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EXECUTION OF THE PLAN

THE CONTRACT to install the television network and the short-wave internal and external sound broadcasting station in Ghana amounted to very nearly £3,000,000. In terms of value this is a large sum—in terms of realization of a plan, it represents a vast organizational effort on the part of many people, not only in Ghana itself, but also in the United Kingdom and elsewhere. The construction of buildings, the laying of roads, the manufacture and despatch of equipment, the erection of masts and aerials, the provision of power supplies, the installation of apparatus, the testing, the training, the travelling, the feeding, the housing—all these had to be interlocked in an overall plan, over which tight control had to be exercised all the time, because failure in one small area could have damaging, if not disastrous, repercussions on the whole.

The basic plan on which this organization was based has been described in a previous issue.¹

Producing a basic plan that an experienced engineer could follow was relatively simple. Filling in the details and developing a method of presentation required much more effort. This was one of the difficulties associated with the planning, since the choice had to be made on practical and economic grounds. In general, the more detail put into a programme means that less reliance is placed on the memory and experience of the Controller. Equally, a wealth of detail and a clear presentation mean that contributors to the project can more easily understand how their particular contribution fits into the whole scheme. This aspect can be one of the more important gains of such detail planning.

The programme had essentially to be dynamic, and in order to achieve this it was necessary to receive realistic reports from the various sites and fields regularly. This proved to be one of the big difficulties with the system, and it was found essential that the Controller should visit site every two or three months during the contract.

When failure to programme occurred, it was essential to have details of proposed remedies. It was equally important to be warned of potential success or failure. It occasionally occurred that one contributor would take up what he thought was 'slack' in the system, forgetting some simple fact, e.g. that due to shortage of accommodation his operatives had to be away from site to allow others to come in. Accommodation was one of the main problems of the scheme, and the plan depended on the various construction teams moving from site to site on completion of their task, to make way for successive teams.

The general overall plan was to a large extent decided by the time taken to complete the studio buildings at Accra and the buildings at Ejura, together with the delivery of the equipment for the link and the 250-kW transmitters for Ejura. A summary of each

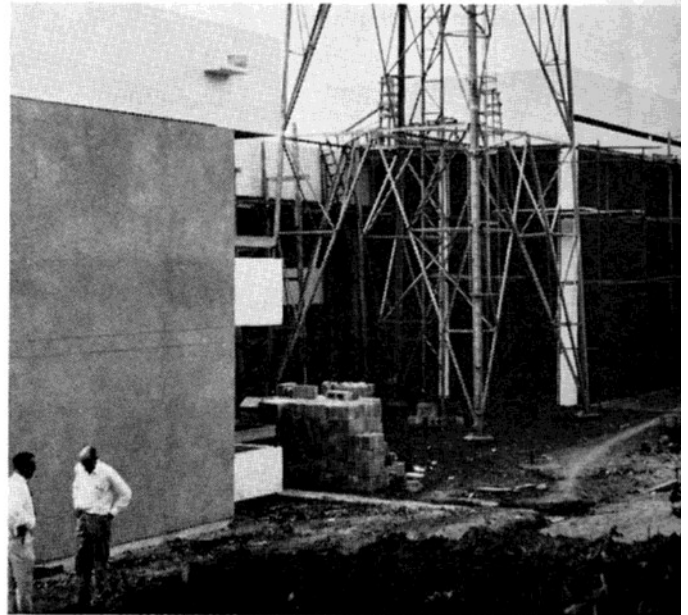


Fig. 1. The studio building during construction. The author is seen on one of his many visits to the site discussing progress with a site engineer.

