PREPARATORY SURVEY REPORT
ON
THE PROJECT
FOR
STRENGTHENING
OF
ELECTRONIC MEDIA PRODUCTION CENTRE
IN
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
IN
THE REPUBLIC OF INDIA

May 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

NHK Integrated Technology Inc.

PREFACE

Japan International Cooperation Agency (JICA) conducted the preparatory survey on the Project for Strengthening of Electronic Media Production Centre in Indira Gandhi National Open University in the Republic of India.

JICA sent to India a survey team from October 25 to November 20, 2009.

The team held discussions with the officials concerned of the Government of India, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to India in order to discuss a draft outline design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of India for their close cooperation extended to the teams.

May 2010

Nobuko Kayashima

Director General,
Human Development Department
Japan International Cooperation Agency

Letter of Transmittal

We are pleased to submit to you the preparatory survey report on the Project for Strengthening of Electronic Media Production Centre in Indira Gandhi National Open University in the Republic of India.

This survey was conducted by NHK Integrated Technology Inc., under a contract to JICA, during the period from October, 2009 to May, 2010. In conducting the survey, we have examined the feasibility and rationale of the project with due consideration to the present situation of India and formulated the most appropriate outline design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Akira Nagase

Project Manager,
Preparatory Survey team on
the Project for Strengthening of
Electronic Media Production Centre
in Indira Gandhi National Open University

NHK Integrated Technology Inc.

SUMMARY

The Republic of India (hereinafter refereed to as "India") is located in southwest Asia and has the shape of an inverted triangle measuring about 3,200km from north to south and about 3,000km from east to west.   To the east India borders on Myanmar, Bangladesh and the Bay of Bengal, to the west on Pakistan and Arabian Sea, to the south on the Indian Ocean, and to the north on Nepal and, via the Himalayas, on China.   With a total population of 1,120 million (World Bank statistics in 2007) living on a vast territory of 3.287million km^2 (about nine times the size of Japan), India forms a multifarious and complex country, that is multi-racial, multi-religious, multi-lingual and multi-cultural.   In India, a country that possesses a vast territory and a huge population, the Government of India (GOI) has attached the great importance to the development of human resources as the basic condition essential to strengthening and promotion of poverty reduction and national socio-economic development.   For the development of human resources, GOI believes that diffusion and upgrading of education to the nationals are the most effective means, and has given the high priority for the development of education field.   Specially, GOI has promoted complete diffusion of primary education in India, taking into consideration that India is assigned as E9 for "Education for All (EFA)" which is the worldwide initiative for complete diffusion of primary education by 2010.   In addition, GOI has also encouraged diffusion of higher education in order to respond the high demand of sophisticated human resources following the dramatic development of Information Technology (IT) industry.

In India, higher education institutions include 337 universities and 20,992 colleges with over 14 million students attending them.   However, the enrollment ratio into higher education is 11% (MHRD Educational Statistics in 2005), which is very low compared to the global average of 23.2% and the 22% average in Asia.   Thus, in the 11th 5-year plan (2007/08 to 2011/12), GOI intends to increase investment in higher education by ten-fold, improving the enrollment rate to 15%.

Specifically, the following will be set as goals towards the enrichment of higher education:
To elevate the low rate of 11% enrollment into higher education (ages 18 to 23) to 15% during the period of the plan (to be raised up to 21% by the end of the 12th 5-year plan) through expanding educational opportunities in order to increase the number of students from 14 million to 21 million:
To improve the quality of higher education by strengthening skills, capacity building, training, job creation and continuing education in addition to the expansion of educational opportunities.   (This includes establishing higher education institutions on par with the global standard through enhancing facilities, equipment and teaching methods to improve the quality of existing universities.)

In order to reach these goals, the traditional higher education infrastructure will be expanded.   In addition to this, the use of distance education that is open to the public will be ranked as a critical

means of expanding education opportunities at the earliest feasible time under the concept of "Whenever, Wherever, Whoever."

In addition to contribution to socio-economic development in India, open distance education is also the fastest way to resolve the educational disparity among regions. This is achieved through methods unique to public distance education, which uses a multimedia package method that effectively fuses interviews, printed materials, audio/video programs, materials using IT technology and a learning system via satellite.

The open distance education system implemented in India is comprised of 13 state open universities and the distance education organizations attached to approximately 140 universities around the country, with the core of the system at the Indira Gandhi National Open University (IGNOU). As GOI would like to democratize education and give access to education to people in all layers of society throughout every region across the country, GOI has placed high priority on upgrading of the open distance education system in order to realize GOI's wish.

IGNOU is an autonomous organization that was established by an Act of Parliament in September 1985 under the Department of Higher Education of the Ministry of Human Resource Development. Its objects were to develop, promote and diffuse higher education based on theories and methods of distance education employing information communications technology (ICT). As of November 2009, IGNOU serves the education to whole country of India and 33 overseas countries through 21 schools of study and a network of 59 Regional Centres, more than 2,300 Study Centres, and 52 Oversea Centres. IGNOU offers 175 programs in Certificate, Diploma, Bachelor's, Master's and Ph.D. comprising 1,500 courses, with 380 faculty members and academic staff as Headquarters and about 36,000 counsellors from conventional institutions of higher learning. In 2008/09, no. of fresh enrolment in 2008/09 is 555,310 students and no. of registered is more than 2 million students. This no. of registered students amounts to 15% of total student in higher education in India. (IGNOU Profile 2009)

For the approximately 1,500 course lessons currently established at IGNOU, mainly self-study is done using textbooks distributed to each student. Depending on the course, audio/video programs are produced and used to supplement the textbooks. These audio/video programs are distributed at each Regional Centre, Study Centre and Oversea Centre, and are also available for purchase by students who wish to do so. Additionally, these audio/video programs can be watched and listened through India's national television network (Doordarshan: DD), India's national radio network (All India Radio: AIR), IGNOU's educational satellite television broadcasting (Gyan Darshan: GD), and IGNOU's educational FM radio broadcasting (Gyan Vani: GV) and IGNOU website (IPTV). Besides, at the Regional Centres and Study Centres, academic counsellors are available to conduct face-to-face lessons with students. Furthermore, there are also compulsory courses that require teleconference

lessons with professors using broadcasting.　Thus, classes are implemented using a diverse range of shapes and forms.

Designated as a supporting organization of IGNOU, the Electronic Media Production Centre (EMPC) produces the audio/video programs used to supplement textbooks.　Since its establishment in 1985, the main operations of EMPC have included producing, duplicating and distributing audio/video programs.　However, with the expansion of IGNOU's activities, EMPC added operations for four (4) channels of educational satellite television broadcasting (GD-1 to 4) in 2000 and educational FM radio broadcasting (GV) in 2001 to its original operations.

Channel 2 of GD Broadcasting (GD-2) is used as an interactive distance education channel for participants of distance education, including IGNOU students.　As a part of the IGNOU courses that require for class participation, teleconference-style (1 video channel, 2 audio channels) lessons are broadcast six times per day, (annual average of 1,200 lessons, including the teleconference lessons of other organizations) from 10:30 to 20:00 every day.

In EMPC, audio/video programs are produced mainly using two video program production studios and two audio program production studios that were improved by Japan's Grant Aid in 1993. However, since GD-2 was started, one of the video program production studios has been used exclusively as the transmission studio for the GD-2 teleconference lessons, making it impossible to use for the production of audio/video programs.　Consequently, current production of video programs is made in the remaining video program production studio and through field recordings.

However, the equipment used at present has already exceeded its service life and obtaining spare parts is getting difficult.　Then, the equipment becomes seriously superannuated, and malfunctions are a frequent occurrence.　If the current situation is left as it is, video program production will become apparently impossible within the next few years, thus negatively affecting the education of over two million students of IGNOU.

The program production is made still using the system comprising conventional analog equipment so that production efficiency remains low.　Furthermore, as mentioned above the analog equipment becomes remarkably superannuated and is suffering from frequent failures, which makes production efficiency much worse.　Now, the production output of 200 video programs per year is barely sustained by long and hard work of EMPC production staff who work 365 days throughout the year without holidays, much beyond the normal working days (210 days).

Besides, according to digitalization of DD that also broadcasts video programs produced at EMPC, the necessity strongly arises as to changing analog to digital production equipment.

In order to improve this situation and continue audio/video program production, as well as advance production efficiency, it is necessary to update audio/video program production equipment using digital technology in line with global and domestic trends.

Under these conditions, GOI made a request for Japan's Grant Aid to continue video program production and advancement of efficiency in production activities by improvement of the equipment to be used mainly in Video Program Production Studio-1 of EMPC, which is currently the only place for video program production.

In response to the request, Japan International Cooperation Agency (JICA), the official agency implementing technical cooperation, ODA Loans, and Grant Aid, decided to conduct a Preparatory Survey and sent the Preparatory Survey Team (hereinafter referred to as "the Team") on the Project for Strengthening of Electronic Media Production Centre in Indira Gandhi National Open University (hereinafter referred to as "the Project") to India over the period of 27 days from October 25, 2009 to November 20, 2009, to examine the relevance of the Project and to draw up the necessary and most appropriate outline design for the Project. The Team reviewed the contents of the request from India side and discussed them with the relevant parties, and conducted the field survey at the project site (New Delhi).

Through the earnest discussions about the contents, IGNOU/EMPC made the following requests for changing the specifications of the equipment.

> Based on recent digitalization trends for the equipment, the IGNOU/EMPC side plans to shift video program production to an High Definition (HD) format from a Standard Definition (SD) format, thus changing their request for SD/HD applicable models from a SD format only.
>
> Also, in response to the trend towards tapeless recording media, IGNOU/EMPC plans to convert traditional video tape to digital recording media. Therefore, a request was changed for equipment specifications with the capability of handling digital video recording media.

In response to the revised request from IGNOU/EMPC, the Team explained the basic concept that the equipment to be procured under the Project will be capable of handling both existing SD format and newly requested HD format, to formulate the proper system which will not become obsolete in the next 10 years under current transitional situation of shifting to HD. The India side fully agreed to the concept. Then, the Team presented the revised contents of the Project that included essential equipment proposed by the Japanese side in addition to the requested equipment items from India side, to achieve the goals of the Project. This was done while discussing the necessity and validity of the contents of the Project requested, upon which the final request from the India side was confirmed.

After returning to Japan, while taking the contents of the final request into consideration, the Team examined the optimum range, scale, quantity and layout of equipment from the viewpoint of status of audio/video program production of EMPC, operation and maintenance capability of EMPC,

the relevance, the need and socio economical effect of the Project, and formulated the most appropriate plan. The Team summed up the content of the plan in the Draft Outline Design Report, and revisited India for 7 days from March 7, 2010 to March 13, 2010 to explain to the relevant parties of the India side and to make the final confirmation of the project content through discussion.

The aim of the Project is to update the current superannuated equipment to the state-of-the-art equipment that can apply the current digitalization in India to produce the audio/video programs continuously that are offered as one of IGNOU's study support services, for approximately 2 million students. The Project also aims to improve efficiency of program producing, to increase the level of understanding of classes among students, to improve learning efficiency by offering high-quality audio/video programs, and to improve working conditions of EMPC staff.

Outline of the Project is as follows:

[Concept of the Project]

Responding to the global shift to digitalization
– Becoming "tapeless"
  Digitalization of video recording media
– Video format
  Introduction of High Definition (HD) format in addition to traditional Standard Definition (SD) format

With digitalization of video recording media, introduction of SD/HD format, and transfer of duplication of video programs distributing to students from video tape to DVD, the advancement of the quality of video programs will be realized.

Advancement in efficiency of video program production at EMPC
– Introduction of a virtual studio system
– Introduction of a video common sharing network

With the introduction of a virtual studio system and a video common sharing network, a video program production system using maximum digital functionality will be created, thus advancing video program production efficiency.

The equipment to be procured is shown in the table below:
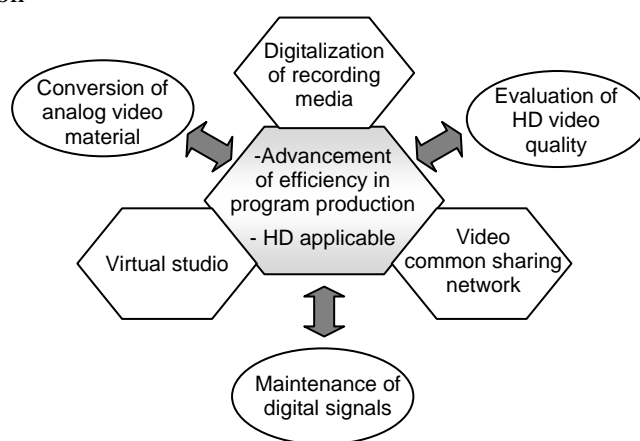
Planned Equipment for Video Program Production

	System	Concept	Q'ty
1	Video Program Production Studio-1 (Virtual Studio System)	• Advancement of Efficiency in Program Production • Virtual Studio System • HD Applicable • Digitalization of Recording Media	1 set
2	Field Recording (ENG) System	• Advancement of Efficiency in Program Production • HD Applicable • Digitalization of Recording Media	3 sets
3	Routing Switcher System	• HD Applicable	1 set
4	Video Common Sharing Network (Video Server System)	• Advancement of Efficiency in Program Production • Digitalization of Recording Media	1 set
5	DVD Duplication System	• HD Applicable • Digitalization of Recording Media	1 set
6	Computer Graphics System	• Virtual Studio System • Advancement of Efficiency in Program Production	2 sets
7	Measuring Equipment	• Maintenance of Digital Signals	1 set
8	Analog to Digital Format Conversion System	• Conversion of Analog Video Materials	1 set
9	SD/HD Preview System	• Evaluation of HD Video Quality	1 set
10	Spare Parts	• Spare Parts necessary for operation and maintenance of the above equipment	1 lot

Scope of works for which the India side is responsible in the Project are as below.

Removal of the existing equipment (including dimmer racks in Video Program Production Studio-1) at each room where the equipment procured under the Project is to be installed, at the cost of the India side

Payment of the advising (issuance) fee of Authorization to Pay (A/P) and bank commission fees necessary for the Project

Payment of customs duties of the imported equipment

In case this Project is implemented under Japan's Grant Aid, the implementation schedule would totally be approx. 15 months long including approx. 4 months for detailed design and approx. 11 months of procurement and installation of the equipment. The total project cost to be born by India side is approx. 32,285,000Rp. (equivalent to about 64 million Japanese Yen).

The implementation of the Project will be supervised by the Ministry of Human Resources Development (MHRD) and the project implementing agency will be IGNOU. EMPC will be

responsible for the operation and maintenance after the Project has been implemented.   The scope of works of the India side will be carried out by IGNOU.   IGNOU has submitted to GOI the letter which mentioned that IGNOU will implement the scope of works of the India side by their own budget.   In addition, the project implementation system has already been established, and there is no problem either in operation or maintenance cost after the completion of this Project.

The effect that can be expected of implementation of this Project is as follows:

(1)   Direct Effect

EMPC will be able to continuously produce the average 200 video programs per year required by courses in IGNOU's various schools.   In the 10 years after the Project, approximately 2000 video programs can be produced and offered to approx. 2 million students of IGNOU throughout India and 33 countries where the Oversea Centres of IGNOU exist.

The new digital video program production system will possess a capability of producing 200 video programs annually with 210 working days from the capability of the current system requiring 365 working days to produce the same number of video programs, and thus much improve production efficiency.

The digital (HD) video programs with high quality images can be produced by using digital equipment in place of existing analog equipment and can be continuously broadcast through educational satellite television broadcasting channels and India's national television network.

(2)   Indirect Effect

By advancing program production efficiency, in addition to production of video programs for each school, production of video programs will also be possible for the science education broadcast channel that is planned for implementation.

The content of the produced video programs will be enhanced by the use of various visual effects, computer graphics, etc., and the video quality will also be greatly upgraded.   In combination with DVD usage at the Regional Centres and the Study Centres, it will further enhance the level of students' understanding as well as learning efficiency.

Enhancement of the distance education system will contribute to achieving one of the objectives of the 11th 5-year plan, which is to "elevate the rate of entrance into higher education".   Eventually, it will eliminate educational disparities among regions in India, and contribute to socioeconomic development and eradication of poverty in India.

CONTENTS

Preface

Letter of Transmittal

Summary

Contents

Location Map

List of Figures & Tables

Abbreviations

Appendices

1. Member List of the Survey Team
2. Survey Schedule
3. List of Parties Concerned in India
4. Minutes of Discussions

Project Site

New Delhi

Copyright (c) Compare Infobase Pvt Ltd. 1999-2000
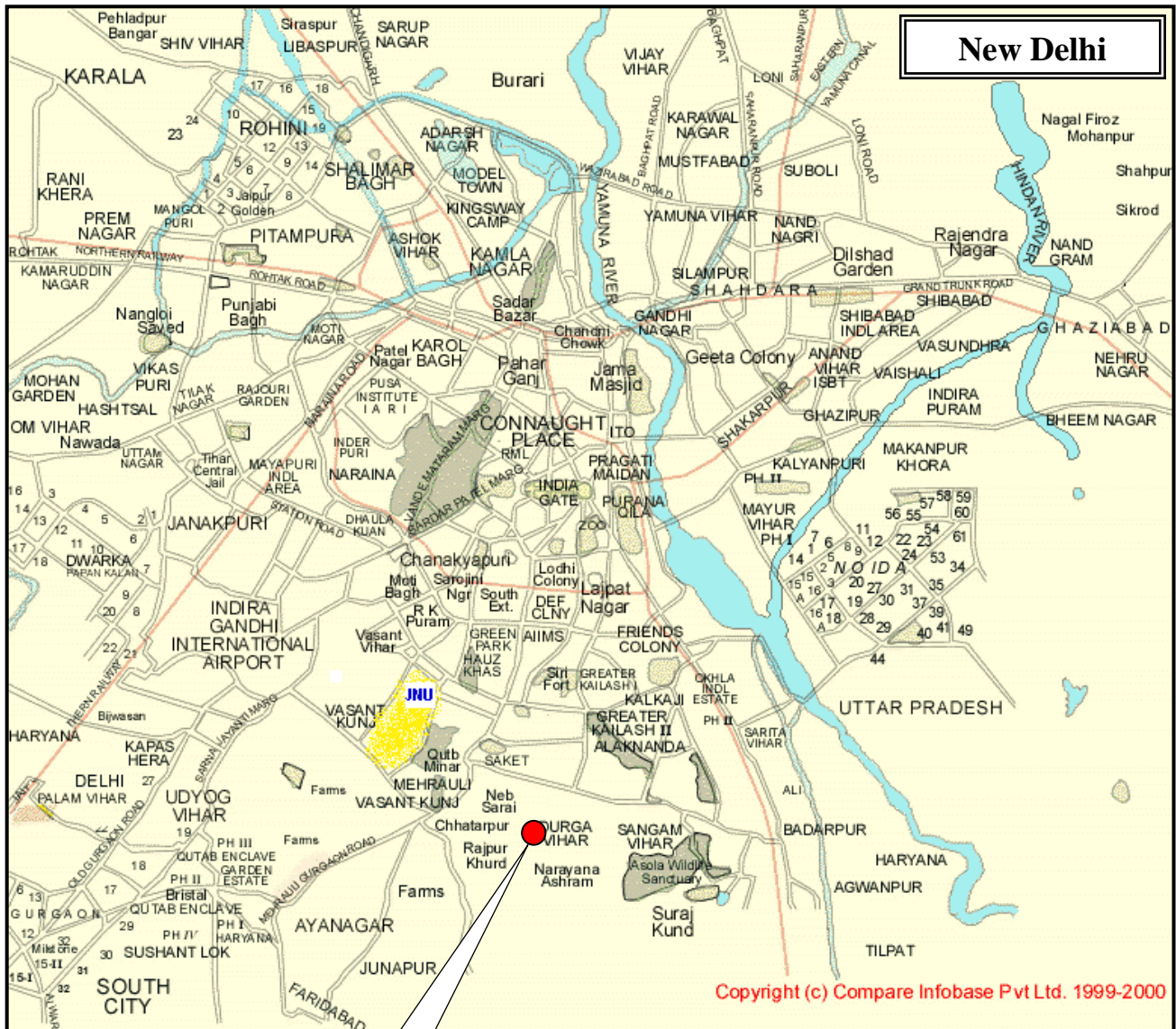
Indira Gandhi National Open University (IGNOU)

Maidan Garhi, New Delhi,India
  N: 28° 29   42.11
  E: 77° 12   10.96

INDIA

0   400   800km

New Delhi

List of Figures & Tables

Abbreviations

2D:	2-Demension		GUI:	Graphical User Interface
3D:	3-Demension		GV:	Gyan Vani
A/D Converter:	Analog to Digital Converter		HD:	High Definition
AIR:	All India Radio		ICAI:	Institute of Catered Accountant of India
A/P:	Authorization to Pay		I/F:	Interface
A/V:	Audio/Video		IGNOU:	Indira Gandhi National Open University
AVR:	Automatic Voltage Regulator		IIT:	Indian Institute of Technology
B/A:	Banking Arrangement		IVR:	Induction Voltage Regulator
CCD:	Charge Coupled Device		LAN:	Local Area Network
CCU:	Camera Control Unit		LCD:	Liquid Crystal Display
CEC:	Centre for Education and Communication		LD:	Lighting Director
CG:	Computer Graphics		LED:	Light Emitting Diode
CIET:	Central Institute of Educational Technology		MCRC:	Mass Communication Research Centre
CN:	Connector		MHRD:	Ministry of Human Resources Development
D/A Converter:	Digital to Analog Converter		MOF:	Ministry of Finance
DAE:	Department of Atomic Energy		MPEG:	Motion Picture Experts Group
DAVCMC:	DAV College Managing Committee		MPX:	Multiplexer
DD:	Doordarshan TV		NBE:	National Board of Education
DEA:	Department of Economic Affairs		NCERT:	National Council of Educational Research and Training
DEP-SSA:	Distance Education Program-SSA		NIOS:	National Institute of Open Schooling
DMPX:	De-multiplexer		NITTTR:	National Institute of Technical Teachers' Training and Research
DTH:	Direct to Home			
DVB:	Digital Video Broadcasting			
E/N:	Exchange of Notes		OC:	Oversea Centre
EMPC:	Electronic Media Production Centre		PAL:	Phase Alternation Line
FD:	Floor Director		RAID:	Redundant Array of Independent Disks
G/A:	Grant Agreement			
GD:	Gyan Darshan		RC:	Regional Centre
GOI:	Government of India		SC:	Study Centre

SD:	Standard Definition
SDI:	Serial Digital Interface
SOA:	School of Agriculture
SOCE:	School of Continuing Education
SOCIS:	School of Computer & Information Science
SOE:	School of Education
SOEDS:	School of Extension and Development Studies
SOET:	School of Engineering and Technology
SOFL:	School of Foreign Languages
SOGDS:	School of Gender and Development Studies
SOH:	School of Humanities
SOHS:	School of Health Science
SOITS:	School of Interdisciplinary and Trans-disciplinary Studies
SOJNMS:	School of Journalism and New Media Studies
SOL:	School of Law
SOMS:	School of Management Studies
SOPVA :	School of Performing and Visual Arts
SOS:	School of Science
SOSS:	School of Social Science
SOSW:	School of Social Work
SOTHSM:	School of Tourism Hospitality Service Sectoral Management
SOTST :	School of Translation Studies and Training
SOVET:	School of Vocational Education and Training
UGC:	University Grant Commission
UHF:	Ultra High Frequency
UPS:	Uninterruptible Power Supply
UV:	Ultra Violet
VE:	Video Engineer

Chapter 1   Background of the Project

Chapter 1   Background of the Project

1-1   Background of the Project

IGNOU is an autonomous organization that was established by an Act of Parliament in September 1985 under the Department of Higher Education of the Ministry of Human Resource Development.   Its objects are to develop, promote and diffuse higher education based on theories and methods of distance education employing information communications technology (ICT).   As of November 2009, IGNOU serves the education to whole country of India and 33 overseas countries through 21 schools of study and a network of 59 Regional Centres, more than 2,300 Study Centres, and 52 Oversea Centres.   IGNOU offers 175 programs in Certificate, Diploma, Bachelor's, Master's and Ph.D. comprising 1,500 courses, with 380 faculty members and academic staff as Headquarters and about 36,000 counsellors from conventional institutions of higher learning.   In 2008/09, no. of fresh enrolment in 2008/09 is 555,310 students and no. of registered is more than 2 million students.   This no. of registered students amounts to 15% of total student in higher education in India. (IGNOU Profile 2009)

For the approximately 1,500 course lessons currently established at IGNOU, mainly self-study is done using textbooks distributed to each student.   Depending on the course, audio/video programs are produced and used to supplement the textbooks.   These audio/video programs are distributed at each Regional Centre, Study Centre and Oversea Center, and are also available for purchase by students who wish to do so.   Additionally, these audio/video programs can be watched and listened through India's national television network (Doordarshan: DD), national radio network (All India Radio: AIR), IGNOU's educational satellite television broadcasting (Gyan Darshan: GD), IGNOU's educational FM radio broadcasting (Gyan Vani: GV), and IGNOU website.   Besides, at the Regional Centres and Study Centres, academic counsellors are available to conduct face-to-face lessons with students. Furthermore, there are also compulsory courses that require teleconference lessons with professors using broadcasting.   Thus, classes are implemented using a diverse range of shapes and forms.

