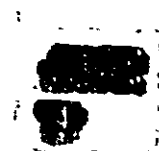


REPUBLIC OF ZAMBIA
REPORT ON RADIO AND TELEVISION NETWORK
EXPANSION PROJECT

VOLUME II
TECHNICAL SPECIFICATION AND SUPPLY LIST
FOR
TRANSMITTING AND STUDIO EQUIPMENT

FEBRUARY 1974

OVERSEAS TECHNICAL COOPERATION AGENCY
IN
JAPAN



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国際協力事業団	
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TECHNICAL SPECIFICATION

[A]

GENERAL CONDITION

ZAMBIA MINISTRY OF INFORMATION, BROADCASTING AND TOURISM

TENDER NO.

and

SPECIFICATION NO.

concerning the

SUPPLY INSTALLATION AND COMMISSIONING OF TELEVISION

AND RADIO BROADCASTING

ZAMBIA MINISTRY OF INFORMATION, BROADCASTING AND TOURISM

INVITATION TO TENDER

1. Tenders are invited for the supply, installation and commissioning of Television and Radio Broadcasting Equipment in accordance with the general requirements as described, and subject to the terms and conditions prescribed herein.

2. Tenders must be marked "Tender No. " and must be received by the Ministry of Information, Broadcasting and Tourism, not later than

INTRODUCTION

This Tender calls for the manufacture, supply, installation and commissioning of Television and Radio Broadcasting Equipment for the Zambia Ministry of Information, Broadcasting and Tourism in accordance with the attached conditions and specifications.

Any further details which the Tenderer may require to assist in the preparation of his Tender may be obtained by application in writing to the Chief Engineer.

ZAMBIA MINISTRY OF INFORMATION, BROADCASTING AND TOURISM

TENDER FOR GOODS

To:
The Secretary,
Ministry of Information, Broadcasting and Tourism

Sirs,

We hereby offer in accordance with the attached.

Conditions of Tendering and Contract to supply, deliver, install and
commission the equipment described and referred to in Specification

No. attached hereto,

.....
.....

the total value of the tenders being yen

.....

In the event of these tenders or any of them being accepted, we undertake
to carry out the obligations placed upon the Contractor as provided for
in, or as reasonably to be inferred from, the said Conditions of Tender-
ing and Contract and the said Specification.

Dated this day of 1974.

..... Tenderer's Signature

..... Tenderer's Address

.....

.....

PART I

CONDITIONS OF CONTRACT AND TENDERING

CONDITIONS OF CONTRACT AND TENDERING

SECTION 1: GENERAL CONDITIONS

1. DEFINITIONS

In the General Conditions and Specification hereto attached, the following terms shall have the meanings assigned to them unless there is something in the context inconsistent therewith or repugnant thereto:

'The Government' means the Zambia Government.

'The Ministry' means the Ministry of Information Broadcasting and Tourism.

'Director' means the Director of the Zambia Broadcasting Services (hereinafter called as ZBS) or any person duly authorised for the time being to act on his behalf or in that capacity.

'The Engineer' means the Chief Engineer of the ZBS or any person duly authorised for the time being to act on his behalf or in that capacity.

'The Contract' shall mean and include the tender and acceptance thereof, (including these General and the Specification and drawings if any) for the supply, delivery, installation and commissioning of the equipment, and all other documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said Contract.

'Tenderer' means each person who tenders to supply and deliver the equipment, and includes the Tenderer's legal personal representative.

'Person' includes companies, partnerships, firms and ZBS.

'Contractor' means the Tenderer whose tender has been accepted by the Ministry and includes the Contractor's legal personal representatives, successors, and permitted assigns.

'Contract Price' means the amount stated in the tender which the Ministry accepts.

'Work' means the total work to be done by the Supplier under the Contract.

'Month' means a calendar month.

'Clause' includes the whole of any paragraphs or subclauses grouped together, and prefaced by a common number.

'The Specification' includes the Specification, Schedule of Equipment, any plans and drawings attached to or issued with the Specification, and any variations thereof in writing as may be agreed between the Ministry and the Supplier.

'Equipment' All the machinery apparatus material articles components and things of all kinds which are to be supplied and delivered.

2. GENERAL

(a) These Conditions of Contract and Tendering relate to the supply of Television and Radio Broadcasting Equipment and the installation and commissioning thereof.

(b) The tender and all information (including captions, titles, and notes on all drawings) supplied with the tender or as part of the contract shall be in the English language.

- (c) The Contract shall be considered as a contract made in Zambia and subject to Zambian laws.
- (d) The Contract shall become effective upon the approval of the Export - Import Bank of Japan, with the consent of the Government of Japan, in accordance with the Project Loan Agreement under the provisions of the General Agreement and Agreed Procedures dated between the Government and the Export - Import Bank of Japan.
- (e) Upon the signing of the Contract by the Government and the Contractor, the Government shall arrange to send Application for Approval of the Contract to the Export - Import bank of Japan immediately and to obtain Notice of Approval of the Contract within one month after the date of the signing of the Contract.

3. TENDERS

- (a) Every tender shall be in the form annexed hereto and shall be signed by the Tenderer and lodged or posted to The Ministry so as to be received not later than the date and time specified in the invitation to tender. Every tender should be enclosed in a sealed envelope and also marked on the outside with the tender number.
- (b) The Government shall not be required to accept the lowest or any tender.
- (c) Every tender shall be a continuing offer and irrevocable for 90 days from the date of closing of tenders.
- (d) Each tenderer shall comply with all the provisions contained in these General Conditions.

4. DETAILS, INFORMATION AND DOCUMENTS REQUIRED WITH TENDER

The Tenderer shall sets of his tender with full details, information and documents, where applicable, as set out in this clause.

- (a) A Warranty in respect of electronic tubes.
- (b) A Schedule of Compliance in the terms of Clause 6.
- (c) A Warranty of Performance in the terms of Clause 7.
- (d) Technical Information in accordance with the requirements of the Specification.
- (e) Schedules of Equipment

The relevant details of price, country of origin, delivery time of each section of the equipment.

5. PRICE

- (a) Separate Prices. A separate price for the supply and delivery to the port of export, in the country of origin, for each item of equipment as described in the Schedule of Equipment shall be given.
- (b) Discount. The rate of any discount allowable and the amount on which it is computed shall be stated. Any reduction in price or special discount which the Tenderer is prepared to give or allow for any combination of items in the Schedule of Equipment should be stated.
- (c) Duty and Sales Tax. Duty and Sales Tax in Zambia are not to be included in the tendered price.
- (d) Freight Charges. Tenderers must show estimated freight charges from Port of Export to the final designations.

(e) Currency

Payment shall be made in Japanese Yen and Zambian Kwacha in Japan and Zambia respectively as agreed in the Contract. In case the Contractor leave Zambian Kwacha unused, the Government shall arrange the remainder of it can be exchanged for Japanese Yen and returned to Japan.

(f) Import duties Clearance Permit and Consuler Fees

(i) Import duties, sales tax and other charges applicable to importation of stores will be paid by the Government for all items becoming eventually the property of the Government. No consular fees are involved in connection with the stores. Any other taxes levied outside of the country of the Contractor shall be borne by the Government.

(ii) The Government will ensure that the installation tools and materials and personal properties for the installation engineers will enter to Zambia from free all duties and taxes and that all necessary for the import of the above will be made by available without any delay.

6. SCHEDULE OF COMPLIANCE

(a) The tenderer shall make out and submit with his tender a Schedule of Compliance which shows which items of the equipment the Tenderer offers comply with the requirements of this specification.

(b) In respect of any items of equipment which do not so comply the Tenderer shall state what is the standard of the equipment offered.

7. WARRANTY OF PERFORMANCE

The Tenderer shall warrant that the performance of the equipment tendered for by him shall be as described by him and also as set out in the relevant clauses of the specification, or, if the Tenderer specifically excludes or varies any sub-clause therein in the Schedule of Compliance or otherwise, he shall warrant the alternative performance stated.

8. PERFORMANCE BOND

In order to guarantee that the Contractor will duly and properly perform the Contract, the Contractor shall submit to the Government a performance deposit in an amount in Japanese Yen equal to ten (10) percent of the Original Contract Price in the form of a letter of guarantee issued by Japanese Bank in favour of the Government, at the time of issuance of Notice of Approval of Contract by the Export-Import Bank of Japan.

The performance bond shall remain valid until the expiry of the Contractor's Maintenance and Guarantee Period.

9. TENDER PRICE VARIATION

The prices tendered shall be considered to be firm unless the Tenderer stipulates that the prices are subject to adjustments in respect of variations in costs. Where there is such a stipulation, the Tenderer shall indicate in the tender the basis proposed for the adjustment of prices.

10. EXPENSES OF TENDER

The Ministry shall not be responsible for, or pay for, any expenses or losses which may be incurred by Tenderers in the preparation of their tenders.

11. CONTRACTOR TO INFORM HIMSELF FULLY

The Contractor shall be deemed to have examined the Conditions, Specification, Schedules and any drawings fully and completely.

12. TERMS OF PAYMENT

a. METHOD OF PAYMENT

The Government will make arrangements for the issue of an at sight irrevocable Letter of Credit by the Bank of Zambia in favour of the Contractor, such Letter of Credit to cover the price of the equipment, the total cost of transport, and eighty percent of the installation costs and shall be valid for a period of ____ months and confirmed by a Bank in the country of the Contractor.

b. EQUIPMENT

Payment in respect of the value of each shipment of the equipment shall be made in Japanese Yen on presentation to the designated bank of;

- (a) Invoice in triplicate
- (b) Bill of Lading
- (c) Advice note in triplicate detailing contents of each packing case
- (d) Relevant marine insurance policy or certificate of such insurance

c. TRANSPORTATION COST

The transport cost of each consignment of equipment shall be calculated by dividing the proposed number of consignments into the transport costs. Payment shall be made in respect of the transport cost of each consignment against receipt by the designated bank of a delivery note endorsed by the Engineer within three days after receipt of delivery note of the equipment

referred to therein to the effect that shipment have made at port of Export.

d. **INSTALLATION**

Payment in respect of the installation costs will be made in Japanese Yen for eighty per cent of the value of work completed against the Letter of Credit on presentation of monthly invoices by the Contractor to the designated bank and as to twenty per centum in Zambian Kwachas in Zambia within 10 days of the issue of such invoices.

13. **PACKING**

- (a) The equipment shall be suitably packed, taking into account the nature of the equipment and the type of transportation.
- (b) The tendered price shall include the cost of packing.
- (c) Any loss or damage resulting from insufficient or defective packing shall be made good by the Contractor at his own expense, and within a reasonable time.
- (d) In addition to being adequately addressed, any case shall be marked on at least two of its outside faces with its gross and net weights, and be numbered in such manner that it can be readily identified.

14. **DATE FOR COMPLETION**

The Contractor shall supply, install and commission the equipment on or before the date defined in the Contract as 'the date for completion' (or within any extension of such dates as may be granted by the Ministry) and the Ministry shall be entitled to

deduct or set off after the date for completion (as amended by any extensions granted) as and by way of liquidated damages and not as and in the nature of a penalty, the sum or sums of 0.25% of the Contract Price of the delayed portion of the equipment for each and every week's delay after the Date for Completion.

15. EXTENSION OF TIME

If, by reason of any cause beyond the control of the Contractor (including industrial dispute, shipping), the Contractor shall have been delayed or impeded in the completion of the contract, the Contractor shall be granted such extension or extensions as appear reasonable to the Director, whose decision shall be final and conclusive.

16. FINAL ACCEPTANCE TESTS AFTER INSTALLATION

When each equipment has been installed in its permanent location final acceptance tests will be performed. Immediately after acceptance tests have been completed to the satisfaction of the Engineer he shall issue a certificate to this effect in respect of the equipment being tested.

17. MAINTENANCE

(a) The Contractor shall be liable for any defects arising from faulty design, materials or workmanship in each transmitter or from any act or omission of the Contractor, that may develop under proper usage within a period of twelve months after the date of issue of each certificate specified in Clause 16. The Contractor's liability shall include all costs including labour, involved in replacing or renewing equipment or work. Where the Contractor replaces or renews any defective

equipment or work under this clause the provisions of this clause shall apply to the equipment or work so replaced or renewed until the expiration of twelve months from the date of such replacement or renewal.

- (b) This clause shall not apply to electronic tubes or semi-conductors in respect of which the manufacturer's usual warranty (or such other warranty as may be approved by the ZBS) is given.
- (c) Notwithstanding the above provisions and without limiting the liability of the Contractor or thereunder, the ZBS undertakes to install small replacement parts delivered from of charge by the Contractor under this clause at the place of use. The Contractor shall be granted facilities to supervise or check any such work if so desired by him. The decision of the ministry as to what are deemed to be small replacement parts shall be final.

18. INDEMNITY

The Contractor shall indemnify and keep indemnified the ministry against all losses and claims for injuries or damage to any person or property whatsoever which may arise out of or in consequence of the execution of the work and against all claims demands proceedings damages costs charges and expenses whatsoever in respect thereof or in relation thereto PROVIDED always that nothing herein contained shall be deemed to render the Contractor liable for or in respect of or to indemnify the Ministry against any compensation or damages for or in respect to injuries or damages to persons or property resulting from any act or neglect done or committed during the currency of the Contract by the Ministry its agents servants or other contractors (not being employed by the

Contractor) or for or in respect of any claims demands proceedings damages costs charges or expenses in respect thereof or in relation thereto.

19. ASSIGNMENT AND SUB-LETTING OF THE CONTRACT

The Contractor shall not, without the prior consent in writing of the Ministry, which shall not be unreasonably withheld, assign or transfer the Contract or the benefits or obligations thereof any part thereof to any person.

The Contractor shall not without the prior consent in writing of the Ministry, which shall not unreasonably be withheld, sublet the Contract or any part thereof or make any sub-contract with any person or persons for the supply of any major components of the equipment but the restriction contained in this clause shall not apply to subcontracts for materials, for minor details, or for any parts of the equipment of which the makers are named in the Contracts.

Any such consent shall not relieve the Contractor from his obligations under the Contract.

20. PATENT RIGHTS

The Contractor shall not in or about the execution of the Contract manufacture, supply, deliver or use or cause or permit to be manufactured, supplied, delivered, or used on any machine, instrument, process, article, matter or thing, the manufacture, sale, supply delivery or use of which would be an infringement of any patent (except and unless he shall have obtained a proper licence so to do) and shall indemnify the Ministry from all claims, proceedings, payment of royalties, damages, costs, charges, expenses, loss and liability which the Ministry may incur or be put to by reason or in consequence, directly or indirectly, of any breach of this condition.

[B]

TRANSMITTING EQUIPMENT

TECHNICAL SPECIFICATION
OF
TELEVISION TRANSMITTING EQUIPMENT
AND ASSOCIATED EQUIPMENT

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PART 1
GENERAL REQUIREMENTS

1. General

The purpose of this technical specification is to define the technical characteristics, performance requirements and composition of the VHF television transmitters and associated equipment to be supplied, installed and handed over to the Administration in perfect operating condition.

The material, equipment and installation work shall conform to this specification and to the up-to-date recognized standard of the art.

2. System standards

All television transmitters and associated equipment covered by this specification shall satisfy the System B standard of the International Radio Consultative Committee (C. C. I. R.) and shall provide satisfactory performance in color television broadcasting by the PAL system.

3. Transmitter site

The contractor shall supply the equipment to the sites listed in TABLE 1.

4. Equipment composition of each station

The types and quantity of transmitters and associated equipment to be installed in each transmitting station shall be as shown in TABLE 2. A system block diagram of television transmitting stations is shown in Fig. 1.

5. Frequencies of equipment

The channel numbers of the television transmitters, microwave link carrier frequency and VHF communication equipment carrier frequency shall be as shown in TABLE 3. (The frequencies for the microwave links and communication equipment shall be shown in terms of frequency band.)

6. Design and manufacturing requirements

6.1 Components

High-quality components shall be used throughout the system to obtain stable and reliable operation and to reduce the required space. Particular attention shall be paid to the selection of long-life and up-to-date components.

The components (resistors, capacitors, coils, potentiometers, relays, rectifiers, transformers, tubes, semi-conductors, integrated circuits, etc.) shall be operated with a sufficient margin of security, especially as regards the dissipated power, operating voltages, currents and heating conditions considering ambient conditions of 0° C to 40° C in temperature and 90 % in relative humidity for indoor equipment, and 0° C to 45° C in temperature and 95 % in relative humidity for outdoor equipment.

The components shall be used in normal conditions for which they are designed.

6.2 Mechanical

The material shall be manufactured according to the normal standards of the art. All equipment and accessories shall be of the best quality free from flaws and other defects and shall be to the satisfaction of the Administration.

The assembly of various elements shall be such that they shall be easily accessible for maintenance and inspection.

The design of mechanical drives shall be such as to prevent the possibility of slips or incorrect registration.

Noise produced by various parts of the installation, particularly by the rotating machines (motors, fans, etc.) shall be reduced as much as possible.

6.3 Wiring and connections

The wiring of high-voltage circuits shall be red, while no color discrimination is necessary for the wiring of low-voltage circuits.

Coaxial plugs and other connectors shall be so designed that they will not endanger humans or break down the equipment even if they should be wrongly connected.

Wires inside the racks, shall be either put in conduits or bound orderly in bundles.

The wiring materials shall be such that they will develop a minimum of deterioration in dielectric strength and insulation resistance over a long period of use.

6.4 Marking and labeling

Each rack and panel of the equipment provided by the Contractor shall be clearly and suitably marked with its title to permit ready identification for purposes of maintenance and inspection.

The transmitting tubes, cavities, the jacks and other necessary parts of plug-in units shall be marked or stamped with names, parts numbers, etc.

The chassis shall be clearly marked with the names of plug-in units at points where they will be installed.

Transformers, capacitors, choke coils, high-power wire wound resistors and other necessary parts shall be stamped with

the parts numbers shown in the connection diagram; and the chassis shall also be stamped with the parts numbers of the parts to be installed on the chassis.

All markings and stamps shall be in the English language.

6.5 Electron tubes and semi-conductor devices

6.5.1 All vacuum tubes and semi-conductor devices shall be long-life, industrial and professional type.

Due consideration shall be given to reducing the number of different types of tubes to a minimum. Furthermore, the number of tubes used in the transmitters and associated equipment is to be made a minimum by the use of transistors, particularly in low-power stages.

Silicon rectifiers shall be preferred as power supply.

The general assembly of the rectifiers shall be designed to ensure adequate ventilation and low operating temperatures. Mercury vapour rectifiers will not be permitted.

Filaments of tubes may be heated AC or DC. If DC is used, this shall be obtained from rectifiers and not from rotating machinery.

When a tube or a semi-conductor device is replaced, the performance of the unit and of the system as a whole shall remain within the limits specified, without requirement of any special selection of a tube or semi-conductor device.

If the Contractor considers it necessary to readjust the equipment after the replacement of certain tubes or semi-conductor devices, he shall mention it explicitly and show that such readjustments should only require measuring sets provided by the Contractor.

6.5.2 For each type of tube and semi-conductor device used in the equipment the Bidder shall furnish the necessary data, documents and catalogues regarding the technical characteristics. In addition, the data required in TABLES 4 and 5 shall be furnished for the power tubes above 100 watts used in the equipment offered.

6.5.3 Definitions

1) Tube life

The life of the tube shall be the total time the filament is energized until the tube is expended.

2) Expended tube

A tube shall be considered expended only when its performance falls below that required for the satisfactory operation of the equipment.

3) Conditions of credit for tubes

The Bidders shall indicate the conditions of credit with regard to the tubes expended before the guaranteed period.

The Administration shall not be responsible for the return of the tubes failing prematurely. Such tubes may, however, be handed over to the representatives of the Contractor or manufacturer in Lusaka.

4) Supply of spare tubes after the contract expires

The Bidders are to indicate the period during which the spare tubes shall be supplied with the same guaranteed life as given in the tender at the prices based on a formula which relates the cost of the tube in the offer to some price index at the time of the order.

This clause covers the period starting after the normal expiry of the contract.

7. Protection of personnel

All precautions for the security of the personnel shall be taken.

In particular:

7.1 Warning signs such as "Danger", "Keep Out" and "High Tension" (in English) shall be used where necessary.

7.2 All parts under dangerous tension shall be completely enclosed with sufficient, rigid metallic or meshed panels.

7.3 All the metallic parts shall be earthed. In particular, metallic panels, all sorts of metallic dorrs, accesses, various ducts, etc. shall be earthed. Earth conductors shall be copper wires or strips fixed with bolts or soldered to the metal.

If the equipment consists of different cabinets or cubicles or units bolted to each other, each cabinet, cubicle or unit shall have at least one individual earthing.

The earthing of the building will be made by the Administration according to the drawings furnished by the Contractor.

7.4 An electro-mechanical interlock system is to be used to avoid and prevent access into a cubicle before disconnecting high tensions.

7.5 Particular attention shall be paid to the screening of the whole installation in order to reduce the field due to the transmitters.

7.6 Noise produced by various parts of the installation, particularly by the rotating machinery (motors, fans, etc.) shall be reduced as much as possible, even if these parts are not placed in the transmitter hall.

8. Protection of equipment

8.1 All necessary precautions shall be taken to protect the equipment against any incident and false operation due to the personnel. In particular; fuses and circuit breakers, protective relay circuits, fast acting switches and all other protective devices shall be used in order to protect the installation against overloads and surges.

Integrated protective circuits shall be preferred in order to provide maximum protection during unusual conditions. To this end, fast acting switches may be used for overload protection in high voltage plate supplies, magnetic circuit breakers and overload relays in medium and low voltage power supplies.

Protection circuits shall contain overload indicators.

8.2 It is preferred that a fault indicating facility shall be provided.

8.3 When certain incidents, not immediately dangerous for the equipment, occur, the transmitter shall be automatically shut-off for a fraction of time and restored again. If the fault persists after three attempts at restoring the transmitter to normal condition, then the high voltage and other supplies liable to cause damage to the equipment shall be cut-off; visual and aural alarms shall operate. However, all precautions shall be taken to avoid untimely operation of the alarm system.

8.4 The Bidder shall furnish all necessary data, block and circuit diagrams to illustrate and define clearly the protective systems both for personnel and equipment against common incidents which may be internal in their origin (short circuit, overload, insufficient bias or cooling, etc.) or external (overmodulation, static discharges, lightning, accidental mains power changes, etc.).

9. Buildings

Station buildings are to be covered by a separate contract. The floor layout of the station buildings is shown in Fig. 2. The layout of the equipment and accessories shall conform to Fig. 2.

In determining the layout of the equipment, the possible additional installation of FM transmitters in the future shall be taken into consideration.

If the Bidder finds it necessary to modify those plans to meet his requirements, then he shall clearly indicate those modifications and supply the necessary drawings in the tender. These modifications shall not, however, be on such a scale as to preclude them from being incorporated. The modifications agreed upon shall be carried out by the Administration.

10. Towers

Towers are to be covered by a separate contract.

11. Public mains supply

The public mains supply shall be 3-phase, 4-wire, $380\text{ V} \pm 10\%$ and $50\text{ Hz} \pm 1\text{ Hz}$. The voltage regulators and the equipment required by this specification and to be supplied by the Contractor shall be suitable for operation on this mains supply.

12. Spares

The Bidder shall set aside for spares an amount of 5 % of the F. O. B. value of the transmitters and associated equipment offered in the tender. The Administration will determine the items and quantities of spares to be purchased with this amount. In order to enable the Administration to do this, the following shall be supplied by the Contractor in three months after the signing of the contract.

- 12.1 Spares list for power supplies and switchboard to supplier's recommendation for two-year operation. This list shall include the unit and total prices.
- 12.2 Spares list for test equipment to supplier's recommendation for two-year operation. This list shall include the unit and total prices.
- 12.3 Spares list for all the other equipment and antenna system, including components such as receiving and transmitting tubes, transistors, resistors, potentiometers, capacitors, relays, insulators, fuses, switches, plugs and jacks, signal lamps, rotating machinery, bearings, brushes, springs, belt or chain drives, etc. and interchangeable units (in case of failures), such as modules, amplifiers, and filters. This list shall include technical characteristics, ordering information, unit prices and the quantities recommended by the contractor for two-years operation.

13. Tools

Special tools for the operation and maintenance of all individual units shall be supplied by the Contractor. A list of such tools shall be submitted in the tender.

14. Technical documents

The following documents shall be furnished within two months after FOB delivery by the Contractor. The documents shall be supplied in English and each in 5 copies.

- 14.1 General system description, all equipment assembly description, detailed installation plans, floor arrangements and final layout of the equipment feeder and antennas as agreed upon.

- 14.2 Block and circuit diagrams, wiring diagrams and all other relevant information on the whole system and individual units.
- 14.3 Instruction books for operation, maintenance and troubleshooting of every individual unit and of the system.
- 14.4 Names and addresses of various manufacturers whose products are used throughout the equipment, material and system.

PART 2
TELEVISION TRANSMITTERS

1. Dual 10 kW VHF television transmitter

1.1 General

- 1.1.1 The transmitter shall be a high-reliability one designed by the latest technology.
- 1.1.2 The transmitter shall be provided with an appropriate protective circuit to protect the personnel from injuries and accidents.
- 1.1.3 Its modulation system shall be of the intermediate frequency (IF) modulation type.
- 1.1.4 The equipment shall be constructed to be as much solid state as possible, shall use no more than two transmitting tubes for the vision transmitter and no more than one transmitting tube for the sound transmitter, and their preheating time shall be as short as possible.
- The transmitter shall be so designed as to permit ease of replacement of transmitting tubes and inspection of the inside of the cavities.
- 1.1.5 High voltage rectifiers shall be avalanche type silicon rectifiers.
- 1.1.6 The transmitter shall be suitable for unattended operation.
- 1.1.7 The transmitter shall require a minimum of installation space on the floor and be easy to install. To meet these requirements, the main high-voltage transformer and blowers shall be built inside the main rack of the transmitter.

1.2 Composition

The transmitter shall consists of the following.

- 1.2.1 2 sets 10 kW VHF TV transmitter complete with exciter power amplifier, operating tubes and blower.
- 1.2.2 1 set Visual combining unit
- 1.2.3 1 set Aural combining unit
- 1.2.4 1 ea Cabinet rack
- 1.2.5 1 set Output equipment consisting of:
 - 1) 1 set CIN diplexer with filters
 - 2) 1 set U-link panel
 - 3) 1 ea Dummy load
- 1.2.6 1 set Input equipment consisting of:
 - 1) 2 ea Pre-distortion amplifier
 - 2) 2 ea Phase equalizer
 - 3) 1 ea Video jack panel
 - 4) 1 ea Limiting amplifier
 - 5) 1 ea Audio jack panel
- 1.2.7 1 set Monitoring equipment consisting of:
 - 1) 1 ea Visual demodulator
 - 2) 2 ea Linear detector
 - 3) 1 set Master monitor
 - a) 1 ea Picture monitor
 - b) 1 ea Waveform monitor
 - 4) 1 ea Aural demodulator
 - 5) 1 set Audio monitor
 - a) 1 ea Monitor amplifier
 - b) 1 ea Loud speaker
 - 6) 1 ea Monitor switcher with V-U meter
 - 7) 1 ea Demodulator input selector

- 8) 1 ea NFB panel
- 9) 1 ea Cabinet rack
- 10) 1 ea Air monitor
- 1.2.8 1 set Spare parts
- 1.2.9 1 set Accessories

A block diagram of the dual 10 kW VHF transmitter is shown in Fig. 3.

1.3 Specifications

1.3.1 Vision section

- 1) Type of emission
A5C (negative modulation)
- 2) Rated power output
20 kW (sync peak value) at the output of the visual combining unit.
- 3) Frequency range
One channel in the range of band III specified by the orderer. See TABLE 3.
- 4) Frequency stability
Carrier frequency stability shall be better than ± 500 Hz over a period of one month.
- 5) Video frequency response
The video amplitude/frequency response shall be such as to satisfy the limits given in the diagram and table of Fig. 4.
- 6) Pulse and bar response
Pulse and Bar response and Pulse/Bar ratio shall comply with C. C. I. R. Rec. 451-1 (1970, New Delhi) as measured by using 2T pulse. See Fig. 5-1 and 5-2. Where, the K factor shall be less than 2 %.

7) Linearity

5 % or less as measured by the following method:

Input: Sync signal level set to 0.3 V.

Video signal increased from 0 V to 0.7 V at 0.1 V increments.

Output: Sync signal level, pedestal level and video signal level corresponding to various input signal levels are measured with an envelope CRO, whose data is used to calculate linearity by the equation shown in Fig. 6.

8) Output load impedance

50 ohms unbalanced

9) Input impedance

75 ohms unbalanced

10) Input level

1.0 V_{p-p}, variable from 0.7 V to 1.7 V_{p-p}.

11) Output variation

2 % or less (Variation of sync peak level over one picture frame)

The measuring method shall be as follows:

The transmitter is modulated by such square wave that pure black level and pure white level are repeated by a repeating frequency of 50 Hz; the transmitter output is observed with an envelope CRO to check the variation of the maximum output level by the method shown in Fig. 7 and to calculate it by the equation shown in Fig. 7.

12) Output regulation

4 % or less

The measuring method shall be as follows:

The output of the transmitter when it is set to black modulation is observed with an envelope CRO; and then the transmitter output at white level modulation is observed with the envelope CRO; and its output regulation is calculated by the equation shown in Fig. 8.

13) Modulation capability

When the transmitter is modulated by a pure white signal, the reference white signal level shall be able to be set from 10 % to 12.5 % of the sync peak value.

14) AM noise level (p-p)

50 dB or less.

The measuring method shall be as follows:

With the transmitter AC-coupled, the output of it is set to 56 % of the rated output level (which corresponds to the pedestal level output). Then the transmitter is modulated by a 15 kHz sine wave so the waveform of the transmitter output as shown on the envelope CRO will be a modulated wave as shown in Fig. 9. The modulated wave is detected with a linear detector, and its level is measured with the CRO. Then, with the transmitter free from modulation, its noise is detected with the linear detector whose peak-to-peak output is measured with the CRO. On the basis of the data obtained therefrom, AM noise level will be calculated by the equation shown in Fig. 9.

15) Differential phase

$\pm 3^\circ$ or less.

The measuring method shall be as follows:

The transmitter is modulated by the special signal waveform shown in Fig. 10 and the modulated waveform is demodulated. Using a DG-DP test equipment, the phase of a color subcarrier on each step is measured against

the phase of color subcarriers at pedestal level. The transmitter must have a DP compensator in it when measuring differential phase.

16) Differential gain

± 5 % or less.

The measuring method shall be as follows:

The transmitter is modulated by the special signal waveform shown in Fig. 10 and the modulated wave is demodulated. Using a DG-DP test equipment the level of a subcarrier on each step is measured against that part of the subcarrier which is considered constant in amplitude to determine its deviation in percent. See Fig. 10. The transmitter must have a DG compensator in it when measuring differential gain.

17) Envelope delay vs. frequency

± 50 nS over 0.2 - 2.5 MHz.

± 30 nS at 4.43 MHz.

± 50 nS at upper sideband limit.

The measuring method shall be as follows:

With the transmitter AC-coupled, its output power is set to one-quarter of the rated output level. The transmitter is modulated by a 2 MHz sine wave as shown in Fig. 11, and is demodulated by a V.S.B. demodulator. Using an envelope delay meter, envelope delays are measured. They by gradually changing the modulation frequency to about 2 MHz, a similar check is made. Envelope delays for various modulation frequencies must be within the ranges shown in Fig. 11. The specifications of the V.S.B. demodulator shall comply with ones shown in Fig. 12-1 and Fig. 12-2.

18) Harmonic and spurious radiation

Maximum 1 mW.

The harmonics and spurious radiation measured at test load at full transmitter power (i. e., with a black picture) shall not exceed 1 mW.

19) Waveform distortion

Field-time waveform distortion: It shall comply with C. C. I. R. Rec. 421-2, 3.5.1.1 (1970, New Delhi)

Line-time waveform distortion: It shall comply with C. C. I. R. Rec. 421-2, 3.5.2.2 (1970, New Delhi)

Short-time waveform distortion: It shall comply with C. C. I. R. Rec. 421-2, 3.5.3.2

As for test signals and responses, see Fig. 13-1, Fig. 13-2 and Fig. 13-3.

Incidental phase modulation : Under the reference white level, -46 dB, relative to ± 50 kHz deviation at 1000 Hz.

1.3.2 Sound section

1) Type of emission

F3

2) Rated output power

4 kW at the output of the aural combining unit.

3) Transmitting channel

One channel on band III specified by the orderer.
See Table 3.

4) Frequency stability

The carrier frequency stability shall be better than ± 500 Hz over a period of one month.

- 5) Audio frequency response
 +1 dB or less over 30 - 15,000 Hz relative to the level at 1,000 Hz.
- 6) Frequency deviation
 The maximum frequency deviation of the sound transmitters shall be +50 kHz. The transmitters shall also be capable of linear deviations of up to +75 kHz.
- 7) Pre-emphasis
 Pre-emphasis with a time-constant of $50 \mu s \pm 5 \mu s$ shall be employed in the range of 30 to 15,000 Hz.
- 8) AF distortion
 The harmonic distortion shall be less than 1 % between 30 Hz and 15,000 Hz, for deviations of up to +50 Hz and less than 2 % for deviations of +75 kHz.
- 9) Output load impedance
 50 ohms unbalanced
- 10) Input impedance
 600 ohms balanced
- 11) Audio input level
 A deviation of +50 kHz is to be produced by 1,000 Hz at an input level of +4 dBm. This input shall be adjustable over a range of +5 dB.
- 12) FM noise level
 The FM noise level shall be better than -60 dB relative to the audio frequency output corresponding to +50 kHz deviation by a 1,000 Hz modulating frequency.
- 13) AM noise level
 The AM noise level for all frequencies between 30 Hz and 15 kHz shall be better than -50 dB relative to carrier level.

14) Spurious

Maximum 1 mW.

The harmonics and spurious radiation measured at test load at full transmitter power shall not exceed 1 mW.

15) Simultaneous amplitude modulation

The amplitude modulation due to frequency modulation shall be at least 40 dB below the carrier for a deviation of +50 kHz at 1 kHz.

1.3.3 General

1) Power consumption

65 kVA or less at black level.

2) AC input

- a) Voltage 380 V
- b) Line frequency 50 Hz
- c) Phase 3-phase, 4-wire
- d) Permissible voltage variation
 - 5 % for slow line variation
 - 2 % for regulation

3) Ambient temperature

Characteristics requirements shall be satisfied in the ambient temperature range of 0° C to 40° C. The transmitters shall operate without trouble in the ambient temperature range of 40° C to 45° C.

4) Relative humidity

Characteristics requirements shall be satisfied at a relative humidity of 90 % or less.

5) Operation

The transmitter shall be capable of continuous operation with maximum modulations for 24 hours without developing excessive heating of any part and/or component or degradation of performance.

6) Manual output selection

In case one of the video or audio transmitters that are in parallel operation fails, U-links in the output panel may be manually reconnected to raise the transmitter output, which has dropped to one-quarter of the rated output level, to one-half of the same.

7) Dummy load

- a) There shall be a single dummy load to be used common to the video and audio transmitters.
- b) The points that can be checked with the dummy load shall be the individual output of each video transmitter and of each audio transmitter and the combined output of the two video transmitters and of the two audio transmitters in parallel operation.
- c) The power consumption of the dummy load shall be more than 12.5 kW (rms). The dummy load shall be of forced air-cooled type.
- d) The frequency band to be used by the dummy load shall be any channel on band III specified by the order.
- e) The dummy load shall have an input impedance of 50 ohms, and a VSWR of less than 1.1 in the frequency range used.

f) The ambient temperature range for the dummy load shall be from 0°C to 45°C and the relative humidity 90 % maximum.

8) Cooling

The cooling of the transmitters shall be by forced air cooling.

2. Dual 1 kW VHF television transmitter

2.1 General

2.1.1 The number of transmitting tubes used in the video transmitter shall be one or less.

2.1.2 The audio transmitter shall be solid state throughout. In other respects, the transmitters shall be the same as specified in 1.1.

2.2 Composition

The transmitters shall consist of the following. A block diagram of the dual 1 kW VHF transmitter is shown in Fig. 3.

- | | | |
|-------|----------|---|
| 2.2.1 | 2 sets | 1 kW VHF TV transmitter complete with exciter, power amplifier, operating tubes and blower. |
| 2.2.2 | 1 set | Visual combining unit |
| 2.2.3 | 1 set | Aural combining unit |
| 2.2.4 | 1 ea | Cabinet rack |
| 2.2.5 | 1 set | Output equipment, consisting of; |
| | 1) 1 set | CIN diplexer with filters |
| | 2) 1 set | U-link panel |
| | 3) 1 ea | Dummy load |

- | | | |
|-------|-------|--------------------------------------|
| 2.2.6 | 1 set | Input equipment, consisting of: |
| 1) | 2 ea | Pre-distortion amplifier |
| 2) | 2 ea | Phase equalizer |
| 3) | 1 ea | Video jack panel |
| 4) | 1 ea | Limiting amplifier |
| 5) | 1 ea | Audio jack panel |
| 2.2.7 | 1 set | Monitoring equipment, consisting of: |
| 1) | 1 ea | Visual demodulator |
| 2) | 1 ea | Linear detector |
| 3) | 1 set | Master monitor |
| a) | 1 ea | Picture monitor |
| b) | 1 ea | Waveform monitor |
| 4) | 1 ea | Aural demodulator |
| 5) | 1 set | Audio monitor |
| a) | 1 ea | Monitor amplifier |
| b) | 1 ea | Loud speaker |
| 6) | 1 ea | Monitor switcher with V-U meter |
| 7) | 1 ea | Demodulator input selector |
| 8) | 1 ea | NFB panel |
| 9) | 1 ea | Cabinet rack |
| 10) | 1 ea | Air monitor |
| 2.2.8 | 1 set | Spare parts |
| 2.2.9 | 1 set | Accessories |

2.3 Specifications

2.3.1 Vision section

1) Rated output power

2 kW (sync peak value) at the output of the visual combining unit. Other specifications of the vision section shall be the same as those given 1.3.1, 1.3.

2.3.2 Sound section

1) Rated output power

0.4 kW at the output of the aural combining unit.

Other specifications of the sound section shall be the same as those given in 1.3.2, 1.3.

2.3.3 General .

1) Power consumption

12 kVA or less at black level.

2) Dummy load

a) The power consumption of the dummy load shall be more than 1.5 kW. The dummy load shall be of natural cooling type.

Other specifications of the dummy load shall be the same as given in vii), 3), 2.1.3.

PART 3
MICROWAVE LINKS

1. 10 W microwave link

1.1 General

The 10 W microwave link will be used for transmitting and receiving television video and audio programs between the television transmitting station and television studio, or between the television studio and a microwave terminal station, or between the television transmitting station and microwave terminal station.

1.1.1 The equipment shall be solid state in construction except for the amplifier in the final stage of the transmitter. All the semi-conductors shall be so designed as to have sufficient capacity for the operation of the equipment.

1.1.2 The equipment shall be capable of transmitting and receiving color television programs of the C. C. I. R. system B, PAL system, without trouble.

1.1.3 The transmitter to be installed in the Kitwe TV studio and the receiver to be installed in the Kasompe TV station shall have each stand by equipment which shall be automatically put in action in case those in normal use should fail. See TABLE 7 for the components.

1.2 Composition

1.2.1 Transmitting section (Installed in the Kitwe studio)

- | | | |
|----|--------|------------------------|
| 1) | 2 sets | Transmitting equipment |
| 2) | 2 sets | 10 W TWT amplifier |
| 3) | 1 set | Output exchanger |

1.2.2 Receiving section (Installed in the Kasompe TV station)

- 1) 2 sets Receiving equipment
- 2) 1 set Input divider

1.2.3 Common

- 1) 4 sets Power supply (2 sets in the Kasompe TV station and another 2 sets in the Kitwe TV studio)
- 2) 1 set Spare parts
- 3) 1 set Accessories

1.3 Specifications

1.3.1 Ratings

1) Transmitting section

- a) Frequency One channel on 7 GHz band specified by the orderer
- b) Output power 10 W at the output of 10 W TWT amplifier
- c) Modulation Variable reactance frequency modulation
- d) Maximum frequency deviation 8 MHz (p-p)
- e) Audio subcarrier FM wave of 7.5 MHz \pm 140 kHz
- f) Intermediate frequency 70 MHz
- g) Video input 1.0 V_{p-p}, 75 ohms, positive polarity, it shall be adjustable by \pm 3 dB
- h) Audio input 0 dBm, 600ohms balanced, it shall be adjustable by \pm 3 dB

- | | | |
|----------------------|------------------------|--|
| i) | Video monitor output | 1.0 Vp-p, 75 ohms, positive polarity |
| j) | Audio monitor output | +10 dBm, 600 ohms balanced |
| k) | Power supply | Single-phase, AC, 220 V, 50 Hz |
| l) | Ambient temperature | 0°C - 40°C |
| 2) Receiving section | | |
| a) | Frequency | One channel on 7 GHz band specified by the orderer |
| b) | Receiving input | -50 - -25 dBm |
| c) | Receiving signal | FM multiplex wave with a maximum frequency deviation of 8 MHzp-p |
| d) | Audio subcarrier | FM wave of 7.5 MHz \pm 140 kHz |
| e) | Receiving system | Superheterodyne |
| f) | Intermediate frequency | 70 MHz |
| g) | Video output | 1.0 Vp-p, 75 ohms, positive |
| h) | Audio output | +10 dBm, 600 ohms balanced |
| i) | Video monitor output | 1.0 Vp-p, 75 ohms, positive polarity |
| j) | Power supply | Single-phase, AC, 220 V, 500 Hz |
| k) | Ambient temperature | 0°C - 40°C |

1.3.2 Performance

1) Stability

a) Source voltage

Performance requirements specified in Item 2) below shall be satisfied without readjustment when source voltage fluctuates $\pm 5\%$ of rated voltage level.

b) Ambient temperature

Performance requirements specified in Item 2) below shall be satisfied without readjustment in the ambient temperature range of 0°C to 40°C . The equipment shall be good for practical purposes when used in the ambient temperature range of 40°C to 45°C .

c) Gain

The gain stability shall be in accordance with C. C. I. R. Rec. 421-2, item 3.1 3.2.

2) Overall transmitting and receiving characteristics

a) Vision section

i) Frequency response

Within ± 0.5 dB at 40 Hz - 1 MHz; within ± 1 dB at 1 - 5 MHz; frequency response at over 5 MHz shall be dependent on BEF. Less than -40 dB at 7.5 MHz.

ii) S/N

It shall be in accordance with C. C. I. R. 421-2, item 3.3.

- iii) **Waveform distortion** Output waveform distortion for a 50 Hz symmetrical square wave with a sag of less than 0.5 % and 150 kHz and 250 kHz symmetrical square wave inputs with a rise time of less than 0.03 μ S shall be as follows:
 Rise time: Less than 0.1 μ S
 Overshoot: Less than 15 %
 Sag: Less than 3 %
- iv) **Differential phase** The transmitter is modulated by a modulation waveform resulting from superposing a 4.43 MHz sub-carrier on step waveforms with APLs of 10 %, 50 % and 90 %. The phase variation of other sub-carriers from the phase of the 0th 4.43 MHz subcarrier shall be less than $\pm 3^\circ$.
- v) **Differential gain** Under the same condition as above, the amplitude variation of 4.43 MHz shall be less than ± 3 %.
- vi) **Envelope delay** It shall comply with C. C. I. R. Rec. 421-2, Fig. 11, curve B (1970, New Delhi)
- b) **Sound section**
- i) **Frequency response** Within ± 1 dB at 30 Hz - 15 kHz (in reference to 400 Hz)
- ii) **S/N** With pure white signals transmitted to the vision section,

iii) AGC characteristic

IF output variation for input
variation of -50 to -25 dBm :
Less than 1 dB

iv) De-emphasis

The 625-line standard specified
in the C. C. I. R. Recommendation
405-1 (1970, New Delhi).

2. 0.5 W - 0.1 W microwave link

2.1 General

2.1.1 The equipment shall be solid state throughout, and the semi-conductors used therein shall have sufficient capacity for the operation of the equipment.

2.1.2 The equipment shall be capable of transmitting and receiving color television programs of the C. C. I. R. system B, PAL system, without trouble.

2.1.3 The 0.5 W transmitters to be installed in the Lusaka Studio Centre and the receivers to be installed in the Lusaka TV Station shall have stand by equipment so when the ones in normal use fail they shall be automatically switched over to the standby units.

The Lusaka Studio Centre and the Lusaka Microwave Station may be connected by a single 0.1 W transmitter and a single receiver. See TABLE 7 for the components.

2.2 Composition

2.2.1 Transmitting section

- 1) 2 sets 0.5 W transmitting section (installed in the Lusaka Studio Centre)
- 2) 1 set Output exchanger
- 3) 3 sets 0.1 W transmitting section (installed in the Kaloko Hill Microwave Station, Lusaka Studio Centre and Lusaka Microwave Station)

2.2.2 Receiving section

- 1) 5 sets Receiving section (installed in the Nakupata Hill TV Station, Lusaka TV stations -- 2 sets -- Lusaka Studio Centre, and Lusaka Microwave Station)
- 2) 1 set Input divider (installed in the Lusaka Studio Centre)

2.2.3 Common

- 1) 5 sets Power supply (3 sets for the Lusaka Studio Centre, 1 set for the Lusaka Microwave Station and 1 set for the Kaloko Hill Microwave Station)
- 2) 1 set Spare parts
- 3) 1 set Accessories

2.3 Specifications

2.3.1 Ratings

- 1) Transmitting section
 - a) Output power 0.5 W or 0.1 W at the output of transmitting equipment

Other ratings are the same as specified in 1), 1.3.1.

2) Receiving section

Same as 2), 1.3.1.

2.3.2 Performance

Same as 1.3.2.

PART 4
CABLE LINKS

1. General

Cable links shall be used in cases where microwave stations or TV studios are located relatively close to television stations. The places where cable links will be used and their approximate distances are as follows: Cables must be buried underground.

<u>Name of station</u>	<u>Distance</u>	<u>Name of station</u>
1) Kabwe TV Station	Approx. 1 km	Kabwe Microwave Station
2) Pemba TV Station	Approx. 200 m	Pemba Microwave Station
3) Tara TV Station	Approx. 200 m	Tara Microwave Station
4) Senkobo TV Station	Approx. 200 m	Senkobo Microwave Station

2. Composition

Cable link components shall be as follows:

- 1) 2 sets Video cable
- 2) 2 sets Audio cable

Each one set of these cables is for regular use and the other for standby. The Bidder shall give the type and specifications of these cables in his tender documents.

- 3) 2 sets Control cable
- 4) 2 sets Monitoring cable
- 5) 2 sets Video jack panel

One set for microwave stations and the other for TV transmitting stations.

- 6) 2 sets Audio jack panel
One set for microwave stations and the other for TV transmitting stations.
- 7) 1 set Video signal equalizer
- 8) 1 set Audio signal equalizer
- 9) 1 set Spare parts
- 10) 1 set Accessories

3. Specifications

3.1 Vision section

The visual section of a cable link using a visual equalizer shall have the following overall characteristics.

3.1.1 Input signal

- 1) Level and polarity VS 1 Vp-p, positive polarity
- 2) Permissible range of level variation 0.3 - 2 Vp-p
- 3) Input impedance 75 ohms unbalanced

3.1.2 Output signal

- 1) Level and polarity VS 1 Vp-p, positive polarity
- 2) Adjustable range of video level 0 - 2.0 Vp-p
- 3) Adjustable range of sync level 0 - 0.5 Vp-p
- 4) Output impedance 75 ohms unbalanced
- 5) Frequency response Frequency deviation less than ± 0.5 dB at 60 Hz - 8 MHz.
Roll off at over 8 MHz.

- 6) Linearity (APL 10 % - 90 %)
- DG: Less than 2 %
- DP: Less than 2 °
- 7) Noise
- Hum: Less than -60 dBp-p/p-p
- Random noise :
- Less than -54 dBp-p/p-p
- 8) Waveform distortion
- a) Video circuit
- i) Sag (50 Hz) Less than ± 1 %
- ii) Overshoot (15 kHz, 250 kHz)
- Less than 5 %
- iii) Rise time (15 kHz, 250 kHz)
- Less than 0.06 μ S
- iv) Smear Less than 2 %
- b) Sync circuit
- i) Sag (H, V) Less than 2 %
- ii) Overshoot Less than 2 %
- iii) Rise time Less than 0.2 μ S
- iv) Power supply AC 220 V, single-phase, 50 Hz
- v) Ambient temperature and humidity
- Temperature : 0°C - +45°C
- Humidity : Less than 95 %

3.2 Audio section

The audio section of a cable link using an audio equalizer shall have the following overall characteristics.

3.2.1 Input signal

- 1) Level 0 - +10 dBm
- 2) Input impedance 600 ohms ± 10 % (for 1000 Hz)
- 600 ohms ± 15 % (for 50 - 15,000 Hz)

3.2.2	Output signal	
	1) Level	+10 dBm +5 dBm -4 dBm
	2) Output impedance	Suitable to 600 ohm load
3.2.3	Frequency response	Within ± 0.3 dB at 50 - 15,000 Hz in reference to 1,000 Hz
3.2.4	Distortion	Less than 0.3 % up to an output level of 15 dBm at 50 - 15,000 Hz.
3.2.5	S/N	More than 50 dB for an input of 0 dBm
3.2.6	Power supply	AC 220 V, single-phase, 50 Hz
3.2.7	Ambient temperature and humidity	Temperature : 0° - +45°C Humidity : Less than 95 %

PART 5
POWER SUPPLY

1. General

The power to be consumed by the television transmitting station will be supplied from a commercial power source.

Emergency power generators will be installed at Lusaka and Kasombe and the power supply room of the other stations shall have enough space for an emergency power generator so it may be easily installed any time in the future.

An automatic power supply exchanger shall be installed at the all stations so, in case an emergency power generator is installed, switching between commercial power supply and an emergency power supply may be easily possible after simple connecting work involving relays contacts.

2. Composition

The power supply shall consist of the following:

- | | | |
|-----|--------|--|
| 2.1 | IVR | |
| | 6 sets | 75 kVA IVR |
| | 1 set | 20 kVA IVR |
| 2.2 | 6 sets | High-tension incoming cubicle |
| | 1 set | High-tension incoming cubicle |
| 2.3 | 6 sets | Voltage regulator control cubicle |
| | 1 set | Voltage regulator control cubicle |
| 2.4 | 6 sets | 380 V, 220 V, 100 V distribution cubicle |
| | 1 set | 380 V, 220 V, 100 V distribution cubicle |
| 2.5 | 6 sets | Automatic exchanger cubicle |
| | 1 set | Automatic exchanger cubicle |

- 2.6 2 sets 75 kVA Emergency power generator (for Lusaka and Kasompe)

See TABLE 2 for the places where these will be installed. The main transformer (high-tension/380 V) will be secured by the Administration so the Contractor is requested to give the specifications of the required transformer.