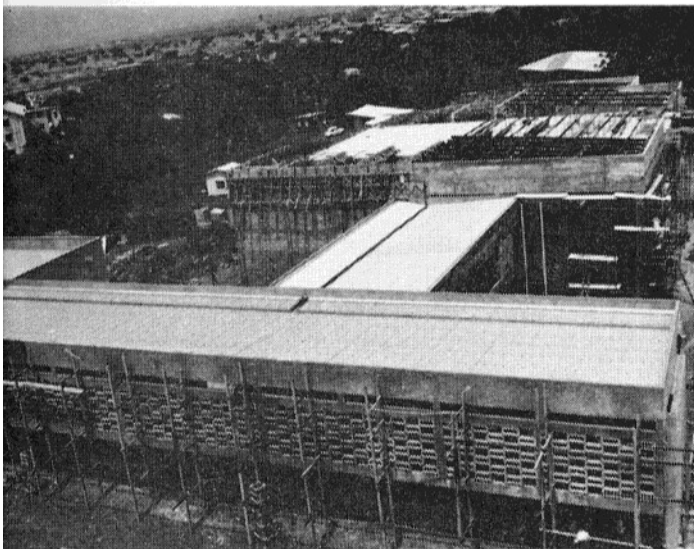


Fig. 2. The studio buildings begin to take shape. Comparison with this and the original plan shows how the original plan was adhered to.

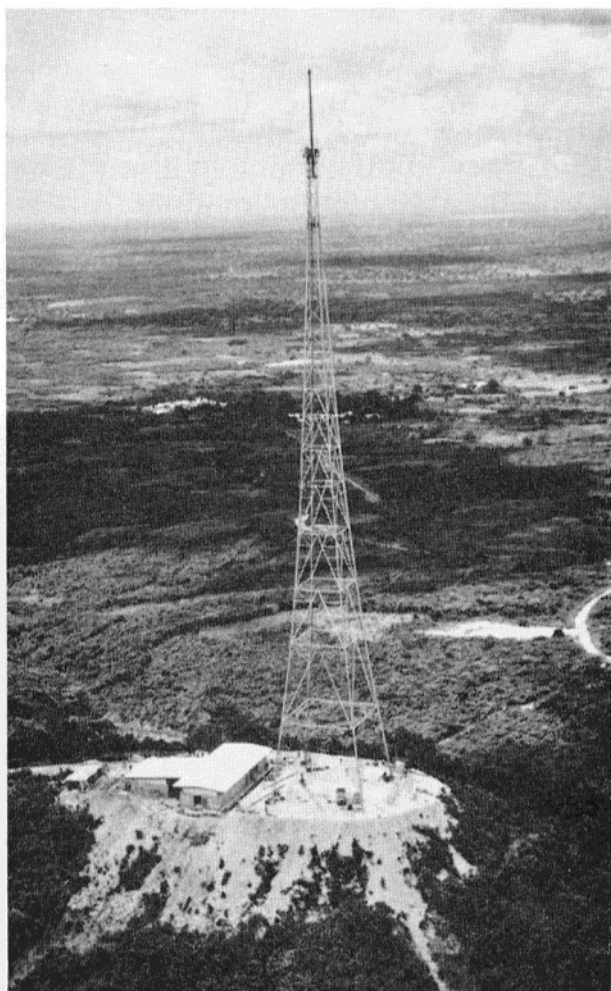


Fig. 3. The transmitter site at Ajankote. This site which gives coverage over a considerable area of the coastal plain was created by slicing the top off the hill.

section of the project with a description of the special problems involved follows.