Designated as a supporting organization of IGNOU, the Electronic Media Production Centre (EMPC) produces the audio/video programs used to supplement textbooks.   Since its establishment in 1985, the main operations of EMPC have included producing, duplicating and distributing audio/video programs.   However, with the expansion of IGNOU's activities, EMPC added operations for four (4) channels of educational satellite television broadcasting (GD-1 to 4) in 2000 and educational FM radio broadcasting (GV) in 2001 to its original operations.

Channel 2 of GD Broadcasting (GD-2) is used as an interactive distance education channel for participants of distance education, including IGNOU students.   As a part of the IGNOU courses that

require for class participation, teleconference-style (1 video channel, 2 audio channels) lessons are broadcast six times per day, (annual average of 1,200 lessons, including the teleconference lessons of other organizations) from 10:30 to 20:00 every day.

In EMPC, audio/video programs are produced mainly using two video program production studios and two audio program production studios that were improved by Japan's Grant Aid in 1993. However, since GD-2 was started, one of the video program production studios has been used exclusively as the transmission studio for the GD-2 teleconference lessons, making it impossible to use for the production of audio/video programs.   Consequently, current production of video programs is made in the remaining video program production studio and through field recordings.   However, the equipment used at present has already exceeded its service life and obtaining spare parts is getting difficult.   The equipment becomes obviously superannuated, and malfunctions are a frequent occurrence.   If the current situation is left as it is, video program production will become impossible within the next few years, thus negatively affecting the education of over two million students of IGNOU.   To resolve this situation and continue audio/video program production, it is necessary to update audio/video program production equipment using digital technology in line with global and domestic trends.

Under these conditions, the Government of India (GOI) made a request for Japan's Grant Aid for the Project for Strengthening of Electronic Media Production Centre in Indira Gandhi National Open University (herein after referred to as "the Project") to continue video program production at EMPC by improvement of video program production equipment to be used mainly in video program production studio-1 of EMPC, which is currently the only place for video program production.

1-2   Contents of the Request

In addition to confirming the background regarding the requested equipment items from IGNOU/EMPC, which is the implementing organization of the Project, Japanese side reviewed the contents of the request.   Through the earnest discussions about the contents, IGNOU/EMPC made the following request for changing the specifications of the equipment.

Based on recent digitalization trends for the equipment, the IGNOU/EMPC side plans to shift video program production to an High Definition (HD) format from a Standard Definition (SD) format, thus changing their request for SD/HD applicable models from a SD format only.

Also, in response to the trend towards tapeless recording media, EMPC plans to convert

traditional video tape to digital recording media. Therefore, a request was changed for equipment specifications with the capability of handling digital video recording media.

In response to the revised request from IGNOU/EMPC, Japanese side presented and explained the basic concept of the Project that the equipment to be procured under the Project will be capable of handling both existing SD format and newly requested HD format, to formulate the proper system which will not become obsolete in the next 10 years under current transitional situation of shifting to HD. The India side fully agreed to the concept of the Project. Then the Japanese side presented the revised contents of the Project that included essential equipment proposed by the Japanese side in addition to the revised request from India side, to achieve the goals of the Project.

Table 1-1 summarizes the final request from India side consists of the minimal amount necessary to achieve the purpose of the Project and the priorities thereof.

Measuring equipment, Analog to Digital format conversion system and SD/HD preview system included in the final request items are the proposed items from Japanese side.

Table 1-1   Final Request Items from India Side and Their Priority

	System	Concept	Priority
1	Video Program Production Studio-1 System	• Advancement of Efficiency in Program Production • Virtual Studio System • HD Applicable • Digitalization of Recording Media	1
2	Field Recording (ENG) System	• Advancement of Efficiency in Program Production • HD Applicable • Digitalization of Recording Media	2
3	Routing Switcher System	• HD Applicable	9
4	Video Common Sharing Network (Video Server System)	• Advancement of Efficiency in Program Production • Digitalization of Recording Media	5
5	DVD Duplication System	• HD Applicable • Digitalization of Recording Media	6
6	Computer Graphics System	• Virtual Studio System • Advancement of Efficiency in Program Production	4
7	Measuring Equipment (Proposed by Japanese side)	• Maintenance of Digital Signals	8
8	Analog to Digital Format Conversion System (Proposed by Japanese side)	• Conversion of Analog Video Materials	3
9	SD/HD Preview System (Proposed by Japanese Side)	• Evaluation of HD Video Quality	7
10	Spare Parts	• Spare Parts necessary for operation and maintenance of the above equipment	−

Chapter 2　Contents of the Project

Chapter 2   Contents of the Project

2-1   Basic Concept of the Project

2-1-1   National Development Objectives and Project Goals

In India, higher education institutions include 337 universities and 20,992 colleges with over 14 million students attending them.   However, the enrollment ratio into higher education is 11% (MHDR Educational Statistics in 2005), which is very low compared to the global average of 23.2% and the 22% average in Asia.   Thus, in the 11th 5-year plan (2007/08 to 2011/12), GOI intends to increase investment in higher education by ten-fold, improving the enrollment rate to 15%.

Specifically, the following will be set as goals towards the enrichment of higher education:
To elevate the low rate of 11% enrollment into higher education (ages 18 to 23) to 15% during the period of the plan (to be raised up to 21% by the end of the 12th 5-year plan) through expanding educational opportunities in order to increase the number of students from 14 million to 21 million:
To improve the quality of higher education by strengthening skills, capacity building, training, job creation and continuing education in addition to the expansion of educational opportunities.   (This includes establishing higher education institutions on par with the global standard through enhancing facilities, equipment and teaching methods to improve the quality of existing universities.)

In order to reach these goals, the traditional higher education infrastructure will be expanded.   In addition to this, the use of distance education that is open to the public will be ranked as a critical means of expanding education opportunities at the earliest feasible time under the concept of "Whenever, Wherever, Whoever."

In addition to contribution to socio-economic development in India, open distance education is also the fastest way to resolve the educational disparity among regions.   This is achieved through methods unique to public distance education, which uses a multimedia package method that effectively fuses interviews, printed materials, audio/video programs, materials using IT technology and a learning system via satellite.

The open distance education system implemented in India is comprised of 13 state open universities and the distance education organizations attached to approximately 140 universities around the country, with the core of the system at the Indira Gandhi National Open University (IGNOU).   As GOI would like to democratize education and give access to education to people in all layers of society throughout every region across the country, GOI has placed high priority on upgrading of the open distance education system in order to realize GOI's wish.

IGNOU is an autonomous organization that was established by an Act of Parliament in September 1985 under the Department of Higher Education of the Ministry of Human Resource Development.   Its objects were to develop, promote and diffuse higher education based on theories

and methods of distance education employing information communications technology (ICT).　As of November 2009 it has evolved into one of the largest-scale open universities in the world, with more than 2 million registered students and 1,500 course lessons offered in certification, diploma, Bachelor's, Master's and Ph.D. programs in 21 schools and 175 subjects.

For the approximately 1,500 course lessons currently established at IGNOU, mainly self-study is done using textbooks distributed to each student.　Depending on the course, audio/video programs are produced and used to supplement the textbooks.　These audio/video programs are distributed at each Regional Centre, Study Centre and Oversea Centre, and are also available for purchase by students who wish to do so.　Additionally, these audio/video programs can be watched and listened through India's national television network (Doordarshan: DD), national radio network (All India Radio: AIR), IGNOU's educational satellite television broadcasting (Gyan Darshan: GD), and IGNOU's educational FM radio broadcasting (Gyan Vani: GV) and IGNOU website (IPTV).　Besides, at the Regional Centres and Study Centres, academic counsellors are available to conduct face-to-face lessons with students.　Furthermore, there are also compulsory courses that require teleconference lessons with professors using broadcasting.　Thus, classes are implemented using a diverse range of shapes and forms.

Designated as a supporting organization of IGNOU, the Electronic Media Production Centre (EMPC) produces the audio/video programs used to supplement textbooks.　Since its establishment in 1985, the main operations of EMPC have included producing, duplicating and distributing audio/video programs.　However, with the expansion of IGNOU's activities, EMPC added operations for four (4) channels of educational satellite television broadcasting (GD-1 to 4) in 2000 and educational FM radio broadcasting (GV) in 2001 to its original operations.

Channel 2 of GD Broadcasting (GD-2) is used as an interactive distance education channel for participants of distance education, including IGNOU students.　As a part of the IGNOU courses that require for class participation, teleconference-style (1 video channel, 2 audio channels) lessons are broadcast six times per day, (annual average of 1,200 lessons, including the teleconference lessons of other organizations) from 10:30 to 20:00 every day.

In EMPC, audio/video programs are produced mainly using two video program production studios and two audio program production studios that were improved by Japan's Grant Aid in 1993. However, since GD-2 was started, one of the video program production studios has been used exclusively as the transmission studio for the GD-2 teleconference lessons, making it impossible to use for the production of audio/video programs.　Consequently, current production of video programs is made in the remaining video program production studio and through field recordings.

However, the equipment used at present has already exceeded its service life and obtaining spare parts is getting difficult.　Then, the equipment becomes seriously superannuated, and malfunctions are

a frequent occurrence. If the current situation is left as it is, video program production will become apparently impossible within the next few years, thus negatively affecting the education of over two million students of IGNOU.

The program production is made still using the system comprising conventional analog equipment so that production efficiency remains low. Furthermore, as mentioned above the analog equipment becomes remarkably superannuated and is suffering from frequent failures, which makes production efficiency much worse. Now, the production output of 200 video programs per year is barely sustained by long and hard work of EMPC production staff who work 365 days throughout the year without holidays, much beyond the normal working days (210 days).

Besides, according to digitalization of DD that also broadcasts video programs produced at EMPC, the necessity strongly arises as to changing analog to digital production equipment.

In order to improve this situation and continue audio/video program production, as well as advance production efficiency, it is necessary to update audio/video program production equipment using digital technology in line with global and domestic trends.

With this as a background, The aim of the Project is to update the current superannuated equipment to the state-of-the-art equipment that can apply the current digitalization in India to produce the audio/video programs continuously that are offered as one of IGNOU's study support services, for approximately 2 million students. The Project also aims to improve efficiency of program producing, to increase the level of understanding of classes among students, to improve learning efficiency by offering high-quality audio/video programs, and to improve working conditions of EMPC staff. Since IGNOU is the central organization for open distance education and promotion of its activities has been given a high priority in the 11th 5-year plan, the Project is positioned to back up the 11th 5-year plan now in progress.

2-1-2 Outline of the Project

The input and activities necessary to achieve the goals above and the expected output of the Project are summarized as follows:

◆　Input

　　Japanese Side:

　　[Equipment]

　　　Procurement/Installation of Video Program Production Equipment

- Video Program Production Studio-1 System　　　　　　　1 set
- Field Recording (ENG) System　　　　　　　　　　　　3 sets
- Routing Switcher System　　　　　　　　　　　　　　1 set

- Video Common Sharing Network (Video Server System)　　1 set
- DVD Duplication System　　1 set
- Computer Graphics System　　2 sets
- Measuring Equipment　　1 set
- Analog/Digital Format Conversion System　　1 set
- SD/HD Preview System　　1 set
- Spare Parts　　1 set
- Installation Materials　　:　1 set

[Human Resources]

- Engineers to implement initial guidance and operation training of the equipment to be procured under the Project

India Side:

[Works]

- Removal of the existing equipment (including dimmer racks at video program production studio-1) in each room where the equipment procured under the Project is to be installed.

[Human Resources]

- Personnel for operation and maintenance of audio/video program production equipment (in status quo)
- Personnel for audio/video program production (in status quo)

◆ Activities

- Training personnel in charge of operation and maintenance of audio/video program production equipment
- Securing budget for operation and maintenance of audio/video program production equipment
- Training personnel in charge of audio/video program production
- Securing budget for audio/video program production

The following output can be expected.

◆ Output

- EMPC will be able to continuously produce the average 200 video programs per year required by courses in IGNOU's various schools. In the 10 years after the Project, approximately 2000 video programs can be produced.
- The digital (HD) video programs with high quality image can be produced by using digital equipment in place of existing analog equipment.

- The content of the produced video program will be enhanced by the use of various visual effects, computer graphics, etc., and the video quality will also be greatly upgraded.

- In addition to production of video programs for each school, production of video programs will also be possible for the science education broadcast channel that is planned for implementation.

- Working conditions of EMPC staff in charge of video program production will be improved.

2-2   Outline Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1)   Basic policy for equipment design

    1)   Scope of cooperation

The Project is to support the technical area of activities in EMPC which is one of the support organizations of IGNOU.   The project focus will be placed on one of EMPC's main operations, video program production, to advance production efficiency. Improvements related to audio program production activities and educational broadcasting activities started by EMPC in 2000 will not be included in the Project.

In addition, as IGNOU has conducted adequate maintenance management in EMPC facilities such as buildings, air conditioning equipment and power supply equipment, renovations and repairs are unnecessary.   Therefore, facility renovation is also not included in the Project.

    2)   Shift from analog to digital

Although the global movement toward digitalization began in the early 1990s, in this era, video tape had already built up a steadfast position as the main analog video recording media.   However, there were issues with video tape, which are shown in Table 2-1 below.

Table 2-1   Typical Issues of Analog Format

As the recording media is tape, video materials cannot be used when they are physically lent out for editing.	Common sharing of video materials: not possible
A large storage space is necessary as the tapes are large in content.	Space for storage: large
After repeating the process of recording editing copying over and over, obvious image deterioration appears.	Video quality: deteriorating
Necessary video parts cannot be easily extracted from recorded video tape.	Editing time: long and inefficient
As the VTR has many mechanical structures making it necessary to replace worn parts, periodic maintenance is essential.	Maintenance: high costs

However, since then there have been remarkable developments in digital technology and signal processing without deterioration of video quality has been achieved.   Today, the ability to produce high quality video programs is taken for granted.   In line with this progression, video recording media is shifting from the video tape used in the era of analog for recording media towards the use of multimedia that includes discs and semiconductor memory.

Additionally, technology has been developed so that information (metadata) such as positional information of recording and location of recording, as well as the title of the recorded material, date and time of recording, etc. can be added together into recorded video materials in the form of digital signals. Because of this, improved usage and management efficiency can be expected for editing after recording and for video materials management. With advances in digitalization, Table 2-2 shows ways of resolving issues typical in the era of analog, which are shown in Table 2-1 above.

Table 2-2   Typical Issues Resolved by Digital Format

Common sharing of video materials: possible	By further developing the network system, video common sharing is possible.
Space for storage: small	Recording media such as discs and semiconductor memory is small in size.
Video quality: same quality maintained	With digital recording, there is no deterioration even repeating editing or duplicating.
Editing time: short and efficient	By using random access and metadata, searching for necessary video part becomes significantly faster.
Maintenance: low costs	As there are few mechanical structures in digital equipment, maintenance costs are extremely low.

In addition, the digital equipment greatly contributes to signal quality retention, and with this merit, there is less disparity between the different grades of the equipment. Current trends show support for the equipment with high cost performance. However, it is necessary to carefully consider the durability of the equipment. Even if specifications are the same, durability must be considered from a viewpoint of long-term usage. As the objective of the Project is the implementation of stable video program production, from this viewpoint, the equipment grade will be considered to meet the needs of the project objective for an optimal system configuration.

3) Responding to the digitalization trend of broadcasting sector in India

India's broadcasting sector is administrated by the Prasar Bharati, the Broadcasting Corporation of India, under the jurisdiction of the Ministry of Information and Broadcasting. Broadcasting services in India are implemented mainly through Doordarshan (DD, national television broadcaster) with its nationwide network and All India Radio (AIR, national radio broadcaster). Private satellite television broadcasters and private FM broadcasters are also involved. Digitalization and a shift from standard definition (SD) format to high definition (HD) format in the field of broadcasting began with the 10th 5-year plan (2002/03 to 2006/07), and is presently advancing with remarkable momentum as detailed below. Based on the above, the Project will introduce the equipment necessary to accommodate

India's trend towards digitalization.

DD's movement to digitalization

Through 1,395 TV transmitting stations nationwide, DD covers 91% (DD statistic in 2008) of India's population. As a development project of the 11th 5-year plan, the promotion of digitalization is advocated with the aim of achieving a shift to HD format which realizes sharp, high-quality video images. A budget of 23.81 billion Rp. has been allocated to DD for the complete digitalization of video program production and TV transmitting equipment. Regarding the status of DD's shift to digitalization, 30 of the 66 TV studio centres nationwide had finished equipping for digitalization by 2005. As for HD, a goal for completion of its adoption by September 2010 has been set in order to shoot in HD format and broadcast over digital terrestrial television the 17 events of the Commonwealth Games to be held in India in October 2010. Bidding procedures for introducing the HD equipment to four TV studio centres in Delhi, Mumbai, Calcutta and Chennai are underway, and an HDTV broadcasting van with four onboard HD cameras has already been procured for the DD Headquarters (Delhi). Furthermore, work is progressing with the aim of introducing the HD equipment for all 66 TV studio centres by the end of the 12th 5-year plan in 2016/17. Regarding digital terrestrial television, the pilot project adopting DVB system began in 2004 at the four cities of Delhi, Calcutta, Mumbai and Chennai. By the end of the 11th 5-year plan in 2011/12, digital terrestrial television will be started at 30 cities. Furthermore, by the end of the 12th 5-year plan in 2016/17, it is planned that all 630 TV transmitting stations will change the transmitters from analog to digital type and start digital terrestrial broadcasting.

AIR's movement to digitalization

Through 255 radio transmitting stations nationwide, AIR covers 99% (AIR statistic in 2008) of India's population. There is a long history of digitalization at AIR beginning 20 years ago. At the radio program production centres in 10 locations nationwide, including Delhi, audio servers have been installed as the main digital equipment and the digitalization of radio program production equipment been completed. As a development project of the 11th 5-year plan, the promotion of digitalization including shift to Digital Radio Mondale (DRM) of medium-wave and shortwave broadcasting in addition to enhancing the FM broadcasting network is advocated. It also includes digital satellite radio broadcasting. Currently, concrete installation plans are being formulated. (A portion of shortwave radio broadcasting has

begun test DRM broadcasts.)   A budget of 31.55 billion Rp. has been allocated to AIR for digitalization in the 11th 5-year plan.

Mass Communication Research Centre (MCRC) in Jamia Millia Islamia University
Affiliated with the university engaged in cultivating human resources for the broadcasting sector in both India and overseas, MCRC (improved by Japan's Grant Aid in 1991) is keeping with the shift to digitalization with the installation of the digital broadcasting equipment for training students.   A portion of the video production studios for training use has been equipped with HD studio cameras, and the digital equipment has been procured for all audio editing system, video editing system, and computer graphics system.   The students (300 students per year) who are trained by using the digital equipment will work in the broadcasting sector, including IGNOU, in the near future.

4)   Equipment design concept
EMPC has been continuing to digitalize the equipment step by step by procuring severs for audio program production and the digital equipment for video program editing, etc. with their own funds since improved by Japan's Grant Aid in 1993.   However, a large portion of the existing equipment are still comprised of analog type, and compared to the global progression of digitalization, their system shows signs of becoming obsolete.
Meanwhile, with the global popularity of digital terrestrial television broadcasting, video program production equipment employs an even higher level of digital technology shifting from traditional SD format to clearer HD format video program production.   In keeping with the transition period from SD to HD at present, the equipment applicable both for SD format and HD format is largely defused.   With the remarkable momentum with which digitalization including adoption of HD format is progressing, HD functionality will also be incorporated for design of the equipment.
However, although the global movement to digitalization has accelerated and technology has advanced, it is an unrealistic expectation to digitalize all of the analog equipment at once in consideration of investment expense and operation issues.   Consequently, the Project is to be regarded as the first step in the shift to digitalization, aiming to create an optimal system in which usable existing analog equipment is involved to the system so that it can be applicable without problem to both SD and HD formats.   In the meantime, it will not become obsolete for the operation for at least 10 years from now onward.   Besides, in order to improve the working conditions of EMPC staff, studio recording efficiency will be advanced by introducing of a virtual studio system.   Editing efficiency will also be

advanced by introducing a video common sharing network (video server system) for editing of video programs. For video program production in the past, considerable amount of time were required for creating and setting up the studio scenery set for each program, preventing efficient video program production. Utilizing the virtual studio system, which is being introduced globally, studio sets will be made by computer graphics, which makes diversified and efficient video program production possible.

Responding to the global shift to digitalization

- Becoming "tapeless"

  Digitalization of video recording media

- Video format

  Introduction of High Definition (HD) format in addition to traditional Standard Definition (SD) format

With digitalization of video recording media, introduction of SD/HD format, and transfer of duplication of video programs distributing to students from VTR to DVD, the advancement of the quality of video programs will be realized.
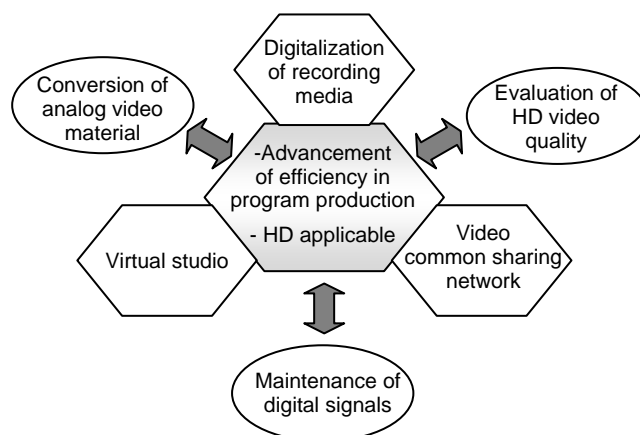
Advancement in efficiency of video program production at EMPC

- Introduction of a virtual studio system
- Introduction of a video common sharing network as an editing system

With the introduction of a virtual studio system and a video common sharing network together with non-linear editing system, a video program production system using maximum digital functionality will be created, thus advancing video program production efficiency.

