FROM: SOUTH: The Third World Magazine, March 1984

economic coherence. The consequences have often included high production costs, as illustrated by the failure of most industries in Africa to make inroads into world markets. (Africa's share in world exports of manufactures is not only tiny — about a third of one per cent — but has declined, while the shares of Asia and Latin America have been rising.) Poor export performance has, in turn, led to a loss of dynamism, so that the pace of industrialisation has slowed.

- Again related to the issue of urban bias, "Member states have not usually accorded the necessary priority to agriculture . . ." in the words of the Organisation of African Unity. This failure has been marked by large net outflows of resources from the rural economy, by insufficient price incentives, by weak supporting services in the provision of inputs and training, and by inadequate research efforts. It has led both to declining shares on world primary product markets and falling per capita food production at home.
- Governments have neglected the task of shorter-term economic management. This has aggravated balance of payments weaknesses and, in a sizeable number of cases, has resulted in rapid inflation. All too often, policies have had an anti-export bias — for example, through the taxation of export commodities and over-valued currencies. In some cases, large external debt burdens have been accumulated in an unplanned manner, indeed often without any clear idea of the overall scale of obligations being incurred. Budgetary discipline has weakened. Credit creation policies have sometimes been muddled or misguided.

Many would also agree that:

□ Governments have expanded the role of the public sector beyond its capacity for tolerably efficient levels of operation, because of severe manpower and institutional constraints;

□ Governments have been damagingly ambivalent about the role of the private sector generally and of foreign investors in particular; and

□ There has been a no less damaging ambivalence towards rapid population growth, so that there is still scarcely a country in sub-Saharan Africa with an effective population policy.

On the first six propositions, consensus might break down in their application to particular cases and in the design of corrective measures. In addition, economic policies have been changing in Africa, partly because of the severe economic difficulties of the last two years, and under pressure from the IMF and World Bank. There is now greater recognition of the dangers of neglecting agriculture and of the key importance of smallholder cultivation. Attitudes to the exchange rate are gradually becoming less rigid. There is some disposition to re-examine the role of the state in economic life. Some governments have been strengthening their fiscal and monetary systems.

The suitability of economic policies is necessarily influenced by the manpower and institutional resources available for their execution. A number of the weaknesses identified are grounded in the inadequacy of these resources in most African states. Policy improvements must be chosen with these constraints in mind — a factor which points generally to less extensive and less complex state intervention.

However, economic development may well not be the overriding policy goal: government objectives may be quite different — 'nation-building'; the imposition of a religion or ideology; the consolidation of power; communal or personal enrichment.

The ministerial corruption that is so widely complained about by Africans is particularly potent in undermining governmental legitimacy. Sometimes lacking secure popular support or even a legal basis, governments are often preoccupied with their own security and with buying off special interest groups — in the barracks, commerce and industry, the parastatals and the parliaments. The reform of economic policy lacks friends in high places and the attempt peters out when it begins to hurt the influential. In some countries political reform is a prerequisite for policy reform.

Tony Killick

Seeds and microchips

For the small farmers of developing countries, the computer as primary tool of agricultural efficiency is a distant prospect. But the microchip is already making its impact in the grain fields and rice paddies, boosting yields dramatically by calculating how growers can optimise crop strategies.

In China's Hunan province, rice farmers have increased yields by at least 50,000 tonnes on 260,000 hectares of land. Information on optimum times for planting, fertilising, weeding and harvesting is obtained from the local computer centre. All the peasant farmer has to do is supply information about specific conditions on his land. The computer provides a production plan laid out in simple charts.

In Venezuela, peasant farmers linked to a pilot computer project are reporting wheat and maize yields up by 25 per cent. Terminals in each village are hooked up to the programme in a central computer in the city.

Despite the success stories, major technical, financial and educational problems must be solved before computers can play a significant role in Third World agriculture. In the short term, an increasing volume of work will be turned over to computers in government farm surveys, food policy planning and regional agricultural services.