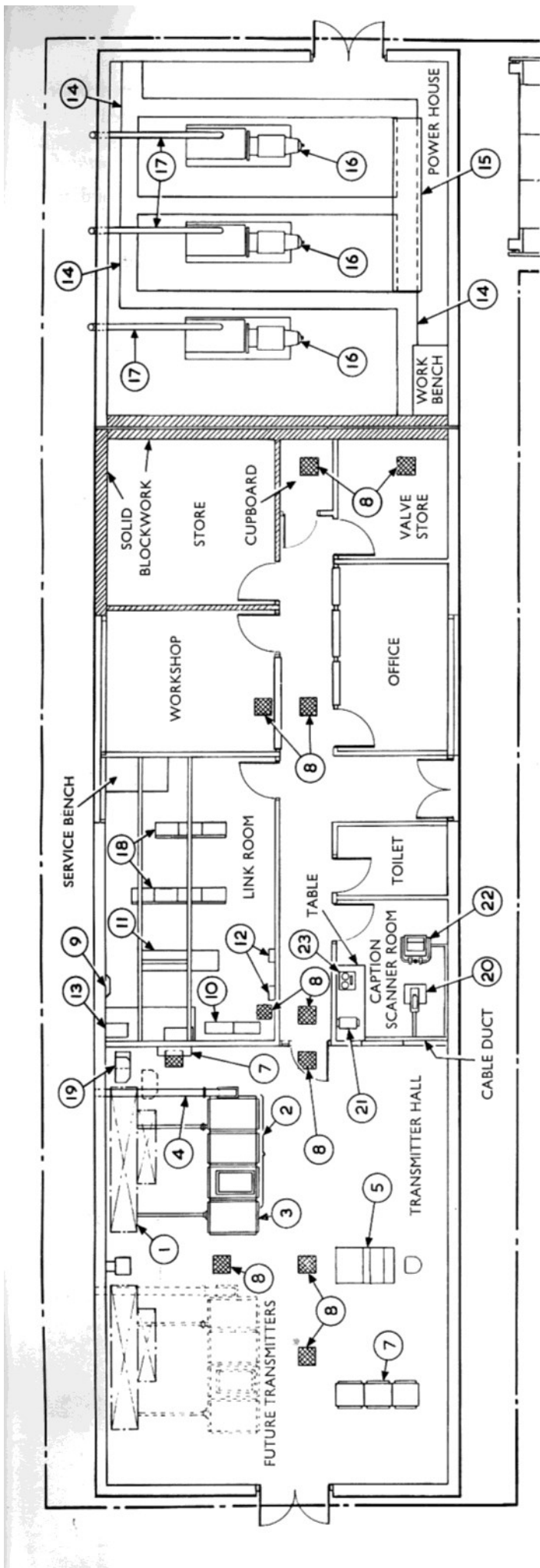
TELEVISION STUDIOS ACCRA

A start was made on the studio buildings in Accra in June 1963. Plans for these already existed² but they had to be modified to meet changing requirements, and the resident architect had the problem of keeping the builder up to an agreed programme, whilst at the same time having to produce detailed drawings, incorporating the modifications for him. He always managed to keep one step ahead of the builder. Supplies presented their own problems. Occasionally, local supplies failed and there were consequent delays on the building programme. On one occasion it was cement and another steel reinforcing. Other supplies had to be ordered from England and it was the task of our hard-worked contract and supplies staffs in Chelmsford to organize their purchase and despatch to fit in with the programme.

It was originally planned to have the studio buildings completed by June 1964 and the installation of equipment complete before the end of the year. In the event, the building programme had fallen behind but installation, nevertheless, began at the beginning of July. Installation in an unfinished building is difficult and far from efficient, but we had received a request to get one studio working ahead of the remainder of the installation so that it could be put into use for training purposes. Though this requirement was later changed, our early efforts were aimed at meeting it. Our team of engineers and fitters from Chelmsford assisted by members of the staff of Ghana Broadcasting Corporation had a tough time during the installation. Because work had to start before the building was complete, it meant working without air conditioning in a building without any windows. Add to this the very temporary lighting, the army of building operatives and the dust, and one can imagine the difficulties. The installation was, however, virtually finished by the end of the year and acceptance tests completed well within our contract date.

TELEVISION TRANSMITTING STATIONS

Three stations were sited on hilltops, and though this was good from a radiation point of view, it presented problems during installation. Ajankote is situated 18 miles by road from Accra and from it one had an excellent view of the coastal plain. A rather long access road to the edge of the site had been completed before we arrived, leaving the short but rather steep portion up to the building to be constructed by the



builder. In addition, the top of the hill had to be sliced off to make enough space for the mast and the building. This meant that special precautions had to be taken with the mast foundations, and the erection of the mast gave our construction engineer a few unusual problems. One he had not experienced before was to meet a small snake on the mast about 50 ft from the ground! The Jamasi site had a much shorter access road but was much steeper. The top of the hill was large enough to avoid any serious problems for the building contractor—other than getting men and material to site from the main road. Kissi was the least difficult of the three, a short and not too steep access road, and a minimum of clearing necessary on the site.

The three transmitting installations were carried out consecutively by virtually the same three teams, who were responsible for the towers, the transmitting equipment and the diesel generating equipment respectively. The team working on the diesel equipment also installed similar equipment on the link sites at Korforidua, Ejuanema and Kumasi.