(2) Policy on natural environment conditions

The project site is located in New Delhi that is subject to semi-arid climate conditions with both a rainy season and a dry season. New Delhi's height above sea level is approximately 250 m, and there is a large gap between hot and cold weather. The average temperature for May to June is approximately 30°C, making it very hot. The rainy season is from July to August.

In the existing EMPC building where the equipment to be procured under the Project is to be installed, air conditioning and ventilation facilities are available and are operating well. Thus, there will be no particular impact on the equipment to be procured under the Project caused by

climate conditions such as temperature, humidity and precipitation.

Road access to the project site is mostly paved and will not present problems.　However, in the last 2 km area before reaching the project site, the road becomes flooded with even the smallest amount of rain.　Thus, inland transport should avoid the rainy season (July to August) as much as possible.

1)　Precipitation

The average annual and monthly precipitation from 2000 to 2008, and the month that recorded the maximum amount of precipitation are as follows.　2003 was recorded as the year with the most precipitation at 1,161 mm.　There is no recorded observation of snowfall.

Site	Observation years	Average annual precipitation (mm)	Average monthly precipitation (mm)	Maximum average precipitation month	
				Precipitation (mm)	Recorded month
New Delhi	2000 to 2008	776.5	64.7	210.5	July

2)　Temperature

The average monthly highest and lowest temperatures from 2000 to 2008 and the months in which they were recorded are shown in the following table.　The highest temperature of 46°C was recorded in May 2005, while the lowest temperature has never reached below freezing.

Site	Observation years	Average monthly highest temperature		Average monthly lowest temperature	
		Temperature (°C)	Recorded month	Temperature (°C)	Recorded month
New Delhi	2000 to 2008	39.3	May	7.2	January

3)　Humidity

The average monthly highest and lowest humidity levels from 2000 to 2008 and the months in which they were recorded are shown in the following table.

Site	Observation years	Average monthly highest humidity		Average monthly lowest humidity	
		Humidity (%)	Recorded month	Humidity (%)	Recorded month
New Delhi	2000 to 2008	91.5	December	22.1	April

4)　Earthquakes

For the period between 2000 and 2008, an earthquake measuring 7.9 on the Richter scale occurred in Gujarat (westernmost state in India) in January 2000.　However, there is no record of an earthquake in New Delhi.

(3) Policy on social infrastructure

Although electric power conditions within New Delhi area are relatively stable, power failures also occur from time to time. During the preparatory survey period, they occurred at an average pace of twice per week. The existing EMPC building in which the equipment to be procured under the Project will be installed is equipped with 200kVA and 500kVA standby generators, which run during power failures. However, approximately five minutes is required to supply power by the standby generators from the time of the power failure. Consequently, for the equipment incorporated a computer, such as the non-linear editing equipment, computer graphics and video server, an uninterruptible power supply (UPS) unit will be installed to prevent loss of data during power interruption.

(4) Policy related to usage of local companies

The main equipment used at EMPC is manufactured mostly in Japan, Europe and the United States. Installation of such equipment was performed by engineers dispatched from each manufacturer. Thus, the installation work of the equipment to be procured under the Project will also be implemented by skilled engineers dispatched from the manufacturers. Skilled local workers from electric work companies in New Delhi will also be employed to assist in the equipment installation work in their applicable fields.

(5) Policy related to operation and maintenance management at EMPC

The video program production system will be designed not to change, after implementation of the Project, EMPC's currently implemented video program production process and the number of production staff members, as described below. The annual number of operating days at EMPC is set at 210 (105 days in the first semester, 105 in the second semester).

1) Developing scenarios for video programs

Scenarios for video programs are produced by the producer designated by the EMPC director, the professor(s) of the school and the course coordinator.

2) Recording and editing of video programs

Under the producer in charge, studio recording of video programs is implemented by staff members of EMPC's Production Unit and Engineering Unit.

Staff for studio recording: Producer: (1), Assistant Producer: (1), Camera man: (3 to 4), Technical Director: (1), Video Engineer: (1), Audio Engineer: (1), Camera Engineer: (1), VTR Engineer: (1), Character Generator Engineer: (1), Lighting Engineer: (1)

<div align="center">– Total of 12 to 13 staff members</div>

       Staff for field recording: 3 crews (3 to 5 members/crew)

3)   Video Program Preview

      After recording and editing, contents and quality of produced video programs will be checked by a program preview team consisting of the dean in charge, professor in charge, the EMPC director, producer in charge, and course coordinator, and so on.

4)   Video Program completion

      After making revisions as indicated during the preview, the video program will be completed upon approval by the program preview team.

The driving force of the Project will be staff members of EMPC's Engineering Unit and Production Unit. The Engineering Unit is in charge of operation and maintenance management of the equipment for program production, transmission and broadcasting. Daily maintenance work is conducted by the staff members of Engineering Unit together with a maintenance engineer from an outside agent with whom a yearly maintenance contract has been held for the last 15 years. Although the Engineering Unit staff members have extensive experience and solid technical capabilities, they are not accustomed to working with the digital technology used in the equipment that will be introduced in the Project. Therefore, at the end of the implementation of the Project, the operation training of the equipment to be procured under the Project will be held following equipment installation work.

(6)   Policy related to setting the grade for equipment, etc.

The specifications for the audio/video program production equipment are broadly classified into three grades: "Broadcast grade", "Professional grade" and "Consumer grade". "Broadcast grade" adopts the specifications necessary for stable broadcasting activities, and takes into account issues such as continuous operation and redundancy needed to reduce the chances of malfunction and to improve reliability. Broadcast grade is expensive as the equipment has been devised so that its design can be modified according to the preferences of the user. In the era of analog, most equipment used for broadcast activities was broadcast grade because of its reliability. "Broadcast grade" equipment was also procured to EMPC under the last Japan's Grant Aid. However, with advancement of digitalization, even though "Professional grade" cannot be modified according to user's preferences, highly reliable equipment in this grade is widespread as it is comparable specifications to "Broadcast grade" equipment. Thus, the border between "Broadcast grade" and "Professional grade" is going to disappear. Recently, some of "Consumer grade" equipment also has adequate specifications for use at broadcasting stations in

Japan.   Accordingly, the equipment to be procured under the Project will be selected from the most appropriate grade among three to match the purpose of its usage.

(7)   Policy related to procurement of the equipment and implementation period

1)   Policy related to procurement of the equipment

The video program production equipment to be procured under the Project is not manufactured in India.   Although the equipment is manufactured mainly in Japan, with other manufacturers in the United States and Europe, major overseas manufacturers have local agents in New Delhi along with a support system.   In addition, EMPC has a yearly maintenance contract with a local agent (CMS Computers Limited), which is providing maintenance for existing equipment in cooperation with EMPC staff.   Since EMPC also has deals with the local agencies of 13 major manufacturers in Japan, the United States and Europe, maintenance and repairs of the equipment are commissioned if sudden malfunctions occur.   Consequently, even if the equipment for the Project is procured from Japanese, American and European manufacturers, there should be no problems in after-sales service, including procuring spare parts, after implementation of the Project.   Thus, an appropriate country for procurement will be decided upon considering the balance among procurement costs, equipment specifications and their track record of development and diffusion of digital audio/video equipment.

In particular, the history of digital video equipment is not so long, and there has been still little record showing actual operation of the systems composed of various digital equipment items from different manufacturers.   Even though the digital equipment has been manufactured in accordance with the global standards, minute differences in their acceptable range of standards might cause some noise.   Depending on the systems, in case the equipment from Japan is connected directly with the equipment procured other than Japan, it is clearly necessary to match the specifications of the equipment.   In addition, the equipment will be selected while sufficiently considering their connectivity performance.

Regarding the format of video recorder, Japanese manufacturers have been global leaders in its development and thus have the initiative.   Therefore, video recorder will be procured from Japan directly or from a factory in third country of Japanese manufacturers.

For intercommunication equipment, peripheral of the program production system, American products have become the global de facto standard and had a track record of being widely used by broadcast stations around the world as a standard.   Therefore, instead of using a Japanese product, procurement from a third country is appropriate.

For character generators, procurement from a third country is preferable considering accommodation of languages (English).

2) Policy related to setting of the implementation period
The following points will be considered in setting the implementation period.

Manufacturing period and shipment of the equipment to be procured under the Project
Approximately six months are required for the manufacturing and procurement of all of the equipment for the Project. After completion of manufacturing and procurement of all equipment, sea transport using one ship will be considered.

Process for installation work
Video program production activities shall be suspended during the period of installation work. Therefore, to shorten this period as much as possible, the installation work schedule with minimal impact on video program production activities will be formulated. This may include beginning equipment installation work from Video Program Production Studio-1, as well as keeping in mind that during the period before school semesters (January to March and July to September), the number of programs produced is particularly great.

Tests / Inspections
For the Project, the factory inspection before ex-godown of the equipment and the pre-shipment inspection of the equipment before loading ship for sea transport by a third-party inspection organization will be conducted as well as acceptance inspections after completion of installation work. The implementation schedule will be formulated considering the time required for these inspections including the necessary time for preparation and approval.

Completion of the Project
The completion of the Project will be marked with the completion of the operation training of the equipment following this installation work.

2-2-2 Basic Plan

2-2-2-1　Validation of the Request

In addition to confirming the background regarding the concept of the Project and requested equipment items from IGNOU/EMPC, the Japanese side explained the basic concept that the equipment to be procured under the Project will be capable of handling both SD format and HD format to formulate the proper system which will not become obsolete in the next 10 years under current transitional situation of shifting to HD taking into consideration of the current global and Indian trends in digitalization. In response to the basic concept from the Japanese side, the India side fully agreed the concept from the Japanese side. Then the Japanese side presented the revised contents of the Project that included essential equipment proposed by the Japanese side in addition to the requests from the India side, to achieve the goals of the Project. This was done while discussing the necessity and validity of the contents of the Project requested, upon which the final request from the India side were confirmed.
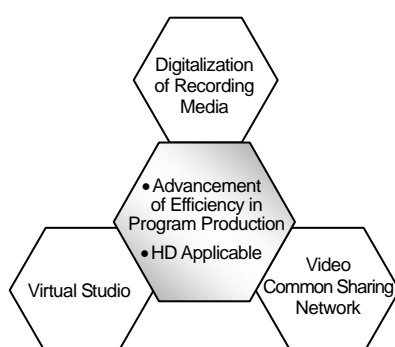
Concept of the Project by India side　　Proposed concept of the Project from Japanese side
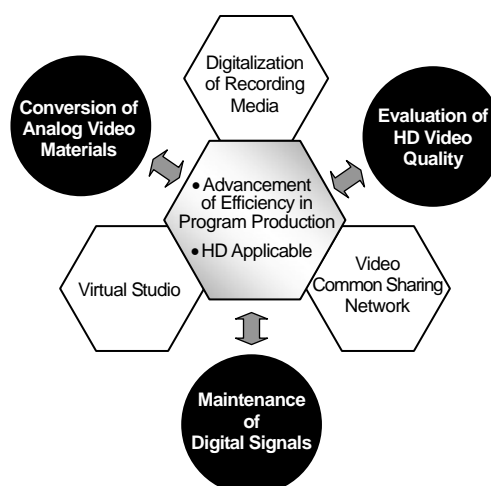
Although the existing equipment at EMPC is maintained well so that is still in very good condition, more than fifteen years have passed since the equipment was procured under the last Japan's Grant Aid in 1993. With recent advances in digital technology, the current system consisting of analog equipment at EMPC shows clear deterioration and obsolescence. In addition, as the equipment has exceeded its operational service life, the procurement of spare parts from the manufacturer has also become difficult. Furthermore, with the operations of the educational satellite television broadcasting (GD) started in 2000, one of the two existing video program production studios is used daily and exclusively as a live broadcasting studio for the teleconference lessons that are incorporated into a portion of the IGNOU academic course curriculum. This has caused a critical situation in which only the one remaining video program production studio is available for the

production of video programs.

The academic courses offered at IGNOU have increased dramatically from 400 at the time of the last Japan's Grant Aid in 1993 to the current 1,500, with the number of enrolled students at approximately two million.   There are plans to further increase the number of schools and courses (by 77 courses in 13 schools which is equal to 1,500 credits) by the end of the 11th 5-year plan (March 2012).   Furthermore, GOI has requested IGNOU to produce video programs for the new science education satellite channel (GD-5).   Under these conditions, video programs are being produced through the diligent maintenance of the considerably deteriorated equipment.   Since there is no way to stop this aged deterioration, it is clear that the production of video programs will no longer be possible in the near future.   In addition, it is necessary to improve the work conditions of EMPC production staff who work 365 days throughout the year without holidays, much beyond the normal working days to produce 200 video programs per year.   The final requested equipment of the Project from the India side consists of the very minimal amount necessary.   If any of the equipment requested is excluded from the Project, the formulated video program production system will become poor balance and will interfere with achieving the goal of the Project.

The details of final request are shown below with the reason for the change from the initial request.   The results of validity examinations for the final requested equipment are also explained.

---

[1]   Video Program Production Studio-1   Virtual Studio System

Summary of current equipment   Studio area: 216 m^2

There are 12-13 staff members involved with video program recording, with 200 operating days per year.   Most of the equipment used is analog equipment that was installed under Japan's Grant Aid in 1993, and has become clearly deteriorated.   At the time after the initial installation, video recording was done with three studio cameras, but recording methods were changed to adapt to the diversified video programs being produced.   Therefore, one additional studio camera was procured with own funds of IGNOU, and currently four studio cameras are used for video recording.   Although the VTRs are in SD format, digital VTRs capable of continuous use have been introduced.   The lighting equipment including a dimmer control unit (90 lighting control capability) and lamps has also deteriorated.   Additionally, as the manufacturer has gone bankrupt, procurement of spare parts became impossible.   Therefore, an immediate renewal of lighting equipment is necessary.   The cyclorama on the studio floor also shows considerable deterioration, thus requiring repairs.

Summary of requested equipment

The virtual studio system with four studio cameras was requested. However the main production format of video programs was SD format. In anticipation of the high definition era, SD/HD format conversion equipment was also included in the request.

Main revision points

The following revisions were made regarding the optimal equipment and quantity based on program

recording methods and studio operation methods at EMPC.

1. Making the entire system SD/HD format applicable, a composition using four (4) studio cameras was changed to three (3) studio cameras and one (1) multi-purpose remote camera

2. Two (2) box type lenses for studio cameras were requested, but based on program recording methods, using the same portable lenses as the existing equipment is optimal.   Therefore, this was changed.

3. For studio lighting equipment, an renewal is necessary to cope with the virtual studio system and the considerably deteriorated dimmer control units.   However, continued use of the baton equipment, including motors and wires, is possible.

4. Six (6) SD format VTRs for recording were requested, but to accommodate tapelessness, this was changed to three (3) HD digital disc recorders.   The interface units for existing SD-VTR will be included to make the continuous usage of existing SD-VTRs.

How the revisions came about

As the existing cyclorama in the studio floor has deteriorated, repairs are necessary for efficient program production continuously in the future.   However, this would mean a large-scale repair work for a 216 m^2 area of studio floor.   As an alternate method, the virtual studio system using digital technology could be introduced.   In comparing the cost, installation period, and level of work difficulty of repairing the cyclorama and introduction of the virtual studio system, introduction of the virtual studio system is less expensive, does not require special techniques for installation work, and can be completed in a short period of time.   Therefore, it was decided that introduction of the virtual studio system was the optimal choice. In addition, with the introduction of the virtual studio system, large props set on the studio floor would no longer be necessary for the production of video programs.   This would considerable reduce video program production time, and expecting to advanced studio operation efficiency.

However, as the concept of the request was based on using SD format, the composition of entire system will be revised to avoid problems in future program production with the adoption of HD format.   The major points are as follows.

The signal proccessing standard of the system will be in HD format.   However, the interface units will be installed at input/output ports of the signals to effectively utilize the existing SD-VTR and ensure compatibility with SD.

One (1) remote camera will be installed at near ceiling of the studio floor to make it possible to produce more variation of video programs.   Thus, out of the four (4) studio cameras requested, one (1) will be changed to a multi-purpose remote camera.

A total of nine (9) digital and analog waveform monitors were requested, but following the studio system will be digitalized, this will be changed to five (5) digital multi-format waveform monitors.

Although it was feared that lighting equipment had deteriorated, there are no problems in the mechanical portions and they are functioning well.   Therefore, just the flourescent lighting required for the virtual studio system and the dimmer control units will be renewed.

Comparison of initial and final request details			D Delete	C Change	A Addition
Initial Request		Evalu-	Final Request		
Equipment	Q'ty	ation	Equipment	Q'ty	Reason of Change
3CCD SD Camera	4 nos.	C	3CCD SD/HD Color Camera	3 nos.	HD/SD type, This was changed into 3 studio cameras in consideration of program production method.

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
		A	Multi-Purpose HD Remote Camera	1 no.	Installed near the ceiling of the studio floor, optimal scene-creation can be done in the virtual studio system.
Zoom Lens, etc.	4 nos.	C	Zoom Lens, etc.	3 nos.	Same quantity as 3 sets of 3CCD SD/HD Cameras.
Digital VTR SD	6 nos.	C	Interface unit for SD-VTR	1 no.	To ensures effective utilization of the existing SD-VTR and SD compatibility.
		A	HD Digital Disc Recorder	3 nos.	Alternate equipment of VTRs to cope with tapeless and HD trends. Increased to a total of 3 comprising 2 for video playback and 1 for recording.
Virtual Set	1 set		Virtual Set	1 set	Equipment for the virtual studio system.
SDI Distribution Board (2ch)	4 nos.	D			Not required due to HD system.
SDI Distribution Board for Monitoring	4 nos.	D			Not required due to HD system.
D/A Board for Monitoring	4 nos.	D			Not required due to HD system.
Character Generator	1 no.	C	HD Character Generator	1 no.	HD Type.
Microphones		C	Microphones		Quantity of each microphone shall be determined in consideration of studio area and purpose of usage.
Dynamic Type	8 nos.		Dynamic Type	4 nos.	
Condenser Type	8 nos.		Condenser Type	6 nos.	
Gun Type	2 nos.		Gun Type	1 no.	
Wireless Type with Handy Transmitter	6 nos.		Wireless Type with Handy Transmitter	3 nos.	
Floor Stand	6 nos.		Floor Stand	3 nos.	
60-inch Plasma Monitor	3 nos.	C	50-inch Studio Monitor	2 nos.	As there are no large props in a virtual studio system, the performers will always perform by watching at the studio monitor during recording. There will normally be 2 monitors in the studio, which can be shifted to the control room as necessary. The minimum quantity and size of the monitor was determined based on usage frequency and studio size.
Analog Waveform Monitor	4 nos.	D			A multi-format waveform monitor can also be used for this purpose.
Digital Waveform Monitor	4 nos.	C	Digital Multi-Format Waveform Monitor	5 nos.	Using as a dual purpose monitor for HD digital waveform and analog waveform, the quantity is set to maximize functional usage including monitoring functions.
Vector Scope	1 no.	D			Not required.

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
Lighting Equipment	1 set		Lighting Equipment for Virtual Studio	1 set	Accompanying the introduction of the virtual studio system, flourescent lighting equipment and the deteriorated dimmer control units will be renewed Spare lamps will be included.

[2] Field Recording (ENG) System

Summary of current equipment

Recording of interviews, medical practices and agricultural work is being performed by going out to mainly universities, hospitals and agricultural fields. The reporting crew consists of three teams, with field recording taking place approximately 100 days per year, making the frequency of equipment usage high. Recordings are done by using a camcorder as the main recording equipment of which maintenance is done on a regular basis. However, since the equipment has been used for more than 15 years, malfunctions due to aging and wear occur frequently.   Thus, replacement is necessary.

Summary of requested equipment

A request was made for four (4) SD digital portable camcorders (including accessories), six (6) digital still cameras, six (6) Mini DV camcorders and one (1) portable audio mixer.

Main revision points

The total number of field recording (ENG) system was revised to three (3) sets to correspond with the number of reporting crew.

How the revisions came about

- Three (3) sets of the field recording system will be replaced in consideration of the number of reporting crew (3 crews). The field recording camcorder will adopt SD/HD applicable type employing discs to facilitate exchanging video materials with the studio or editing system.
- One (1) portable audio mixer was requested, and changes were not made in consideration of usage frequency.
- Considering usage purposes of digital still cameras and MiniDV camcorders, three (3) sets each will be proper and sufficient as the same quantity to the number of reporting crew.
- The format of the MiniDV camcorders will be HDV format to provide compatibility with HD.

Comparison of initial and final request details
D Delete C Change A Addition

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
SD Digital Portable Camcorder	4 nos.	C	HD Digital Portable Camcorder	3 nos.	SD/HD Type. Same quantity as No. of reporting crew.
Zoom Lens, etc.	4 nos.	C	Zoom Lens, etc. (HD Type)	3 nos.	Same quantity as HD Digital Portable Camcorder.

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
Mini DV Camcorder with Accessories	6 nos.	C	MiniDV/HDV Camcorder with Accessories	3 nos.	SD/HDType. Used supplementarily for recording video materials at the time of the failure of digital portable camcorder during field recording, the quantity was changed to 3 sets to match the number of crews.
Digital Still Camera	6 nos.	C	Digital Still Camera	3 nos.	Used supplementarily for shoot the still pictures during field recording, the quantity was changed to 3 sets to match the number of crews.

[3]　Routing Switcher System

Summary of current equipment

A sync signal generator and sync signal distribution amplifier were installed in the master control room by Japan's Grant Aid in 1993, but a large-scale routing switcher system was not introduced.　Currently, a patch panel is used for switching of the line connection, but its deterioration has caused accidents including contact failure.　Furthermore, the time it takes to perform the line switching operations interferes with video program production.　Therefore, introduction of an efficient routing switcher system is necessary.

Summary of requested equipment

A 128-input × 128-output routing switcher and monitor equipment were requested.

Main revision points

After a complete shift to digital, the necessary number of lines would be less than 64 lines.　Therefore, the standard and widely used 64-input × 64-output routing switcher will be requested.

How the revisions came about

As the number of necessary lines for program production at EMPC can be set at approx. 60 lines after digitalizaiton as shown below, the input/output numbers for the routing switcher were revised.

Video Program Production Studio-1	6 lines	
Video Program Production Studio-2:	6 lines	
Editing Room:	7 lines	
Duplication Room:	2 lines	
Gyan Darshan Transmission Room:	8 lines	
External Lines:	4 lines	
Edusat Control Room:	6 lines	
Server Room:	5 lines	
Maintenance Room:	2 lines	
Computer Graphics Room:	4 lines	
Video Common Sharing Network (Video Server):	10 lines	Total　60 lines

Comparison of initial and final request details					D Delete C Change A Addition	
Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
128-input × 128-output Digital Routing Switcher	1 no.	C	64-input × 64-output Digital Routing Switcher	1 no.	Based on the necessary number of lines, this was changed from 128 to 64.
Digital Waveform / Vector Scope	1 no.	C	Digital Multi-Format Waveform Monitor	1 no.	This was changed to a multi-format type that can handle HD.
		A	Video Sync. System	5 nos.	For 1 × Server Room, 2 × CG Rooms, 1 × Video Server, 1 × A/D Format Conversion System
		A	Patch Panel	1 set	Added to accommodate the period of transition before complete digitalization.