3. Specifications

3.1 IVR

- | | | |
|-------|----------|---|
| 3.1.1 | Input | 3-phase, 4 W, 50 Hz, 380 V \pm 10 % |
| 3.1.2 | Output | 3-phase, 3 W, 50 Hz, 380 V \pm 1.5 % |
| 3.1.3 | Capacity | 75 kVA (except for Tara Station)
20 kVA (for Tara Station) |

3.2 Cubicles

The system of each cubicle shall conform to Fig. 15. The layout of the cubicles shall be as shown in Fig. 2. The Bidder shall include a power supply schematic diagram and an equipment arrangement diagram in his tender.

3.3 Automatic exchanger

The automatic exchanger shall at least have the following functions.

- 3.3.1 Switching between the commercial power supply and the emergency power generator by manual or remote control.
- 3.3.2 Automatic switching to the emergency power generator in case the commercial power supply or IVR fails.

The Bidder shall give the specifications of the automatic exchanger in his tender.

3.4 Emergency power generator

- | | | |
|-------|-----------|-----------------------|
| 3.4.1 | Capacity | 75 kVA |
| 3.4.2 | Voltage | 380 V 3 phase, 4 wire |
| 3.4.3 | Frequency | 50 Hz |

4. Installation

The power supply equipment shall be installed as follows:

- 4.1 The Administration shall manufacture a main transformer which meets the specifications of the Contractor, bring it into the installation site, and install it.
- 4.2 The Administration shall lay high-tension power lines to the power receiving pit in the power supply room.
- 4.3 The Contractor shall bring all power supply equipment except the main transformer into the installation site and install the equipment.
- 4.4 The Contractor shall wire inside station buildings from the high-tension receiving pit as necessary.

PART 6
MONITORING AND CONTROL EQUIPMENT

1. General

- 1.1 The stations (i. e., the seven stations at Kasompe, Nakupata Hill, Kabwe, Lusaka, Pemba, Tara and Senkobo) which form a transmitting network shall be able to be centrally monitored and controlled at the Lusaka Studio Centre.
- 1.2 The Studio Centre shall be provided with control panels for each of these stations.
- 1.3 The logic circuit which generates the codes to be transmitted from the Studio Centre to each transmitting station shall consist of a single circuit. In other words, only one logic circuit shall be used to control each of these stations, generating an initial code for each station with an encoder.
- 1.4 The transmitting stations shall be so designed that control operation will begin only when the control signal received matches the initial code of the station receiving that signal.
- 1.5 The monitor signals which indicate the operating condition of each transmitting station shall be encoded at the station before being sent to the Studio Centre, where the monitor signals shall be decoded to operate the lamp indicators.
- 1.6 The monitor signals shall be transmitted via a pair of routes. Since the monitor signals transmitted from each station will be mixed in this pair of transmission routes, the carriers which

constitute the monitor signals shall be easily identifiable at the Lusaka Studio Centre by using a different frequency for each station.

1.7 Communication telephones connecting the Lusaka Studio Centre to each transmitting station shall be overlapped with the above-mentioned control and monitor signals. These telephones shall be audible to all transmitting stations simultaneously when the Studio Centre calls a transmitting station, while a reply or a call from a transmitting station to the Studio Centre may be audible only to the Studio Centre.

1.8 This system requires no batteries for control or monitoring purposes in case of the commercial power supply's failure. However, the system shall be so designed as to return to normal control and monitoring conditions automatically when power supply is resumed.

1.9 The control signal output shall be of a pulse contact type and the monitor signal input shall be of a continuous contact type.

2. Monitoring and control functions

The control functions to be transmitted from the Lusaka Studio Centre to each transmitting station and the monitoring functions to be transmitted back from each transmitting station to the Lusaka Studio Centre shall be as shown in TABLE 6.

If monitoring functions indicating the following abnormalities are received, alarm buzzers as well as lamp indicators in the Lusaka Studio Centre shall be turned ON.

- 2.1 Transmitter No.1 Fault
- 2.2 Transmitter No.2 Fault
- 2.3 Fire
- 2.4 Door open
- 2.5 Control line OFF

A block diagram of the monitoring and control system is shown in Fig. 14.

3. Composition

The monitoring and control equipment shall consist of the following.

3.1 Lusaka Studio Centre

- 3.1.1 1 set Central operation panel consisting of:
 - 1) 7 ea Control switches section
 - 2) 7 ea Lamp indicator section
 - 3) 1 set Associated parts
- 3.1.2 1 set Logic unit consisting of:
 - 1) 7 ea Encoder
 - 2) 1 ea Register
 - 3) 1 ea P/S (Parallel to series) converter
 - 4) 7 ea S/P (Series to parallel) converter
 - 5) 7 ea Receiving register
 - 6) 7 ea Lamp driver
 - 7) 1 set Associated parts
- 3.1.3 1 set Carrier I/O (input-output) unit consisting of:
 - 1) 1 ea FS (Frequency shift) modulator
 - 2) 7 ea Demodulator
 - 3) 1 ea Line amplifier
 - 4) 2 ea Low-pass filter
 - 5) 8 ea Band-pass filter

- 6) 1 ea Variable attenuator
- 7) 2 ea Transformer
- 8) 1 set Associated parts
- 3.1.4 1 set Telephone consisting of:
 - 1) 1 ea Line amplifier
 - 2) 2 ea Transformer
 - 3) 1 ea Speaker
 - 4) 1 ea Variable attenuator
 - 5) 1 ea Telephone
 - 6) 1 set Associated parts
- 3.1.5 1 set Power supply
- 3.1.6 1 ea Cabinet rack
- 3.1.7 1 set Spare parts
- 3.1.8 1 set Accessories
- 3.1.9 1 set Installation material

3.2 Transmitting station

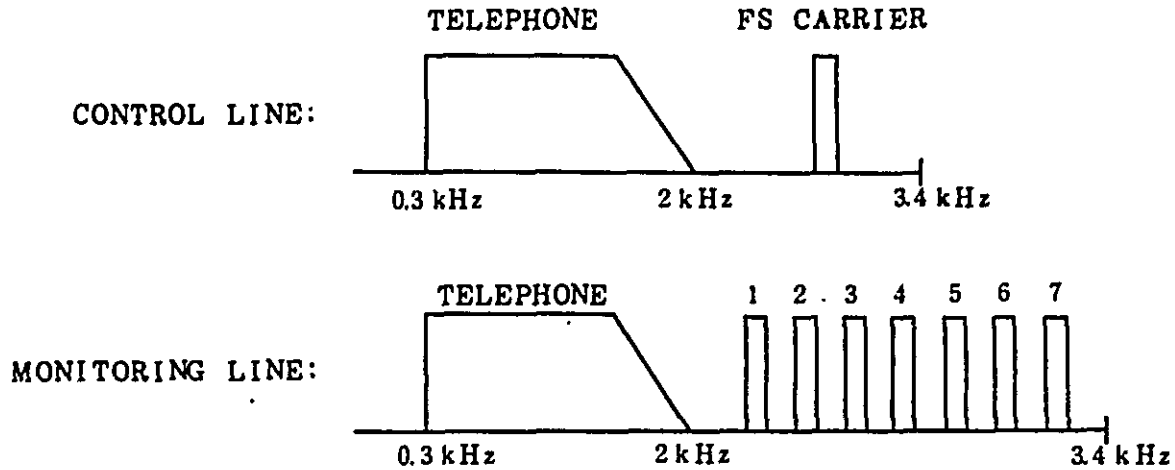
- 3.2.1 7 sets Logic unit consisting of:
 - 1) 7 ea Relay driver
 - 2) 7 ea S/P converter
 - 3) 7 ea Scanning unit
 - 4) 7 ea Encoder
 - 5) 1 set Associated parts
- 3.2.2 1 set Carrier I/O unit consisting of:
 - 1) 7 ea Modulator
 - 2) 7 ea Demodulator
 - 3) 14 ea Band-pass filter
 - 4) 14 ea Low-pass filter
 - 5) 7 ea Line amplifier

6)	14 ea	Transformer
7)	7 ea	Variable attenuator
8)	1 set	Associated parts
3.2.3	7 sets	Control output relay
3.2.4	7 sets	Operation panel
3.2.5	1 set	Telephone consisting of:
1)	1 ea	Line amplifier
2)	2 ea	Transformer
3)	1 ea	Speaker
4)	1 ea	Variable attenuator
5)	1 ea	Telephone
6)	1 set	Associated parts
3.2.6	1 set	Power supply
3.2.7	1 ea	Cabinet rack
3.2.8	1 set	Installation material

4. Specification

4.1	No. of control functions	8 functions per station
4.2	No. of monitoring functions	16 functions per station
4.3	Signal modulation	FS modulation
4.4	Carrier frequency band	2 - 3.4 kHz
4.5	Telephone transmitting frequency band	0.3 - 2 kHz

The frequencies shall be arranged. as follows:



- 4.6 Signal transmitting time Control: The time from depressing control switch in the Lusaka Studio Centre to the operation of relays at transmitting terminal station shall be less than 1 second.
Monitoring: The time from the occurrence of something wrong with transmitter equipment to lamp display at the Studio Centre shall be less than 2.5 seconds maximum and 1.2 seconds on average.
- 4.7 Control output A set of pulse make contacts shall be provided for each control function. The contact capacity shall be more than DC48 V, 0.5 A (non-inductive load).
- 4.8 Monitor input Two sets of make contacts per monitoring function shall be provided from the outside. One of the sets

- shall be used for the logic circuit to feed back to the Lusaka Studio Centre; and the other for the display of the operation panel in transmitting stations.
- 4.9 Carrier output -26 dBm, 600 ohms balanced, variable up to -10 dBm at 1 dB increments by a semi-fixed attenuator. The impedance of output transformer shall be set to 350 ohms balanced or 200 ohms balanced by tap changing.
- 4.10 Telephone signal transmitting level Max. 0 dBm
- 4.11 Circuit loss Normal operation at a circuit loss of 30 dB.
- 4.12 Circuit loss variation Within ± 10 dB
- 4.13 Circuit S/N The ratio of carrier receiving level S to noise level N shall be greater than 25 dB.
- 4.14 Telephone receiver output 200 mW at speaker input terminal. When the telephone receiver hook is up, the speaker input shall be turned OFF and the voice of the party on the other end of the line shall be connected to the receiver.
- 4.15 Power supply AC 220 V, 50 Hz. The equipment shall operate normally at voltage variations of up to ± 10 %.

PART 7
VHF COMMUNICATION EQUIPMENT

1. General

The VHF communication equipment mentioned herein consists of transmitters and receivers which transmit monitoring and control signals for television transmitters as well as communication signals between Kasompe, Nakupata Hill and Lusaka television stations and relevant microwave terminal stations.

The number of sets required by each station and their transmitting outputs shall be as shown in TABLE 2 and TABLE 9.

The equipment shall be solid state and highly reliable.

2. VHF communication transmitter

2.1 Specifications

- | | |
|---------------------------|--|
| 1) RF frequency | 160 MHz band. Frequency to be specified separately. |
| 2) Transmitting output | 10 W ± 20 % or 1 W ± 20 % across 50 ohms unbalanced. |
| 3) Modulation | F3 |
| 4) Maximum deviation | ± 5 kHz |
| 5) Modulating frequency | Max. 3.4 kHz |
| 6) Pre-emphasis | 75 μ S |
| 7) Frequency stability | Within $\pm 1 \times 10^{-5}$ |
| 8) Modulation input level | Shall be stated. |
| 9) Frequency response | Shall be stated. |
| 10) Distortion | Shall be stated. |
| 11) S/N ratio | Shall be stated. |

- | | |
|------------------------|-------------------------------|
| 12) Spurious radiation | -60 dB or less |
| 13) Power source | AC 220 V, single-phase, 50 Hz |
| 14) Temperature | 0°C - +45°C |
| 15) Humidity | 95 % or less |

3. VHF communication receiver

3.1 Specifications

- | | |
|------------------------------|---|
| 1) RF frequency | 160 MHz band. Frequency to be specified separately. |
| 2) Type of reception | Superheterodyne |
| 3) IF frequency | Shall be stated. |
| 4) Demodulating frequency | Shall be stated. |
| 5) De-emphasis | 75 μ S |
| 6) Local frequency stability | Within $\pm 1 \times 10^{-5}$ |
| 7) Frequency response | Shall be stated. |
| 8) Distortion | Shall be stated. |
| 9) S/N ratio | Shall be stated. |
| 10) Noise figure | 8 dB or less |
| 11) Sensitivity | Input required for suppressing noise by 20 dB: 6 dB μ or less across input impedance of 50 ohms unbalanced. |
| 12) Spurious radiation | -60 dB or less |
| 13) Squelch sensitivity | Shall be stated. |
| 14) Power source | AC 220 V, single-phase, 50 Hz |
| 15) Temperature | 0° - +45°C |
| 16) Humidity | 95 % or less |

PART 8
ANTENNA SYSTEMS AND FEEDERS

1. General

The TV, microwave link and VHF communication equipment antenna systems and feeders complete with all components essential to its performance and with all elements and fittings necessary to mount them on to the supporting structures and to connect them to the main feeders in accordance with the requirements of the whole system shall be supplied and installed by the Contractor.

The towers surmounted by structural support columns to support the antenna systems and feeders in accordance with the Contractor's requirements shall be stated in other documents. These towers will be designed to accommodate not only Band III antenna systems which are covered by this specification but also the FM antenna to be installed in the future.

A UHF band antenna shall also be installed by attaching a mast on top of the towers in the future.

The TV and other kind of antenna systems complete with reflecting screens and radiating elements, main and distribution feeder systems, including all components of the feed system and fittings for the antenna and feeders to be mounted on the supporting structures shall be supplied and installed by the Contractor.

2. Design requirements

All TV and other kind of antenna and feeder system elements and fittings shall be manufactured of materials that will not deteriorate with exposure to sunlight, water, air, or dust at ambient temperature from 0°C to 50°C (surface temperature) and relative humidity up to 95 %.

The complete antenna and feeder system shall be designed so as to require minimum maintenance and adjustment over an extended period and to allow easy inspection of the system for maintenance purposes, and for the replacement of faulty parts with a minimum time and effort.

All live parts, such as feed points and open lines, shall be positioned protected so that they cannot accidentally be touched by personnel climbing the tower. The antenna performance is to be independent of the tower and support structures.

3. VHF-TV antenna characteristics

3.1 Operating band

The antenna systems shall be suitable for operation in the frequency range of 174 MHz to 230 MHz.

3.2 Power rating

Each antenna system and main feeder shall be rated to handle continuously the total R. F. power of vision and sound transmitters operating at full rating.

The Bidder shall indicate in the tender the power rating of each antenna panel.

3.3 Configuration, polarity and directivity of antenna

The configuration, polarity and directivity of the antenna for each station shall be as given in TABLE 7.

3.4 Radiation patterns

The horizontal radiation patterns and vertical radiation patterns for each station satisfying the particular requirements in each case shall be given in the tender. In addition, the horizontal

and vertical radiation patterns of one panel shall be given in the tender.

One antenna panel shall be tested at the factory with regard to radiation pattern, power capacity and input impedance. In the case of omnidirectional patterns, the variation from a perfectly circular pattern shall not be more than ± 2 dB. The effective radiated power figures given in TABLE 7 are approximate values in the horizontal patterns of the antenna systems.

In the vertical radiation pattern, null filling shall be employed to satisfy the requirements of each station. The exact amounts of null filling shall be determined after the contract when full information regarding the terrains covered by each station is supplied.

3.5 Standing wave ratio

The SWR on the main feeder shall not be greater than 1.13 for normal operation. The Bidder shall state the maximum value of SWR which the main feeder is designed to withstand.

3.6 Feeder characteristics

The Bidder shall give full information regarding the mechanical and electrical characteristics of the main distribution feeders in the tender. Attenuation per meter and power handling capacity shall be stated. Main feeder diameter shall be 3 1/8" at the dual 10 kW stations and 1 5/8" at the dual 1 kW stations. The main feeder shall be of a rigid type.

4. SHF parabolic antennas

4.1 Operating band

The antenna systems shall be suitable for operation in the frequency range of 7 GHz band.

4.2 Parabolic antennas and feeders

The diameters, the kind of waveguides and approximate dimensions of the parabolic antennas to be used in each station shall be as shown in TABLE 8. Of these parabolic antennas, the ones to be installed at the Kitwe Studio, Kaloko Hill Microwave Station and the Lusaka Microwave Station shall be mounted to existent steel towers. The equipment to be used in these stations shall be installed either in an existent microwave terminal station or in the Kitwe Studio by the Bidder. Drawings showing the arrangement of existent equipment in the stations and showing existent steel towers with positions where existent antenna elements are mounted, which are required for installation planning, will be handed to the Bidder from the Administration. Feeders shall be scaled and pressurized with dry air. 50 m length of feeder shall be supplied for each transmitting end as well as for each receiving end.

The Bidder shall also submit the unit prices of the waveguide system so as to enable the Administration to make necessary adjustments between the stations when the exact lengths of the feeders are determined. The feeders and antenna shall be installed and mounted by the Contractor. All connectors and fittings shall be supplied by the Contractor.

The following parabolic type antenna characteristics shall be given in the tender.

- 1) RF antenna heads characteristics.
- 2) VSWR at the transmitter output and receiver input.
- 3) The gain of the antenna with reference to a halfwave dipole.
- 4) Beam angle and sidelobe attenuation.
- 5) Antenna frequency bandwidth.

- 6) Horizontal and vertical rotating angle.
- 7) All other relevant information, in particularly, mechanical characteristics, such as dimensions, weights, fitting parts, details, and drawings.

5. VHF communication equipment antenna

5.1 Operating band

The antenna systems shall be suitable for operation in the frequency range of 160 MHz band.

5.2 Antennas and feeders

The antennas for VHF communication equipment to be used in each station shall be 5-element Yagi antennas as shown in TABLE 9.

Those antennas to be installed at the Kitwe Studio, Kaloko Hill Microwave Station and Lusaka Microwave Station shall be mounted to the existent steel towers of existent stations, and the equipment shall be installed in the existent stations.

The feeders and antennas shall be installed and mounted by the Contractor. All connectors and fittings shall be supplied by the Contractor.

The following antenna characteristics shall be given in the tender.

- 1) VSWR at the transmitter output and receiver input.
- 2) The gain of the antenna with reference to a halfwave dipole.
- 3) Horizontal radiation pattern.
- 4) Vertical radiation pattern.
- 5) All other relevant information, in particularly, mechanical characteristics, such as dimensions, weights, fitting parts, details, and drawings.

6. Installation

The installation of antenna and feeder systems will normally be carried out at the same time as the installation of the transmitting equipment. However, in the event the tower is erected and ready before the transmitter building, and in view of the fact that the climatic conditions allow the installation of antenna and feeder systems only during a certain period of the year, then the installation of the antenna and feeder system shall be carried out by the Contractor independently of the installation of the transmitting equipment if the Administration so desires. In such a case, the Contractor will be notified at least one month in advance.

The acceptance of the antenna and feeder systems shall be carried out after the transmitting equipment has been installed and the whole system is completed.

PART 9
TEST EQUIPMENT

1. General

Test equipment shall be solid state as much as possible, and be small in size and light in weight for easy portability.

The test equipment shall be complete with the necessary standard accessories (including instruction books in English) and standard spare parts.

2. Composition

2.1 Test equipment to be kept in each transmitting station.

<u>Quantity</u>	<u>Description</u>
1) 7 sets	AM sideband analyzer
2) 7 sets	Oscilloscope
3) 7 sets	Insulation resistance tester
4) 7 sets	Multi tester
5) 7 sets	Vacuum tube voltmeter

2.2 Test equipment to be kept in the Lusaka Studio Centre

<u>Quantity</u>	<u>Description</u>
1) 1 set	Video test signal generator
2) 1 set	Envelope oscilloscope
3) 1 set	FM sideband analyzer
4) 1 set	Audio test set
5) 1 set	Audio variable attenuator
6) 1 set	VHF sweeper
7) 1 set	RF detector

- 8) 1 set RF button type attenuator
- 9) 1 set Frequency counter and divider
- 10) 1 set Envelope delay test equipment
- 11) 1 set Vectorscope
- 12) 1 set RF signal generator
- 13) 1 set Impedance bridge
- 14) 1 set Field intensity meter
- 15) 1 set DG. DP test equipment
- 16) 1 set Wide band oscillator
- 17) 1 set N. F. B. tester
- 18) 1 set I. C. tester
- 19) 1 set 5 W walky-talky

PART 10

TABLE AND DRAWINGS

TABLE 1 TRANSMITTER SITE

Name of site	Location	Height	Temperature	Humidity
Kasompe	Map No. 1227 D2 (96.15, 9.85)	1410M A.S.L.	Max. 32.5°C Min. 22.5°C	Max. 95% Min. 25%
Nakupata Hill	Map No. 1328 B1 (76.75, 48.15)	1080M A.S.L.	Max. 32.5°C Min. 22.5°C	Max. 95% Min. 25%
Kabwe	Map No. 1428 A4 (58.85, 4.20)	1180M A.S.L.	Max. 32.5°C Min. 22.5°C	Max. 95% Min. 25%
Lusaka	Map No. 1528 A4 (49.25, 92.55)	1042M A.S.L.	Max. 32.5°C Min. 22.5°C	Max. 95% Min. 27%
Pemba	Map No. 1627 C2 (54.60, 74.40)	1050M A.S.L.	Max. 32.5°C Min. 20°C	Max. 95% Min. 25%
Tara	Map No. 1628 O4 (77.15, 26.55)	1450M A.S.L.	Max. 32.5°C Min. 20°C	Max. 95% Min. 25%
Senkobo	Map No. 1725 O4 (91.40, 54.70)	1250M A.S.L.	Max. 35°C Min. 22.5°C	Max. 95% Min. 20%

Note:

(1) Temperature :

Max. means mean daily maximum temperature for October.

Min. means mean daily minimum temperature for July.

(2) Humidity

Max. means monthly mean relative humidity at 6 a.m. in February.

Min. means monthly mean relative humidity at 2 a.m. in August.

TABLE 2 EQUIPMENT COMPOSITION OF EACH STATION

Equipment Name of Station	Dual 10kW Transmitter	Dual 1kW Transmitter	10W Macro Wave Link Transmitter	0.5W Micro Wave Link Transmitter	0.1W Micro Wave Link Transmitter	Micro Wave Link Receiver	Cable Link Jack Panel	Cable Link Equalizer	Monitor & Control Equipment	VHF 10W Communication Transmitter	VHF 1W Communication Transmitter	VHF Communication Receiver	Power supply 7.5 kVA	Power supply 20 kVA	T.V. Transmitting Antenna	3 mφ Parabolic Antenna	1.8 mφ Parabolic Antenna	5-Element Yagi Antenna	100 m Tower	60 m Tower	Building	75KVA Engine Generator	Test Equipment
Kasompe T.V. station	1					2			1	1		1	1		1	1		2		1	1	1	1
Kitwe T.V. studio			2							1		1				1		2					
Nakupata Hill T.V. station	1					1			1		1	1	1		1		1	2		1	1		1
Kaloko Hill Micro station					1						1	1					1	2					
Kabwe T.V. station	1						1	1	1				1		1					1	1		1
Kabwe Micro station							1																
Lusaka T.V. station	1					2			1		1	1	1		1		1	2	1		1	1	1
Lusaka Studio Centre				2	1	1			1		2	2					3	4			1		1
Lusaka Micro station					1	1					1	1					2	2					
Pemba T.V. station	1						1	1	1				1		1					1	1		1
Pemba Micro station							1																
Tara T.V. station		1					1	1	1					1	1					1	1		1
Tara Micro station							1																
Senkabo T.V. station	1						1	1	1				1		1					1	1		1
Senkabo Micro station							1																
Total of Equipment	6	1	2	2	3	7	8	4	8	2	6	8	6	1	7	2	8	16	1	5	8	2	8

TABLE 3 FREQUENCIES OF EQUIPMENT

Equipment Name of station	VHF T.V. Transmitter			Micro Wave Link	Communi- cation Equip.
	channel	Vision Carrier	Sound Carrier		
Kasompe	III - 9	203.25 MHz	208.75 MHz	7 GHz Band	160 MHz Band
Nakupata Hill	III - 7	189.25 MHz	194.75 MHz		
Kaswe	III - 8	196.25 MHz	201.75 MHz		
Lusaka	III - 10	210.25 MHz	215.75 MHz		
Pemba	III - 8	196.25 MHz	201.75 MHz		
Tara	III - 6	182.25 MHz	187.75 MHz		
Senkobo	III - 10	210.25 MHz	215.75 MHz		
<p>Note</p> <p>Polarization of radiation is vertical for Pemba and Senkobo. It is horizontal for other stations.</p>					

TABLE 4 TECHNICAL DATA OF TUBE

Tube	Function	Quantity Used	Dissipated Power according to modulation	Max. Dissipation rates	Cooling system	Manufacturer

TABLE 5 GUARANTEE AND PRICE OF TUBE

Tube	Individual Guarantee		Shelf life (Months)	Prices US \$
	Contractor	Manufacturer		F. O. B.

TABLE 6 MONITORING AND CONTROL ITEMS
OF TRANSMITTING STATION

No.	Monitoring Item	Control Item
1.	Transmitter	No. 1 ON - OFF
2		TRANSMITTER ON
3		No. 2 ON - OFF
4		TRANSMITTER OFF
5		No. 1 HT ON
6		TRANSMITTER FAULT HOLD RESET
		AUTOMATIC OPERATION
		REMOTE CONTROL
		SPARE * (ENGIN GENERATOR ON)
7	COMMERCIAL SOURCE ON - OFF	SPARE * (ENGIN GENERATOR OFF)
8	PROGRAMME ON - OFF	* FOR LUSAKA AND KASOMPE TV TRANSMITTING STATION
9	FIRE	
10	DOOR OPEN	
11	CONTROL LINE OFF	
12	AUTOMATIC - REMOTE	
13	MANNUAL OPERATION	
14	SPARE	
15	SPARE	
16	SPARE	

TABLE 7 SPECIFICATION OF TRANSMITTING ANTENNA

Name of Station	ERP Max	Tx Power	Configuration of Antenna	Polarization	Directivity	Height of Tower
Kasompe	200KW	2x10KW	2-Dipole 4x7 Panels	H	OD	60m A.G.L.
Nakupata Hill	200KW	2x10KW	2-Dipole 2x6 Panels 2x8 Panels	H	D	60m A.G.L.
Kabwe	200KW	2x10KW	2-Dipole 4x7 Panels	H	OD	60m A.G.L.
Lusaka	200KW	2x10KW	2-Dipole 4x7 Panels	H	OD	100m A.G.L.
Pemba	200KW	2x10KW	2-Dipole 4x7 Panels	V.	OD	60m A.G.L.
Tara	10KW	2x1KW	2-Dipole 4x4 Panels	H	OD	60m A.G.L.
Sonkobo	200KW	2x10KW	2-Dipole 4x7 Panels	V.	OD	60m A.G.L.

H : Horizontal

V : Vertical

OD : Omni directional

D : Directional

TABLE 8 SPECIFICATION OF MICRO WAVE LINK

1	Route	Output Power	Number of Set	Diameter of Dish	Wave Guide	Antenna Height
2	Kitwe Studio → Kasompe TV Station	10 W	1 set in use 1 set for spare	Tx. Side. 3 mp Rx. Side. 3 mp	R 70 Tx. Side. 30m Rx. Side. 30m	Tx. Side. 30m A.G.L. Rx. Side 30m A.G.L.
3	Kaloko Hill Micro Station → Nakupata Hill TV Station	0.1 W	1 set in use	Tx. Side. 1.8 mp Rx. Side. 1.8 mp	R 70 Tx. Side 30m Rx. Side 30m	Tx. Side 30m A.G.L. Rx. Side 30m A.G.L.
4	Lusaka TV Studio → Lusaka TV station	0.5 W	1 set in use 1 set for spare	Tx. Side 1.8 mp Rx. Side 1.8 mp	R 70 Tx Side 30m Rx. Side 30m	Tx. Side 30m A.G.L. Rx. Side 30m A.G.L.
5	Lusaka TV studio → Lusaka Micro Station	0.1 W	1 set in use	Tx. Side 1.8 mp Rx. Side 1.8 mp	R 70 Tx. Side 30m Rx. Side 30m	Tx. Side 30m A.G.L. Rx. Side 30m A.G.L.
6	Lusaka Micro Station → Lusaka TV studio	0.1 W	1 set in use	Tx. Side 1.8 mp Rx. Side 1.8 mp	R 70 Tx. Side 30m Rx. Side 30m	Tx. Side 30m A.G.L. Rx. Side 30m A.G.L.
<p>Note</p> <p>(1) Tx. : Transmitting</p> <p>(2) Rx. : Receiving</p> <p>(3) S/N \geq 30dB at worst time</p> <p>(4) Band : 7 GHz Band</p>						

TABLE 9 SPECIFICATION OF VHF BAND COMMUNICATION EQUIPMENT

Name of Station	Output Power of TX	Number of TX	frequency	Number of RX	Transmitting Antenna	Receiving Antenna
Kavonpe TV station	10W	1 set	160MHz Band	1 set	5Y-1, 1 set	5Y-1, 1 set
Kitwe Studio	10W	1 set	160MHz Band	1 set	5Y-1, 1 set	5Y-1, 1 set
Nakupata Hill TV station	1W	1 set	160MHz Band	1 set	5Y-1, 1 set	5Y-1, 1 set
Kaloko Hill Micro station	1W	1 set	160MHz Band	1 set	5Y-1, 1 set	5Y-1, 1 set
Lusaka TV station	1W	1 set	160MHz Band	1 set	5Y-1, 1 set	5Y-1, 1 set
Lusaka Studio Centre	1W	2 set	160MHz Band	2 set	5Y-1, 2 set	5Y-1, 2 set
Lusaka Micro station	1W	1 set	160MHz Band	1 set	5Y-1, 1 set	5Y-1, 1 set

Note

(1) Tx. : Transmitter (2) 5Y-1 : Yagi-Antenna of Five Elements,
 (3) Rx. : Receiver 1 section

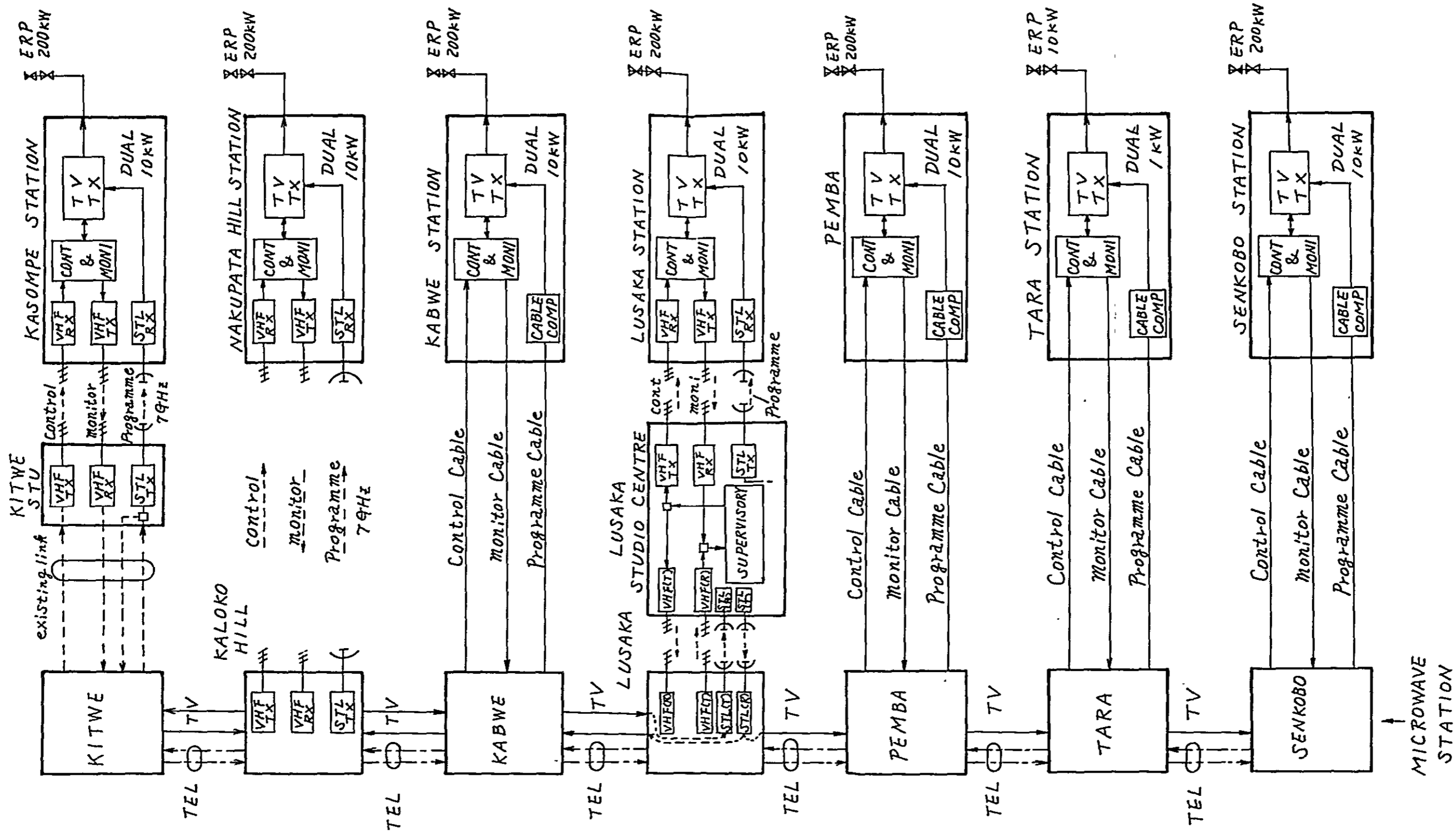


Fig 1 SYSTEM BLOCK DIAGRAM OF TELEVISION TRANSMITTING STATIONS

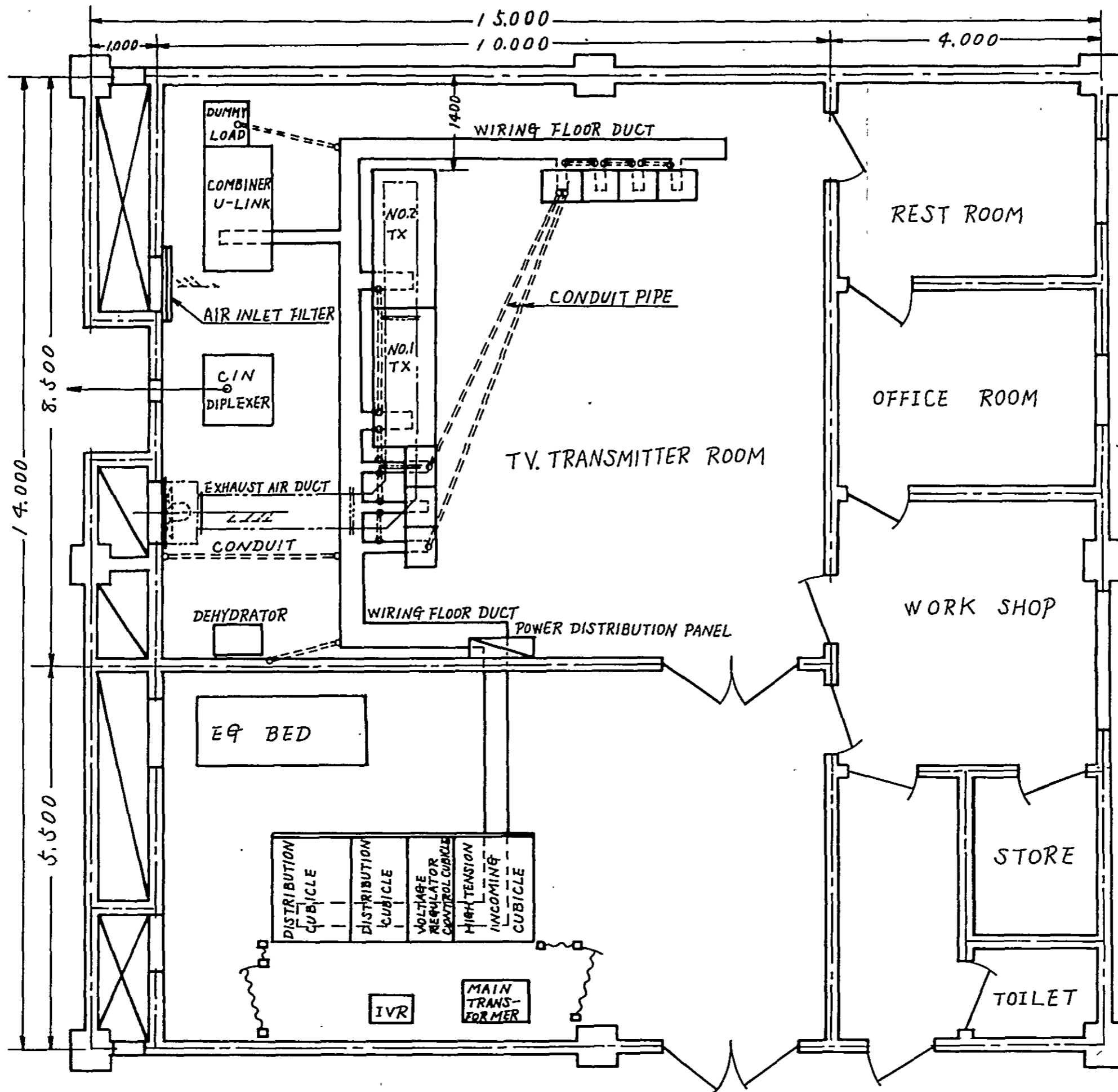
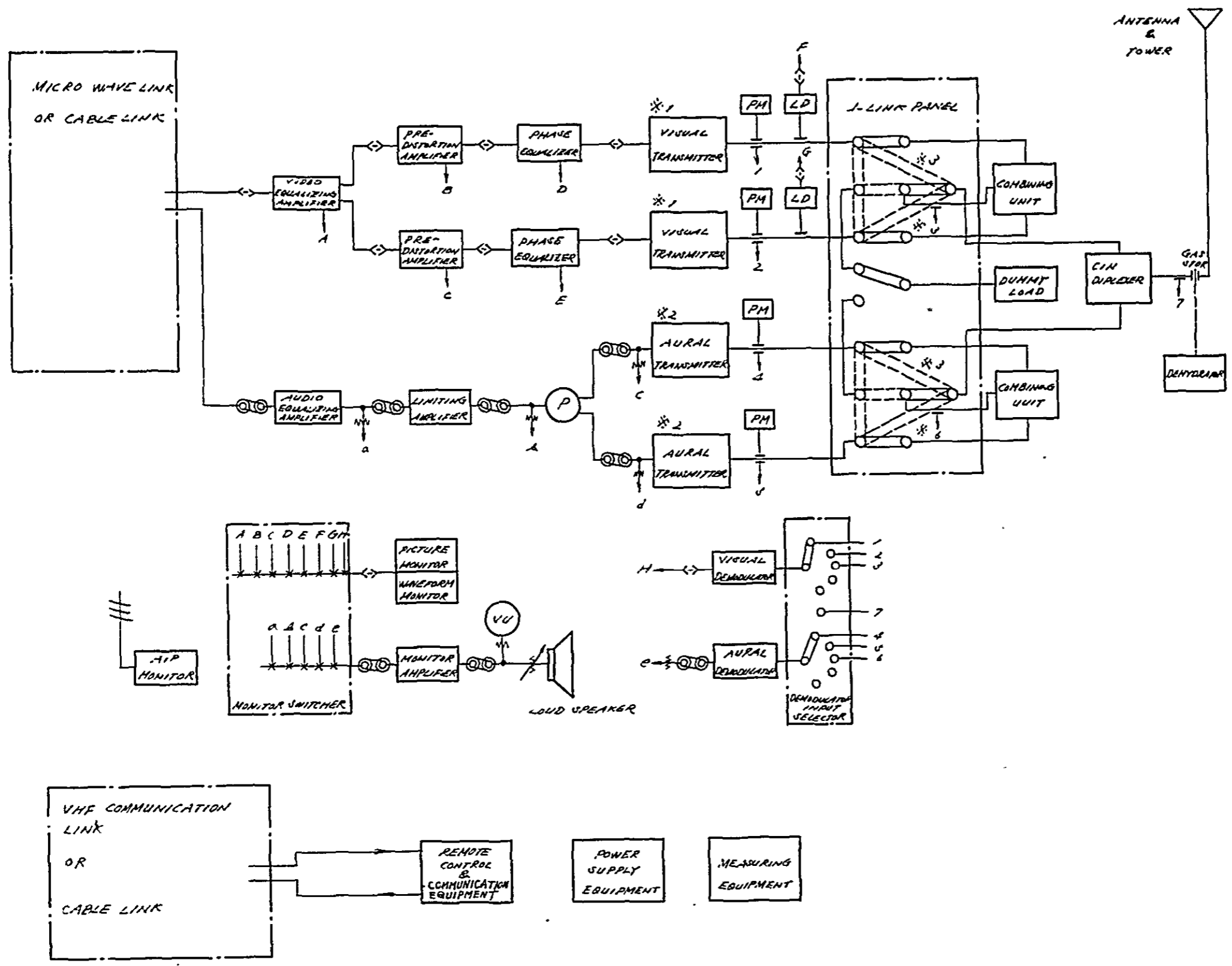


Fig. 2 LAY OUT OF TRANSMITTING STATION

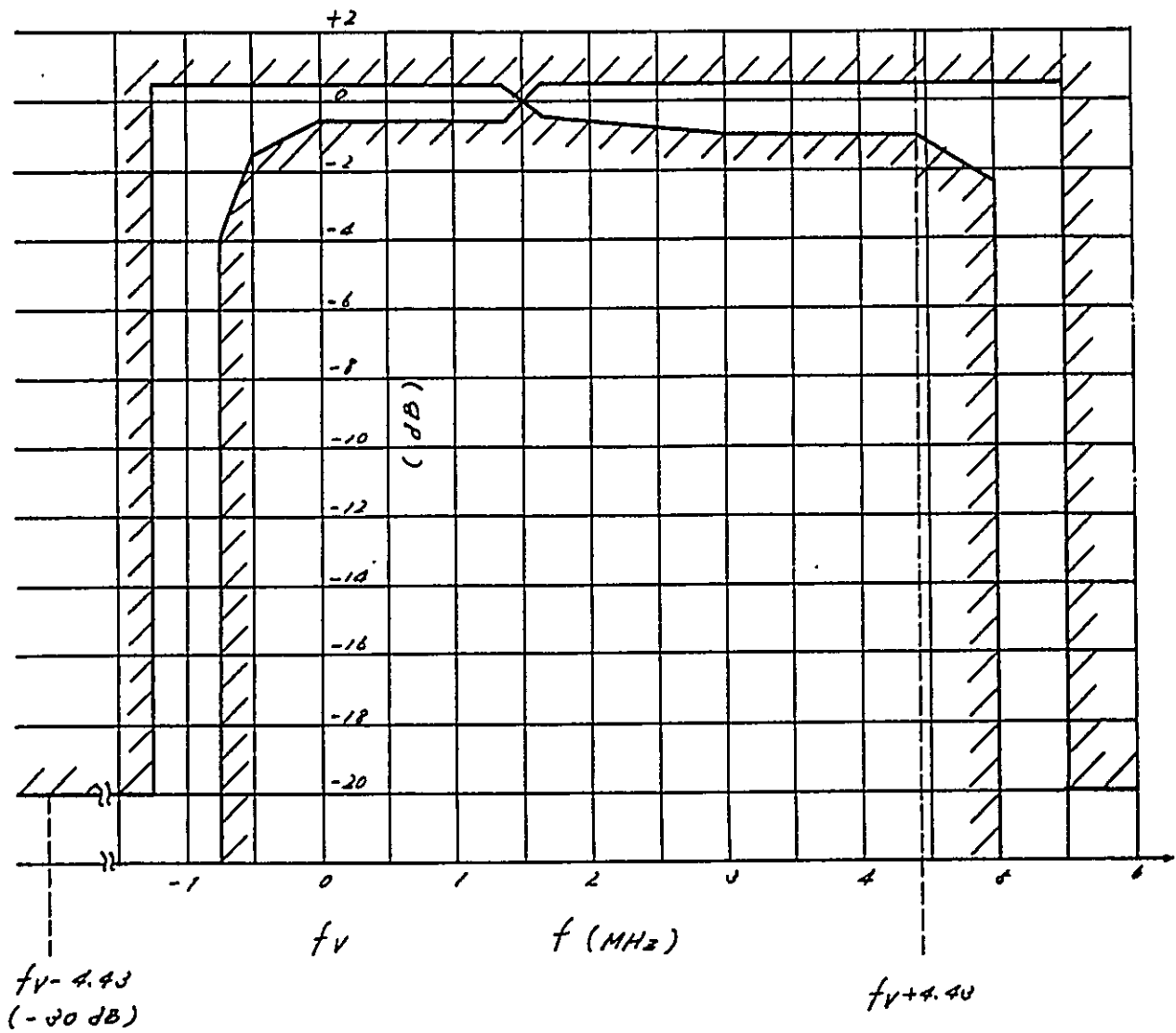


*1: 10KW / 1KW
 *2: 2KW / 200W
 *3: Emergency U Link

CODE	DESCRIPTION
PM	POWER METER
LD	LINEAR DETECTOR
(-)	VIDEO JACK PANEL
(O)	AUDIO JACK PANEL
T	DIRECTIONAL COUPLER
+	ATTENUATOR

Fig. 4 BLOCK DIAGRAM OF DUAL 10KW/DUAL 1KW VHF TV TRANSMITTER

Fig. 4 VIDEO AMPLITUDE/FREQUENCY RESPONSE



Frequency Relative to Vision Carrier (MHz)	Limits (dB)	
	Max.	Min.
- 4.43	- 30	—
- 1.25 and below	- 20	—
- 0.75	+ 0.5	- 4.0
- 0.5	+ 0.5	- 1.5
0	+ 0.5	- 0.5
+ 1.5	Reference	
+ 3.0	+ 0.5	- 1.0
+ 4.43	+ 0.5	- 1.0
+ 5.0	+ 0.5	- 2.5
+ 5.5 and above	- 30	—

Fig 5-1 2T PULSE AND BAR

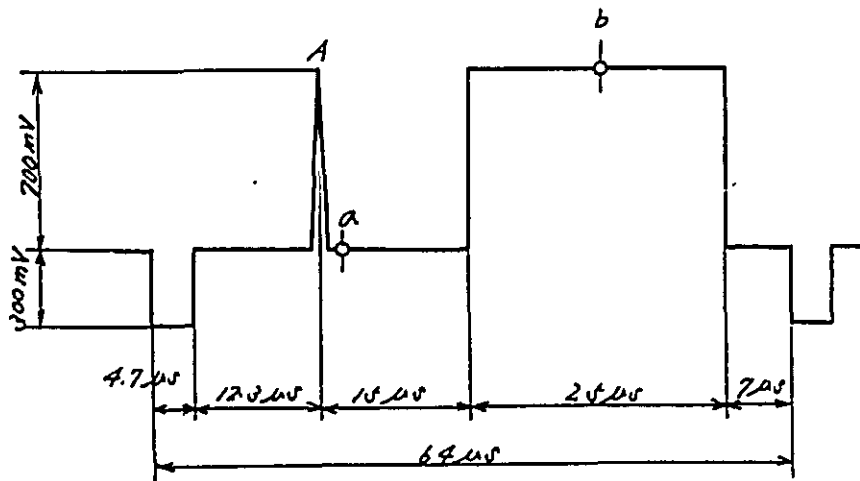
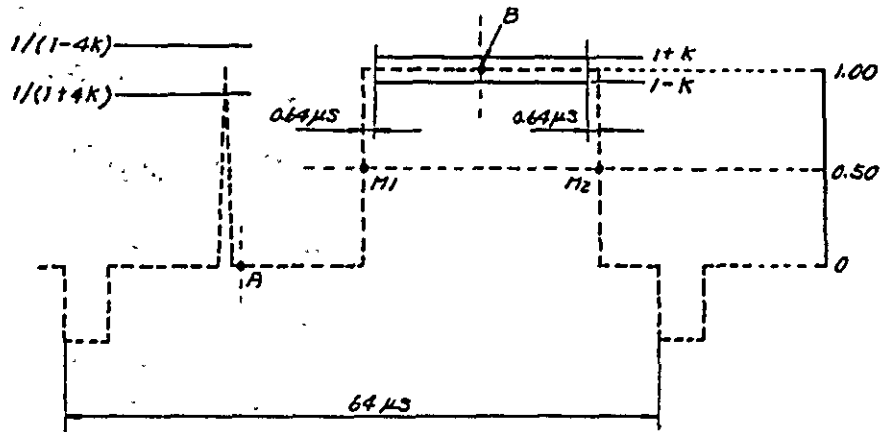
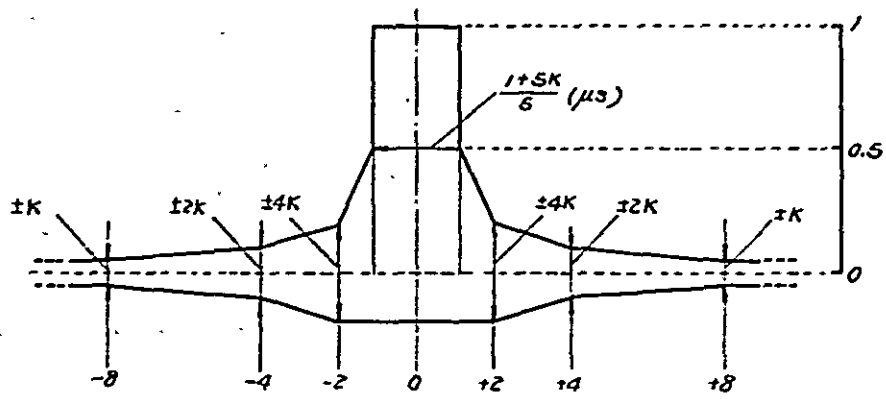


Fig. 5-2 PULSE, BAR RESPONSE AND PULSE/BAR RATIO



2T bar response and 2T pulse/bar ratio



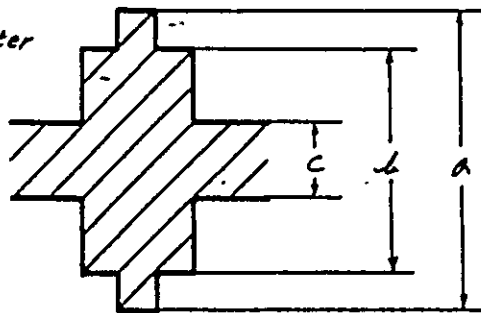
2T pulse response Unit interval : 100 ns

Fig. 6 METHOD OF LINEARITY MEASUREMENT

Data Sheet

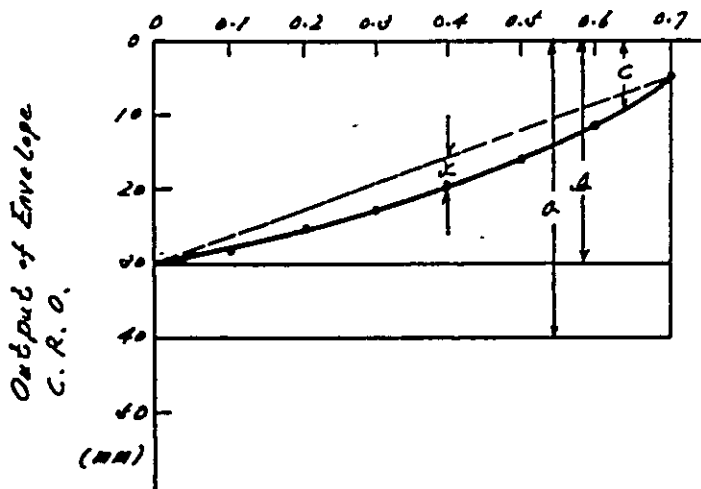
Video Input (V)	sync. (mm)	Pedestal (mm)	Video Output (mm)
0			
0.1			
0.2			
0.3			
0.4			
0.5			
0.6			
0.7			

Output Signal of Transmitter
on Envelope C.R.O.