At each site, the aim was to have the buildings and masts completed at the same time so that the installation engineer could supervise the erection of the aerial and feeder during the early stages of the equipment installation. The original design for the transmitter buildings² at these sites was considered in the light of local conditions to be unsuitable and a new basic design was made. This was adapted to the topographical conditions at each site. The diesel

Fig. 4. A plan of a typical transmitter site.

1. Filterplexer and internal feeder assembly
2. 5-kW band I vision transmitter, type BD372A
3. 1-kW band I f.m sound transmitter, type BD324A
4. Exhaust air duct
5. Control consoles
6. P.I.E cabinets
7. Distribution board
8. Cable pit with cover
9. Dehydrator for waveguide
10. MH141 equipment
11. Channelling racks and power supply
12. Link-room distribution panel
13. U.h.f equipment
14. Cable trench with covers
15. Switchboard
16. Generating set
17. Exhaust pipe
18. Philips equipment
19. Dehydrator for feeder
20. Vidicon camera unit, type BD871
21. Camera control unit, type 4340B
22. Caption and clock mounting assembly
23. Tape recorder



Fig. 5. The transmitter building at Jamasi.

generating plant would ideally be completed before the installation of the radio equipment started, but in any event had to be complete by the time the equipment was ready for test.

Installation work started in June 1964 and was complete before the end of the year.

MICROWAVE LINK

The plan for the microwave link was to erect the masts at Ejuanema and Kumasi first so that a physical check could be made of this rather long route.³ Afterwards, the mast at Korforidua and then the two smaller masts at Ejura and Accra would be erected. The relatively small buildings at Ejuanema, Kumasi and Korforidua would be erected when the mast foundation blocks were made.

The electronic equipment was not due to be available until August 1964, so there was a lull in the