[4]　Video Server System (Archive)

Summary of current equipment

The complete video programs (approx. 3000) and video materials recorded on video tape are stored in tape cabinets in the library and managed with a computerized database management system.

Summary of requested equipment

A server system with a hard disk capacity of 10,000 hours of video programs, 44 sets of browsing terminals, and 6 sets of ingest/browsing terminals were requested.

Main revision points

Management of the audio/video program library will be done in the same way as before with the existing cabinets and database management system.　Using analog/digital format conversion system, video programs will be converted from tapes to discs.

However, from the aspect of advancement of efficiency in video program production, video common sharing network will be established by introduction of a video server with 150-hour storage capacity of HD video programs and non-linear editing equipment.

How the revisions came about

A server with a hard disk capable of storing 10,000 hours which is a large-scale computer system was requested.　It was requested that all of the programs recorded on tapes in the existing cabinets be transferred to the server, but from an operations and maintenance management standpoint, this is not ideal and realistic.　Therefore, the library management system will remain as it is, with the transfer of programs recorded on tape to discs securing ample cabinet storage space.

However, from the aspect of advanced efficiency in video program production, a broad improvement in the program editing work flow should be set as a goal.　Advanced efficiency in editing work can be realized by storing video programs and studio recordings directly on the video server and through video common sharing network.

Comparison of initial and final request details			D Delete C Change A Addition		

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
5 Node Archive System (10,000hours@25Mbps)	1 set	C	Existing Cabinets and Data Management System to be used for Library	1 set	The programs originally recorded on VTR tape will be converted to disc media using an A/D format conversion system and managed in cabinets. The existing system will be used for database access.
Digital VTR(SD)	6 nos.	C	HD Digital Disc Recorder	2 nos.	This is changed to recorders for ingest terminals. However, for the SD-VTR, existing equipment will be used so that only a connective interface will be added.
			HDV-VTR	2 nos.	
			Interface for SD-VTR	2 nos.	
Application Software for Automatic Transmission	1 set	D			Not required.
Application Server	1 no.	C	Administration Terminal	1 no.	For the multi-format video server management system.
3 Node Cluster Server (100hours@25Mbps)	1 no.	C	Multi-Format Video Server (150hours@25Mbps)	1 no.	To store frequently used video programs.
Computer for On-Line Network	44 nos.	C	Browsing Terminal	4 nos.	The same quantity as the number of non-linear editing equipment so that the editing system user can check materials in advance.
Computer	6 nos.	C	Ingest Terminal (SD)	2 nos.	This is divided into necessary ingest terminals.
			Ingest Terminal (HD)	2 nos.	
			Ingest Terminal (HDV)	2 nos.	
		A	Non-Linear Editing System	4 nos.	Server connection-type online network editing system to advance efficiency in program production.
System Software	1 set	C	Network Management Application Software	1 set	This is changed to software for the video common sharing network.

---

[5] DVD Duplication System

Summary of current equipment

While the VHS tape duplication system (30 simultaneous copies) that was installed under the Japan's Grant Aid in 1993 still exists, it is not in use as currently duplication is done on Video CDs (VCD) and DVDs for video program distribution purpose. The currently operating DVD duplication equipment consists of an obsolete consumer-grade product with unstable performance. Furthermore, the video quality of the duplicated DVDs lacks sharpness affected by the noise.

Summary of requested equipment

As a video program duplication system for DVDs to be distributed to RCs, SCs and students, a request

was made for a system that can duplicate 100 DVDs at one time.

Main revision points

The DVD duplication system will be introduced as requested, but as video programs in HD format cannot be directly duplicated to DVD, it is necessary to record after conversion to an SD analog format signal.　For this, it is necessary to simultaneously introduce the master DVD production system.

How the revisions came about

Mainly VHS tapes and VCDs have been used in India as the video duplication media, but a shift is being made to DVDs because of their large recording capacity.　Duplication work by outsourcing organization is one method, but since the annual number of duplicated and distributed DVDs is approximately 3000, it is possible to do it by EMPC.　Thus, the DVD duplication system and the master DVD production system will be procured as an integrated system for duplication purpose.

Comparison of initial and final request details　　D Delete　C Change　A Addition

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
DVD Master Duplication System	1 no.	C	Master DVD Production System	2 nos.	This system is to produce the master DVD disc that will be the original DVD for duplication.　2 sets will be procured based on the current operating conditions.
DVD Recorder	4 nos.	C	DVD Recorder	2 nos.	A drive for writing data to master DVD discs is essential equipment.　This will be of the same quantity as the master DVD production systems.
Digital Video Monitor	6 nos.	C	Digital Video Monitor	2 nos.	Same quantity as master DVD production system
Application Software for DVD Duplication System	1 set	D			Not required.
DVD High Speed Duplication System (100 copies at once)	1 no.		DVD Duplication System	1 no.	The number of discs that can be copied at one time will be investigated.

[6]　Computer Graphics System

Summary of current equipment

Two (2) sets of computers for graphics, two (2) sets of SD-VTRs and monitors were procured under the Japan's Grant Aid in 1993, but they have already been rendered unusable.　Presently, supplementary computers are being temporally used.

Summary of requested equipment

Four (4) sets of Computer Graphics Systems are requested.

Main revision points

The request for four (4) sets of Computer Graphics Systems was changed to two (2) sets.

How the revisions came about

The computer graphics system is essential for producing background scenes for the production of programs in virtual studio system.   In addition, this equipment is also used for creating program titles.   As there are two computer operators at EMPC, the procured quantity will be the same as in 1993 (two (2) sets), which will not hinder operations.   However, considering operational efficiency, the requested four (4) sets of 19-inch LED monitor (two sets per each system) will remain unchanged.

Comparison of initial and final request details D Delete C Change A Addition

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
Computer Graphics	4 nos.	C	Computer Graphics System	2 nos.	Same quantity as existing.
Computer	4 nos.	D			Not required.
19-inch LED Monitor	4 nos.		19-inch LED Monitor	4 nos.	To improve work efficiency, 2 monitors will be connected per 1 system.
Application Software for Graphics System	1 set	C	Application Software for Graphics System	2 sets	Same quantity as computer graphics system
		A	Flat Bed Scanner	2 nos.	Added to handle input from paper media.
		A	UPS	2 nos.	This was added to protect data in case the city power source fails.

---

[7]   Measuring Equipment

Summary of current equipment

The existing measuring equipment at EMPC is for use with analog equipment only.   Measuring equipment that can be used for maintenance of the digital equipment to be procured under the Project is not owned.

Summary of requested equipment

Although not included in the initial requests, this was proposed by the Japanese side as the essential equipment for achieving the goals of the Project.   It was found through discussions that measuring equipment was not included on the request list due to a mistake on the EMPC side.

Main revision points

In order to maintain digital quality, measuring equipment necessary to operate and maintain the system in good condition after completion of the Project will be introduced, with a focus on digital type measuring equipment.

How the revisions came about

Transmission of HD signals between digital equipment components can be up to 1.485Gbps. As transmission quality is affected by even the type and length of the cables, checks of transmission characteristics using measuring equipment are necessary, especially for transmission of digital signals between rooms.

In addition, for measuring analog audio/video signals which are converted to analog signal from the transmitted digital signal, it is necessary to renew the measuring equipment since calibration of the existing measuring equipment for measuring is impossible due to its deterioration and a lack of reliability.

Comparison of initial and final request details　　　　　D Delete　C Change　A Addition

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
		A	Digital Video Analyzer	1 no.	To confirmation of digital video signal transmission quality.
		A	Digital Multi-Format Waveform Monitor	1 no.	To maintain the digital equipment in studio.
		A	Oscilloscope	1 no.	To repair and maintain all of equipment.
		A	Audio Analyzer	1 no.	To maintain program production equipment.
		A	Clump Meter	1 no.	To measure and check electrical current of power supply.
		A	Digital Multi Meter	1 no.	To repair and maintain all of equipment.
		A	Audio/Video Signal Generator	1 no.	Standard signal generator for repairs and maintenance.

---

[8]　Analog/Digital Format Conversion System

Summary of current equipment

Since tape media is used for recording of video programs in EMPC, analog to digital format conversion system is not owned. However, the recording media of video programs will be transferred from tape to disc by the Project. Therefore, a system is necessary to convert the large amount of video tape materials and programs stored in the library to disc media.

Summary of requested equipment

Although not included in the initial requests, it was proposed by the Japanese side as an essential system for achieving the goals of the Project.

Main revision points

Although not included in the initial requests, this system will be introduced to convert analog to digital format and is essential for the functional capability of the work flow in video program production in the Project.

With this system, the barrier between tape (analog) and disc (digital) media will be lowered, and work flow can be regulated. In addition to media conversion from tape to disc, this system will also be used for playback of the recorded video signal for the master DVD production system, which will be installed in the same room.

How the revisions came about

Although the conversion system comprising of five (5) players (master side) and five (5) recorders (slave side) was considered at first, it was changed to the conversion system comprising of three (3) players and three (3) recorders based on work flow of video program production and the number of stored video tape programs in the library.   All SD-VTRs on the master side will be planned to use the existing equipment.

Comparison of initial and final request details　　　　　　　[D] Delete　[C] Change　[A] Addition

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
		[A]	Up-Converter for SD-VTR	3 nos.	To convert taped media, including the video programs and video program materials that are stored in the library to disc media.
		[A]	HD Digital Disc Recorder	3 nos.	
		[A]	Routing Switcher	1 no.	
		[A]	Monitor Switcher	1 no.	Organically linking to other systems, after conversion is completed, it will also function organically as a part of the master DVD production system.
		[A]	Monitor Speaker	1 no.	
		[A]	HD Multi-Format Monitor	1 no.	
		[A]	Digital Multi-Format Waveform Monitor	1 no.	

---

[9]　SD/HD Preview System

Summary of current equipment

The Preview System applicable only for SD format that was procured under the Japan's Grant Aid in 1993 is in operation.

Summary of requested equipment

Although not included in the initial requests, it was proposed by the Japanese side as an essential system for achieving the goals of the Project.

Main revision points

The Preview System for evaluating complete video programs produced both in HD and SD formats will be introduced.

How the revisions came about

The existing projector is not HD applicable type, but showing the recorded video programs on a screen for viewer evaluation on the contents and quality before broadcast or duplication is essential.   Therefore, a system will be introduced in which previewing in HD format, in addition to the original SD format, is possible.   However, use of the existing SD-VTRs to playback SD video programs is a prerequisite.

Comparison of initial and final request details					D Delete C Change A Addition
Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
		A	HD Video Projector	1 no.	This system is essential for previewing video programs produced in SD/HD format. Usage of existing equipment will be applied for SD-VTR, which will be connected directly to the A/V switcher.
		A	HD Digital Disc Recorder	1 no.	
		A	HDV-VTR	1 no.	
		A	DVD Player	1 no.	
		A	9-inch Multi-Format Monitor	1 no.	
		A	A/V Switcher with Mixer	1 no.	
		A	Condenser Microphone	2 nos.	
		A	Microphone Stand	2 nos.	
		A	Graphic Equalizer	2 nos.	
		A	Power Amplifier	2 nos.	
		A	Audio Speaker	4 nos.	
		A	Rack	1 set	

[10]   Spare Parts

Summary of current equipment

 Spare parts are appropriately inventory controlled in a constantly manned warehouse.

Summary of requested equipment

 There was a request for spare parts, but concrete details were not specified.

Main revision points

 Spare parts necessary for maintenance of digital equipment for one (1) year are included. Newly introduced recording medias necessary for one (1) year operation are also included as supplies.

How the revisions came about

 In principle, maintenance for digital equipment is done by the manufacturer.   In India, the maintenance systems of manufacturer branch agencies are relatively well organized, thus stock will be focused on parts that are difficult to obtain in emergencies.

Comparison of initial and final request details					D Delete C Change A Addition
Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
Spare Parts	1 set		Spare Parts	1 set	To procure the parts essential for digital equipment.
Recording Media	1 set		Recording Media		To set for procurement at the volume of recording medias necessary for one year of operations.
			Disc	1 set	
			Memory Card	1 set	
			MiniDV Cassette	1 set	
			DVD	1 set	

[11]　Audio Editing System　1-4

Summary of current equipment

It is operated using the equipment procured under the Japan's Grant Aid in 1993.　Some equipment purchased with IGNOU own funds is also used, but the digital audio tape (DAT) equipment is now rarely used.

Summary of requested equipment

A request was made for four (4) sets of digital audio workstations (DAW) with audio DVD as an external input/output device, as well as accessories.

Main revision points

As a plan for self-funded procurement and installation was ascertained through discussions, this entire system is to be deleted.

Comparison of initial and final request details　　D Delete　C Change　A Addition

Initial Request		Evalu-ation	Final Request		
Equipment	Q'ty		Equipment	Q'ty	Reason of Change
Digital Audio Workstation	4 nos.	D			
Interface Unit	4 nos.	D			
LCD Monitor	8 nos.	D			
Computer	8 nos.	D			
Plug-in Software	4 nos.	D			
Audio Monitor Speaker	8 nos.	D			Audio Editing System will be improved by IGNOU.
Digital Audio Mixer	4 nos.	D			
2ch Analog Mic./Line Input Unit	4 nos.	D			
Interface Unit	4 nos.	D			
Digital Audio Distribution Board	4 nos.	D			
D/A Converter	8 nos.	D			
DVD Recorder	8 nos.	D			
MD Disc Recorder	4 nos.	D			
Multi-Track Recorder	4 nos.	D			
UPS	4 nos.	D			

A comparison chart of initially requested equipment and finally requested equipment by the India side is shown in Table 2-3

Table 2-3   Comparison List of Initial and Final Equipment Requested

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
1	Video Program Production Studio-1 (Virtual Video System)		Video Program Production Studio-1 (Virtual Video System)		
1.1	Digital Color Camera		Digital Color Camera		
(1)	3-chip CCD SD Camera	4 Nos.	3-chip CCD SD/HD Color Camera	**3** Nos.	HD/SD type. Adequate quantity in consideration of program production method.
(2)	Tripod Attachment with Fluid head for Virtual Application	4 Nos.	Tripod Attachment with Fluid head for Virtual Application	**1** No.	1 camera will be used as virtual purpose exclusively.
(3)	Camera Adaptor	4 Nos.	Camera Adaptor	**3** Nos.	Same quantity as 3-chip CCD SD/HD camera.
(4)			Multi-Purpose HD Remote Camera	**1** No.	1 of 4 cameras is change to HD multi-purpose type (Mounted at the upper part of Studio).
(5)			Camera Remote Control Unit	**1** No.	For Multi-purpose HD remote camera.
	5-inch B/W View Finder	2 Nos.		**0** No.	Delete.
(6)	7-inch Color View Finder	2 Nos.	6-inch Color View Finder	**3** Nos.	Adequate size for SD/HD type camera.
	Large Lens Adaptor	2 Nos.		**0** No.	Not required.
	View Finder Saddle	2 Nos.		**0** No.	Not required.
(7)	Zoom Lens		Zoom Lens		
(a)	Studio Zoom Lens	2 Nos.	Portable Zoom Lens(HD)	**2** Nos.	Adoption of adequate lens in consideration of operating area of camera in studio floor.
(b)	All Servo Zoom/Focus Demand	2 Nos.	Zoom/Focus Demand for Portable Zoom Lens	**2** Nos.	For portable zoom lens (HD).
(8)	Portable Zoom Lens for Virtual Application	4 Nos.	Portable Zoom Lens for Virtual Application (HD)	**1** No.	
(9)	Lens Remote Controller	4 Nos.	Lens Remote Controller	**1** No.	For portable zoom lens for virtual application (HD).
(10)	Camera Control Unit	4 Nos.	Camera Control Unit	**3** Nos.	Same quantity as the 3-chip CCD SD/HD camera.
(11)	Camera Remote Control Panel	4 Nos.	Camera Remote Control Panel	**3** Nos.	Same quantity as the 3-chip CCD SD/HD camera.
(12)	Pedestal	4 Nos.	Pedestal	**3** Nos.	Same quantity as the 3-chip CCD SD/HD camera.
(13)	Cam head (included in Pedestal)	4 Nos.	Cam head (included in Pedestal)	**3** Nos.	Same quantity as the 3-chip CCD SD/HD camera.
(14)	Script Holder	4 Nos.	Script Holder	**3** Nos.	Same quantity as 3-chip CCD SD/HD camera
(15)	Camera Cable		Camera Cable		
(a)	CCU to Camera CN Plate	4 Nos.	CCU to Camera CN Plate	**3** Nos.	Same quantity as the 3-chip CCD SD/HD camera.
(b)	Camera CN Plate to Camera	4 Nos.	Camera CN Plate to Camera	**3** Nos.	Same quantity as the 3-chip CCD SD/HD camera.
(16)	Camera CN Plate (for Studio)	2 Nos.	Camera CN Plate (for Studio)	**1** No.	Minimum quantity.
(17)	Test Chart		Test Chart		
(a)	Test Chart Set	2 Nos.	Test Chart Set	**2** Nos.	
(b)	Test Chart Stand	1 No.	Test Chart Stand	**1** No.	

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
(18)	Video Selector	2 Nos.	Video Selector	**2** Nos.	
(19)	Camera Command Network Unit		Camera Command Network Unit		
(a)	Master Setup Unit	2 Nos.	Master Setup Unit	**1** No.	Same quantity as the 3-chip CCD SD/HD camera.
(b)	Command Cable	20 Nos.	Command Cable	**1** Lot	Ethernet type cable.
(20)	Cyclorama for Virtual Set	1 No.	Cyclorama for Virtual Set	**1** No.	Essential for virtual studio system.
(21)	Virtual Processor with Software (1 Camera Virtual)	1 No.	Virtual Processor with Software (1 Camera Virtual)	**1** No.	
1.2	Digital VTR		Digital Disc Recorder		
	Digital SD VTR	6 Nos.		**0** No.	Use of existing digital SD-VTR.
(1)			Up-Converter for SD-VTR	**1** No.	Additional Interface to use of existing digital SD-VTR.
(2)			HD Digital Disc Recorder	**3** Nos.	Change from digital SD-VTR to HD digital disc recorder.
(3)	Rack Mount Kit	6 Nos.	Rack Mount Kit	**3** Nos.	Same quantity as the HD digital disc recorder
(4)	Video Monitor	6 Nos.	Video Monitor	**4** Nos.	3 for HD digital disc recorder, 1 for existing digital SD-VTR
(5)	Audio Monitor Speaker	3 Nos.	Audio Monitor Speaker	**1** Lot	Minimum quantity.
(6)	TBC Remote Control Unit		TBC Remote Control Unit		
(a)	TBC Remote	6 Nos.	TBC Remote	**3** Nos.	Same quantity as the HD digital disc recorder
(b)	Remote Control Panel	6 Nos.	Remote Control Panel	**3** Nos.	Same quantity as the HD digital disc recorder
(c)	Remote Control Unit	6 Nos.	Remote Control Unit	**3** Nos.	Same quantity as the HD digital disc recorder
	Control Panel Extension Kit	6 Nos.		**0** No.	Not required.
(7)	Rack Mount Kit	6 Nos.	Rack Mount Kit	**2** Nos.	For SD-VTR
1.3	Digital Video System		Digital Video System		
(1)	SD Digital Production Switcher & Effecter (2D, 3D)		HD Digital Production Switcher & Effecter (2D, 3D)		
(a)	SD Digital Video Switcher	1 No.	HD Digital Video Switcher	**1** No.	16-input.
(b)	Input/Output Connector Board	1 No.	Input/Output Connector Board	**1** Lot	
(c)	Control Panel	1 No.	Control Panel	**1** Lot	
(d)	Device Control Unit	1 No.	Device Control Unit	**1** Lot	
(e)	Frame Memory Board	1 No.	Frame Memory Board	**1** Lot	
(f)	DME Board	1 No.	DME Board	**1** Lot	
	A/D Converter	4 Nos.		**0** No.	Not required.
	D/A Converter	4 Nos.		**0** No.	Not required.
(2)	VDA, DDA, VJ, Patch Cable		VDA, DDA, VJ, Patch Cable		
(a)	Interface Unit	6 Nos.	VDA, DDA, VJ, Patch Cable	**1** Lot	
(b)	Analog Video Distribution Board	4 Nos.	Interface Unit	**1** Lot	
(c)	SDI Distribution Board	4 Nos.	A/V Interface Board with A/V MPX Board	**1** Lot	Interface to multiplex audio signals and video signals.
	2CH SDI Distribution Board	4 Nos.		**0** Lot	Not required due to HD type.
	SDI Distribution Board for Monitoring	4 Nos.		**0** Lot	Not required due to HD type.
	D/A Board for Monitoring	4 Nos.		**0** Lot	Not required due to HD type.
(d)	Patch Panel	10 Nos.	Patch Panel	**1** Lot	
(e)	Patch Cable 30cm	10 Nos.	Patch Cable 30cm	**1** Lot	
(f)	Patch Cable 50cm	30 Nos.	Patch Cable 50cm	**1** Lot	

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
(g)	Patch Cable 100cm	20 Nos.	Patch Cable 100cm	**1** Lot	
(3)	Rack		Rack		
(a)	System Rack with Channel Base	3 Nos.	System Rack with Channel Base	**1** Lot	
(b)	I/O Connection Plate	9 Nos.	I/O Connection Plate	**1** Lot	
(c)	Mini Rack for LD, VE Panel	2 Nos.	Mini Rack for LD, VE Panel	**2** Nos.	Essential for confirmation of lighting status in consideration of present operation system.
(4)	Console	10 Nos.	Console	**1** Lot	
	Chair	10 Nos.		**0** No.	Delete.
(5)	Video Monitor Switcher		Video Monitor Switcher		
(a)	Video Monitor Switcher Shelf	1 No.	Video Monitor Switcher Shelf	**1** No.	
(b)	Select Panel for VE	1 No.	Select Panel for VE	**1** No.	
(c)	Select Panel for LD	1 No.	Select Panel for LD	**1** No.	
(6)	Up/Down Converter		Up/Down Converter		
(a)	Mounting Frame for Video Interface Unit	1 No.	Mounting Frame for Video Interface Unit	**1** No.	
(b)	625→HD Up-Converter	2 Nos.	625→HD Up-Converter	**1** Lot	
(c)	HD→625 Down Converter	2 Nos.	HD→625 Down Converter	**1** Lot	
(d)			DVD Recorder	**2** Nos.	Distribution of DVD to performers in order to confirm the contents and quality of programs promptly after recording.
1.4	Character Generator		HD Character Generator		
(1)	Character Generator	1 No.	HD Character Generator	**1** No.	HD type.
(2)	14-inch Video Monitor	1 No.	14-inch HD Video Monitor	**1** No.	HD type.
(3)	17-inch Display	1 No.	17-inch Multi-scan Display	**1** No.	
(4)	Table & Chair	1 No.	Table	**1** No.	"Chair" will be deleted.
(5)	Take Switch Panel	1 No.	Take Switch Panel	**1** No.	
(6)	Digital Scan Converter with Genlock	4 Nos.	Digital Scan Converter with Genlock	**3** Nos.	Essential quantity for system configuration.
(7)			UPS	**1** No.	Protection of data at the time of power failure.
1.5	Digital Audio System		Digital Audio System		
(1)	Digital Audio Mixer	1 No.	Digital Audio Mixer		
	Digital Audio Mixer	1 No.	Digital Audio Mixer (20inputs)	**1** No.	Essential input channel in consideration of present operation system (20 input).
	Impedance Transformer	1 No.		**0** No.	Not required.
(2)	A/D Converter	5 Nos.	A/D Converter	**1** Lot	
(3)	D/A Converter	5 Nos.	D/A Converter	**1** Lot	
(4)	DVD Recorder	5 Nos.	Memory Recorder	**3** Nos.	Consideration of present diffusion status.
(5)	CD Player (CD-RW)	2 Nos.	CD Player	**2** Nos.	Not required of writing function.
(6)	Audio Monitor Speaker	2 Nos.	Audio Monitor Speaker	**1** Lot	
(7)	Audio Effecter	5 Nos.	Audio Effecter	**2** Nos.	Essential quantity in consideration of recording procedures.
(8)	Digital Telephone Hybrid	2 Nos.	Digital Telephone Hybrid	**1** No.	
(9)	Rack	1 No.	Rack	**1** Lot	
	Chair	1 No.		**0** No.	Delete
(10)	Audio Sync. Generator (Word Sync)	1 No.	Audio Sync. Generator (Word Sync)	**1** No.	
(11)	Microphone		Microphone		