- a: Sync level (mm)
- b: Pedestal level (mm)
- c: Video Output level (mm)

Data Form

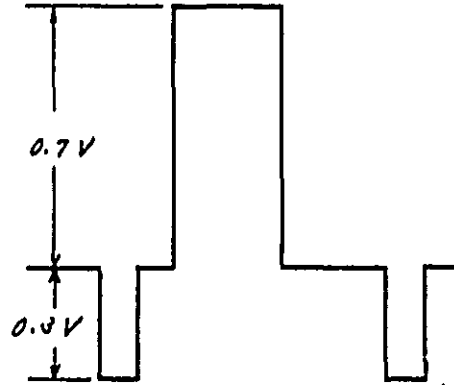


Equation of linearity.

$$\text{Linearity} = \frac{x}{a} \times \frac{1}{0.625} \times 100 (\%)$$

Fig. 7 METHOD OF OUTPUT VARIATION
MEASUREMENT

Input Signal



Output Signal of
Transmitter on
Envelope C.R.O.

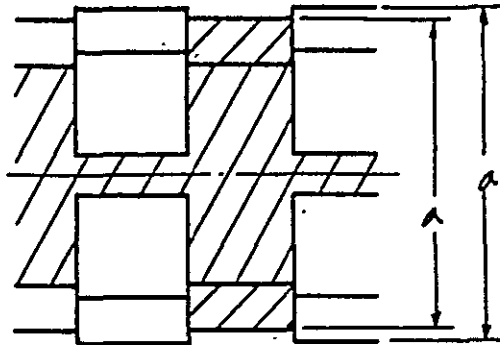
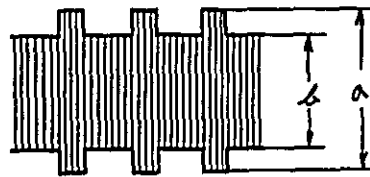
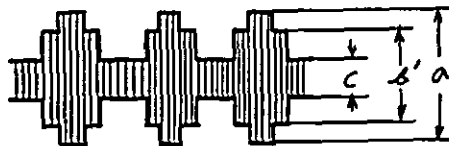


Fig. 8 METHOD OF OUTPUT REGULATION MEASUREMENT

Output Signal of Transmitter on Envelope C.R.O for Black level

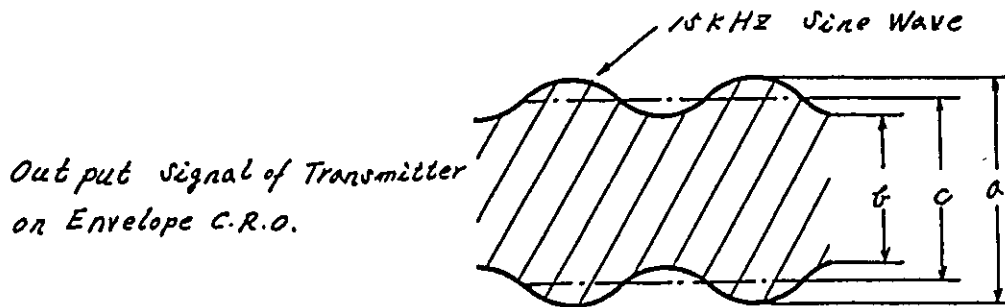


Output Signal of Transmitter on Envelope C.R.O for White level



$$\text{Output Regulation} = \frac{a - a'}{\frac{1}{2}(a + a')} \times 100\%$$

Fig. 9 METHOD OF AM NOISE LEVEL MEASUREMENT



a : maximum level

b : minimum level .

c : Pedestal level

$$\frac{b}{a} = 0.6$$

$$S/N = 20 \log \frac{e_s}{e_n} + 4.4 \text{ (dB.)}$$

4.4 dB : Correct Coefficient in conversion,
15 KHZ signal level into video component
(62.5% of Sync. Level)

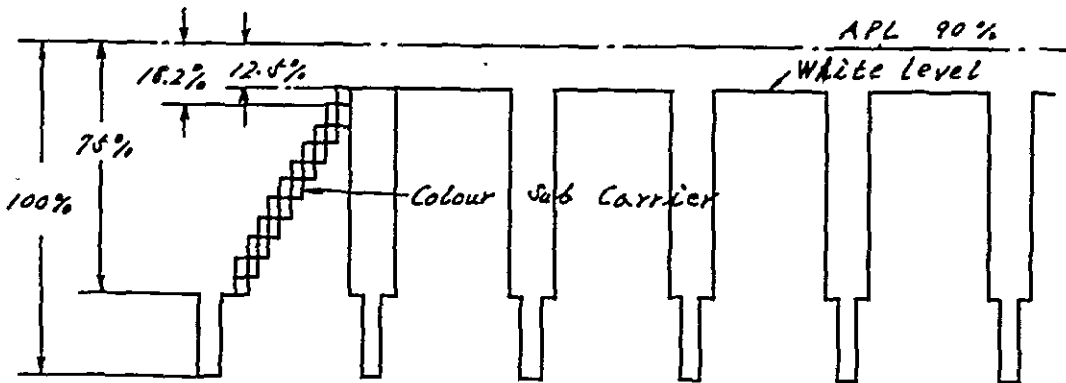
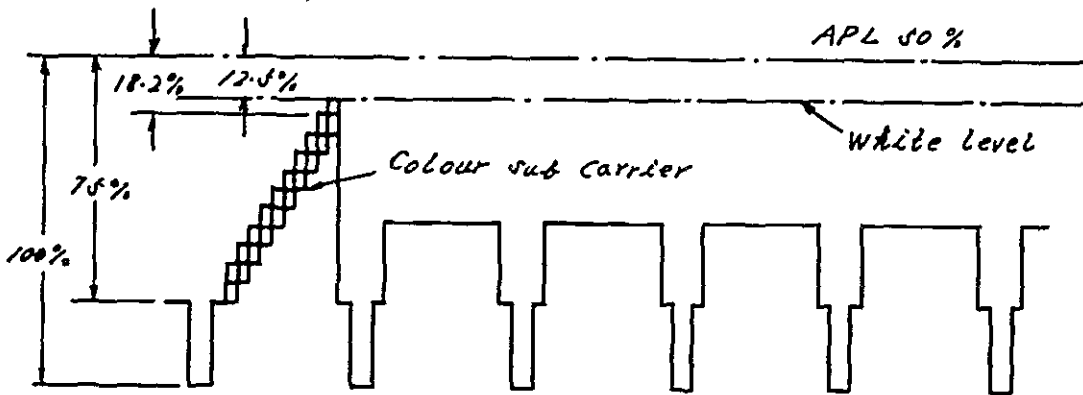
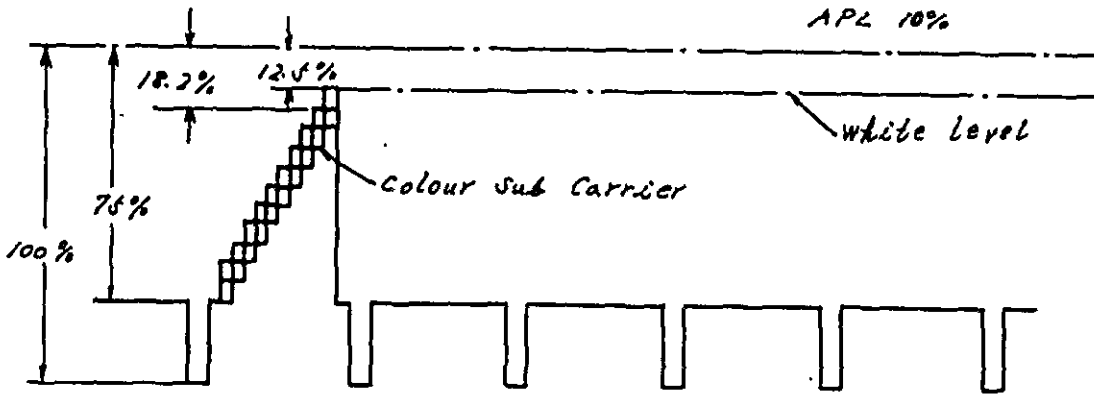
e_s : 15 KHZ Signal level (P-P)

e_n : noise level (P-P)

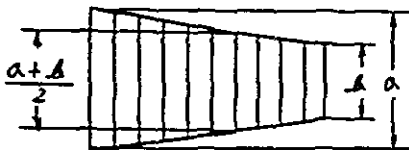
Fig 10 SPECIAL SIGNAL FOR

DG. DP MEASUREMENT

Input Signal



Out put of demodulated Colour sub Carrier



$$DG = \frac{a - \frac{1}{2}(a+b)}{\frac{1}{2}(a+b)} \times 100 (\%) \quad (+ \text{ side})$$

$$DG = \frac{\frac{1}{2}(a+b) - b}{\frac{1}{2}(a+b)} \times 100 (\%) \quad (- \text{ side})$$

Fig. 11 METHOD OF ENVELOPE DELAY MEASUREMENT

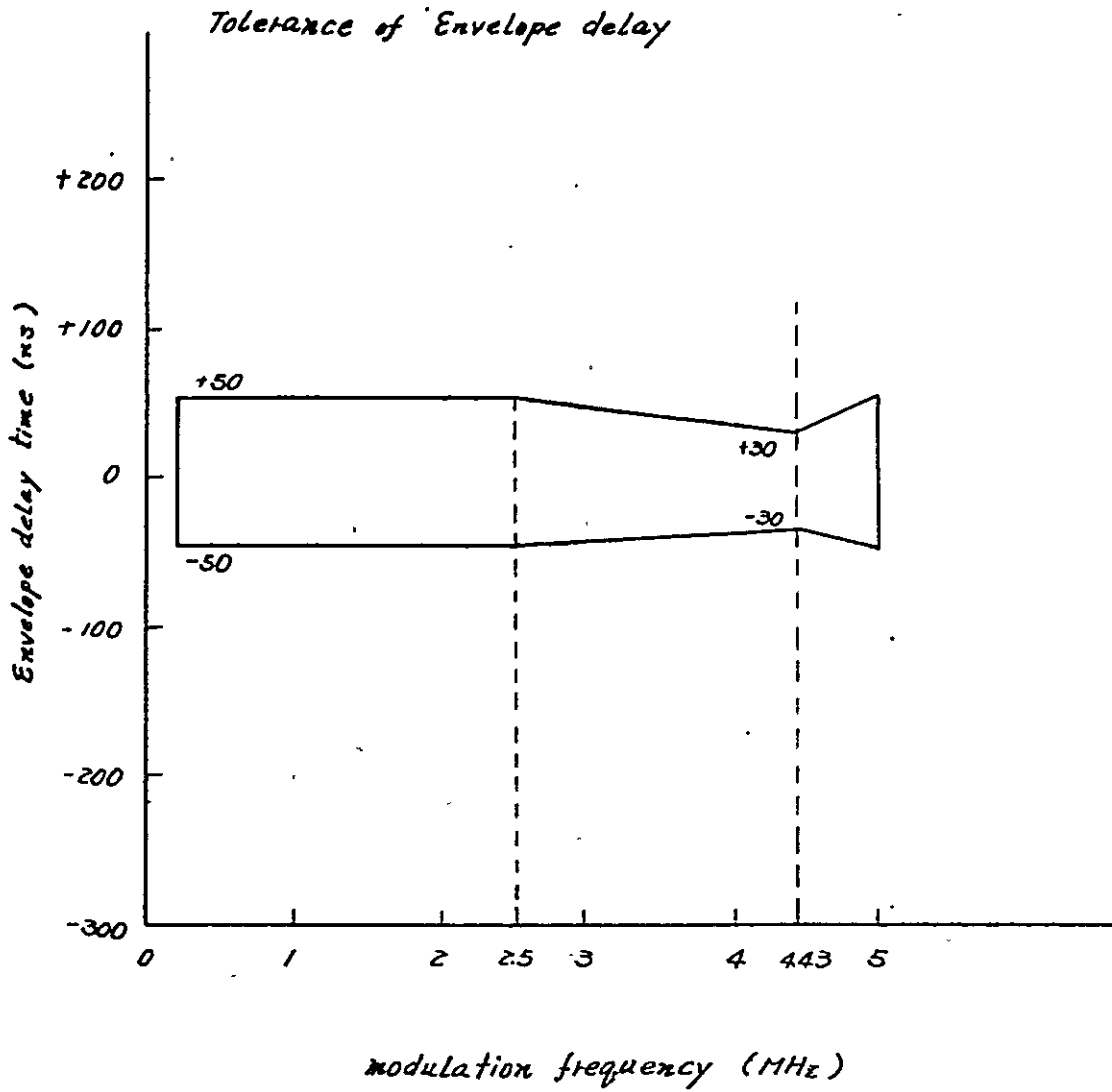
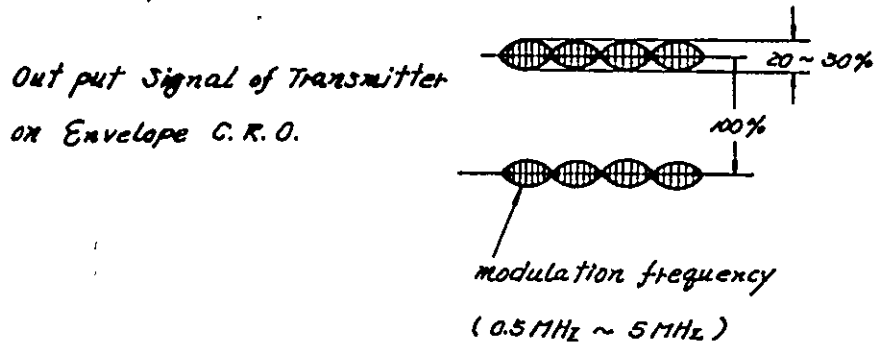
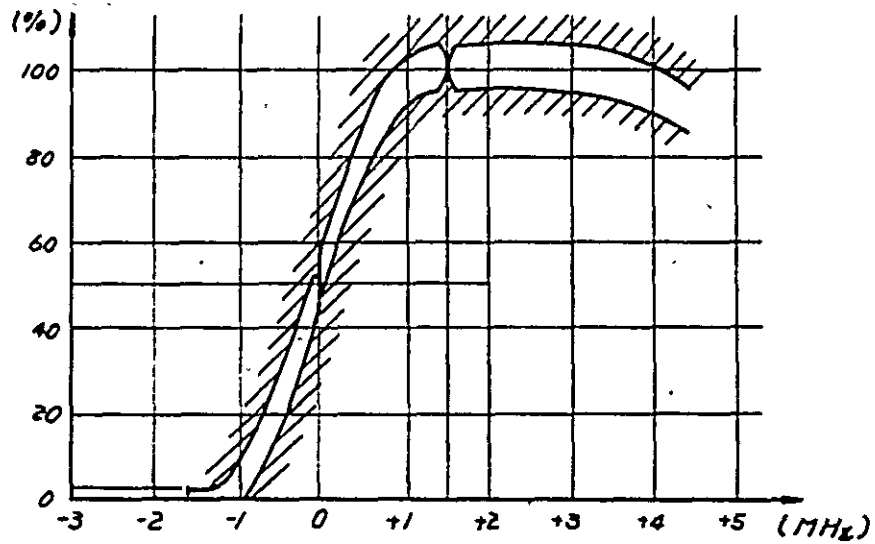


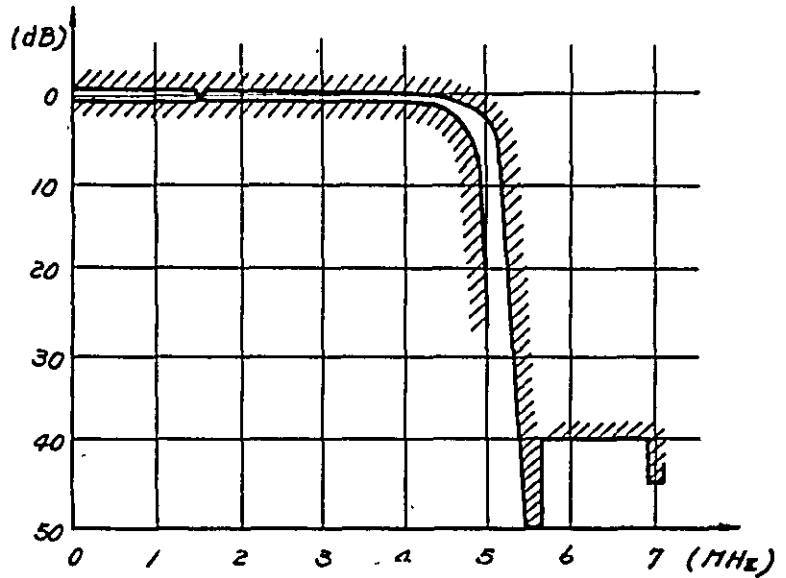
Fig. 12-1 NYQUIST SLOPE CHARACTERISTIC
OF V. S. B. DEMODULATOR



Frequency MHz	Nominal value %	Limiting value %
< -1.65	—	0 2
-1.5 ± 0.15	—	0 0.8
-1	3.5	0 8.5
-0.5	20	15 25
0	50	48 52
+0.5	80	75 85
+1	96.5	91.5 101.5
+1.5	100	reference
+3	100	95 105
+4	95	90 100
+4.5	90	85, 95

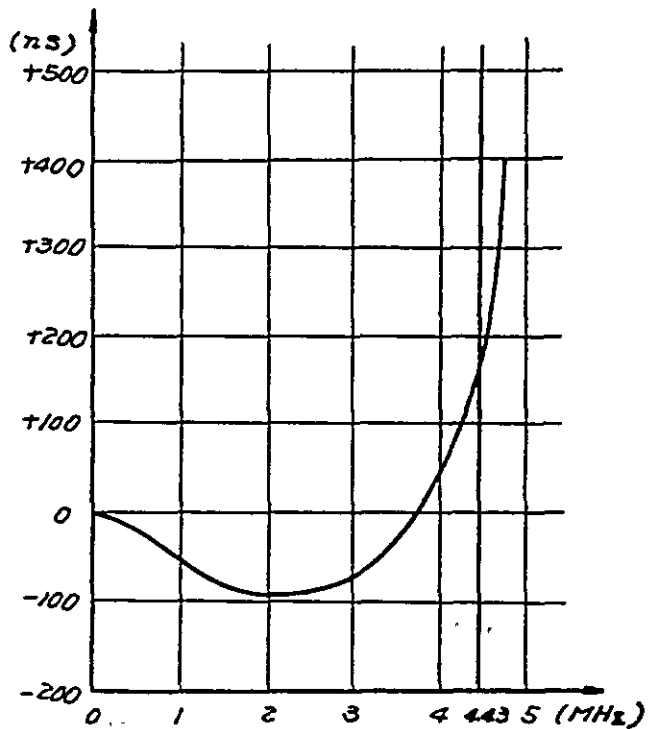
Fig. 12-2 CHARACTERISTICS OF V. S. B. DEMODULATOR

Frequency MHz	Nominal value dB	Limiting value dB
1.5	0	reference
0~3	0	+0.5, -0.5
4	0.5	0, -1
4.5	1	-0.5, -1.5
5	6	-2.5, -26
5.5 ± 0.1	-	-50
5.6 ~ 6.9	-	-40
7 ± 0.1	-	-46



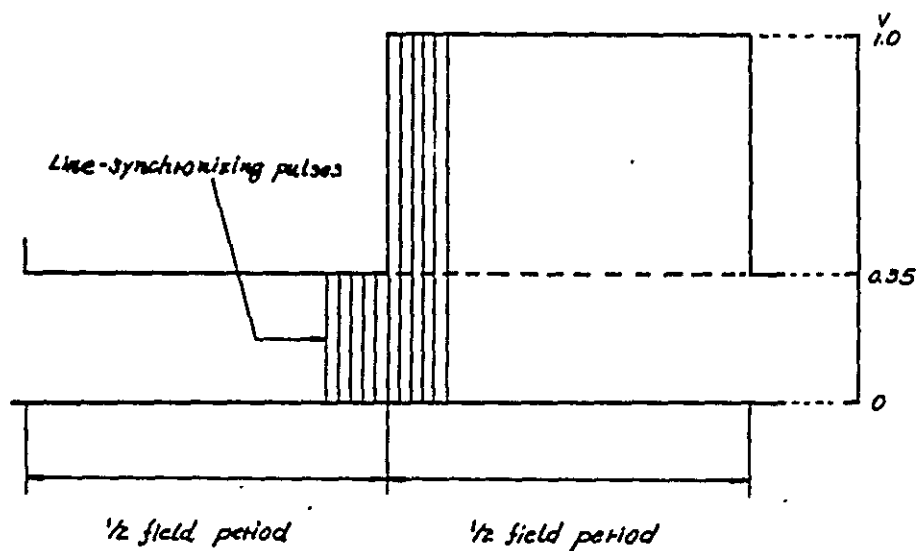
Over all amplitude / Frequency Response

Frequency MHz	Nominal value ns	Tolerance ns
0	0	±12
0.25	-5	±12
1	-53	±12
2	-90	±12
3	-75	±12
3.75	0	±12
4.45	+170	±25
4.8	+400	±50

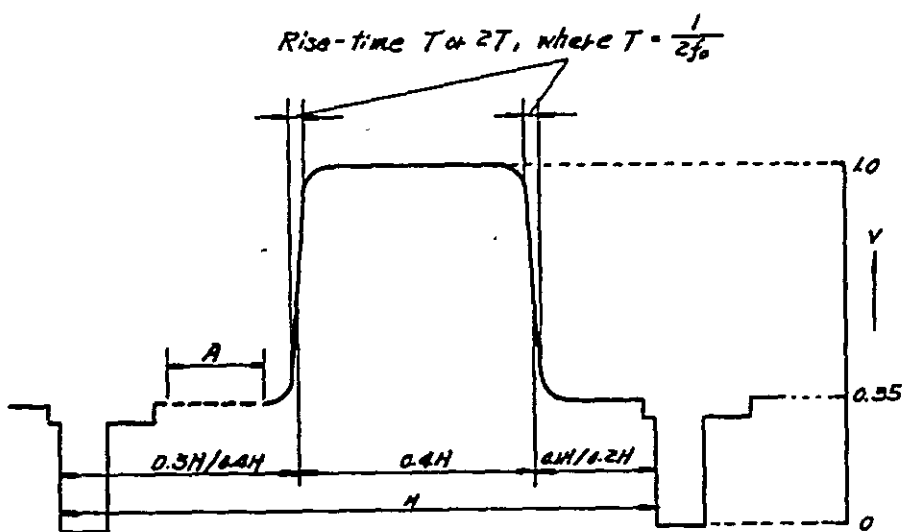


Group delay characteristic of
V. S. B. demodulator

Fig. 13-1 TEST SIGNALS FOR WAVE FORM DISTORTION

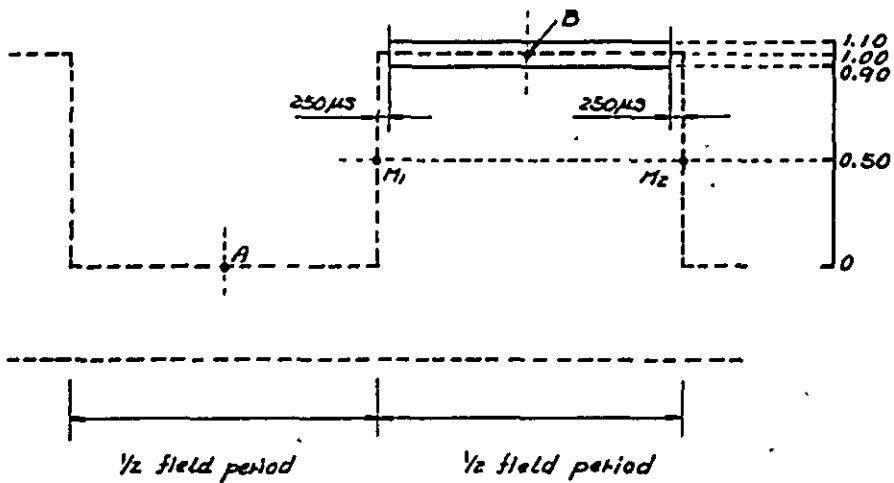


Test signal No. 1 for field-time wave form distortion

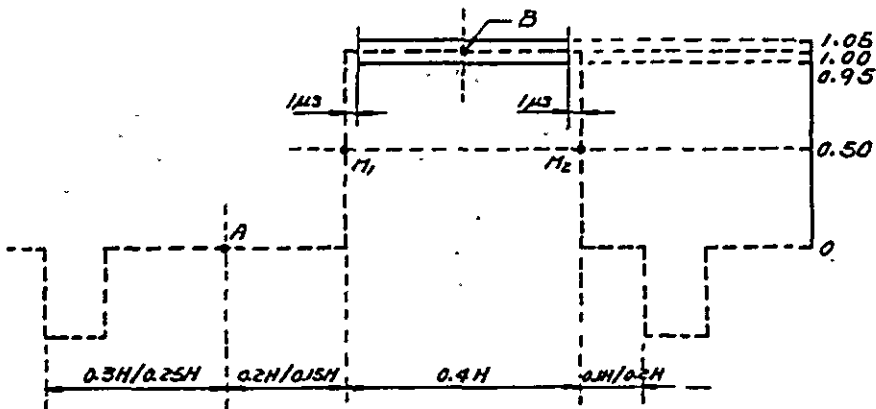


Test signal No. 2 for line-time wave form distortion

Fig. 13-2 WAVE FORM RESPONSES OF
FIELD-TIME AND LINE-TIME
WAVEFORM DISTORTION



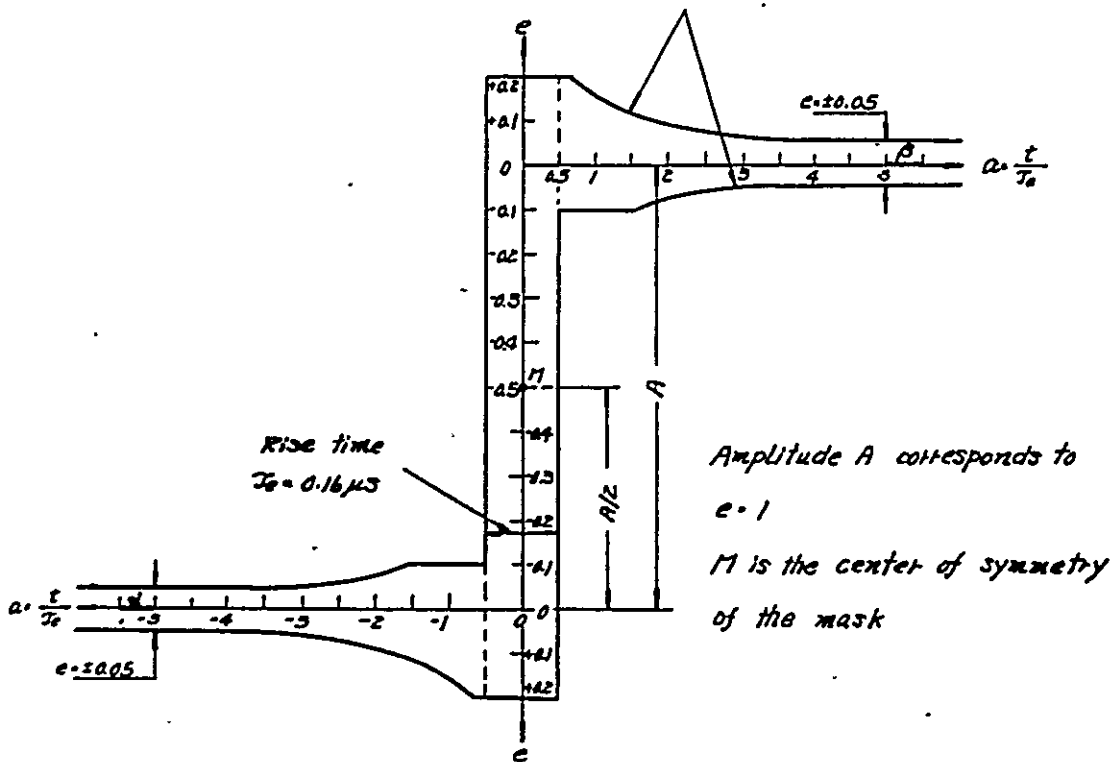
Waveform response to Test Signal No. 1



Waveform response to Test Signal No. 2

Fig. 13-3 MASK FOR WAVEFORM RESPONSE OF SHORT-TIME WAVEFORM DISTORTION

Mask formed by a part of the curve defined by:
 $\pm e^{-\frac{1}{8a}} + 0.025$ within the limits: $e = +0.2$ and
 $e = -0.1$ on the one hand, and $e = \pm 0.05$ up to
 $t = 1\mu s$ on the other hand.



Mask for waveform response to Test Signal No. 2 of systems B.

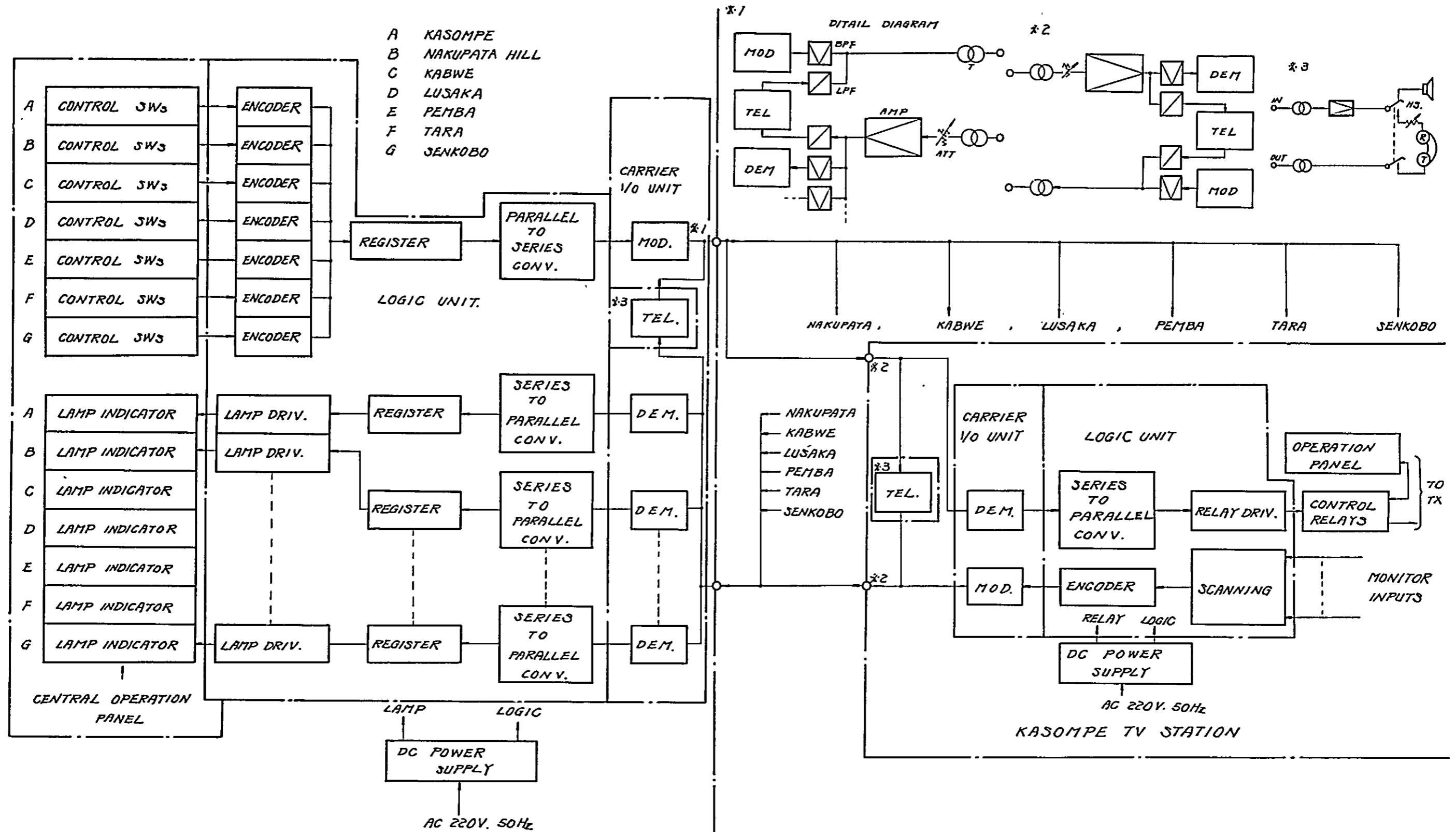


Fig. 14 BLOCK DIAGRAM OF MONITORING AND CONTROL EQUIPMENT

NOTE : (1) Is in case of 24KV
power supply equipment
for TARP STATION

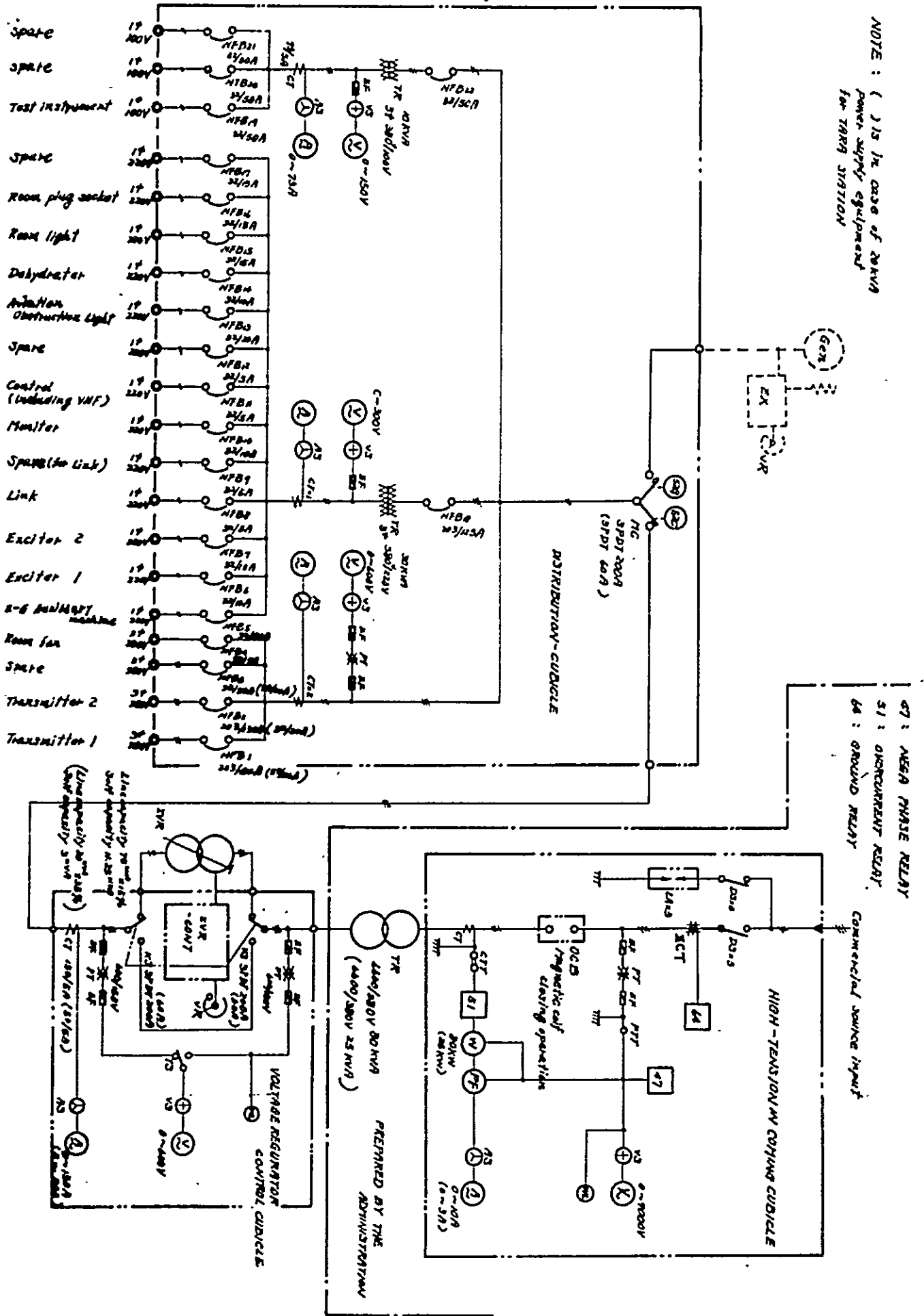


Fig. 15 CONNECTION DIAGRAM OF POWER SUPPLY

[C]

TV STUDIO EQUIPMENT

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PART I
GENERAL DESCRIPTION OF THE PLAN

1. Introduction

This specification covers the sound, vision and lighting equipment to be used in the studios and an outside broadcast vehicle, which form part of the television broadcasting equipment to be installed in the Republic of Zambia for presenting news, educational, cultural and recreational programs.

The Television Centre will be built in Lusaka, -the capital of the Republic of Zambia, and will have three TV studios, one colour outside broadcast vehicle and other apparatuses necessary for the production of program.

In addition, one monochrome outside broadcast vehicle and one VTR equipment will be installed in Kitwe City.

2. Description of Studio Block Layout

2.1 Lusaka Station

The Lusaka Station, where news, educational, cultural and recreational programs will be produced, will have two studios, each 200 square meter class in floor space, and another studio, 100 square meter class in floor space.

One of the two studios, which will be 200 square meter class in floor space and be used for producing studio programs such as dramas and musicals, will use the colour outside broadcast vehicle as auxiliary control equipment.

Other equipment to be installed will include a telecine room, a VTR room, a telecine/VTR control room, a master control room, a central apparatus room, a production and vision control room, a sound control room, a viewing room and a lighting room.

The names of the studios will be shown by the following symbols hereinafter.

- 1) 200 m² class studio T-200-A
- 2) 200 m² class studio (to be driven
by OB vehicle) T-200-B
- 3) 100 m² class studio T-100-A

Figure 8, "FUNCTIONAL BLOCK DIAGRAM OF TV BROADCAST EQUIPMENT", gives brief information on studio systems and the main equipment to be included. The details of studio layout are shown in Figures 1 and 2.

2.2 Kitwe Station

This station already has an existent studio, which will be equipped with one VTR and one outside broadcast vehicle.

3. Scope of Specification

3.1 Contractor's Responsibilities

In accordance with the conditions of Contract and Tendering supplied with this Specification, the successful Tenderer will be required to :

- a) Supply all equipment called for in this Specification,
- b) Supervise the installation of equipment,
- c) Test and commission for the installation of all equipment covered by this Specification.

3.2 Areas to be Equipped

The following technical areas must be equipped and commissioned.

- 1) Studio T-200-A, including associated Production Control, Vision Control, Sound Control, Lighting Control, and Studio.
- 2) Studio T-200-B, including associated Lighting Control and Studio.
- 3) Studio T-100-A, including associated Production Control, Vision Control, Sound Control, Lighting Control and Studio.
- 4) Telecine Room.
- 5) VTR Room.
- 6) Telecine and VTR Control Room.
- 7) Master Control Room,
- 8) Central Apparatus Room.
- 9) Theatre Room.
- 10) Viewing Room.
- 11) Colour Outside Broadcast Vehicle.

4. Interpretation of Specification

Details in drawings and text of Specification are intended to illustrate the functions of various equipments called for. Where specific preference exists for equipment types or operational features, these are noted. However, the Tenderer is invited to offer alternatives to the proposed design if he considers they more readily fulfill the operational requirements of the Specification.

PART 2
GENERAL TECHNICAL REQUIREMENTS

1. Television Standards and Practice

1.1 System Standards

The equipment shall be designed to operate in accordance with CCIR 625, 50 Hz Systems B, described in the CCIR Document "Report 407-1 Characteristics of Colour Systems, XII th Plenary Assembly, New Delhi 1970".

1.2 Vision Waveforms

- 1) The standard vision waveform in use within the Studio Centre shall be a 1 volt composite signal from the tip of the synchronising pulse to reference peak white. The picture to synchronising signal ratio shall be 7/3.
- 2) The polarity of the distributed composite signal shall be such that whites are positive-going.
- 3) Vision waveforms distributed within the Centre will NOT generally include a pedestal as part of the picture component, but provision must be made at picture source and at intermediate processing points for variation of a pedestal between 0 and 15 % of the signal between blanking and peak white levels.

1.3 Pulse Waveforms

- 1) Equipment shall be capable of satisfactory and normal operation from pulses having a peak-to-peak amplitude of 2 volts and negative-going polarity.

- 2) The timing of pulses at the output of synchronising pulse generators must be such that the leading edge of line drive is coincident with the leading edge of the line blanking pulse.

1.4 Terminating Impedances

Terminating impedances of all video and pulse equipment at the input and output terminals shall be 75 ohms.

1.5 Characteristic Impedance of Coaxial Cables

All cables interconnecting units of vision or pulse equipment shall have a characteristic impedance of 75 ohms unbalanced to ground.

2. Audio Levels and Impedances

2.1 General Requirements

The level of distribution to the studio-to-transmitter link equipment and to the destinations in Centre shall be 0 dBm at 600 ohms balanced to ground.

The impedance of the audio distribution circuits interconnecting the various audio devices (such as switching system and amplifiers) in the station shall be 600 ohms balanced.

All audio systems shall operate normally even if operating level rises 15 dB above normal level in peak value.

2.2 Microphone Circuits

Microphone circuits shall be unterminated and suitable for connection to microphones of nominal impedances of 250 ohms and 600 ohms.

3. General Electrical Requirements

3.1 Supply Voltages and Frequency

The equipment shall be designed to operate from a single-phase, 220 V, 50 Hz supply. If a three-phase supply is required for particular equipment, this shall be stated in the tender. Equipment design shall cater for variations in supply voltage of up to 5 % and in frequency of up to 5 %, from the figures quoted above.

3.2 Stability of Operation

After the equipment has been adjusted to its normal operating conditions, its performance shall be completely stable under all conditions likely to be met in normal service, and it shall be capable of operation without adjustment (other than of operational controls) over a period of at least 12 hours. In particular, the performance and other requirements of this Specification shall be met under the following conditions:

- 1) Power supply voltage and frequency variations within the limits specified in Item 2.3.1
- 2) Replacement with the same kind of unit, or with the same kind of parts not specially selected.

3.3 Equipment Protection

The equipment shall be protected as far as is reasonably possible against unsafe conditions that may result from the failure of components or wiring, or from incorrect operating procedures. In particular, provision shall be made to prevent damage to equipment in the event of:

- 1) Failure of scanning stages;
- 2) Failure of any pulses, or power supply;
- 3) Inadvertent removal of the load on a power supply;
- 4) Mains surges.

3.4 Operational Security of Switching Equipment

The equipment shall be so designed that it will maintain its original condition as much as possible when the power is supplied again after a power failure.

3.5 Safety of Personnel

Adequate precautions shall be taken against the possibility of accidental personal contact which could result in electric shock.

3.6 Testing Facilities

Metering facilities and voltage or waveform test points shall be provided on equipment where practicable in order to check the equipment's operation. The use of module extender boards is favoured for rapid fault diagnosis.

3.7 Types of Connectors

In particular, coaxial cable connectors shall be of BNC type, and microphone circuits shall use connectors of Canon Series XLR-3-12C, XLR-3-11C (for extension cords) and XLR-3-13 types.

3.8 Unused Plugs or Sockets

Where connection is not normally made to a plug or socket on a unit of equipment, the mating socket or plug shall be provided to cater for future requirements.

3.9 Mating of Connectors

All connectors on adjacent units of equipment shall be designed and selected so that they cannot be incorrectly mated. They shall be positive in connection and captive against removal by vibration.

4. Mechanical Requirements

4.1 General Mounting Arrangements

Where applicable, equipment shall be mounted in cabinet racks, consoles, or desks, which shall, as far as practicable, be fully pre-wired at the Contractor's works. To facilitate removal of individual equipment units for maintenance purposes, connection to them shall be by means of connectors of a type which is readily available.

4.2 Cabinet Racks

Where rack mounting of equipment is specified, the racks shall be of cabinet type. Provision must be made for racks to be bolted to the floor, and to a side wall or adjacent racks.

4.3 Interchangeable Units

Where practicable, plug-in equipment units shall be used. Replacement of any unit by another which is electrically identical shall not necessitate any mechanical adjustments. However, the connection of units of different electrical characteristics must be prevented. Removal and replacement of units with power still applied shall not result in any component damage.

Mechanical design should allow for the insertion of extra units to cater for future expansion.

4.4 Labelling on Control Panels

All control switches, gain controls, faders, etc. on control panels shall be clearly labelled in such a way that there is high contrast between characters and their background. The terminology used may be abbreviated, but shall be such as to leave no doubt as to the function of controls. Terminology shall be subject of discussion between Contractor and Chief Engineer.

Where labelling of rotary controls will be subjected to wear out from constant fingering, some form of transparent protective covering could be used to advantage.

4.5 Surface Finishes

All metallic surfaces shall be suitably treated, and all timber construction suitably sealed and filled before final coating. Desk tops, panel surfaces and similar areas, subject to constant and hard wear, shall be of a material and finish which will withstand such wear.

5. Design and Workmanship

Design, workmanship, materials, components, and finish of all equipment covered by this Specification shall be of the highest quality throughout, and shall conform to modern engineering practice. Design and construction shall be such that:

- 1) The equipment will operate continuously over long periods;
- 2) A minimum of maintenance attention is required;
- 3) Maintenance can be undertaken readily;
- 4) The appearance is pleasing overall.

6. Test Equipment at Installation Works

The test equipment to be used for conducting delivery tests at the site shall, in principle, be provided by the Contractor.

7. Technical Information

All technical information shall be supplied in the English language.

PART 3
DESIGN FEATURES FOR LUSAKA STUDIO CENTRE

1. General

The main signal paths showing sound and vision signals through the Studio Centre are shown in Figures 4 (vision), 3 (pulse) and 5 (sound). Figures 6 and 7 are provided for giving information on vision and sound systems of the outside broadcast vehicle.

The programs produced in the studio or with the telecine equipment, VTR, etc. will be recorded by the VTR or be transmitted via the master control room to a network or an ST link.

2. General Description of Equipment

2.1 Studio Connector Boxes

The following two connector boxes are required for the studios.

- 1) Camera cable connector box, wall-mounted.
- 2) Technical outlet box, wall-mounted.

The kinds of connector boxes required for the various studios and their locations are shown in Figures 1 and 2.

2.2 Control Desks

- 1) Control desk panel design shall be determined through a careful examination by the Contractor to make sure that the design will pose no problems in producing programs.
- 2) The outward shape of the control desks shall be determined by a careful study on the basis of human engineering.

2.3 T-200-A Productions Studio

The T-200-A production studio, 200 square meter class in floor space, will have its control room on the first floor overlooking the studio. The control room shall be adjacent to four areas for lighting control, production control, vision control and sound control. Particularly, the sound control area will be a wall-partitioned room. This studio, where drams and musicals will be produced, will require three monochrome cameras, and will be lighted basically with fluorescent lamps by manually operating buttons which are connected to the lighting fixtures.

2.4 T-200-B Production Studio

This studio will be the same size as the T-200-A studio and used for colour program production by means of the colour OB vehicle. Therefore the Specification calls for only a lighting control area and colour studio lighting equipment in this studio.

Production control vision control and sound control will be performed by means of the equipment on the outside broadcast vehicle.

2.5 T-100-A Presentation Studio

This studio will be in the order of 100 square meters in floor space. The studio control room will be provided in the master control room by partitioning it with a wall. Production, vision and sound controls will be provided on a single console. Lighting control will be done in the studio.

Considering that the monitor stand is about 1.8 meters high above floor level, the height of the control desks must be so determined that the operator will be able to look into the studio between the monitor stand and the control desk.

This studio, where news and interview programs will be produced, will require two monochrome cameras, and be lighted by lighting fixtures suspended from grid pipes.

2.6 Telecine Room

The telecine room will have 1 chain of 16 mm twin lens flying spot film scanner and 2 chains of monochrome cameras. Each of these monochrome cameras will be comined with 2 film projectors and a 35 mm slide projector. In addition to these film and slide projectors, a caption scanner, a clock scanner, and 2 magnetic sound film recorders used for recording the speech on a film translated from an original language into the local language will be installed in the telecine room.

The telecine room will have enough floor space to accomodate additional apparatuses which may b einstalled in the future.

2.7 VTR Room

The VTR room will have 2 VTRs, one colour and one monochrome specifications, and enough floor space to accommodate additional apparatuses which may be installed in the future.

The VTR compressors will be housed in a sound-proof box to minimize noise in the room.

2.8 Telecine and VTR Control Room

This room will be equipped with a control panel to centrally control one 16 mm colour flying spot film scanner, the 2 chains of monochrome cameras and 2 chains of opeque and clock scanners in the telecine room and the 2 VTRs in the VTR room.

2.9 Master Control Room

The master control room, which will function as the heart of the studio station, will require a switcher for feeding out programs. Also, an S-T link, a network equipment, and video and audio monitors for monitoring the programs will be installed in the master control room.

2.10 Central Apparatus Room

This room will have a cabinet rack installed, in which camera control unit, switchers, video and pulse delay units for phase adjustment, video and pulse distribution amplifiers and other units for the studios, the telecine room, VTR room and master control room will be mounted and centrally controlled.

In addition, a master clock for giving standard time in the station and a distribution rack for building monitoring will be installed.

2.11 Colour Outside Broadcast Vehicle

This vehicle, designed primarily for easy maneuverability and operation, will be used not only for covering outdoor events and taking video tape recordings but as bus-control equipment for the T-200-B studio in colour.

The main components of equipment on board include three live colour cameras, a VTR, two sets of microwave unit, and a power supply.

2.12 Others

Maintenance and testing equipment, spare parts and spare units will be required.