A versatile package of inter-related computer programmes for farming is the Scapa system (Systems for Computer-Aided Agricultural Planning and Action). Produced by the UK's International Computers Limited, it is being used in two areas of Malaysia.

Based on data collected from local farms, printouts are available to guide farmers step-by-step to grow rubber more efficiently in 16 different combinations with other crops. The programme also gives progress reports and other services including information on farm sales and listing of inputs.

The computer is also being deployed in cattle management. An example is the Daisy programme, run by the department of agriculture and horticulture of the University of Reading, UK. For a fee, farmers are given personal advice on how best to look after their cattle operation. In one case, better doctoring of cattle feed saved a farmer with 500 cows US$4,200 a month.

A Reading veterinarian package called Panacea is being used in Kenya to programme the dipping of animals. After a year of operation, tick fever outbreaks have been reduced. The programme is also being used in northern Colombia for livestock production surveys and to combat cattle disease.

Large-scale agricultural development projects in Third World countries will depend increasingly on computers to handle payrolls, budgets, inventories, and to plan, manage and evaluate projects.

A pioneering effort in this field is the Ayangba agricultural development project in Benue state, Nigeria. Ayangba, one of several government-run projects for rural communities, covers everything from farming to road-building. Based on surveys, computer programmes are written to calculate field sizes, crop yields and patterns, labour inputs and five-year cost tables for the project.

While these early forays into a comparatively new area appear to be proving their worth, largescale implementation in the Third World faces major obstacles: limited choice; a severe shortage of local technicians and programmers; inadequate data gathering and programming.

However, optimists forecast the computer's agricultural role will grow as the hardware gets cheaper and more powerful, databanks multiply and the advantages of computer farming boost demand.

Maria Elena Hurtado

sent to Wal Wallace Abu Dhabi on Apr. 5'84 all

VITA, AMSAT plan system

Low-cost satellite to link villages

By Alice Gerlach and Gary Garriott

Experts from around the world met in Paris on February 23-24 to discuss ways to apply new microelectronics technology to development. The conference, entitled "A Speculation on the Barefoot Microchip: Communication at the Village Level," was sponsored by U.N. Development Forum.

VITA announced at the conference a pioneering plan to bring satellite communications to less developed countries at low cost. Working with the Radio Amateur Satellite Corporation (AMSAT), VITA proposes to launch a low-earth orbit satellite to demonstrate a technique of sending and receiving technical information for a fraction of the cost of using geo-synchronous satellites.

VITA Deputy Executive Director Alice Gerlach and Technical Adviser Gary Garriott unveiled the plan in a paper entitled "Low-Earth Orbit Satellites: Communication on the Cheap." A condensed version of the paper appears here:

The microelectronics revolution has begun to make rapid changes in the ways information is collected, stored, manipulated, and transferred, as well as in the value of information itself. Less developed countries (LDCs) are increasingly aware that they must participate in these revolutionary technologies or be left even further behind.

Particularly important is the potential of communications using advanced digital techniques to make available a great variety of services that could substantially improve resource accessibility for the poorer countries. As microelectronics expert Juan Rada writes, "Data, information and a new productive infrastructure should benefit not only the few; we cannot have a world divided between information 'poor' and 'rich.'"

Indian space scientist Yash Pal puts it this way:

"A framework for a new global information system can be developed... A remarkable liberating quality of the present technological age is that individual components of technology--either existing or possible--can be put together in an infinity of ways, some of which can...definitely improve man's quality of life."

There are increasing pressures on the agricultural, social, economic, and political systems of LDCs due to expanding populations, high energy costs, and environmental degradation. At the same time, there also is a tremendous growth of information available on agricultural systems, renewable energy technologies, medium-scale industrial equipment, and small- to intermediate-scale technology to solve many of these problems.

However, LDCs face great problems in getting this information to entrepreneurs, peasant farmers, and others at the micro level. Time, funds, personnel, and other resources often are too limited to make the needed technical information available to users when project momentum is high. Poorer nations also have much less access to information on development resources.