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
(a)	Lavaliere Microphone	8 Nos.	Lavaliere Microphone	**8** Nos.	Essential quantity in consideration of program production methods.
(b)	Dynamic Microphone	8 Nos.	Dynamic Microphone	**4** Nos.	Essential quantity in consideration of program production methods.
(c)	Condenser Microphone	8 Nos.	Condenser Microphone (for Music, Vocal)	**6** Nos.	Essential quantity in consideration of program production methods.
(d)	Gun Microphone	2 Nos.	Gun Microphone	**1** No.	Essential quantity in consideration of program production methods.
(12)	Wireless Microphone System		Wireless Microphone System		
(a)	Wireless Microphone Transmitter		Wireless Microphone Transmitter		
a)	Handy Transmitter	4 Nos.	Handy Transmitter	**3** Nos.	Use for recording at IGNOU campus. Compliant to radio law in India.
b)	Lavaliere Type Microphone Transmitter	2 Nos.	Lavaliere Type Microphone Transmitter	**1** No.	Use for recording at IGNOU campus. Compliant to radio law in India.
	Handy Transmitter	2 Nos.		**0** No.	Delete (dittography).
(b)	UHF Synthesizer Tuner	4 Nos.	UHF Synthesizer Tuner		
a)	Synthesizer Tuner Base Unit	1 No.	Synthesizer Tuner Base Unit	**1** No.	Same quantity as the wireless transmitter.
b)	Synthesizer Tuner Unit	4 Nos.	Synthesizer Tuner Unit	**4** Nos.	Same quantity as the wireless transmitter.
c)	Antenna Divider	1 No.	Antenna Divider	**1** No.	Same quantity as wireless transmitter.
d)	Antenna	4 Nos.	Antenna	**1** No.	Same quantity as wireless transmitter.
(13)	Microphone Stand		Microphone Stand		
(a)	Boom Stand	1 No.	Large size Boom Stand for Gun Microphone	**1** No.	
(b)	Floor Stand	6 Nos.	Floor Stand	**3** Nos.	Use of 3sets of existing boom stand. Procure for deficiency quantity.
(c)	Table Stand	6 Nos.	Table Stand	**6** Nos.	Essential quantity in consideration of program production procedures.
(14)	Microphone Cable		Microphone Cable		
(a)	20m	10 Nos.	20m	**10** Nos.	Essential quantity in consideration of program production procedures.
(b)	10m	10 Nos.	10m	**10** Nos.	Essential quantity in consideration of program production procedures.
(c)	5m	10 Nos.	5m	**10** Nos.	Essential quantity in consideration of program production procedures.
(d)	8-pair Multi Cable (30m) with CN Box & Reel	1 No.	8-pair Multi Cable (30m) with CN Box & Reel	**1** No.	Essential quantity in consideration of program production procedures.
(15)	Microphone CN Plate	1 No.	Microphone CN Plate	**1** No.	
1.6	Video Sync. System		Video Sync. System		
(1)	Digital Sync. Signal Generator	1 No.	Digital Sync. Signal Generator	**2** Nos.	
(2)	Auto Changeover Unit	1 No.	Auto Changeover Unit	**1** No.	
(3)	Digital Video Distribution Amplifier	2 Nos.	Sync. Distribution Amplifier (HD)	**1** Lot	HD type.

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
1.7	Monitoring System		Monitoring System		
(1)	14-inch Video Monitor	18 Nos.	14-inch HD Video Monitor	1 Lot	Quantity will be fixed depend on system configuration. (HD type).
(2)	20-inch Video Monitor with SDI Input	4 Nos.	20-inch HD Video Monitor with HD- SDI Input	4 Nos.	
(3)	60-inch Plasma Screen	3 Nos.	50-inch Studio Monitor with Accessories (Wall mounting & Stand)	2 Nos.	1: studio floor, 1: sub-control room
(4)	Digital Waveform & Vector scope	4 Nos.	Digital Waveform & Vector scope		
(a)			Digital Multi-Format Waveform Monitor	5 Nos.	Essential quantity. Adoption of multi-format type monitor.
	Analog	4 Nos.		0 No.	Delete.
	Analog Waveform Monitor	4 Nos.		0 No.	Delete.
(b)	Rack Mount Kit	4 Nos.	Rack Mount Kit	1 Lot	
	Digital	4 Nos.		0 No.	Delete.
	Digital Waveform Monitor	4 Nos.		0 No.	Delete.
	Rack Mount Kit	4 Nos.		0 No.	Delete.
(c)	1/2 Blank Panel	4 Nos.	1/2 Blank Panel	1 Lot	
	Vector Scope	1 No.		0 No.	Delete.
(5)	Audio Monitor Speaker with Amplifier (Stereo)	1 No.	Audio Monitor Speaker with Amplifier (Stereo)	1 Lot	
(6)	Audio Monitor Speaker for LD & VE	2 Nos.	Audio Monitor Speaker for LD & VE	1 Lot	
(7)	Audition Monitor Speaker (Stereo)	1 No.	Audition Monitor Speaker (Stereo)	1 Lot	
(8)	Studio Audio Monitor Speaker with Amplifier	2 Nos.	Studio Audio Monitor Speaker with Amplifier and Stand (Stereo)	1 Lot	
(9)	Talkback/Foldback Speaker	1 No.	Talkback/Foldback Speaker	1 Lot	
(10)	14-inch Master Video Monitor		14-inch Multi-Format Master Video Monitor		
	14-inch Master Video Monitor	1 No.	14-inch Multi-Format Master Video Monitor	1 Lot	
	NTSC/PAL Input Adaptor	1 No.	NTSC/PAL Input Adaptor	1 Lot	
(11)	Air Monitor	1 No.	Air Monitor	1 No.	
(12)	Monitor Shelf	1 No.	Monitor Shelf	1 Lot	
(13)	A/V Monitor CN Panel	2 Nos.	A/V Monitor CN Panel	1 Lot	
(14)	Stereo Headphone	2 Nos.	Stereo Headphone	1 Lot	
1.8	Intercom System		Intercom System		
(1)	Studio Intercommunication System	1 No.	Studio Intercommunication System	1 No.	
(2)	Headset, Microphone	12 Nos.	Headset, Microphone (Wired and Wireless)	12 Nos.	
1.9	On-Air Light and Tally System		On-Air Light and Tally System		
(1)	On-air Tally Logic	1 No.	On-air Tally Logic	1 No.	
(2)	On-air Tally Light for PM	25 Nos.	On-air Tally Light for PM	1 Lot	
(3)	On-air Tally Light for Floor, Entrance	4 Nos.	On-air Tally Light for Floor, Entrance	1 Lot	

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
1.10	Virtual Set and Accessories	1 Lot	Virtual Set and Accessories	1 Lot	
1.11	Lighting Equipment		Lighting Equipment		
(1)	Fluorescent Light (110W), 2 Tube with Barn Doors	30 Nos.	Fluorescent Light with Barn Doors (2 Tube, more than 80W)	30 Nos.	Accommodate to virtual studio system.
(2)	Fluorescent Light (220W), 4 Tube with Barn Doors	40 Nos.	Fluorescent Light with Barn Doors (4 Tube, more than 160W)	40 Nos.	Accommodate to virtual studio system.
(3)	Fluorescent Light (330W), 6 Tube with Barn Doors	20 Nos.	Fluorescent Light with Barn Doors (6 Tube, more than 240W)	20 Nos.	Accommodate to virtual studio system.
(4)	Dimmer Controller	1 Set	Dimmer Control Unit (90 Lights Control)	1 Set	Accommodate to virtual studio system.
(5)	Spare Lump	200 Nos.	Spare Lump	1 Lot	Accommodate to virtual studio system.
(6)	Lighting Grid and Accessories	1 Lot	Accessories	1 Lot	Use of existing lighting grid.
2	Field Recording (ENG) System		Field Recording (ENG) System		Same quantity as No. of ENG crew.
2.1	Digital Camera System		Digital Camera System		
(1)	Portable Digital Camcorder		Digital Portable Camcorder		
(a)	SD Portable Digital Camcorder	4 Nos.	HD Digital Portable Camcorder	3 Nos.	SD/HD type with 3.5-inch (16:9 aspects) view finder.
(b)	Ethernet Adaptor	4 Nos.	Ethernet Adaptor	3 Nos.	Same quantity as the HD digital portable camcorder.
(c)	SDI Output Function	4 Nos.	SDI Output Function	3 Nos.	Same quantity as the HD digital portable camcorder.
(d)	Pull-down (24P shooting) Function	4 Nos.	Pull-down (24P shooting) Function Analog Composite Input Board	3 Nos.	Same quantity as the HD digital portable camcorder.
	2-inch View Finder	4 Nos.	3.5-inch Color View Finder	3 Nos.	Same quantity as the HD digital portable camcorder.
(e)	Tripod Attachment	4 Nos.	Tripod Attachment	3 Nos.	Same quantity as the HD digital portable camcorder.
(f)	Tripod Adaptor	4 Nos.	Tripod Adaptor	3 Nos.	Same quantity as the HD digital portable camcorder.
(g)	Condenser Microphone	4 Nos.	Condenser Microphone	3 Nos.	Same quantity as the HD digital portable camcorder.
(h)	Microphone Cable	4 Nos.	Microphone Cable	3 Nos.	Same quantity as the HD digital portable camcorder.
(2)	27×Zoom Lens with 2 extender	4 Nos.	27×Zoom Lens with 2 extender	3 Nos.	Same magnifying power as existing lens.
(3)	UV Filter	4 Nos.	UV Filter	3 Nos.	Same quantity as the HD digital portable camcorder.
(4)	Rechargeable Battery Pack	24 Nos.	Rechargeable Battery Pack	18 Nos.	Same quantity as the HD digital portable camcorder.
(5)	Battery Charger	8 Nos.	Battery Charger	6 Nos.	Same quantity as the HD digital portable camcorder.
(6)	AC Power Adaptor		AC Power Adaptor		
(a)	AC Power Adaptor	4 Nos.	AC Power Adaptor	3 Nos.	Same quantity as the HD digital portable camcorder.
(b)	DC Power Cable	4 Nos.	DC Power Cable	3 Nos.	Same quantity as the HD digital portable camcorder.

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
(7)	Carrying Case	4 Nos.	Carrying Case	3 Nos.	Same quantity as the HD digital portable camcorder.
(8)	Tripod, Head, Dolly, Portable Case	4 Nos.	Tripod, Head, Dolly, Portable Case	3 Nos.	Same quantity as the HD digital portable camcorder.
(9)	Field Cover/Rain Jacket		Field Cover/Rain Jacket		
(a)	Field Cover	4 Nos.	Field Cover	3 Nos.	Same quantity as the HD digital portable camcorder.
(b)	Rain Jacket	4 Nos.	Rain Jacket	3 Nos.	Same quantity as the HD digital portable camcorder.
2.2	9-inch Color Monitor		9-inch Video Monitor		
(1)	9-inch Color Monitor	4 Nos.	9-inch Video Monitor	3 Nos.	Same quantity as the HD digital portable camcorder.
(2)	ENG Kit	4 Nos.	ENG Kit	3 Nos.	Same quantity as the HD digital portable camcorder.
(3)	Rechargeable Battery Pack	8 Nos.	Rechargeable Battery Pack	6 Nos.	Same quantity as the HD digital portable camcorder.
(4)	Battery Adaptor	2 Nos.	Battery Adaptor	2 Nos.	Same quantity as the HD digital portable camcorder.
2.3	UHF Synthesizer Transmitter	4 Nos.	UHF Synthesizer Transmitter	3 Nos.	Same quantity as the HD digital portable camcorder. Compliant to radio law in India.
2.4	UHF Synthesizer Tuner	4 Nos.	UHF Synthesizer Tuner	3 Nos.	Same quantity as the HD digital portable camcorder. Compliant to radio law in India.
2.5	Microphone		Microphone		
(1)	Dynamic Microphone	4 Nos.	Dynamic Microphone	3 Nos.	Same quantity as the HD digital portable camcorder.
(2)	Gun Microphone		Gun Microphone		
(a)	Gun Microphone	4 Nos.	Gun Microphone	3 Nos.	Same quantity as the HD digital portable camcorder.
(b)	Carrying Case	4 Nos.	Carrying Case	3 Nos.	Same quantity as the HD digital portable camcorder.
(3)	Hand Grip	4 Nos.	Hand Grip	3 Nos.	Same quantity as the HD digital portable camcorder.
(4)	Wind-shield for Gum Microphone	4 Nos.	Wind-shield for Gum Microphone	3 Nos.	Same quantity as the HD digital portable camcorder.
(5)	Fishpole		Fishpole		
(a)	Fishpole	4 Nos.	Fishpole	3 Nos.	Same quantity as the HD digital portable camcorder.
(b)	Fishpole Adaptor	4 Nos.	Fishpole Adaptor	3 Nos.	Same quantity as the HD digital portable camcorder.
(6)	Wireless Microphone		Wireless Microphone		
(a)	Wireless Transmitter	4 Nos.	Wireless Transmitter	3 Nos.	Same quantity as the HD digital portable camcorder.
(b)	Lavaliere Microphone	4 Nos.	Lavaliere Microphone	3 Nos.	Same quantity as the HD digital portable camcorder.
2.6	Microphone Cable		Microphone Cable		
(1)	10m	4 Nos.	10m	3 Nos.	Same quantity as the HD digital portable camcorder.

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
(2)	5m	4 Nos.	5m	**3** Nos.	Same quantity as the HD digital portable camcorder.
(3)	3m	4 Nos.	3m	**3** Nos.	Same quantity as the HD digital portable camcorder.
(4)	1.5m	4 Nos.	1.5m	**3** Nos.	Same quantity as the HD digital portable camcorder.
2.7	Stereo Headphone	4 Nos.	Stereo Headphone	**3** Nos.	Same quantity as the HD digital portable camcorder.
2.8	Lighting Equipment		Lighting Equipment		
(1)	Battery Operate Cool Light	4 Nos.	AC Operate Cool Light	**3** Nos.	Same quantity as the HD digital portable camcorder.
(2)	Spare Lamp	100 Nos.	Spare Lamp	**18** Nos.	Same quantity as the HD digital portable camcorder.
(3)	Accessories	4 Nos.	Accessories	**3** Nos.	Same quantity as the HD digital portable camcorder.
	Spare Lamp	100 Nos.		**0** No.	Delete (dittography).
2.9	Portable Audio Mixer		Portable Audio Mixer		
(1)	Portable Compact Mixer	1 No.	Portable Audio Mixer	**1** No.	
(2)	AC Power Adaptor	1 No.	AC Power Adaptor	**1** No.	
(3)	Battery Case	1 No.	Battery Case	**1** No.	
(4)	Rechargeable Battery	4 Nos.	Rechargeable Battery	**3** Nos.	
(5)	Battery Charger	1 No.	Battery Charger	**1** No.	
2.10	Mini DV Camcorder		MiniDV/HDV Camcorder		
(1)	Mini DV Camcorder with Accessories	6 Nos.	MiniDV/HDV Camcorder with Accessories	**3** Nos.	SD/HD type. Same quantity as the no. of ENG crew.
(2)	MiniDV Cassette	200 Nos.	MiniDV Cassette	**0** No.	Including in spare parts.
2.11	Digital Still Camera with Zoom Lens	6 Nos.	Digital Still Camera with Zoom Lens	**3** Nos.	Same quantity as No. of ENG crew
3	Routing Switcher System		Routing Switcher System		
3.1	Routing Equipment		Routing Equipment		
(1)	Digital Routing Switcher (128×128)	1 No.	Digital Routing Switcher (64×64)	**1** No.	Necessary no. of input/output lines
(2)	Digital Video Monitor	3 Nos.	20-inch Digital Video Monitor	**2** Nos.	Input monitor: 1, output monitor (HD type).
(3)	Digital Waveform/Vector Scope Monitor (Comb. Unit)	1 No.	Digital Multi-Format Waveform Monitor	**1** No.	HD type.
(4)	Rack	1 No.	Rack	**1** No.	
	Table, Chair	1 Lot		**0** Lot	Delete.
3.2			Video Sync System (for CAR, CG 2, Server, A/D)		
(1)			Digital Sync. Signal Generator (HD)	**5** Nos.	Server Room, Computer Graphics Room×2, CAR, A/D Format Conversion Room: Total 5 systems
(2)			Sync. Signal Distribution Amplifier (HD)	**1** Lot	

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
3.3			Patch Panel, A/D Converter, D/A Converter		
(1)			Patch Panel	**7** Nos.	For digital routing switcher (64×64).
(2)			Patch Cable	**1** Lot	For digital routing switcher (64×64).
(3)			Interface Unit	**1** No.	For digital routing switcher (64×64).
(4)			A/D Converter + HD-SDI Up-Converter	**2** Nos.	For connection of existing analog line (2 up steam lines).
(5)			HD-SDI Down Converter + D/A Converter	**2** Nos.	For connection of existing analog line (2 down steam lines).
(6)			HD-SDI →Analog (PAL) Converter	**2** Nos.	For existing Satellite Earth Station.
4	Video Server System (Archive)		Video Server System (Archive)		
	5 node Archive System for 10,000 hours of Strage@25Mbps	1 No.	Existing Archive (Library) System Existing cabinets shall be used.	**0** No.	Use of existing tape cabinets and data management system.
	Digital VTR	6 Nos.		**0** No.	
	System Components, Cable, Connector	1 Lot		**0** Lot	
	System Software	1 Lot		**0** Lot	
	Automatic Transmission and Play-out Server	1 Set		**0** Set	
	Application Server	1 Set		**0** Set	
	3 node Clusters with 100 hours@25Mbps with Automation	1 Set		**0** Set	
	Computer for On-line Network Distribution	50 Nos.		**0** No.	
	Digital Monitor	10 Nos.		**0** No.	
	Routers and Miscellaneous Equipment	1 Lot		**0** Lot	
(1)			Ingest Terminal for SD Format with 17-inch Monitor	**2** Nos.	Use of existing SD digital VTR.
(2)			Ingest Terminal for HD Format with 17-inch Monitor and HD Digital Disc Recorder	**2** Nos.	Upload of HD format video programs.
(3)			Ingest Terminal for HDV Format with 17-inch Monitor and HDV-VTR	**2** Nos.	Upload of HDV format video programs.
(4)			Browsing Terminal	**4** Nos.	Viewing of video programs stored in the video server.
(5)			Administration Terminal	**1** No.	Management of server system.
(6)			Non-Linear Editing System with 17-inch Monitor and HD Digital Disc Recorder	**4** Lot	Network editor.
(7)			Multi-Format Video Server (150-hours@50Mbps)	**1** No.	Storage of video programs (150-hour@50Mbps).
(8)			HD-SDI Input Board	**2** Nos.	For direct recording of programs from studio-1 & -2.
(9)			Network Management Application Software	**1** Lot	For operation of network system.

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
5	DVD Duplication System		DVD Duplication System		
(1)	DVD Master Duplication System	1 Lot	Master DVD Production System	2 Lot	Production of master DVD for duplication purpose.
(2)	DVD Recorder	4 Nos.	DVD Recorder	2 Nos.	Driver for master DVD production system.
(3)	Digital Video Monitor	6 Nos.	Digital Video Monitor	2 Nos.	PAL type monitor to monitor DVD playback programs.
(4)	DVD Media	10,000 Nos.	DVD Media	0 No.	Including in spare parts.
	Application Software for DVD Duplication System	1 Set		0 Set	Delete.
(5)	DVD High Speed Duplication System (100DVD at once)	1 Set	DVD Duplication System (8 DVD at once)	1 Set	
6	Computer Graphics System		Computer Graphics System		
	Computer Workstation	4 Nos.		0 No.	
(1)	Graphic Workstation	4 Nos.	Graphic Workstation	2 Nos.	Same quantity as the existing.
(2)	19-inch LCD Monitor	4 Nos.	19-inch LCD Monitor	4 Nos.	Operator: 1, display of graphics: 1.
(3)	Application Software for Graphic System	1 Set	Application Software for Graphic System	2 Sets	
(4)			Flat Bed Scanner	2 Nos.	Read into paper media.
(5)			UPS	2 Nos.	For protect the data at the time of power failure.
7			Measuring Equipment (Proposed by Japanese Side)		For the maintenance of digital equipment and signals.
(1)			Digital Video Analyzer	1 No.	Measuring of digital signal and characteristics of the digital equipment.
(2)			Digital Multi-Format Waveform Monitor	1 No.	Measuring of input/output signals of HD digital disc recorder.
(3)			Oscilloscope	1 No.	Monitoring of signal waveform.
(4)			8ch Audio Analyzer	1 No.	Measuring of audio signal characteristics.
(5)			Reference Audio Monitor with HD-SDI Option	1 No.	Monitoring of audio signals including HD signals.
(6)			Clump Meter	1 No.	Maintenance of power supply.
(7)			Digital Multi Meter	1 No.	
(8)			Video Signal Generator	1 No.	Generation of standard video signal.
(9)			Tool set (including Coaxial Connector Clump Tool)	1 Set	
			Alignment Disc		For adjustment of HD digital disc recorder.
			Alignment Tape		As for adjustment of HDV recorder.
8			Analog/Digital Format Conversion System (Proposed by Japanese Side)		Digital conversion of existing analog tapes.
			SD-VTR	0 No.	Use of existing SD digital VTR.
(1)			Up-Converter for SD-VTR	3 Nos.	Added Interface to use of existing SD digital VTR.
(2)			HD Digital Disc Recorder	3 Nos.	Recording/playback of converted digital/analog signals.

