APPENDIX 5

FIELD REPORT

PREPARATORY SURVEY (FOR BASIC DESIGN)
ON
THE PROJECT
FOR
IMPROVEMENT OF MEDIUM WAVE RADIO BROADCASTING NETWORK
AND DISASTER PREVENTION
IN
TUVALU

FIELD REPORT

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Table of Contents

1. Introduction

This Field Report is to establish mutual understandings between JICA Study Team (hereinafter referred to as "the Team") for the project for Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention (hereinafter referred to as "the Project") and the Tuvalu side such as Tuvalu Media Department (TMD) and relevant organizations of the Government of Tuvalu on the technical and engineering aspects for the Project. This has been also prepared by the Team based on the results of the field survey and discussions with the Tuvalu side.

Through the field survey, the Team confirmed the present condition of the existing MW radio broadcasting facilities in TMD which services has been stopped since 2002 due to collapse of MW antenna, those facilities cannot be used any longer. Instead TMD started FM broadcasting services to all the nine (9) islands in the country. However the existing FM transmitters in some islands have stopped due to mechanical trouble and no radio service can reach to those islands. The existing radio station building has become superannuated and the Project is desired for the country to recover MW radio broadcasting services by replacing to new facilities.

The Project aims to provide radio broadcasting services reliably to all the islands in the country by establishing MW radio broadcasting system. Both the Tuvalu and the Japanese sides have recognized to proceed the plans of the equipment component, specifications and undertakings by the both sides under the Project as described in this report.

It is also noted that all the information as described in this report will be decided after further studies in Japan and consultations with JICA and relevant organizations of the Government of Japan. JICA will submit the draft final report, which describes the final component of the Project, to the Tuvalu side in July 2009 as stated in the Minutes of Discussions (M/D) signed by both parties on 17th March 2009.

2. Present Situation of the Project site

2-1 TMD's Radio Station Building

The existing Radio Station Building was constructed in 1975, consisting of one (1) productions studio, two (2) news studios, Master Control Room (MCR) and offices. At present, there can be seen serious damage and sound leakage due to rain in the building as well as malfunction of air-conditionings. This situation is disturbing proper radio broadcasting services, any renovation or repairing of the building can be no longer expected due to becoming too old for use.

2-2 MW Antenna Site

The proposed site for the new MW Antenna is located between the TMD's existing transmitter house and pond. The land is covered with mangrove trees and other bushes, 0.5 m lower than the existing transmitter house and muddy in the rainy season. There is also Non-directional beacon tower owned by Tuvalu Civil Aviation in the site, which will be removed by the Tuvalu side if the Project is approved for implementation. Those mangrove trees and bushes shall be removed by the Tuvalu side before foundation work of the new MW Antenna by the Japanese side.

3. Basic Design Concept

In order to design the buildings and plan the equipment component of the Project, the following technical design concept shall be considered.

3-1 Climatic Conditions

(1) Altitude of the Site

- Radio Station Building:	Less than 5.0 meter (above sea level)
- MW Antenna:	Less than 2.0 meter (above sea level)

(2) Temperature

- Minimum:	22.9 ℃ in 2008
- Maximum:	33.0 ℃ in 2008

(3) Humidity: Max. 99 % in 2008

(4) Wind velocity: Max. 30.0 m/s in 2008

(5) Seasons

- Rainy season:	November to April
- Dry season:	May to October

(6) Annual Rainfall: 3,059 mm in 2008

(7) Earthquake: No earthquake has been recorded

(8) Thunderstorms: Normally, only a few thunderstorms are experienced per year.

3-2 Applicable Design Standards

Table 3-2-1. Applicable Design Standards

	Name of Standards	Application
(a)	International Electrotechnical Commission (IEC)	Main functions of electrical goods in general
(b)	International Standardization Organization (ISO)	Performance of industrial products in general
(c)	Japanese Industrial Standards (JIS)	Industrial products in general
(d)	Japanese Electrotechnical Commission (JEC)	Electrical goods in general
(e)	The Standard of Japan Electrical Manufacturer's Association (JEM)	Same as above
(f)	Japan Electric Association Code (JEAC)	Same as above
(g)	Japan Cable Maker's Association Standard (JCS)	Electrical wires and cable
(h)	Electrical Industrial Association of Japan (EIAJ)	Electrical goods in general
(i)	International Telecommunication Union (ITU)	Electrical goods in general
(j)	Society of Motion Picture and Television Engineers (SMPTE)	Broadcasting equipment in general
(k)	Other related Japanese and International standards such as AES/EBU (Audio Engineering Society/ European Broadcast Union)	Industrial products in general
(l)	International Civil Aviation Organization (ICAO)	Antenna Mast
(m)	Electronic Industries Association of the U.S.A (EIA)	Same as above
(n)	Japanese building code and standards	Building design

3-3 Other Issues for Design

(1) AC Power Supply: 415 V (3 phase) or 240 V (single phase), 50Hz

(2) Soil Bearing Capacity: 150 kN/m^2 for the Antenna site
80 kN/m^2 for the Radio Station Building
(based on a result of soil investigation by the Team)

4. Building Plan

The Team and TMD have agreed to the following outlines of the building plan as a draft schedule for further studies by the Team in Japan, such as project cost estimation, preparation of the detail building specification and the draft final report, etc.

4-1 The New Radio Station Building

(1) Story: One (1) story building

(2) Floor area:

OA Studios;	18 m^2
Production Studio;	72 m^2
Master Control and Maintenance Room;	18 m^2
Waiting Hall;	18 m^2
Offices;	100 m^2
Machine Room;	30 m_2
Others;	74 m^2
Total	330 m^2

(3) Highest point of roof: Approximately 7.50 m

(4) Building service:
- Indoor lighting and outlet for all rooms
- Water storage system (underground) *
- Septic system
- Air conditioning and ventilation system

* The Tuvalu side requested the Team the capacity of the water storage tank to be maximized for the purpose of public water storage for the people on disaster prevention.

4-2 The New Transmitter House

(1) Story: One (1) story building

(2) Floor area:

Transmitter Room;	21.00 m^2
Maintenance Room;	3.75 m^2
Generator Room;	7.50 m^2
Corridor;	3.75 m^2
Total	36.00 m^2

(3) Highest point of roof: Approximately 5.00 m

(4) Building service:
- Indoor lighting and outlet for all rooms
- Air conditioning and ventilation system

5. Equipment Plan

The Team and TMD have agreed to the following contents of the equipment plan (hereinafter referred to as "the Equipment") as a draft schedule for further studies by the Team in Japan, such as project cost estimation, preparations of the detail equipment specification and the draft final report, etc.

5-1 List of the Planned Equipment Component

Priority	No.	Description	Q'ty
A	**1**	**MW Antenna System**	**1 lot**
	1.1	Antenna System	1 set
	1.2	OB Lighting System with Remote Controller	1 set
	1.3	Radial Earth	1 set
	1.4	Antenna Tuning Unit (ATU) Compartment with Automatic Tuning System	1 set
	1.5	Feeder	1 set
A (C: Additional 1 Transmitter for Stand-by)	**2**	**10kW Medium Wave Transmitter**	**1 lot**
	2.1	10kW Medium Wave Transmitter	1 set
	2.2	Output Change-over Switch (U-link)	1 set
	2.3	10kW Dummy Load	1 set
	2.4	Program Input Equipment (PIE) Rack	1 lot
	(1)	Audio Processor Amplifier	1 set
	(2)	Control Panel (Input Select Switch, Meter Panel and Monitor Switcher)	1 set
	(3)	Monitor Amplifier	1 set
	(4)	Monitor Speaker	1 set
	(5)	ON AIR Monitor Receiver with Receiving Antenna	1 set
	(6)	Audio Jack Panel	1 set
	(7)	NFB Panel	1 set
	(8)	Rack	1 set
A	**3**	**Power Supply Equipment and Air Conditioning for Transmitter**	**1 lot**
	3.1	35kVA Engine Generator with Fuel Tank	1 set
	3.2	Control Panel with Automatic Change-over Switch	1 set
	3.3	35kVA Automatic Voltage Regulator & Primary Distribution Board (PDB)	1 set
	3.4	35kVA Isolation and Lightning Protection Transformer	1 set
	3.5	Air Conditioning	2 sets
A	**4**	**Master Control System**	**1 lot**
	4.1	Mixer for Master Control	1 set
	4.2	Limiter / Compressor	1 set
	4.3	ADA	1 set
	4.4	Monitor Panel with VU Meter and Speaker	1 set
	4.5	AJB and Patching Cable	1 set
	4.6	Graphic Equalizer	1 set
	4.7	Radio Receiver	1 set
	4.8	Receiving Antenna	1 set

Priority	No.	Description	Q'ty
	4.9	Equipment Rack with NFB Panel	2 sets
	4.10	Non-linear Editing System	1 set
	4.11	Control Table for Non-linear Editing System	1 set
	4.12	Non-liner Software	1 set
	4.13	UPS for CPU	1 set
	4.14	HUB	1 set
	4.15	STL Transmitter with Antenna and Mast	1 set
	4.16	STL Receiver with Antenna and Pole	1 set
	4.17	Room to Room Interphone Terminal	6 sets
	4.18	ON AIR Light with Control Switch	3 sets
	4.19	AVR for Master and Studio	1 set
	4.20	In House Monitor Amplifier	1 set
	4.21	In House Monitor Speaker with Volume Control Panel	6 sets
	4.22	Radio Wave Clock	12 sets
	4.23	Earth Materials for Equipment Ground	1 set
	5	**ON AIR Studio System**	**2 lots**
		(each comprising)	
	5.1	Audio Mixer with Back up Power Supply	1 set
	5.2	Telephone Pick Up	1 set
	5.3	Non-linear Editing System	1 set
	5.4	Non-linear Software	1 set
	5.5	UPS for CPU	1 set
	5.6	Stereo Monitor Speaker with Amplifier	1 set
A	5.7	Headphone	3 sets
	5.8	Headphone Amplifier	1 set
	5.9	Microphone for DJ with Wind Screen	1 set
	5.10	Microphone Boom Stand for DJ	1 set
	5.11	Microphone for Guest	2 sets
	5.12	Microphone Table Stand for Guest	2 sets
	5.13	Control Table	1 set
	5.14	Operation Chair for DJ	1 set
	5.15	Chair for Guest	2 sets
A	**6**	**Production Studio System**	**1 lot**
	6.1	Audio Mixer with Back up Power Supply	1 set
	6.2	CD Recorder	2 sets
	6.3	Digital Portable Recorder	1 set
	6.4	Telephone Pick Up	1 set
	6.5	Non-linear Editing System	1 set
	6.6	Non-liner Software	1 set
	6.7	UPS for CPU	1 set
	6.8	Graphic Equalizer	1 set
	6.9	Effecter	1 set
	6.10	Stereo Monitor Speaker	1 set
	6.11	Monitor Amplifier	1 set

