SAIDOR SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	67	7	30	30	0	0
. TGP - Trunk and Junctions (T)	9	2	7	0	0	0
. LPP - Power Provisions	47	6	6	35	0	0
. XUP - Subscriber Cables	15	1	4	10	0	0
. BGP - Buildings	17	2	5	10	0	0
SUB TOTAL	155	18	52	85	0	0

14. PROJECT: 1808 - BALIMO SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	92	18	70	4	0	0
. LPP - Power Provisions	17	5	10	2	0	0
. XUP - Subscriber Cables	6	1	4	1	0	0
SUB TOTAL	115	24	84	7	0	0

15. PROJECT: 1838 - VARIOUS RSS SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. LPP - Power Provisions	148	20	38	90	0	0
. TPP - Trunk & Junction Channeling Equipment	93	14	75	4	0	0
. VOP - VHF Subscriber Equipment	514	17	77	420	0	0
SUB TOTAL	755	51	190	514	0	0

TOTAL ANALOG SYSTEMS	3005	319	883	1796	7	0
TOTAL DIGITAL SYSTEMS	1610	147	413	1017	33	0
TOTAL RURAL PROJECTS	4615	466	1296	2813	40	0

RURAL DEVELOPMENT PROGRAMME - YEAR 2

PLANT ACCOUNT/DESCRIPTION	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
BGP - Buildings	344	9	70	265	0	0
LPP - Power Provision	658	80	73	505	0	0
SUP - Town Cabling	0	0	0	0	0	0
TGP - Trunk and Junctions (T)	0	0	0	0	0	0
TPP - T & J Channeling Equipments	90	15	45	30	0	0
TRP - Trunk and Junction	675	20	55	600	0	0
VAR - Various Assets	60	5	10	45	0	0
VHP - VHF Subscriber Equipments	535	30	85	420	0	0
XAP - Local Auto Exchange Eulpments	60	0	0	60	0	0
XCP - Conduit	72	3	9	60	0	0
XUP - Subscriber Cables	131	5	21	105	0	0
	2625	167	368	2090	0	0

YEAR 2 - DIGITAL SYSTEMS

1. PROJECT: 1206 - KEREMA DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	75	20	55	0	0	0
. LPP - Power Provisions	268	65	43	160	0	0
. XUP - Subscriber Cables	81	3	18	60	0	0
. BGP - Buildings	154	9	70	75	0	0
. XCP - Conduit	72	3	9	60	0	0
SUB TOTAL	650	100	195	355	0	0

2. PROJECT: 1066 - EAST SEPIK DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	250	0	0	250	0	0
. TGP - Trunk and Jnctions (T)	0	0	0	0	0	0
. LPP - Power Provisions	150	0	0	150	0	0
. BGP - Buildings	100	0	0	100	0	0
. SUP - Town Cabling	0	0	0	0	0	0
SUB TOTAL	500	0	0	500	0	0

3. PROJECT: 1988 - EASTERN HIGH'D DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	250	0	0	250	0	0
. XAP - Local Auto Exchange Equipment	60	0	0	60	0	0
. XUP - Subscriber Cables	25	0	0	25	0	0
. BGP - Buildings	40	0	0	40	0	0
SUB TOTAL	375	0	0	375	0	0

4. PROJECT: 1998 - MILNE BAY NETWORK (PHASE 2)	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	100	0	0	100	0	0
. TPP - Trunk & Junction Channeling Equipment	25	0	0	25	0	0
. LPP - Power Provisions	75	0	0	75	0	0
. BGP - Buildings	50	0	0	50	0	0
SUB TOTAL	250	0	0	250	0	0

5. PROJECT: 2008 - HUON PENINSULA SYSTEM (INTERIM)	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. VOP - VHF Subscriber Equipment	100	15	25	60	0	0
. LPP - Power Provisions	65	5	10	50	0	0
. XUP - Subscriber Cables	25	2	3	20	0	0
. VAR - Various Assets (Equipments/Huts)	60	5	10	45	0	0
SUB TOTAL	250	27	48	175	0	0

6. PROJECT: 1838 - VARIOUS RSS SYSTEMS	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TPP - Trunk & Junction Channeling Equipment	65	15	45	5	0	0
. VOP - VHF Subscriber Equipment	435	15	60	360	0	0
. LPP - Power Provisions	100	10	20	70	0	0
SUB TOTAL	600	40	125	435	0	0