3. Technical Equipment

3.1 T-200-A Production Studio

3.1.1 Vision Equipment

1) Vision Switcher

The program production switcher will have a total of 6 busses, including 4 effect busses and 2 monitor busses, and require at least 9 video inputs. It must be capable of such effects as fade-in, fade-out, superimpose, dissolve, cut, wipe and keying by external keying signals. It must be able to superimpose with or without edges, and to colour superimposed images.

In addition to 9 input buttons for the selection of effect busses, the switcher shall have an OFF button.

Not only the program production switcher but also pulse distributors, etc. shall be designed for compact size and reliability.

The control buttons for this switcher must be provided on the console in the vision control area of the control room, and various units mounted in the rack in the central apparatus room.

The program production switcher shall have the following functions.

a) The number of video signal inputs shall be 9 or more, composite. (Input cable compensation required)

b) The number of busses required:

Effect busses	4
Monitor bus	1
Emergency bus	1

c) The kinds of effects shall be as follows:

Cut, fade, mix wipe, keying.

- d) 7 or more wiping waveforms, plus positioner.
- e) The required minimum number of video outputs : 7 line outputs, 3 monitor outputs, 2 line or monitor outputs, and one MIX/EFF output, all composite signals.

The performance requirements of the program production switcher shall be as follows:

- i) Video input and output signals shall be composite signals, 1V, 75 ohms.
- ii) Sync signals shall be sync, horizontal drive, vertical drive and blanking, each 2V, negative : burst flag signals, subcarrier and PAL pulse, each 2V.
- iii) Sync signal, setup and burst shall be gated during blanking period immediately before the final output of the switcher and added again before sending out with blanking period reshaped.
- iv) Frequency response shall be within ± 0.5 dB at frequencies of up to 8 MHz and roll off at over 8 MHz.
- v) Differential gain shall be less than 1.5%; differential phase less than 1.5° .
- vi) Level deviation shall be within ± 0.5 dB at 100 KHz.
- vii) Absolute phase deviation shall be within $\pm 1^\circ$ at 4.43 MHz.
- viii) Crosstalk for video input shall be more than 40 dB at 4.43 MHz.
- xi) Dissolve drift shall be within $\pm 5\%$.
- x) Synchronous noise shall be less than 30 m Vp-p.

2) Picture Monitor

- a) The studio will require one 23-inch monochrome monitor, for which a moveable stand shall be provided.
- b) The production, vision and lighting control rooms will require five 9-inch monochrome monitors and three 17-inch monochrome monitors.
- c) The sound control room will require one 17-inch monochrome monitor.

3) Production Control Room

- a) The production control console will require one 9-inch monochrome monitor and one waveform monitor.
- b) The camera control unit shall be capable of remote control on the iris and pedestal.
- c) ON AIR tally for the cameras will be required.
- d) VTR and telecine equipment will require the following remote controls.

VTR: "Stop" "Start"

Telecine camera: "Live" "Super"

16mm film projector: "Stop" "Still" "Start"
"Optical" "Magnetic"

35mm slide projector: "Lamp ON" "Lamp OFF"
"Slide change" "Slide skip change"

Caption scanner: "Lamp ON" "Lamp OFF"
"Change" "Skip"

4) Studio cameras will require the following :

- a) 3 sets of lead-oxide tube type camera heads with a 5-inch viewfinder.

- b) 3 sets of accessories.
 - c) 3 sets of test charts.
 - d) 3 sets of 10 : 1 zoom lenses.
 - e) 3 sets of range extenders (x2).
 - f) 3 sets of camera pedestals with a balance head.
- 5) Studio floor equipment
- a) 1 set of mobile camera crame
 - b) 1 set of back-projection equipment
 - c) 1 set of television prompter

3.1.2 Sound Equipment

The sound equipment will require 16 input channels, of which 12 inputs will be for microphone input channels. The remaining 4 inputs must be high-level input channels for other sound sources.

Each microphone input channel shall be such that two microphone inputs can be selected. Thus there shall be, in effect, 24 microphone inputs available.

The four high-level input channels shall be such that 14 input signals can be selected for use.

A special effect filter circuit shall have a jackfield.

1) Sound control room

a) Sound console

This console with a total of 16 inputs channel will be operated by a single sound operator.

Twelve input channels are low-level inputs to be used for microphone inputs, and the other four are high-level inputs to be used for the turntable, tape recorder and line inputs.

Each low-level input channel will be able to select two microphone inputs so that a total of 24 microphone inputs may be connected.

The four high-level input channels will be able to select any of 14 inputs.

This sound console shall have the following functions in addition to the above-mentioned.

- o Audition circuit
- o Talkback circuit
- o Holdback circuit
- o Test oscillator for level setting
- o Sound effect filter
- o Echo circuit (which shall be usable when an echo machine is installed in the future).
- o Remote control circuit for turntable, tape recorder, etc.
- o Jackfield.
- o VU meter
- o Monitoring circuit

b) Disc player

Two disc players of console type shall be installed on the right side of the sound console.

They operate at two speeds of 45 rpm and 33 1/3 rpm, which may be selected as required.

These disc players shall be able to be started and stopped by either local or remote control.

c) Tape recorder/player

One console type tape recorder/player shall be installed on the left side of the sound console.

It will use full-track tapes at 9 1/2 cm per second or

19 cm per second, which may be selected as required.
The tape recorder/player shall be able to be started and stopped by either local or remote control.

d) Cartridge tape player

One cartridge tape player shall be installed on the left side of the sound console side by side with the tape recorder/players.

The cartridge tape player shall be able to be started and stopped by either local or remote control.

e) Loudspeakers

This control room shall be equipped with a program monitor loudspeaker, audition speaker, talkback speaker, etc.

2) Studio floor equipment

a) Studio microphones

The required number of studio microphones, including condenser microphone, velocity microphone and dynamic microphone, shall be provided.

Flush-mounted wall type receptacles and grid pipe receptacles for connecting microphones shall be provided.

b) The studio shall be equipped with the required number of microphone booms, floor stands (large and small, and desk stands.)

c) Microphone extension cords

The required number of microphone extension cords shall be provided.

d) Loudspeakers

The studio monitor loudspeaker will be used for both talkback and program monitoring, and be automatically silenced when the microphone is live. This loudspeaker shall be of wall type. In addition, a holdback loudspeaker of console type with casters shall be provided.

e) Headphones

Headphones for monitoring and talkback while the studio microphones are live shall be provided.

f) ON AIR display lamps

ON AIR display lamps shall be installed in the studio and at the entrance to the studio.

3) Other equipment

Program monitor speakers and talkback speakers will be required for the production control room, vision control room and lighting control room.

3.2 T-100-A Presentation Studio

3.2.1 Vision Equipment

1) Vision Switcher

The switcher for producing news and interview programs will require a total of 4 busses, including 2 effect busses, 1 cut bus and another monitor bus, and at least 9 video inputs. It must be capable of such effects as fade-in, fade-out, superimpose, dissolve, cut and keying by external keying signals.

It must be 9 input select buttons for the effect and cut busses and an OFF button.

The production vision switcher must be well designed for compact size and reliability.

The production switcher shall have the following functions:

- a) The number of video signal inputs shall be 9 or more, composite. (Input cable compensating required)
- b) The number of busses shall be 2 effect busses, 1 cut bus and another monitor bus.
- c) The kinds of effects shall be cut, fade, mix and keying.
- d) The required minimum number of video outputs: 7 line outputs, one mix output, 3 monitor outputs, and 2 line or monitor outputs, all composite signals.

The performance requirements of the program production switcher shall be as follows:

- i) Video input and output signals shall be composite signals, 1Vp-p, 75 ohms.
 - ii) Sync signals shall be sync horizontal drive, vertical drive, blanking, each 2Vp-p, negative; and burst flag signals, subcarrier, PAL pulse, each 2Vp-p.
 - iii) Sync signal, set up and burst shall be gated during blanking period immediately before the final output of the switcher and added again before sending out, with the blanking period reshaped.
 - vi) Differential gain shall be less than 1.0%; differential phase less than 1.0°.
 - v) Other performance requirements shall be the same as those of the switcher for the T-200-A Studio.
- 2) Picture Monitor
- a) The studio will require one 23-inch monochrome monitor, for which a moveable stand shall be provided

b) The production, vision and lighting control rooms will require three 9-inch monochrome monitor and another three 17-inch monochrome monitors.

3) Production control console

The production console shall have the same functions as the one in the production control room for the T-200-A Studio except the function of the switcher.

4) Studio Cameras

The studio cameras required are the same as those of the T-200-A Studio except that the required number is 2 sets.

3.2.2 Sound Equipment

The sound equipment will require 10 input channels, of which 6 inputs will be microphone input channels and the remaining 4 high-level input channels for other sound sources. The four high-level input channels must be selected from among 14 inputs.

A special effect filter circuit shall have a jackfield.

1) Sound Control Section.

a) Sound console

This console with a total of 10 input channels will be operated by a single sound operator.

Of these input channels, 6 are low-level inputs for microphones and the other 4 high-level channels for turntable, tape recorder and line inputs.

Each low-level input channel will be able to select two microphone inputs so that a total of 12 microphone inputs may be connected.

The four high-level input channels will be able to select any of 14 inputs.

This sound console shall have the following functions in addition to the above-mentioned.

- o Audition circuit
- o Talkback circuit
- o Test oscillator for level setting
- o Remote control circuit for turntable, tape recorder, etc.
- o Jackfield'
- o VU meter
- o Monitoring circuit

b) Disc players

Same as the ones in the T-200-A Studio.

c) Tape recorder/player

Same as the one in the T-200-A Studio.

d) Cartridge tape player

Same as the one in the T-200-A Studio.

e) Loudspeakers

Same as the ones in the T-200-A Studio.

2) Studio Floor Equipment

a) Studio microphones

The required number of studio microphones, including condenser microphone, velocity microphone and dynamic microphone, shall be provided.

Flush-mounted wall type receptacles for connecting microphones shall be provided.

b) Microphone stands

The studio shall be equipped with the required number of microphone floor stands. (large and small and desk stands.)

c) Microphone extension cords

The required number of microphone extension cords shall be provided.

d) Loudspeakers

The studio monitor loudspeaker will be used for both talkback and program monitoring, and be automatically silenced when the microphone is live. This loudspeaker shall be of wall type.

e) Headphones

Headphones for monitoring and talkback while the studio microphones are live shall be provided.

f) ON AIR display lamps

ON AIR display lamps shall be installed in the studio and at the entrance to the studio.

3) Other Equipment

Program monitor speakers and talkback speakers will be required for the production control room, vision control room and lighting control room.

3.3 Telecine and VTR Control Room

3.3.1 Vision Equipment

1) Telecine distribution switcher

Considering future expansion, the telecine distribution

switcher shall have at least 8 inputs and 8 outputs, including spare outputs. The control panel will be placed in the telecine control room, but the equipment necessary for switching operations will have to be placed in the central apparatus room.

The telecine distribution switcher must switch vision and sound at the same time. However, if no simultaneous switching of vision and sound is required, it may be controlled by an OFF button to be provided on the sound control console.

The crosstalk of this switcher for vision signals shall be more than 50 dB at 4.43 MHz.

2) VTR Input Switcher

This switcher, intended for switching studio -produced programs for video tape recording, will require a minimum of 8 vision and sound inputs and a minimum of 6 vision and sound outputs. It must be able to simultaneously switch vision and sound.

The crosstalk of this switcher for vision signals shall be more than 50 dB at 4.43 MHz.

3) VTR Output Switcher

This switcher, intended for feeding out VTR signals to the studio or the master control room, shall have 6 vision inputs and 6 vision outputs, considering future expansion. It must be able to switch vision and sound simultaneously with the control system.

The crosstalk of this switcher for vision signals shall be more than 50 dB at 4.43 MHz.

4) Picture Monitors

a) Two 13-inch precision color monitor for monitoring

Telecine 1 (16 mm film scanner) and colour VTR will be required.

- b) Five 9-inch monochrome monitors for monitoring Telecines 2, 3, 6 and 7 and VTR 2 will be required.

5) Control Console

The control console shall have the following functions.

- a) To distribute output signals from the telecine equipment to each studio or the master control room.
- b) To select various signals to VTRs.
- c) To distribute VTR output signals to each studio or the master control room.
- d) To determine the points of control on the telecine equipment and VTRs.

6) Vision and sound equipment in the master control room.

Of vision equipment, 3 sets of color stabilizing amplifiers and vectorscope shall be mounted in the rack.

- 7) Two sets of pulse generators, a pulse switcher, and a pulse distributor.
- 8) Station master clock.
- 9) Distributor for building monitor.
- 10) Various relay panels.
- 11) Tally light indicating optical or magnetic sound.

3.3.2 Sound Equipment

- 1) Telecine distribution switcher

The telecine distribution switcher shall have at least

8 inputs and 14 outputs, including spare outputs. The control panel will be placed in the telecine control room, but the equipment necessary for switching operations will have to be placed in the central apparatus room. This switcher must switch vision and sound at the same time, but in case no simultaneous switching of vision and sound is required, an OFF button on the sound console may be operated to release simultaneous operation. In the case of non-simultaneous operation, the sound button will be used for controlling the sound distribution switcher. The crosstalk of this switcher for sound signals shall be more than 60 dB at 8 kHz.

2) VTR Input Switcher

The sound VTR input switcher shall operate simultaneously with the vision input switcher, and have the same number of inputs and outputs as the latter.

The crosstalk of this switcher for sound signals shall be more than 60 dB at 8 kHz.

3) VTR Output Switcher

The sound VTR output switcher shall operate simultaneously with the vision VTR output switcher, and have the same number of inputs and outputs and the same control circuit as the latter.

The crosstalk of this switcher for sound signals shall be more than 60 dB at 8 kHz.

4) Monitor Circuit

a) One loudspeaker for telecine monitoring will be required.

b) One loudspeaker for monitoring VTR inputs and outputs will be required.

5) Sound Control Console

This control console will require the following.

- a) Control buttons for the telecine distribution switcher.
- b) Control buttons for the telecine monitors.
- c) Control buttons for the VTR input and output monitor.
- d) Monitor amplifier.

3.4 Central Apparatus Room

The cabinet rack to be installed in this room shall house the following.

- 1) Camera control unit, vision equipment and sound equipment for the T-200-A Studio.
- 2) Camera control unit, vision equipment and sound equipment for the T-100-A Studio.
- 3) Camera encoder and vision distributor for the telecine room.
- 4) Vision and sound switchers for the telecine and VTR control room.

3.5 Master Control Room

3.5.1 Vision Equipment

1) Vision switcher

The master control switcher, intended as a switcher for feeding out programs, shall have a total of 4 busses including 2 effect busses, 1 cut bus and another monitor bus, and require at least 16 vision inputs.

It shall be capable of such effects as fade-in, fade-out, superimpose, dissolve and cut. This switcher shall be

designed especially for reliability.

This switcher shall have the following functions.

- a) The number of vision inputs shall be 16 or more for composite signals. (Input cable compensation required).
- b) The number of busses shall be 2 mix busses, 1 cut bus and another monitor bus.
- c) The number of vision outputs shall be 4 or more line outputs and 3 or more monitor outputs, all for composite signals.
- d) The cross-points of the cut buses shall be interlocked with those of the audio switcher

This switcher's performance requirements are the same as those of the production switcher for the T-100-A studio.

2) Picture Monitors

- a) The master control room shall have ten 9-inch monochrome monitors for monitoring purposes.
- b) The console shall have one 9-inch precision monochrome monitor and another waveform monitor.
- c) Two 13-inch precision color monitor will be required for master out and for preview.
- d) One 20-inch or larger color monitor will be required as air monitor.

3) Production Control Console

This control console shall have the same functions as that of the production control room in the T-200-A studio, but is different from the latter only in that no remote control means for the camera control unit will be required.

3.5.2 Sound Equipment

1) Sound Console

This sound console, to be used for feeding out programs, will be operated by a single operator, and require at least one low-level input and 24 high-level inputs.

The low-level input will be used for microphone input; and the 24 high-level inputs will be switched to the 6 busses.

Of the 6 busses, 4 will be mixed and then fed out to the STL. Another bus will be fed out to the network.

The remaining one will be used for auditioning.

This sound console shall have the following functions in addition to the above-mentioned.

- o Audition circuit
- o Talkback circuit
- o Test oscillator for level setting
- o Remote control circuit for turntable, tape recorder, etc.
- o Jackfield
- o VU meter
- o Monitoring circuit
- o Limiting amplifier
- o Line equalizer
- o Vision interlock circuit for high-level input switcher.

2) Disc Player

One console type disc player shall be installed on the side of the sound console.

Same as the one for T-200-A in other specifications.

3) Tape Recorder/Player

Same as the one for T-200-A.

4) Cartridge Tape Player

Same as the one for T-200-A

5) Loudspeakers

The control room shall be equipped with a program monitor loudspeaker, audition speaker and talkback speaker.

3.6 Studio Cameras

The cameras to be used in the T-200-A Studio and T-100-A Studio shall all be the same monochrome live cameras. All camera control units shall be mounted in the cabinet racks in the central apparatus room to be centrally controlled.

These cameras shall have the following functions.

- 1) These monochrome cameras must be of a type that uses 1-inch leadoxide tubes.
- 2) They shall be designed compact and light in weight and easy to maintain.
- 3) They shall have dynamic knee characteristics for producing a tone similar to that produced by an image orthicon having horizontal and vertical contour correctors.
- 4) They shall be designed to resist shocks of up to 2G.

These cameras shall also meet the following performance requirements.

- a) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
- b) Sync signals shall be 2Vp-p, negative.
- c) Output signals shall be composite signals, 1Vp-p.
- d) The cameras shall produce pictures satisfactory for practical purposes within 2 minutes after the power is switched on.

- e) Resolution shall be more than 550 TV lines.
- f) Deflection distortion shall be less than 0.5 % within a circle whose diameter is 80 % of the picture height ; less than 1 % in a circle whose diameter is equivalent to the picture height ; and less than 1.5 % in other areas.
- g) Frequency response shall be within ± 0.5 dB at frequencies up to 4 MHz, within ± 1 dB at 4 MHz to 6 MHz, and roll off at 6 MHz and over.

3.7 Telecine Machines and Scanners

- 1) The telecine equipment to be installed under the present specification is as has been mentioned above.
After distributing vision and sound in the telecine VTR control room, the telecine equipment will be controlled with studio production control panels and master control panels. Which control panel to use in controlling the telecine equipment will be determined in the telecine VTR control room.
- 2) The magnetic sound film recorder shall reproduce sounds synchronous with the picture track of 16 mm films.
This magnetic sound film recorder shall have the following functions.
 - a) Easy to operate in recording and reproducing.
 - b) Stable performance.
 - c) Easy to maintain.

The magnetic sound film recorder shall meet the following performance requirements.

- i) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.

- ii) Both input and output levels shall be 0 dBm, 600 ohms balanced.
 - iii) Frequency response shall be within ± 1 dB at 50 Hz to 10 kHz.
 - vi) Signal-to-noise ratio shall be more than 50 dB.
- 3) The 16 mm colour flying spot film scanner shall meet the following functional requirements.
- i) The equipment is housed in two units : a scanner/mechanism cubicle, and a combined control cubicle.
 - ii) The 16 mm film scanner shall be able to accommodate large film capacity spools of up to 43 cm (17 in).
 - iii) The film scanner shall have a built-in logarithmic color masking, color encoder, and waveform and picture monitoring facilities.
 - iv) The color film scanner shall change for monochrome scanning immediately to take out picture from either positive or negative film and/or cinemascope film.
- 4) The 16 mm film scanner shall meet the following performance requirements.
- i) Power input source shall be single-phase a. c. 220 V ± 6 %, 50 Hz ± 4 %.
 - ii) The equipment shall be driven by horizontal drive, vertical drive, mixed syncs and mixed blanking signals, each drive pulses are 2 V to 4 V peak-to-peak negative-going.
 - iii) The film scanner shall delivers composite video signal, 1 Vp-p, positive-going into 75-ohm and sound signal, balanced to 0 dBm for 40 % modulation into 600-ohm.

- iv) The equipment shall produce video signals from positive color or monochrome film having a density range of 0.5 to 2.3 and from negative monochrome film.
- 5) The telecine monochrome camera shall meet the following functional requirements.
 - a) The camera shall be of a type which employs one 1-inch vidicon.
 - b) The camera shall have a built-in shading corrector.
 - c) The camera shall be stable in operation and easy to maintain.
 - d) The camera shall have ASC (Automatic sensitivity control), AGC (Automatic gain control), and ABL (Automatic black level control) for easy adjustment.
- 6) The telecine monochrome camera shall meet the following performance requirements.
 - a) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
 - b) Sync signals shall be sync horizontal drive, vertical drive and blanking signals, each 2Vp-p, negative.
 - c) Output signals shall be composite signals, 1Vp-p.
 - d) Horizontal resolution shall be more 600 TV lines in the center.
 - e) Frequency response shall be within ± 1 dB frequencies up to 6 MHz, within +1 dB and -3 dB at 6 MHz to 8 MHz and roll off at 8 MHz and over.
- 7) The 16 mm film projector shall meet the following functional requirements.

- a) Both vision and sound shall become steady within one second.
 - b) The projector shall be stopped automatically a film comes to its end.
 - c) It shall be easily operated with buttons on a control panel.
 - d) It shall give an alarm when the film is cut during the projection.
 - e) The illumination provided by the projector shall be constant without adjustment.
 - f) The projector shall be remote-controllable.
- 8) The 16 mm film projector shall meet the following performance requirements.
- a) Film speed shall be 25 frames per second.
 - b) Misregistration shall be less than 0.15 % in vertical directions and less than 0.1 % in sidewise directions.
 - c) The projector lens shall be F1.4.
 - d) The project lamp shall be of a type which is easily available. In case the lamp in use fails, it shall be automatically changed to the spare lamp.
 - e) The projector shall have a sound device capable of reproducing sounds by both optical and magnetic means. Signal-to-noise ratio shall be more than 53 dB. Tally lights on the remote control console as well as on the projector shall indicate which sound system, optical or magnetic, is being used.
 - f) Sound frequency response shall be within ± 2 dBm at 50 Hz to 7000 Hz.

- 9) The multiplexer shall meet the following requirements,
 - a) It shall be of a double-mirror type.
 - b) Mirror changing speed shall be less than 0.2 seconds.
 - c) Driving voltage shall be 24 V DC.
- 10) The slide projector shall meet the following requirements.
 - a) Slide size shall be 2 inches x 2 inches.
 - b) The slide projector shall have a capacity of 32 or more slides.
 - c) Picture changing speed shall be less than 0.1 second.
 - d) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
 - e) The projector shall use a lamp which is easily available on the market.
 - f) The projector shall be remote-controllable.
- 11) The caption scanner shall meet the following requirements.
 - a) Opaque card size shall be 12 inches x 10 inches.
 - b) The scanner shall have a capacity of 10 or more opaque cards.
 - c) Card changing speed shall be less than 2 seconds.
 - d) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
 - e) The scanner shall use a lamp which is easily available on the market.
 - f) The scanner shall be remote-controllable.
 - g) It may use a monochrome camera which employs one 1-inch vidicon.

- 12) The monochrome camera for the clock scanner shall meet the following requirements.
 - a) The camera shall be of a type which employs one 1-inch vidicon.
 - b) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
 - c) Output signals shall be composite signals, 1 Vp-p.
 - d) Horizontal resolution shall be more than 600 TV lines in the center.
 - e) Frequency response shall be less than -3 dB at 8 MHz. and under and roll off at over 8 MHz.
- 13) Clock scanning means scanning a clock with a monochrome camera for clock scanner.

No illumination of the clock need not be considered.
Any special light, if required. shall be specified.

3.8 Video Tape Recorder

Two VTRs, one for color and the other for monochrome use, to be installed under the present specification shall meet the following functional requirements.

- 1) It shall be a 4-head transversal VTR small in size, light in weight and great in reliability.
- 2) It shall be capable of recording high bands.
- 3) One VTR shall be able to reproduce color programs and to edit them electronically.
- 4) The monochrome VTR shall be convertible to a colour VTR by adding colour accessories in case of colour television broadcasting in the future.

The VTR shall meet the following performance requirements.

- a) Source voltage shall be 220 V \pm 5 %, 50 Hz.
- b) Vision input and output signals shall be composite signals, 1 Vp-p, 75 ohms unbalanced.
- c) Sound input and output signals shall be +8 dBm 600 ohms balanced.
- d) Tape speed shall be 15 inches per second.
- e) Recording time shall be more than 90 minutes.
- f) The VTR shall be remote-controllable.

3.9 Pulse Generation and Distribution

- 1) The pulse signals required by the equipment in the Studio Centre shall be the pulse outputs generated and distributed by the pulse generators to be provided in the central apparatus room.
- 2) The central apparatus room shall be equipped with two pulse generators having gen-lock functions. These pulse generators shall be connected to a pulse switcher so one of them may be used for the ON AIR line and the other for the recording line. In case the ON AIR line fails, that pulse generator shall be switched quickly to the recording line.
- 3) The pulse phases of all components of equipment in the Studio Centre shall be adjusted beforehand.
- 4) A 9-input gen-lock switcher shall be provided for smooth gen-lock operation of the remote and local systems.

3.10 Test Waveforms

Preselected test waveforms and sound test signals are required at the input of certain equipment for operational and maintenance purposes.

A vertical interval keyer will be required.

3.11 Communications

The following communications systems will be required.

- 1) Inter-communication for program production.
- 2) Talkback between director and performer.
- 3) Radio telephone system for communication between the studio and the outside broadcast vehicle.
- 4) Interphone for communication with performers and office people.

The aim is to permit simultaneous communications on different aspects of station operations by several persons in the same control room with a minimum of mutual interference.

3.12 Building Monitors

A system of distribution of vision and sound signals is required throughout the Centre for general viewing in offices and other non-technical areas. These signals will be distributed from the master control output. The equipment necessary for their distribution shall be installed in the central apparatus room.

Building monitors will be installed at about 50 places and it is desirable that their vision input signals be 1 Vp-p composite signals and sound input signals be -22 dBm.

3.13 Master Clock System

The master clock which will provide the correct time in the station shall meet the following requirements.

- 1) It shall have a stability of at least 0.09 seconds per day.
- 2) It shall produce signals to drive secondary clocks.
- 3) It shall have a time output for broadcasting.

The master clock shall be installed in the central apparatus room, and control 30, 1-second, 3-hand secondary clocks for broadcasting use and 120, 2-hand, 30-second secondary clocks for use in the station building.

The secondary clock shall indicate 24 hours.

3.14 Studio Lighting

The power source for studio lighting shall be a 3-phase, 4-wire, 220 V power supply. The height from the studio floor to the ceiling grip shall be 6 meters. The grid shall be made by crossing gas pipes with a diameter of GP40A, 1.5 meters apart from joint to joint in both directions, and tightening the joints with U-bolts.

The grid shall be secured in place by inserting the 12 mm threading iron bolts suspended from ceiling inserts into the grid pipe joints and tightening double nuts.

- 1) The T-200-A and T-200-B Studios shall require the following battens.
 - a) Six light battens, 6.5 meters long, 20-ampere, 8-way 4-circuit type.
 - b) Three horizont - battens, 6.5 meters long, 20-ampere, 12-way, 4-circuit type.

- c) The horizont - battens shall be installed 1.5 meters from the horizont.
- 2) The T-200-A Studio and T-200-B Studio will require counterweight systems for raising or lowering the battens to allow easy replacement of light bulbs or placing the lights. The counterweight systems shall be of a balance weight type which will balance with the weight of the battens, and may be manually operated. Six such counterweight systems will be required for the light battens, and three for the horizont battens.
 - 3) The T-200-A Studio and T-200-B Studio shall use 18 fluorescent lights, each consisting two 220 W lamps, as base lights. The base light fixture will be suspended from chains between the battens, and require an SCR light regulator.
 - 4) The T-200-A and T-200-B Studios shall have a control console in the control room on the first floor overlooking the studio to control the lights.
 - 5) The T-100-A Studio shall have 24, 20-ampere, 2-way grid plug sockets on the grid.
 - 6) The T-100-A Studio shall have a power distributing board having a main switch, branch NFBs and branch direct line switches. The studio lights will be controlled with these direct line switches.
 - 7) Each studio shall have four 20-ampere, 2-way wall plug sockets.
 - 8) If any request must be made to the building contractor regarding the lighting equipment, the required drawings shall be submitted.

3.15 Others

1) Mobile Camera Crane

One set of mobile camera crane shall be provided.

The crane will enhance dynamic camera handling through vertical movement in shooting scenes at program production, especially at musicals and at dramas. The camera head together with a cameraman shall be vertically raised or lowered on the crane. The crane shall be provided with caster wheels for greater maneuverability. It is preferable that floor space of the crane is as minimum as possible. A vertical movement shall be controlled with a hydraulic or oil pressure.

The mobile camera crane shall meet the following performance requirements.

- i) The cameraman's seat shall be rotatable through range of 300°
- ii) The total vertical camera-mount range shall be more than 125 cm (50 in).
- iii) The maximum camera-mount height shall be 2 m (80 in).
- iv) The camera crane shall have safety device of elevator emergency stop and elevator lock.
- v) The size of chassis shall be less than approx. 1.2 m (50 in.) wide and 2.5 m (100 in.) long.
- vi) The crane should not make harmful noise and disturb program production in the studio, when it moves on the floor or up and down.

2) Back projection equipment

One set of back projection equipment shall be provided for producing a composite shot, which consists of projectors

and a projection screen. The projectors project some background scene on the screen in the rear.

A TV camera takes a shot of objects such as performers, some stage settings etc., together with the projected background as if they were in the same scene.

The projection screen to be used shall be of such type as to give a very brilliant transmission with an enough contrast even on the condition that the objects in front of the projection screen are lighted at 1500 lux.

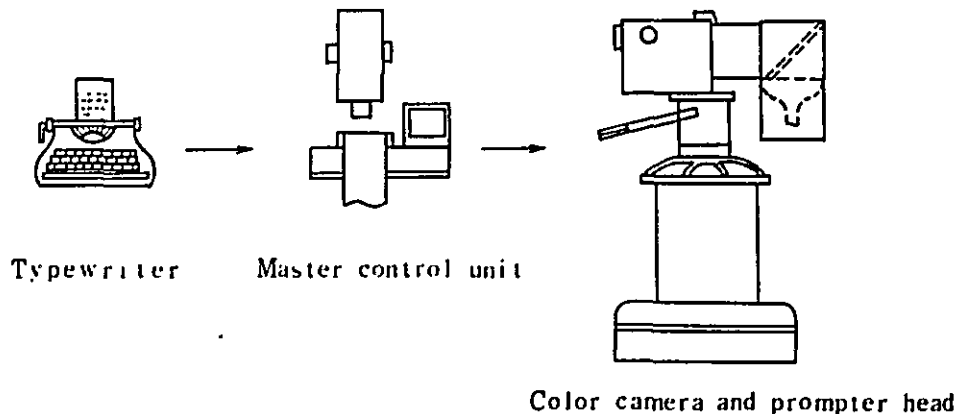
The back projection equipment shall meet the following performance requirements.

- i) The screen shall be more than 1 m (40 in.) by 1.3 m (67 in.) in size and easy to carry.
 - ii) The projector shall project 16 mm motion picture and 2" x 2" slide.
 - iii) The screen shall have good characteristics of convergence and transparency of light.
- 3) Television prompter

One set of television prompter mainly consisting of a prompter head, a master control unit and a type writer shall be provided. The equipment gives cuing signals to performers, news casters, narrators etc., without an unnatural eye-scan. The master control, having a roll paper mounting unit with a paper feed mechanism and a monochrome vidicon camera, will pick up the cue information typed or hand-written on the roll paper (to be lighted if necessary) and convert it into video signals.

The prompter head consists of a picture monitor placed at right angle in front of TV camera lens and a half mirror

placed at 45 degrees from the picture monitor as shown below. Speakers can see cue information reflected from the picture monitor.



The television prompter shall meet the following performance required.

- i) The projected size shall be more than 14 in. in diagonal.
- ii) Transparency characteristic of prompter head mirror should not deteriorate the colour quality of a colour camera.
- iii) The script shall be able to type on standard office typewriter.
- iv) The scrolled typewriting paper shall be 125 cm (5 in.) in width.
- v) The speaker shall be able to regulate the script paper speed in remote position.

4) Status light

ON AIR display lamps must also be placed in the entrances of studio floor and the control rooms. The lamps shall be

large-size and red in colour to help smooth production of programs.

3.16 Colour Outside Broadcast Vehicle

The colour outside broadcast vehicle is used for colour program production, equipped with three sets of lead-oxide tube colour camera.

All equipment to be mounted on the vehicle shall meet the specifications under CCIR System B, PAL colour system.

3.16.1 Motor Vehicle

Designed mainly for maneuverability and ease of use, the motor vehicle shall satisfy the following requirements.

- 1) Engine horse-power shall be more than 180 HP.
- 2) The vehicle shall have a maximum speed of more than 100 Km per hour.
- 3) The vehicle shall approximately measure 10 meters long, 2.5 meters wide and 3.5 meters high, and weight about 15 tons.
- 4) A precision clock shall be provided.
- 5) The vehicle shall have an air conditioner with a capacity of more than 16000 K cal per hour.
- 6) Cable drums shall be driven by motor.

3.16.2 Power Supply

The vehicle's power supply shall meet the following requirements.

- 1) It shall have a power generating capacity of more than 20 KVA, single phase, and ratings of 220 V, 50 Hz.

It must be able to operate continuously for more than 10 hours.

- 2) It shall have a single phase, 220 V input terminal for external power supply.
- 3) An automatic voltage regulator shall be provided to ensure steady power supply in case power is received from an external source.

3.16.3 Colour Camera

Three sets of colour camera shall be required to install on the vehicle.

These cameras shall have the following functions.

- 1) They must be of a type that uses three 1-inch lead-oxide tubes.
- 2) They shall be designed compact and light in weight and easy to maintain.
- 3) The camera head shall have a viewfinder with a tilting mechanism to make it easier for the camera man to operate it.
- 4) They shall be designed to resist shocks of up to 2G.

These cameras shall also meet the following performance requirements.

- a) Source voltage shall be 220 V \pm 5 %, 50 Hz.
- b) Pulse requirements shall be as follows.

Horizontal drive pulse	0.5 to 6.Vp-p
Vertical drive pulse	Same as above
Blanking pulse	Same as above
Synchronizing pulse	Same as above

- c) Output signals shall be red, green and blue, three channels each.
- d) Pictures satisfactory for practical purposes shall be obtained in 2 minutes after the power is switched on.
- e) Resolution shall be more than 500 TV-lines in the centre.
- f) Registration shall be within the following values.
 - First zone : 0.05 % in circle whose diameter is 80 % of image height.
 - Second zone ; 0.2 % in circle whose diameter is same as image width.
 - Third zone ; 0.4 % in other area.
- g) Deflection distortion shall be less than 0.5 % at the first zone and less than 1 % at the second zone.

3.16.4 Vision Equipment

All vision equipment shall comply with PAL standards. A schematic diagram of the vision equipment for the vehicle is shown in Figure 9.

1) Vision switcher

The switcher will have a total of 6 busses, including 4 effect buses and 2 monitor buses, and require at least 7 video inputs. It must be capable of such effects as fade-in, fade-out, superimpose, dissolve, cut, wipe and keying by external keying signals. It must be able to superimpose with or without edges, and to colour superimposed images.

The control buttons for this switcher must be provided on the console in the production area of the vehicle,

and the electronic unit mounted in the equipment rack. The program production switcher shall have the following functions.

a) The number of video signal inputs shall be 7 or more, composite.

b) The number of busses required :

Effect buses 4

Monitor bus 1

Emergency bus 1

c) The kinds of effects shall be as follows :

Cut, fade, mix, wipe, keying

d) 7 or more wiping waveforms, plus positioner.

e) The required minimum number of video outputs : 7 line outputs, 3 monitor outputs, and one MIX/EFF output, all composite signals.

The performance requirements of the switcher shall be as follows :

i) Video input and output signals shall be composite signals, 1 Vp-p 75 ohms.

ii) Sync signals shall be sync, horizontal drive, vertical drive and blanking, each 2 Vp-p negative ; burst flag signals, subcarrier and PAL pulse, each 2 Vp-p.

iii) Sync signal, setup and burst shall be gated during blanking period immediately before the final output of the switcher and added again before sending out with blanking period reshaped.

iv) Frequency response shall be within ± 0.5 dB at frequencies of up to 8 MHz and roll off at over 8 MHz.

- v) Differential gain shall be less than 1.5 % ; differential phase less than 1.5°.
 - vi) Level deviation shall be within ± 0.5 dB at 100 kHz.
 - vii) Absolute phase deviation shall be within $+1^\circ$ at 4.43 MHz.
 - viii) Crosstalk for video input shall be more than 40 dB at 4.43 MHz.
 - ix) Dissolve drift shall be within ± 5 %.
 - x) Synchronous noise shall be less than 30m Vp-p.
- 2) Two sets of colour synchronizing pulse generator will be required, one for regular use and the other for a stand-by.
 - 3) Three sets of colour encoder shall be provided, incorporated with the colour cameras.
 - 4) Other necessary equipment including monitoring equipment, test equipment and a vertical interval keyer shall be provided.

3.16.5 Sound Equipment

A schematic diagram of the sound equipment to be installed on the vehicle is shown in Figure 7.

The sound equipment shall meet the following requirements.

- 1) External equipment
 - a) Remote amplifier

One 6-channel input remote amplifier shall be installed.

Provision shall be made to allow future installation of 4-channel, 6-channel or 8-channel remote amplifiers.

b) Remote amplifier connecting box.

This connecting box will be used for connecting sound equipment at the spot of an outdoor event to the sound equipment in the vehicle with a single interconnection cable.

One remote amplifier connecting box shall be provided.

This connecting box shall have the following functions.

- o Switching and connection of sound program lines.
- o Intercom circuit.
- o Communication telephone circuit.
- o Monitor circuit.
- o Remote amplifier power supply.
- o Utility circuit for AC power supply.

c) Monitor speaker

One or two speaker boxes with a built-in amplifier shall be provided.

d) Others

The required number of microphones, microphone stands, microphone extension cables, cable reels, sound reflector with microphone, portable telephones, intercom headsets, etc. shall be provided.

2) Internal Equipment

a) Audio control console

This will be used for adjusting, switching, monitoring and otherwise operating the sound circuits in the outside broadcast vehicle.

This console shall have the following functions.

- o Sending out sound programs.
- o Switching lines.
- o Line level monitoring with VU meter.
- o Monitor circuit.
- o Intercom circuit.
- o Communication telephone circuit.
- o Test oscillator for level setting.

b) Intercom box

One or two intercom boxes shall be provided in the vehicle at a point or points where intercom communication will be required.

c) Monitor speaker

One monitor loudspeaker shall be installed near the control console in the vehicle.

d) Others

The required number of portable telephones, intercom headsets, etc. shall be provided.

3.16.6 Wireless Equipment

- 1) Two sets of microwave link equipment shall be provided for ensuring two hop relays. A transmitting equipment with an output power rating of more than 0.5 W, 7 GHz, and its receiving equipment will be required. The microwave link equipment will have to cover a distance of 20 - 30 kilometers and thus require a parabolic antenna, 1.2 meters in diameter.
- 2) As radio telephone equipment, a 160 MHz VHF/FM transceiver with an output power rating of more than 5 W for the mobile station and a 160 MHz VHF/FM

tranceiver with an output power rating of more than 25 W for the fixed stations will be required. Whip antennas are preferable for the radio telephone equipment.

- 3.16.7 A high/low band colour VTR shall be installed. Preferable is the same type of VTR as the one to be installed in the Centre.

PART 4
FACILITIES FOR KITWE STATION

The Kitwe Station will require one set of high/low band monochrome VTR and one unit of monochrome outside broadcast vehicle complete, which will be used together with the existent equipment in the studios.

1. Video Tape Recorder

The same type as the one to be installed in Lusaka Station will be preferable. It shall meet the following functional requirements.

- 1.1 It shall be a 4-head transversal VTR, small in size, light in weight and great in reliability.
- 1.2 It shall be capable of recording high bands.
- 1.3 It shall be convertible to a colour VTR by adding colour accessories in case of colour television broadcasting in the future.

The VTR shall meet the following performance requirements.

- 1) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
- 2) Vision input and output signals shall be composite signals, 1 Vp-p, 75 ohms unbalanced.
- 3) Sound input and output signals shall be +8 dBm, 600 ohms balanced.
- 4) Tape speed shall be 15 inches per second.
- 5) Recording time shall be more than 90 minutes.
- 6) The VTR shall be remote-controllable.

2. Outside Broadcast Vehicle

2.1 Motor Vehicle

Designed mainly for maneuverability and ease of use, the motor vehicle shall approximately satisfy the following requirements.

- 1) Engine horsepower shall be more than 130 HP.
- 2) The vehicle shall have a maximum speed of more than 100 km per hour.
- 3) The vehicle shall approximately measure 7.5 meters long, 2.5 meters wide, 3.5 meters high and weight less than 10 tons.
- 4) A precision clock shall be provided.
- 5) The vehicle shall have an air conditioner with a capacity of more than 12,000 Kcal per hour.
- 6) Motor-drive cable drums.

2.2 Power Supply

The vehicle's power supply shall meet the following requirements.

- 1) It shall have a power generating capacity of more than 15 kVA, single-phase, and ratings of 220 V, 50 Hz. It must be able to operate continuously for more than 10 hours.
- 2) It shall have a 1-phase, 220 V input terminal for external power input.
- 3) Provision shall be made to ensure steady power supply in case power is received from an external source.

Depending on cases, an automatic voltage regulator may have to be installed.

2.3 Cameras

The cameras to be used in the T-200-A Studio and T-100-A Studio in Lusaka Studio Centre shall all be the same monochrome live cameras.

These cameras shall have the following functions.

- 1) These cameras must be of a type that uses 1-inch lead-oxide tubes.
- 2) They shall be designed compact and light in weight and easy to maintain.
- 3) They shall have dynamic knee characteristics for producing a tone similar to that produced by an image orthicon having horizontal and vertical contour correctors.
- 4) They shall be designed to resist shocks of up to 2G.

These cameras shall also meet the following performance requirements.

- a) Source voltage shall be $220\text{ V} \pm 5\%$, 50 Hz.
- b) Sync signals shall be 2Vp-p, negative.
- c) Output signals shall be composite signals, 1Vp-p.
- d) The cameras shall produce pictures satisfactory for practical purposes within 2 minutes after the power is switched on.
- e) Resolution shall be more than 550 TV lines.
- f) Deflection distortion shall be less than 0.5 % within a circle whose diameter is 80 % of the picture height ; less than 1 % in a circle whose diameter is equivalent to the picture height; and less than 1.5 % in other areas.
- g) Frequency response shall be within ± 0.5 dB at frequencies up to 4 MHz, within ± 1 dB at 4 MHz to 6 MHz, and roll off at 6 MHz and over.

2.4 Vision Equipment

A schematic diagram of the vision equipment to be installed in the vehicle is shown in Figure 6.

The vision equipment shall meet the following requirements.

- 1) The vision switcher shall have a total of 4 busses, including 2 effect busses, 1 cut bus and another monitor bus, and at least 7 vision inputs.

The effects shall include fade-in, fade-out, superimpose, dissolve, cut and keying by external key signals.

Seven input buttons for selecting the effect and cut busses and an OFF button shall be provided.

- 2) Two sets of synchronizing pulse generators for monochrome will be required, one for regular use and the other a stand-by. Their selection must be controllable with a single act of operation.
- 3) Other necessary equipment includes a waveform monitor, monochrome picture monitor and test signal generator.

2.5 Sound Equipment

A schematic diagram of the sound equipment to be installed on the vehicle is shown in Figure 7.

The sound equipment shall meet the following requirements.

- 1) External equipment
 - a) Remote amplifier

One 6-channel input remote amplifier shall be installed. Provision shall be made to allow future installation of 4-channel, 6-channel or 8-channel remote amplifiers.

b) Remote amplifier connecting box.

This connecting box will be used for connecting sound equipment at the spot of an outdoor event to the sound equipment in the vehicle with a single interconnection cable.

One remote amplifier connecting box shall be provided. This connecting box shall have the following functions.

- o Switching and connection of sound program lines.
- o Intercom circuit.
- o Communication telephone circuit.
- o Monitor circuit.
- o Remote amplifier power supply.
- o Utility circuit for AC power supply.

c) Monitor speaker

One or two speaker boxes with a built-in amplifier shall be provided.

d) Others

The required number of microphones, microphone stands, microphone extension cables, cable reels, sound reflector with microphone, portable telephones, intercom headsets, etc. shall be provided.

2) Internal Equipment

a) Audio control console

This will be used for adjusting, switching, monitoring and otherwise operating the sound circuits in the outside broadcast vehicle.

This console shall have the following functions.

- o Sending out sound programs.
 - o Switching lines.
 - o Line level monitoring with VU meter.
 - o Monitor circuit.
 - o Intercom circuit.
 - o Communication telephone circuit.
 - o Test oscillator for level setting.
- b) Intercom box
- One or two intercom boxes shall be provided in the vehicle at a point or points where intercom communication will be required.
- c) Monitor speaker
- One monitor loudspeaker shall be installed near the control console in the vehicle.
- d) Others
- The required number of portable telephones, intercom headsets, etc. shall be provided.

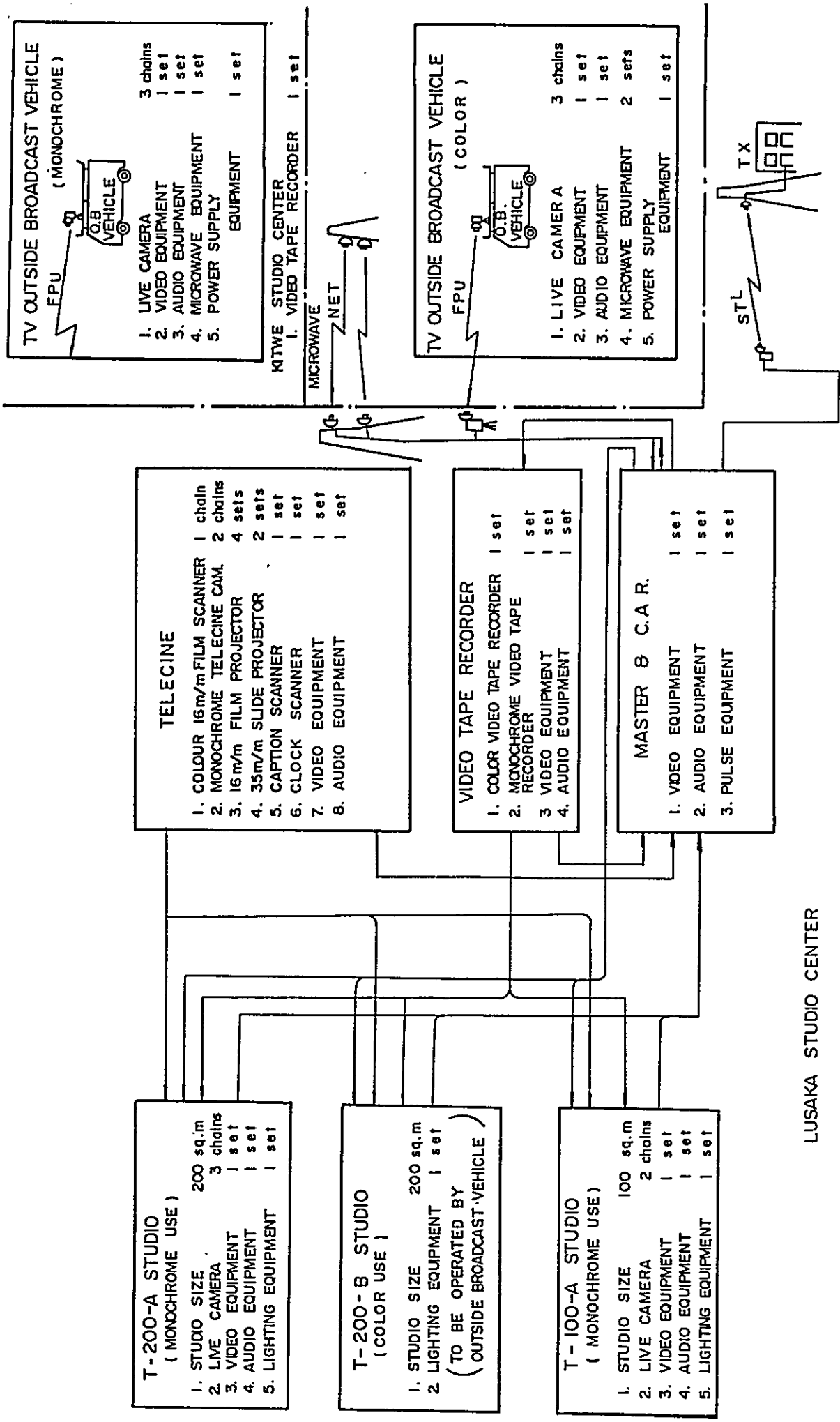
2.6 Wireless Equipment

- 1) As microwave link equipment, a transmitting equipment with an output power rating of more than 0.5 W, 7 GHz, and a 7 GHz receiving equipment will be required. The microwave link equipment will have to cover a distance of 20-30 kilometers and thus require a parabolic antenna, 1.2 meters in diameter.
- 2) As radio telephone equipment, a 160 MHz VHF/FM transceiver with an output power rating of more than 5 W for the mobile station and a 160 MHz VHF/FM transceiver

with an output power rating of more than 25 W for the fixed stations will be required. Whip antennas are preferable for the radio telephone equipment.

- 3) A high/low band monochrome VTR shall preferably be the same type as the one to be installed in the Centre.