Priority	No.	Description	Q'ty
	6.12	Stereo Audition Monitor Speaker with Amplifier	1 set
	6.13	Headphone	2 sets
	6.14	Studio Monitor Speaker (wall mount type)	1 set
	6.15	Monitor Amplifier for Studio Monitor Speaker	1 set
	6.16	Talk Back Speaker	1 set
	6.17	Amplifier for Talk Back Speaker	1 set
	6.18	Condenser Microphone	4 sets
	6.19	Dynamic Microphone	15 sets
	6.20	Microphone Carrying Case	1 set
	6.21	Microphone Boom Stand	4 sets
	6.22	Microphone Table Stand (Gooseneck Type)	15 sets
	6.23	Microphone Cable (20m)	10 sets
	6.24	Microphone Cable (10m)	10 sets
	6.25	Studio Connector Plate	1 set
	6.26	Equipment Rack with NFB Panel	1 set
	6.27	Control Table for Audio Mixer	1 set
	6.28	Control Table for Non-linear Editing System	1 set
	6.29	Operation Chair	3 sets
	6.30	Table for Guest	1 set
	6.31	Chair for Guest	5 sets
A	**7**	**Editing System**	**1 lot**
	7.1	Editing Mixer	1 set
	7.2	CD Recorder	2 sets
	7.3	Cassette Tape Recorder	1 set
	7.4	Non-linear Editing System	1 set
	7.5	Control Table for Non-linear Editing System	1 set
	7.6	Non-liner Software	1 set
	7.7	UPS for CPU	1 set
	7.8	Stereo Monitor Speaker with Amplifier	1 set
	7.9	Headphone	1 set
	7.10	Line Transformer Box	1 set
	7.11	Equipment Rack with NFB Panel	1 set
	7.12	Operation Chair	1 set
B	**8**	**News Car System**	**1 lot**
	8.1	4WD Mini VAN	1 set
	8.2	Radio Transceiver with Antenna	1 set
	8.3	Radio Transceiver for Base Station with Antenna	1 set
	8.4	Digital Portable Recorder with Microphone	3 sets
	8.5	Handy Talky	2 sets
A	**9**	**Connection Materials**	**1 lot**
	9.1	Power Cable	1 set
	9.2	Audio Cable	1 set
	9.3	Control Cable	1 set
	9.4	LAN Cable	1 set

Priority	No.	Description	Q'ty
	9.5	Earthing Cable	1 set
	9.6	Cable Rack	1 set
	9.7	Cable Tray	1 set
	9.8	Cupper Bar for Cable Tray	1 set
	9.9	Cable Pit and Cover	1 set
	9.10	Indoor Feeder	1 set
	10	**Maintenance Equipment and Tools**	**1 lot**
	10.1	Distortion Meter/Oscillator	1 set
	10.2	Audio Attenuator	1 set
	10.3	Oscilloscope	1 set
	10.4	Frequency Counter	1 set
	10.5	Circuit Tester	2 sets
A	10.6	Impedance Bridge, Receiver/Generator	1 set
	10.7	Field Strength Meter	1 set
	10.8	High Voltage Probe	1 set
	10.9	Tool Kit	2 sets
	10.10	Storage Rack	4 sets
	10.11	Safety Belt	3 sets
	10.12	Safety Belt (Long Type)	3 sets
	11	**Spare Parts**	**1 lot**
	11.1	PA Module for Transmitter (1pc each type)	1 set
	11.2	RF Driver Unit for Transmitter	1 set
	11.3	Power Supply Module for Transmitter (1pc each type)	1 set
A	11.4	Control Board for Transmitter	1 set
	11.5	Monitor Board for Transmitter	1 set
	11.6	Power FET for PA Module	1 set
	11.7	Printed Board for AVR Control	1 set
	11.8	Maintenance Kit for Antenna System	1 set
	12	**Consumable Parts**	**1 lot**
	12.1	Fan unit for Transmitter	5 sets
	12.2	Air Filter for Transmitter	5 sets
	12.3	Fuse for Transmitter	5 sets
A	12.4	Surge Absorber for Isolation Transformer	5 sets
	12.5	Lamp for OB Lightning System	5 sets
	12.6	Fuse for PIE	5 sets
	12.7	Fuse for AVR	5 sets
	12.8	CD-R	3,000 pcs
	12.9	Memory chip for Digital Portable Recorder	20 pcs

5-2 Key Specifications of the Equipment

5-2-1. MW Antenna System

It shall be vertical polarization type medium wave antenna with a height of 45 m, consisting of the following equipment:

- 45m height Vertical polarization Antenna
- OB Lighting System shall be Medium intensity white beacon regulated by ICAO
- Radial Earth
- Antenna Tuning Unit (ATU) with Automatic Tuning System
- The compartment which contains ATU shall be included.
- Feeder

5-2-2. 10 kW Medium Wave Transmitter

(1) 10 kW Medium Wave Transmitter

- Frequency: 621 kHz
- Output Power: 10 kW
- Transmitting System: Single
- Type: Fully Solid State
- Modulation: Digital AM modulation
- Output Impedance: 50 Ω
- Audio Input Level: 0 ~ +10 dBm
- Cooling System: Forced Air Cooling
- Power Supply: AC 415 V, 3 φ, 50 Hz

(2) Output Change-over Switch

- Type : U-link Type

(3) 10 kW Dummy Load

- Impedance: 50 Ω
- Cooling System: Forced Air Cooling

(4) Program Input Equipment (PIE) Rack

It shall be a rack system consisting of the following equipment to be installed in the

control room.

- Audio Processor Amplifier
  High level of average modulation and increase sideband power shall be maintained by a Multi-band Compression.
- Control Panel including Meter Panel and Monitor Switcher
- Monitor Amplifier: 20 W
- Monitor Speaker
- On Air Monitor Receiver with Receiving Antenna
  Receiving range: 150 kHz to 32 MHz
- Audio Jack Panel: 20 pairs
- NFB Panel
- Rack

5-2-3. Power Supply Equipment and Air Conditioning for Transmitter

An engine generator shall be provided for emergency power supply when the city power supply stops. The capacity of the generator shall cover maximum power consumption of the proposed transmitter.

The Isolation & Lightning Transformer, AVR and PDB shall cover the range of voltage fluctuations in consideration with the site condition.

(1) Engine Generator with Fuel Tank

- Power Supply: AC 415 V, 3 φ, 50 Hz
- Output Capacity: 35 kVA or more
- Fuel: Diesel
- Fuel Tank Capacity shall be specified, which can cover continuous two (2) hours operation of the transmitter.

(2) AVR & PDB

- Input: AC 415 V, 3 phase 4 wires
- Output: AC 415-240 V
- Capacity 35 kVA or more

(3) Isolation & Lightning Transformer

- Capacity: 35 kVA or more

(4) Air Conditioning System

It shall be installed in the transmitter room and used for cooling of the transmitter, consisting of the following units:

- 7.5 kW=5,500 kcal/h Indoor Unit x 2
- 7.5 kW=5,500 kcal/h Outdoor Unit x 2

5-2-4. Master Control System

Master control shall have the function to change the program sent from each studio or the recorded program output to the transmitter, consisting of the following equipment:

- Mixer for Master Control
- Limiter / Compressor
- Monitor Panel with VU meter and Speaker
- Audio Jack Panel: 40 pairs
- Graphic Equalizer: Line signal frequency compensation
- Radio Receiver: For monitoring of ON AIR signal
- Equipment Rack with NFB Panel
- Non-linear Editing System with UPS
- HUB for Networking of Non-linear Editing System
- Control Table for Non-linear Editing System and Operation Chair
- STL Transmitter and Receiver for sending the Program signal to Transmitter.
- Room to Room Interphone Terminal
- ON AIR Light with Control Switch
- AVR for Master and Studio
- In House Monitor System
- Radio Wave Clock
- Earth Material for Equipment Ground

5-2-5. ON Air Studio System (2 Studios)

It shall be one room type studio system which mainly performs the live program. DJ performs announcement and operation of the broadcast equipments by one person. DJ operation table is compactly packed for easy operation, consisting of the following equipment:

- Audio Mixer with Back up Power Supply
- Telephone Pick Up
- Non-linear Editing System with UPS
- Monitor Equipment
- Microphone and Stand
- Control Table and Operation Chair

5-2-6. Production Studio System

This system shall compose sub-control room and studio floor which mainly performs the recording program such as music program and talk program, etc., consisting of the following equipment:

- Audio Mixer with Back up Power Supply
- CD Recorder
- Digital Potable Recorder
- Telephone Pick Up
- Non-linear Editing System with UPS
- Graphic Equalizer
- Effecter
- Monitor Equipment
- Microphone and Stand
- Equipment Rack with NFB Panel
- Control Table and Operation Chair

5-2-7. Editing System

It shall be a system for editing the material recorded in production studio and the other studios, and completing the program, consisting of the following equipment:

- Editing Mixer
- CD Recorder
- Cassette Tape Recorder
- Non-linear Editing System with UPS
- Control Table and Operation Chair
- Monitor Equipment

- Line Transformer Box

5-2-8. News Care System

It is used for the purpose which passes on live information urgently through radio from a spot of the disaster to secure the safety of people who live in the islands at the time of disaster, such as typhoon, tornado, etc., consisting of the following equipment:

- 4WD Mini VAN
- Radio Transceiver System
- Digital Portable Recorder with Microphone

5-2-9. Connection Materials

The following materials shall be provided for the Installation Work of the Equipment (but not limited to):

- Power Cable
- Audio Cable
- Control Cable
- LAN Cable
- Earthing Cable
- Cable Rack
- Cable Tray
- Copper Bar for Cable Tray
- Cable Pit and Cover
- Indoor Feeder

5-2-10. Maintenance Equipment and Tools

The following measuring equipment shall be provided for maintenance of the Equipment:

- Distortion Meter/Oscillator
  It shall be provided to measure automatically various audio signal parameters such as Distortion, S/N, etc.
- Audio Attenuator: 4 dial type
- Oscilloscope
  Frequency range: DC to 100 MHz
- Frequency Counter

Frequency range: 10 Hz to 230 MHz

- Circuit Tester
- Impedance Bridge, Receiver/Generator
  Frequency range: 500 kHz to 5 MHz
- Field Strength Meter
  Frequency range: 500 kHz to 5 MHz
- High Voltage Probe
  Attenuation: x 1,000
- Tool Kit
  It shall be designed for daily and periodical maintenance of broadcasting equipment with a carrying case.
- Storage Rack
  It shall be provided to protect and save the precision equipment and spare parts, such as a microphone and measuring instrument, from damage, salt and humidity.
- Safety Belt and Safety Belt (Long type)
  It shall be provided for safety during maintenance work of the antenna tower, etc.

5-2-11. Spare Parts

The following spare parts shall be provided for repairing work in a short time at a failure:

- PA Module for Transmitter (1 pc each type)
- RF Driver Unit for Transmitter
- Power Supply Module for Transmitter (1 pc each type)
- Control Board for Transmitter
- Monitor Board for Transmitter
- Power FET for PA Module
- Printed Board for AVR Control
- Maintenance Parts for Antenna System

5-2-12. Consumable Parts

The following consumable parts shall be provided for periodical maintenance works and daily regular works:

- Fan unit for Transmitter
- Air Filter for Transmitter

- Fuse for Transmitter
- Surge Absorber for Isolation Transformer
- Lamp for OB Lighting
- Fuse for PIE
- Fuse for AVR
- CD-R
- Memory chip for Digital Portable Recorder

6. Results of the Other Studies

The Team carried out the following study(ies) to confirm availability of the Project site for safe operation of the broadcasting equipment.