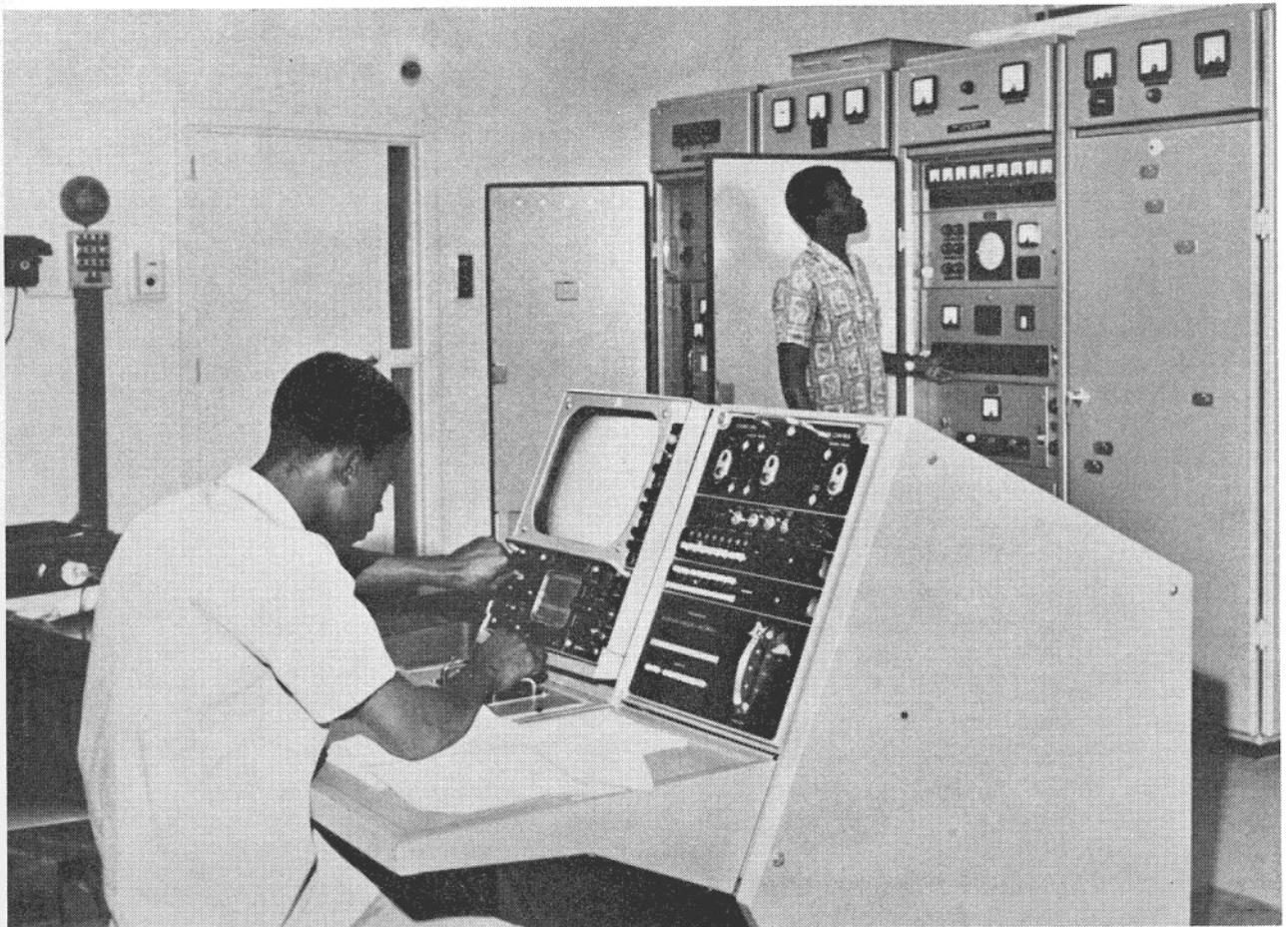


Fig. 6. The transmitter hall at Jamasi.

installation. Towards the end of July, however, work again started on the erection of the feeders, waveguide and microwave dishes. By the middle of August, when the electronic equipment arrived from Marconi Italiana together with an installation team, this work was well advanced. The target was the completion of the installation by the end of the year, and in order to achieve this, it had been decided to fly the equipment to Ghana. An aircraft was, therefore, chartered to collect some equipment from the United Kingdom calling at Genoa for the link equipment and some of the installation team, and to continue to Accra. Lorries and personnel were on the airfield to meet the aircraft, unload it promptly and deliver the equipment to the seven sites. The installation was complete and tested early enough to allow most of the team to return to their homes before Christmas.

EJURA BROADCAST TRANSMITTING STATION

Ejura was the largest single feature of the scheme and its size and complexity can be judged by the two articles in this issue dealing with it.

Work here began as soon as the site was handed over to us in August 1963. There was a considerable task to clear the site and subsequently to control the tropical growth of vegetation on the large areas required for the aerials and feeders. The mast construction engineer went to site at the end of October 1963 and his staff began to arrive the following month. His team was finally complete about the end of January. It was planned that the construction work would be well advanced before some of the team left to erect the towers for the TV stations.

This site was somewhat isolated and because of the limited accommodation, it was intended to complete the erection of the masts and aerial arrays by the time the transmitter buildings were finished. Accommodation would then be available for the team of engineers and fitters who would be involved in the installation and commissioning of the transmitters and aerials. The installation of the generating equipment would be well on its way by this time, as completion of the power house was to be given priority.

Several difficulties were met which made necessary a succession of adjustments to timing of the programme though the above sequence of events remained the target. Unseasonable heavy rains made access to the site most difficult and caused unexpected delays. A lesson to be learnt from this experience is that more study of records should have been made and less notice taken of people's memories.

Stone from nearby quarries was found to be inferior and was not approved by our consultant. Alternative sources had to be found and tested. Large quantities were required for the concrete for the mast blocks and diesel-engine blocks as well as the buildings. This problem, together with the occasional shortage of cement, caused significant delays. To contain the effect of these building delays, more overlapping of activities became necessary with the result of added difficulties with accommodation, and alternative arrangements had to be made. The permanent staff quarters which were to have been available for our use in September were delayed and it was necessary to erect temporary quarters.

A temporary diesel set was obtained for the domestic supplies and for a temporary supply for small machine tools during installation. The domestic load was considerable as we had provided air-conditioners for the bedrooms in the temporary bungalows and, of course, all had refrigerators. When it became clear that the putting into service of the 'house sets' in the power house would be delayed, it was decided to get a second temporary generator to ensure a 24-hour supply and allow time for some maintenance.