TOTAL ANALOG SYSTEMS	1100	67	173	860	0	0
TOTAL DIGITAL SYSTEMS	1525	100	195	1230	0	0
TOTAL RURAL PROJECTS	2625	167	368	2090	0	0

RURAL DEVELOPMENT PROGRAMME - YEAR 3

PLANT ACCOUNT/DESCRIPTION	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
BGP - Buildings	310	40	95	175	0	0
LPP - Power Provision	499	45	114	340	0	0
SUP - Town Cabling	105	30	30	45	0	0
TGP - Trunk and Junctions (T)	1	1	0	0	0	0
TPP - T & J Channeling Equipments	105	30	65	10	0	0
TRP - Trunk and Junction	885	100	235	550	0	0
TRR - Equipment/Recovery	50	15	35	0	0	0
VOP - VHF Subscriber Equipments	435	15	60	360	0	0
XAP - Local Auto Exchange Eulpments	60	15	45	0	0	0
XUP - Subscriber Cables	100	10	30	60	0	0
	2550	301	709	1540	0	0

YEAR 3 - DIGITAL SYSTEMS

1. PROJECT: 1066 - EAST SEPIK DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	150	50	100	0	0	0
. TGP - Trunk and Jnctions (T)	1	1	0	0	0	0
. LPP - Power Provisions	69	20	49	0	0	0
. BGP - Buildings	45	15	30	0	0	0
. SUP - Town Cabling	35	20	15	0	0	0
SUB TOTAL	300	106	194	0	0	0

2. PROJECT: 1216 - KULSIMAU DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	250	0	0	250	0	0
. LPP - Power Provisions	140	0	0	140	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
. BGP - Buildings	80	0	0	80	0	0
SUB TOTAL	500	0	0	500	0	0

3. PROJECT: 1286 - CAPE RODNEY DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	265	10	5	250	0	0
. LPP - Power Provisions	120	0	0	120	0	0
. BGP - Buildings	85	0	0	85	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
SUB TOTAL	500	10	5	485	0	0

4. PROJECT: 1988 - EASTERN HIGH'D DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	100	20	80	0	0	0
. XAP - Local Auto Exchange Equipment	60	15	45	0	0	0
. XUP - Subscriber Cables	40	10	30	0	0	0
. BGP - Buildings	50	15	35	0	0	0
. TRR - Equipment/Recovery	50	15	35	0	0	0
SUB TOTAL	300	75	225	0	0	0

YEAR 3 - ANALOG SYSTEMS

5. PROJECT: 1998 - MILNE BAY NETWORK (PHASE 2)	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	120	20	50	50	0	0
. TPP - Trunk & Junction Channeling Equipment	40	15	20	5	0	0
. LPP - Power Provisions	70	15	45	10	0	0
. SUP - Town Cabling	70	10	15	45	0	0
. BGP - Buildings	50	10	30	10	0	0
SUB TOTAL	350	70	160	120	0	0

6. PROJECT: 1838 - VARIOUS RSS SYSTEMS	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TPP - Trunk & Junction Channeling Equipment	65	15	45	5	0	0
. VOP - VHF Subscriber Equipment	435	15	60	360	0	0
. LPP - Power Provisions	100	10	20	70	0	0
SUB TOTAL	600	40	125	435	0	0
TOTAL ANALOG SYSTEMS	950	110	285	555	0	0
TOTAL DIGITAL SYSTEMS	1600	191	424	985	0	0
TOTAL RURAL PROJECTS	2550	301	709	1540	0	0

RURAL DEVELOPMENT PROGRAMME - YEAR 4

PLANT ACCOUNT/DESCRIPTION	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
BGP - Buildings	440	0	0	440	0	0
LPP - Power Provision	730	0	0	730	0	0
TGP - Trunk and Junctions (T)	0	0	0	0	0	0
TPP - T & J Channeling Equipments	65	0	0	65	0	0
TRP - Trunk and Junction	1008	0	0	1008	0	0
VOP - VHF Subscriber Equipments	435	0	0	435	0	0
XUP - Subscriber Cables	122	0	0	122	0	0
	2800	0	0	2800	0	0

YEAR 4 - DIGITAL SYSTEMS

1. PROJECT: 1146 - SOUTHERN H'LDS DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	250	0	0	250	0	0
. TGP - Trunk and Jnctions (T)	0	0	0	0	0	0
. LPP - Power Provisions	150	0	0	150	0	0
. BGP - Buildings	100	0	0	100	0	0
. XUP - Subscriber Cables	0	0	0	0	0	0
SUB TOTAL	500	0	0	500	0	0