<Measurement of Voltage Stability>

TMD has 3 different route of power supply; two by public city power through different substations operated by Tuvalu Electricity Corporation (TEC), another by a stand-by diesel engine generator operated by Tuvalu Telecommunication Corporation (TTC) to be switched on during power interruption of the public city power. The Team measured a voltage at a location in the existing TMD's Radio Station Building. The result of the measurement is shown as follows:

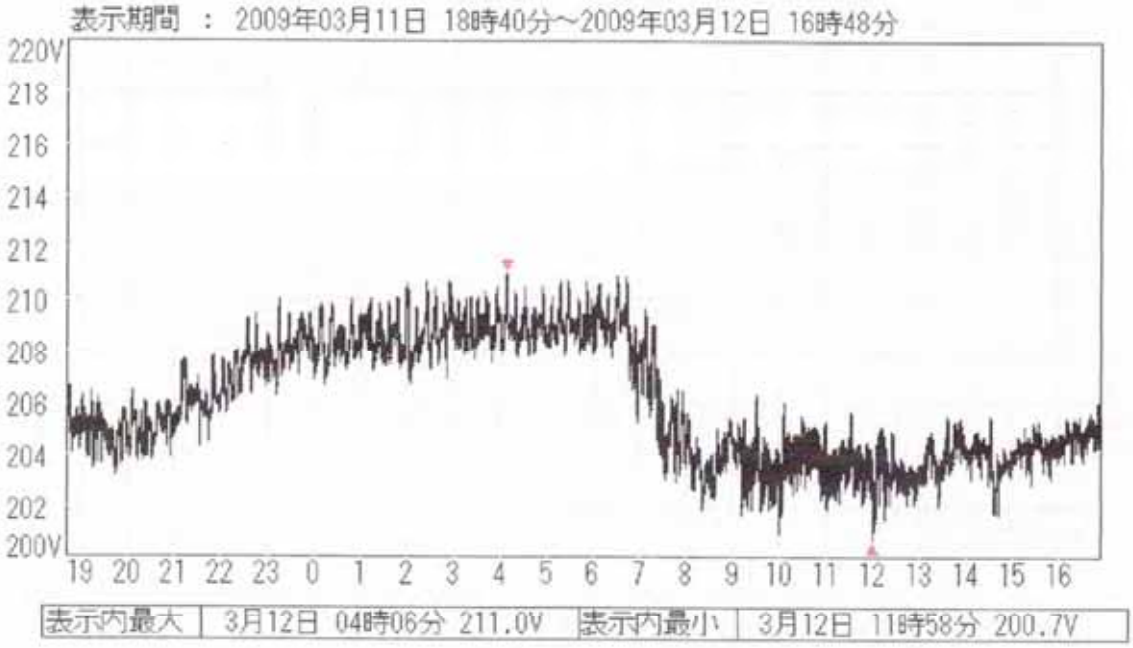
Location: The existing production studio

Period: From "18:40 on 11th Mar. 2009" until "16:48 on 12th Mar. 2009"

Result: See Fig. 7-1.

The rated voltage in Tuvalu is 240V. According to the result, voltage values at the location were measured average of 204V in daytime and average of 208V in nighttime due to high power consumption in daytime. There could be found no power interruption but there were always voltage drops lower than permissible level that is -10% (216V) of the rated voltage.

Therefore, the Team plans to equip with UPS and/or AVR with the Equipment to protect from such striking voltage drop for safe operation of the Equipment. The Team also advises the Tuvalu side that TEC should improve voltage by changing a tap position of distribution transformer in the existing substation or changing the line from another substation.



1. Period: From "18:40 on 11th Mar. 2009" until "16:48 on 12th Mar. 2009"
2. Location: Production Studio
3. Max. value: 211.0V at 04:06 on 12th Mar. 2009
4. Min. value: 200.7V at 11:58 on 12th Mar. 2009

Fig. 7-1: Result of Voltage Measuring in the Existing TMD's Radio Station Building

7. The Work Demarcation of the Project

7-1 Principle

The work demarcation between the Japanese side and the Tuvalu side (TMD and relevant organizations of the Government of Tuvalu) shall be as shown below.

Table 7-1. The Work Demarcation of the Project

Work Item	Responsibilities		Remarks
	Japanese	Tuvalu	
(1) Procurement of the Equipment	○		"The Equipment" is defined in **the Equipment Plan of Chapter 5.**
(2) Transportation of the Equipment to the Project site including insurance	○		Delivery Point: Store yard near the Project site
(3) Tax exemption and custom clearance of the Equipment at the port of disembarkation		○	
(4) Securing store yard for unloading containers of the Equipment near the Project site		○	
(5) Construction of the new Radio Station Building and the new Transmitter House in the Project site	○		Including temporary road for construction
(6) Installation, Adjustment and Testing of the Equipment	○		Installation of Radial Earth for the new Antenna

Work Item	Responsibilities		Remarks
	Japanese	Tuvalu	
(7) Initial operation & Total system trainings of the Equipment including equipment for the trainings	○		
(8) Bush clearing and Removal of Obstacles in the Project site for the new Antenna		○	**To be completed before starting foundation work of the new Antenna by the Japanese side.**
(9) Removal work of the existing equipment and cables including Shifting work of the existing studios and Master Control System for Temporary broadcasting	**(Advice)**	○	**To be completed before demolishing of the existing Radio Station Building by the Japanese side.**
(10) Demolishing of the existing Radio Station Building and Leveling the site	○		
(11) Securing of yard for rubbish		○	**Ditto**
(12) Provision of Power Supply from the existing substation to the new Radio Station Building and the new Transmitter House including a back-up power supply for the new Radio Station Building.	**(Advice)**	○	**Ditto**
(13) Provision of additional two (2) Telephone Lines to the new Radio Studios and Program line between Studios and Transmitter for back up	**(Advice)**	○	**To be completed before Installation of the Equipment**
(14) Test Broadcasting (On Air)	**(Advice)**	○	
(15) Installation of the existing Satellite Receiving Antenna on the new Radio Station Building		○	
(16) Construction of Fences and Gates around the new Radio Station Building		○	
(17) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		○	
(18) To maintain and use properly and effectively the facilities contracted and equipment provided under the Grant Aid		○	
(19) To bear all the expenses, other than those to be borne by the Grant Aid		○	

Note: ○ indicates the side responsible for the work.

7-2 Tax Exemption Procedure

The following procedure shows steps necessary to exempt from taxes and custom duty of the Equipment to be procured under the Project. The Tuvalu side shall undertake arrangement necessary for the exemption of the Equipment without delaying.

① Before shipment of the Equipment, the Japanese Contractor shall submit a photocopy of the Exchange of Notes to Department of Customs, Ministry of Finance and Economic Planning through the responsible organization of the Tuvalu side on the Project for registration of the Tax exemption.

② Before arrival of the Equipment at a port in Tuvalu, the Japanese Contractor shall

submit i) Original Bill of Lading and ii) Original Invoice for transporting the Equipment to Custom Clearing Agent (CCA) in Tuvalu.

③ CCA prepares custom forms of the Equipment and submit to Department of Customs for approval.

④ After approval by the Department of Customs, Cargos of the Equipment will be released.

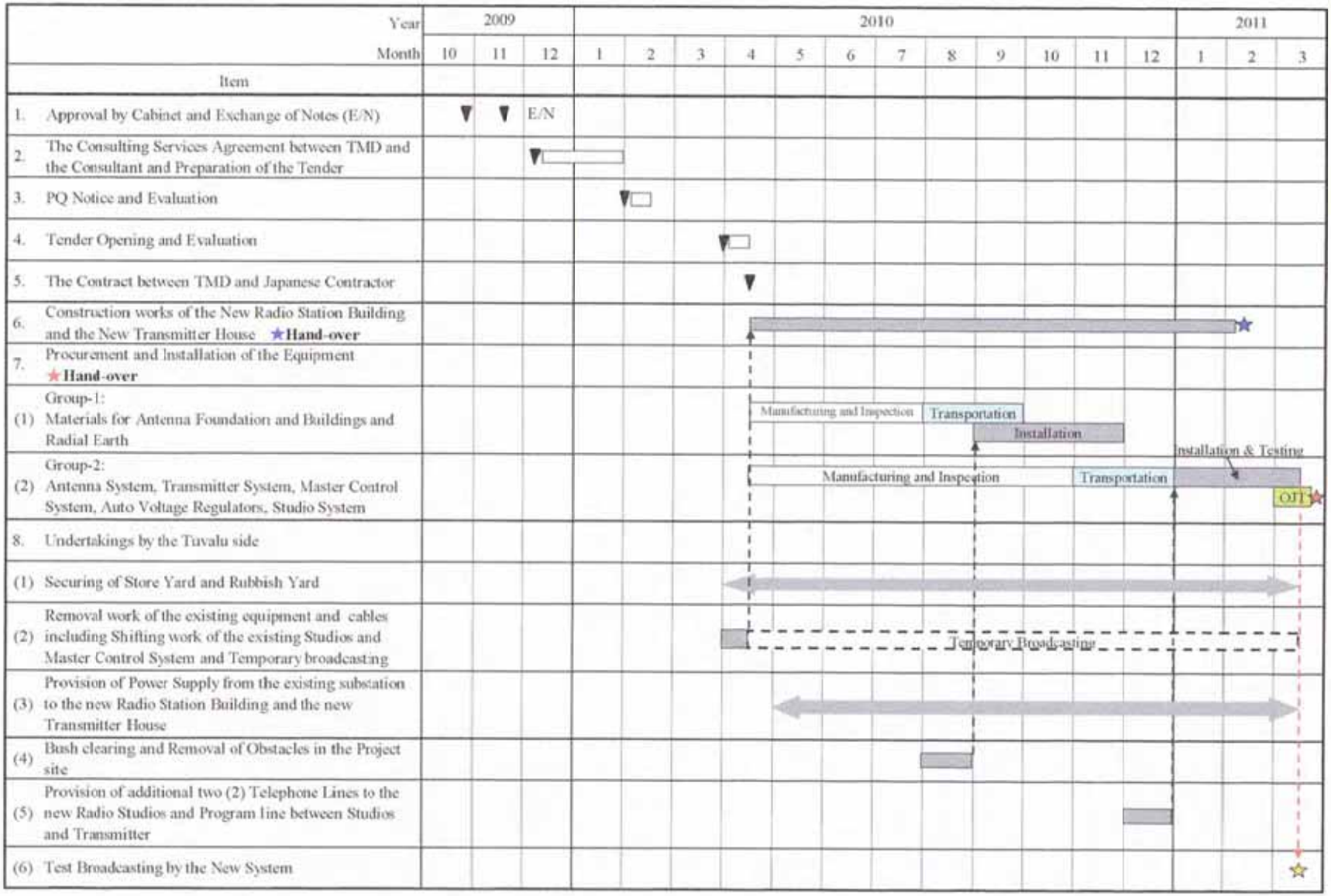
8. Budget Estimation of the Undertakings by TMD (the Tuvalu side)

For the undertakings to be done by the Tuvalu side (TMD and relevant organizations of the Government of Tuvalu) as shown in Chapter 7 above, The Team estimated the budget necessary for the undertakings to be secured by the Tuvalu side **by March 2010** as follows:

Table 8-1. Budget Estimation of the Undertakings by the Tuvalu side

Item	Estimated Cost (A$)	Remarks
(1) Securing store yard for unloading containers of the Equipment near the Project site	0	TMD will utilize the existing store yard near the Project site.
(2) Bush clearing and Removal of Obstacles in the Project site for the new Antenna	12,000	Cutting tress: 23 A$/man/day x 432 man*day = 9,936 A$ Cutting bushes: 23 A$/man/day x 87 man*day = 2,001 A$
(3) Removal work of the existing equipment and cables including Shifting work of the existing studios and Master Control System for Temporary broadcasting	0	TMD's staffs will undertake this work.
(4) Securing of yard for rubbish	0	
(5) Provision of Power Supply from the existing substation to the new Radio Station Building and the new Transmitter House including a back-up power supply for the new Radio Station Building.	2,000	Cables: 14 A$/m x 100 m = 1,400 A$ kWh meter: 100 A$ Installations: 50 A$/hr x 10 man*hrs = 500 A$
(6) Provision of additional two (2) Telephone Lines to the new Radio Studios and Program line between Studios and Transmitter	300	100 A$/line x 3 lines
(7) Installation of the existing Satellite Receiving Antenna on the new Radio Station Building	0	TMD's staffs will undertake this work.
(8) **Construction of Fences and Gates around the new Radio Station Building**	9,500	Fences: 900 A$ for foundation 5,500 A$ for Net fences Gates: 200 A$ for Main entrance 2,900 A$ for Slide type for Vehicle
Total amount:	**23,800**	

9. Implementation Schedule of the Project (Tentative)



10. Operation and Maintenance and Financial Plans for TMD

10-1 Budget Estimation of Operation and Maintenance

The Team estimated budget to be secured by the Tuvalu side necessary for proper operation and maintenance of the facilities after the completion of the Project in the following categories:

(1) Staffing

The Team advises the Tuvalu side that TMD should employ additionally one (1) technician (8,000A$/year) for proper operation and maintenance of the MW radio broadcasting facilities.