PART 5
DRAWINGS



LUSAKA STUDIO CENTER

Fig. 8 FUNCTIONAL BLOCK DIAGRAM OF TV BROADCAST EQUIPMENT

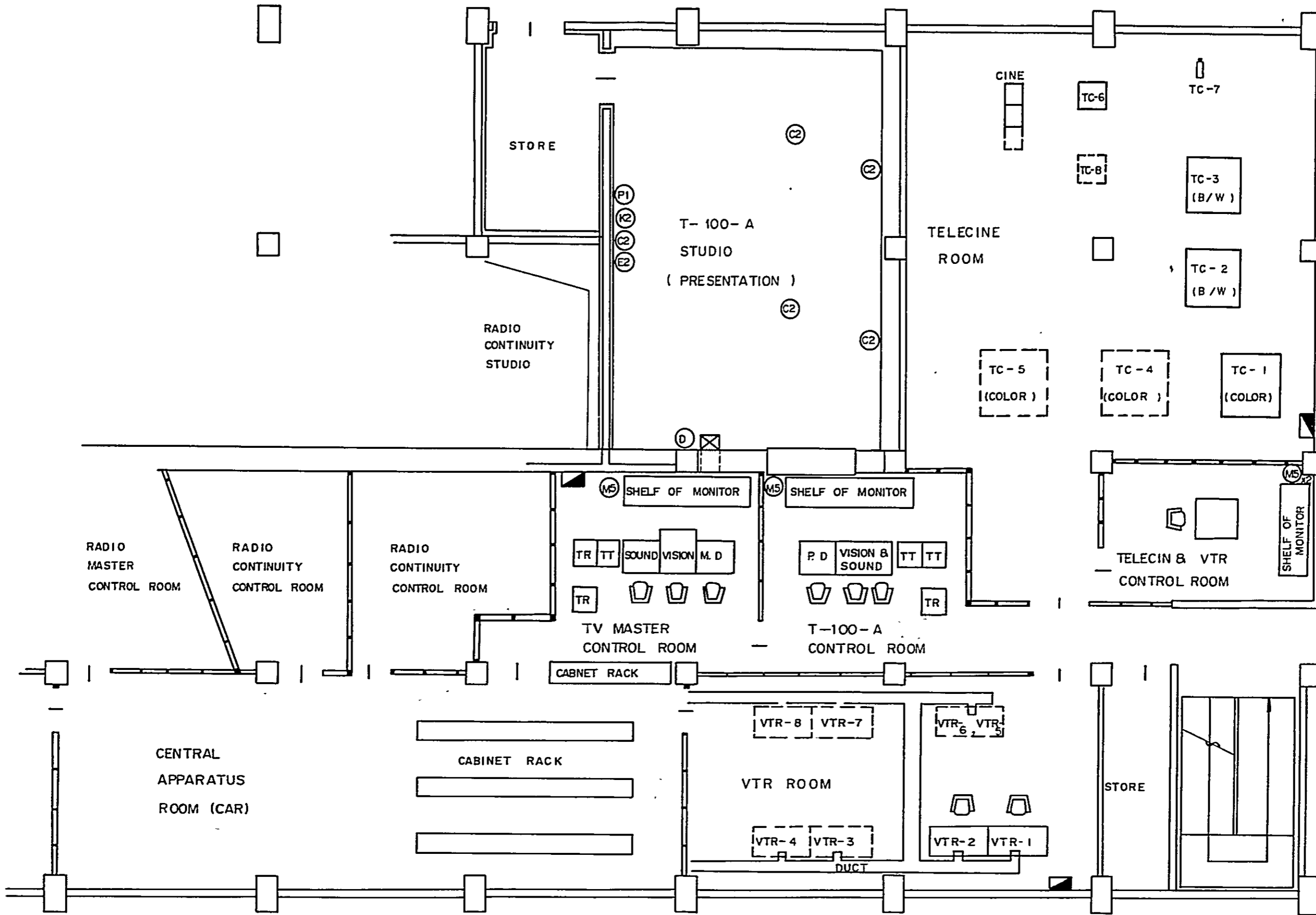


Fig. 1 1ST FLOOR LAYOUT (MASTER.TC. VTR. T-100-A. CAR)

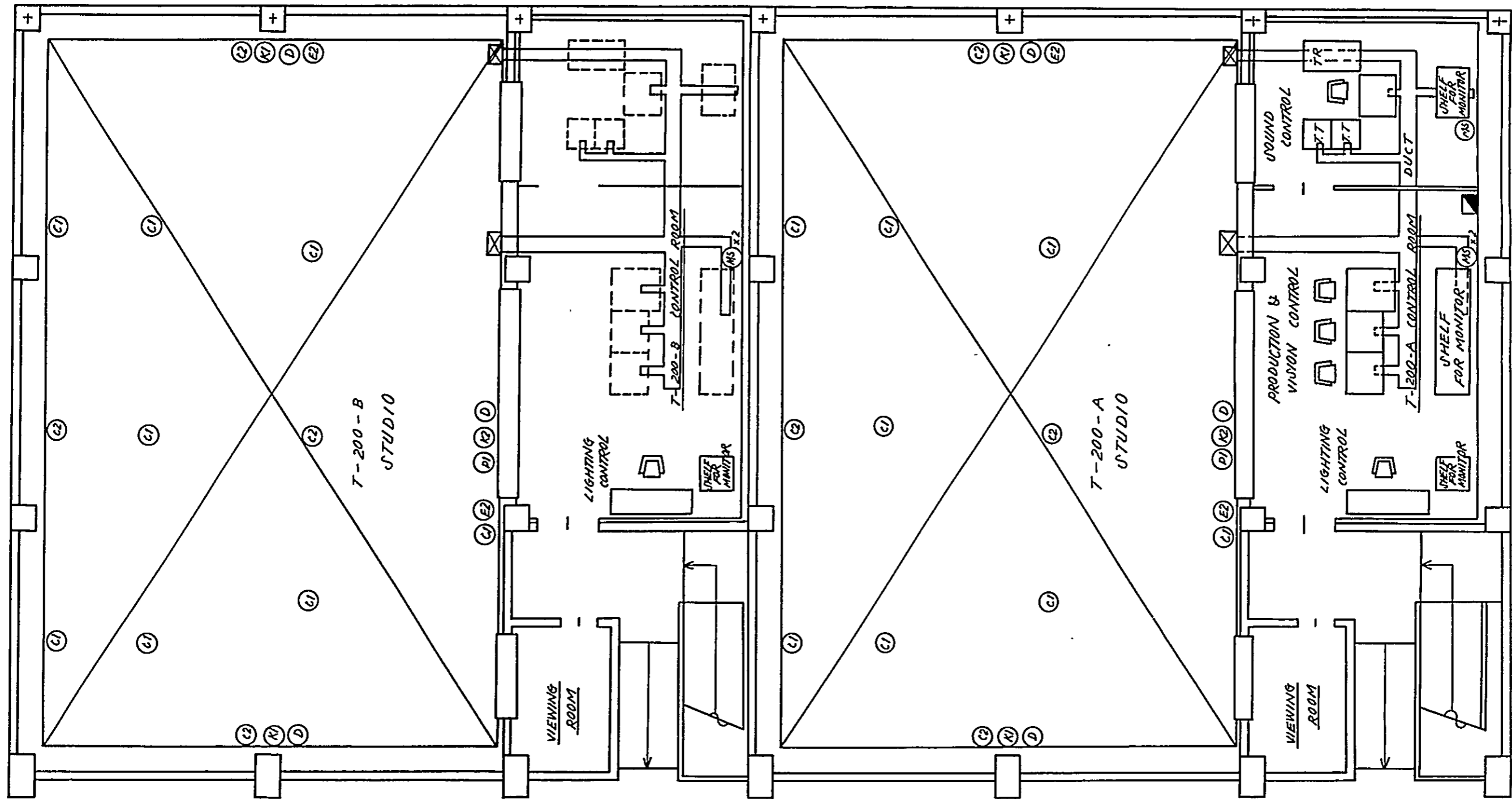
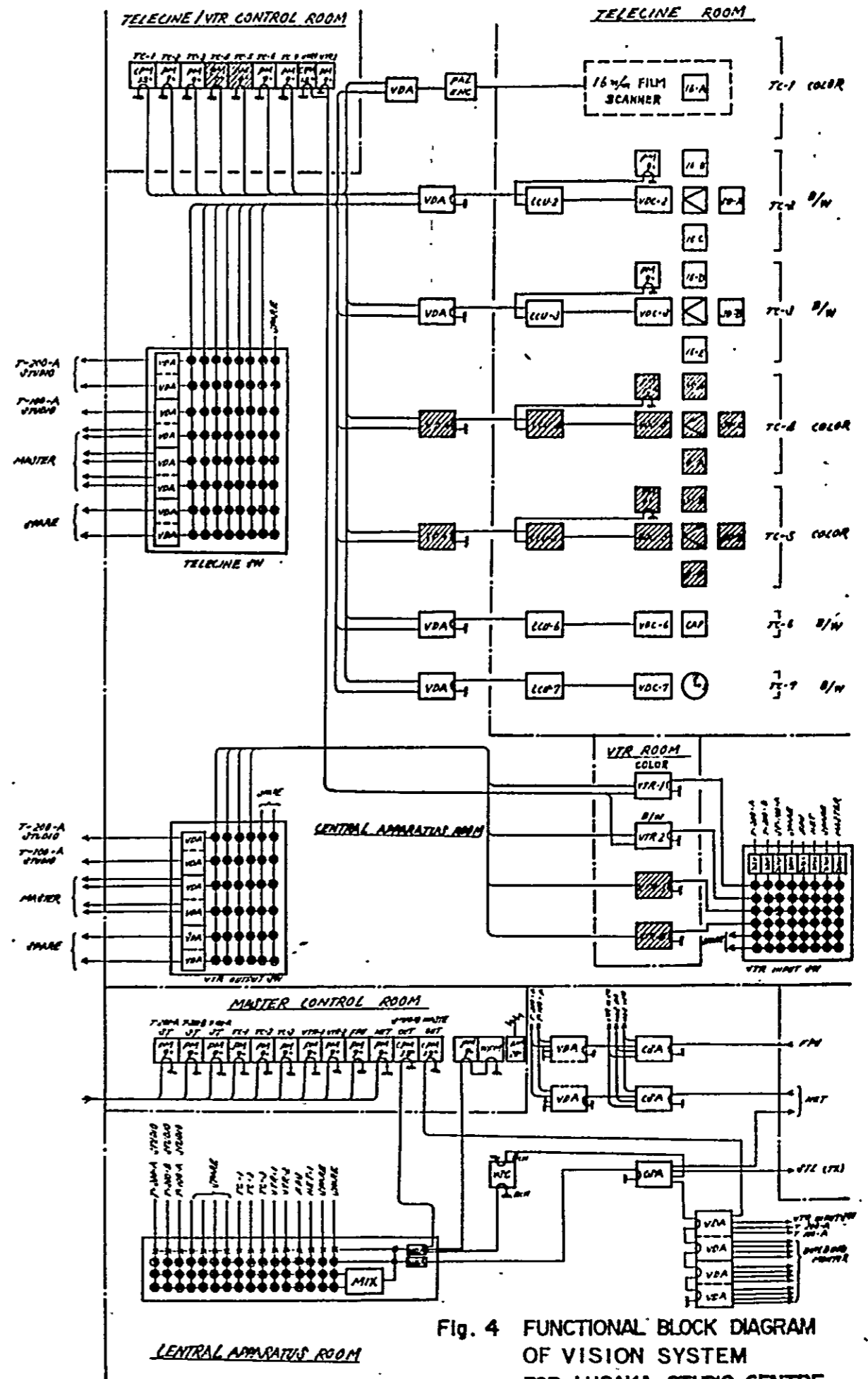
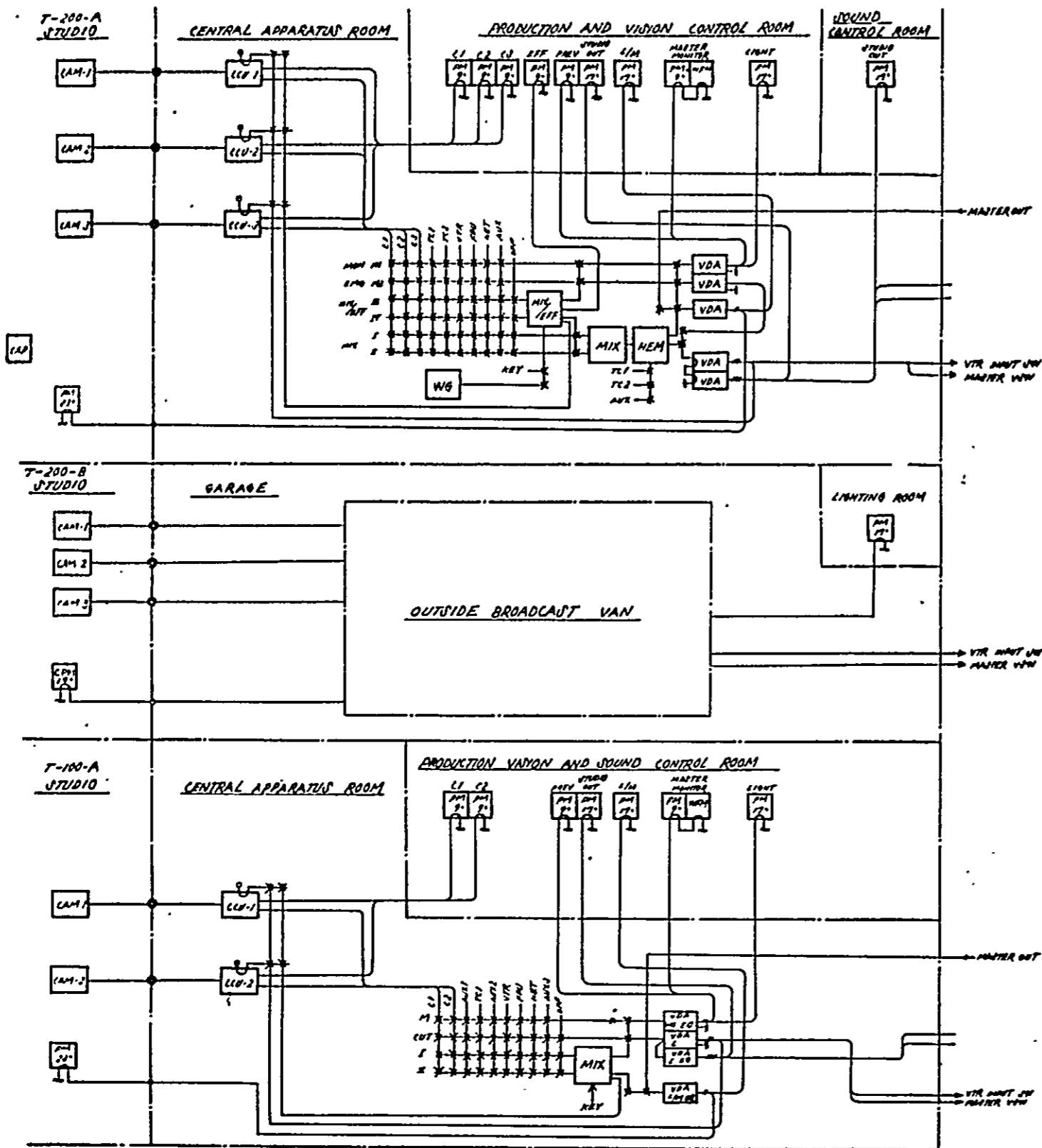


Fig. 2 T-200-A & T-200-B
STUDIO CONTROL ROOM
FLOOR LAYOUT



MEANS: FUTURE PLAN

Fig. 4 FUNCTIONAL BLOCK DIAGRAM OF VISION SYSTEM FOR LUSAKA STUDIO CENTRE

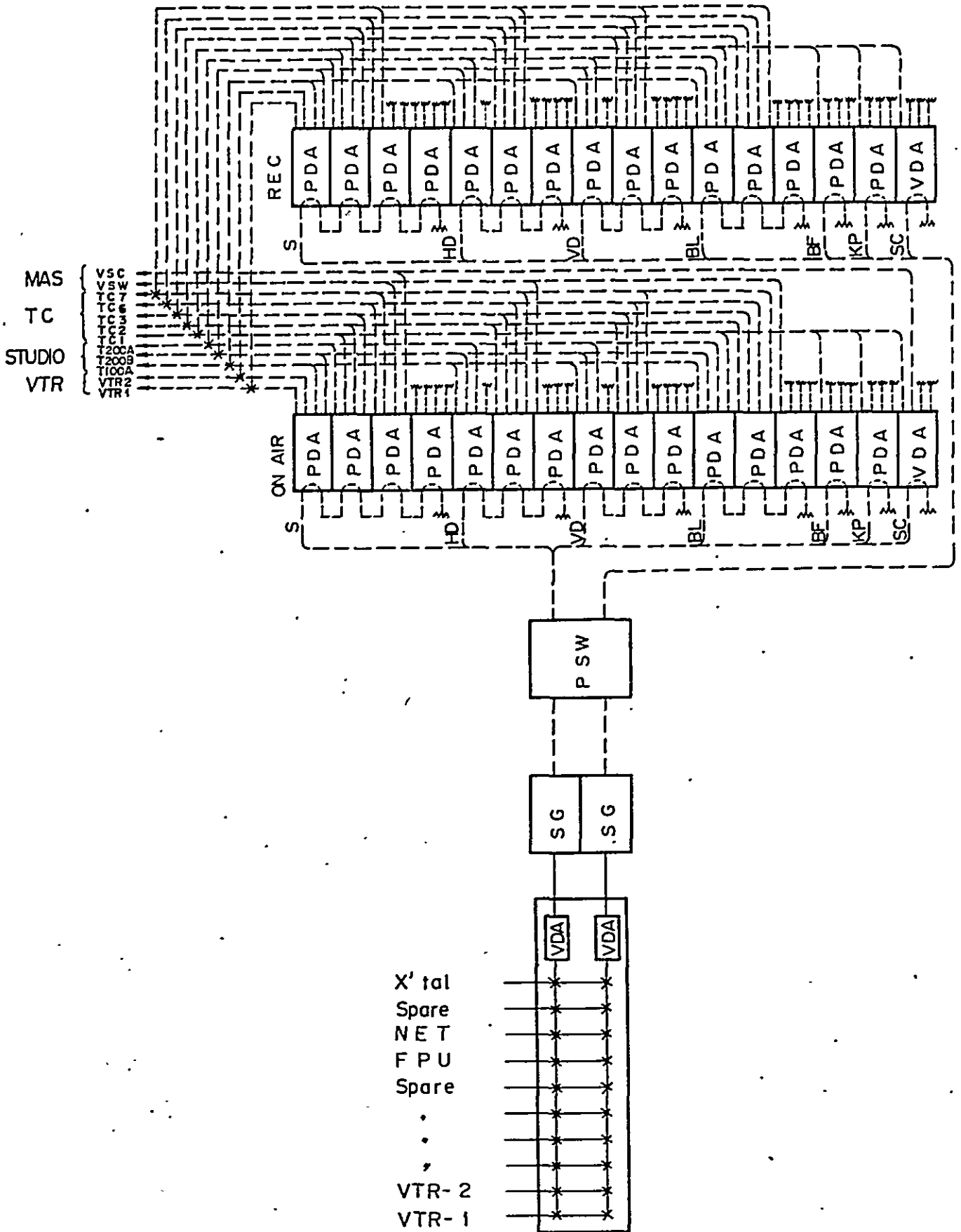


Fig. 3 FUNCTIONAL BLOCK DIAGRAM OF PULSE SYSTEM FOR LUSAKA STUDIO CENTER

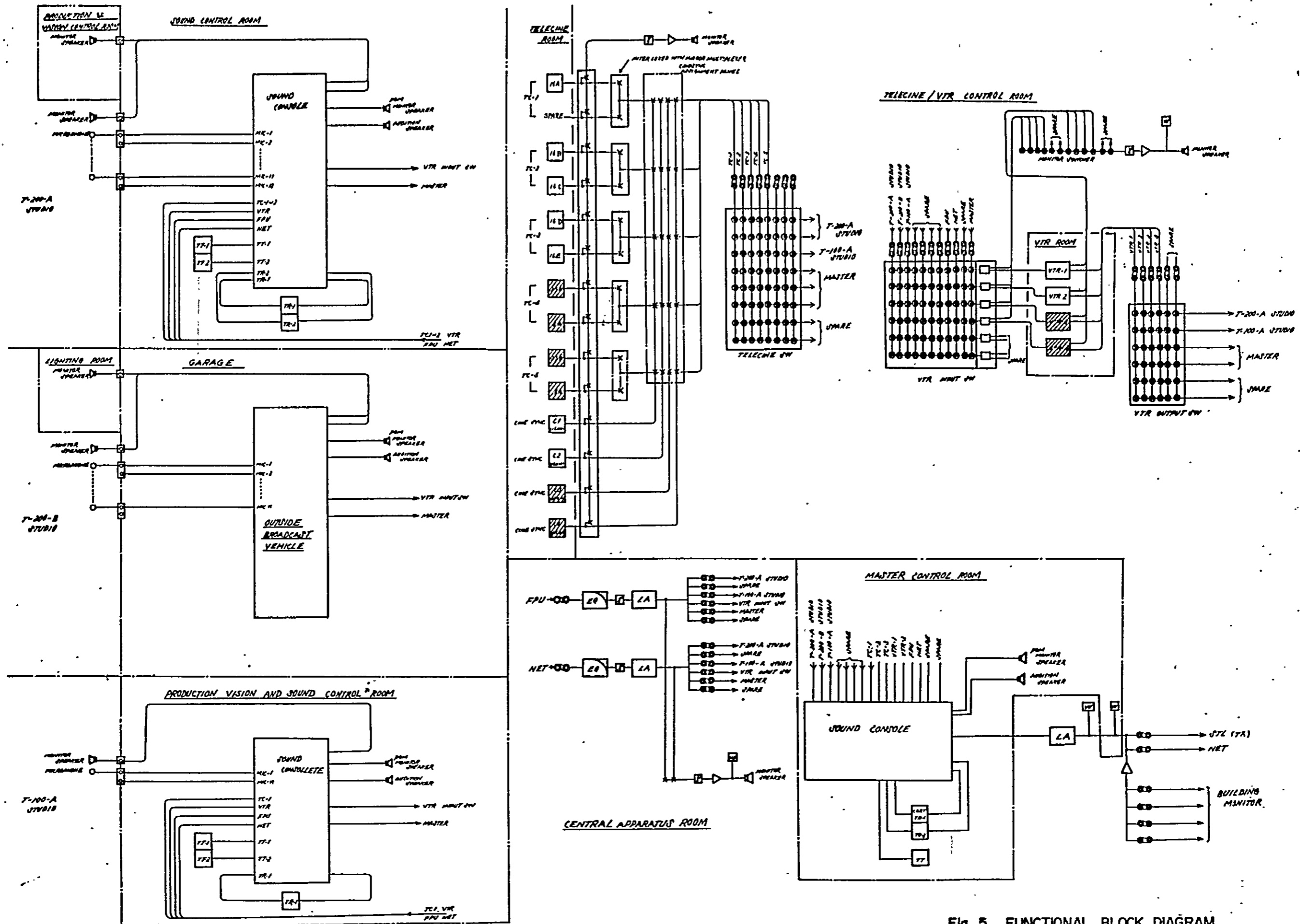


Fig. 5 FUNCTIONAL BLOCK DIAGRAM OF SOUND SYSTEM FOR LUSAKA STUDIO CENTRE

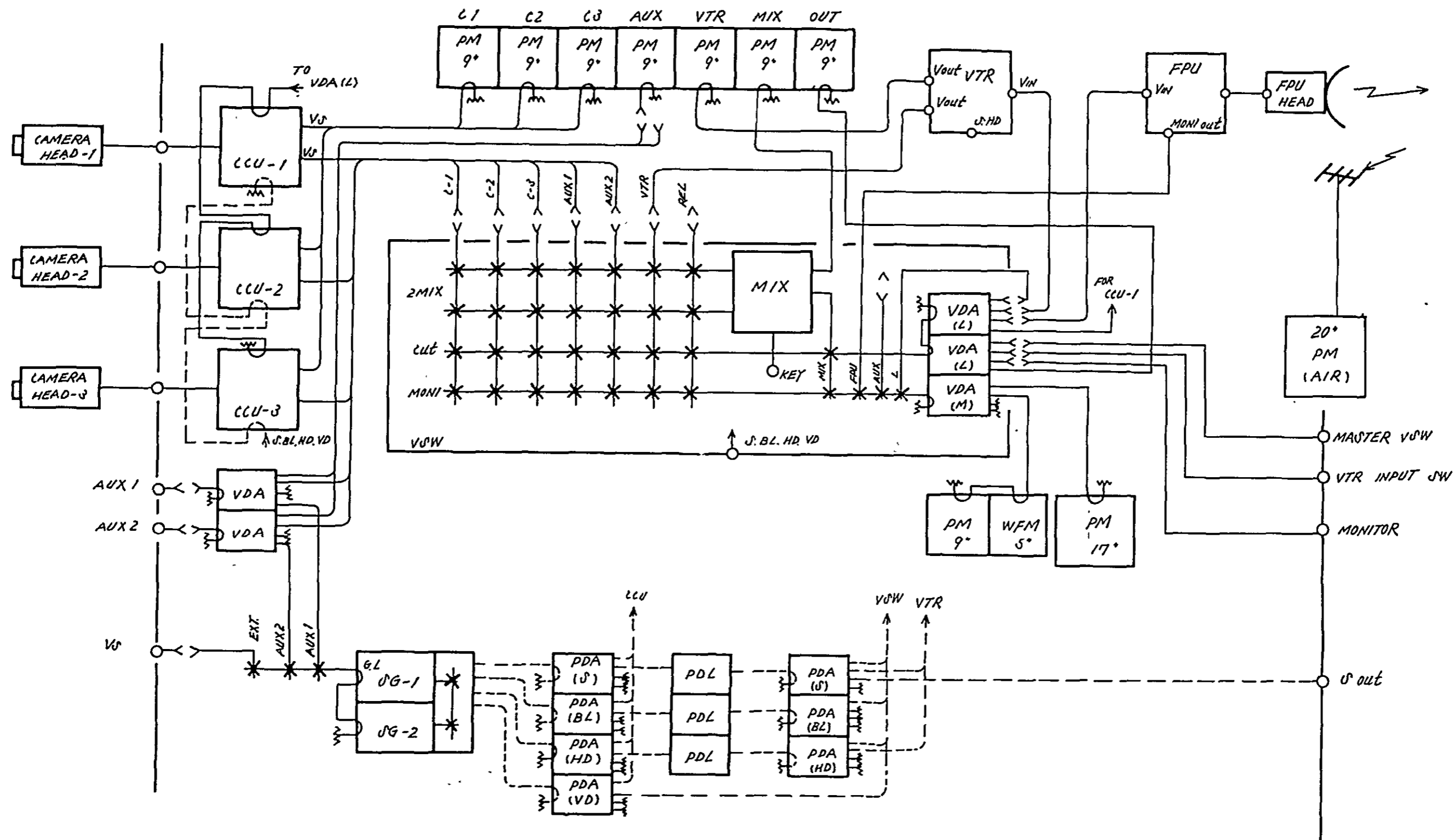


Fig. 6 FUNCTIONAL BLOCK DIAGRAM OF VISION & PULSE SYSTEM FOR OUTSIDE BROADCAST VEHICLE

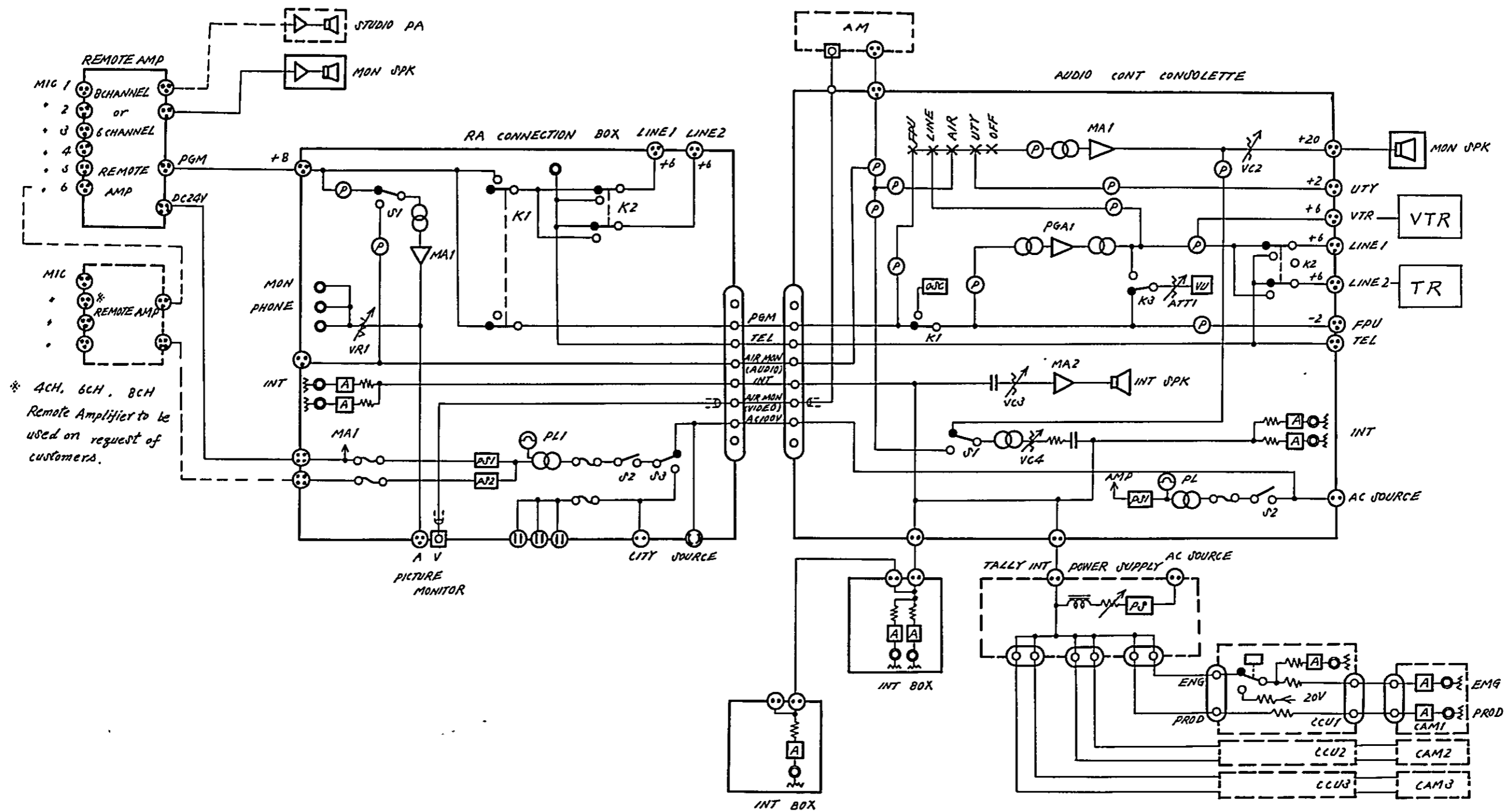
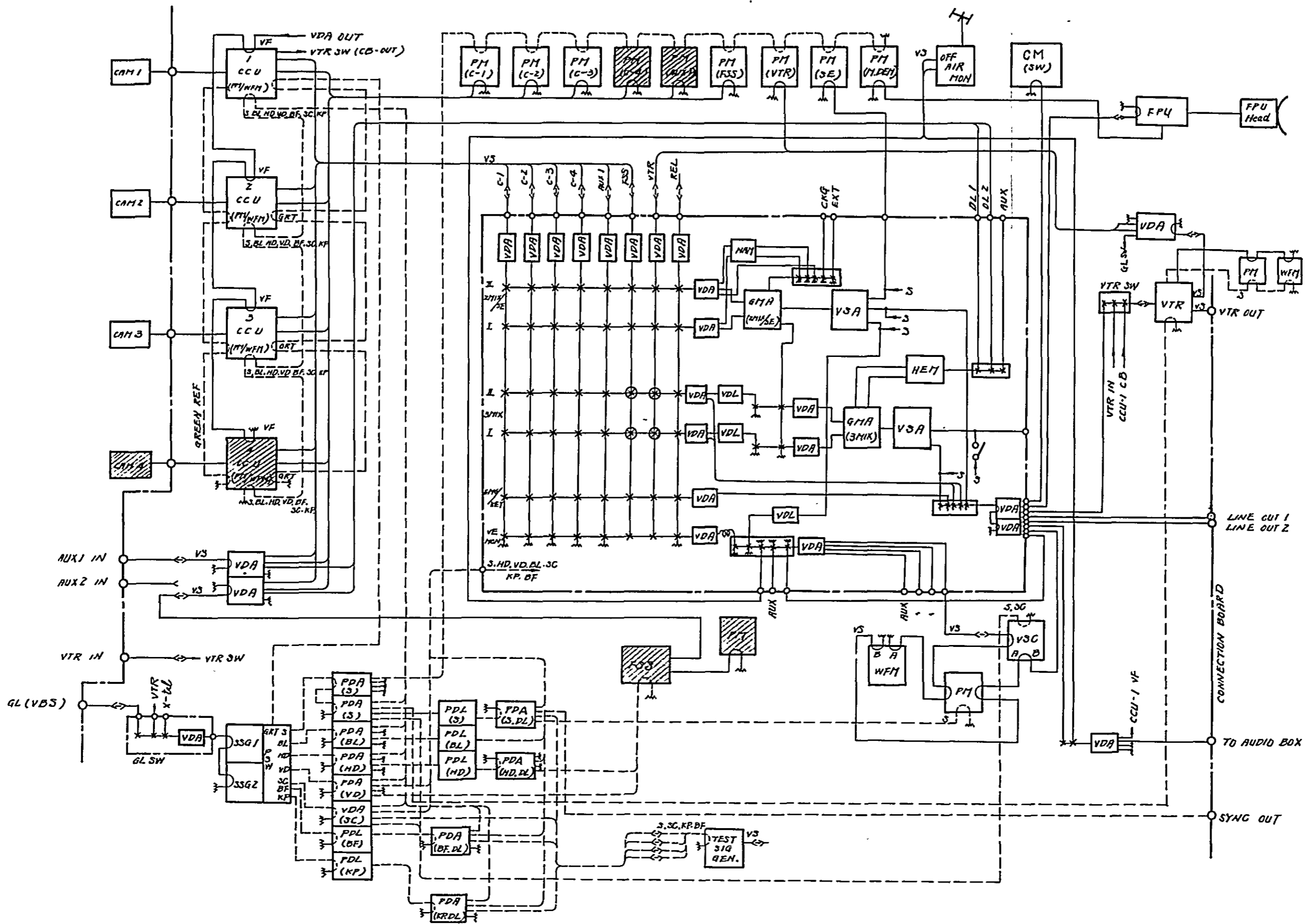


Fig. 7 FUNCTIONAL BLOCK DIAGRAM OF SOUND SYSTEM FOR OUTSIDE BROADCAST VEHICLE



MEANS: FUTURE PLAN
 (NOT LISTED UP
 SUPPLY LIST)

Fig. 9 FUNCTIONAL BLOCK DIAGRAM OF VIDEO & PULSE SYSTEM FOR COLOR OUTSIDE BROADCAST VEHICLE

[D]

RADIO STUDIO EQUIPMENT

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PART 1
GENERAL DESCRIPTION OF THE PLAN

The works specified herein shall be installed in the Studio Centre in Lusaka. The total works will be divided into

two phases As the first phase, the centre shall contain:

- one 140 m² studio (R-140-A)
- one 70 m² studio (R-70-A)
- four 30 m² studios (R-30-A, B, C, D)
- three continuity and news studios
- Associated technical facilities

The following facilities will be added on the later stage.

- one 140 m² studio
- one 70 m² studio
- four 30 m² studios

This tender specification prescribes the works of phase 1.

The centre shall provide and control one general service, one home service and one external service feeds.

These services are carried from the centre to the transmitting stations via VHF or UHF FM links.

All equipment used in the centre shall be of modern design utilizing solid-state components.

PART 2
GENERAL DESCRIPTION OF THE EQUIPMENT

In the first stage of the plan, the following equipment and fixtures will be required for radio broadcasting.

1. Three sets of feedout equipment connected to transmitters respectively. One of the three sets will be used for local-language service (home service) and the other two for English-language service (general service and external service).
One set of feedout equipment consists of a continuity studio, a news studio and a continuity control room.
The continuity studio will be used for producing and sending out programs using discs, for example, disc jockey programs.
The news studio will be used for announcing news and for inserting news in disc jockey programs as appropriate.
2. One set of large studio equipment will be required.
The large studio will consist of a studio about 140 square meters in floor space, an announce booth and a control room.
In the large studio audience-participation programs, music programs and drama programs may be produced.
3. One set of medium studio equipment will be required. The medium studio will consist of a studio about 70 square meters in floor space, an announce booth and a control room.
In this studio, light music programs, dramas and long-hour programs may be produced.
4. Four sets of small studio equipment will be required. The small studio will consist of a studio about 30 square meters in floor space and a control room.
The small studio will be used for producing "patterned programs"

such as news, education and cultural programs. And until the second stage of construction is completed, one room will be used also as a film dubbing room.

5. Each studio will require a sound effect equipment. In each studio, the audio console will be fitted with a sound effect filter to obtain sound effects.

6. One set of dubbing and reproducing/recording equipment will be required.

This equipment will be used for the following purposes:

6.1 Checking and editing recorded tapes.

6.2 Reproducing and recording from tape to tape.

6.3 Changing tape speed.

6.4 Changing the number of tape tracks.

7. Six sets of listening room equipment will be required. These sets of listening equipment will be used by sponsors, producers, artists and other people for listening to programs in an ideal condition. It will be also possible to reproduce discs and tapes and listen to them by such people as program sources.

8. The master control room will have all input and output lines connected to it.

The most important output lines are those to transmitters and network output lines to other stations.

One video monitor showing the station output is required.

9. A echo room equipment will be required for obtaining reverberation effects.

This equipment will be used for producing reverberation effects in each studio through the echo room assignment switcher.

PART 3
SYSTEM REQUIREMENTS

This section deals with the requirements for the system of the studios and control rooms in the centre.

Drawings providing information on the whole system and floor layout are as follows:

Figure 1-1 FUNCTIONAL BLOCK DIAGRAM OF RADIO
BROADCAST EQUIPMENT

Figure 1-2 FUNCTIONAL BLOCK DIAGRAM OF RADIO
STUDIO SYSTEM

Figure 2 LAYOUT ON THE GROUND FLOOR

Figure 3 LAYOUT ON THE 1ST FLOOR

1. Feedout equipment

1.1 General

The three sets of feedout equipment will be arranged side by side one another. Each set of equipment will consist of a continuity studio, a news studio and a control room. These sets of equipment will be used as production points for gathering and controlling program sources to be supplied to the transmitters.

The continuity studio will have a disc jockey desk and two disc players for the production of disc jockey programs.

The news studio is where the announcer will answer requests for sending out all sorts of program sources. Also, it will be used for news announcement and for inserting news in disc jockey programs. The continuity control room will be able to receive the outputs of all studio equipment via the master control room and, with the tape recording/reproducing equipment, cartridge tape players, audio console and news studio, will have the functions of sending out program sources. The continuity studio, news studio and continuity control room will have windows in their walls to permit seeing into one another.

1.2 Continuity studio

1.2.1 Required functions

1) Disc jockey desk

The disc jockey desk will be placed facing the window adjacent to the control room, and be used by the announcer and disc jockey. The desk will have an audio mixer and a remote control unit for disc players.

The jockey will perform the following:

- a) Operating the cough switch for turning ON or OFF the microphone.
- b) Gain control for the studio monitor loudspeaker.
- c) Call and talkback to the control room.
- d) Gain control for disc reproducer output.

Refer to Figure 4 - FUNCTIONAL BLOCK DIAGRAM OF DISC JOCKEY DESK,

2) Studio microphone

The studio microphone of bidirectional type will be suspended from the studio ceiling and be adjustable in height.

3) Disc players

One each disc player will be arranged on the right and left sides of the disc jockey, who will be able to control them either by local or remote. Operating speeds of 45 rpm and 33 1/3 rpm may be selected as appropriate.

4) Studio monitor loudspeaker and headphone

The studio monitor loudspeaker will be used for both talkback and program monitoring. It will be silenced

automatically when the microphone is live. A headphone will be provided for monitoring and talkback while the loudspeaker is dead.

5) Remote control unit

The disc players can be started and stopped at the disc jockey desk.

6) Power receptacle

The studio will have a power receptacle for supplying electric power to the equipment.

7) Slave clock

A slave clock with 3 hands and driven every second will be installed at an easy-to-see position in the studio.

8) In addition, status lamps will be provided in the studio and at the entrance to the studio, and a cue light on the disc jockey desk.

1.2.2 Equipment

Each continuity studio will have the following equipment.

Disc jockey desk	1
Microphone	1
Microphone support	1
Monitor loudspeaker	1
Microphone extension cord	1
Headphone	1
Disc player	2
Remote control unit	1
Slave clock	1

1.3 News studio

1.3.1 Required functions

1) Announce desk

The announce desk will be placed facing the window adjacent to the continuity studio and visible from the continuity control room through a window.

The desk may be used by two announcers facing each other over the desk, and will have an announcer control box on it to be operated by one of the announcers.

2) Studio microphone

The studio microphone of bidirectional type will be suspended from the ceiling over the announce desk, and be adjustable in height.

3) Announce control box

The announce control box will allow the announcer to perform the following:

- a) Operating the cough switch for turning ON and OFF the microphone.
- b) Gain control for the studio monitor loudspeaker.
- c) Call and talkback to the control room.

4) Studio monitor loudspeaker and headphone

The studio monitor loudspeaker will be used for both talkback and program monitoring, and will be silenced automatically when the microphone is live or when the studio sends a program on the air. A headphone will be provided for monitoring and talkback while the speaker is dead.

5) Slave clock

A 3-hand clock driven every second will be installed at an easy-to-see position in the studio.

- 6) In addition, status lamps will be provided in the studio and at the entrance to the studio and a cue light on the announce desk.

1.3.2 Equipment

Each news studio will have the following equipment.

Announce desk	1
Announce control box	1
Microphone	1
Microphone support	1
Microphone extension cord	1
Studio monitor loudspeaker	1
Headphone	2
Slave clock	1

1.4 Continuity control room

1.4.1 Required functions

1) Audio console, type A

The audio console will be placed in front of the windows shared by the news studio and the continuity studio so both studios will be able to be seen well from the audio console. Having 12 input channels and 1 output, this audio console will be operated by a single operator. Six input channels are low-level input channels which will be used for microphone input; and the other 6 are high-level inputs to be used for the disc players, tape recorder/player, and other line inputs.

The audio console will have a jack panel, a remote control unit, level meters and amplifiers.

It can also control status lamps and cue light.

Refer to figure 5 - FUNCTIONAL BLOCK DIAGRAM OF AUDIO CONSOLE, TYPE A.

- 2) **Technical interphone**
A technical interphone will be required for communication with other studios.
- 3) **Slave clock**
A 3-needle slave clock driven every second will be installed in an easy-to-see position in the control room.
- 4) **Status lamp**
A red lamp indicating that the control room is now in use will be installed at the entrance door of the control room.
- 5) **Program monitor loudspeaker**
The program monitor loudspeaker will be enclosed in the speaker box and placed in the control room.
- 6) **Talkback loudspeaker**
The talkback loudspeaker will be enclosed in the speaker box and placed in the control room.
- 7) **Remote control unit**
The remote control unit is built into the audio console and will be operated by the audio operator to remote-control, at the audio console, the start/stop of tape recorder/player and cartridge tape player.
- 8) **Tape recorder/players**
Two console type tape recorder/players will be placed by the operator seat for easy operation. The tape recorder/players may be controlled in local or remote mode in starting or stopping.
Full track tapes will be used on the tape recorder/players, whose operating speeds of 9 1/2 cm per second and 19 cm per second may be selected as desired.

9) Cartridge tape players

Two cartridge tape players will be placed in the control room in such a position as to assure ease of control by the operator. Their starting and stopping can be local- or remote-controlled.

1.4.2 Equipment

Each continuity control room will have the following equipment.

Audio console (12 inputs, 1 output), type A	1
Technical interphone	1
Slave clock (1-second drive, 3-hand type)	1
Program monitor loudspeaker	1
Talkback loudspeaker	1
Audition loudspeaker	1
Remote control unit	1
Tape recorder/player	2
Cartridge tape player	2

2. Large studio equipment (R-140-A)

2.1 General

The large studio will be equipped for the production of music programs, audience-participation programs and dramas.

The equipment will consist of a studio about 140 square meters in floor space, an announce booth and a control room.

The control room will have enough space for a producer, an audio operator and an assistant operator.

2.2 Large studio

2.2.1 Required functions

1) Studio microphone

The studio microphone will be controlled in the control room.

Power receptacles for plugging in the studio microphone will be provided inside the studio at appropriate locations.

2) Microphone patching

The audio console in the control room will have jack panels for patching the microphone.

All microphone circuits and all microphone inputs to the audio console will be terminated at the microphone jack panels. Thus the use of these jack panels will permit the formation of any microphone circuit route for input to the audio console. The audio console will be so designed that no noise will be picked up between the high level and low-level jack panels.

3) Studio monitor loudspeaker

The studio monitor loudspeaker will be used for both talkback and program monitoring, and be automatically silenced when the microphone is live.

4) Headphone

A headphone will be provided for monitoring and talkback while the studio microphone is live.

5) Foldback monitor

A foldback monitor output will be provided in the studio for use in reproducing sound effects in the studio.

6) Power output

Power outputs will be provided for the electrical equipment in the studio.

7) Clock

A 1-second drive, 3-hand slave clock will be installed in an easy-to-see position in the studio.

8) In addition, status lamps will be provided in the studio and at the entrance to the studio and a cue light in the studio.

2.2.2 Equipment

The large studio will have the following equipment.

Microphone receptacle	As required
Microphone	6
Microphone stand	3
Microphone cable	As required
Headphone	3
Studio monitor loudspeaker	1
Slave clock	1

2.3 Announce booth

2.3.1 Required functions

1) Announce desk

The announce desk will be placed under the window adjacent to the control room side so the announcer will be able to see the control room. Two announcers may sit face to face on both sides of the desk.

2) Announcer microphone

An announcer microphone of bidirectional type will be supported by a microphone stand and placed on the announce desk.

3) Announce control box

The announce control box will have the following functions so one announcer may be able to control it.

- a) Gain control for the monitor loudspeaker.
- b) Control on calls and talkback to the control room.
- c) Microphone cough switch.

4) Monitor loudspeaker and headphone

A monitor loudspeaker will be provided in the announce booth for program monitoring and talkback. It will be silenced automatically when the microphone is live.

A headphone will be provided for monitoring and talkback while the speaker is dead.

5) Slave clock

A 1-second drive, 3-hand slave clock will be installed in an easy-to-see position in the studio.

- 6) In addition, status lamp will be provided in the announce booth and a cue light on the announce desk.

2.3.2 Equipment

The announce booth will have the following equipment.

Microphone	1
Microphone desk stand	1
Monitor loudspeaker	1
Headphone	1
Announce control box	1

2.4 Control room

2.4.1 Required functions

1) Audio console, type B

The audio console will be placed facing the window on the studio side. With 18 inputs and 1 output, this audio console will be operated by a single audio operator.

Twelve input channels will be low-level inputs used for microphone inputs and the other 6 input channels high-level inputs for disc players, tape recorder/players and other line inputs. Also this audio console will be equipped with a jack panel, remote control unit, level meters and amplifiers.

It can control the status lamps and cue light.

Refer to figure 6 - FUNCTIONAL BLOCK DIAGRAM OF AUDIO CONSOLE, TYPE B.

2) Disc players

Two console type disc players will be installed by the audio console against the wall. These players operate on 45 rpm and 33 1/3 rpm, which may be selected as desired.

The disc players may be started and stopped by local or remote control.

3) Tape recorder/players

Three console type tape recorder/players will be installed near the audio console. The starting and stopping operation of the tape recorder/players can be either local- or remote-controlled.

Full track tapes will be used on these recorder/players, whose operating speeds of 9 1/2 cm per second and 19 cm per second may be selected as desired.

4) Cartridge tape players

One cartridge tape player will be installed by the audio console, and will be local- or remote-controlled for their starting and stopping.

- 5) Remote control unit
The remote control unit, built into the audio console, will have the functions of controlling the starting, and stopping of the tape recorder/players and the starting and stopping of the disc players and cartridge players by the audio operator at the audio console.
- 6) Technical interphone
A technical interphone will be required for communication with other studios.
- 7) Slave clock
A 1-second drive, 3-hand slave clock will be installed in an easy-to-see place in the control room.
- 8) Status lamp
A red status lamp indicating that the control room is in use will be installed at the entrance to the control room.
- 9) Call buzzer
A call buzzer will be provided for making calls from the announce booth.
- 10) Program monitor loudspeaker
The program monitor loudspeaker will be enclosed in the speaker box and placed in the control room.
- 11) Talkback loudspeaker
The talkback loudspeaker will be enclosed in the speaker box and placed in the control room.

2.4.2 Equipment

The large studio control room will have the following equipment.

Audio console (18 inputs, 1 output), type B	1
Disc player	2
Tape recorder/player	3
Cartridge tape player	1
Remote control unit	1
Technical interphone	1
Slave clock (1-second drive, 3-hand)	1
Program monitor loudspeaker	1
Talkback loudspeaker	1
Audition loudspeaker	1

3. Medium studio equipment (R-70-A)

3.1 General

The medium studio will be so equipped as to be able to produce light music program, dramas, etc.

The equipment will consist of a studio about 70 square meters in floor space, an announce booth and a control room.

The control room will have enough space for a producer, audio and recording/reproduction operators.

3.2 Medium studio

3.2.1 Required functions

1) Studio microphones

The studio microphones will be controlled in the control room. Wall power receptacles will be provided in the studio as appropriate.

2) Studio monitor loudspeaker

The studio monitor loudspeaker will be used for both talkback and program monitoring, and be automatically silenced when the microphone is live.

3) Headphone

A headphone will be provided for monitoring and talkback while the studio microphones are live.

4) Foldback monitor

A foldback monitor output will be provided in the studio for use in reproducing sound effects in the studio.

5) Cue light

A cue light will be provided in the studio.

6) Power output

Power outputs will be provided for the broadcasting equipment in the studio.

7) Clock

A 1-second drive 3-hand slave clock will be placed in an easy-to-see place in the studio.

8) In addition, status lamps will be provided in the studio and at the studio entrance.

3.2.2 Equipment

The medium studio will have the following equipment.

Microphone receptacle	As required
Microphone	3
Microphone stand	3
Microphone cable	3
Headphone	1
Studio monitor loudspeaker	1
Slave clock	1

3.3 Announce booth

3.3.1 Required functions

1) Announce desk

The announce desk will be placed under the window adjacent to the control room so the announcer will be able to see the control room. Two announcers may sit face to face on both sides of the desk.

2) Announcer microphone

An announcer microphone of bidirectional type will be supported by a microphone stand and placed on the announce desk.

3) Announce control box

The announce control box will have the following functions which may be controlled by a single announcer.

a) Gain control for the monitor loudspeaker.

b) Control on calls and talkback to the control room.

c) Microphone cough switch.

4) Monitor loudspeaker and headphone

A monitor loudspeaker will be provided in the announce booth for program monitoring and talkback purposes. It will be automatically silenced when the microphone is live. A headphone will be provided for monitoring and talkback while the speaker is dead.

5) Slave clock

A 1-second drive, 3-hand slave clock will be installed in an easy-to-see position in the studio.

6) In addition, status lamps will be provided in the

announce booth and a cue light on the announce desk.

3.3.2 Equipment

The announce booth will have the following equipment

Microphone	1
Microphone desk stand	1
Monitor loudspeaker	1
Headphone	1
Announce control box	1

3.4 Control room

3.4.1 Required functions

1) Audio console, type C

The audio console will be placed facing the window on the studio side. With 14 inputs and 1 output, the audio console will be operated by a single audio operator.