2. PROJECT: 1216 - KULSIMAU DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	100	0	0	100	0	0
. LPP - Power Provisions	120	0	0	120	0	0
. XUP - Subscriber Cables	20	0	0	20	0	0
. BGP - Buildings	60	0	0	60	0	0
SUB TOTAL	300	0	0	300	0	0

3. PROJECT: 1286 - CAPE RODNEY DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	110	0	0	110	0	0
. LPP - Power Provisions	80	0	0	80	0	0
. BGP - Buildings	80	0	0	80	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
SUB TOTAL	300	0	0	300	0	0

4. PROJECT: 1968 - HUON PENINSULA DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	265	0	0	265	0	0
. LPP - Power Provisions	120	0	0	120	0	0
. BGP - Buildings	85	0	0	85	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
SUB TOTAL	500	0	0	500	0	0

YEAR 4 - ANALOG SYSTEMS

5. PROJECT: 1106 - MT. KOROMA SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	83	0	0	83	0	0
. LPP - Power Provisions	60	0	0	60	0	0
. BGP - Buildings	45	0	0	45	0	0
. XUP - Subscriber Cables	12	0	0	12	0	0
SUB TOTAL	200	0	0	200	0	0

6. PROJECT: 1116 - WESTERN PROVINCE NETWORK	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	200	0	0	200	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
. LPP - Power Provisions	100	0	0	100	0	0
. BGP - Buildings	70	0	0	70	0	0
SUB TOTAL	400	0	0	400	0	0

7. PROJECT: 1838 - VARIOUS RSS SYSTEMS	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TPP - Trunk & Junction Channeling Equipment	65	0	0	65	0	0
. VOP - VHF Subscriber Equipment	435	0	0	435	0	0
. LPP - Power Provisions.	100	0	0	100	0	0
SUB TOTAL	600	0	0	600	0	0

TOTAL ANALOG SYSTEMS	1200	0	0	1200	0	0
TOTAL DIGITAL SYSTEMS	1600	0	0	1600	0	0
TOTAL RURAL PROJECTS	2800	0	0	2800	0	0

RURAL DEVELOPMENT PROGRAMME - YEAR 5

PLANT ACCOUNT/DESCRIPTION	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
BGP - Buildings	410	0	0	410	0	0
LPP - Power Provision	595	0	0	595	0	0
TGP - Trunk and Junctions (T)	5	0	0	5	0	0
TPP - T & J Channeling Equipments	65	0	0	65	0	0
TRP - Trunk and Junction	900	0	0	900	0	0
VOP - VHF Subscriber Equipments	435	0	0	435	0	0
XUP - Subscriber Cables	175	0	0	175	0	0
	2585	0	0	2585	0	0

YEAR 5 - DIGITAL SYSTEMS

1. PROJECT: 1146 - SOUTHERN H'LDS DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	100	0	0	100	0	0
. TGP - Trunk and Jnctions (T)	5	0	0	5	0	0
. LPP - Power Provisions	75	0	0	75	0	0
. BGP - Buildings	75	0	0	75	0	0
. XUP - Subscriber Cables	45	0	0	45	0	0
SUB TOTAL	300	0	0	300	0	0

2. PROJECT: 1968 - HUON PENINSULA DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	110	0	0	110	0	0
. LPP - Power Provisions	80	0	0	80	0	0
. BGP - Buildings	80	0	0	80	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
SUB TOTAL	300	0	0	300	0	0

3. PROJECT: 1978 - UPPER RAMU DIGITAL RSN	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	420	0	0	420	0	0
. LPP - Power Provisions	180	0	0	180	0	0
. BGP - Buildings	140	0	0	140	0	0
. XUP - Subscriber Cables	60	0	0	60	0	0
SUB TOTAL	800	0	0	800	0	0

4. PROJECT: 1106 - MT. KOROMA SYSTEM	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	70	0	0	70	0	0
. LPP - Power Provisions	60	0	0	60	0	0
. BGP - Buildings	45	0	0	45	0	0
. XUP - Subscriber Cables	10	0	0	10	0	0
SUB TOTAL	185	0	0	185	0	0