(2) Building

(A$)

Item	Unit Cost	Every Year	
		Q'ty	Amount
Maintenance of Air Conditioning	4,300	1	4,300
Cleaning Water Tank	700	1	700
Repairing Water Pumps	1,400	1	1,400
Repairing Electrical Facility	1,400	1	1,400
Painting Antenna Mast	11,400	1	11,400
Total			19,200

(3) Spare Parts

(A$)

Item	Unit Cost	Every Year		Every 3 Years		Every 5 Years	
		Q'ty	Amount	Q'ty	Amount	Q'ty	Amount
Cables	140	3	420				
Microphone	290	1	290				
Headphone	290	3	870				
Switches, Connectors, etc.	710	1	710				
Fan Unit for TX	710	1	710				
Air Filter for TX	710	2	1,420				
Various Fuses	290	5	1,450				
Lamp for OB Lighting	1,430	3	4,290				
Surge Absorber for Iso. Tr.	1,430	1	1,430				
PA Module for TX	1,430		0	3	4,290		
RF Driver Unit for TX	1,430		0	3	4,290		
Power Supply Module for TX	1,430		0	3	4,290		
Various Printed Board	1,430		0	3	4,290		
FET for PA Module	1,430		0	3	4,290		
UPS	2,860		0			5	14,300
Total			11,590		21,450		14,300

(4) Consumables

(A$)

Item	Unit Cost	2nd year		3rd year		4th year and after	
		Q'ty	Amount	Q'ty	Amount	Q'ty	Amount
CD-R (Media)	1	3,000	3,000	3,000	3,000	2,000	2,000
Total			3,000		3,000		2,000

The above quantities of consumables are estimated on the basis of:

- Consumables to be used in the 1st year after the completion of the Project are 3,000 pcs of CD-R which will be provided under the Project for the initial operation of the new facility.
- The Tuvalu side shall secure a budget for consumables to be used in the 2nd year and afterwards.
- 3,000 pcs of CD-R per year until the 3rd year will be required for converting the TMD's existing archives to different format of the new media.
- After the 4th year, 2,000 pcs of CD-R per year will be used for regular works.

(5) Reserve Fund for Replacing to the New Facilities (For 10 years)

(A$)

Item	Unit Price	Q'ty	Amount
Transmitter	714,000	1	714,000
Guy wires and Insulators	143,000	1	143,000
Studio Equipment	571,000	1	571,000
News Car System	71,000	1	71,000
Air Conditioning	43,000	1	43,000
Back up Generator	43,000	1	43,000
Total			1,585,000

10-2 Training Cost for TMD's Staffs

The Team estimated budget to be secured by the Tuvalu side necessary for training programmes plan in the following table, necessary for TMD's management to achieve the benefits of the Project below-mentioned in Chapter 11.

(A$)

Training Plan (): Number of person	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1. Overseas Training for the Radio Broadcasting by own fund (1)	10,000		10,000		10,000		10,000		10,000		10,000	
2. Pacific Island National Association (PINA) Workshop in Fiji (2)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
3. Overseas Training for the Radio Broadcasting by ODA (1)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Total Cost	16,000	6,000	16,000	6,000	16,000	6,000	16,000	6,000	16,000	6,000	16,000	6,000

Note: Cost of the above Trainings

1. 10,000 A$ One (1) month training for broadcasting on the school by the Government of Tuvalu
2. 2,000 A$ Workshop for Media in Fiji
3. 2,000 A$ One (1) month training for broadcasting on the school by ODA scholarship

10-3 Financial Plan for TMD

The Team advises the Tuvalu side a financial plan for TMD by the following table, basing on the financial record of TMD as of 2008 and 2009 and foreseeing costs through the above-mentioned budget estimation of operation and maintenance and training cost for TMD's staffs.

The plan also shows that TMD can renew the MW radio broadcasting equipment to be expected after ten (10) years of the completion of the Project by reserving fund every year.

Financial Plan for TMD

(Unit : x1,000A$)

No	Year	2008	2009	2010	1 2011 Completion of the Project	2 2012	3 2013	4 2014	5 2015	6 2016	7 2017	8 2018	9 2019	10 2020
A.	**Revenue**													
(1)	Parliament Broadcasting	34.0	10.0	10.0	10.0	10.4	10.9	11.4	11.9	12.4	12.9	13.5	14.1	14.7
(2)	Commercial Radio	55.0	55.0	55.0	56.2	57.9	59.6	61.4	63.2	65.1	67.1	69.1	71.2	73.3
(3)	Photocopy and Binding Services	22.5	26.8	28.0	29.2	30.5	31.8	33.2	34.7	36.2	37.8	39.5	41.2	43.0
(4)	Publishing Newspaper	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(5)	Public Audio Services	0.0	0.0	0.0	5.0	5.1	5.3	5.4	5.6	5.7	5.9	6.1	6.2	6.4
(6)	Others	5.5	6.5	6.8	7.1	7.4	7.7	8.1	8.4	8.8	9.2	9.6	10.0	10.4
	TOTAL [A]	**120.0**	**101.3**	**99.8**	**107.5**	**111.4**	**115.3**	**119.5**	**123.8**	**128.3**	**132.9**	**137.7**	**142.8**	**147.9**
B.	**Expenditure**													
(1)	Salaries and Allowances	165.2	206.3	223.4	233.2	243.5	254.2	265.4	277.0	289.2	302.0	315.2	329.1	343.6
(2)	Business Travel Cost	7.3	12.1	12.6	13.2	13.8	14.4	15.0	15.7	16.4	17.1	17.8	18.6	19.4
(3)	Telephone and Internet Cost	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
(4)	**Maintenance Cost**	**4.3**	**3.5**	**2.2**	**3.0**	**36.8**	**36.8**	**57.2**	**35.8**	**50.1**	**57.2**	**35.8**	**35.8**	**57.2**
1)	Building	1.8	1.8	0.5	0.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2
2)	Spare Parts	1.2	1.2	1.2	0.0	11.6	11.6	33.0	11.6	25.9	33.0	11.6	11.6	33.0
3)	Vehicle and Fuel	1.3	0.5	0.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4)	Consumables	-	-	-	0.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
(5)	Office Expenses and Computer Supplies	10.0	8.0	8.0	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
(6)	Training Fee	0.0	16.0	6.0	16.0	6.0	16.0	6.0	16.0	6.0	16.0	6.0	16.0	6.0
	TOTAL [B]	**188.3**	**247.4**	**253.7**	**276.1**	**310.7**	**332.1**	**354.3**	**355.2**	**372.4**	**402.9**	**385.6**	**410.2**	**436.9**
C	A-B=C	-68.3	-146.1	-153.9	-168.6	-199.4	-216.7	-234.8	-231.4	-244.1	-270.0	-247.8	-267.5	-289.0
D	**Governmental Budget for Compensation**	**68.3**	**146.1**	**153.9**	**168.6**	**199.4**	**216.7**	**234.8**	**231.4**	**244.1**	**270.0**	**247.8**	**267.5**	**289.0**
E	E=C+D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F	**Reserve Fund (Depreciation)**	**0.0**	**0.0**	**0.0**	**158.5**	**158.5**	**158.5**	**158.5**	**158.5**	**158.5**	**158.5**	**158.5**	**158.5**	**158.5**
	Total Reserve Fund				**158.5**	**317.0**	**475.5**	**634.0**	**792.5**	**951.0**	**1,109.5**	**1,268.0**	**1,426.5**	**1,585.0**

11. Benefit of the Project

The Team and TMD confirmed the benefit of the Project which is to be achieved after three (3) years from the completion of the Project in 2011, as follows:

- **To provide reliable and stable radio services to the people living in all the islands in Tuvalu.**
- **To improve capability of TMD to produce original programmes and others to enrich public awareness.**
- **To provide rapidly disaster warning information to the people of Tuvalu.**

12. Drawings for Basic Design

Dwg. No.	Title
G-01	Location Map of the Project site
A-01	Plot Plan of the New Radio Station Building
A-02	Elevation of the New Radio Station Building
A-03	Roof Plan of the New Radio Station Building
A-04	Plan of the New Transmitter House
Sy-01	Block Diagram of 10 kW MW Transmitter System
Sy-02	Block Diagram of Master Control System
Sy-03	Block Diagram of ON AIR Studio System
Sy-04	Block Diagram of Production Studio System
Sy-05	Block Diagram of Editing System
Sy-06	Block Diagram of News Car System
L-01	Floor Layout of Radio Broadcasting Section
L-02	Equipment Layout of ON AIR Studio System

(End)

Annex-1: Letter from TMD for Training during the Project

TUVALU MEDIA DEPARTMENT
TUVALU GOVERNMENT
VAIAKU, FUNAFUTI, TUVALU
Phone: (688) 20138, Fax (688) 20732
Email: <mtaape@gov.tv>

19 March, 2009

To: **JICA Study Team**

Subject: **Training Request by Tuvalu Media Department**

The Tuvalu Media Department (TMD) seeks training assistance to sustain the new installation of modern digitalized MW radio broadcasting system to be implemented in the very near future under the AM Radio Broadcasting Project. The plan will take the opportunity and advantage of the JICA Study Team, to include in the scope of the project the following training components:

1. Hands on training during the installation of new modern digitalized equipments of MW radio broadcasting system consist of transmission system and studio system and antenna, i.e. TMD's technicians would involve in all installation work carried out during the implementation of the MW radio broadcasting system project.

2. Operation, maintenance and troubleshooting guidance of all new MW radio broadcasting system.

The necessity of this request is based on the fact that the Tuvalu Media technical staffs do not have the capability due to lack of technology skill of modern digitalized MW radio broadcasting system.

The Tuvalu Media Department seeks the possibility of providing further training for TMD's technicians to study in Japan. The need to expose TMD's technicians in an advanced technology environment would surely benefit to TMD for proper operation and maintenance use of new facilities. The idea is also to impart the knowledge from those who had exposed to Japan to other local technicians, and most importantly to realize the durability of the new facilities. Furthermore, we also hope that the possibility of continuous and intensive training of this kind would be mostly appreciated.

We believe that this request is necessary and also consistent with your expectation for the long-term run of the project, and hope that you will find it in your hearts and budget to support our request.

If I can provide additional information to encourage consideration of our request, please feel free to contact me.