Eight input channels will be low-level inputs used for microphone inputs and the other 6 input channels high-level inputs for disc players, tape recorder/players and other line inputs. Also this audio console will be equipped with a jack panel, remote control unit, level meters and amplifiers.

Refer to figure 7.- FUNCTIONAL BLOCK DIAGRAM OF AUDIO CONSOLE, TYPE C.

2) Disc players

Two console type disc players will be installed near the audio console. These players operate on 45 rpm and 33 1/3 rpm, which may be selected as desired. The disc players may be started and stopped by local or remote control.

3) Tape recorder/players

Two console type tape recorder/players will be installed near the audio console. The starting and stopping operation of the tape recorder/players can be either local- or remote-controlled.

Full track tapes will be used on these recorder/players, whose operating speeds of 9 1/2 cm per second and 19 cm per second may be selected as desired.

4) Cartridge tape players

One cartridge tape player will be installed by the audio console, and will be local- or remote-controlled for their starting and stopping.

5) Remote control unit

The remote control unit, built into the audio console, will have the functions of controlling the starting and stopping of the tape recorder/players and the starting and stopping of the disc players and cartridge players by the audio operator at the audio console.

6) Technical interphone

A technical interphone will be required for communication with other studios.

7) Slave clock

A 1-second drive, 3-hand slave clock will be installed in an easy-to-see place in the control room.

8) Status lamp

A red status lamp indicating the control room is in use will be installed at the entrance to the control room.

9) Call buzzer

A call buzzer will be provided for making calls from the announce booth.

10) Program monitor loudspeaker

The program monitor loudspeaker will be enclosed in the speaker box and placed in the control room.

11) Talkback loudspeaker

The talkback loudspeaker will be enclosed in the speaker box and placed in the control room.

3.4.2 Equipment

The medium studio control room will have the following equipment.

Audio console (14 inputs, 1 output) type C	1
Disc player	2
Tape recorder/player	2
Cartridge tape player	1
Remote control unit	1
Technical interphone	1
Slave clock	1
Program monitor loudspeaker	1
Talkback loudspeaker	1
Audition loudspeaker	1

4. Small studio equipment (R-30 -A, B, C, D)

4.1 General

The small studio will have four sets of equipment for producing interview and news programs.

Each of these sets will consist of a studio about 30 square meters in floor space and a control room. The control room will have enough space for a producer, and audio operator. One of the four rooms is so designed that it may also be used as a film dubbing room till the completion of the next project.

4.2 Small studio

4.2.1 Required functions

1) Announce desk

An announce desk for announcer will be provided.

2) Interview table

An interview table, large enough to seat 5 - 6 people around it, will be placed in the center of the studio. The table top will be of sound adsorbing type. The table is opened at the center so a microphone may be suspended or a floor stand may be placed.

3) Studio microphone

Studio microphones of non-directional type will be suspended from the center hole in the table top or be fitted to a floor stand which is adjustable in height. Four microphone outputs will be provided in the wall.

4) Announce control box

The announce control box to be operated by the announcer will have the following functions.

- a) Gain control for the studio monitor loudspeaker.
- b) Calls and talkback to the control room.
- c) Microphone cough switch

5) Studio monitor loudspeaker and headphone

The studio monitor loudspeaker will be used for talkback and program monitoring, and will be automatically silenced while the microphone is live. A headphone will be provided for monitoring and talkback while the speaker is dead.

6) Slave clock

A 1-second drive, 3-hand slave clock will be placed in an easy-to-see place in the studio.

7) In addition, status lamps will be provided in the studio and at the studio entrance and a cue light on the announce desk.

4.2.2 Equipment

The studio, R-30-A will have the following equipment.

Microphone	2
Microphone floor stand	2
Microphone extension cord	2
Earphone	4
Studio monitor loudspeaker	1
Projection screen	1
Slave clock	1

The remaining three studios, R-30-B, R-30-C and R-30-D, will have the following equipment.

Announce control box	1
Microphone	2
Microphone floor stand	2
Microphone extension cord	2
Headphone	1
Studio monitor loudspeaker	1
Slave clock	1

4.3 Control room

4.3.1 Required functions

1) Audio console, type D

The audio console will be placed facing the window on the studio side. With 10 inputs and 1 output, the audio console will be operated by a single audio operator. Four input channels will be low-level inputs used for microphone inputs and the other 6 high-level inputs for disc players, tape recorder/players and other line inputs.

Also this audio console will be equipped with a jack panel, remote control unit, level meters and amplifiers. Refer to figure 8 - FUNCTIONAL BLOCK DIAGRAM OF AUDIO CONSOLE, TYPE D

2) Disc players

Two console type disc players will be installed near the audio console. These players operate on 45 rpm and 33 1/3 rpm, which may be selected as desired. The disc players may be started and stopped by local or remote control.

- 3) **Tape recorder/players**
Two console type tape recorder/players will be installed near the audio console. The starting and stopping operation of the tape recorder/players can be either local- or remote-controlled.
Full track tapes will be used on these recorder/players, whose operating speeds of 9 1/2 cm per second and 19 cm per second may be selected as desired.
- 4) **Remote control unit**
The remote control unit, built into the audio console, will have the functions of controlling the starting and stopping of the tape recorder/players and the starting and stopping of the disc players by the audio operator at the audio console.
- 5) **Technical interphone**
A technical interphone will be required for communication with other studios.
- 6) **Slave clock**
A 1-second drive, 3-hand slave clock will be installed in an easy-to-see place in the control room.
- 7) **Status lamp**
A red status lamp indicating the control room is in use will be installed at the entrance to the control room.
- 8) **Call buzzer**
A call buzzer will be provided for making calls from the announce booth.
- 9) **Program monitor loudspeaker**
The program monitor loudspeaker will be enclosed in the speaker box and placed in the control room.

10) Talkback loudspeaker

The talkback loudspeaker will be enclosed in the speaker box and placed in the control room.

4.3.2 Equipment

The small studio control room will have the following equipment.

Audio console (10 inputs, 1 output), type D	1
Disc player	2
Tape recorder/player	2
Remote control unit	1
Technical interphone	1
Slave clock (1-second drive, 3-hand)	1
Program monitor loudspeaker	1
Audition loudspeaker	1
Talkback loudspeaker	1
Film dubbing equipment (in one room only)	1

5. Dubbing and transcription room

5.1 General

A dubbing and transcription room will be required for editing, correcting and transcribing recorded tapes. This room will be equipped with various kinds of tape recorder/players for recording and playing back at various speeds, erasers and editing machines.

These devices may be used for changing the speed of tapes recorded at various speeds, or for transcribing recording from open-reel tapes to cartridge tapes or vice versa.

A headphone will be normally used for monitoring recorded tapes.

The following conversions of tape speeds and tracks will be possible.

<u>Original tape</u>	<u>Transcribed tape</u>
Full track type	Full track type
9-1/2 cm per second	9-1/2 cm per second
19 cm per second	19 cm per second
38 cm per second	Cartridge tape type
2-track 1-channel type	
4-3/4 cm per second	
9-1/2 cm per second	
19 cm per second	

The following changes of tapes will be possible:

<u>Original tape</u>	<u>Transcribed tape</u>
Open reel tape	Open reel tape
Open reel tape	Cartridge tape
Cartridge tape	Open reel tape

5.2 Required functions

5.2.1 Tape recorder/players, type A

Two tape recorder/players type A, the same as those used in the studio control rooms and master control room for broadcasting purposes, will be provided.

Full track (1-track, 1-channel) type.

Tape speeds of 9-1/2 cm per second and 19 cm per second may be selected as desired.

5.2.2 Tape recorder/player, type B

One full-track (1-track, 1-channel) tape recorder/player type B will be provided, and may be operated at 19 cm per second or 38 cm per second as required.

5.2.3 Tape recorder/player type C

One half-track (2-track, 1-channel) tape recorder/player type C will be provided, and may be operated at 4 3/4 cm per second, 9 1/2 cm per second or 19 cm per second as required.

5.2.4 Cartridge tape recorder/player

Two cartridge tape recorder/player will be provided.

5.2.5 Erasers

Two erasers will be provided for erasing unnecessary tape recordings in a short time.

5.2.6 Editing equipment

Two sets of editing equipment, including a device for playing and monitoring the tapes to be edited, will be provided.

5.3 Equipment

The dubbing and transcription room will have the following equipment.

Tape recorder/player, type A	2
Tape recorder/player, type B	1
Tape recorder/player, type C	1
Cartridge tape recorder/player	2
Three speed disc player	2
Tape eraser	2
Editing equipment	2

6. Master control room equipment

6.1 General

The master control room to be located among the three continuity control rooms, will control all programs coming into and going out of the radio station.

The equipment in the master control room will be operated by a single operator; and includes all technical controls, a control console and racks.

The racks will have jack panels and other terminal devices that will be used frequently every day as well as input and output assignment switchers.

6.2 Required functions

6.2.1 General

The master control room will gather all radio voice signals and form circuits for allocating, coordinating or selecting them on the basis of matrixes, thus permitting diversified modes of operation.

The master control room will have the following equipment for handling signals and forming circuits:

One small monochrome video monitor will be provided for showing TV MCR output. Also, several audio tie lines for carrying TV sound from TV MCR.

- 1) Program inputs, including all studio input, external line inputs and network inputs from local stations.
- 2) Program outputs, including local transmitter outputs and network outputs.
- 3) Monitor system
- 4) Monitors for monitoring signals from the transmitters.
- 5) Test signal.
- 6) Signals from each studio control room to the echo room and from the echo room to each studio control room.

6.2.2 Program circuits

All program circuits from and to the master control room will be wired via a jack panel in the rack to the program switcher. Therefore, completely flexible use of program circuits can be made in addition to fixed circuit patterns.

The Program switcher will consist of an input assignment switcher and an output assignment switcher

All switcher inputs and outputs will be led out to the jack panel for use in patching and testing.

Program circuits will be formed by operating the amplifiers, equalizer and jack panel placed in the master control room.

The control panel for the input and output assignment switchers will be installed in the master control room.

Peak limiting amplifiers will be inserted in the switcher output for the local transmitters and networks.

The output assignment switcher has 26 input and 21 output channels.

The 26 inputs include continuity studios No. 1 to No. 3, and studios R-140-A, R-70-A and R-30-A, B, C, D with provision for 17 future expansion inputs.

The 21 output channels consist of:

3 for continuity studios No. 1 to No. 3

3 for Lusaka Station A

3 for Lusaka Station B

3 for Kitwe Station

3 for Kabwe Station

3 for Woodland Station

3 for Livingstone Station

Any output channel can select any input, that is, there is a possibility of feeding all different programs among 26 input channels to 21 output channels.

Figure 12 - "FUNCTIONAL BLOCK DIAGRAM OF INPUT AND OUTPUT ASSIGNMENT SWITCHERS" is provided for giving information.

6.2.3 Monitoring system

In the master control room, home service, general service and external service programs for Lusaka Station A can be listened to from a monitor loudspeaker automatically at one minute interval. Programs for other stations such as Lusaka Station B, Kitwe Station, etc. can be monitored by means of selection of manual monitoring switcher.

VU meters are provided for all outgoing channels.

A house monitoring system will be installed in the master control room. Home service and general service programs will be distributed by an audio distributing amplifier to the required destinations in the centre.

6.2.4 On-air signals

The master control room will have three receivers for receiving broadcast signals for home service, general service and external service.

Audio outputs from the receivers will be led to the jack panel from which they will be distributed to the continuity control rooms and the master control room. These outputs can be monitored together with master control room line outputs through selection with a monitor selecting switcher.

6.2.5 Test signal

The master control room will have a test signal generator whose test signals will be led to the jack panel from which the signals will be distributed to each studio through patching.

6.2.6 Remote input

The master control room will be provided with the equipment necessary for handling remote line inputs to the centre.

Remote inputs will be distributed through the input assignment switcher to each studio.

6.2.7 Technical interphone

A technical interphone will be installed for use in communicating with other studio control rooms.

6.2.8 Echo room equipment

This equipment will assign a specific combination of a studio and a echo room in the centre.

A switcher will be mounted in the rack of the master control room.

This switcher will have lines to and from all studios connected via the jack panel.

6.2.9 Tape recorder/player

A tape recorder/player for program monitoring will be provided in the master control room, and permit recording of programs.

6.2.10 Slave clock

A 1-second drive, 3-hand slave clock will be placed in an easy-to-see position in the room.

6.3 Equipment

The master control room will have the following equipment.

6.3.1 Equipment rack components

Audio amplifier	As required
Jack panel	As required
Standard receiver	3
Shortwave receiver	1
Echo room assignment switcher	1
Test signal generator	2
VU meter	As required
Input assignment switcher	1
Output assignment switcher	1

	Line equalizer	As required
	Peak limiting amplifier	As required
	Technical interphone	1
6.3.2	Operator control panel components	
	Input assignment switcher panel	1
	Output assignment switcher panel	1
	Echo room assignment switcher panel	1
	Monitor selecting switcher panel	1
	Technical Interphone	1
	Monitor loudspeaker	3
	Slave clock	1
	Tape recorder/player	1
6.3.3	The following equipment will be provided at appropriate places in the centre.	
	Wall type monitor loudspeaker	120
	Floor type monitor loudspeaker	30
	Monitoring amplifier	As required
	Picture Monitor (9 inch)	1
	24 hour recording machine	1

7. Echo room .

7.1 General

There will be an echo room for providing each studio with reverberations as sound effects. Though there will be two echo rooms by the time when the final stage of work is completed, there will be just one built in the first stage. It will be shared by all the studios. The master control room may assign a specific combination of a studio with this echo room. The echo room is a long room equipped with speaker and microphone arranged at appropriate distances to produce reverberation effects.

7.2 Required functions

7.2.1 Loudspeaker

The loudspeaker will reproduce the sound to which reverberations from a selected studio control room are to be added.

7.2.2 Microphone

The microphone will pick up the sound reproduced by the loudspeaker and added with reverberations, and send the sound back to the original studio control room.

7.3 Equipment

The echo room will have the following equipment

Loudspeaker	1
Microphone	1
Audio amplifier	As required

8. Listening room

8.1 General

There will be six listening rooms..

The purpose of these rooms is to reproduce program sources in an excellent listening environment. The rooms will be equipped with a disc player, a tape recorder/player, and a loudspeaker with a high-quality amplifier.

8.2 Required functions

8.2.1 Disc player

One disc player will be provided and operated at 45 rpm or 33-1/3 rpm as required.

8.2.2 Tape recorder/player

One tape recorder/player will be provided.

Full-track tapes will be used on this tape recorder/player at 9 1/2 cm per second or 19 cm per second.

8.2.3 Loudspeaker with amplifier

A loudspeaker with amplifier will be provided for monitoring the reproduced output of the disc player or the tape recorder/player.

8.3 Equipment

Five listening rooms will have the following equipment.

Disc player	1
Tape recorder/player	1
Loudspeaker with amplifier	1

The remaining one listening room will have the following equipment.

Disc player	1
Cartridge tape player	1
Loudspeaker with amplifier	1

9. Clock equipment

9.1 General

The clock equipment will consist of a master clock, and many slave clocks.

The master clock will be installed in the central apparatus room where television broadcasting equipment will be placed. The slave clocks will be installed in the radio and television studios and the administration areas where appropriate.

9.2 Required functions

9.2.1 Master clock

These include a master clock, a power supply and a pulse generator, with which 1-second and 30-second pulses will be generated and distributed to the slave clocks.

There will also be a shortwave standard receiver for checking the time.

9.2.2 Slave clocks

- a) There will be 30 1-second pulse-drive, 3-hand clocks indicating 24 hours to be used in the technical areas.
- b) There will be 120 30-second pulse-drive, 2-hand clocks indicating 24 hours to be used in the offices.

9.3 Equipment

Master clock	1 set
Slave clock (30-second drive, 2-hand)	120
Slave clock (1-second drive, 3-hand)	30

PART 4
RECORDING VEHICLE

A recording vehicle will be required for producing programs such as festivals and other outdoor events participated in by a number of people.

Drawings providing information on the system and floor layout are as follows:

Figure 9 - FLOOR LAYOUT OF RECORDING VEHICLE

Figure 10 - FUNCTIONAL BLOCK DIAGRAM OF AUDIO
SYSTEM

1. Vehicle

1.1 General

The vehicle is a compact, bus-like one having the normal functions of an automobile and the required minimum space as a studio and control room. The vehicle has a small stage in the rear end so a show may be presented and a master of ceremony may address to the people who have come to see or take part in a program.

The vehicle will also provide good comfort for the operators to work on it.

1.2 Required functions

1.2.1 Chassis

The vehicle uses a bus chassis about 4 meters long in wheelbase to protect the equipment on the vehicle from shock.

1.2.2 Body

The body measures about 8 meters long, about 2.5 meters wide. There is the driver's seat in the front end of the body, followed by a generator, an air conditioner room, an audio control room and a stage which are arranged in this order.

The stage is an open type one.

The driver's compartment has seats for the driver and another, and the audio control room has seats for two audio operators.

2. Mobile studio equipment

2.1 Required functions

2.1.1 Audio consolette

An audio consolette will be placed on a desk by the side of the window at the center of the body. With 6 inputs and 1 output, the audio consolette will be operated by a single operator.

Four input channels are low-level inputs to be used for microphone inputs, and the other 2 input channels are low-level or high-level inputs which may be selected with a switch as desired.

The high-level inputs will be used for tape recorder/players, disc players and other line inputs. The audio consolette will have a test signal generator for testing purposes, and talkback, public address and monitoring functions. It will also have VU meters, amplifiers, etc.

2.1.2 Public address system

The public address system consists of two speakers, a microphone and an audio amplifier.

The audio amplifier will receive public address output from the audio consolette and microphone input to reproduce them from the speakers, which will be mounted on the body.

2.1.3 Tape recorder/players

Two tape recorder/players will be provided -- one for feeding tape recordings to the audio console for use in program production, and the other for recording the programs produced in the recording vehicle. These recorder/players will use full-track tapes at tape speeds of 9 1/2 cm per second or 19 cm per second.

2.1.4 Disc player

One disc player of portable type will be provided. It will operate at 45 rpm or 33 1/3 rpm, which may be selected as required.

2.1.5 Monitor loudspeaker

A monitor will be mounted to the ceiling in the control room for the audio operator.

2.1.6 Headphone

Headphones will be used for monitoring purposes during program production.

2.1.7 Microphone

There will be microphones to be controlled from inside the vehicle, where an external audio terminal board will be provided for connecting the external microphone to the audio console inside.

2.2 Equipment

The recording vehicle will have the following equipment .

Audio console	1
Public address system	1
Tape recorder/player	2
Disc player	1
Monitor loudspeaker	1

Headphone	3
Microphone	6
Clock (battery driven type, 3-hand)	1

3. Other equipment

3.1 Required functions

3.1.1 Engine generator

A 5 kVA engine generator will be installed behind the driver's seat for generating power to the air conditioner and audio equipment. The generator will be equipped with an automatic voltage regulator. The power supply for the tape recorder/players will have an automatic frequency control.

3.1.2 Air conditioner

Air conditioners will be installed for assuring operator comfort. They are not automobile air conditioners but will be used while the vehicle is parked. They are separate type air conditioners, whose cooling unit of wall type be installed inside the vehicle and whose condensing unit will be mounted on the roof of the vehicle.

3.2 Equipment

Engine generator, 5 kVA	1
Air conditioner	2

PART 5
SOURCES

1. Microphones

- 1.1 Generally, microphones will be directly wired to audio console channels and plugged into wall receptacles.
- 1.2 In the continuity rooms and news studios, dynamic or ribbon microphones will generally be used.
- 1.3 The studios will be so designed that dynamic, ribbon or condenser microphones can be used. All microphone lines can be patched with the jack panel in the audio console in the control room.

2. Auxiliary sources

Auxiliary recording sources include tape recorder/players, cartridge tape players and disc players. These devices have appropriate built-in amplifiers to raise output signals to standard line level. They will be so connected that they may be easily replaced any time.

3. External lines

All external lines will be terminated at the jacks in the master control room.

These lines in continuous use will be normalized by the equalizer and amplifier that are on the same jack panel for correcting their frequency characteristics and raising signals to standard level. Unused other lines will be patched to the equalizer and amplifier as necessary. After the external lines are equalized and signals raised to standard level by master controls, they will be distributed as desired by the input assignment switcher.

4. Time signal

Time tones will be generated by the master clock. The time signal will be distributed to the master control room to be inserted in appropriate programs.

5. Standard test signal

Two standard test signal generators will be installed in the master control room. Generator outputs can be supplied to any area through the program switcher or patching. These signal generators will be used for calibrating VU meters and for regulating the operating level of equipment in the studio centre.

6. Sound effect

An effect filter mounted in the audio console in each control room may be used for providing effect sounds in programs by patching on the jack panel in the console.

7. Reverberation

Reverberation effects will be artificially generated by speakers and microphones in the echo room. A switching equipment will be provided in the master control room so the echo room can be connected to any studio.

8. VHF/UHF reception

A VHF or UHF link will be formed in relaying programs in places where no lines are available so programs transmitted wireless will be received by receivers to be installed in the master control room. Receiver outputs will be supplied via the jack panel in the master control room to the input assignment switcher, from which the outputs will be distributed to appropriate studios as necessary.

PART 6
REMOTE FEEDOUT

1. Transmitter

The radio stations will be capable of transmitting three kinds of program, home service, general service and external service. Transmission output will be selected by the operator in the master control room with the output assignment switcher and connected to the studio-transmitter link leading to the transmitters. The transmitter OFF AIR output received by the receivers in the master control room can be continuously monitored by the operators in the master control room to identify any interruption of programs caused by something or other. Peak limiting amplifiers will be connected to the output of the output assignment switcher leading to the respective transmitters.

2. Network broadcasting station

Programs to network stations will be selected by the operator in the master control room with the output assignment switcher, as in supplying programs to the transmitter, and then by transmitted via G. O. P. line. Peak limiting amplifiers will be installed to the respective feedout lines.

PART 7
LOCAL ROUTE

1. Audio console

The audio console to be installed in each studio control room will have built-in unit type amplifiers, power supply, effect filter and others in its frame. All audio consoles are virtually the same in structure so that the operator will get accustomed to any audio console in any studio.

All audio consoles have 6 high-level input channels but differ from one another in the number of low-level input channels.

The audio console has circuits for audition, program monitor, talkback, foldback, reverberation, effect filter, etc.

2. Input assignment switcher

The input assignment switcher can quickly and automatically connect external inputs as well as line, VHF or UHF link inputs from other stations to any studio.

The switcher has 8 inputs and 26 outputs and can supply them to any place requiring access to program sources.

3. Output assignment switcher

The output assignment switcher, located in the master control room, is a main switching unit in the centre and is designed to quickly and automatically connect various program sources to any destination as desired.

All studio lines will be connected to this switcher having up to 26 inputs. It has 21 outputs, 3 of which will be connected to the continuity rooms, 6 to the two local transmitters for home service, general service and external service, 12 for network transmission.

The output lines to the continuity control rooms are so designed that input lines from the same continuity control room cannot be selected to avoid a looping disturbance.

4. Echo room assignment switcher

The echo room will be allocated to studio control rooms by the operator in the master control room.

The echo room assignment switcher's input and output lines rise on the jack panel to permit flexible use.

The input and output switches to the echo room will be so interlocked that the sounds of the studio selected will not be sent to any other studio.

At the phase 1, one echo room will be constructed. Provision, however, shall be made for two room installation.

5. Audio patching equipment

Jack panels will be provided for testing and maintenance of the master control room and other studios, and allow quick change or rearrangement of program lines.

PART 8
MONITORS

1. Studio

- 1.1 Monitor equipment for the production studio will be built into the audio console so the operator will be able to monitor input sources and outgoing programs in the control room. There will be a high-quality speaker suitable for checking sound quality in the operating room. Each studio will have a monitor speaker so, when the microphone is turned OFF, the announcer or performers may be able to listen to the program.
- 1.2 Monitor equipment for the continuity control room will be built into the audio control so the operator in the control room will be able to listen to 1) a program source or a program going out of the studio, and 2) OFF AIR and audition sound at the same time. Thus two speakers will be installed in the control room. These speakers are high-quality speakers necessary for strict examination of sound quality. The control room will have a VU meter for the operator to check on the transmission level of programs. There will also be a monitor speaker in the studio so the announcer may be able to listen to outgoing programs when his microphone is dead.

2. Master control room

- 2.1 A jack panel will be mounted in the equipment racks so the operator will be able to monitor or test any signal coming into the master control room, or to test any send-out line.
- 2.2 The master control room will have level meters and high quality loudspeaker for monitoring programs to the transmitters at all times.

3. OFF AIR monitor

The master control room will have an antenna system erected on the roof and receivers to receive signals transmitted from the Lusaka transmitting station. OFF AIR sounds will be continuously monitored so that any interruption of programs by whatever reason may be quickly detected. The monitor output will also be distributed to the continuity control rooms.

4. House monitor

The house monitor system, consisting of 120 wall type speakers and 30 floor type speakers, will cover all parts of the radio centre and office areas. The master control room's outputs will be distributed to these speakers. The two outputs of home service and general service will be led to these speakers, which may be selected with switches at speaker position. The house monitor system is designed primarily for checking the contents of programs rather than their sound quality that will be checked in each studio control room.

PART 9
TECHNICAL COMMUNICATIONS

1. Technical interphone system

The technical interphone system consists of a wide range of devices for use in communicating purposes regarding the technical operation of the centre.

2. Talkback

Talkback equipment will be built into the audio console to permit direct communication between the control room and its studio or announce booth. The talkback sounds of each studio and announce booth will come through the same program monitor system to be heard from the studio monitor speakers and headphones. If the studio microphones are live, the studio monitor speakers will be automatically silenced. But talkback sounds can be listened to with the headphones.

Talkback can be heard in the control room by operating appropriate controls. Where the announce box is used, the announcer may use his own program microphone for talkback.

PART 10
ACCESSORY EQUIPMENT

The drawing figure 11 - FUNCTIONAL BLOCK DIAGRAM OF ACCESSORY EQUIPMENT SYSTEM, is provided for information on PART 10.

1. Clock system

The clock system permits accurate time checks throughout the centre. It consists of a master clock to be placed in the central apparatus room and slave clocks placed where necessary.

The clock system can produce time tone signals. A floating battery power supply assures uninterrupted service even in case of power failure. Slave clocks include thirty 1-second drive, 3-hand pulse clocks and 120 30-second drive, 2-hand pulse clocks.

2. Status lamps

Status lamps will be installed in the studio control rooms, studios and announce booths and at their entrances for easy identification of whether they are in use or not.

The red lamp remains OFF when the studio is not in use, and will light when the OUT key in the audio console is turned ON.

3. Cue lights

Green cue lights will be controlled with the non-lock switch on the audio console regardless of the microphone circuit. The cue light switch will light the green lamps in the studio and on the announce desk separately.

4. Call buzzer

A call buzzer will be provided for the announcer in the studio to call the attention of the operator in the control room to see whether his microphone is live. A call button is built into the announce control unit for the announcer. When the announcer pushes this button, the buzzer in the control room sounds.

PART 11
INTERCHANGEABILITY WITH TV EQUIPMENT

A complete and accurate television production equipment is installed in the control area on the same premises. It is desirable that the two systems be interchangeable for ease of changing the audio equipment. Interchangeability is particularly important for the following.

1. Connectors

All connectors must be interchangeable.

2. Clock system

Slave clocks must be interchangeable.

3. Patching equipment

Jacks and patching cords must be interchangeable for ease of changing and testing.

PART 12

DRAWINGS

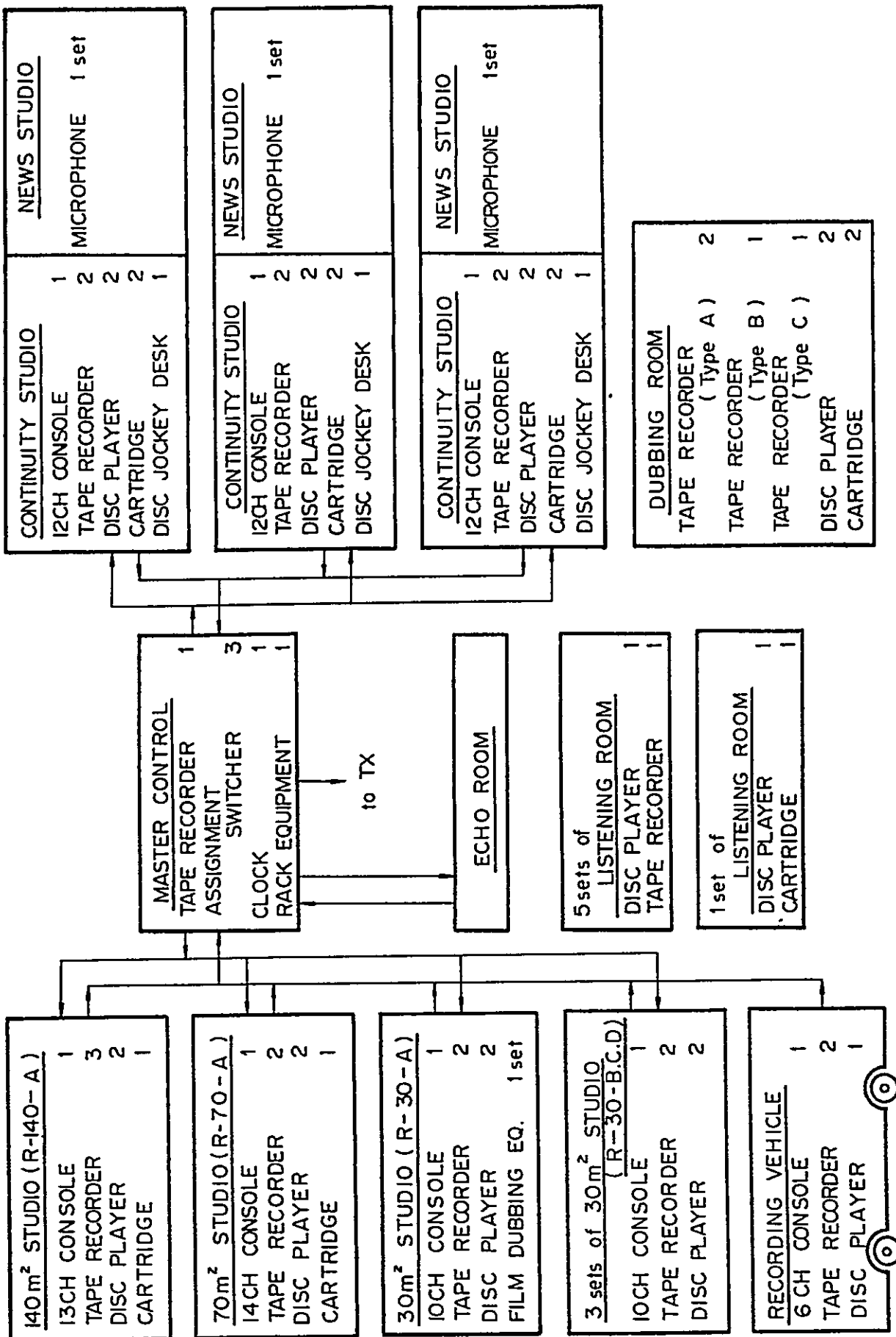


Fig. 1-1 FUNCTIONAL BLOCK DIAGRAM OF RADIO BROADCAST EQUIPMENT

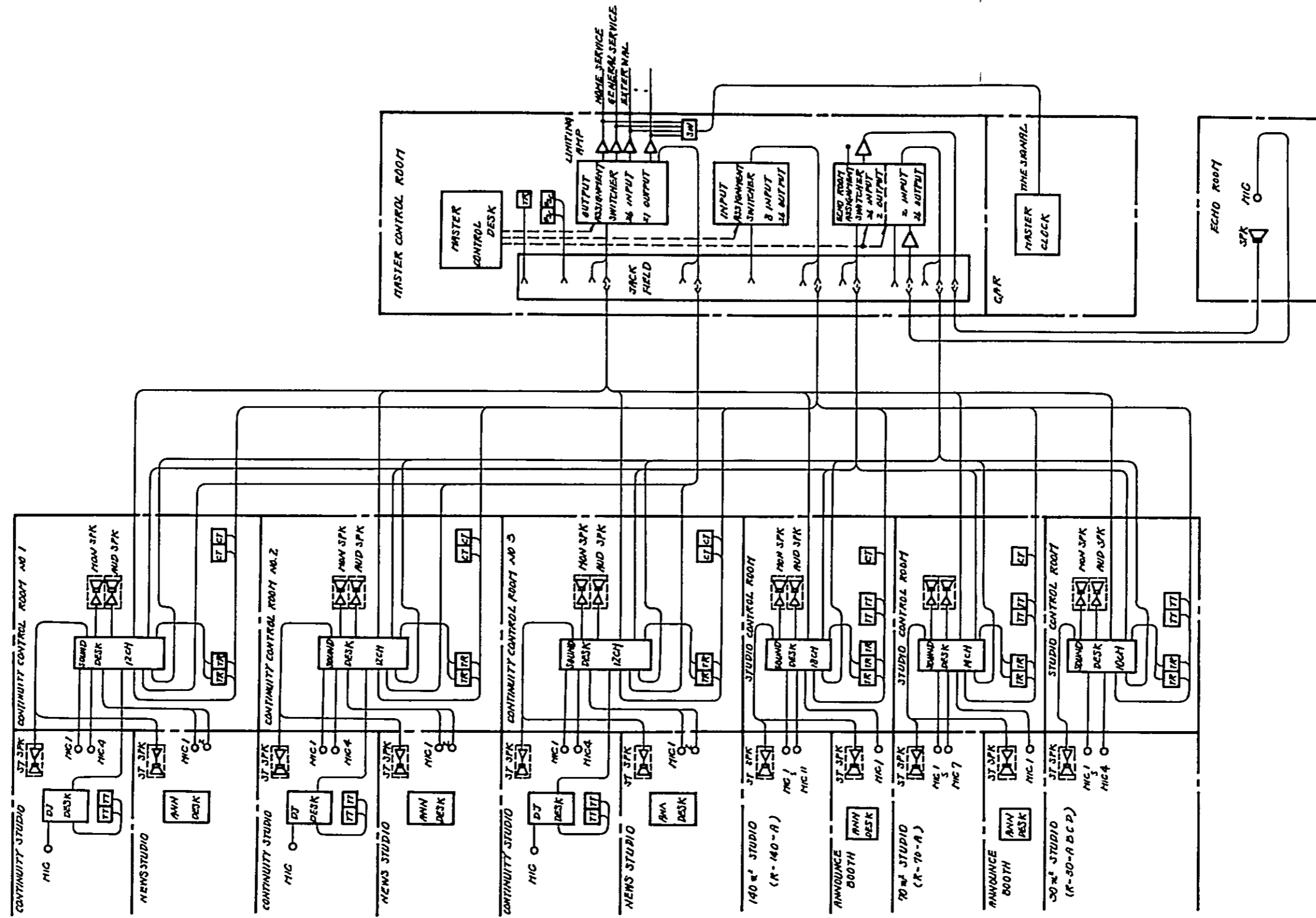


Fig. 1-2 FUNCTIONAL BLOCK DIAGRAM OF RADIO STUDIO SYSTEM

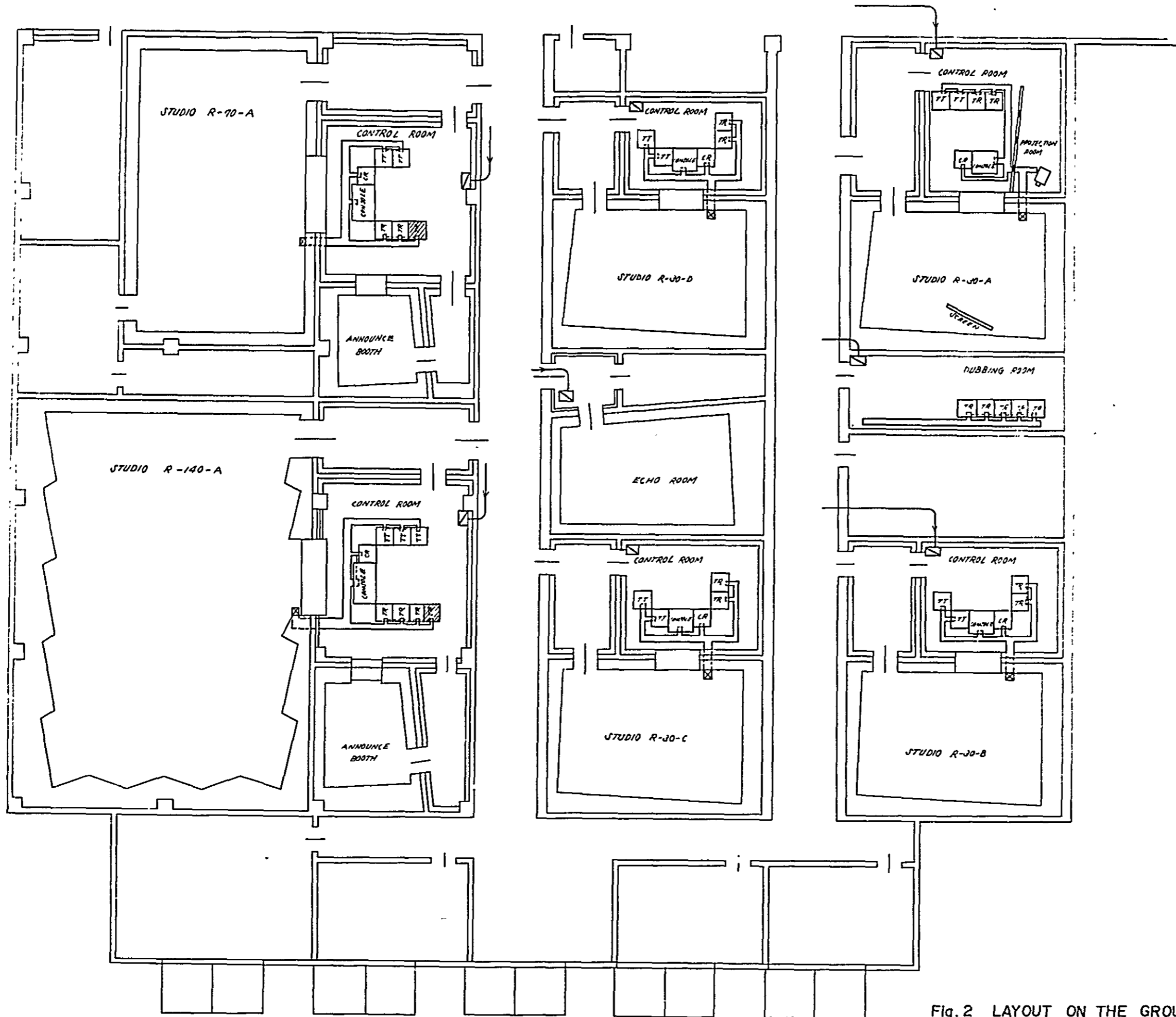


Fig. 2 LAYOUT ON THE GROUND FLOOR

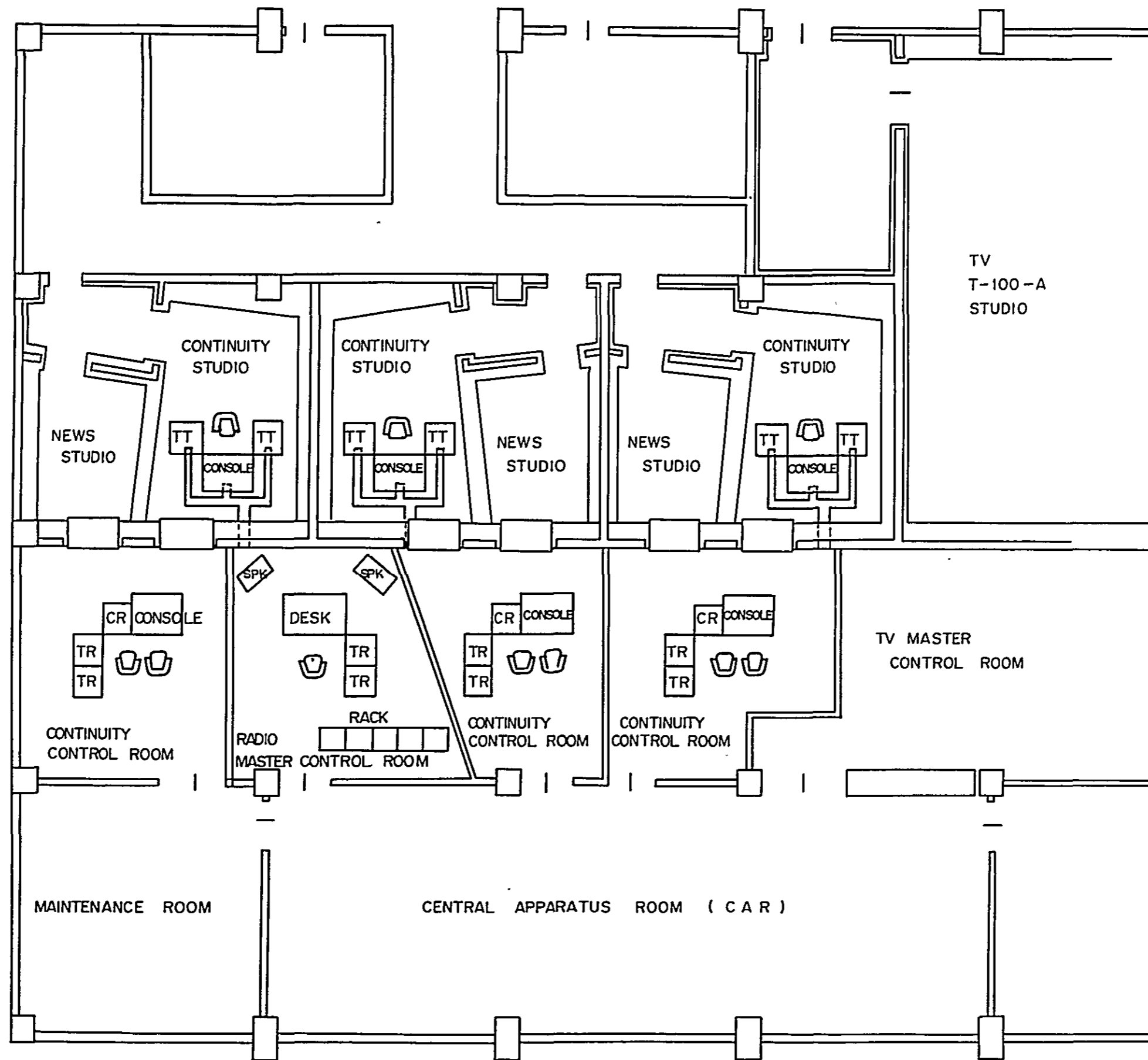


Fig. 3 LAYOUT ON THE 1ST FLOOR

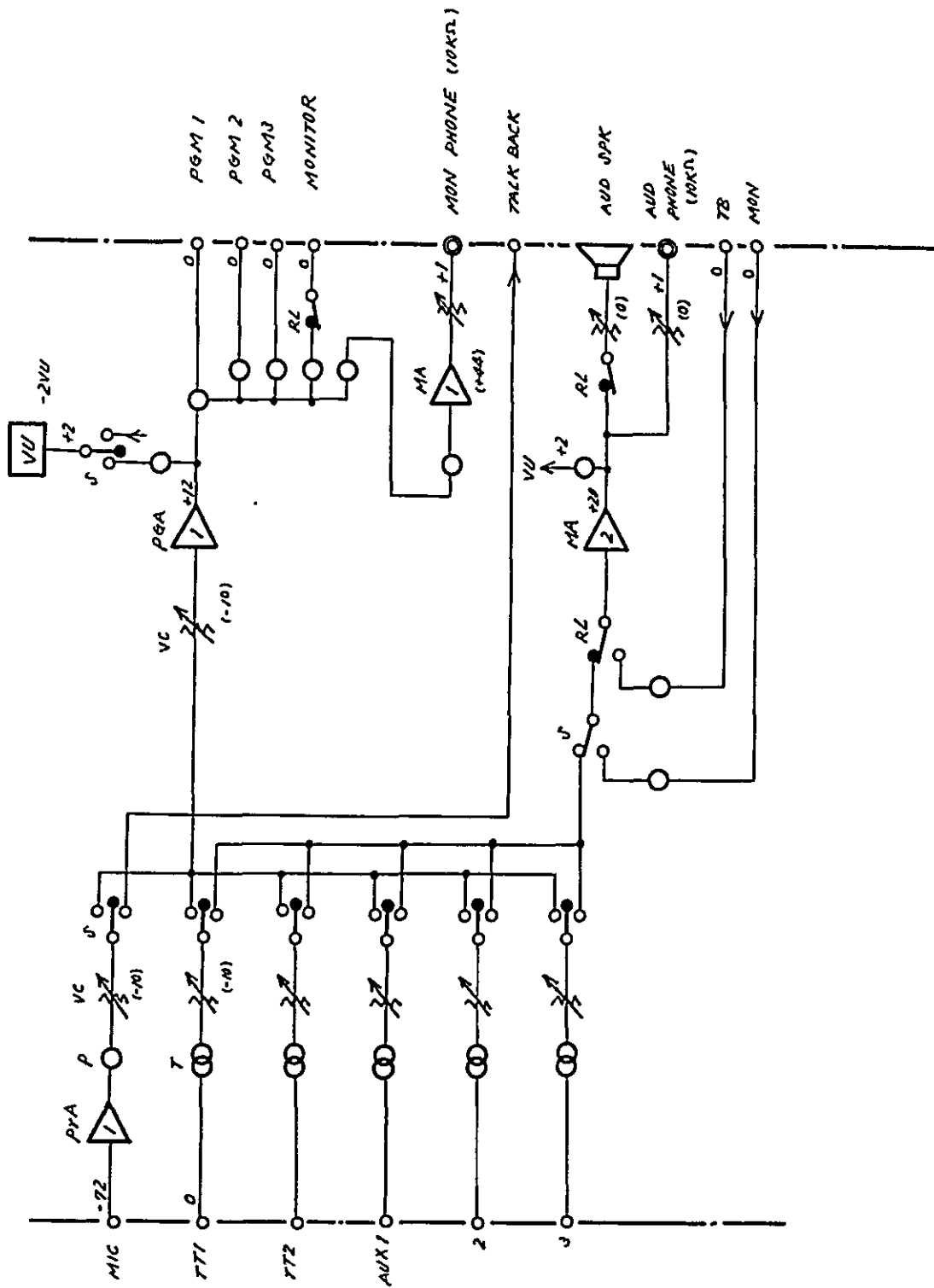
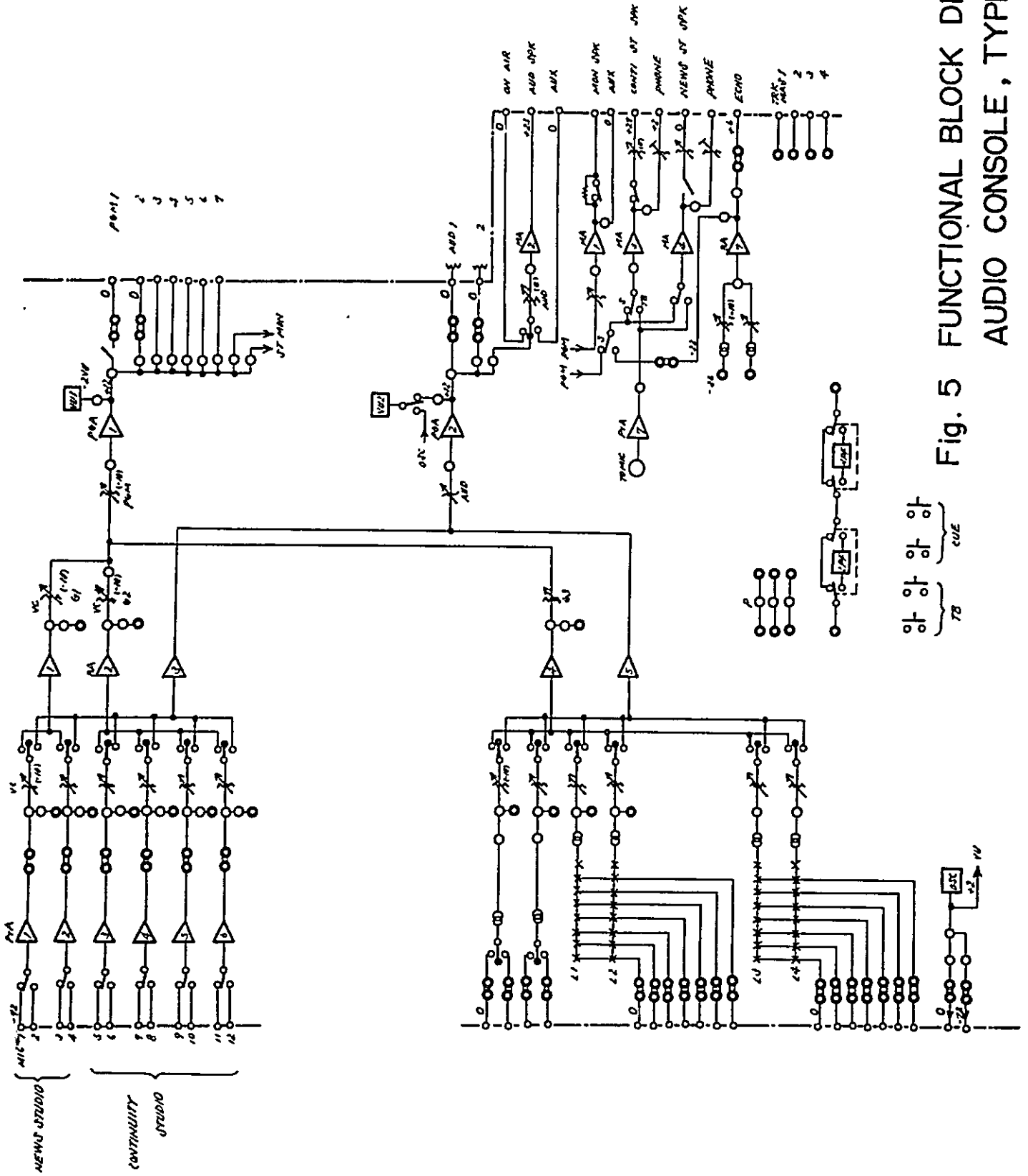