5. PROJECT: 1116 - WESTERN PROVINCE NETWORK	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TRP - Trunk and Junctions	200	0	0	200	0	0
. XUP - Subscriber Cables	30	0	0	30	0	0
. LPP - Power Provisions	100	0	0	100	0	0
. BGP - Buildings	70	0	0	70	0	0
SUB TOTAL	400	0	0	400	0	0

6. PROJECT: 1838 - VARIOUS RSS SYSTEMS	TOTAL COST	LABOUR	INCR	PROCURE	STRES	CONT
. TPP - Trunk & Junction Channeling Equipment	65	0	0	65	0	0
. VOP - VHF Subscriber Equipment	435	0	0	435	0	0
. LPP - Power Provisions	100	0	0	100	0	0
SUB TOTAL	600	0	0	600	0	0

TOTAL ANALOG SYSTEMS	1185	0	0	1185	0	0
TOTAL DIGITAL SYSTEMS	1400	0	0	1400	0	0
TOTAL RURAL PROJECTS	2585	0	0	2585	0	0

(2) Scope of Work

SCOPE OF WORK

FOR

THE FEASIBILITY STUDY

ON

RURAL TELECOMMUNICATION

DEVELOPMENT PLAN

IN

THE INDEPENDENT STATE OF PAPUA NEW GUINEA

AGREED UPON BETWEEN

AUTHORITIES CONCERNED OF THE GOVERNMENT OF

THE INDEPENDENT STATE OF PAPUA NEW GINEA

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

PORT MORESBY

DECEMBER 14th, 1988

Mr. Shigehiko NAOE	Mr. Robert IGARA	Mr. Ron ELIAS
Leader,	First Assistant	Managing Director,
Preliminary Study Team	Secretary,	Post and
Japan International	Foreign Aid Management	Telecommunication
Cooperation Agency	Division	Corporation
	Department of	
	Finance and Planning	

I. INTRODUCTION

In response to the request of the Government of the Independent State of Papua New Guinea (hereinafter referred to as "P.N.G."), the Government of Japan decided to implement the Feasibility Study on Rural Telecommunication Development Plan (hereinafter referred to as "the Study") in P.N.G., in accordance with relevant laws and regulations as part of the technical cooperation programmes of the Government of Japan.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Study, in close cooperation with the authorities of the Government of P.N.G.

The present document sets forth the Scope of Work for the Study.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to prepare and propose a Rural Telecommunication Development Plan consisting of

1) Village Payphone Programme and

2) Rural Extention and Expansion Programme up to the year of 1993.

III. OUTLINE OF THE STUDY

1. Area of the Study

The Study covers the rural areas necessary for Rural Telecommunication Development Plan in P.N.G.

2. Contens of the Study

2.1. Collection and analysis of data and information related to rural telecommunication:

(1) Social and economic statistics

(2) National development plan

(3) Present situation and future plan of other social infrastructure related to rural telecommunication

(4) Relevant laws and regulations for telecommunication

(5) Relevant technical standards for telecommunication

(6) Statistics of financial status of PTC

(7) Existing Status of telecommunications facilities

(8) Existing development plans and on-going projects in relation to telecommunications.

(9) Existing status of operation and management of telecommunications

(10) Topographic conditions and infrastructure in the proposed site

(11) Construction condition in P.N.G.

(12) Other related matters

2.2. Feasibility Study

(1) Development plan for the whole of P.N.G.;

a. Background

b. Demand and traffic forecast

c. Rural telecommunication development plan
(including operation and maintenance requirement)

d. Tariff

e. Evaluation

f. Policy Option

(2) Initial plan for agreed nominated provinces:

a. Site selection in planned area

b. System design

c. Public telephone

d. Power Supply

e. Telephone shelter

f. Base station facilities

g. Other related facilities

IV. SCHEDULE OF THE STUDY

The Study shall be undertaken in accordance with the tentative schedule shown in the table.

V. REPORTS

JICA will prepare and submit the following reports in English to the Government of P.N.G.

1. Inception Report:

Twenty (20) copies prior to commencement of the first work in P.N.G.

2. Interim Report:

Twenty (20) copies at the beginning of the second work in P.N.G.

3. Draft Final Report:

Twenty (20) copies at the end of the third work in Japan.

By the end of the study of Japanese study team (hereinafter referred to as "the Team") for the explanation in P.N.G., the Government of P.N.G. will provide JICA with its comments on the Draft Final Report.

4. Final Repot:

Forty (40) copies within two (2) months after the receipt of the said comments on the Draft Final Report.