There is an urgent need to

VITA's Alice Gerlach and Gary Garriott at Paris conference.

use new technology to develop systems to improve the flow of technical information both within LDCs, and between LDCs and developed countries.

VITA believes that faster, cheaper, and more reliable communication between technical information centers and field personnel could expand the capabilities of technical advisers, agricultural extension agents, and other development workers to an extent unknown in the past. For this reason, it has begun to pursue applications of advanced microelectronics and space technology to disseminate development information to LDCs.

The new effort is a logical extension of traditional VITA services. During the past 23 years, VITA has provided customized responses to more than 42,000 requests for technical information, mostly from people and businesses in LDCs.

To answer the requests, VITA uses its extensive in-house library resources, its worldwide network of more than 4,000 VITA Volunteer experts, a paid technical staff, document exchange agreements with more than 200 development organizations, and more than 100 of its own technical publications.

> 'Less developed countries must participate in these revolutionary technologies or be left even further behind.'

Most of these requests come to VITA as letters sent via international mail. And therein lies the most difficult obstacle to reliable service: turn-around time. For while it generally takes VITA staff and volunteers only a few days to prepare a response, the postal delay in sending letters back and forth may be as long as three or four months, if the mail is received at all.

These delays in correspondence can be critical. Enthusiasm and resources may diminish if project planners must wait for the information they need. Also, technical solutions often require a dialogue rather than a single question-and-answer cycle.

That is why VITA has in recent years begun to explore different ways to use electronic media to communicate technical information to LDCs more quickly. For example, it has been working with the Voice of America to broadcast shortwave radio programs about different technologies. It has also supported a weekly ham radio net for amateur radio operators to discuss de-

velopment issues and technologies.

In addition, VITA helped arrange about 20 audio teleconferences on renewable energy topics with user groups in the South Pacific, using the PEACESAT network on the ATS-1 satellite of the U.S. National Aeronautics and Space Administration (NASA).

These initiatives have been fruitful. But they leave unsolved the fundamental problem of providing technical information in response to a specific question quickly without prohibitive telephone, telex, or satellite costs.

A recent workshop on computer-based conferencing systems for LDCs identified a possible solution: asynchronous communication via a low-earth orbit satellite. Amateur radio groups in the United States have been using such satellites for years.

A low-earth orbit satellite in such a system would act as an inexpensive flying mailbox. A user in Country X would beam up a message from an inexpensive ground station, using low-power transmitters and a simple antenna system. The satellite would pick up the message through narrowband VHF/UHF transceivers. As it flew to other parts of the world, it could beam down the message to a ground station in Country Y.

The satellite would move in a sub-synchronous orbit, traveling over different parts of the earth during the day. It would appear over a given earth station at the same times every day. Thus, the ground station in Country X might send and receive messages at, say, 8:30 a.m. and 6 p.m. every day.

Such a system would enable a user to send a technical question to VITA or some other center, and receive a detailed answer the next day.

VI has joined forces with the Radio Amateur Satellite Corp. (AMSAT) to test the concept. AMSAT is a nonprofit scientific corporation founded in the greater Washington, D.C., area in 1969. It fosters international good will and cooperation through joint technical experimentation and study of space communications technology.

Radio amateurs throughout the world participate in these activities on a noncommercial basis. AMSAT has been responsible for the successful launch of three satellites in the OSCAR series (Orbiting Satellite Carrying Amateur Radio). It currently is involved in the "Phase III" project, which will provide long-life communication spacecraft at near-synchronous orbits. Phase III is scheduled for launch in early 1983, more than 20 years after the first OSCAR was launched.

AMSAT plans to launch a packet radio satellite (PACSAT) in late 1984 or early 1985. It is working with VITA to use this satellite for development purposes.

The two organizations hope to design PACSAT as a prototype of a new class of satellite service. They will use digital packet processing techniques with a worldwide store-and-forward message capability to produce the "flying mailbox" system described above.