Fig. 4 FUNCTIONAL BLOCK DIAGRAM OF DISC JOCKEY DESK



TRK 1
TRK 2
TRK 3
TRK 4

Fig. 5 FUNCTIONAL BLOCK DIAGRAM OF AUDIO CONSOLE, TYPE A

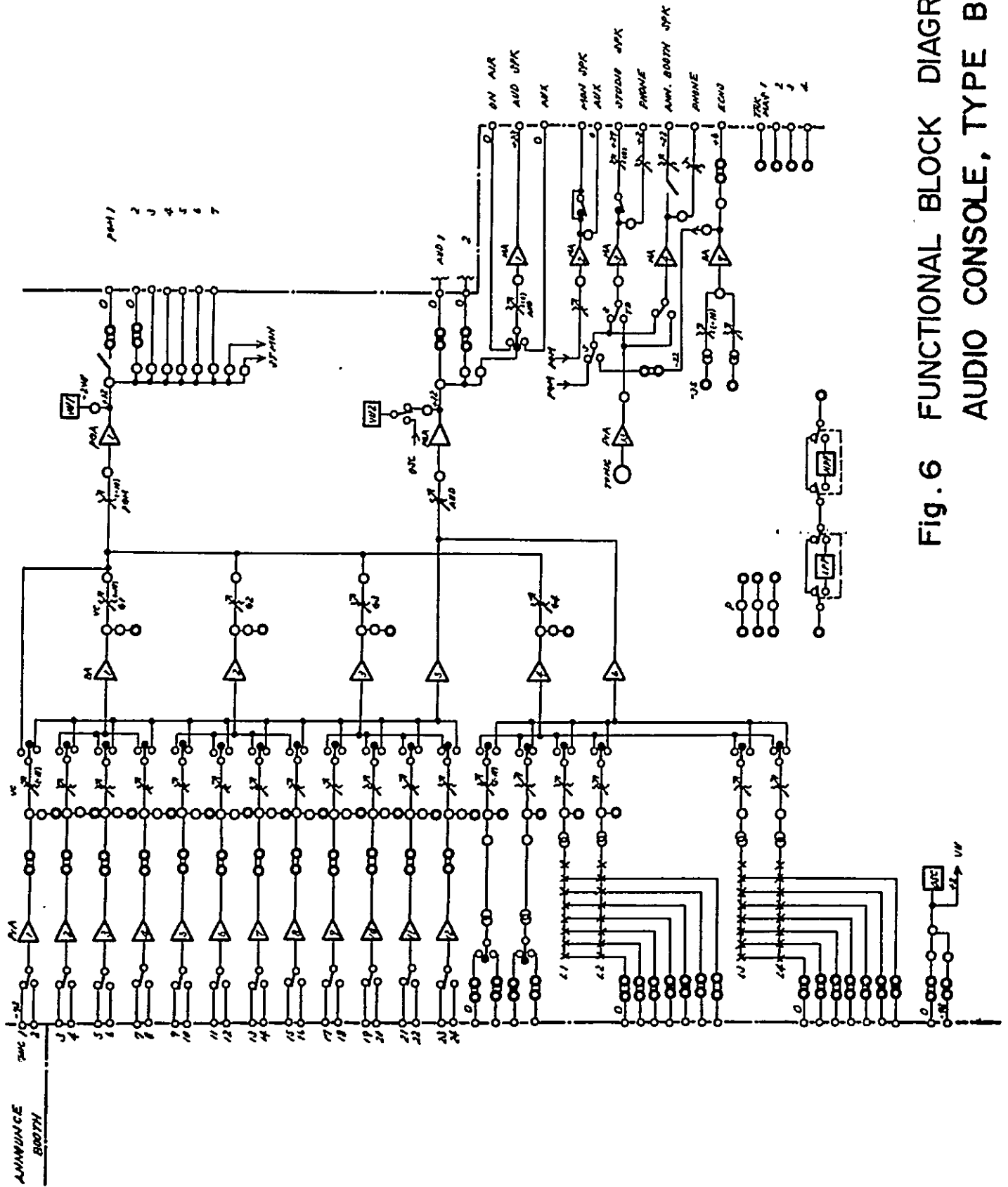


Fig. 6 FUNCTIONAL BLOCK DIAGRAM OF
AUDIO CONSOLE, TYPE B

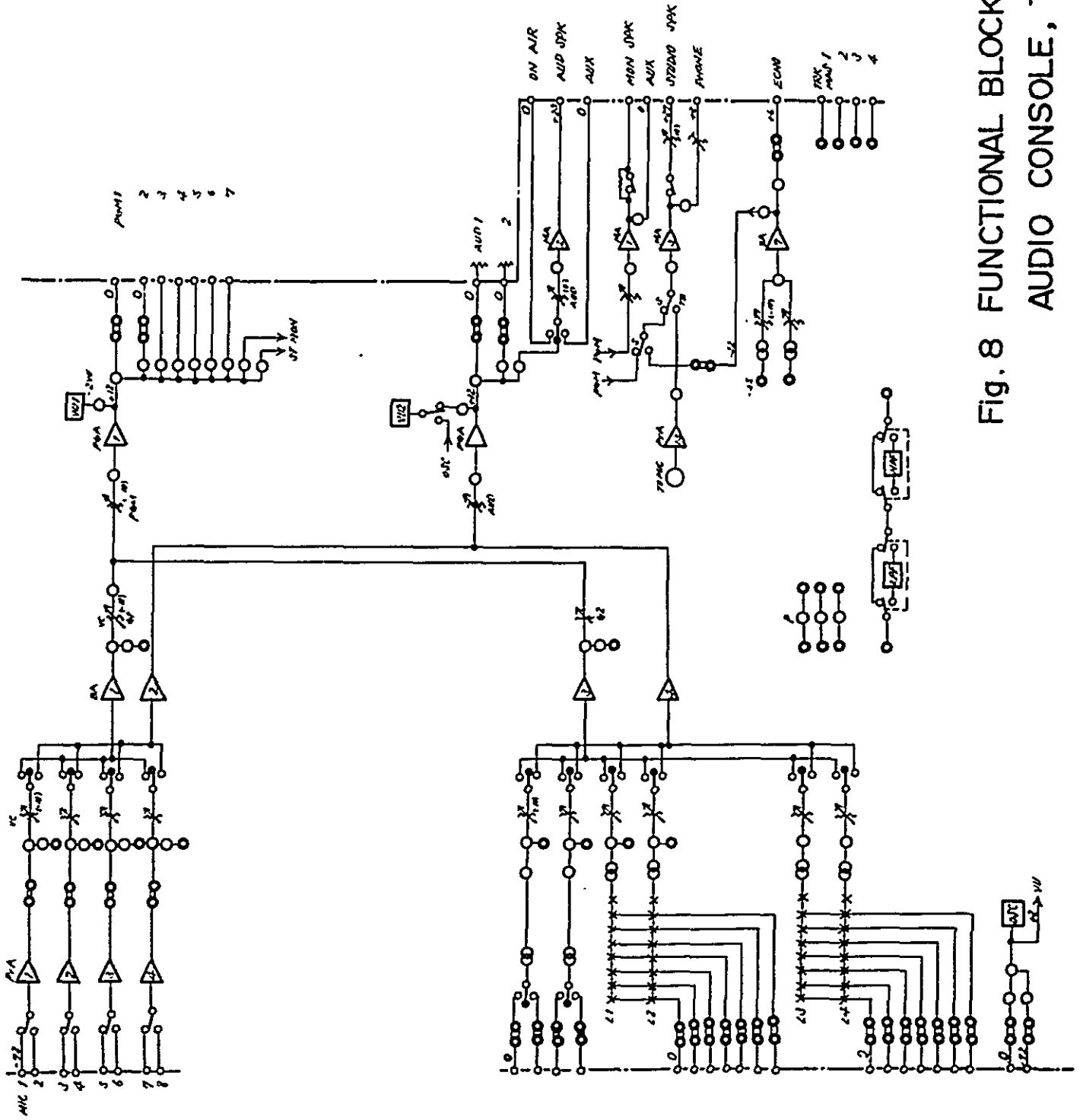


Fig. 8 FUNCTIONAL BLOCK DIAGRAM OF
AUDIO CONSOLE, TYPE D

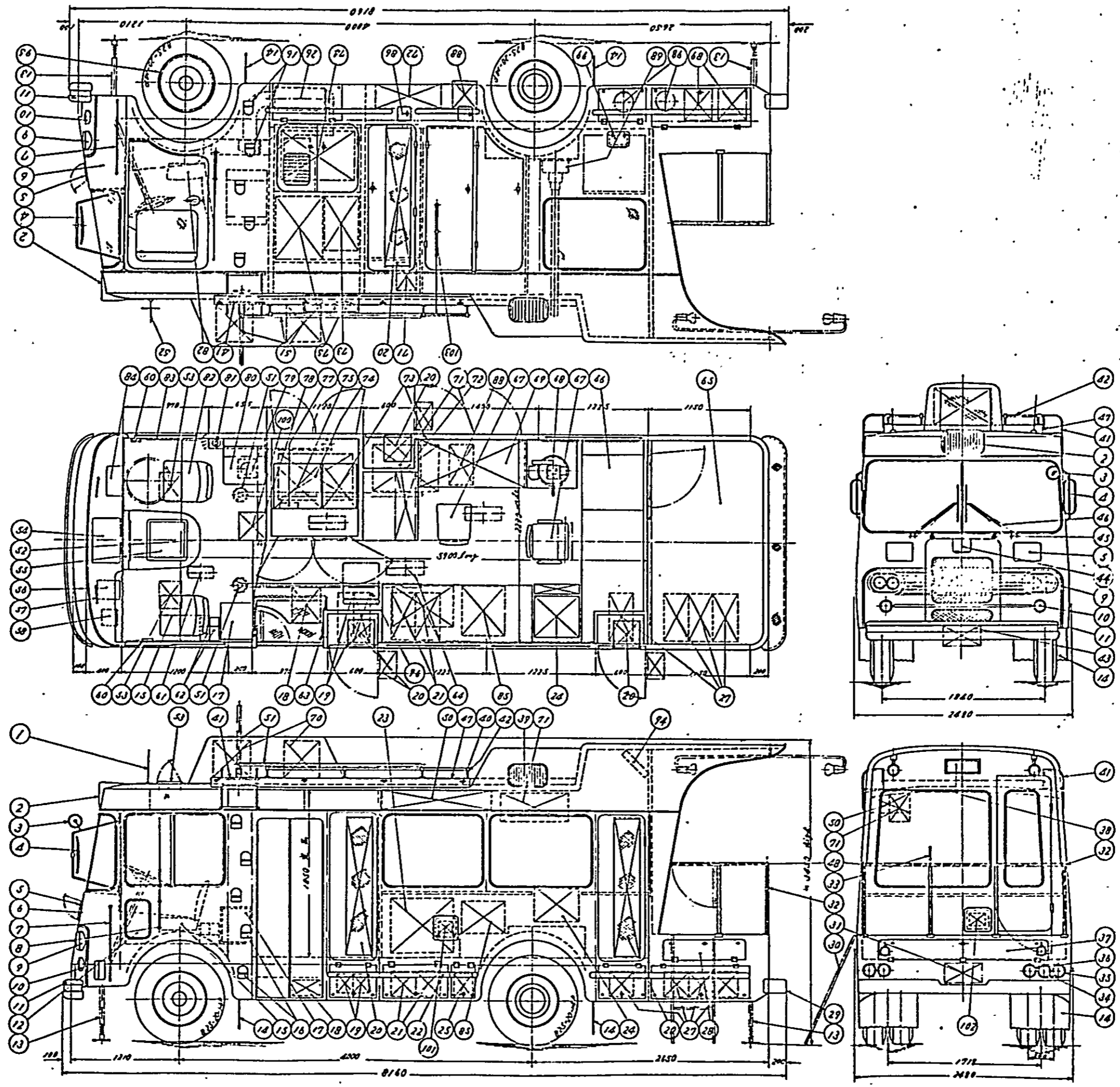


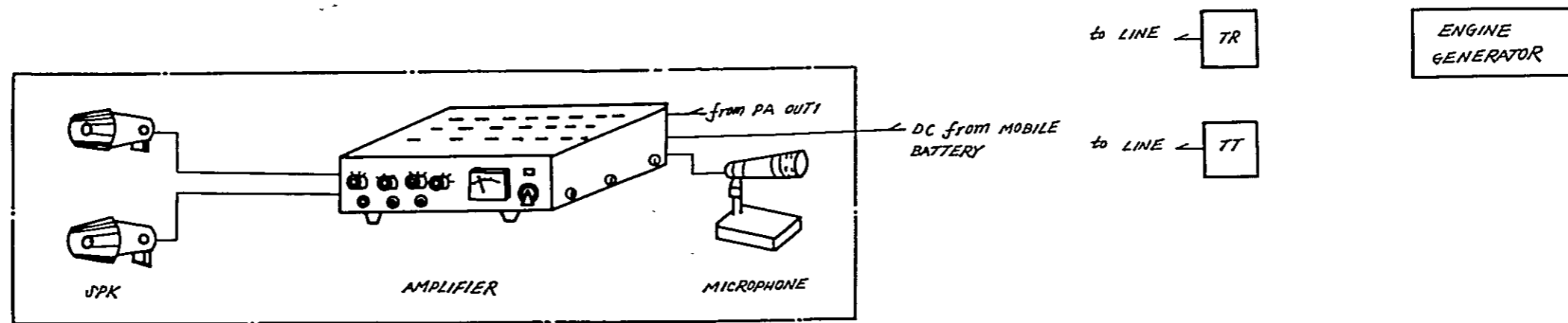
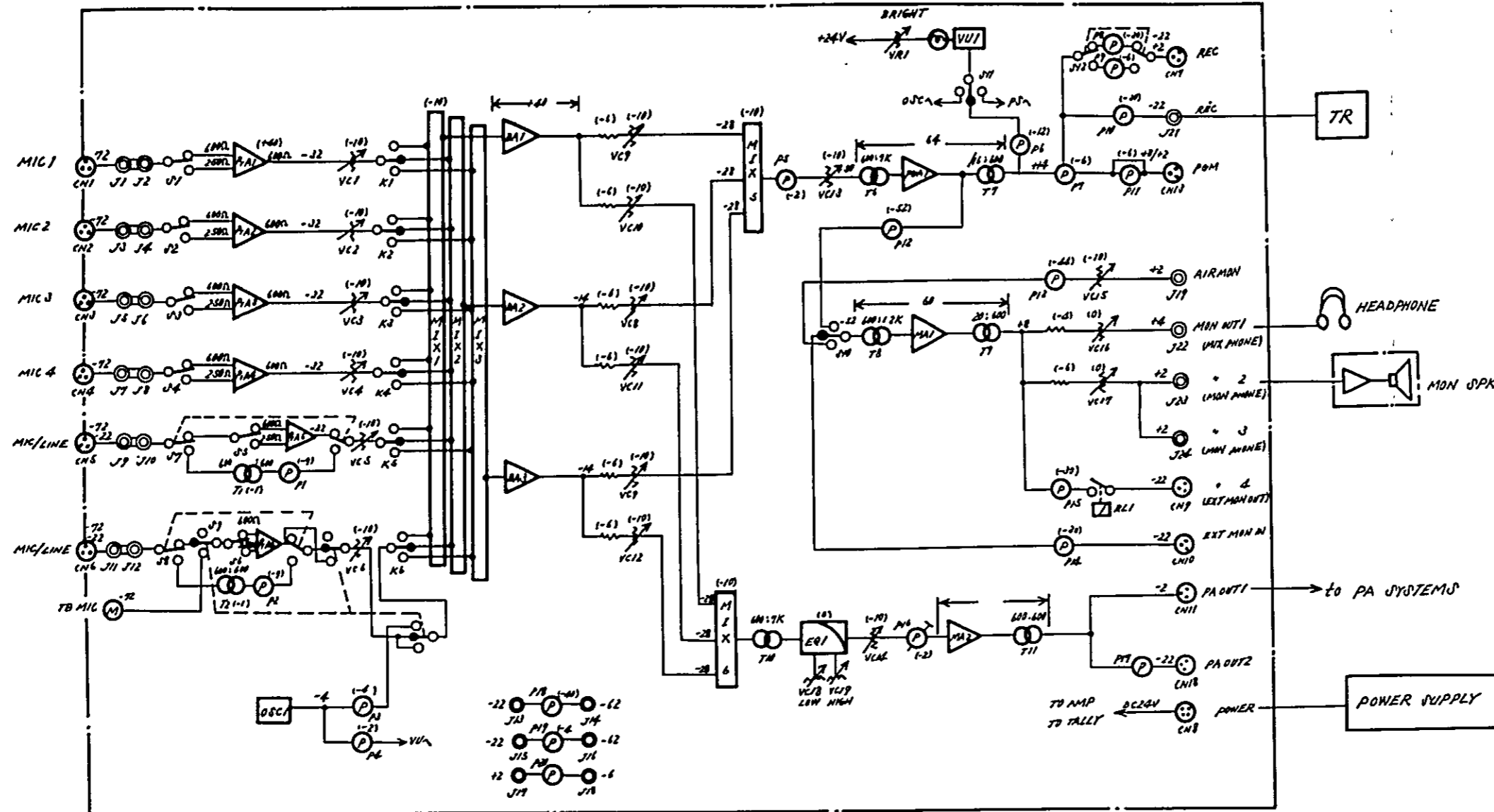
Fig.9 FLOOR LAYOUT OF RECORDING VEHICLE

APPELATION LIST OF RECORDING VEHICLE

Item No.	Appellation	Item No.	Appellation
1.	Whip Antenna	31.	Rear Number Plate
2.	Loud Speaker	32.	Grip Pipe
3.	Under Mirror	33.	Mic. Hanger
4.	Rear-view Mirror	34.	Tail Lamp
5.	Ventilator	35.	Flasher Lamp
6.	Flasher Lamp	36.	Back Lamp
7.	Flag Pole	37.	Storage
8.	Antenna	38.	Indicator
9.	Head Light	39.	Loud Speaker
10.	Fog Lamp	40.	Hook
11.	Front Bumper	41.	Step
12.	Peep Window	42.	Handrail
13.	Clamp Jack	43.	Front Number Plate
14.	Mud Protection Rubber	44.	Injection Hole
15.	Assistant's Seat	45.	Window Washer
16.	Step	46.	Window Wiper
17.	Tool Box	47.	Stage on Rooftop
18.	Storage	48.	Fittings for Sound Reflector
19.	Battery	49.	Cancel
20.	Loud Speaker	50.	Shelf
21.	Battery	51.	Antenna
22.	Side Bumper	52.	Antenna
23.	Inverter	53.	Ventilator
24.	Disc. Player	54.	Car Cooler
25.	Wash Basin	55.	Baggage Stand
26.	Heater	56.	Radio Telephone
27.	Battery	57.	Defroster Nozzle
28.	Storage	58.	Car Radio
29.	Rear Bumper	59.	Canceled
30.	Ladder	60.	Ash Tray

Item No.	Appellation	Item No.	Appellation
61.	Room Lamp	92.	TV Receiver
62.	Stopper	93.	Clock
63.	Step Lamp	94.	Loud Speaker
64.	Fluorescent Lamp	95.	Wheel Step
65.	Stage	96.	Sheet
66.	Folding Table	97.	Shelf
67.	Mixer's Seat	98.	Storage
68.	Antenna	99.	Power Terminal
69.	Shelf	100.	Power Transformer
70.	Cooler Unit	101.	Audio Terminal
71.	Cooler	102.	Terminal
72.	Fuel Tank	103.	Antenna
73.	Charger		
74.	Engine Generator		
75.	Power Distribution Board		
76.	Cancel		
77.	Generator Operation Panel		
78.	Duct		
79.	Suction Hole		
80.	Sheet		
81.	Extinguisher		
82.	Driver's Seat		
83.	Test Data		
84.	Meter Panel		
85.	Charger		
86.	Injection Hole		
87.	Injection Hole		
88.	Fuel Tank		
89.	Storage		
90.	Cancel		
91.	Table for Audio Console		

6CH AUDIO CONSOLE



PUBLIC ADDRESS SYSTEMS

Fig. 10 FUNCTIONAL BLOCK DIAGRAM OF

AUDIO SYSTEM FOR RECORDING VEHICLE

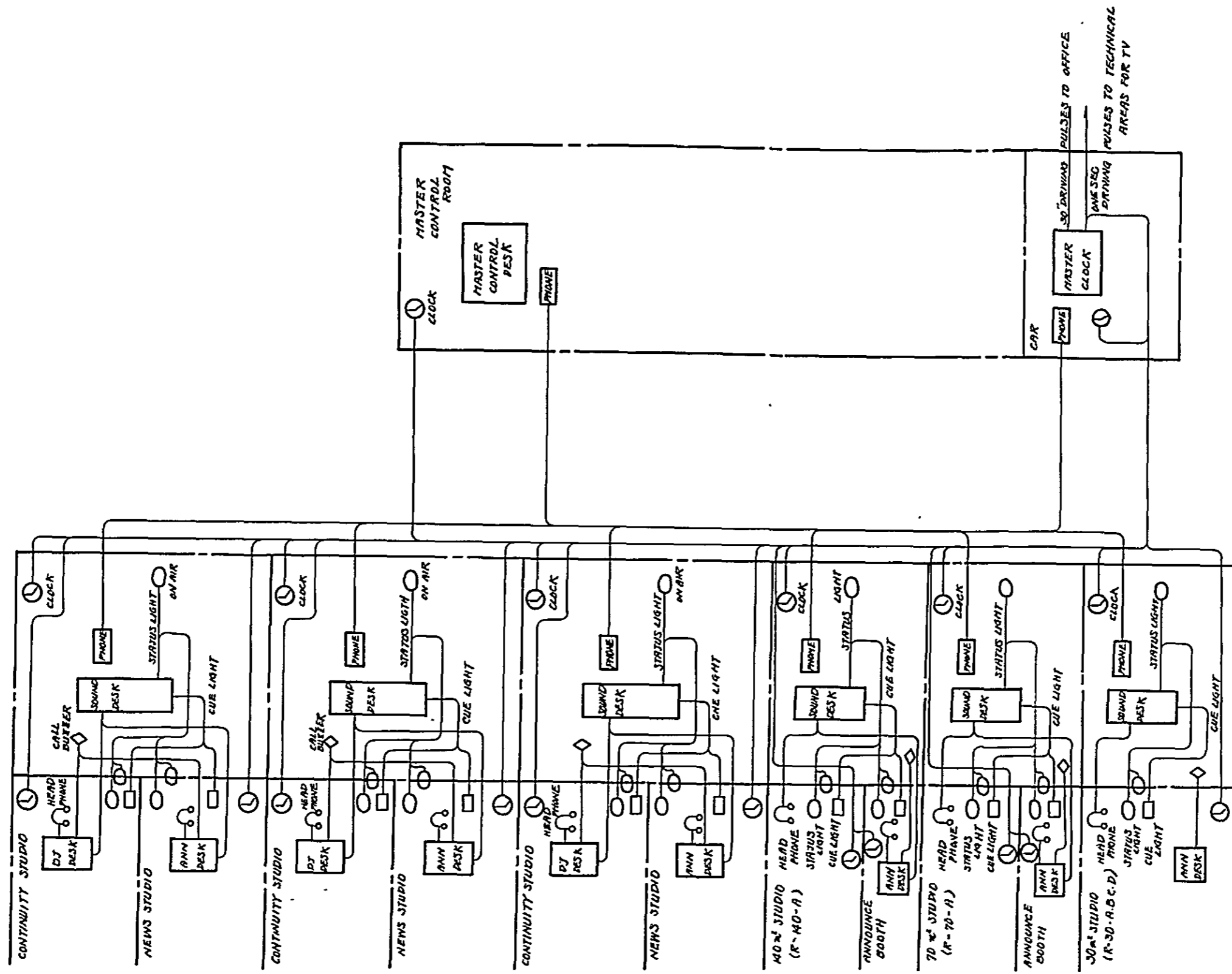


Fig. 11 FUNCTIONAL BLOCK DIAGRAM OF ACCESSORY EQUIPMENT SYSTEM

SUPPLY LIST

[A]

TRANSMITTING EQUIPMENT

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[I] KASOMPE TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 10kW VHF TV TRANSMITTER
1.1	1 set	Dual 10kW VHF TV Transmitter consisting of:
1.1.1	2 sets	10kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor
1.4.4	1 ea	Aural Demodulator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2.		MICRO WAVE LINK
2.1	2 sets	7 GHz 10 W Micro Wave Link consisting of:
2.1.1	2 sets	Receivers
2.1.2	1 set	Automatic Exchanger
2.1.3	1 ea	Cabinet Rack
2.2	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle
3.2	1 set	75 kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle
3.5	1 set	80 kVA Main Transformer (prepared by the Administration)
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare Parts
3.8	1 set	Accessories
3.9	1 set	Installation Material
3.10	1 set	75 kVA Engine Generator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker
4.5.4	1 ea	Variable Attenuator
4.5.5	1 ea	Telephone
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
5.		VHF COMMUNICATION EQUIPMENT
5.1	1 set	160.MHz Band 10 W Transmitter
5.2	1 set	160 MHz Band Receiver
5.3	1 ea	Cabinet Rack
5.4	1 set	Installation Material
6.		ANTENNA
6.1		2-Dipole Antenna for Dual 10 kW Transmitter
6.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 4 sides x 7 panels
6.1.2	1 set	Branch Feeders
6.1.3	1 set	Junction Boxes
6.1.4	1 set	Tee Transformers
6.1.5	1 set	Rigid Copper Transmission Lines
6.1.6	1 set	Adaptors
6.1.7	1 set	Hangers
6.1.8	1 set	Gas Stoppers
6.1.9	1 ea	Dehydrator
6.1.10	1 set	Installation Material
6.2		Parabolic Antenna for 7 GHz Micro Wave Link
6.2.1	1 ea	3m ϕ Parabolic Antenna
6.2.2	1 set	Wave Guide with Fittings
6.2.3	1 ea	Dehydrator
6.2.4	1 set	Installation Material
6.3		YAGI Antenna for 160 MHz Communication Equipment
6.3.1	2 ea	YAGI Antenna of 5-Elements
6.3.2	1 set	Installation Material

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
7.		TEST EQUIPMENT
7.1	1 set	AM Side Band Analyzer
7.2	1 set	Oscilloscope
7.3	1 set	Megohm Meter
7.4	1 set	Circuit Tester
7.5	1 set	Vacuum Voltage Meter

[II] KITWE TV STUDIO

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		MICRO WAVE LINK
1.1	2 sets	7 GHz 10 W Micro Wave Link consisting of:
1.1.1	2 sets	Transmitter
1.1.2	2 sets	10 W TWT Linear Amplifier
1.1.3	1 set	Automatic Exchanger
1.1.4	1 ea	Cabinet Rack
1.1.5	1 set	Power Meter
1.2	1 set	Spare Parts (included spare parts for receiver)
1.3	1 set	Accessories (included accessories for receiver)
1.4	1 set	Installation Material
2.		VHF COMMUNICATION EQUIPMENT
2.1	1 set	160 MHz Band 10 W Transmitter
2.2	1 set	160 MHz Band Receiver
2.3	1 ea	Cabinet Rack
2.4	1 set	Spare Parts (included spare parts for receiver installed at Kasombe transmitting station)
2.5	1 set	Accessories (included accessories for receiver installed at Kasombe transmitting station)
2.6	1 set	Installation Material
3.		ANTENNA
3.1		Parabolic Antenna for 7 GHz Micro Wave Link
3.1.1	1 ea	3m ϕ Parabolic Antenna
3.1.2	1 set	Wave Guide with Fittings
3.1.3	1 ea	Dehydrator
3.1.4	1 set	Installation Material

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.2		YAGI Antenna for 160 MHz Communication Equipment
3.2.1	2 ea	YAGI Antenna of 5-Elements
3.2.2	1 set	Installation Material

[III] NAKUPATA HILL TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 10kW VHF TV TRANSMITTER
1.1	1 set	Dual 10kW VHF TV Transmitter consisting of:
1.1.1	2 sets	10kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor
1.4.4	1 ea	Aural Demodulator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2.		MICRO WAVE LINK
2.1	1 set	7 GHz 0.1 W Micro Wave Link consisting of:
2.1.1	1 set	Receiver
2.1.2	1 ea	Cabinet Rack
2.1.3	1 set	Spare Parts (included spare parts for transmitter installed at Kaloko Hill micro wave station)
2.1.4	1 set	Accessories (included accessories for transmitter installed at Kaloko Hill micro wave station)
2.1.5	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle
3.2	1 set	75 kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle
3.5	1 set	80 kVA Main Transformer (prepared by the Administration)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare parts
3.8	1 set	Accessories
3.9	1 set	Installation Material
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker
4.5.4	1 ea	Variable Attenuator
4.5.5	1 ea	Telephone

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material
5.		VHF COMMUNICATION EQUIPMENT
5.1	1 set	160 MHz Band 1W Transmitter
5.2	1 set	160 MHz Band Receiver
5.3	1 ea	Cabinet Rack
5.4	1 set	Spare Parts (included spare parts for equipment installed at Kaloko Hill Micro wave station)
5.5	1 set	Accessories (included accessories for equipment installed at Kaloko Hill micro wave station)
5.6	1 set	Installation Material
6.		ANTENNA
6.1		2-Dipole Antenna for Dual 10kW Transmitter
6.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 2 sides x 6 panels, 2 sides x 3 panels.
6.1.2	1 set	Branch Feeders
6.1.3	1 set	Junction Boxes
6.1.4	1 set	Tee Transformers
6.1.5	1 set	Rigid Copper Transmission Lines
6.1.6	1 set	Adaptors
6.1.7	1 set	Hangers
6.1.8	1 set	Gas Stoppers
6.1.9	1 ea	Dehydrator
6.1.10	1 set	Installation Material

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
6.2		Parabolic Antenna for 7 GHz Micro Wave Link
6.2.1	1 ea	1.8 m ϕ Parabolic Antenna
6.2.2	1 set	Wave Guide with Fittings
6.2.3	1 ea	Dehydrator
6.2.4	1 set	Installation Material
6.3		YAGI Antenna for 160 MHz Communication Equipment
6.3.1	2 ea	YAGI Antenna of 5-Elements
6.3.2	1 set	Installation Material
7.		TEST EQUIPMENT
7.1	1 set	AM Side Band Analyzer
7.2	1 set	Oscilloscope
7.3	1 set	Megohm Meter
7.4	1 set	Circuit Tester
7.5	1 set	Vacuum Voltage Meter

[IV] KALOKO HILL MICRO WAVE STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		MICRO WAVE LINK
1.1	1 set	7 GHz 0.1 W Micro Wave Link consisting of:
1.1.1	1 set	Transmitter
1.1.2	1 ea	Cabinet Rack
1.1.3	1 set	Power Meter
1.1.4	1 set	Installation Material
2.		VHF COMMUNICATION EQUIPMENT
2.1	1 set	160 MHz Band 1 W Transmitter
2.2	1 set	160 MHz Band Receiver
2.3	1 ea	Cabinet Rack
2.4	1 set	Installation Material
3.		ANTENNA
3.1		Parabolic Antenna for 7 GHz Micro Wave Link
3.1.1	1 ea	1.8 m ϕ Parabolic Antenna
3.1.2	1 set	Wave Guide with Fittings
3.1.3	1 ea	Dehydrator
3.1.4	1 set	Installation Material
3.2		YAGI Antenna for 160 MHz Communication Equipment
3.2.1	2 ea	YAGI Antenna of 5-Elements
3.2.2	1 set	Installation Material

[V] KABWE TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 10kW VHF TV TRANSMITTER
1.1	1 set	Dual 10kW VHF TV Transmitter consisting of:
1.1.1	2 sets	10kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor
1.4.4	1 ea	Aural Demodulator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2.		CABLE LINK
2.1	2 sets	Video Cable
2.2	2 sets	Audio Cable
2.3	1 set	Monitoring Cable
2.4	1 set	Control Cable
2.5	1 set	Video Cable Compensator
2.6	1 set	Audio Cable Compensator
2.7	1 set	Jack Panel
2.8	1 ea	Cabinet Rack
2.9	1 set	Spare Parts
2.10	1 set	Accessories
2.11	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle
3.2	1 set	75 kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle
3.5	1 set	80 kVA Main Transformer (prepared by the Administration)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare Parts
3.8	1 set	Accessories
3.9	1 set	Installation Material
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker
4.5.4	1 ea	Variable Attenuator
4.5.5	1 ea	Telephone

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material
5.		ANTENNA
5.1		2-Dipole Antenna for Dual 10 kW Transmitter
5.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 4 sides x 7 panels
5.1.2	1 set	Branch Feeders
5.1.3	1 set	Junction Boxes
5.1.4	1 set	Tee Transformers
5.1.5	1 set	Rigid Copper Transmission Lines
5.1.6	1 set	Adaptors
5.1.7	1 set	Hangers
5.1.8	1 set	Gas Stoppers
5.1.9	1 ea	Dehydrator
5.1.10	1 set	Installation Material
6.		TEST EQUIPMENT
6.1	1 set	AM Side Band Analyzer
6.2	1 set	Oscilloscope
6.3	1 set	Megohm Meter
6.4	1 set	Circuit Tester
6.5	1 set	Vacuum Voltage Meter

[VI] KABWE MICRO WAVE STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		CABLE LINK
1.1	1 set	Jack Panel

[VII] LUSAKA TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 10kW VHF TV TRANSMITTER
1.1	1 set	Dual 10kW VHF TV Transmitter consisting of:
1.1.1	2 sets	10 kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.4	1 ea	Aural Demodulator
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2.		MICRO WAVE LINK
2.1	2 sets	7 GHz 0.5 W Micro Wave Link consisting of:
2.1.1	2 sets	Receivers
2.1.2	1 set	Automatic Exchanger
2.1.3	1 ea	Cabinet Rack
2.1.4	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle ,
3.2	1 set	75 kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle
3.5	1 set	80 kVA Main Transformer (prepared by the Administration)
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare Parts
3.8	1 set	Accessories

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.9	1 set	Installation Material
3.10	1 set	75 kVA Engine Generator
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker
4.5.4	1 ea	Variable Attenuator
4.5.5	1 ea	Telephone
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material
5.		VHF COMMUNICATION EQUIPMENT
5.1	1 set	160 MHz Band 1 W Transmitter
5.2	1 set	160 MHz Band Receiver
5.3	1 ea	Cabinet Rack
5.4	1 set	Installation Material
6.		ANTENNA
6.1		2-Dipole Antenna for Dual 10kW Transmitter
6.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 4 sides x 7 panels
6.1.2	1 set	Branch Feeders
6.1.3	1 set	Junction Boxes
6.1.4	1 set	Tee Transformers
6.1.5	1 set	Rigid Copper Transmission Lines
6.1.6	1 set	Adaptors
6.1.7	1 set	Hangers
6.1.8	1 set	Gas Stoppers
6.1.9	1 ea	Dehydrator
6.1.10	1 set	Installation Material
6.2		Parabolic Antenna for 7 GHz Micro Wave Link
6.2.1	1 ea	1.8 m ϕ Parabolic Antenna
6.2.2	1 set	Wave Guide with Fittings
6.2.3	1 ea	Dehydrator
6.2.4	1 set	Installation Material
6.3		YAGI Antenna for 160 MHz Communication Equipment
6.3.1	2 ea	YAGI Antenna of 5-Elements
6.3.2	1 set	Installation Material

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
7.		TEST EQUIPMENT
7.1	1 set	AM Side Band Analyzer
7.2	1 set	Oscilloscope
7.3	1 set	Megohm Meter
7.4	1 set	Circuit Tester
7.5	1 set	Vacuum Voltage Meter

[VIII] LUSAKA STUDIO CENTRE

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		MICRO WAVE LINK
1.1	2 sets	7 GHz 0.5 W Micro Wave Link consisting of:
1.1.1	2 sets	Transmitter
1.1.2	1 set	Automatic Exchanger
1.1.3	1 ea	Cabinet Rack
1.1.4	1 set	Power Meter
1.2	1 set	7 GHz 0.1 W Micro Wave Link consisting of:
1.2.1	1 set	Transmitter
1.2.2	1 set	Power Meter
1.2.3	1 set	Receiver
1.2.4	1 ea	Cabinet Rack
1.3	1 set	Spare Parts (included spare parts for equipment installed at Lusaka transmitting station and micro wave station)
1.4	1 set	Accessories (included accessories for equipment installed at Lusaka transmitting station and micro wave station)
2.		MONITORING AND CONTROL EQUIPMENT
2.1	1 set	Central Operation Panel consisting of:
2.1.1	7 ea	Control Switches Section
2.1.2	7 ea	Lamp Indicator Section
2.1.3	1 set	Associated Parts
2.2	1 set	Logic Unit consisting of:
2.2.1	7 ea	Encoder
2.2.2	1 ea	Register

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
2.2.3	1 ea	P/S (Parallel to Series) Converter
2.2.4	7 ea	S/P (Series to Parallel) Converter
2.2.5	7 ea	Receiving Register
2.2.6	7 ea	Lamp Driver
2.2.7	1 set	Associated Parts
2.3	1 set	Carrier I/O (Input, Output) Unit consisting of:
2.3.1	1 ea	FS (Frequency Shift) Modulator
2.3.2	7 ea	Demodulator
2.3.3	1 ea	Line Amplifier
2.3.4	2 ea	Low Pass Filter
2.3.5	8 ea	Band Pass Filter
2.3.6	1 ea	Variable Attenuator
2.3.7	2 ea	Transformer
2.3.8	1 set	Associated Parts
2.4	1 set	Telephone consisting of:
2.4.1	1 ea	Line Amplifier
2.4.2	2 ea	Transformer
2.4.3	1 ea	Speaker
2.4.4	1 ea	Variable Attenuator
2.4.5	1 ea	Telephone
2.4.6	1 set	Associated Parts
2.5	1 set	Power Supply
2.6	1 ea	Cabinet Rack
2.7	1 set	Spare Parts (included spare parts for equipment installed at transmitting stations)
2.8	1 set	Accessories (included accessories for equipment installed at transmitting stations)
2.9	1 set	Installation Material

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.		VHF COMMUNICATION EQUIPMENT
3.1	2 sets	160 MHz Band 1 W Transmitter
3.2	2 sets	160 MHz Band Receiver
3.3	2 ea	Cabinet Rack
3.4	1 set	Spare Parts (included spare parts for equipment installed at Lusaka transmitting station and micro wave station)
3.5	1 set	Accessories (included accessories for equipment installed at Lusaka transmitting station and micro wave station)
3.6	1 set	Installation Material
4.		ANTENNA
4.1		Parabolic Antenna for 7 GHz Micro Wave Link
4.1.1	3 ea	1.8 m ϕ Parabolic Antenna
4.1.2	3 sets	Wave Guide with Fittings
4.1.3	3 ea	Dehydrator
4.1.4	1 set	Installation Material
4.2		YAGI Antenna for 160 MHz Communication Equipment
4.2.1	4 ea	YAGI Antenna of 5-Elements
4.2.2	1 set	Installation Material
5.		TEST EQUIPMENT
5.1	1 set	Test Signal Generator
5.2	1 set	Envelope Oscilloscope
5.3	1 set	FM Side Band Analyzer
5.4	1 set	Audio Test Set
5.5	1 set	Audio Variable Attenuator
5.6	1 set	VHF Sweeper

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
5.7	1 set	RF Detector
5.8	1 set	RF Button Type Attenuator
5.9	1 set	Frequency Counter and Divider
5.10	1 set	Envelope Delay Test Equipment
5.11	1 set	Vector Scope
5.12	1 set	RF Signal Generator
5.13	1 set	Impedance Bridge
5.14	1 set	Field Intensity Meter
5.15	1 set	DG/DP Test Equipment
5.16	1 set	Wide Band Oscillator
5.17	1 set	NFB Tester
5.18	1 set	I. C. Tester
5.19	1 set	5 W Walkey-talky

[IX] LUSAKA MICRO WAVE STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		MICRO WAVE LINK
1.1	1 set	7 GHz 0.1 W Micro Wave Link consisting of:
1.1.1	1 set	Transmitter
1.1.2	1 set	Power Meter
1.1.3	1 set	Receiver
1.1.4	1 ea	Cabinet Rack
1.2	1 set	Installation Material
2.		VHF COMMUNICATION EQUIPMENT
2.1	1 set	160 MHz Band 1 W Transmitter
2.2	1 set	160 MHz Band Receiver
2.3	1 ea	Cabinet Rack
2.4	1 set	Installation Material
3.		ANTENNA
3.1		Parabolic Antenna for 7 GHz Micro Wave Link
3.1.1	2 ea	1.8 m ϕ Parabolic Antenna
3.1.2	2 sets	Wave Guide with Fittings
3.1.3	2 ea	Dehydrator
3.1.4	1 set	Installation Material
3.2		YAGI Antenna for 160 MHz Communication Equipment
3.2.1	2 ea	YAGI Antenna of 5-Elements
3.2.2	1 set	Installation Material

[X] PEMBA TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 10 kW VHF TRANSMITTER
1.1	1 set	Dual 10 kW VHF TV Transmitter consisting of:
1.1.1	2 sets	10 kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor
1.4.4	1 ea	Aural Demodulator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2.		CABLE LINK
2.1	2 sets	Video Cable
2.2	2 sets	Audio Cable
2.3	1 set	Monitoring Cable
2.4	1 set	Control Cable
2.5	1 set	Video Cable Compensator
2.6	1 set	Audio Cable Compensator
2.7	1 set	Jack Panel
2.8	1 ea	Cabinet Rack
2.9	1 set	Spare Parts
2.10	1 set	Accessories
2.11	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle
3.2	1 set	75kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle
3.5	1 set	80kVA Main Transformer (prepared by the Administration)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare Parts
3.8	1 set	Accessories
3.9	1 set	Installation Material
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker
4.5.4	1 ea	Variable Attenuator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.5.5	1 ea	Telephone
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material
5.		ANTENNA
5.1		2-Dipole Antenna for Dual 10 kW Transmitter
5.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 4 sides x 7 panels
5.1.2	1 set	Branch Feeders
5.1.3	1 set	Junction Boxes
5.1.4	1 set	Tee Transformers
5.1.5	1 set	Rigid Copper Transmission Lines
5.1.6	1 set	Adaptors
5.1.7	1 set	Hangers
5.1.8	1 set	Gas Stoppers
5.1.9	1 ea	Dehydrator
5.1.10	1 set	Installation Material
6.		TEST EQUIPMENT
6.1	1 set	AM Side Band Analyzer
6.2	1 set	Oscilloscope
6.3	1 set	Megohm Meter
6.4	1 set	Circuit Tester
6.5	1 set	Vacuum Voltage Meter

[XI] PEMBA MICRO WAVE STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		CABLE LINK
1.1	1 set	Jack Panel

[XII] TARA TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 1 kW VHF TRANSMITTER
1.1	1 set	Dual 1 kW VHF TV Transmitter consisting of:
1.1.1	2 sets	1 kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor
1.4.4	1 ea	Aural Demodulator

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2		CABLE LINK
2.1	2 sets	Video Cable
2.2	2 sets	Audio Cable
2.3	1 set	Monitoring Cable
2.4	1 set	Control Cable
2.5	1 set	Video Cable Compensator
2.6	1 set	Audio Cable Compensator
2.7	1 set	Jack Panel
2.8	1 ea	Cabinet Rack
2.9	1 set	Spare Parts
2.10	1 set	Accessories
2.11	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle
3.2	1 set	20 kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle
3.5	1 set	25 kVA Main Transformer (prepared by the Administration)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare Parts
3.8	1 set	Accessories
3.9	1 set	Installation Material
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker
4.5.4	1 ea	Variable Attenuator
4.5.5	1 ea	Telephone

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material
5.		ANTENNA
5.1		2-Dipole Antenna for Dual 1 kW Transmitter
5.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 4 sides x 3 panels
5.1.2	1 set	Branch Feeders
5.1.3	1 set	Junction Boxes
5.1.4	1 set	Tee Transformers
5.1.5	1 set	Rigid Copper Transmission Lines
5.1.6	1 set	Adaptors
5.1.7	1 set	Hangers
5.1.8	1 set	Gas Stoppers
5.1.9	1 ea	Dehydrator
5.1.10	1 set	Installation Material
6.		TEST EQUIPMENT
6.1	1 set	AM Side Band Analyzer
6.2	1 set	Oscilloscope
6.3	1 set	Megohm Meter
6.4	1 set	Circuit Tester
6.5	1 set	Vacuum Voltage Meter

[XIII] TARA MICRO WAVE STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		CABLE LINK
1.1	1 set	Jack Panel

[XIV] SENKOBO TRANSMITTING STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		DUAL 10 kW VHF TRANSMITTER
1.1	1 set	Dual 10 kW VHF TV Transmitter consisting of:
1.1.1	2 sets	10 kW VHF TV Transmitter Complete with Exciter, Power Amplifier, Operating Tubes and Blower.
1.1.2	1 set	Combining Unit (Visual & Aural)
1.1.3	1 set	Phase Adjuster
1.1.4	1 set	Distributor of Oscillator
1.1.5	1 set	Oscillator Exchanger
1.1.6	1 ea	Cabinet Rack
1.2	1 set	Output Equipment consisting of:
1.2.1	1 set	CIN Diplexer with Filters
1.2.2	1 set	U-link Panel
1.2.3	1 ea	Dummy Load
1.3	1 set	Input Equipment consisting of:
1.3.1	2 ea	Pre-Distortion Amplifier
1.3.2	2 ea	Phase Equalizer
1.3.3	1 ea	Video Jack Panel
1.3.4	1 ea	Limiting Amplifier
1.3.5	1 ea	Audio Jack Panel
1.4	1 set	Monitoring Equipment consisting of:
1.4.1	1 ea	Visual Demodulator
1.4.2	2 ea	Linear Detector
1.4.3		Master Monitor
1.4.3.1	1 ea	Picture Monitor
1.4.3.2	1 ea	Waveform Monitor

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.4.4	1 ea	Aural Demodulator
1.4.5		Audio Monitor
1.4.5.1	1 ea	Monitor Amplifier
1.4.5.2	1 ea	Loud Speaker
1.4.6	1 ea	Monitor Switcher with V-U Meter
1.4.7	1 ea	Demodulator Input Selector
1.4.8	1 ea	NFB Panel
1.4.9	1 ea	Cabinet Rack
1.4.10	1 ea	Air Monitor
1.5	1 set	Spare Parts
1.6	1 set	Accessories
1.7	1 set	Installation Material
2.		CABLE LINK
2.1	2 sets	Video Cable
2.2	2 sets	Audio Cable
2.3	1 set	Monitoring Cable
2.4	1 set	Control Cable
2.5	1 set	Video Cable Compensator
2.6	1 set	Audio Cable Compensator
2.7	1 set	Jack Panel
2.8	1 ea	Cabinet Rack
2.9	1 set	Spare Parts
2.10	1 set	Accessories
2.11	1 set	Installation Material
3.		POWER SUPPLY
3.1	1 set	High Tension Incoming Cubicle
3.2	1 set	75 kVA Inductive Voltage Regulator
3.3	1 set	Voltage Regulator Control Cubicle
3.4	1 set	Distributing Cubicle

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.5	1 set	80 kVA Main Transformer (prepared by the Administration)
3.6	1 set	Automatic Exchanger from Commercial Power to Engine Generator
3.7	1 set	Spare Parts
3.8	1 set	Accessories
3.9	1 set	Installation Material
4.		MONITORING AND CONTROL EQUIPMENT
4.1	1 set	Logic Unit consisting of:
4.1.1	1 ea	Relay Driver
4.1.2	1 ea	S/P (Series to Parallel) Converter
4.1.3	1 ea	Scanning Unit
4.1.4	1 ea	Encoder
4.1.5	1 set	Associated Parts
4.2	1 set	Carrier I/O (Input, Output) Unit consisting of:
4.2.1	1 ea	Modulator
4.2.2	1 ea	Demodulator
4.2.3	2 ea	Band Pass Filter
4.2.4	2 ea	Low Pass Filter
4.2.5	1 ea	Line Amplifier
4.2.6	2 ea	Transformer
4.2.7	1 set	Associated Parts
4.3	1 set	Control Output Relay
4.4	1 set	Operation Panel
4.5	1 set	Telephone consisting of:
4.5.1	1 ea	Line Amplifier
4.5.2	2 ea	Transformer
4.5.3	1 ea	Speaker

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.5.4	1 ea	Variable Attenuator
4.5.5	1 ea	Telephone
4.5.6	1 set	Associated Parts
4.6	1 set	Power Supply
4.7	1 set	Cabinet Rack
4.8	1 set	Installation Material
5.		ANTENNA
5.1		2-Dipole Antenna for Dual 10 kW Transmitter
5.1.1	1 set	2-Dipole Transmitting Antenna for Band III, 4 sides x 7 panels
5.1.2	1 set	Branch Feeders
5.1.3	1 set	Junction Boxes
5.1.4	1 set	Tee Transformers
5.1.5	1 set	Rigid Copper Transmission Lines
5.1.6	1 set	Adaptors
5.1.7	1 set	Hangers
5.1.8	1 set	Gas Stoppers
5.1.9	1 ea	Dehydrator
5.1.10	1 set	Installation Material
6.		TEST EQUIPMENT
6.1	1 set	AM Side Band Analyzer
6.2	1 set	Oscilloscope
6.3	1 set	Megohm Meter
6.4	1 set	Circuit Tester
6.5	1 set	Vacuum Voltage Meter

[XV] SENKOBO MICRO WAVE STATION

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		CABLE LINK
1.1	1 set	Jack Panel

[B]

TV STUDIO EQUIPMENT

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LUSAKA STUDIO

[I] T-200-A STUDIO VISION AND SOUND EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>STUDIO EQUIPMENT</u>
1. 1		Camera and Pedestals
1. 1. 1		Photo-conductive Type Camera Chains 3 sets of CCU are Installed in CAR Please Refer to Item [VIII] 1. 1
1. 1. 1. 1	3 sets	Camera Head
1. 1. 1. 2	3 sets	Accessories
1. 1. 1. 3	3 sets	Test Chart
1. 1. 1. 4	3 sets	Zoom Lens
1. 1. 1. 5	3 ea	"2 times" Range Extenders for Zoom Lens
1. 1. 1. 6	2 sets	Camera Cable
1. 1. 1. 7	3 sets	Camera Mounting 1 set of Friction Head with Tripod and Dolly
1. 2	1 ea	Mobile Camera Crane
1. 3		Picture Monitor
1. 3. 1	1 ea	General Purpose Monochrome Picture Monitor (23-inch)
1. 3. 2	1 ea	Mobile Stand for above Monitor
1. 4	1 ea	Loudspeaker
1. 5	1 set	Roller Caption Machine
1. 6		Back-projection Equipment
1. 6. 1	1 set	16mm Film Projector
1. 6. 2	1 set	Mobile Screen
1. 7	1 set	Television Prompter
1. 8		Microphone
1. 8. 1	3 ea	Condenser Microphone