Yours sincerely,

Stanley MANAO
Chief Engineer

cc: Melali Taape
Director

Annex-2: TMD's Activity Plan for Utilization of News Car

TUVALU MEDIA DEPARTMENT
TUVALU GOVERNMENT
VAIAKU, FUNAFUTI, TUVALU
Phone: (688) 20138, Fax (688) 20732
Email: <mtaape@gov.tv>

23rd March, 2009

To: JICA Design Team.

Subject: TMD Activity Plan for utilization of News Car.

I wish to provide TMD Activity Plan for the utilization of the News Car, proposed under the Project for the Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention in Tuvalu.

TMD proposes to utilize the News Car for **"actuality"** coverage of both News and Radio Program from any location on Funafuti for the sole purpose of Information coverage and dissemination to the Tuvalu people on all the islands.

Please find below TMD's Plan for the News Car:

1. On-site Japan - ODA projects news coverage for radio news and program live broadcast from site where project activities are actually being undertaken including Coastal Management Project and Renewable Energy projects in Tuvalu.

2. News coverage through live interviews with high level Japanese Government Officials visiting Tuvalu including Japanese Ambassador to Tuvalu and delegation.

3. Radio news / radio program interviews with JICA officials visiting Tuvalu islands.

4. Radio news / radio program coverage of disaster related events and program activities around Funafuti.

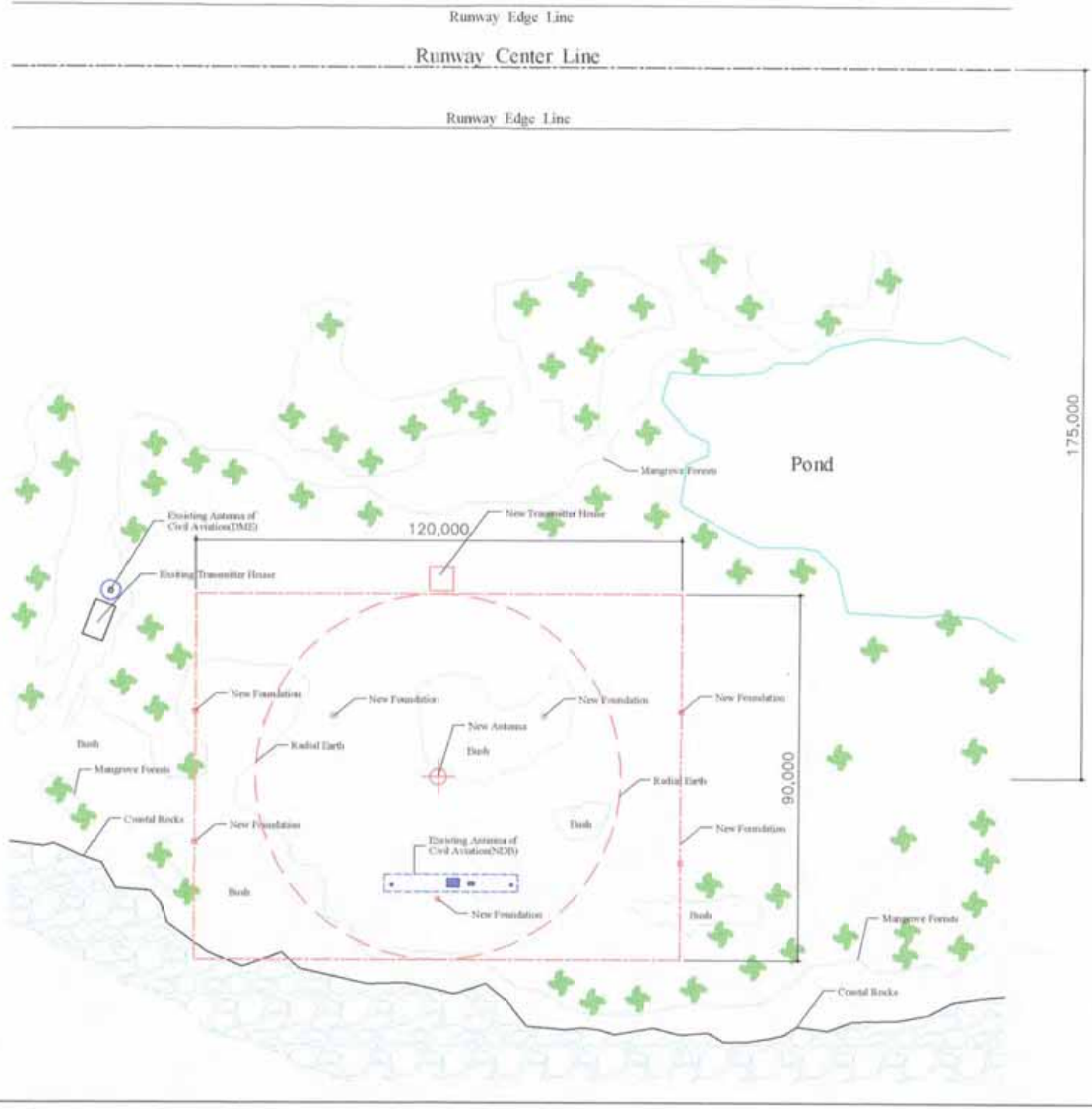
5. Coverage of Tuvalu-Japan government official meetings in relation to Japan ODA Projects to be held in Tuvalu.

6. Coverage of any future Japan-Tuvalu consultations to be held in Tuvalu, and to carry out all other necessary radio coverage of national official events including Parliament Sittings, disaster related events and many more.

Sincerely,

Melali Taape.

Melali Taape
Director
Tuvalu Media Department
Office of the Prime Minister
Vaiaku,
Funafuti,
TUVALU.



THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE
Title: Location Map of the Project site				DWG. No. G-01
DATE	DESIGNED	CHECKED	APPROVED	REVISION

YACHIYO ENGINEERING CO., LTD. TOKYO, JAPAN

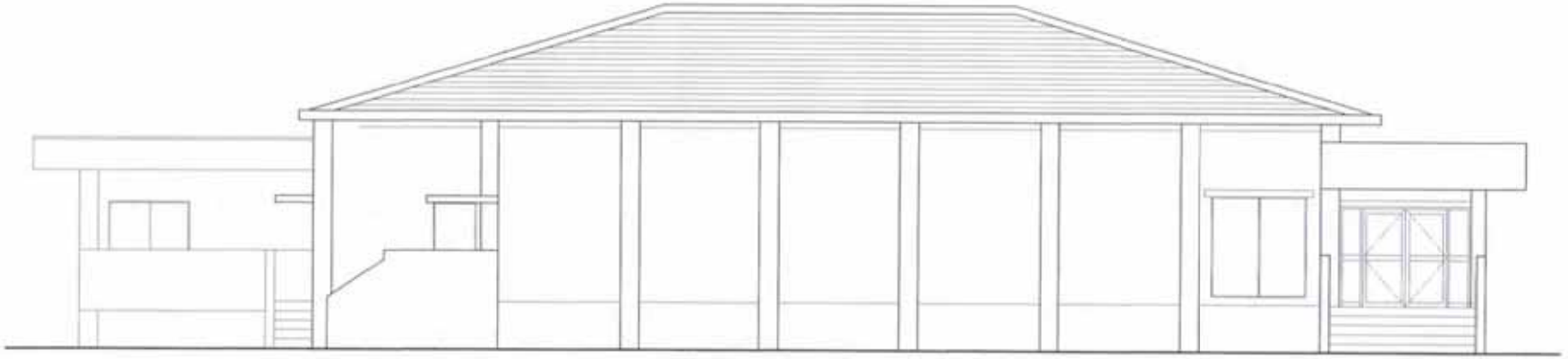
A-6-28

THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE
Title: Plot Plan of the New Radio Station Building				DWG. No. A-01
DATE	DESIGNED	CHECKED	APPROVED	REVISION

YACHIYO ENGINEERING CO., LTD. TOKYO, JAPAN

A-6-29

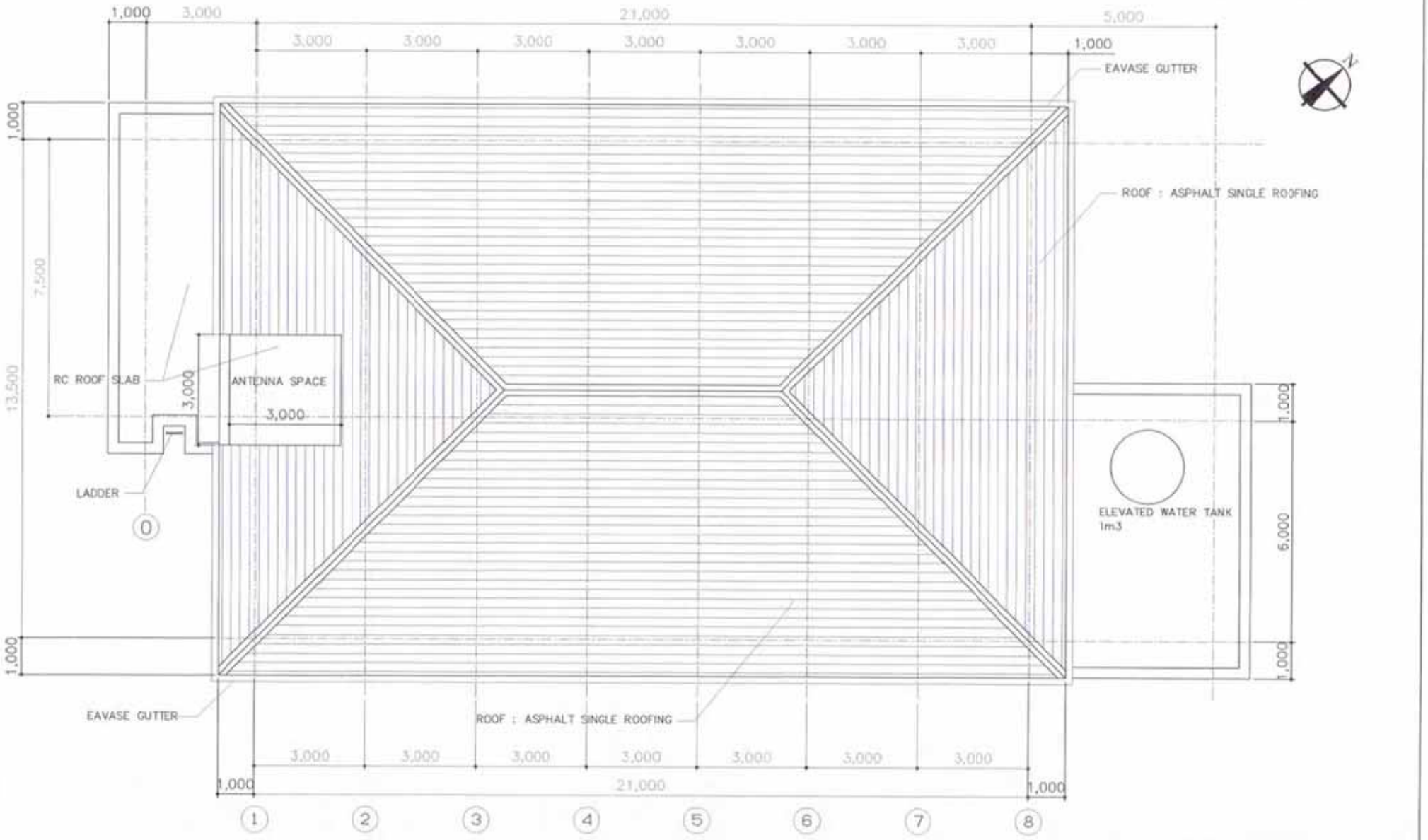
O LINE ELEVATION S=1/100



D LINE ELEVATION S=1/100

THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU	SCALE S=1/100
Title: Elevation of the New Radio Station Building	DWG. No. A-02
DATE / DESIGNED / CHECKED / APPROVED	REVISION
YACHIYO ENGINEERING CO., LTD. TOKYO, JAPAN	