Such packet radio systems are ideally matched to the transfer of development information. For one thing, large numbers of stations can share a common facility, using packet networking techniques to merge several sets of users simultaneously. All the users keep on the same set of channels, which makes full use of the radio spectrum. Thus, the total number of stations--and the cost--is reduced.

A second benefit of the shared channels is that users can find one another easily. They do not need to search across a wide frequency band. A third benefit is that transmissions are reliable. The system checks the integrity of data arriving at each destination.

The PACSAT system has the principal advantage inherent in all satellite communications: rapid access from any point on earth to any other point independent of land-based telecommunication systems. It could be used for worldwide technical information transfer, as well as for disaster relief and emergency communication.

However, PACSAT would be far cheaper than satellites in geosynchronous orbits. It would use low-cost and relatively unsophisticated ground station technology while still providing reliable, high volume information transfer.

As planned by VITA and AMSAT, the PACSAT system would connect a grid of amateur radio ground stations and ground-based networks worldwide (see article, facing page). The network would include LDC technical documentation centers, remote development projects, non-governmental agencies, private voluntary organizations (PVOs), etc.

VITA would be the main control station for the information experiment. It would receive questions from and supply information to the ground stations. The system would be managed jointly by VITA and AMSAT.

The two groups already have begun design work on the PACSAT system, with VITA providing limited initial funding. Additional funding will be obtained from other sources. Design, construction, testing, and spacecraft integration will take about 18 months. Launch is projected for late 1984 or early 1985, with a testing and demonstration period of two years.

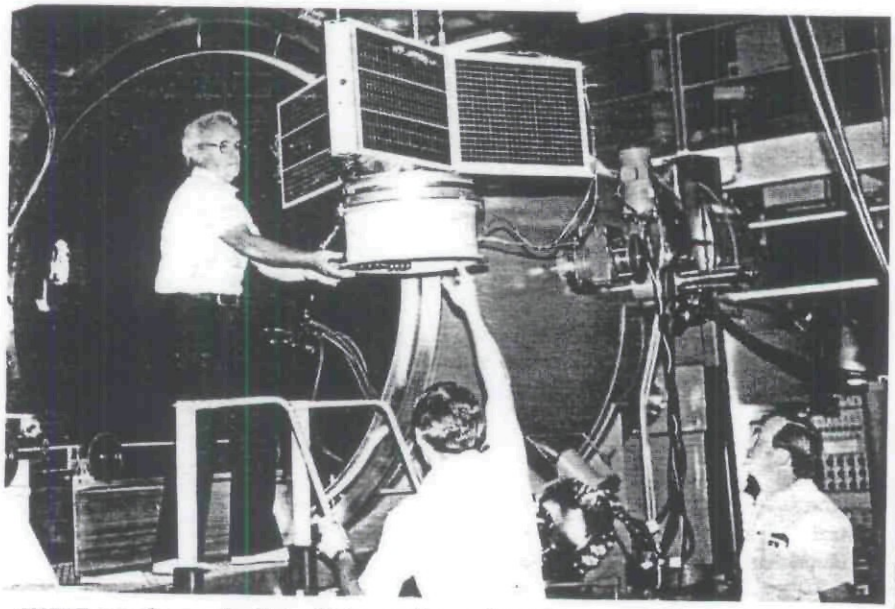
The PACSAT concept is an exciting attempt to put the latest technology at the service of the village. The microelectronics revolution is upon us, like it or not, and developing countries must devise systems such as this to exploit computers and satellites in appropriate ways.

PACSAT offers speed, reliability, and a chance to avoid the regulatory and economic constraints imposed by systems dependent on geosynchronous orbital satellites. Above all, its extremely modest cost might finally make it possible for people in some of the world's poorest, most remote areas to get the technical information they need quickly to help improve their lives.

Volunteer group

VITA is organizing a group of VITA Volunteers to review the technical design and operational aspects of the proposed PACSAT system. The group will also advise the project as needed.