VI. UNDERTAKINGS OF THE GOVERNMENT OF P.N.G

1. To facilitate smooth conduct of the Study, the Government of P.N.G. shall take necessary measures;

(1) To secure the safety of the Team.

(2) To permit the members of the Team to enter, leave and sojourn in P.N.G. for the duration of their assignment therin, and exempt them from alien registration requirements and consular fees.

(3) To exempt the members of the Team from taxes, duties and any other charges on equipment, machinary and other materials brought by the Team into P.N.G. for the conduct of the Study.

(4) To exempt the members of the Team from income taxes and other charges of any kinds imposed on or in connection with any emoluments or allowance paid to the members of the Team for their services in connection with the implementation of the Study.

(5) To provide necessary facilities to the Team for remittance as well as utilization of the funds introduced into P.N.G. from Japan in connection with the implementation of the Study.

(6) To secure permission for entry into private properties or restricted areas for the conduct of the Study.

(7) To secure permission for the Team to take all data and documents including photographs relating to the Study, for the sole purpose of the Study out of P.N.G. to Japan.

(8) To provide medical services as needed. Its expenses will be chargeable on members of the Team.

2. The Government of P.N.G. shall bear claims, if any arises against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

3. Post and Telecommunication Corporation (hereinafter referred to as "PTC") shall act as counterpart agency and also supporting body to the Team in relation with as governmental and nongovernmental organization concerned for the smooth implementation of the Study.

4. PTC shall, at its own expense, provide the Team during the Study period with the following, in cooperations with other relevant organizations:

(1) Available data and information related to the Study.

(2) Counterpart personnel.

(3) Suitable office space with necessary equipment in P.N.G..

(4) Credentials or identification cards.

VII. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. To dispatch period at its own expense, the Team to P.N.G.

2. To pursue technology transfer to P.N.G. counterpart personnel in the course of the Study.

VIII. CONSULTATION

JICA and PTC will consult with each other in respect of any matter which is not agreed upon in this document and may arise from or in connection with the Study.

TABLE

TENTATIVE STUDY SCHEDULE

MONTH / DESCRIPTION	1	2	3	4	5	6	7	8	9	10
WORK IN P.N.G.		▬▬	▬▬		▬▬	▬▬	▬			
WORK IN JAPAN	▬		▬▬			▬▬		▬		
REPORT PRESENTSTION		△ IC/R		△ IT/R			△ DF/R		△ F/R	

Note: IC/R : Inception Report
IT/R : Interim Report
DF/R : Draft Final Report
F/R : Final Report

(3) Minutes of Meetings

MINUTES OF MEETINGS
ON
SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
RURAL TELECOMMUNICATION
DEVELOPMENT PLAN
IN
THE INDEPENDENT STATE OF PAPUA NEW GUINEA

I. INTRODUCTION

The meetings were held between December 7th and 14th, 1988 at a conference room of the Post and Telecommunication Corporation (hereinafter referred to as "PTC"), in the Independent State of Papua New Guinea (hereinafter referred to as "P.N.G."), for a discussion on "The Feasibility Study on Rural Telecommunications Development in P.N.G." (hereinafter referred to as "the Study").

The attendants at the meetings are shown in ANNEX-I of this minutes.

II. CONTENTS OF THE MEETINGS

1. The draft of the Scope of Work presented by the Preliminary Study Team (hereinafter referred to as "the Team") was agreed between the Team and P.N.G. side.

2. The undermentioned matters were discussed between the Team and P.N.G. side.

(1) P.N.G. side presented the Comments shown in ANNEX-II. Each item in the Comments was discussed by both sides.

(2) P.N.G. side requested the Draft Final Report to be presented by the end of August 1989. The Team answered that the Japanese side will make every effort to realize it, and also stated that the target of commencement of the full-scale study will be March 1989.

(3) Some areas where PTC is planning to install rural facilities will be excluded from the Initial Plan.

(4) P.N.G. side will propose 9 or 10 provinces as object areas of the Initial Plan; detail data will be presented on 3 of the provinces mentioned above, and rough data, of the others. These will be submitted to JICA PNG Office no later than the middle of January 1989.

(5) P.N.G. side requested the following items to be included in the Final Report, and the Team agreed to the request;

a. Background

b. Demand and Traffic forecast

c. Rural telecommunication development plan

d. Tariff

e. Evaluation

f. Policy option

g. Initial Plan

(6) Concerning "Demand and Traffic Forecast" in the item III. 2.2. (1)b. in the Scope of Work;

a) the forecast should be done on a macro-economics basis, based on the PTC's existing Master Plan.

b) detailed investigation should be carried out on the sample villages in the provinces proposed by PTC.