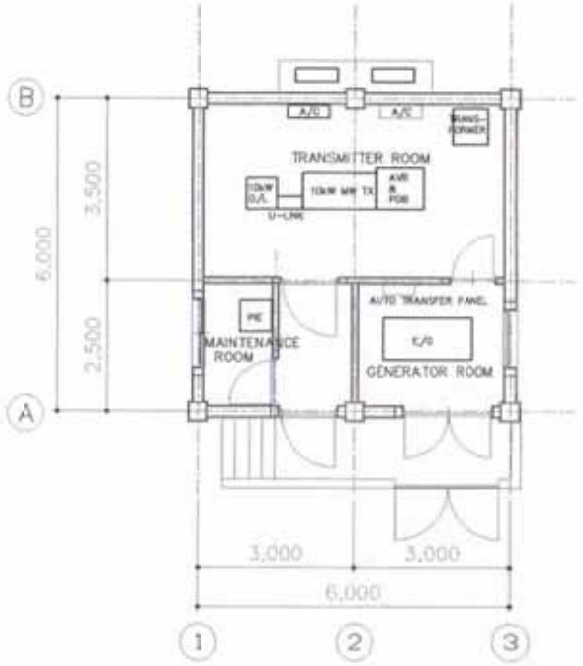
A-6-30



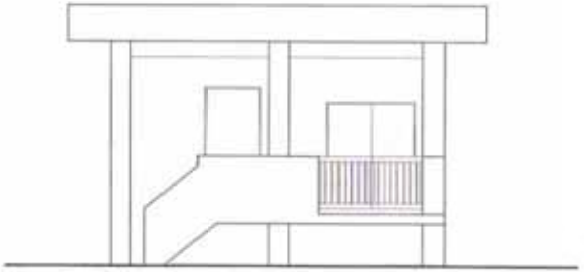
ROOF PLAN S=1/100

THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU	SCALE: S=1/100
Title: Roof Plan of the New Radio Station Building	DWG. No. A-03
DATE / DESIGNED / CHECKED / APPROVED	REVISION
YACHIYO ENGINEERING CO., LTD. TOKYO, JAPAN	

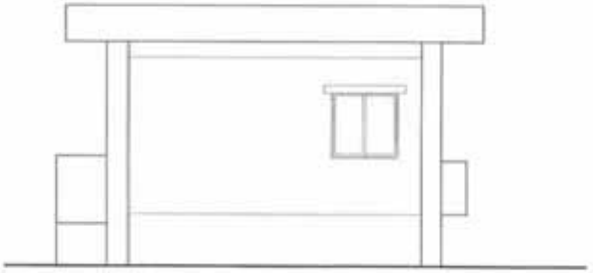
A-6-31



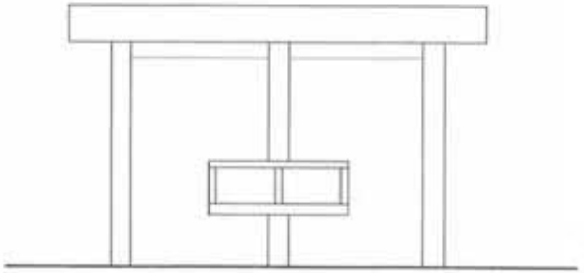
G.FLOOR PLAN



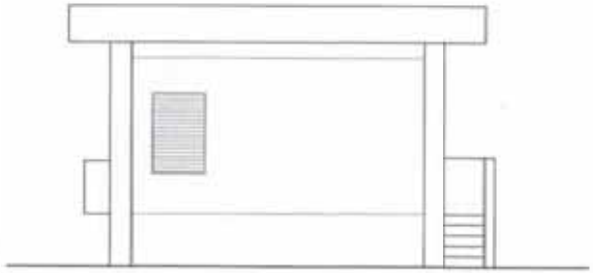
A LINE ELEVATION



1 LINE ELEVATION



B LINE ELEVATION



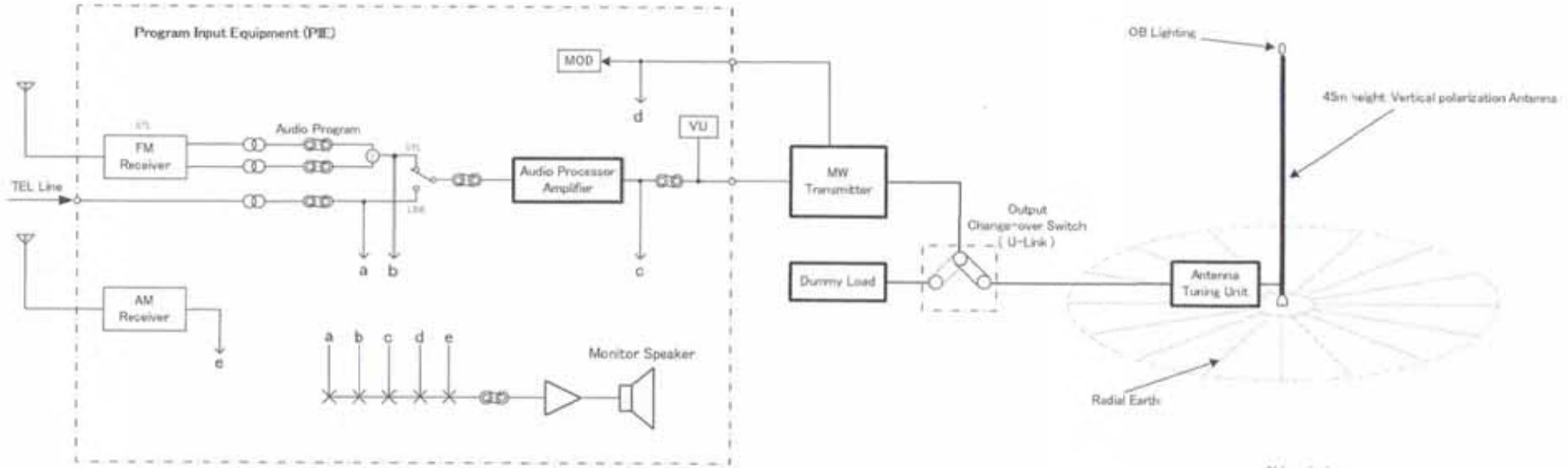
3 LINE ELEVATION

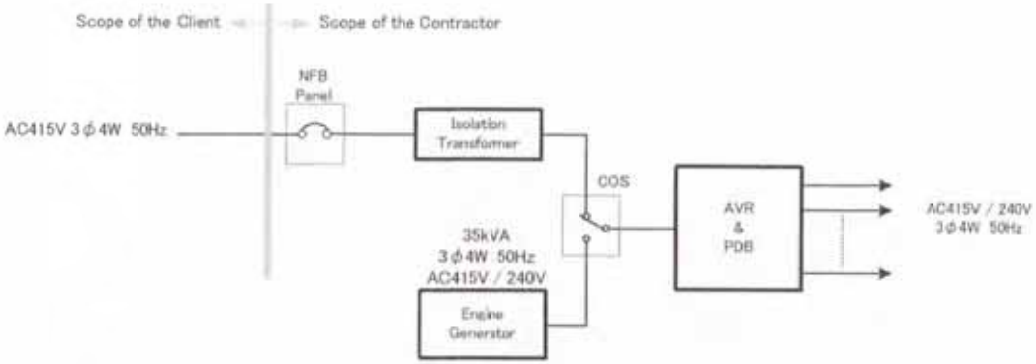
SECTION

THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE S=1/100
Title: Plan of the New Transmitter House				DWG. No. A-04
DATE	DESIGNED	CHECKED	APPROVED	REVISION

yec YACHIYO ENGINEERING CO., LTD. TOKYO, JAPAN

A-6-32





Abbreviation

ATU : Antenna Tuning Unit
AVR : Automatic Voltage Regulator
COS : Change Over Switch
MW : Medium Wave
NFB : Non Fuse Breaker
PDB : Primary Distribution Board
OB : Obstruction (Light)

Symbol

: Molded Case Circuit Breaker

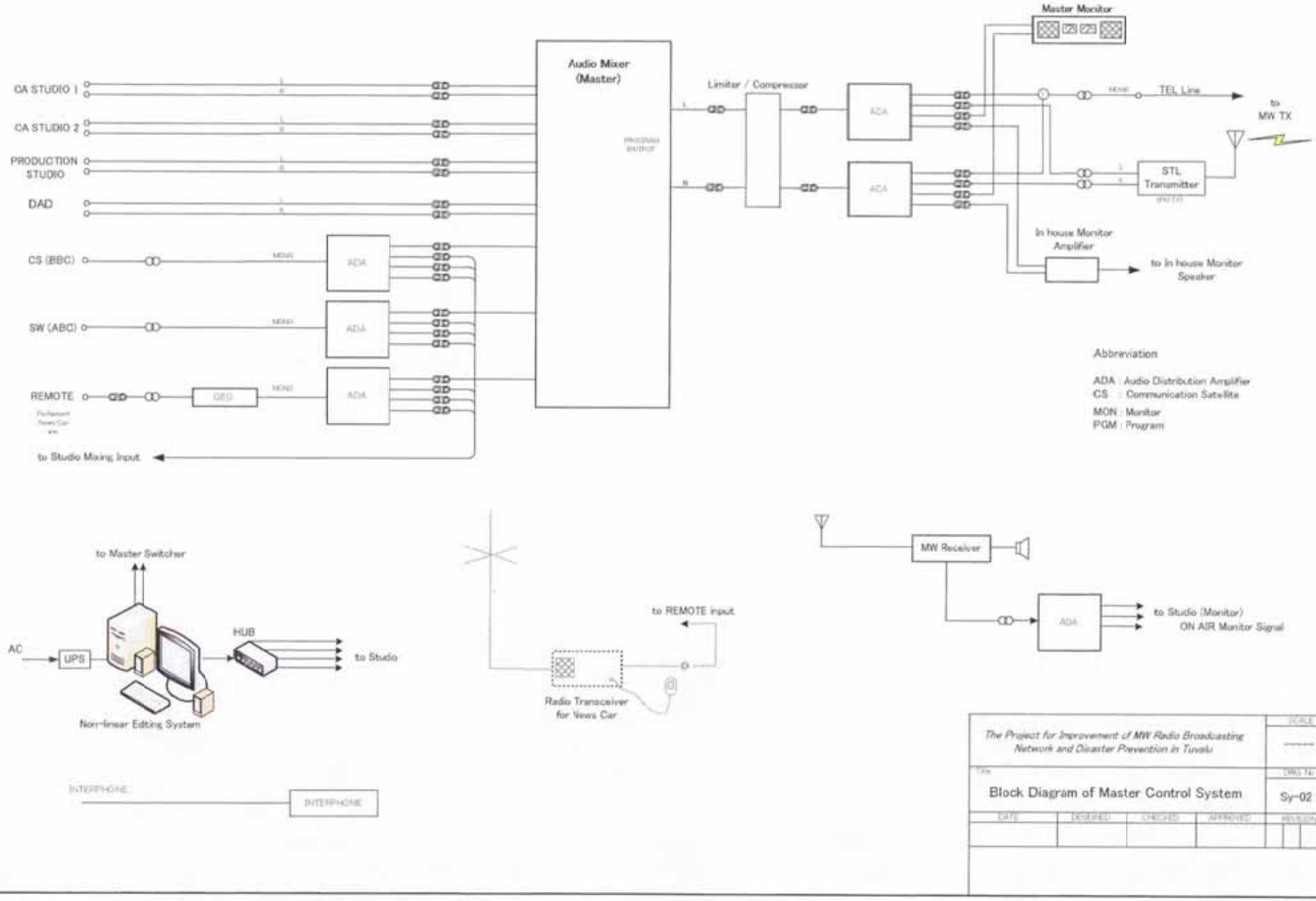
VU : VU (Audio Level) Meter

MOD : Modulation Percent Meter

: Audio Jack

The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu	SCALE: ------
Title: Block Diagram of 10kW MW Transmitter System	DWG No: Sy-01
DATE / DRAWN / CHECKED / APPROVED	REVISION