Interested readers with a background in computer technology and communications should contact Dr. Gary Garriott at VITA.



AMSAT members built this voice-circuit satellite for earlier project. Radio group is working with VITA on PACSAT effort.

Uses low-earth orbiting satellite

How the PACSAT system will work

The heart of the PACSAT system being developed by VITA and AMSAT is a low-earth orbiting satellite that will cover the entire globe. A launch into a polar orbit provides the opportunity to sun-synchronize the satellite, which means it will appear to ground stations at the same times at least twice daily. Each station in the system could communicate directly with other stations within common range of the spacecraft, and store and retrieve messages.

There will be three types of stations: control stations, regional centers, and remote ground stations. AMSAT will operate the command/control stations required to control the satellite and experimental package. VITA headquarters also will have such a station, serving as the principle information dissemination site.

Each control station will be equipped with a small personal computer capable of acquiring and analyzing telemetry data, and of loading the satellite and experiment processors with new programs. The VITA station will include larger disk drive facilities for the necessary on-line information storage that remote stations will request. It also will have facilities to provide print copies and facsimiles.

Three regional centers in different countries will also require on-line data storage. They, too, will use small personal computers. These centers will be requesting larger amounts of data than the typical remote station. For this reason, they will have facsimile and hard copy facilities available to handle technical inquiries from a variety of development organizations.

There will be between six and 20 remote ground stations, each portable and capable of operating with solar power. They will use low-cost amateur radio transceivers (transmitter/receiver units) and simple, omnidirectional antennas. Each station will require a portable microcomputer with cassette storage, and perhaps a small video monitor.

Cartoons by Kim Winnard

Initial estimates suggest that each remote station typically will generate about two pages of requests per pass of the satellite, and receive four pages of information. The typical regional center traffic will be about 30 pages of requests per pass, and perhaps 200 pages of responses. The VITA headquarters station will handle about 100 pages of requests from all stations per pass, and transmit about 700 pages of information per pass once the system is nearly fully subscribed.

The two-way nature of the communications channel will allow the stations random or controlled access to send messages to specific stations or the system in general. For VITA's development information exchanges, such messages generally will take the form of technical inquiries and responses. Material might include charts, entire documents, graphs, and remotely sensed imagery data.

In such a system, PACSAT could be ordered by the ground station to demand information from the sites, change command sequences, or even reload new experiments. Such flexibility might prove very valuable to developing countries, providing them with a low-cost means for experimentation.

The satellite itself will carry twin repeaters, as well as an on-board computer with more than one megabyte of solid state memory.

These repeaters will be designed for integration into an available spacecraft, although there is an excellent possibility to construct a complete spacecraft system exclusively for PACSAT experimental use. One of the two repeaters will

As a young man, I was f ci-nated with metals. Such power --such color--such strength. To think that one could melt and shape a material that could endure outer space as well as a hidden tomb while retaining all its qualities. My love affair with metals has led me over the years to develop an approach to a high-tech product with a low-tech, simple technique.

'Precision casting allows us to produce exact replicas to dimensions and tolerances that we determine.'

In some ways, not having an engineering or foundry background helped my development. I jumped headlong into my experiments, considering that small businesses had to rise above "tried and tested" methods that may be overly engineered, expensive, or even frightening. The challenge was clear--to produce a complicated shape of stable dimensions and a satisfactory metal structure.

After 20 years of experience, I now can help install a successful operation in a month or less.

At the beginning of the process, the main problem is locating the materials needed to build the equipment and run the operation. Flexibility is a major factor for success. Bricks, clays, rice husks, and cow dung make up the majority of the "natural" materials necessary. Scrap pipes, mild steel angles, iron, and some sort of forced air supply are equally necessary.