(7) Evaluation work will be carrried out based on the new tariff system to be proposed by PTC, besides existing one.

(8) To facilitate smooth conduct of the full-scale study, the Team requested PTC to assign at least 2 counterparts, and to provide accomodations in the survey areas. The Team agreed to inform PTC of the composition of the full-scale study Team and the study schedule as soon as possible in order that PTC could make sufficient preparation.

PORT MORESBY
DECEMBER 14th. 1988

Mr. Shigehiko NAOE	Mr. Robert IGARA	Mr. Ron ELIAS
Leader,	First Assistant	Managing Director,
Preliminary Study Team	Secretary,	Post and
Japan International	Foreign Aid	Telecommnication
Cooperation Agency	Management Department	Corporation
	Department of Finance	
	and Planning	

(ANNEX-I)

ATTENDANTS LIST

Dec., 1988

P.N.G. side

NAME	ORGANIZATION	SECTION
Robert Igara	Dept. of Finance	First Assistant Secretary
George Paru	& Planning	Principal Bilateral Aid Program
Yoichi Suzuki		Aid Adviser
Baluwe Umetrifo		A/Assistant Secretary-CSA
Ron Elias	PTC	Managing Director
Fr Danny Coyle		Consultant-Research & Policy
Allan G. Brooks		General Manager Telecom.
John K. Kamblijambi		Corporate Secretary
Jim G. Bantegui		Executive Manager
		Corporate Planning
Alan Olden		Executive Manager
		Engineering Planning Dep.
Nath Heritrenggi		Engineering Planning Dep.
Murray Robinson		Network Planning Branch
Doug Ross		Bearers & Transmission Branch
Sydney Kulupi		District Manager (Goroka EHP)
Kilori Sepoe		Corporate Planner
Japan side		
Shigehiko Naoe	JICA	Leader of the Study Team
Hitosu Watanabe		Member
Hiroshi Takaoka		
Toshihiko Takahashi		
Kinichi Umeya		
Toshio Okazaki	JICA. PNG	Resident Representative
Akira Kumano		Assist. Resident Representative
Akihisa Watanabe	Embassy of Japan	3rd Secretary

COMMENTS ON JICA SCOPE OF WORKS PROPOSAL

1. Period of Study. There is no reason why the whole study should require eight (8) calendar months to complete:

   a) PTC recently completed a World Bank funded study covering the network development plan and management review within six (6) calendar months. The rural telecommunications feasibility study should be completed in six (6) calendar months or less;

   b) Manmonth estimates for various project activities are better indicators than calendar month estimates (see pro-forma under draft Terms of Reference of PTC);

2. Contents of the Study. Proposed contents for the study is fairly limited:

   a) JICA envisions the contents of the study to comprise three major components:

      . collection and analysis of data and information related to rural telecommunications;

      . demand and traffic forecasts for telephone service in rural areas;

      . formulation of rural telecommunications develoment plan.

   b) The following are noted on the above:

      i) the divisions relate more to activities rather than contents of the study;

      ii) insufficient detail is provided on what is to be considered under "demand and traffic forecasts";

      iii) Tariff assessment is missing. Other aspects of rural telecommunications are not covered.

      iv) As stated in draft terms of reference prepared by PTC, the content of the report could be better structured under the following major headings:

         . traffic, demand and tariff assessment;
         . rural network development programme;
         . financial and economic analysis;
         . review of policy options and performance monitoring.

c) The following additional concerns of PTC have not been addressed:

i) review of Detecon report insofar as it relates to rural telecommunications;

ii) independent review of tariffs in relation to rural services and sensitivity analysis;

iii) types and size of equipment, specifications and standards;

iv) manpower, training and maintenance to sucessfully implement the rural telecommunications programme;

v) revenue and expenses of the rural programme (JICA proposal limited to expenses);

vi) impact of rural telecom on base economy and existing support services (e.g., aid posts, schools, etc.);

vii) guidelines for prioritising current and future rural telecom programmes;

viii) need to quantify government support or subsidies;

ix) performance targets and measures

x) need to identify and quantify the costs of the necessary investments to integrate PTC's rural telecom programme with the overall network;

xi) areas of mutual co-operation are not spelt out e.g., technical support, spare part provision, etc.