Item No	Initial Request	Q'ty	Final Request	Q'ty	Reasons for change
(3)			HD Routing Switcher	**1** No.	Interact switching of playback side and recording side.
(4)			Monitor Switcher	**1** No.	Switching of Waveform signals.
(5)			Monitor Speaker	**1** No.	Confirmation of Audio.
(6)			HD Digital Multi-Format Monitor	**1** No.	Monitoring of quality of HD digital video signal.
(7)			Digital Multi-Format Waveform Monitor	**1** No.	Monitoring of waveform signal of HD digital video signal.
9			SD/HD Preview System (Proposed by Japanese Side)		Confirmation and evaluation SD/HD video programs.
(1)			HD Video Projector with 150-inch Screen	**1** Set	Projection of HD/SD format video programs.
(2)			HD Digital Disc Recorder	**1** No.	Playback of HD format Video Programs.
			SD- VTR	**0** No.	Use of existing SD digital VTR.
(3)			HDV-VTR	**1** No.	Playback of HDV format video programs.
(4)			DVD Player	**1** No.	Playback of DVD.
(5)			9-inch Multi-Format Monitor	**1** No.	Monitoring of playback signals to projector.
(6)			A/V Switcher/Mixer (HD)	**1** No.	Adjust of audio signals and video signals of HD format concurrently.
(7)			Graphic Equalizer	**2** Nos.	Adjustment of audio characteristics.
(8)			Condenser Microphone	**2** Nos.	Use of announcer at preview room.
(9)			Microphone Stand	**2** Nos.	For condenser microphone.
(10)			Power Amplifier	**2** Nos.	
(11)			Audio Speaker	**4** Nos.	
(12)			Rack	**1** No.	
10	Spare Parts		Spare Parts		
(1)	Spare Parts	1 Lot	Spare Parts	**1** Lot	Essential spare parts such as moving parts, consumable parts for 1 year operation
(2)			Media		
			Disc	**1** Lot	
			Memory Card (4GB)	**1** Lot	
			Mini DV Cassette	**1** Lot	
			DVD	**1** Lot	

2-2-2-2 Overall Plan

(1) Current Status of the Project Site

    1) Location: Maidan Garhi, New Delhi, India

        26º29'42"N, 77º12'10"E, 254m above sea-level
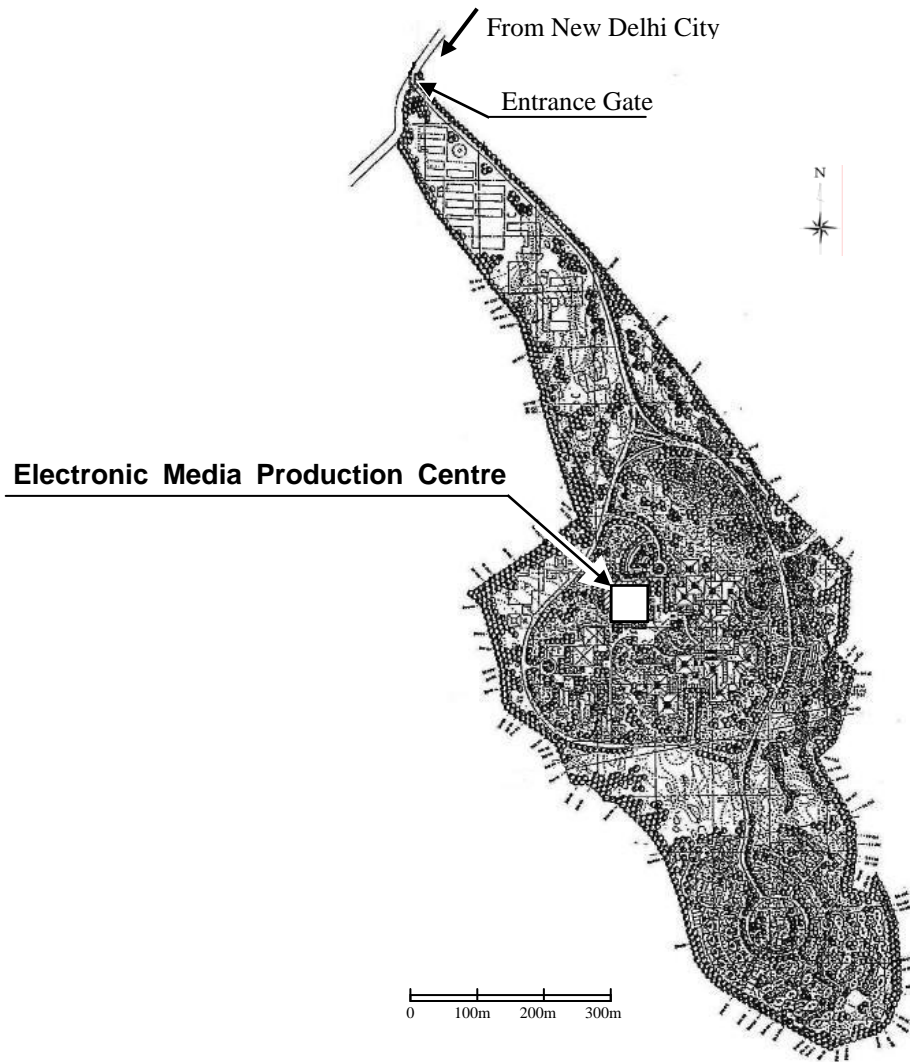
The Project Site (IGNOU Campus)

    2) Situation at Site

The project site is within the IGNOU campus, located in the southern suburbs of New Delhi. (During peak traffic times in the morning and evening, it may take more than one hour to reach from the city centre of New Delhi by car.) The IGNOU campus is situated on a large area of land measuring 150 acres (607,100 m^2). The existing EMPC building that is the target location for the Project is located in the central area of the land and is slightly elevated. Located nearby is the administration building, convention center, guest houses, academic buildings and an area for residents. These areas are arranged in an organized

layout, as if to form a town, in which an infrastructure including roads, commercial electrical power, telephone facility, water supply and drainage is already improved. Additionally, there is no problem with supplying power during outages since the emergency standby generators are available. The entire area of land is surrounded by a sturdy fence with guards posted at the gates, making security problems nonexistent.

The climate in New Delhi, where the project site is located, is semi-arid and consists of rainy and dry seasons. There is a large gap between hot and cold temperatures, with May and June having extremely hot weather with an average temperature of approximately 30°C. As air conditioning and ventilation facility is equipped in the existing building, therefore, weather conditions such as temperature, humidity and precipitation will have no particular impact on the equipment to be procured under the Project.

(2) Summary of the system/equipment comprising the Project

The relationship between requested system/equipment and IGNOU functions involving the production of audio/video programs is as follows:

Function	Equipment/System	Initial Request	Final Request	Status
Program Recording	216m² Video Program Production Studio-1			Renewal by the Project
	180 m² Video Program Production Studio-2	×	×	Use of Existing System
	40 m² Audio Program Production Studio-1	×	×	Use of Existing System
	30 m² Audio Program Production Studio-2	×	×	Use of Existing System
	Field Recording (ENG) System			Renewal by the Project
Program Editing	AB Roll Editing	×	×	Disposition
	Single Step Editing	×	×	Disposition
	Non-Linear Editing (Server System)	×		Renewal by the Project
	Audio Editing		×	Renewal by IGNOU
Program Duplication	Video Program Duplication			Renewal by the Project
	Audio Program Duplication	×	×	Use of Existing System
Program Transmission	Transmission Control		×	Use of Existing System
Program Broadcasting	Satellite Broadcasting	×	×	Use of Existing System
Program Storage	Library		×	Use of Existing System
Maintenance	Measuring Equipment	×		Procured by the Project
	Spare Parts			Procured by the Project

When the global shift to digitalization began in the early 1990s, video tape had already built up a steadfast position as the main media for video recording. However, showing a transition from analog recording to digital recording, tape has been gradually replaced by discs and semiconductor memories as entered the 2000s. Presently, except for the equipment used for filming movies in high definition, video recorders using tape as media are no longer being developed. As the move to tapelessness is spurred on, it is predicted that in several years, obtaining tape media will become difficult. The one-inch tape and U-matic tape that were popular in the 1980s have already disappeared from the market.

Under these conditions, it is easy to speculate that EMPC's video program production system dependent on tape media as shown below will become completely obsolete in the next few years. Thus, the target for the Project will place focus on sustaining audio/video program production capabilities, advancing studio operation efficiency by maximally utilizing digital functions, and upgrading to a video program production system that will not become obsolete in at least the next ten years. However, keeping in mind that it is currently a transitional period for digitalization, a system will be created emphasizing the interface between the existing analog equipment and the new digital system to be implemented.
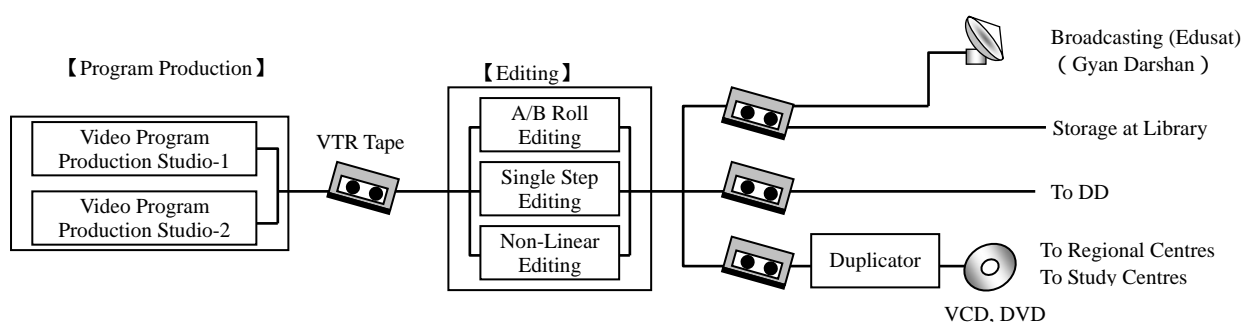
A summary of the video program production system improved under the Project is shown in Fig. 2-1.

Meanwhile, a plan is being formulated by GOI to expand Gyan Darshan educational broadcasting from the current four channels to five channels. The fifth channel will be added as a Science Education Channel that was proposed by GOI in response to fears of Indian citizens moving away from science. The programming for this channel is currently being formulated. It has been decided that the programs for this channel will be produced through a joint effort among IGNOU (central role), GOI, and the Department of Science and Technology in India. This channel will begin as soon as audio/video program production equipment is upgraded by the Project.

In addition, with the shift to video program production both for SD and HD format by the Project,

a satellite digital broadcasting system is planned for completion by the end of the 12th 5-year plan in 2016/17 to provide for simultaneous educational broadcasts in analog and digital. Since video programs are broadcast only via analog broadcasting to Regional Centres and Study Centres currently, the above improvement will be done to match the pace of digitalization at the India national broadcasting (DD) network with diffusion rate for TV receivers of digital broadcast. The currently used satellite is digital applicable type, so this implementation can be done by just digitalizing the satellite transmitting and receiving terminals.
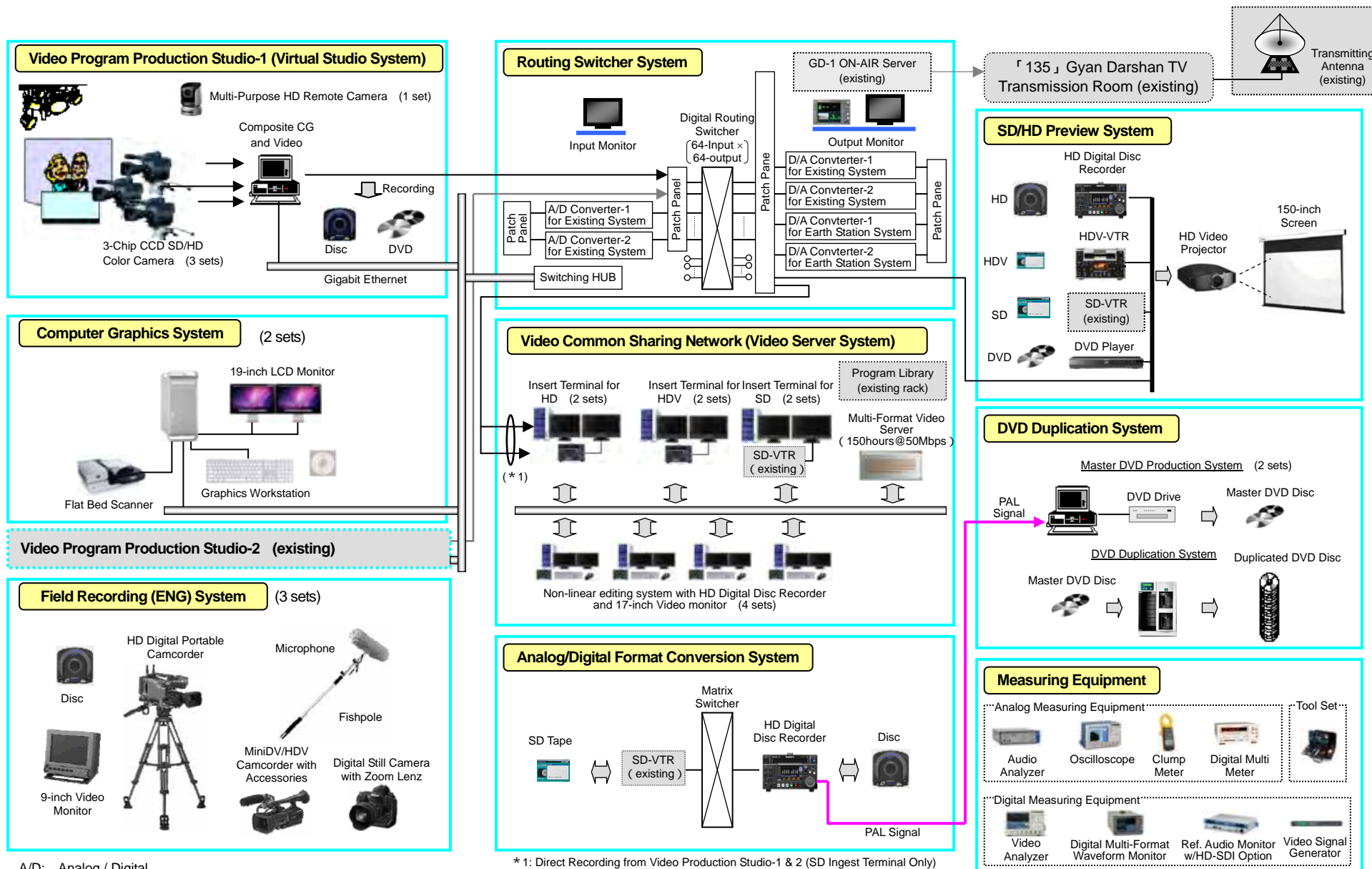
Fig. 2-1   Overall Outline of Video Program Production System

2-2-2-3   Equipment Plan

(1)   Design conditions and policies applicable to all equipment

Design conditions and basic policies for design of the equipment to be procured under the Project are as follows:

1)   Applicable Recommendations and Standards

The recommendations and regulations of the following organizations are widely used internationally as standards in the electrical and communications field and will be applicable for the Project.

International Telecommunication Union-Radio Communication Sector (ITU-R)

International Electrotechnical Commission (IEC)

Japan Industrial Standard (JIS)

Japan Electronics and Information Technology Industries Association (JEITA)

International Organization for Standardization (ISO)

Society of Motion Picture and Television Engineers (SMPTE)

Audio Engineering Society (AES)

Electronic Industries Alliance (EIA)

Indian Wireless Telegraphy Act

2)   Equipment Operating Environment Condition

Ambient Air Temperature :   0 to 40 ℃

Indoor Temperature   :   10 to 35 ℃

Relative Humidity   :   Up to 95

Elevation above Sea Level :   Up to 2500m

3)   Power Supply Condition

Power Supply Voltage and Frequency   :   230V (Single Phase), 50Hz

Voltage Fluctuation Tolerance   :   230V+10/-10

(2)   Policy on Procurement of Video Program Production Equipment

1)   Equipment grade

With advancements in digital technology, widely used professional grade equipment can be used to implement program production with nearly the same functions, performance and stability as expensive broadcast grade equipment. Based on this, procurement of the equipment will not be limited to broadcast grade, and professional grade equipment corresponding to usage purpose will also be considered.

2)   Equipment specifications

SD/HD applicable type digital equipment will mainly be adopted, but the existing equipment owned by EMPC will be applied as analog equipment such as SD-VTRs, etc. necessary for handling of SD format programs.

3)   Recording media

It is prospected that VTR will be end for production in the near future, so to keep in line with the accelerating shift to tapelessness, it is necessary to transfer video recording media to discs, semiconductor memory and other multimedia.   For the Project, discs will be adopted as video recording media based on the reasons mentioned below.

Table 2-4 is a comparison of the price, volume and weight of each recording medium with recording time set at approximately one hour.   The prices are examples of retail prices for recording media found in the domestic Indian market.

From Table 2-4, it can be seen that the purchase price of HD memory consisting of semiconductor flash memory is approximately 16 times more expensive than disc media. It also shows that the HD capable recording media closest in price to the SD format tape media that is currently used by EMPC is disc media.   Discs are small in volume and low in weight, and have an advantage over traditional tapes in that large improvements can be expected in terms of storage.   From operation and maintenance aspect after completion of the Project, this comparison shows that using disc media is the most appropriate with its superiority in terms of price, storage, etc.

Table 2-4   Comparison of Recording Media Prices

	Recoding Format	Recording Time	Volume (cm^3) / Weight (g)	Domestic Indian price [1]
HD Disc	XDCAM HD	65mins. [2] 43mins. [3]	152.09 / 88	2,600Rp.
HD Memory	P2 HD AVC-Intra50	64mins.	23.11 / 45	42,000Rp.
SD Tape	Betacam-SP	64mins.	920.75 / 700	1,200Rp.

1: Market price as of November 2009

2: Recording time in MPEG HD format

3: Recording time in MPEG HD 422 format

4)   Quantity of equipment

When the existing equipment of EMPC was improved in 1990s, the equipment quantity was decided based on provision for complete backup, considering the reliability of the equipment (malfunction frequency) at that time.   However, with the current advancement

of digitalization, the quality and stability of the equipment has increased greatly, with the frequency of malfunctions dropping sharply.　Therefore, the quantity of the equipment to be procured will be the minimum amount necessary for EMPC to produce 200 video programs per year, based on EMPC's audio/video program production system (production methods, number of production personnel, production budget) and EMPC's operation and maintenance management system (technical level of operation and maintenance).

(3)　Equipment installation layout

The layout for the equipment to be procured under the Project is shown in Fig. 2-2.
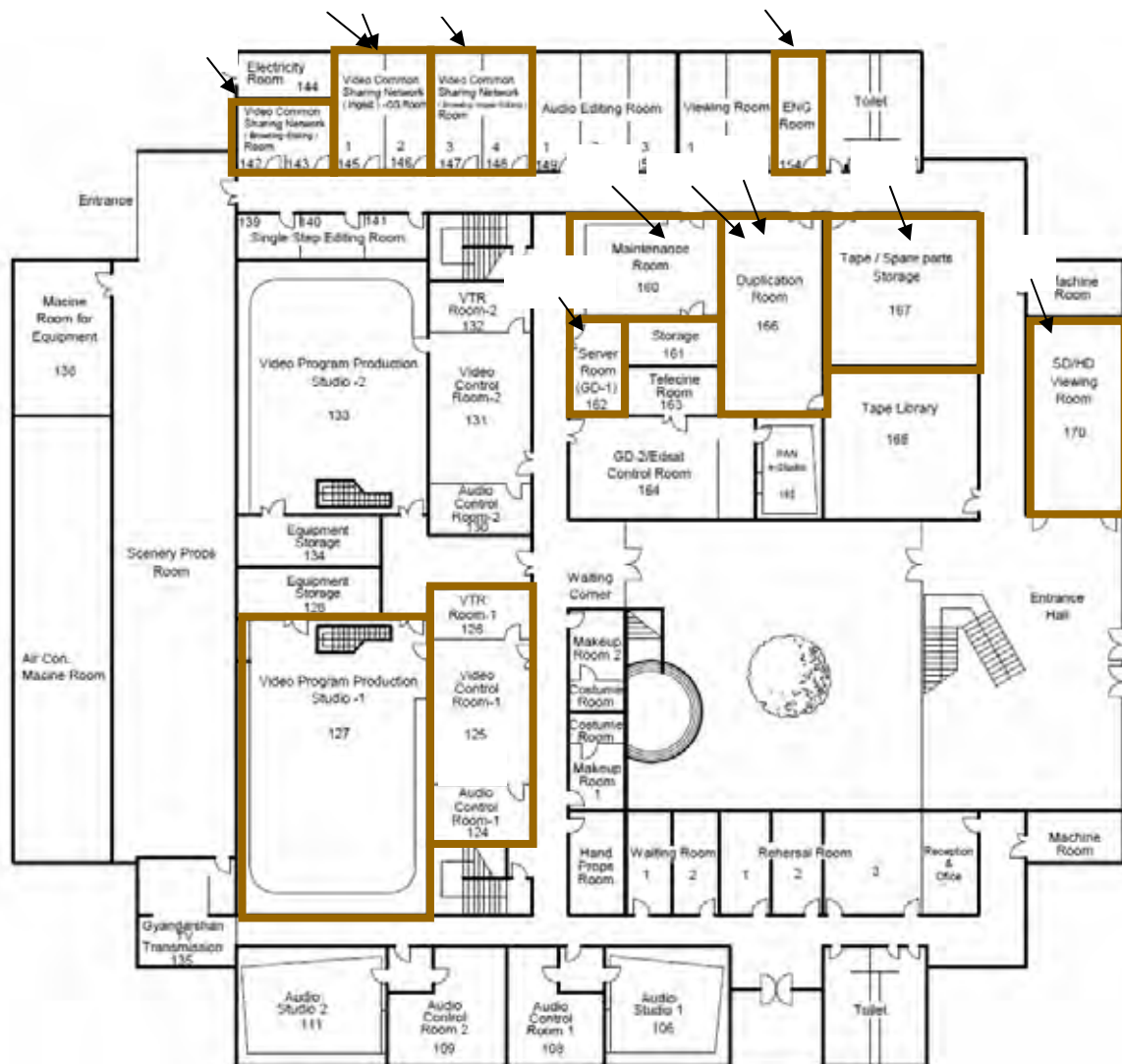
Room No.	System	System No.	Room No.	System	System No.
124	Video Program Production System		147	Video Common Sharing Network (Browsing/Ingest/Edit)	
125	Video Program Production System		148	Video Common Sharing Network (Browsing/Ingest/Edit)	
126	Video Program Production System		154	Field Recording (ENG) System	
127	Video Program Production System		160	Measuring Equipment	
142	Video Common Sharing Network (Browsing/Edit)		162	Routing Switcher System, Video Server	,
143	Video Common Sharing Network (Browsing/Edit)		166	DVD Duplication System, A/D Format Conversion System	,
145	Video Common Sharing Network (Ingest)/CG System	,	167	Spare Parts	
146	Video Common Sharing Network (Ingest)/CG System	,	170	SD/HD Preview System	

Fig. 2-2   System Layout of EMPC

(4)   System interconnection and integration with existing equipment

If a system for continuous use created by connecting the equipment to be procured under the Project and the existing equipment is not formulated, it will be impossible to achieve smooth operations in terms of work flow in audio/video program production of EMPC.   Therefore, for the system design, organic linkage will be achieved within the new system and also between the new system and existing system while paying attention to the following points.   ([XXX] in the text refers to room numbers.)

1)   Concept for interface between new systems and between new and existing systems

Currently, almost signal lines for the existing analog system are gathered in the Server Room [162].   Therefore, it is preferable that all interconnections between systems be routed through Server Room [162].   Typical main system interfaces are shown in Table 2-5.

The existing analog cables used for the existing analog equipment and system, and the digital cables installed in the Project will be mixed and used at the same time.   Thus, for the new digital signal transmission lines, the cables will be chromatically colored so that maintenance and system upgrades can be implemented smoothly.