<u>Item</u>	<u>Qty</u>	<u>Description of goods</u>
1. 8. 2	2 ea	Velocity Microphone
1. 8. 3	2 ea	Velocity Microphone
1. 8. 4	4 ea	Dynamic Microphone
1. 8. 5	2 ea	Lavalier Microphone
1. 9		Microphone Accessories
1. 9. 1	1 ea	Microphone Boom
1. 9. 2	3 ea	Microphone Floor Stand
1. 9. 3	3 ea	Microphone Floor Stand
1. 9. 4	4 ea	Microphone Desk Stand
1. 9. 5	4 ea	Microphone Extension Cord (10m long)
1. 9. 6	2 ea	Microphone Extension Cord (20m long)
1. 10		Lighting Equipment
1. 10. 1		Batten and Accessories
1. 10. 1. 1	6 ea	Light Batten (Length-6.5m, 20 ampere 8 way 4 circuit)
1. 10. 1. 2	3 ea	Horizontal Batten (Length-6.5m, 20 ampere 4 circuit)
1. 10. 2	1 set	Curtain and Curtain Rail
1. 10. 3		Luminaries
1. 10. 3. 1	10 ea	1 kW Scoopligh
1. 10. 3. 2	10 ea	1 kW Solar Spotlight (8-inch fresnel lens with Barn Door)
1. 10. 3. 3	10 ea	500W Solar Spotlight (6-inch fresnel lens)
1. 10. 3. 4	6 ea	Banklight 300W x 6 lamps
1. 10. 3. 5	2 ea	Tripod Stand with Castor
1. 10. 3. 6	2 ea	Low Stand
1. 10. 3. 7	40 ea	Suspension Hanger
1. 10. 3. 8	12 ea	Pantograph
1. 10. 3. 9	4 ea	Wall Conccent Box 20 ampere, 2 way type

<u>Item</u>	<u>Q'ty</u>	<u>Description of goods</u>
1. 10. 3. 10	5 ea	5m long Extension Cable with 20 ampere A type connectors.
1. 10. 3. 11	9 set	4 circuit Terminal Box with 6m long Cable
2.		<u>PRODUCTION VISION AND DIMMER CONTROL ROOM</u>
2. 1		Production Control Desk
2. 1. 1	1 set	Production Control Desk
2. 1. 2		Remote Control Panel
2. 1. 2. 1	1 ea	Assigned Videotape Machines
2. 1. 2. 2	1 ea	Assigned Film and Slide Projectors
2. 1. 2. 3	1 ea	Assigned Caption Scanner for Studio
2. 1. 2. 4	1 ea	Assigned Caption Scanner for TC
2. 1. 2. 5	1 set	Sync-lock Selection
2. 1. 2. 6	1 set	Studio Camera Chains
2. 1. 2. 7	1 set	Picture Monitor and Waveform Monitor with Monitor Select Switch
2. 1. 2. 8	1 set	Communications Panel
2. 1. 2. 9	1 set	VU Meter in Parallel with Programme VU Meter on Sound Mixer
2. 1. 2. 10	1 set	Digital Clock
2. 1. 2. 11	1 set	Studio Warning Light Control Switches and Panel Light
2. 1. 2. 12	1 set	Studio "Cue-Light" Control for Studio Cue
2. 2		Vision Control Desk
2. 2. 1	1 set	Vision Control Desk
2. 2. 2		Vision Operator's Panel
2. 2. 2. 1	1 set	Vision Producer's Panel
2. 2. 2. 2	1 set	Communications Panel
2. 3		Picture Monitors consisting of:

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
2.3.1	5 ea	General Purpose Monochrome Picture Monitor (9-inch)
2.3.2	3 ea	General Purpose Monochrome Picture Monitor (17-inch)
2.4		SCR DIMMER Equipment
2.4.1	1 set	Main Switch Board
2.4.1.1	1 ea	Main NFB of 200 ampere 3P
2.4.1.2	1 ea	SCR Main NFB of 200A 3P
2.4.1.3	1 ea	FL SCR Main NFB of 60A 2P
2.4.2	1 set	Switch Board
2.4.2.1	40 ea	NFB of 20A 1P
2.4.2.2	40 ea	Direct Switcher of 30A 1P
2.4.2.3	3 ea	NFB for FL of 20A 2P
2.4.3	1 set	SCR Dimmer Rack
2.4.3.1	10 ea	Thyristor of 60A (For FL)
2.4.4	1 set	Load Circuit Breaker Board
2.4.4.1	40 ea	Load Plug
2.4.4.2	40 ea	Line Plug
2.4.5	1 set	Light Control Console
2.4.5.1	20 ea	Single Fader
2.4.5.2	1 ea	Cross Fader
2.4.5.3	1 ea	Ampere Meter
2.4.5.4	1 ea	Voltage Meter
2.4.5.5	1 set	Communication Panel
3.		<u>SOUND CONTROL ROOM</u>
3.1		Sound Control Desk
3.1.1	1 set	Sound Control Desk
3.1.2	1 set	Communications Panel
3.1.3	1 ea	Reverberation Plate Control Panel

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.2	2 ea	Turntable
3.3	2 ea	Tape Record/Replay Machines
3.4		Loudspeakers
3.4.1	1 ea	Programme Monitor (8-inch) Console Type
3.4.2	1 ea	Audition Monitor (6-1/2-inch)
3.5	1 ea	General Purpose Monochrome Picture Monitor (17-inch)

[II] T-200-B STUDIO VISION AND SOUND EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>STUDIO EQUIPMENT</u>
1. 1		Picture Monitor
1. 1. 1	1 ea	General Purpose Monochrome Picture Monitor (23-inch)
1. 2	1 ea	Loudspeaker (10-inch)
1. 3		Lighting Equipment
1. 3. 1		Batten and Accessories
1. 3. 1. 1	6 ea	Light Batten (Length-6. 5m, 20 ampere 8 way 4 circuit)
1. 3. 1. 2	3 ea	Horizontal Batten (Length-6. 5m 20 ampere 12 way 4 circuit)
1. 3. 2	1 set	Curtain and Curtain Rail
1. 3. 3		Luminaries
1. 3. 3. 1	20 ea	1 kW Scoopligh (8-inch fresnel lens)
1. 3. 3. 2	10 ea	1 kW Solar Spotlight (6-inch fresnel lens) with Barn Door
1. 3. 3. 3	10 ea	2 kW Solar Spotlight with Barn Door
1. 3. 3. 4	10 ea	500W Solar Spotlight
1. 3. 3. 5	10 ea	Banklight 500W x 6 lamps
1. 3. 3. 6	2 ea	Tripod Stand with Castor
1. 3. 3. 7	2 ea	Low Stand
1. 3. 3. 8	86 ea	Suspension Hanger
1. 3. 3. 9	15 ea	Pantograph
1. 3. 3. 10	6 ea	Wall Consent Box 20 ampere 2 way type
1. 3. 3. 11	10 ea	5m long Extension Cable with 20 ampere A type Connectors
1. 3. 3. 12	9 sets	4 Circuit Terminal Box with 6m long Cable

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
2.		<u>PRODUCTION DIMMER CONTROL ROOM</u>
2.1		Picture Monitor
2.1.1	1 ea	General Purpose Monochrome Picture Monitor (17-inch)
2.2		SCR DIMMER Equipment
2.2.1	1 set	Main Switch Board
2.2.1.1	1 ea	Main NFB of 200A 3P
2.2.1.2	1 ea	SCR Main NFB of 200A 3P
2.2.2	1 set	Switch Board
2.2.2.1	40 ea	NFB of 30A 1P
2.2.2.2	40 ea	Direct switcher of 30A 1P
2.2.2.3	3 ea	NFB for FL of 20A 2P
2.2.3	1 set	SCR Dimmer Rack
2.2.3.1	10 ea	Thyristor of 60A
2.2.4	1 set	Load Circuit Breaker Board
2.2.4.1	40 ea	Load Plug
2.2.4.2	40 ea	Line Plug
2.2.5	1 set	Light Control Console
2.2.5.1	20 ea	Single Fader
2.2.5.2	1 ea	Cross Fader
2.2.5.3	1 ea	Ampere Meter
2.2.5.4	1 ea	Voltage Meter
2.2.5.5	1 set	Communication Panel

[III] T-100-A STUDIO VIDEO AND AUDIO EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>STUDIO EQUIPMENT</u>
1.1		Camera and Pedestals
1.1.1		Photo-conductive Type Camera Chains 2 sets of CCU are installed in CAR. Please Refer to Item [VIII] 2.1
1.1.1.1	2 sets	Camera Head
1.1.1.2	2 sets	Accessories
1.1.1.3	2 sets	Test Chart
1.1.1.4	2 sets	Zoom Lens
1.1.1.5	2 ea	"2 times" Range Extenders for Zoom Lens
1.1.1.6	2 sets	Camera Cable each consisting of : 1 ea of 10m long Camera Cable complete with connectors
1.1.1.7	2 sets	Camera Mounting 1 ea of Friction Head with Tripod and Dolly
1.2		Picture Monitor
1.2.1	1 ea	General Purpose Monochrome Picture Monitor (23-inch)
1.2.2	1 ea	Mobile Stand for above Monitors
1.3	1 ea	Loudspeaker
1.4		Microphone
1.4.1	2 ea	Condenser Microphone
1.4.2	1 ea	Velocity Microphone
1.4.3	2 ea	Lavalier Microphone
1.5		Microphone Accessories
1.5.1	2 ea	Microphone Floor Stand
1.5.2	2 ea	Microphone Floor Stand
1.5.3	2 ea	Microphone Desk Stand
1.5.4	4 ea	Microphone Extension Cord (10m long)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.5.5	2 ea	Microphone Extension Cord (5m long)
1.6		Lighting Equipment
1.6.1	1 set	Curtain and Curtain Rail
1.6.2	1 set	Main Switch
1.6.2.1	1 ea	Main NFB of 100A 3P
1.6.2.2	30 ea	NFB of 30A 1P
1.6.2.3	30 ea	Direct Switcher of 30A 1P
1.6.3	24 ea	Grid Consent (20A 2 way)
1.6.4	4 ea	Wall Consent (20A 2 way)
1.6.5		Luminaries
1.6.5.1	10 ea	1 kW Scoopligh
1.6.5.2	20 ea	Horizontal light 300W x 1 lamp
1.6.5.3	10 ea	500W Barn Door Leaflight
1.6.5.4	40 ea	Suspension Hanger
1.6.5.5	8 ea	Pantograph
1.6.5.6	5 ea	5m long Extension Cable with 20 ampere A type Connectors
1.6.5.7	2 ea	Tripod Stand with Castor
1.6.5.8	2 ea	Low Stand
2.		<u>PRODUCTION VISION AND SOUND</u> <u>CONTROL ROOM</u>
2.1		Production Control Desk
2.1.1	1 set	Vision Control Desk
2.1.2	1 set	Vision Producer's Panel
2.1.3	1 set	Communications Panel
2.1.4	1 set	Digital Clock
2.1.5	1 set	Studio Warning Light Control Switches and Panel Light
2.1.6	1 set	Studio "Cue-Light" Control for Studio Cues

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
2.1.7		Remote Control Panel
2.1.7.1	1 ea	Assigned Videotape Machines
2.1.7.2	1 ea	Assigned Film and Slide Projectors
2.1.7.3	1 ea	Assigned Caption Scanner
2.1.7.4	1 set	Sync-lock Selection
2.1.7.5	1 ea	Studio Camera Chain
2.1.7.6	1 set	Picture Monitor and Waveform Minitor with Monitor Select Switch
2.1.7.7	1 set	Communications Panel
2.2		Sound Control Desk
2.2.1	1 set	Sound Consollete and Desk
2.2.1.1	1 set	Sound Control Panel
2.2.2	1 set	Communications Panel
2.3	2 ea	Turntable
2.4	1 ea	Tape Record/Replay Machines
2.5		Loudspeakers
2.5.1	1 ea	Programme Monitor (8-inch) Console Type
2.5.2		Audition Monitor (6-1/2-inch)
2.6		Picture Monitor consisting of :
2.6.1	3 ea	General Purpose Monochrome Picture Monitors (9-inch)
2.6.2	3 ea	General Purpose Monochrome Picture Monitor (17-inch)
2.6.3	1 ea	Loudspeaker

[IV] VIDEO TAPE-RECORDING ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	1 set	High/Low Band Color Videotape Recorder/ Reproducer
2.	1 set	High/Low Band Monochrome Videotape Recorder/Reproducer
3.	1 set	Videotape and Accessories for Videotape Machine
4.	1 set	Communications Panel

[V] TELECINE ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	4 sets	Automatic 16 m/m Film Projector with Automatic OPT/MAG Sound Ditector each consisting of : 1 ea of Projector Head 1 ea of Projection Lens (105 m/m) 1 ea of Projector Control Panel 1 ea of Pedestal with Sound Monitor 1 ea of Synchronising Drive Pulse Generator 1 ea of Automatic OPT/MAG Sound Ditector 1 ea of Automatic Light Control 1 set of Standard Accessories
2.	2 sets	Sprocketed 16 m/m Magnetic Sound Film Recorder and Reproducer each consisting of : 1 ea of Main Part 1 ea of Take-up Reel Arm Assembly 1 ea of Feed Reel Arm Assembly 1 ea of Head Amplifier Assembly 1 set of Standard Accessories
3.	2 sets	Dual-drum 2-inch x 2-inch Slide Projector each consisting of : 1 ea of Dual-drum Slide Projector 1 ea of Projection Lens 1 ea of Projector Control Panel 1 ea of Pedestal for Slide Projector 1 ea of Automatic Light Control 1 set of Standard Accessories
4.	1 set	12-inch x 10-inch Opaque Card Scanner
5.	1 set	Clock Scanner

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
6.		Photo-conductive Type Telecine Camera comprising :
6.1	1 set	16mm Twin Lens Flying Spot Film Scanner
6.2	2 sets	Monochrome Telecine Camera each consisting of : 1 set of Camera Head 1 ea of Vidicon Tubes 1 ea of Camera Pedestal 1 ea of General Purpose Monochrome Picture Monitor (9-inch) 1 set of Standard Accessories
7.		Optical Mirror Multiplexer comprising :
7.1	2 sets	Multiplexer (Three Directional Mono- chrome Mirror Multiplexer) for Telecine Camera each consisting of : 1 ea of Optical Mirror Selector 1 ea of Control Box 1 set of Standard Accessories
8.		Telecine Mounting Islands consisting of :
8.1	2 ea	Telecine Mounting Island for Combining 1-Monochrome Camera with 3-Projector
8.2	1 ea	Telecine Mounting Island for Combining 1-Camera with 1-Prjector
8.3	1 ea	Telecine Mounting Island for Combining 1-Camera

[VI] TELECINE AND VTR CONTROL ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>CONTROL DESK</u>
1.1	1 ea	Telecine control Panel
1.2	1 ea	VTR input Control Panel
1.3	1 ea	VTR output Control Panel
1.4	1 ea	Communication Panel
1.5	1 ea	Optical and Magnetic Tally Panel
2.		<u>PICTURE MONITOR</u>
2.1	5 ea	General Purpose Monochrome Monitor (9-inch)
2.2	2 ea	Color Picture Monitor (13-inch)
3.		<u>SOUND</u>
3.1	1 ea	Loudspeaker (6-1/2-inch)

[VII] MASTER CONTROL ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>MONITORING EQUIPMENT</u>
1. 1		Picture Monitor 10 ea of General Purpose Monochrome Picture Monitor (9-inch) 2 ea of Color Picture Monitor (13-inch) 1 ea of Color Air Monitor
2.		<u>PRODUCTION CONTROL DESK</u>
2. 1	1 set	Production Control Desk
2. 2		Remote Control Panel
2. 2. 1	1 set	Assigned Videotape Machines
2. 2. 2	1 ea	Assigned Film and Slide Projectors
2. 2. 3	1 ea	Assigned Caption Scanner
2. 2. 4	1 ea	Sync. lock Selection
2. 2. 5	3 sets	Stabilizing Amplifier Controls
2. 3	1 set	Picture Monitor and Waveform with Monitor Select Switch
2. 4	1 set	Communication Panel
2. 5	1 set	VU Meter in Parallel with Programmer VU Meter on Sound Mixer
2. 6	1 set	Digital Clock
2. 7	1 set	Studio Warning Light Control Switchers and Panel Light
2. 8	1 set	Studio "Cue-light" Control for Studio Cues
2. 9	1 ea	Patch Board for Reverberation Unit
2. 10	1 ea	Communication Panel
3.		<u>VISION CONTROL DESK</u>
3. 1	1 set	Vision Control Desk
3. 2	1 ea	Vision Control Panel

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.3	1 set	Communication Panel
4.		<u>SOUND CONTROL DESK</u>
4.1	1 set	Sound Control Desk
4.2	1 ea	Sound Control Panel
4.3	1 ea	Communication Panel
5.	1 ea	Turntable
6.	1 ea	Tape Record/Replay Machine
7.	1 ea	Replay Cartridge Tape Machine
8.		<u>LOUDSPEAKERS</u>
8.1	1 ea	Program Monitor (8-inch) Console Type
8.2	1 ea	Audition Monitor (6-1/2-inch)

[VIII] CENTRAL APPARATUS ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>PHOTO-CONDUCTIVE TYPE LIVE CAMERA FOR T-200-A STUDIO</u>
1.1	3 sets	Live Camera Control Unit
2.		<u>PHOTO-CONDUCTIVE TYPE LIVE CAMERA FOR T-100-A STUDIO</u>
2.1	2 sets	Live Camera Control Unit
3.		<u>RACK MOUNTED VISION AND SOUND EQUIPMENT</u>
3.1		For T-200-A Studio
3.1.1		Vision Switcher Equipment
3.1.1.1	1 set	Vision Switcher
3.1.1.2	1 set	Effect/Mixing Amplifier
3.1.1.3	1 set	Mixing Amplifier
3.1.1.4	1 set	Tally Relay Board
3.1.1.5	1 set	Effect Waveform Generator
3.1.2	2 sets	Video Jackfield with Standard Accessories
3.1.3	1 ea	Circuit Breaker
3.1.4	1 set	Cabinet Rack
3.2		For T-100-A Studio
3.2.1	1 set	Vision Switcher Equipment
3.2.1.1	1 set	Vision Switcher
3.2.1.2	1 set	Mixing Amplifier
3.2.2	2 sets	Video Jackfield with Standard Accessories
3.2.3	1 ea	Circuit Breaker
3.2.4	1 set	Cabinet Rack

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.3		For Master Control Room
3.3.1		Vision Switcher Equipment
3.3.1.1	1 ea	Vision Switcher
3.3.1.2	1 ea	Mixing Amplifier
3.3.2	3 ea	Color Stabilizing Amplifier
3.3.3	1 set	Equalizer Amplifier 16 ea of Equalizing Video Distribution Amplifier Unit 2 ea of Power Supply Stabilizer Unit 2 ea of Power Supply Rectifier Unit 2 ea of Shelf
3.3.4	1 set	Video Distribution Amplifier 3 ea of Video Distribution Amplifier Unit 1 ea of Power Supply Stabilizer Unit 1 ea of Power Supply Rectifier Unit 1 ea of Shelf
3.3.5	3 ea	Video Jackfield with Standard Accessories
3.3.6	2 ea	24V Power Supply
3.3.7	1 ea	Vectorscope
3.3.8	1 ea	Reverberation Unit
3.3.9	3 ea	Audio Limiting Amplifier
3.3.10	2 ea	Audio Equalizer Amplifier
3.3.11	1 ea	Buffer Amplifier
3.3.12	1 ea	Monitor Speaker with Amplifier
3.3.13	1 ea	VU Meter Panel
3.3.14	1 ea	Audio Jackfield
3.3.15	2 ea	Circuit Breaker Chassis
3.3.16	3 ea	Cabinet Rack

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3. 4		For Telecine Room
3. 4. 1	1 ea	Color Encoder with Color Bar
3. 5		For Telecine and VTR Control Room
3. 5. 1	1 ea	VTR Video Input Switcher Matrix
3. 5. 2	1 ea	VTR Sound Input Switcher Matrix
3. 5. 3	1 ea	VTR Video Output Switcher Matrix
3. 5. 4	1 ea	VTR Sound Output Switcher Matrix
3. 5. 5	1 set	Video Distribution Amplifier for VTR Input Switcher 8 ea of Video Distribution Amplifier Unit 1 ea of Power Supply Stabilizer Unit 1 ea of Power Supply Rectifier Unit 1 ea of Shelf
3. 5. 6	1 set	Video Distribution Amplifier for TC Output 4 ea of Video Distribution Amplifier 1 ea of Power Supply Stabilizer Unit 1 ea of Power Supply Rectifier Unit 1 ea of Shelf
3. 5. 7	1 ea	Telecine Video Assignment Matrix
3. 5. 8	1 ea	Telecine Sound Assignment Matrix
3. 5. 9	2 ea	Video Jackfield with Standard Accessories
3. 5. 10	1 ea	Circuit Breaker
3. 5. 11	2 ea	Cabinet Rack
3. 6	2 ea	For Sync Pulse Generator and Distribution consisting of :
3. 6. 1		Sync Pulse Generator with Color-Lock
3. 6. 2	1 ea	Genlock Relay Board
3. 6. 3	1 set	Change-over Relay Board

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.6.4	1 set	Pulse Distribution Amplifier 30 ea of Pulse Distribution Amplifier Unit 1 ea of Video Distribution Amplifier Unit 5 ea of Power Supply Stabilizer Unit 5 ea of Power Supply Rectifier Unit 5 ea of Shelf
3.6.5	1 set	Video Delay Equipment 10 ea of Video Delay Unit 1 ea of Shelf
3.6.6	1 set	Pulse Delay Equipment 20 ea of Pulse Delay Unit 2 ea of Shelf
3.6.7	1 ea	Cabinet Rack
4.	1 set	Master Clock Equipment
5.	1 set	Spare Parts
6.	1 set	Installation Material
7.	1 set	Inter Area Loudspeaking Telephones

[IX] MAINTENANCE AND TEST EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	1 set	<p>Test and Auxiliary Equipment for Three Studio Suits, Comprising :-</p> <p>a) 2-Oscilloscope b) 4-Super 24 Selectest Multimeter c) 2-Level Meters d) 2-Resolution Chart e) 6-Registration Test Charts f) 3-Headphones, each with 6 ft. cord</p>
2.	1 set	<p>Test and Auxiliary Equipment for VTR and Telecine Areas, Comprising :-</p> <p>a) 2-Oscilloscope i. 1-Centimetre Grid Mask ii. 1-'K' Factor Mask iii. 2-Probes vi. 1-Trolley b) 2-Super 24 Selectest Multimeters c) 2-Resolution Chart, Test Slide d) 2-Registration Chart, Test Slide e) 1-Videotape Test Tape f) 1-Bulk Tape Eraser g) 2-Head Demagnetizers h) 2-Headphones, each with 6 ft. cord</p>
3.	1 set	<p>Test and Auxiliary Equipment for the Master/Control Presentation Studio/Central Apparatus Room Areas. Comprising :-</p> <p>a) 1-Oscilloscope Including : i. 1-Centimetre Grid Mask ii. 1-'K' Factor Mask iii. 2-Probes vi. 1-Trolley b) 1-Super 24 'Selectest' Multimeter c) 1-Level Meter d) 1-Headphone with 6 ft. cord</p>

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.	1 set	<p>Test and Auxiliary Equipment for Central Maintenance Areas, Comprising :-</p> <p>a) 2-Oscilloscopes</p> <p> i. 1-Centimetre Grid Mask</p> <p> ii. 1-'K' Factor Mask</p> <p> iii. 2-Probes</p> <p> vi. 1-Trolley</p> <p>b) 1-Insursion Test Signal Generator</p> <p>c) 2-Super 24 'Selectest' Multimeter</p> <p>d) 1-Level Meter</p> <p>e) 1-Loudspeaker</p> <p>f) 2-Coaxial Patch Panels</p> <p>g) 2-Audio Patch Panels Each with Patch-cords</p> <p>h) 2-Headphones Each with 6 ft. cord</p> <p>i) 1-A. V. O. 'Incercuit' Transistor Tester</p> <p>j) 1-Picture and Waveform Monitor</p> <p>k) 2-Tool Boxes Each Containing a Selection of Miscellaneous Small Tools</p>
5.	1 set	<p>Test Equipment for the O. B. Maintenance Room, Comprising :-</p> <p>a) 1-Oscilloscope</p> <p>b) 1-Super 24 'Selectest' Multimeter</p> <p>c) 1-Headphone with 6 ft. cord</p>
6.	2 sets	Technical Manuals

[X] CENTRAL LIBRARY AND PREVIEW THEATRE

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	2 ea	Light duty Disc Reproducer
2.	2 ea	Audio Tape Recorder
3.	4 ea	Monitor Loudspeakers
4.	1 ea	16mm Film Viewer with Facilities for Sound Monitoring
5.	1 set	Film Preview Theatre Equipment Comprising :- a) 1-16mm Sound Film Projector for 25 F. P. S. Operating Complete b) 1-40 Watt Amplifier c) 1-13 ft. x 7 ft. Screen Frame Motorised Side masking opening to picture size 9 ft. wide x 5 ft. High, complete with watt white screen and remote control d) 1-Hitone Loudspeaker

[XI] COLOR OUTSIDE BROADCAST VEHICLE

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>MOTOR VEHICLE</u>
1.1	1 set	Chassis Facility comprising; 1 set - Chassis 1 ea - Fuel Tank for Propulsion Engine 1 ea - Battery 1 ea - Standard Tool 1 ea - Spare Type
1.2	1 set	Body Facility comprising; 1 set - Body 1 set - Shelf for Monitor and Other Unit 1 ea - Audio Control Desk 1 set - Production and Video Engineer Control Desk 1 ea - Storage 1 set - Air Duct 1 ea - Ventilator 1 set - Interior General Purpose Outlets (Single Phase) 1 set - Lighting 1 set - Interior Layout 1 set - Access Doors 1 set - Curtains 1 ea - Driver's Seat 1 ea - Assistant Driver's Seat 8 ea - Program Director's Video and Audio Engineer's Seat 1 ea - Car Cooler (5200 Kcal/H) 2 ea - Car Heater (1800 Kcal/H) 1 ea - Car Radio 4 ea - Clamp Jacks (Hanging Type) 1 set - Roof Deck with Collapsible Hand Rail 1 ea - Hoist 1 ea - Roof Hatch for Cabling 2 ea - Search Light 1 ea - Periscopic Antenna Pole 1 ea - Collapsible Antenna Pole 1 set - Connectors Board for Video and Audio

<u>Item</u>	<u>Qty</u>	<u>Description of Goods</u>
		3 ea - Sliding Shock Mount for Camera Head
		2 ea - Sliding Shock Mount for FPU Head
		2 ea - Sliding Shock Mount for Color Monitor
		9 ea - Mount Adaptor for Picture Monitor
		1 set - Painting
		1 set - Other Accessory Parts
1.3	1 ea	Clock (Crystal Chromometer)
1.4	2 ea	Air Conditioner with Heat Pump (8000 Kcal/H each)
1.5	1 set	Cable Drums (Motor Drive System)
		2 ea - Double Type Cable Drum for Camera Cable
		1 ea - Double Type Cable Drum for Power Cable

2. POWER SUPPLY

2.1	1 ea	Power Distribution Board
2.2	1 ea	Receiving Terminal of City Source (3 ϕ 4W 220V)
2.3	1 ea	Automatic Voltage Regulator (1 ϕ 10kVA)
2.4	1 ea	Emergency Battery Supply (DC 24V, 150A/h)
2.5	1 ea	Battery Charger

3. VIDEO EQUIPMENT

3.1		1" Lead-Oxide Tube Color Camera
3.1.1	3 sets	Color Camera Head with Bias Light Device
		each consisting of ;
		1 ea - Camera Head (Excluding Lens)
		1 ea - Tilting Viewfinder (7")
		1 set - Plumbicon Tube (R, B & G Ch. One each)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.1.2	3 sets	Camera Control Unit (Color Encoder Excluded) each consisting of ; 1 set - Camera Control Unit in Rack with Interconnecting Cables 1 ea - Picture Monitor (12") 1 ea - Waveform Monitor (5") 1 ea - Monitor Switcher 1 ea - Power Supply 1 set - Contour Correction Unit 1 set - Masking Amplifier Unit 1 set - Automatic Ires Control Device
3.1.3	3 sets	PAL Color Encoder
3.1.4	3 sets	Accessories each consisting of ; 1 set - Spare Fuses and Lamps 1 set - Coaxial Connection (BNC) CCU 1 ea - Dust Proof Cover for Camera Head 2 ea - Head Set 1 ea - Continuity Clip 1 ea - Continuity Light 1 ea - Camera Wedge Adaptor Plate 1 ea - Lens Mount Converter and Cap 1 ea - Unit Extender 1 ea - Viewfinder Extension Cable 1 ea - Viewfinder Input Switcher 1 ea - Hood for Viewfinder (Field use) 1 ea - Sunshade Cover 1 ea - Weather-Proof Cover 1 ea - Winter Cover (Less Heater)
3.1.5	3 sets	Test Chart 1 ea - Linearity Chart 1 ea - Gray Scale Chart 1 ea - Color Test Chart
3.1.6	3 ea	Balance Head (Pan and Filt Head)
3.1.7	3 ea	Tripod
3.1.8	3 ea	Dolly

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.1.9	1 set	Camera Cable comprising ; 3 ea - Camera Cable (100m long) 2 ea - Camera Cable (50m long)
3.1.10	1 set	Servo Controlled Zoom Lens comprising ; 3 ea - Zoom Lens 10:1 Ratio Zoom Lens 10:160mm, f:1.6, M.O.D.1.4m All Servo Controlled Zoom with a built-in pattern projector, lens cap and dust cap. 3 ea - Focus control and Preset box. 3 ea - Zoom control unit with cord (4-way, 1m long) 3 ea - Lens Camera connection cord (26-way 1m long) 3 ea - Lens Preset Box connection cord (23-way 0.8m long) 1 set - Range Extender (x1.5 x2.0.x2.5)
3.1.11	1 ea	Centralized Control Panel
3.2	1 set	Video Switcher comprising ; 1 ea - Special Effect Amplifier 1 ea - Mixing Amplifier 1 ea - Control Panel with Faders
3.3	1 set	Video Distribution Amplifier comprising ; 2 ea - Video Distribution Unit 1 ea - Power Source Stabilizer Unit 1 ea - Power Source Rectifier Unit 1 ea - Shelf
3.4	2 ea	Synchronizing Pulse Generator
3.5	1 set	Pulse Switcher
3.6	1 set	Pulse Distribution Amplifier comprising ; 10 ea - Pulse Distribution Unit 4 ea - Pulse Delay Unit 1 ea - Subcarrier Distribution Unit 2 ea - Power Source Stabilizer Unit 2 ea - Power Source Rectifier Unit 1 ea - Shelf

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.7	1 set	Monitor Equipment comprising ; 7 ea - Monochrome Picture Monitor (9 inch) 2 ea - Color Monitor (19 inch) 1 ea - Off-Air Monitor Receiver (Excluding Antenna)
3.8	2 ea	Remote Control Panel for Monitor Switcher
3.9	1 set	Master Monitor 1 ea - Waveform Monitor 1 ea - Picture Monitor
3.10	1 ea	Vectorscope
3.11	1 ea	Video Patching Board 20 Circuit
3.12	1 ea	DC Power Supply for Tally & Relay
3.13	1 set	Test Equipment comprising ; 1 ea - Test Signal Generator 1 ea - Syncroscope
3.14	3 ea	Cabinet Rack
3.15	1 set	Accessories for Video Equipment

4. AUDIO AND INTERCOMMUNICATION
EQUIPMENT

4.1	1 set	Sound Mixer Unit (6 Channels)
4.2	1 set	RA Connection Box
4.3	3 ea	Monitor Speakers
4.4	1 set	Microphone and Accessories comprising ; 2 ea of Close Talking Microphone 4 ea of Dynamic Microphone 2 ea of Lavelier Microphone 4 ea of Microphone-Desk Stand 3 ea of Microphone Floor Stand 4 ea of Wind Screen for Model MS-5 Microphone 1 set of Sound Reflector 3 ea of Microphone Cable Reel 3 ea of Cable Connection Box

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
4.5	1 set	Intercommunication System comprising ; 4 ea of Intercommunication Box 1 ea of Tally Intercommunication Power Supply 10 ea of Head Set
4.6	2 ea	Telephone Hand Set with Loud Speaker
4.7	1 set	Cables comprising ; 5 ea of Microphone Cable (10m long) 4 ea of Microphone Cable (50m long) 1 set of Interconnection Cable 1 ea of 18-way Remote Amplifier Connection Cable (100m long)
4.8	2 ea	Dynamic Headphone
4.9	1 set	Accessories for Audio Equipment
4.10	1 set	Audio Tape Recorder/Reproducer
5.	2 sets	<u>MICROWAVE LINK EQUIPMENT</u> each consisting of ; 1 set of 7 GHz 0.5W Transmitting Equipment comprising ; 1 ea of Transmitting Head 1 ea of Transmitting Control Unit 1 ea of Power Supply 1 set of 7 GHz Receiving Equipment comprising ; 1 ea of Receiving Head 1 ea of Receiving Control Unit 1 ea of Power Supply 1 set of Ancilliary Equipment comprising ; 2 ea of Tripod 2 ea of Parabolic Antenna (1.2mφ) 2 ea of 24-way Camera Cable (50m long)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
6.		<u>VHF RADIO TELEPHONE EQUIPMENT</u>
6.1	1 set	VHF Transceiver for Mobile comprising ; 1 ea of 160 MHz, VHF/FM 5W Radio Telephone Equipment including Microphone 1 ea of Whip Antenna
6.2	1 set	VHF Transceiver for Fixed Station comprising ; 1 ea of 160 MHz, VHF/FM 25W Radio Telephone Equipment including Microphone and Stand 1 ea of Whip Antenna 1 ea of Coaxial Cable (100m long)
7.		<u>VIDEO TAPE RECORDER</u>
7.1	1 set	High/Low Band Color Video Tape Recorder/Reproducer
7.2	1 set	Accessories for Video Tape Machine

KITWE STUDIO

[1] VIDEO TAPE-RECORDER

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	1 set	High/Low Band Monochrome Video Tape Recorder/Reproducer
2.	1 set	Video Tape and Accessories for Videotape Machine

[II] MONOCHROME OUTSIDE BROADCAST VEHICLE

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>MOTOR VEHICLE</u>
1.1	1 set	Chassis Facility comprising : 1 set of Chassis 1 ea of Fuel Tank for Propulsion Engine 1 ea of Battery 1 set of Standard Tool 1 ea of Spare Tyre
1.2	1 set	Body Facility comprising : 1 set of Body 1 set of Shelf for Monitor and Other Units 1 ea of Audio Control Desk 1 set of Production and Video Engineer Control Desk 1 ea of Storage 1 set of Air Duct 1 set of Ventilator 1 set of Interior General Purpose Outlets (Single Phase) 1 set of Lighting 1 set of Interior Layout 1 set of Access Doors 1 set of Curtains 1 ea of Driver's Seat 1 ea of Assitant Driver's Seat 8 ea of Program Director's, Video and Audio Engineer's Seat 1 ea of Car Cooler (5200 Kcal/H) 2 ea of Car Heater (1800 Kcal/H) 1 ea of Car Radio 4 ea of Clamp Jacks (Handing Type) 1 set of Roof Deck 2 ea of Search Light 1 ea of Periscopic Antenna Pole 1 ea of Collapsible Antenna Pole 1 set of Connectors Board for Video and Audio

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
		3 ea of Sliding Shock Mount for Camera Head
		2 ea of Sliding Shock Mount for FPU Head
		9 ea of Mounting Adaptor for Picture Monitor
		1 set of Painting
		1 set of Other Accessory Parts
1.3	1 ea	Clock (Crystal Chronometer)
1.4	1 set	Air Conditioner with Heat Pump (12000 Kcal/H)
1.5	1 set	Cable Drums (Motor Drive System) comprising : 1 ea of Double Type Cable Drum for Camera Cable 1 ea of Double Type Cable Drum for Camera Cable 1 ea of Double Type Cable Drum for Power Cable
2.		<u>POWER SUPPLY</u>
2.1	1 ea	Power Distribution Board
2.2	1 ea	Receiving Terminal of City Source (1 ϕ 220V)
2.3	1 ea	Automatic Voltage Regulator (1 ϕ 7.5kVA)
2.4	1 ea	Battery Charger
2.5	1 ea	Diesel-Alternator (1 ϕ 15kVA)
2.6	1 ea	Diesel-Alternator Control Board
3.		<u>VIDEO EQUIPMENT</u>
3.1		Photo-conductive Type Live Camera Chains comprising :
3.1.1	3 sets	Live Camera Head
3.1.2	3 sets	Live Camera Control Unit

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3. 1. 3	3 sets	Accessories
3. 1. 4	3 sets	Test Chart
3. 1. 5	3 sets	Camera Mounting each consisting of : 1 set of Friction Head with Tripod and Dolly
3. 1. 6	1 set	Camera Cable comprising : 3 ea of 100m long Camera Cable complete with connectors 2 ea of 50m long Camera Cable complete with connectors
3. 1. 7		TV Camera Lens comprising :
3. 1. 7. 1	3 sets	TV Manual Zoom Lens each consisting of : 1 ea of Zoom Lens Zoom Ratio : 1 : 10 Range of Focal Length : 15 to 150-m/m Max. Relative Aperture : 1 : 2
3. 1. 7. 2	1 set	Range Extenders for PV-10 x 15 Zoom Lens comprising : 2 ea of "times 2" Range Extenders 2 ea of "times 2. 5" Range Extenders
3. 2	1 set	Video Switcher comprising : 1 ea of Mixing Amplifier 1 ea of Control Panel with Faders
3. 3	1 set	Video Distribution Amplifier comprising : 1 ea of Video Distribution Unit 1 ea of Power Source Stabilizer Unit 1 ea of Power Source Rectifier Unit 1 ea of Shelf for Above Units
3. 4	2 ea	Synchronizing Pulse Generator
3. 5	1 set	Pulse Switcher

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
3.6	1 set	Pulse Distribution Amplifier comprising : 7 ea of Pulse Distribution Unit 3 ea of Pulse Delay Unit 2 ea of Power Source Stabilizer Unit 2 ea of Power Source Rectifier Unit 2 ea of Shelf for above Units
3.7	1 set	Monitoring Equipment comprising : 7 ea of General Purpose Monochrome Picture Monitor (9-inch) 1 ea of General Purpose Monochrome Picture Monitor (17-inch) 1 ea of Precision Monochrome Picture Monitor (9-inch) 1 ea of Waveform Monitor (5-inch) 1 ea of Off-Air Monitor Receiver (Excluding Antenna)
3.8	1 ea	Remote Control Panel for Monitor Switcher
3.9	1 ea	Video Patching Board
3.10	1 ea	DC Power Supply for Tally & Relay
3.11	1 set	Test Equipment comprising : 1 set of Insertion Test Signal Generator 1 set of Synchroscope with Cart
3.12	3 ea	Cabinet Rack
3.13	1 set	Accessories for Video Equipment

4. AUDIO AND INTERCOMMUNICATION
EQUIPMENT

4.1	1 set	Sound Mixer Unit (6 Channels)
4.2	1 set	RA Connection Box
4.3	3 ea	Monitor Speakers
4.4	1 set	Microphone and Accessories comprising : 2 ea of Close Talking Microphone

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
		4 ea of Dynamic Microphone 2 ea of Lavelier Microphone 4 ea of Microphone Desk Stand 3 ea of Microphone Floor Stand 4 ea of Wind Screen for Microphone 1 set of Sound Reflector 3 ea of Microphone Cable Reel 3 ea of Cable Connection Box
4.5	1 set	Intercommunication System comprising : 4 ea of Intercommunication Box 1 ea of Tally Intercommunication Power Supply 10 ea of Head Set
4.6	2 ea	Telephone Hand Set with Loud Speaker
4.7	1 set	Cables comprising : 5 ea of Microphone Cable (10m long) 4 ea of Microphone Cable (50m long) 1 set of Interconnection Cable 1 ea of 18-way Remote Amplifier. Connection Cable (100m long)
4.8	2 ea	Dynamic Headphone
4.9	1 set	Accessories for Audio Equipment
4.10	1 set	Audio Tape Recorder/Reproducer
5.	1 set	<u>MICROWAVE LINK EQUIPMENT</u> each consisting of : 1 set of 7 GHz 0.5W Transmitting Equipment comprising : 1 ea of Transmitting Head 1 ea of Transmitting Control Unit 1 ea of Power Supply 1 set of 7 GHz Receiving Equipment comprising :

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
		1 ea of Receiving Head
		1 ea of Receiving Control Unit
		1 ea of Power Supply
		1 set of Ancilliary Equipment comprising :
		2 ea of Tripod
		2 ea of Parabolic Antenna (1.2m ϕ)
		2 ea of 24-way Camera Cable (50m long)
6.		<u>VHF RADIO TELEPHONE EQUIPMENT</u>
		comprising :
6.1	1 set	VHF Transceiver for Mobile each consisting of :
		1 ea of 160 MHz, VHF/FM 5W Radio Telephone Equipment including Microphone
		1 ea of Whip Antenna
6.2	1 set	VHF Transceiver for Fixed Station each consisting of :
		1 ea of 160 MHz, VHF/FM 25W Radio Telephone Equipment including Microphone and Stand
		1 ea of Whip Antenna
		1 ea of Coaxial Cable (100m long)
7.		<u>VIDEO TAPE RECORDER</u>
7.1	1 set	High/Low Band Monochrome Video Tape Recorder/Reproducer
7.2	1 set	Video Tape and Accessories for Video Tape Machine

[C]

RADIO STUDIO EQUIPMENT

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LUSAKA STUDIO

[I] FEEDOUT EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	(3 sets)	<u>CONTINUITY STUDIO</u> each consisting of :
1.1	1 ea	Disc Jockey Desk
1.2	1 ea	Velocity Microphone
1.3	1 set	Microphone Support
1.4	1 ea	Microphone Extension Cord (10m long)
1.5	1 ea	Headphone
1.6	2 ea	Disc Player
1.7	1 ea	Monitor Loudspeaker
2.	(3 sets)	<u>NEWS STUDIO</u> each consisting of :
2.1	1 ea	Announce Control Box
2.2	1 ea	Velocity Microphone
2.3	1 ea	Microphone Support
2.4	1 ea	Microphone Extension Cord (10m long)
2.5	1 ea	Monitor Loudspeaker
2.6	1 ea	Headphone
3.	(3 sets)	<u>CONTINUITY CONTROL ROOM</u> each consisting of :
3.1	1 ea	Audio Console (12 input channels), Type A
3.2	1 ea	Technical Interphone
3.3	1 ea	Program Monitor Loudspeaker
3.4	1 ea	Talkback Loudspeaker
3.5	1 ea	Audition Loudspeaker
3.6	2 ea	Tape Recorder/Player
3.7	2 ea	Cartridge Tape Player

[II] LARGE STUDIO (R-140-A)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	(1 set)	<u>STUDIO FLOOR</u> consisting of :
1.1	2 ea	Condenser Microphone
1.2	2 ea	Dynamic Microphone
1.3	2 ea	Velocity Microphone
1.4	3 ea	Microphone Stand
1.5	6 ea	Microphone Extension Cord (10m long)
1.6	3 ea	Headphone
1.7	1 ea	Monitor Loudspeaker
2.	(1 set)	<u>ANNOUNCE BOOTH</u> consisting of :
2.1	1 ea	Microphone
2.2	1 ea	Microphone Desk Stand
2.3	1 ea	Monitor Loudspeaker
2.4	1 ea	Headphone
2.5	1 ea	Announce Control Box
2.6	1 ea	Microphone Extension Cord (10m long)
3.	(1 set)	<u>CONTROL ROOM</u> consisting of :
3.1	1 ea	Audio Console (18 input channels), Type B
3.2	2 ea	Disc Player
3.3	3 ea	Tape Recorder/Player
3.4	1 ea	Cartridge Tape Player
3.5	1 ea	Technical Interphone
3.6	1 ea	Program Monitor Loudspeaker
3.7	1 ea	Talkback Loudspeaker
3.8	1 ea	Audition Loudspeaker

[III] MEDIUM STUDIO (R-70-A)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	(1 set)	<u>STUDIO FLOOR</u> consisting of :
1.1	2 ea	Dynamic Microphone
1.2	1 ea	Velocity Microphone
1.3	3 ea	Microphone Stand
1.4	3 ea	Microphone Extension Cord (10m long)
1.5	1 ea	Headphone
1.6	1 ea	Monitor Loudspeaker
2.	(1 set)	<u>ANNOUNCE BOOTH</u> consisting of :
2.1	1 ea	Microphone
2.2	1 ea	Microphone Desk Stand
2.3	1 ea	Monitor Loudspeaker
2.4	1 ea	Headphone
2.5	1 ea	Announce Control Box
2.6	1 ea	Microphone Extension Cord (10m long)
3.	(1 set)	<u>CONTROL ROOM</u> consisting of :
3.1	1 ea	Audio Console (14 input channels), Type C
3.2	2 ea	Disc Player
3.3	2 ea	Tape Recorder/Player
3.4	1 ea	Cartridge Tape Player
3.5	1 ea	Technical Interphone
3.6	1 ea	Monitor Loudspeaker
3.7	1 ea	Talkback Loudspeaker
3.8	1 ea	Audition Loudspeaker

[IV] SMALL STUDIO (R-30-A)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>STUDIO FLOOR</u>
1.1	2 ea	Velocity Microphone
1.2	2 ea	Microphone Floor Stand
1.3	2 ea	Microphone Extension Cord (10m long)
1.4	4 ea	Earphone
1.5	1 ea	Monitor Loudspeaker
1.6	1 ea	Projection Screen
2.		<u>CONTROL ROOM</u>
2.1	1 ea	Audio Console (10 input channels), Type D
2.2	2 ea	Disc Player
2.3	2 ea	Tape Recorder/Player
2.4	1 ea	Technical Interphone
2.5	1 ea	Monitor Loudspeaker
2.6	1 ea	Audition Loudspeaker
2.7	1 ea	Film Projector
2.8	1 ea	Magnetic Sound Film Recorder/Player
2.9	1 set	Interphone between Projection Room and Control Room

[V] SMALL STUDIO (R-30-B, C, D)

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	(3 sets)	<u>STUDIO FLOOR</u> each consisting of :
1.1	2 ea	Velocity Microphone
1.2	2 ea	Microphone Floor Stand
1.3	2 ea	Microphone Extension Cord (10m long)
1.4	1 ea	Headphone
1.5	1 ea	Monitor Loudspeaker
1.6	1 ea	Announce Control Box
2.	(3 sets)	<u>CONTROL ROOM</u> each consisting of :
2.1	1 ea	Audio Console (10 input channels), Type D
2.2	2 ea	Disc. Player
2.3	2 ea	Tape Recorder/Player
2.4	1 ea	Technical Interphone
2.5	1 ea	Monitor Loudspeaker
2.6	1 ea	Audition Loudspeaker
2.7	1 ea	Talkback Loudspeaker

[VI] DUBBING AND TRANSCRIPTION ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	2 ea	Full Track Tape Recorder/Player, Type A at 9-1/2 and 19 cm per second
2.	1 ea	Full Track Tape Recorder/Player, Type B at 19 and 38 cm per second.
3.	1 ea	Half Track Tape Recorder/Player, Type C at 4-3/4, 9-1/2 and 19 cm per second
4.	2 ea	Disc Player
5.	2 ea	Cartridge Tape Recorder/Player
6.	2 ea	Tape Eraser
7.	2 sets	Editing Equipment
8.	1 ea	Audio Patchfield
9.	1 ea	Cabinet Rack

[VII] MASTER CONTROL ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.		<u>INPUT ASSIGNMENT SWITCHER</u>
1.1	1 set	Switching Matrix (8 inputs, 26 outputs)
1.2	26 ea	Booster Amplifier
1.3	4 ea	VU Meter
1.4	4 ea	VU Meter Selector
1.5	1 ea	Monitor Amplifier
1.6	1 ea	Monitor Switcher
1.7	2 ea	Equipment Rack
1.8	1 ea	Audio Patchfield
2.		<u>OUTPUT ASSIGNMENT SWITCHER</u>
2.1	1 set	Switcher Matrix (26 inputs, 21 outputs)
2.2	21 ea	Limiting Amplifier
2.3	18 ea	VU Meter Panel
2.4	1 ea	One Minute Interval Automatic Changer with Monitor Speaker
2.5	1 ea	Manual Switcher with Monitor Switcher
2.6	3 ea	Equipment Rack
2.7	2 ea	Audio Patchfield
3.	3 ea	Standard Receiver
4.	1 ea	Shortwave Receiver
5.	1 set	Reverberation Room Assignment Switcher
6.	2 ea	Test Signal Generator
7.	4 ea	Line Equalizer
8.	20 ea	Technical Interphone

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
9.	1 ea	Tape Recorder/Player
10.	1 ea	Control Console
11.	1 ea	Picture Monitor (9")
12.	1 set	24 hour Recording Machine (5 channels)

[VIII] ECHO ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	1 ea	Loudspeaker
2.	1 ea	Monitor Amplifier
3.	1 ea	Microphone
4.	1 ea	Preamplifier

[IX] LISTENING ROOM

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	(5 sets)	<u>LISTENING ROOM</u> each consisting of :
1.1	1 ea	Disc Player
1.2	1 ea	Tape Recorder/Player
1.3	1 ea	Loudspeaker with Amplifier
2.	(1 set)	<u>LISTENING ROOM</u> consisting of :
2.1	1 ea	Disc Player
2.2	1 ea	Cartridge Tape Player
2.3	1 ea	Loudspeaker with Amplifier

[X] RECORDING VEHICLE

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	1 ea	Audio Console (6 input channels)
2.	1 ea	Power Supply
3.	1 ea	Monitor Speaker with Amplifier
4.	3 ea	Headphone
5.		Microphone
5.1	4 ea	Dynamic Microphone
5.2	2 ea	Lavelier Microphone
6.		Microphone Accessory
6.1	4 ea	Microphone Desk Stand
6.2	4 ea	Microphone Floor Stand
6.3	1 ea	Sound Reflector
6.4	2 ea	Microphone Cord Reel
6.5	4 ea	Microphone Cord (10m long)
6.6	4 ea	Microphone Cord (20m long)
6.7	2 ea	Microphone Cord (50m long)
7.	2 ea	Tape Recorder/Player
8.	1 ea	Portable Disc Player
9.		Public Address Systems
9.1	1 ea	Power Amplifier (40W)
9.2	2 ea	Horn Speaker
10.	1 ea	Clock
11.	1 set	Vehicle
11.1	1 ea	Chassis
11.2	1 ea	Body
11.3	1 ea	Engine Generator (5kVA)
11.4	1 ea	Conditioner

[XI] ACCESSORY EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	40 ea	Status Lamp
2.	15 ea	Cue Light
3.	10 ea	Call Buzzer
4.	1 set	Audio Tape
5.	1 set	Installation Material
6.	1 set	Spare Parts

[XII] MEASURING EQUIPMENT

<u>Item</u>	<u>Q'ty</u>	<u>Description of Goods</u>
1.	2 ea	Audio Test Set
2.	2 ea	Double Beam Oscilloscope
3.	2 ea	Auto-transformer
4.	2 ea	Variable D. C. Power Supply
5.	2 ea	Valve Tester
6.	2 ea	Transistor Tester
7.	2 ea	Variable Attenuator
8.	5 ea	Circuit Tester