xii) composition of the study team and relevant expertise;

(4) Questionnaire

QUESTIONNAIRE

I. Present Status of Telecommunications Network
1. Telecommunications Network Planning
- Allocation of call loss probability (Traffic engineering standard)
- Transmission engineering standard
2. Switching Equipment
- Hierarchical configuration of national telephone network
3. Trunk Transmission Network
- Are there any meteorological phenomena, topographic or any other conditions particular to your country?
- Radio frequency assignment criteria

II Rural Telephones
1. Existing systems
- System models
- Connection to the national telephone network
- Charging (tariff and charging system, etc.)
- Numbering
- Service level - loss probability
  - transmission loss
- Traffic data of existing rural telephones
- Power Supply - commercial power supply or solar battery
2. Five year plan
- A list of project sites with priority
- Meteorological data of the sites concerned (rainfall, temperature, humidity, the total hours of sunshine per year, etc.)
- Topographic data of the sites concerned
- Frequencies available for the rural telephones
- Detailed maps of the sites

III Ordinary Telephone Services
1. Telephone Service Dimension
- Kinds of services
- Number of telephone subscriber lines and waiters for the last 5 years
- Recent traffic data (number of calls and traffic density of each route and exchange)
- Successful call rate in main cities
2. Tariff, Numbering, Routing system
- Basic charge
- Unit call charge
- Trunk call charge
- Charging zone
- Numbering
- Routing
3. Financial Status
- Tariff revenue - local and toll respectively
- Total income
- Operation and maintenance expenditure
- Taxes
- Investment of facilities

(5) 収集資料リスト

No	資料の名称	発行機関等
	Provincial Data System Rural Community Register	National Statistical Office
1.	West New Britain	
2.	Gulf	
3.	Northern	
4.	East New Britain	
5.	Morobe	
6.	Chimbu	
7.	Southern Highlands	
8.	East Sepik	
9.	Westerm	
10.	Madang	
11.	Western Highlands	
12.	Milne Bay	
13.	Central	
14.	Enga	
15.	North Solomons	
16.	West Sepik	
17.	Manus	
18.	New Irland	
	Final Flgures Census Unit Populations	
19.	Central	
20.	Western Highlands	
21.	Enga	
22.	North Solomons	
23.	Morobe	
24.	West New Britain	
25.	Western	
26.	NCD	