A special oven is needed to burn out the wax from the mold fully and uniformly, and co vitrify the hollow mold to make it ready for pouring in the hot metal. A melt furnace is used to melt the required type and quantity of metal quickly. I have used wood, charcoal, waste crankcase oil, diesel fuel, kerosene, and LPG bottled gas as fuels. Each fuel required changes in the burner designs and other adjustments, but all achieved the necessary results.

The process starts off with a perfect model that is surfaced and finished exactly as required in the final cast piece. Tolerance adjustments are made according to metal shrinkage, etc.

Next, a mold is made from this original model. The mold is then used to reproduce one or more exact wax patterns, using a wax formula made on the spot with local waxes, resins, etc. The surface of the wax must be as close to perfect as possible since any surface texture will be reproduced in the final metal casting, right down to a fingerprint.

This wax model is coated with a refined mixture of cow dung, clay, and rice husks.

This "dung mold" is left to dry out slowly. It then is "baked" in the oven at a predetermined "burn-out cycle" over an eight-hour period. The wax melts away, or is "lost," through an opening in the molds during this stage. As this happens, the dung mold around the wax hardens.

Before removing the mold from the oven, the metal is prepared and melted in the melt furnace at temperatures that may reach as high as 2000°C. Casting takes place once the mold has reached its correct pouring temperature and the metal is ready for pouring.

The hot liquid metal is poured into the receiving cavity of the mold. Once the r has cooled, it may be remc carefully to reveal the c object inside.

Naturally, many other portant things happen throu out the process: metal pre ration, wax and mold contr fluxing, etc. However, noth done throughout the process at such a level that ordin people could not perform job well with good results.

'A group in Papua New Guinea exports large quantities of recycled metal to Australia.'

This process has provided very good spinoff business a group of people in Papua N Guinea who previously had r even heard about castir These "ordinary people" a now running a scrap aluminu bronze reclamation plant th exports large quantities recycled metal to Australia.

The group recently receiv a letter from Australia as ing: "How the hell do you it--such good quality!" If t Australians only knew that t 5-10 tons of beautiful alum num ingots they receive ea week were produced from lef over World War II scrap in cow dung furnace costing le than US$200. Would they surprised...

I have summarized many of m experiences with lost wa casting in a book recentl published by the Intermediat Technology Industrial Service (ITIS), Myson House, Railwa Terrace, Rugby CV21 3HT, Bri tain. ITIS has helped brin this process to many corner of the developing world.

CF-RAI-USAA-PD-GEN-2007-000144

Expanded Number **CF-RAI-USAA-PD-GEN-2007-000144**

External ID

Title

"Seeds and microchips" article by Maria Elena Hurtado upblished in the March 1984 issue of South: the Third World Magazine;
and articles on related topics published in VITA News, April 1983 (see notes)

Date Created / From Date	*Date Registered*	*Date Closed / To Date*
5/17/1984	**8/10/2007 at 2:21 PM**	

Primary Contact

Home Location **CF-RAF-USAA-DB01-2007-09465 (In Container)**

FI2: Status Certain? **No**

Itm Fd01: In, Out, Internal Rec or Rec Copy

Owner Location **Programme Division, UNICEF NYHQ (3003)**

Current Location/Assignee **In Container 'CF-RAF-USAA-DB01-2007-09465 (Upasana Young)' since 8/21/2007 at**

Date Published

FI3: Record Copy? **No**

Record Type **A01 PD-GEN ITEM**

Contained Records

Container **CF/RA/BX/PD/CM/1986/T002: PSC Files - Programme Support Comr**

Fd3: Doc Type - Format	*Da1:Date First Published*	*Priority*

Document Details **Record has no document attached.**

Notes

"Seeds and microchips" article by Maria Elena Hurtado upblished in the March 1984 issue of South: the Third World Magazine;
and
VITA, AMSAT plan system for "Low-cost satellite to link villages" by Alice Gerlach and Gary Garriott, published in VITA News, April 1983

Print Name of Person Submit Image	*Signature of Person Submit*	*Number of images without cover*
SARAJIT DOUGLAS	Saroj Dougl	8