Table 2-5　Connecting Signals between Systems

Room No.	System	Signal	Room No.	System	Signal	Room No.	System
125	Video Program Production Studio-1	HD-SDI	162	Routing Switcher	HD-SDI	145	Video Common Sharing Network
131	Video Program Production Studio-2	PAL	162	Routing Switcher A/D Converter	HD-SDI	145	Video Common Sharing Network
			162	Routing Switcher Down Converter	SDI	135	Gyan DarshanTV Transmission
			162	Routing Switcher D/A Converter	HD-SDI	170	SD/HD Preview
162	Existing Patch Panel	PAL	162	Routing Switcher Multiplexer	HD-SDI		
162	Existing Patch Panel	Analog Audio	162	Multiplexer			
			162	Multi-Format Video Server	LAN	142	Non-Linear Editor
			162	Multi-Format Video Server	LAN	143	Non-Linear Editor
			162	Multi-Format Video Server	LAN	147	Non-Linear Editor
			162	Multi-Format Video Server	LAN	148	Non-Linear Editor

[Signal format explanation]　　HD-SDI: High Definition Digital Video Signal (1080/50i)
　　　　　　　　　　　　　　　 SDI:　　　Standard format (SD) Digital Video Signal (Serial Digital Interface)
　　　　　　　　　　　　　　　 PAL:　　　Analog PAL Format Video Signal
　　　　　　　　　　　　　　　 LAN:　　　Gigabit Ethernet (Computer Network)

Specific equipment connections are shown in Fig. 2-3　Concept of Connection from Server Room [162].　　The names of equipment and their functions as corresponding to the symbols used within the drawing are as follows.

Symbol	Name of equipment	Function
A/D	Video Analog/Digital Converter	Convert analog video signals to SD digital video signals (SDI)
A/D	Audio Analog/Digital Converter	Convert analog audio signals to digital audio signals (AES/EBU)
D/A	Digital/Analog Converter (Video or Audio)	Convert digital video signals (SDI) or digital audio signals (AES/EBU) to analog signals
MPX	Multiplexer	Combines SD digital video signals (SDI) with the digital audio signals (AES/EBU) to form an Embedded SDI signal
DMPX	De-multiplexer	Separates SD digital video signals (SDI) and digital audio signals (AES/EBU) from Embedded SDI signals
U/C	Up-Converter	Converts SDI signals to HD-SDI signals
D/C	Down Converter	Converts HD-SDI signals to SDI signals
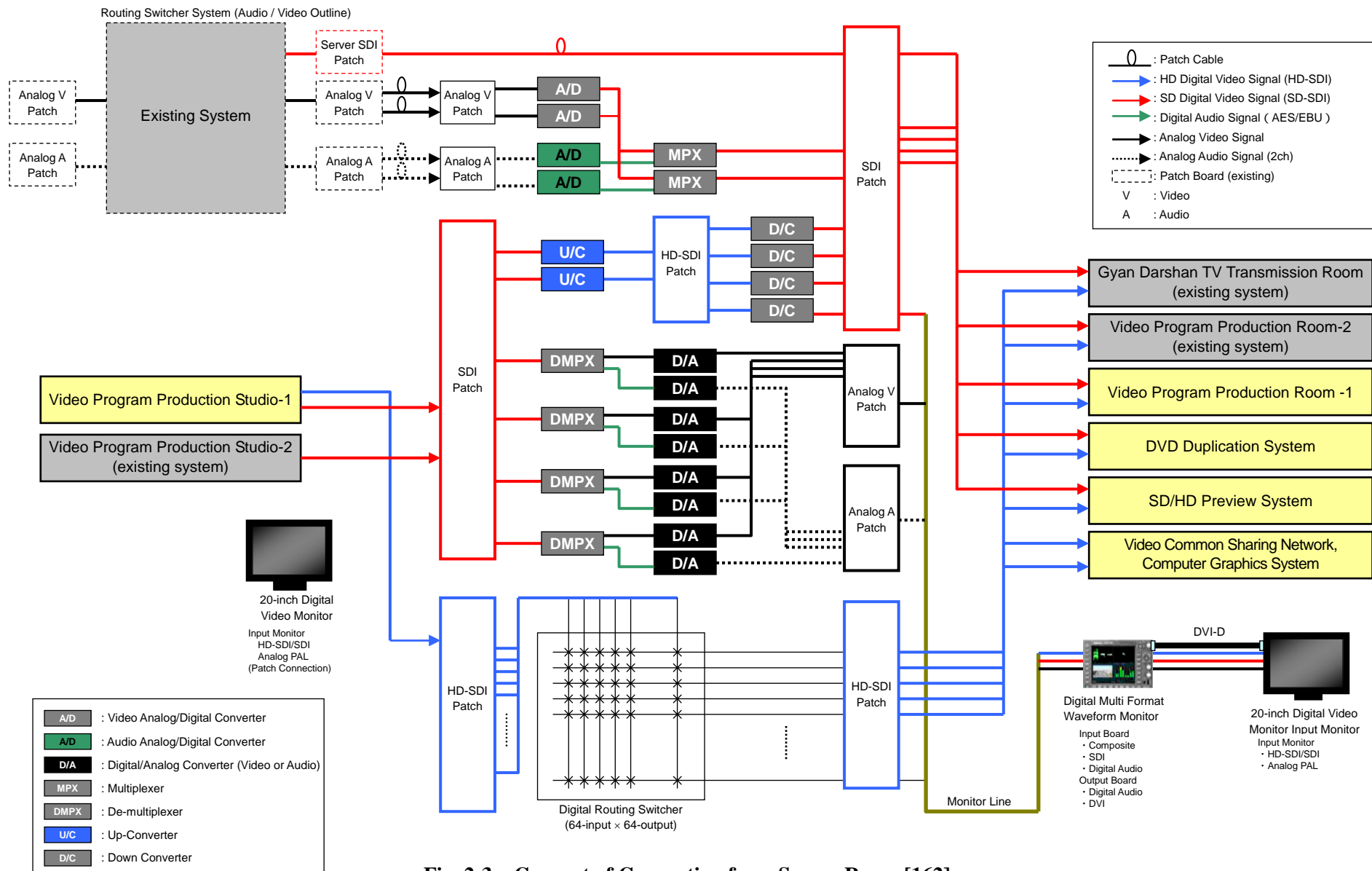
Fig. 2-3   Concept of Connection from Server Room [162]

2) Concept for signal transmission to GD-1

As for the outgoing signal transmission to the existing GD-1, SDI (Serial Digital Interface) signals are sent through one coaxial cable from the Server Room [162] to the Gyan Darshan TV Transmission Room [135]. The Server Room [162] consists of a transmission system using existing video servers and SD-VTRs to upload video programs for GD-1.

In the Project, a routing switcher system will be installed in Server Room [162] and resided together with the existing transmission equipment. In case the HD video program is broadcast from Video Program Production Studio-1 directly, it can be transmitted to GD-1 from here. However, as the present transmission system is applicable for SD, the signal must be converted to an SDI signal using a down converter, routed through the patch panel of the existing system, then transmitted to the Gyan Darshan Transmission Room [135] for GD-1 line. This concept is shown in Fig. 2-4.

[xxx] --- Room No.
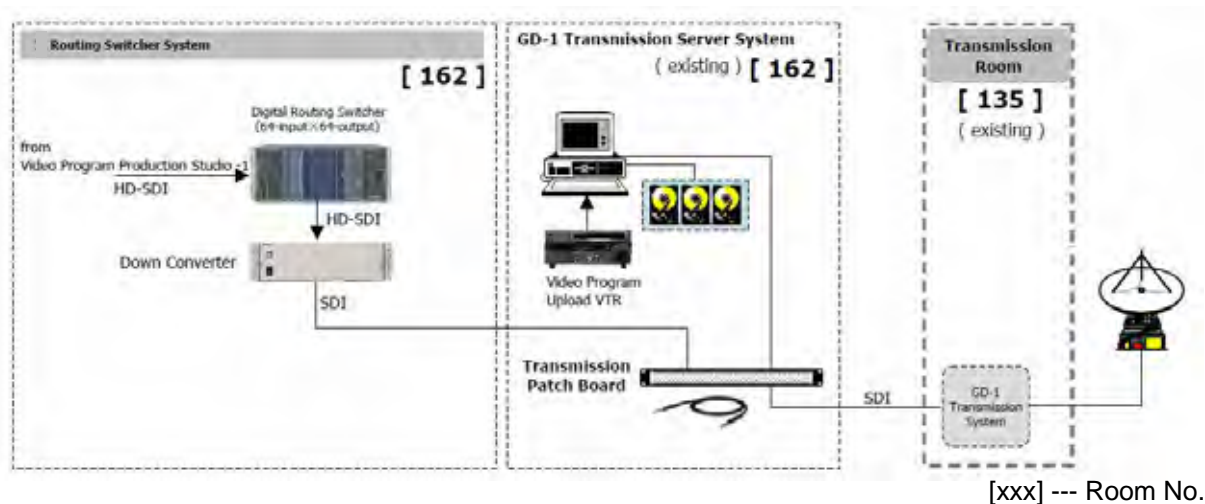
Fig. 2-4　Concept of Transmission to GD-1

3) Concept for Real-Time Recording from the Video Program Production Studio to the Multi-Format Video Server

With the aim of improving work flow of video program production, the interconnection is designed so that signals sent from Video Program Production Studio-1 (HD-SDI signal) [125] and the existing Video Program Production Studio-2 (analog PAL signal) [131] can be directly recorded in the multi-format video server installed at Server Room [162] through a routing switcher system.

In the existing system, output signal from Video Program Production Studio-2 is analog PAL signal. Since this cannot be directly connected to the new system, analog/digital converters (2 up lines, 2 down lines) will be installed in the Server Room [162] to ensure interconnectivity between the existing and new systems.

For the input ports of the multi-format video server system, interface boards for ingest terminals will be installed to handle HD signals sent from the Video Program Production Studio-1 in real time. The concept drawing for real-time recording with the multi-format

video server system is shown in Fig. 2-5.
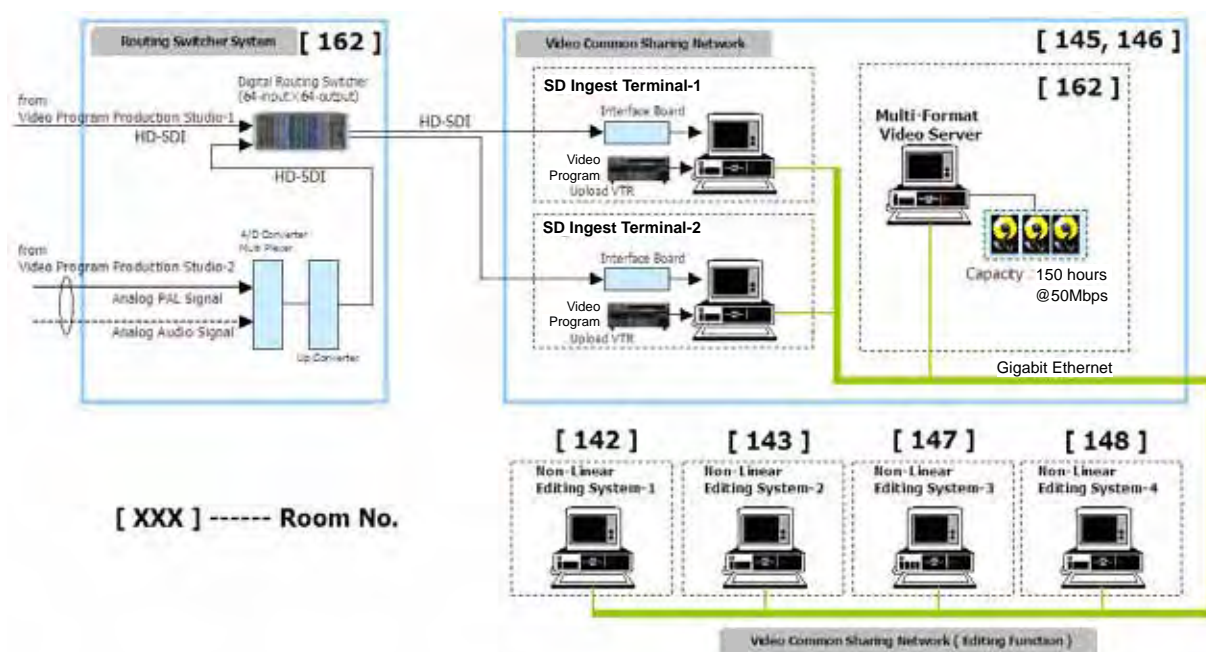
Fig. 2-5   Concept of Real-Time Recording

4)   Concept for Input Signal for the Master DVD Production System

As a portion of the DVD Duplication System, two master DVD production systems shown in Fig. 2-6 will be introduced.   Taking advantage of the merits of installing the analog/digital format conversion system and DVD duplication system in the Duplication Room [166], it will be designed that the analog signal constantly output from the slave HD digital disc recorders of the analog/digital format conversion system can be directly input into the master DVD production system to allow capturing.
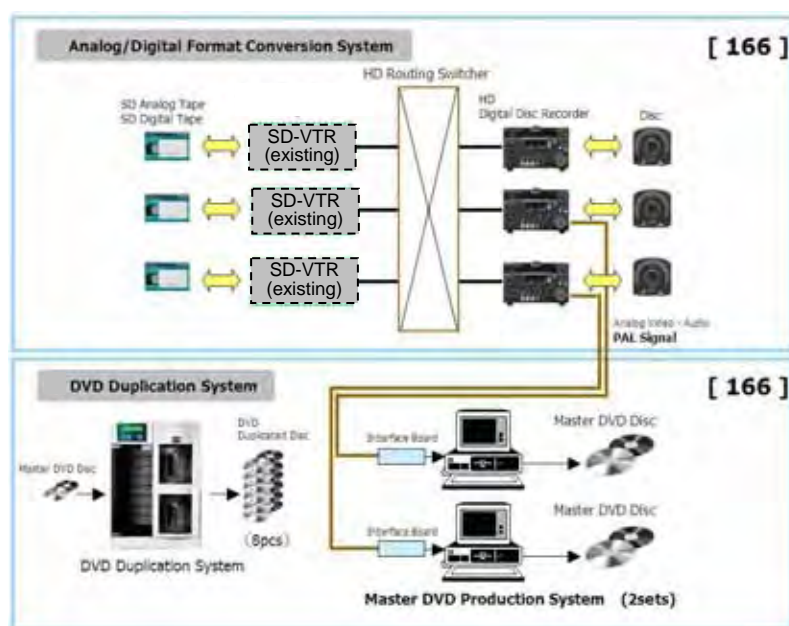
[xxx] --- Room No.

Fig. 2-6   Concept of Master DVD Production System

5) DVD recording in Video Program Production Studio-1 [125]

In Video Program Production Studio-1, it is often the case that the appearing lecturer or producer wants to check the contents (remarks or storyline, etc.) of produced video programs or the video quality immediately after recording. Therefore, DVD recorders will be included in Video Program Production Studio-1 system to record video programs concurrently, and viewing can be done through playback on the SD type DVD player immediately after program recording. Therefore, the final output of the video program production studio-1 system will be connected to a DVD recorder.

(5) Policy for Improvement of Video Program Production System

The policy for improvement of video program production system is as follows:

[1] Video Program Production Studio-1 (Virtual Studio System)

When comparing repairs for the cyclorama on the studio floor and the introduction of the virtual studio system, the results of a comparison focusing on cost, period necessary for the installation work and difficulty level of the work clearly show that the introduction of the virtual studio system using digital technology is less expensive in cost, shorter period for installation work and realizing video program production more effectively with digital technology effect than repairing the cyclorama. Therefore, the video program production studio-1 system renewed under the Project will be both SD and HD applicable combined with the virtual studio system that can composite with computer graphics (CG). With this digitalization, efficient recording of video programs can be achieved and video program production time can be shortened considerably to advancement in studio operations. In addition, since the studio scene set of video programs can be produced by CG through introduction of the virtual studio system, the creation and setting of large props and sets of video programs that required long periods of time in program production can be eliminated, thus shortening video program production time. Also, once a background image is created, it can be saved in the CG System for easy reuse and reprocessing. It can also be used for the production of similar video programs, thus leading to improved cost-efficiency in video program production.

Considering the use of existing SD format video programs and materials during recording, an input interface unit for SD signals will also be installed. By operating with the existing SD-VTR connected to the input interface unit, existing video programs and materials can be effectively used while producing new video programs. In addition, the uninterruptible power supply (UPS) unit will be installed to prevent loss of data for the equipment incorporated a

computer during power failures. The capacity of UPS will be 1.5kVA equivalent to the power consumption of the equipment incorporated a computer.

The main equipment is as follows:

➢ Virtual Studio System

The virtual studio system will be made up of by combining the following equipment with the standard video program production equipment.

Blue Screen

An uniformly blue curtain provides blue background around subject.   The screen is manufactured and placed so that it always surrounds the subject even if the camera moves.   In addition, the blue panels will be laid on the floor and at the bottom of the curtain so that the background can still be captured as blue even with tilted camera angles.

Camera Sensor

To obtain angle information (direction, angle, zoom rate) of the camera, a sensor will be installed in the camera pedestal.   This information will be sent as the camera's parameters to the virtual processor for generating virtual backgrounds.

Virtual Processor

Based on parameters from the camera sensor, 3 dimension (3-D) background images created with a computer graphics will be put into motion and recreated from the camera's point of view.   The images output from this computer will be sent to the video processor as virtual images.

Chroma Keyer

This device cuts out the blue area in the background images and the areas of the performers from the actual images shot by the camera.   This will be included in the HD video production switcher.

Video Processor

This synthesizes and outputs a composite of the virtual background image according to the camera viewpoint that is output by the virtual processor, of actual images, and of the area images from the chroma keyer

Studio Monitor

The final composite image is shown on monitors so that the performers can act naturally in front of the virtual background images and check their performance.

Based on the size of the studio, the size of the monitor will be 50-inch which is big enough so that it can be seen easily by the performers.
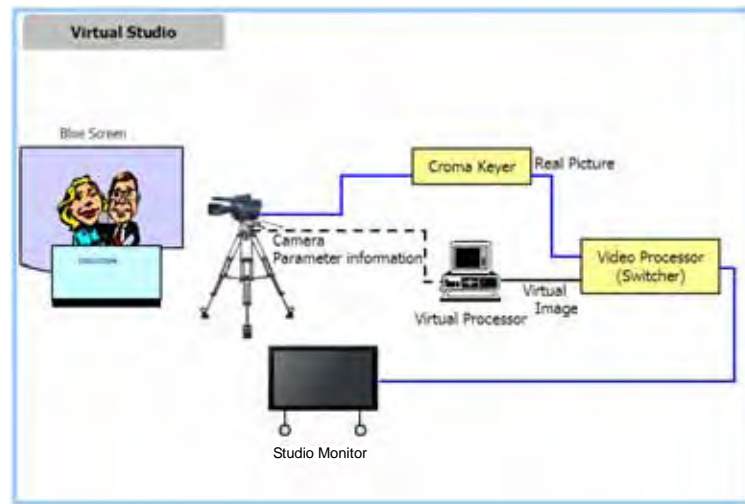
Virtual Studio System

With the virtual studio system shown above, it will operate as follows:

In the studio floor, a studio camera shoots with the walls and floors around the performers covered with a blue screen.   Images shot by a studio camera are sent to the chroma keyer. Camera sensors are mounted on the camera pedestal and zoom lens to detect parameter values including its direction, angle and zoom ratio, which are sent to the virtual processor. The virtual processor will activate the background images according to a camera viewpoint using 3 dimension (3-D) computer graphics that are created beforehand based on the obtained parameter values.   At the same time, the video processor will make a composite of the actual image area information sent from the chroma keyer, actual images from the camera and computer graphics images.   With this, the performers will appear three-dimensional, as if they are actually in front of the virtual background.

➢ Lighting Equipment for Virtual Studio System

For the virtual studio system, in order to prevent awkwardness when combining the virtual background images with real images, projective shadows of the virtual images are purposely not drawn.   Subject in the real images is cut out using region extraction by the chroma keyer.   Regardless on the shadows present on the floor, only the subject is cut out.   With this function, smooth integration of the virtual background image and real images is ensured. In order to do this, as the lighting for the virtual studio system, usage of fluorescent lighting in which light can be scattered is optimal.   It is also preferable for real images, including props, to be shot under the unified lighting conditions by using lamp fittings.

In the Project, a curtain-type blue screen will be installed directly in front of the existing cyclorama and illuminated evenly to prevent shadows using fluorescent lighting. Additionally, incandescent spotlights (existing equipment) can be used to supplement lighting as necessary.

Subjects, including performers and props in front of the blue screen are shot together with the virtual background images while adjustments are made to prevent unnatural shadows using 2-tube, 4-tube, and 6-tube type fluorescent lights.

Installation of fluorescent lighting will be set according to the outline design drawing "Fig. 2-37 Floor Layout of Video Program Production Studio-1 (Lighting Equipment)". However, since Fig. 2-37 shows a standard layout for stage lighting, it will be necessary to arrange the layout appropriately depending on the content and subjects of the video programs to be produced.   Therefore, the type of electrical outlets will be made uniform so that stage lighting can be moved and changed freely.   In accordance with the introduction of fluorescent lights, it is expected that the electric power cost can be saved, because the power consumption of stage lighting will reduce 1/10 in comparison with existing spotlights.

Meanwhile, the existing motorized hoisting equipment and battens for hanging lighting equipment will continue to be used, but the considerably deteriorated dimmer control units including control panel will be renewed to a type that can handle fluorescent lighting.   The number of the existing dimmer control lines is 90 lines, with the existing battens given 84 lines.   Therefore, considering the continuing usage of the existing battens, the number of dimmer control lines of new dimmer control unit will be the same at 90 lines. Dimmer control panel will also be the same type as existing with 80 pre-set faders.
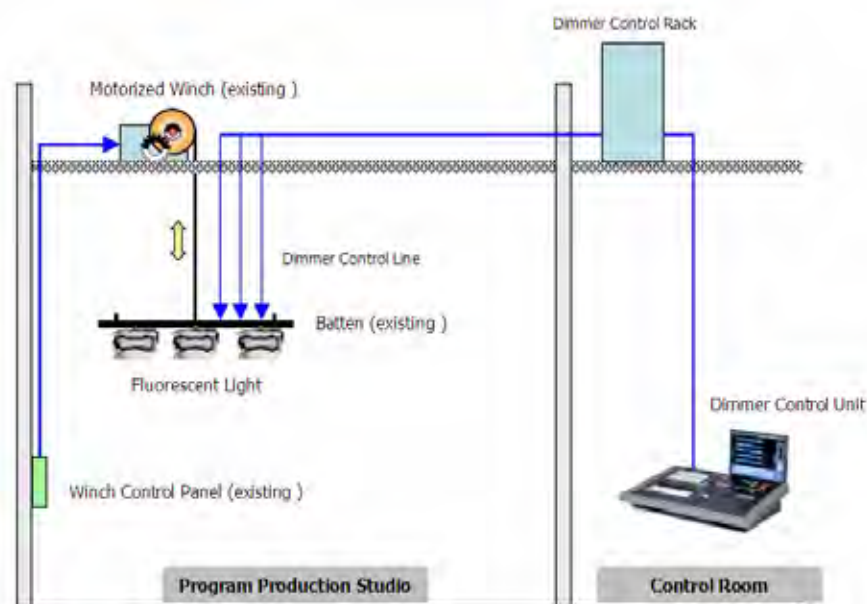
Lighting System of Virtual Studio System

The number of fluorescent lights will be set at 90 to match the number of lighting lines.