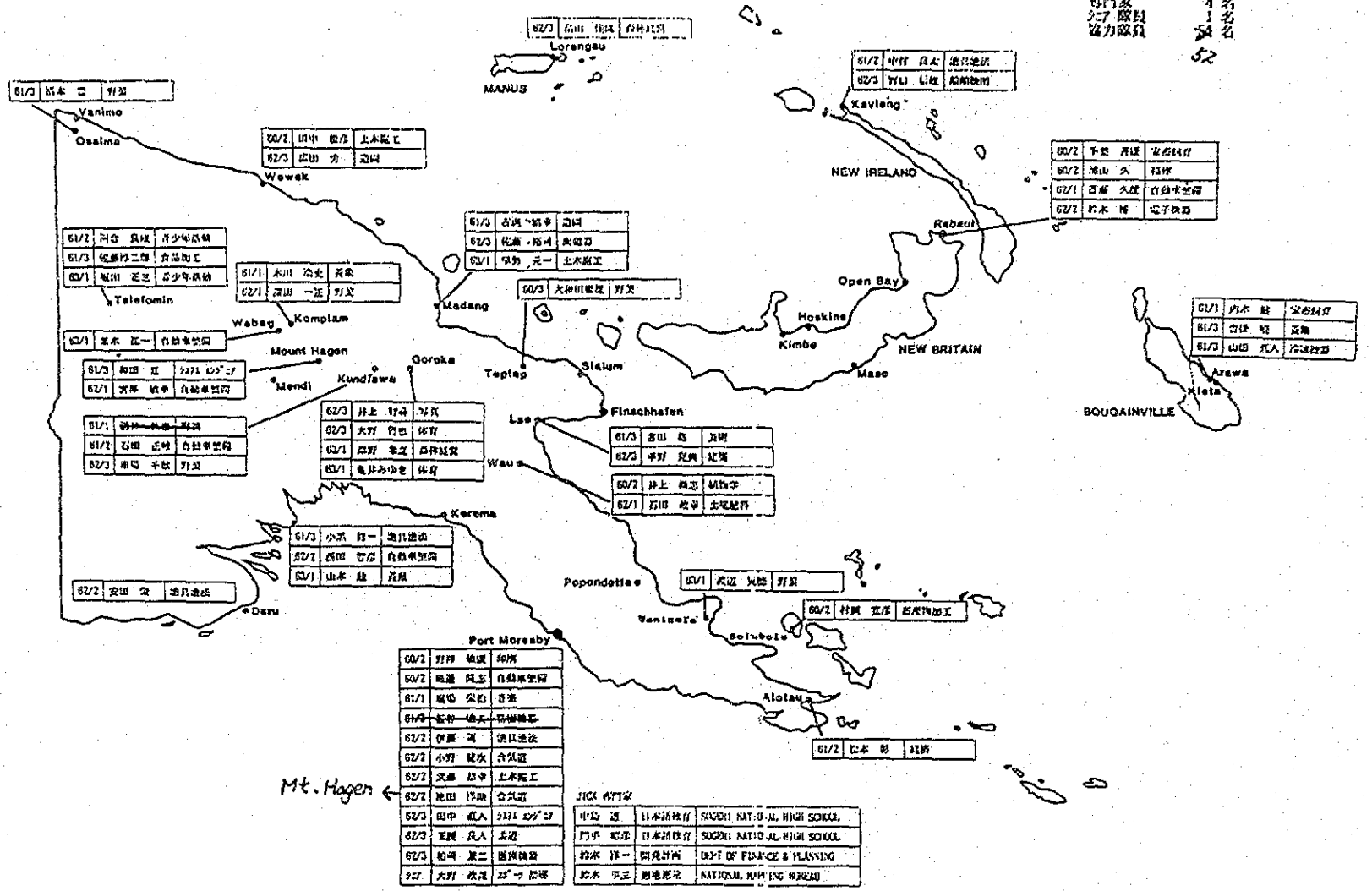
27.	Gulf		
28.	Chimbe		
29.	Manus		
30.	New Irland		
31.	West Sepik		
32.	Madang		
33.	Western Highlands		
34.	Southern Highlands		
35.	Northern Highlands		
36.	Milne Bay		
37.	Policies and Prospects for Sustained and Broard-Based Growth	Vol. 1 ~ Vol.11	World Bank Country Study
38.	Five Year Development Plan (1988-1992)		PTC
39.	Network Performance Report Period 10		PTC
40.	Type of Power Supply (District別)		PTC
41.	Digital Telephone Exchange Vol. 4 (tender)		PTC
42.	National Transmission Plan		PTC
43.	Provincial Boundaries Map Series		PTC
44.	Telecommumications Network of PNG 1988		PTC
45.	Inter-Exchange Telephone Circuits		PTC
46.	電話帳 1988-89		PTC
47.	地図 1/250000 52枚		National Mapping
48.	地図 1/100000 2枚		Bureau
49.	New Telecom Tariffs for 1988		PTC
50.	Rural Development Investment Programmed		PTC
51.	Supply Record of Rural Radiotelephone equip.		PTC
52.	Small/Medium Capacity FDM Bearers		PTC
53.	UHF/VHF Frequency Plan Diagrams		PTC
54.	μ—Wave & UHF Frequency Plan Diagrams (NEC)		PTC
55.	PTC 249 Main Routes		PTC
56.	NTN Entrance Link		PTC
57.	CCIR Radio Frequency Channel Arrangement (THOMSON)		PTC

58.	CCIR Radio Frequency Channel Arrangement (TELETTRA)	PTC
59.	Microwave Frequency Plan (FARINON)	PTC
60.	Microwave Frequency Plan (GRANGER)	PTC
61.	PTC 249 Spur Route	PTC
62.	Structure of the Dep. of Foreign Affairs	PTC

注：特に表示の無いものは1部

（6） P.N.G. 青年海外協力隊々員配置図

JICA所長　1名（中野勝安）
JICA事務所員　1名（塩野　明）
JOCV調整員　1名（大田秀士）
専門家　4名
シニア隊員　1名
協力隊員　54名
52



JICA 専門家			
中島　透	日本語教育	SUGORI NATIONAL HIGH SCHOOL
門平　昭彦	日本語教育	SUGORI NATIONAL HIGH SCHOOL
鈴木　洋一	開発計画	DEPT OF FINANCE & PLANNING
鈴木　平三	測地測量	NATIONAL MAPPING BUREAU