A-6-33


Master Monitor
Audio Mixer
(Master)
CA STUDIO 1
CA STUDIO 2
PRODUCTION STUDIO
DAD
CS (BBC)
SW (ABC)
REMOTE
Parliament News Car etc.
GEO
MONO
ADA
Limiter / Compressor
TEL Line
to MW TX
STL Transmitter
In house Monitor Amplifier
to In house Monitor Speaker
to Studio Mixing Input
Abbreviation
ADA : Audio Distribution Amplifier
CS : Communication Satellite
MON : Monitor
PGM : Program
to Master Switcher
AC
UPS
HUB
to Studio
Non-linear Editing System
to REMOTE input
Radio Transceiver for News Car
MW Receiver
to Studio (Monitor)
ON AIR Monitor Signal
INTERPHONE
The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu
Block Diagram of Master Control System
Sy-02
SCALE
DRG No.
DATE
DESIGNED
CHECKED
APPROVED
REVISION

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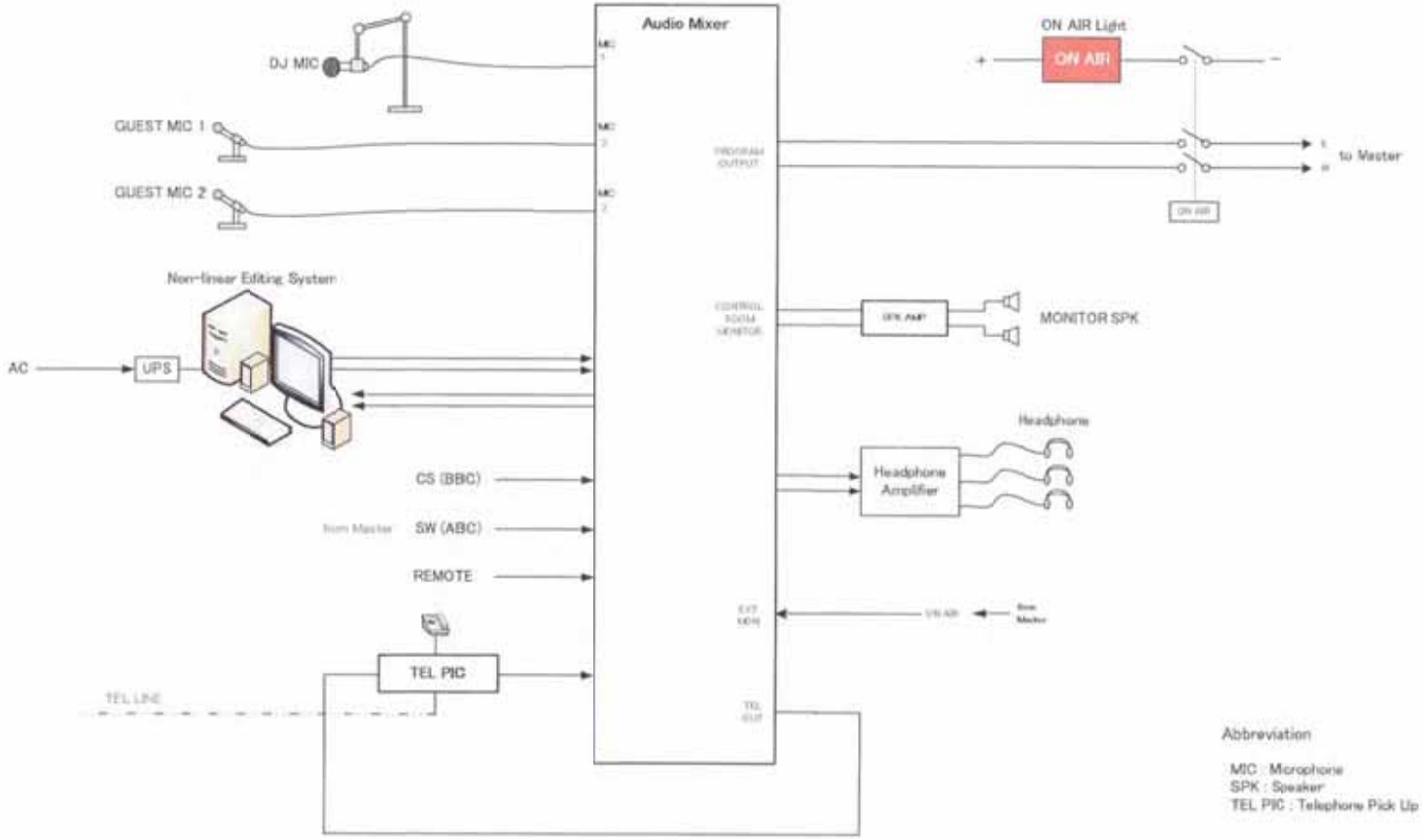
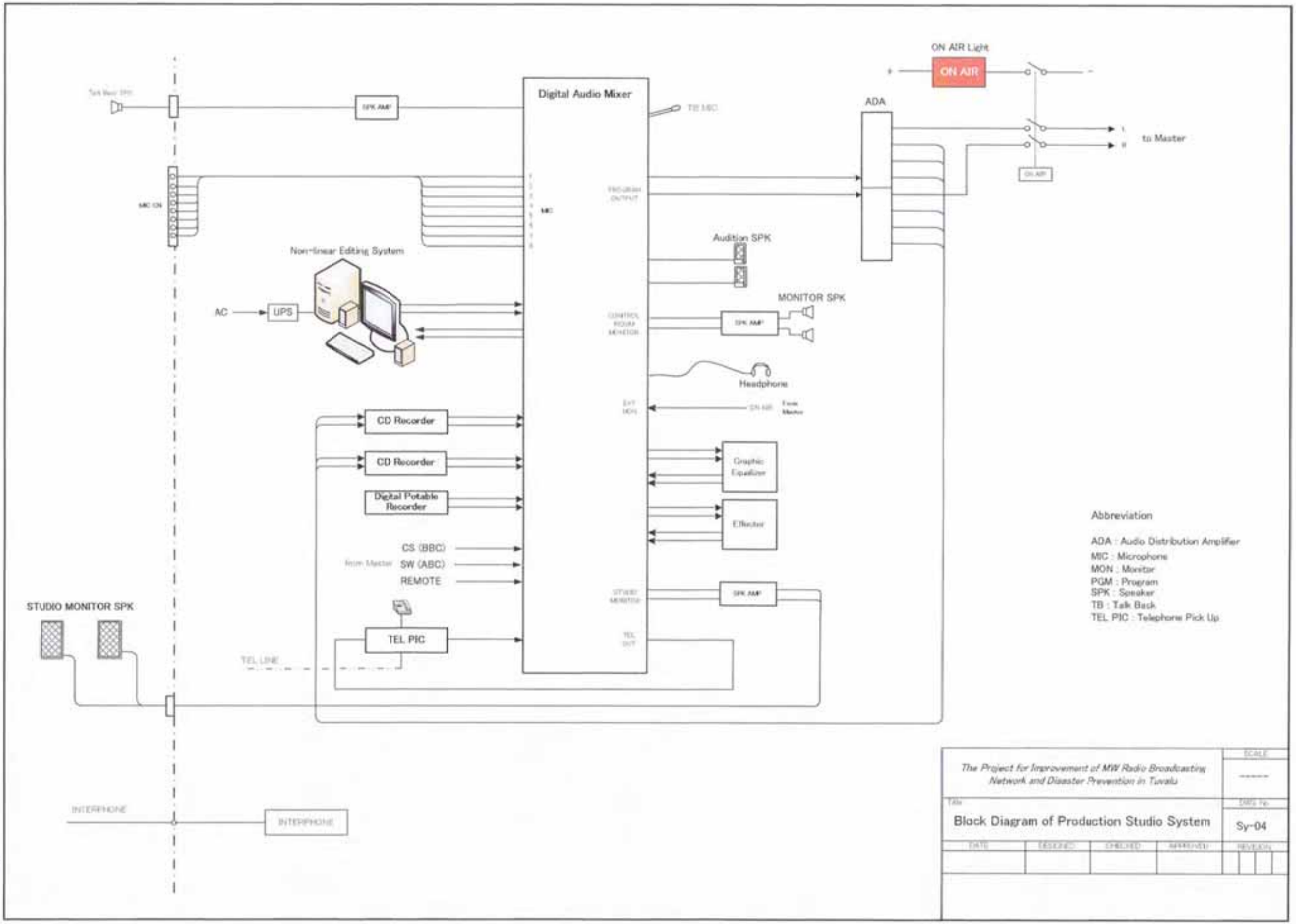
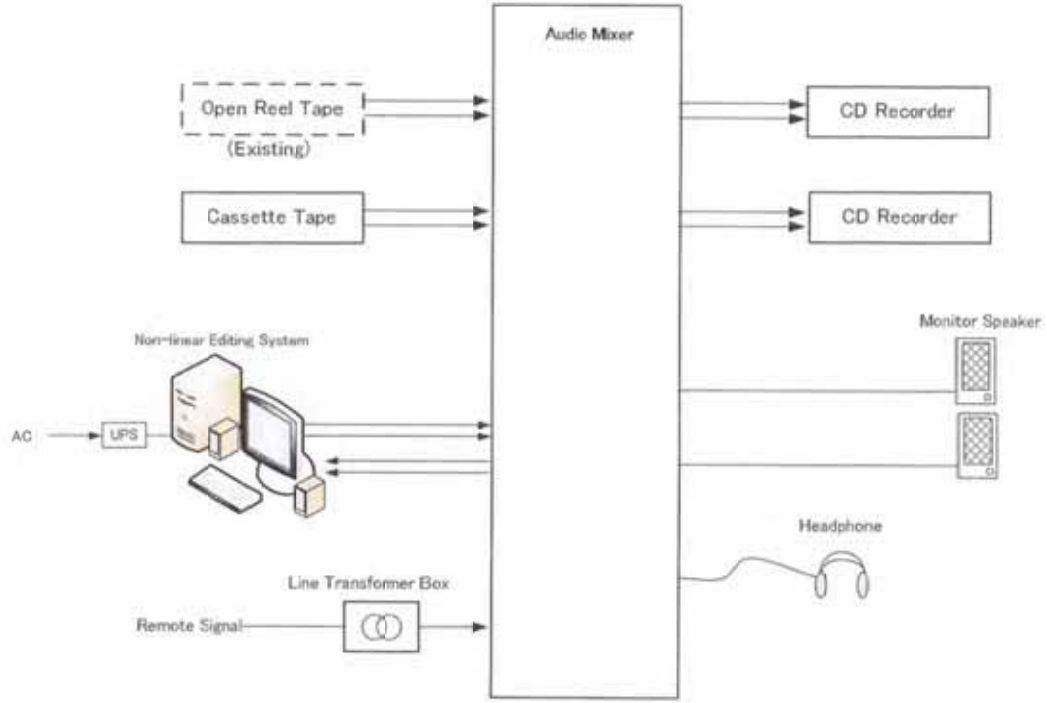