GENERAL PROBLEMS

The phasing of the arrival on site of equipment was given much thought, but because of the conflicting requirements a compromise had to be worked out for each site. Ideally, shipment should be arranged so

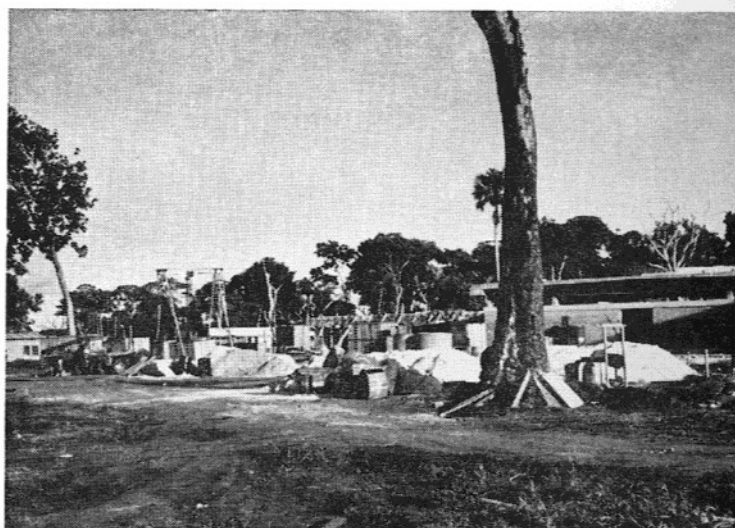


Fig. 7. Ejura in the course of construction.

that equipment arrives on site and can be unpacked immediately prior to it being installed. On the other hand, because of the possibility of damage during transit and the time involved in the possible remanufacture and the shipping of replacements, it was desirable to provide some contingency, though the lack of suitable storage restricted the efforts in this direction.

Ejura provided the biggest trouble in this respect because of the larger bulk of equipment involved and the greater distance it had to be transported by road. Though the road from Accra to Ejura is good, the transport vehicles were often driven too fast and consequently the equipment was given an undue shaking-up in the process. Incidentally, the maintenance costs on our own vehicles was rather high for the same reason.

Almost 600 tons of equipment was shipped to Ejura, this equipment being almost equally divided between the power station, the transmitters and the masts. There were about 650 cases, crates, etc. of transmitting equipment, about half this number for the power house and almost twice this number of cases and bundles of mast and aerial equipment, making a total of about 2,200 packages. For the studios in Accra, we shipped over 80 tons in about 1,000 packages.

At one time, over 50 expatriate staff were engaged on this project and the total number was almost 70. Air passages had to be arranged and accommodation and transport during their stay. Most of this was done by our local representative who did a magnificent job.

The majority of the equipment arrived at the port of Tema, equipment for the Kissi Station at Takoradi and the air shipments at Accra airport.

The clearing through customs and transport to site was undertaken by our agents R. T. Briscoe Ltd. in a most satisfactory manner. The Ejura equipment by its sheer bulk and the distance it had to be sent by road presented quite a problem. That we had so relatively few breakages is a compliment to the packing departments.

CONCLUSION

The fact that the contract was completed successfully on time is proof of the effectiveness of the system of planning. However, the success or failure of any project depends not only on the planning but on the people who do the work. We were very fortunate on this project to have a team of first-class engineers and experts in charge of the various sectors of the work, and they, by their expertise and hard work, carried the project through to a successful conclusion. Throughout the planning and execution of the project, we received the willing assistance and co-operation of the Director and Staff of Ghana Broadcasting, and this in no small measure contributed to its satisfactory conclusion.

REFERENCES

- 1 V. S. BOTTOMS: P.E.R.T in Ghana; *Sound and Vision broadcasting*, Vol. 5, No. 1, Spring 1964.
- 2 P. MUNDIE: Planning the Ghana Television System—in this issue.
- 3 C. R. LEWIS: Microwave Broadcast Link in Ghana—in this issue.



Fig. 8. The temporary bungalows at Ejura which were erected to house the relays of erection teams.



Fig. 9. Interior of one of the bungalows, each of which made its own messing arrangements.