INTERPHONE — INTERPHONE

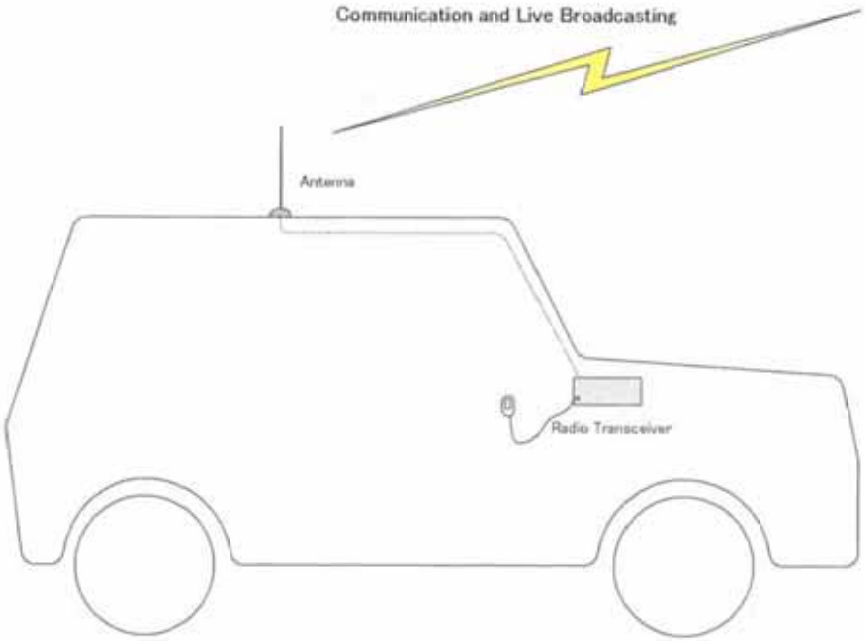
The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu	SCALE: ------
Title: Block Diagram of ON AIR Studio System	Dwg. No. Sy-03
DATE / DESIGNED / CHECKED / APPROVED	REVISION

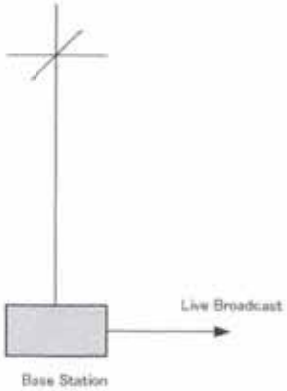
A-6-35

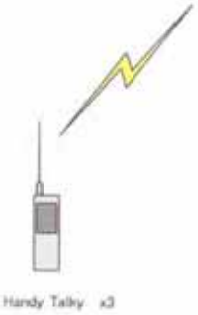

ON AIR Light
ON AIR
ADA
to Master
Digital Audio Mixer
Audition SPK
MONITOR SPK
Headphone
Non-linear Editing System
AC
UPS
CD Recorder
CD Recorder
Digital Potable Recorder
Graphic Equalizer
Effector
CS (BBC)
SW (ABC)
REMOTE
STUDIO MONITOR SPK
TEL PIC
TEL LINE
INTERPHONE
INTERPHONE
Abbreviation
ADA : Audio Distribution Amplifier
MIC : Microphone
MON : Monitor
PGM : Program
SPK : Speaker
TB : Talk Back
TEL PIC : Telephone Pick Up
The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu
Block Diagram of Production Studio System
Sy-04

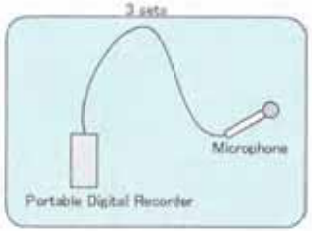


The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu	SCALE: ------
Title: Block Diagram of Editing System	DWG. No. Sy-05
DATE / DESIGNED / CHECKED / APPROVED	REVISION





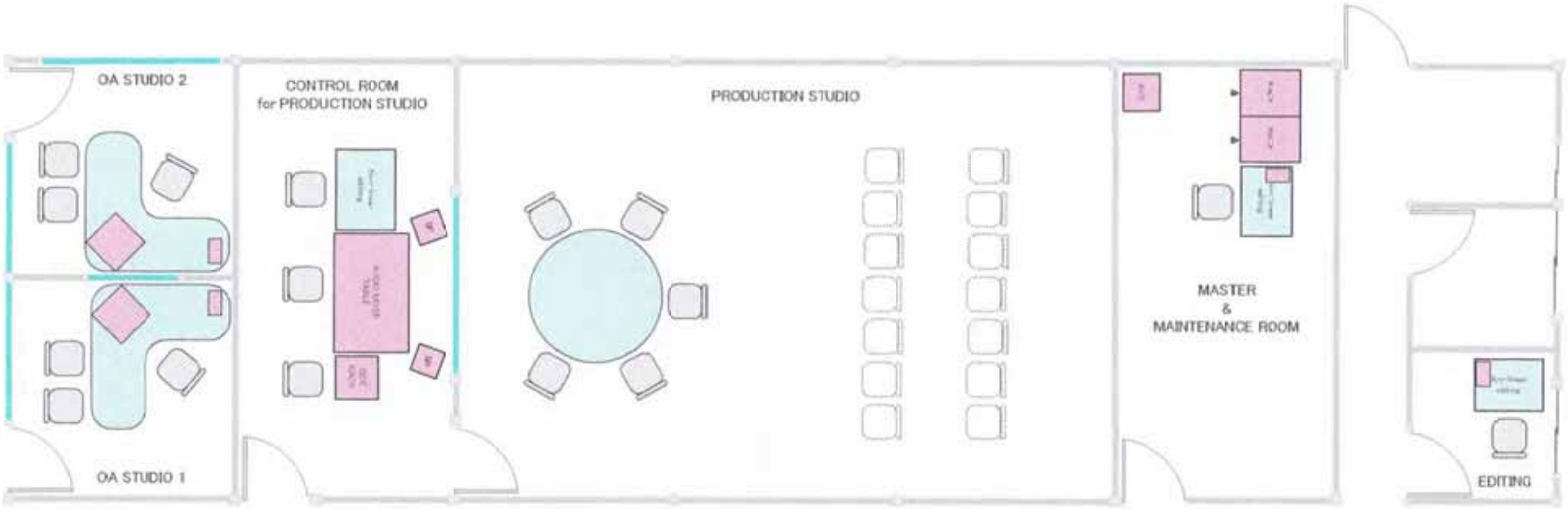




News Gathering and Interview

The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu	SCALE: ------
Title: Block Diagram of News Car System	DWG No: Sy-06
DATE / DESIGNED / CHECKED / APPROVED	REVISION

A-6-38

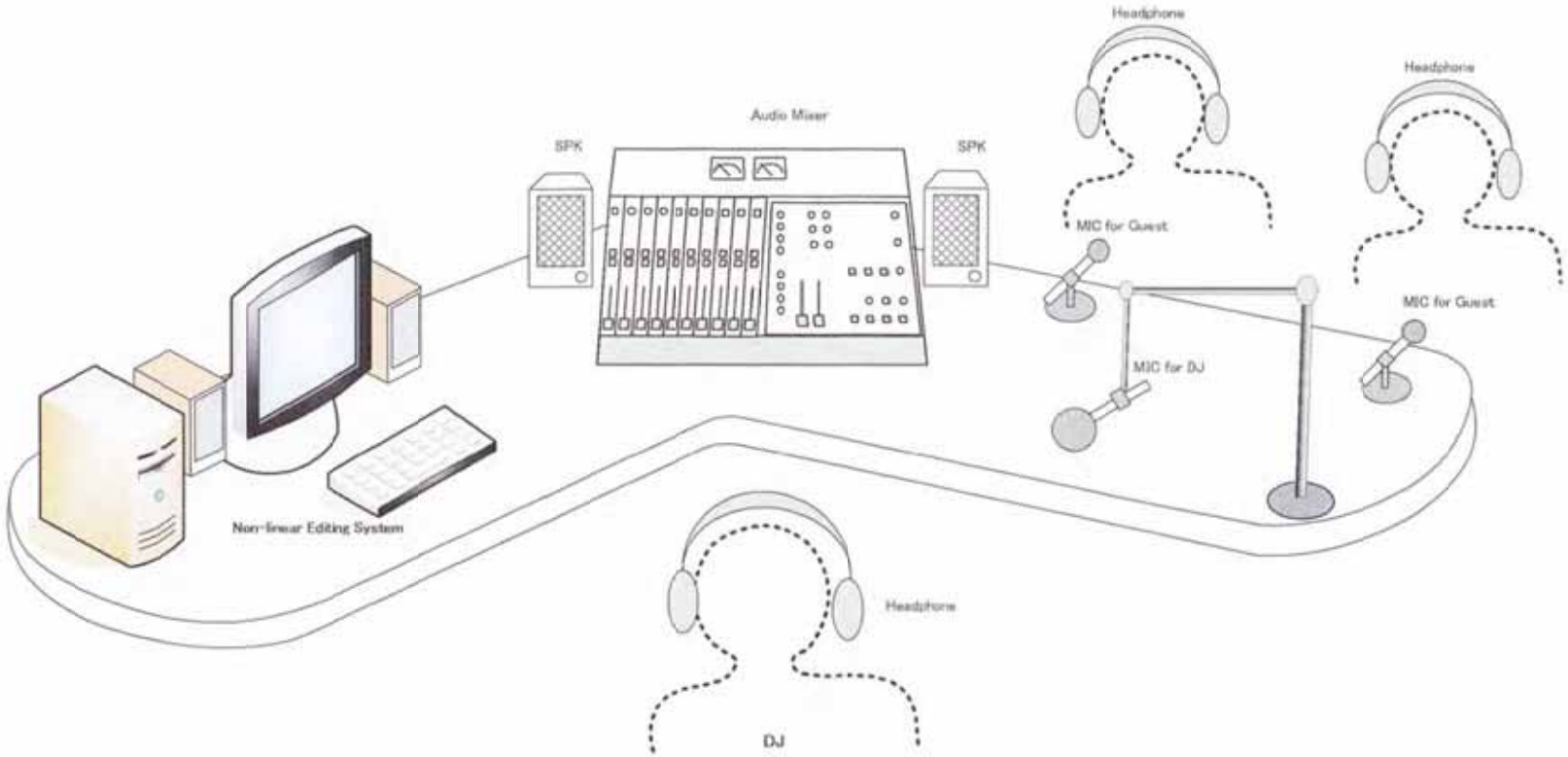


Equipment

Operation Table

Out of Scope

The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu	SCALE: ------
Title: Floor Layout of Radio Broadcasting Section	DWG. No: L-01
DATE	DESIGNED / CHECKED / APPROVED	REVISION



The Project for Improvement of MW Radio Broadcasting Network and Disaster Prevention in Tuvalu				SCALE: ------
Title: Equipment Layout of ON AIR Studio System				DWG No: L-02
DATE	DESIGNED	CHECKED	APPROVED	REVISION

A-6-40