The breakdown of types will be 30 sets of 2-tube type (more than 80W), 40 sets of 4-tube type (more than 160 W), and 20 sets of 6-tube type (more than 240 W).   Since replacing the fluorescent light tube is recommended every 6,000 to 8,000 hours, the same number of spare light tubes will be procured so that 100% (340 light tubes) of the above fluorescent lights can be replaced at one time.   (The service life of fluorescent lights is considered to be 10,000 to 12,000 hours.)

➤ Video System

The video system is broadly divided into the following three blocks.

V-1. Studio Video Input Block   V-2. Video Processing Block

V-3. Audio/Video Output Block
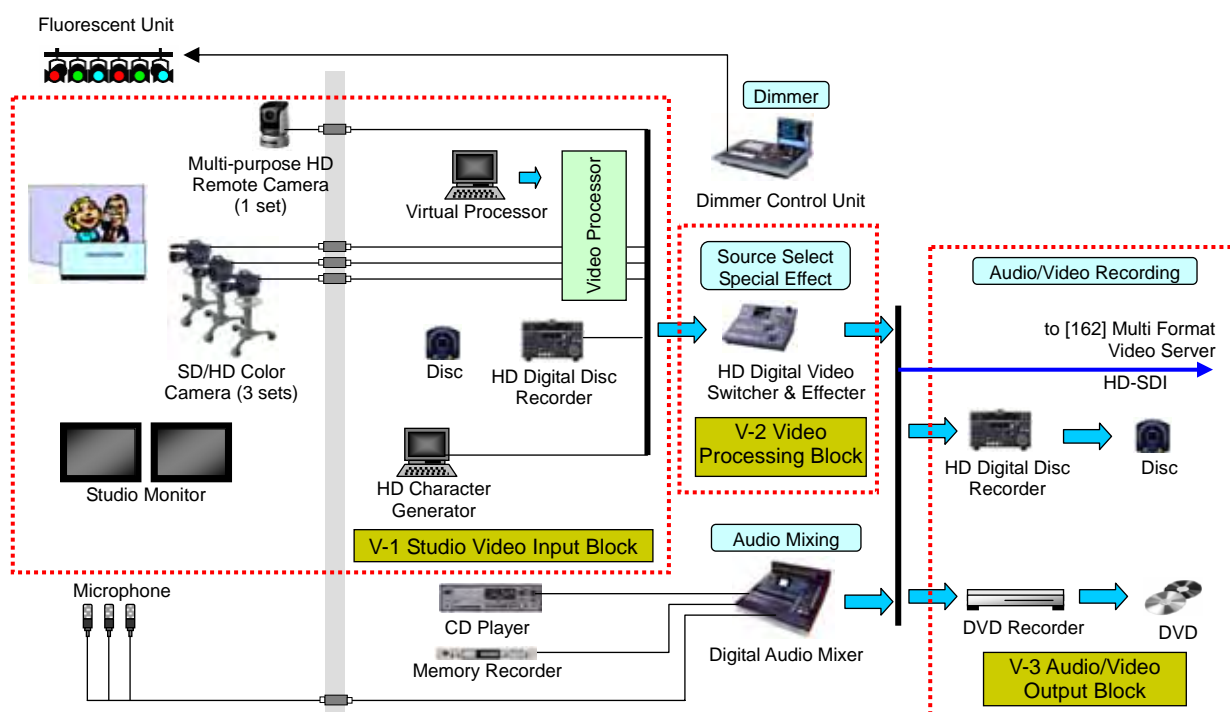
V-1   Studio Video Input Block

Studio Camera

As present operations use four cameras in the studio, the four (4) cameras installation will remain the same under the Project.   However, one of those four will be a multi-purpose remote camera installed near the ceiling of the studio that will be useful in the production of chemistry and music programs, etc in the virtual studio system. A multi-purpose remote camera can be remotely controlled from the control room, allowing for a reduction of the staff needed for fixed-point shooting as well as enhancing convenience during recording.

(a) SD/HD 3CCD Color Camera

This will be a portable-type camera equipped with 2/3-inch 3-chip charge coupled device (CCD) for image sensor and over 1920× 1080 effective pixels. The video signals can be output in both SD-SDI and HD-SDI formats through the camera control unit (CCU).   The interface between the camera and CCU will be able to be connected with a triaxial connector or optical composite connector.

The magnification for the zoom lens to be mounted will have a zoom ratio of more than 21 times, which is the same as the existing equipment and can handle shooting all subjects.

(b) Multi-Purpose HD Remote Camera

This will be a 3-chip CCD camera with HD-SDI capable output signal and also will be standardized to be equipped with a remote controlled platform to control panning, tilting, zooming and focusing.   It will be installed in a fixed position at near the ceiling of the studio with its control being done remotely from the control room.

Camera Remote Control Unit

As the control unit for the above multi-purpose HD remote camera, this equipment has control functions for panning, tilting, zooming and focusing, as well as a control interface (RS422 port).

Virtual Processor and Software

As the central processing equipment for administering the signal system of the virtual studio system, it processes the computer graphics for the virtual studio system. Chroma keying will be done in the V-2 Video Processing Block.

Up-Converter (for existing SD-VTR)

This equipment is an interface allowing the continued use of the existing SD-VTR to convert SD-SDI signals of SD-VTR to HD-SDI signals.   The input signal of the up-converter is digital PAL SDI signal with a quantization bit-rate of over 10 bits.

HD Digital Disc Recorder (for video playback and input)

As the recording media will be shift from VTR to discs under the Project, two (2) sets of SD-SDI/HD-SDI applicable type digital disc recorders that can record and play optical discs will be used in place of existing VTRs used for playback.   This recorder will be able to record and play video signals in MPEG-2 HD 422 compression format

(50 Mbps), and it can handle the audio input/output signals in AES/EBU format independently.   In addition, the input/output SD-SDI/HD-SDI signals should be applicable with an embedded audio format.

HD Character Generator

This is the character generator to insert words and graphics on to the HD video, and should be able to create and send materials through graphic user interface (GUI) manipulation.   In addition, automatic playback will be possible using its macro functions.   The attached external interface possesses a computer network, and will be able to link with existing computers on the network as necessary.

V-2   Video Processing Block

HD Digital Video Switcher

The digital switcher handles video switching during recording, special effects, and image compositing by the key signals, etc.   The existing video switcher (analog type) has 20 input channels, but only 14 of those channels are being assigned.   HD type digital video switcher, setting 16 input channels as shown below will be introduced under the Project.   Multi effect function will be 1.5ME equivalent to existing effect equipped in the existing video production switcher.

Ch-1:	Studio Camera-1	Ch-9:	SD-VTR (existing equipment)
Ch-2:	Studio Camera-2	Ch-10:	Computer Input–1 (existing equipment)
Ch-3:	Studio Camera-3	Ch-11:	Computer Input-2 (existing equipment)
Ch-4:	HD Multi-Purpose Remote Camera	Ch-12:	Computer Input -3 (existing equipment)
Ch-5:	Virtual Processor	Ch-13:	HD Character Generator
Ch-6:	HD Digital Disc Recorder-1	Ch-14:	HD Character Generator Key
Ch-7:	HD Digital Disc Recorder-2	Ch-15:	Spare
Ch-8:	HD Digital Disc Recorder-3	Ch-16:	Color Bar/Black Burst Signal

Virtual Set

This consists of the SD/HD chroma keyer unit, SD/HD video delay unit, control computer and switching hub.   Linking with virtual processor, chroma keying (cutting out the virtual background images) is performed.

V-3   Audio/Video Output Block

HD Digital Disc Recorder (for audio/video recording)

One (1) set of HD digital disc recorder for recording video programs with the same specifications as the HD digital disc recorder for playback video programs will be used in place of the VTR for recording.   Although it will be for recording, it can also be used for playback, depending on the settings.   The video signals that passed through the Video Processing Block and the audio signals that passed through the

Audio Processing Block (to be explained below) are simultaneously input into the recorder to be recorded.

DVD recorder (for audio/video recording)

To allow the performers and others to check the contents immediately after recording, two (2) sets of DVD recorders for producing DVDs will be installed.　The DVD recorders will be able to record and play analog PAL video.　The same HD signal as the one recorded on the HD digital disc recorder is down converted to analog PAL signal and recorded through an analog connection.

➢ Audio System

The audio system is broadly divided into the following three blocks.

　　　A-1 Studio Audio Input Block　　　A-2 Audio Processing Block
　　　A-3 Audio/Video Output Block
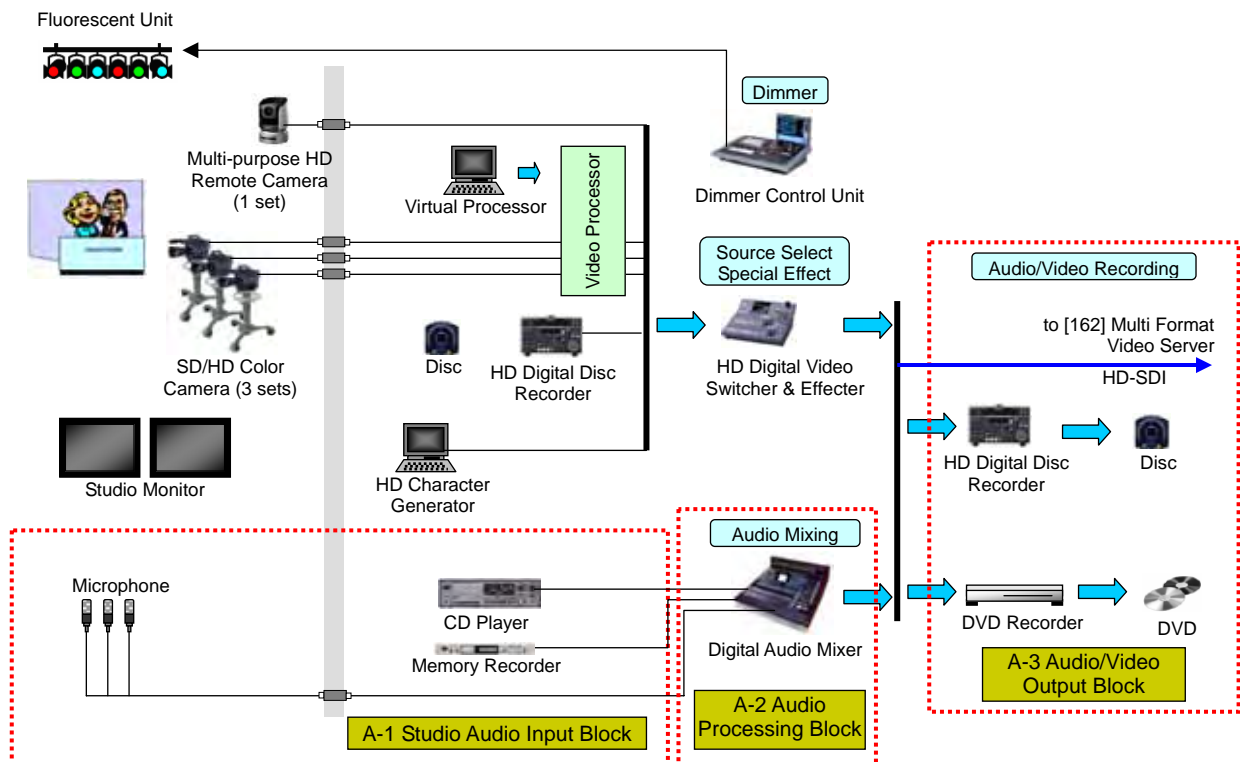
A-1　Studio Audio Input Block

Microphones

Considering the size of the Video Program Production Studio-1 and the content of the video programs to be produced, the following microphones will be procured in the Project.　They will be used for different purposes depending on the method of the produced video program.

- Lavaliere Microphone (8 sets)

  This is a compact microphone used mainly by emcees and during interviews when the performers do not want the microphone to stand out. It is often used by clipping the microphone onto the performer's collar or lapel. A dedicated connector is attached, but this is changed to a cannon type connector.

- Dynamic Microphone (4 sets)

  This is a unidirectional microphone with a high level of general versatility. Because of its simple structure, its mechanical strength and withstanding high volume levels, it is used as a main microphone to produce wide range of video programs.

- Condenser Microphone (6 sets)

  With its thin diaphragm, this microphone can pick up the smallest sounds and is used for recording musical instruments and other subtle sound sources. Since the structure is relatively delicate, thus not strong mechanically, it is inferior to the dynamic microphone in terms of durability. It also requires an exclusive power adaptor.

- Gun Microphone (1 set)

  This microphone is used for collecting frontal sounds and is attached to the studio camera when the performers do not carry microphones. The performers' voices coming from in front of the camera are then recorded.

- Wireless Microphone

  This is used in recording when cables cannot be run through the studio floor. As they use radio waves, the wireless microphones to be used should conform to the regulation set by the Indian Wireless Telegraphy Act to avoid jamming or radio wave interference. As the frequency band allowed for wireless microphone does not have a broad range, the number of wireless microphones that can be used at the same time is limited to approximately ten. Two types of transmitter shall be procured: one is a hand-held type integrated with a stick microphone and the other is a lavaliere microphone type transmitter used by connecting to the previously mentioned lavaliere microphone.

CD Player

CD player will be procured to playback music and sound effects recorded in CDs. Operation of CD player is done manually and output audio is an AES/EBU digital

audio signal.

Memory Recorder

This equipment is used for audio recording of video programs.　Since the manufacture of cassette tape recorders and CD recorders popularly used in the past for audio recording is likely to be discontinued, the memory recorders using semiconductor memory that are currently popular will be employed.　The equipment used will have recording ability in stereo and monaural, AES/EBU digital audio output function, and analog output capability to provide compatibility with the existing analog equipment.

A-2　Audio Processing Block

Digital Audio Mixer

This handles switching audio sources such as microphones, CD player, etc., and adjusting audio level by regulating audio volume during recording.　The existing audio mixer is analog type with 8 microphone input lines and 8 stereo input lines for a total of 16 inputs (16 faders).　There are no problems for recording interviews, etc., when a small number of microphones are used, but when producing music programs including musicals and traditional Indian music for the newly established School of Performing and Visual Arts, multiple musical instruments are used and require many audio inputs.　Therefore, the current 16 inputs are insufficient.　In order to accommodate all kind of video programs to be produced, the digital audio mixer that the number of faders is set at a minimum of 20 and have 24 analog input channels and 4 digital input (AES/EBU) channels which can be expanded as necessary will be procured.

A-3　Audio/Video Output Block

The audio signal processed by the digital audio mixer in the Audio Processing Block is sent to HD digital disc recorder at the Audio/Video Output Block for recording. (Refer to V-3 Audio/Video Output Block.)

➢ On-Air Light and On-Air Tally Light

On-Air Light

On-air lights will be installed to indicate the Video Program Production Studio-1 is in use and to call people's attention when entering the studio.　Remotely operated from the control room, the on-air lights installed in the following seven locations (displaying the word "RECORDING" in red light) can be turned on simultaneously.

On-Air Light Placement Locations

	Placement locations
	In Dimmer Control Unit Room
	Above the Entrance of Camera Store in the Studio
	Above the Entrance/Exit Door from the Control Room to the Studio Floor
	Control Room Entrance (corridor side)
	Inside the Camera Store
	Studio Entrance (public entrance/exit)
	Large Props Room (next to the shuttered entrance to the studio)

On-air light reference figure

Lettering: white

RECORDING

Background: red

ON-Air Tally Light

A tally light to check the video source selected by the digital production switcher will be installed above the video monitors.　The tally light will be indicated automatically by receiving signals through the control logic from source selection key of the digital video switcher.

System Interconnection Concept

Video programs produced in Video Program Production Studio-1 are recorded in HD digital disc recorder at the VTR room [126] that is the part of the control room.　At the same time, in order to start editing work immediately after shooting, and to contribute to efficient studio usage, the produced program is sent through the routing switcher installed in the Server Room to the multi-format video server for recording directly.

Main Equipment Configurations　　　　　　　　　　　　　　　　(I/F: Interface)

Equipment	Key Specifications	Grade	Q'ty
3 CCD SD/HD Color Camera	Quantization bit: 14 bits Image sensor: 2/3-inch 3-chip IT CCD I/F: Triaxial or optical fiber connector	Broadcast	3 Nos.
Multi-Purpose HD Remote Camera	Type: Pan/tilt remote camera Image sensor: 1/3-inch 3-chip CCD I/F: HD-SDI output	Professional	1 No.
Camera Remote Control Unit	Control functions: Pan, tilt, zoom, focus Control I/F: RS422	Professional	1 No.

Equipment	Key Specifications	Grade	Q'ty
Up-Converter (for existing SD-VTR)	Video input: SD-SDI (PAL applicable) Quantization bit: 10 bits or more Video output: HD-SDI (1080i/50 applicable)	Broadcast	1 Set
Virtual Processor and Software	Virtual Processor Control Software Tracking Software Computer CPU: Intel Xeon Equivalent Dual Processor Memory: 4 GB or more LCD: 19-inch TFT or larger	Broadcast	1 Set
HD Digital Disc Recorder	Recording/playback format: MPEG-2 HD 4:2:2 (50Mbps) Recording/playback media: Optical disc Quantization bit: 8 bits Video I/F: SDI (SD/HD) Audio I/F: AES/EBU	Broadcast	3 Nos.
HD Digital Video Switcher	Mix/Effect bus: 1.5 ME Video inputs: 16 or more Video outputs: 6 or more Keyer: 2 or more Control panel: 16 buttons or more, 2 faders Video effects: 2 channels - 2D & 3D effects	Broadcast	1 No.
DVD Recorder	Recording media: 12 cm DVD Hard disk capacity: 160 GB Scheduled recording functions Video D/A converter: 10 bit/108MHz Audio D/A converter: 192kHz/24 bit	Consumer	2 Nos.
HD Character Generator	Hard disk capacity: 300 GB or more Video input HD-SDI, video + key Video output: HD-SDI, video + key	Broadcast	1 No.
Digital Audio Mixer	Analog audio input: 20ch or more Analog audio output: 4 stereo lines, 8 or more AUX lines Digital audio input: 4 or more AES/EBU lines Digital audio output: 4 or more AES/EBU lines	Professional	1 No.
CD Player	Type: Rack mount type (EIA 19-inch) Playback format: CD, MP3	Professional	2 Nos.
Lavaliere Microphone	Polar pattern: Omni-directional Frequency response: more than 100 Hz to 15 kHz	Broadcast	8 Nos.
Dynamic Microphone	Polar pattern: Hyper cardioid Frequency response: more than100Hz to 15kHz	Broadcast	4 Nos.
Condenser Microphone	Polar pattern: Omni-directional/hyper cardioid Frequency response: more than 100Hz to 15kHz	Broadcast	6 Nos.

Equipment	Key Specifications	Grade	Q'ty
Gun Microphone	Polar pattern: Strong hyper cardioid Frequency response: more than 100Hz to 15kHz	Broadcast	1 No.
Handy Microphone Transmitter	RF frequency: approx. 800 to 870 MHz RF output: less than 50 Frequency response: more than 100 Hz to 15 kHz	Broadcast	3 Nos.
Lavaliere Microphone Type Transmitter	RF frequency: approx. 800 to 870MHz RF output: more than 10mW Frequency response: more than 100Hz to 15kHz	Broadcast	1 No.
Studio Monitor with Accessories (a wall mount & stand)	Type: LCD or plasma Screen size: approx. 50 inches Resolution: 1920 × 1080	Professional	2 Nos.
Digital Multi-Format Waveform Monitor	Monitor display: Waveform, vector, picture, status Monitor input: HD/SD-SDI Monitor input (for VE): HD/SD-SDI, PAL Analog, AES/EBU	Broadcast	5 Nos.
On-Air Tally Light	Tally display: red or green LED	Broadcast	1 Set
Virtual Set with Accessories	HD/SD Chroma Keyer system HD/SD video delay unit Control PC Switching hub	Broadcast	1 Set
Lighting Equipment			
Dimmer Control Unit (Including Dimmer Control Panel)	90 lines control (same as existing equipment) Control Panel: 80 pre-set fader type	Broadcast	1 Set
Fluorescent Light with Barn Doors (2 Tubes, more than 80W)	Virtual applicable fluorescent lighting	Professional	30 Pcs.
Fluorescent Light with Barn Doors (4 Tubes, more than 160W)	Virtual applicable fluorescent lighting	Professional	40 Pcs.
Fluorescent Light with Barn Doors (6 Tubes, more than 240W)	Virtual applicable fluorescent lighting	Professional	20 Pcs.
Spare Fluorescent Light Tube (more than 40W)	Fluorescent tubes for above	Professional	340 Pcs.

[2] Field Recording (ENG) System

Field Recording is in operation approximately 100 days per year with 3 reporting crews.   In the Project, 3 sets, the same number as the reporting crews, of field recording system comprising of SD/HD applicable digital portable camcorder, etc., will be procured.   The digital portable camcorders will adopt discs as the recording format for compatibility with

other video program production equipment, and can be connected to the editing system directly.

To deal with recording trouble that may occur during field recording, 3 sets of MiniDV/HDV camcorders will also be procured for emergency use.　Since they will be carried together with portable digital camcorders, they can also be used for recording as supplementary equipment, which makes efficient field recording possible.　In addition, digital still camera will be incorporated for still picture shooting to provide enlarged or telephoto images necessary for program editing.　As the above equipment will be used outdoors, it should be designed for portability and adaptability to changing environments.　As a system characteristic, it should be able to withstand operation in outdoor temperatures of 0 to 40°C.

The main equipment is as follows.

HD Digital Portable Camcorder

This is a SD/HD applicable digital portable camcorder using 2/3-inch 3-chip IT type CCD.　In order to ensure the S/N for dark areas even when shooting outdoors in areas with a high contrast ratio, the camera characteristics will be a video S/N ratio of 54 dB or more, sensitivity of 2000 lux, and F11 or more under 3200 °K conditions.

The recording and playback formats will be broadcast specification MPEG-2 HD 422 (50Mpbs), and based on the economic efficiency in operating costs, the recording media will be the discs adopted for the Project.　As for the HD recording format, it will support 1080/50i format for PAL compatibility and 1080/24p for progressive recording.

UHF Synthesized Transmitter (Wireless Microphone)

To use this in conformance with the Indian Wireless Telegraphy Act and to prevent interference with other industrial wireless devices, the frequency will be synthesized so that it can be changed.　In addition, to prevent conflict when using simultaneously with wired microphones, the frequency response will be of 100 Hz to 15 kHz.

AC Operated Cool Light

As outdoor use is assumed for this equipment, it will basically be battery-powered. However, as there are many reporting opportunities in facilities with AC power sources such as hospitals and universities, this equipment will also support operation using an AC power source so that it can be used without worrying about battery consumption.　Providing illumination by scattering light, this will be a 2-tube type fluorescent light that can handle a variety of subjects and minimizes electricity consumption.

MiniDV/HDV Camcorder

This is used by the reporting crew as the backup use in case the HD digital portable camcorder used as the main recording equipment breaks down so that the reporting crew will not lose reporting opportunities. Although its purpose is for backup use, it can also be used if the crew wants to simultaneously shoot the supplementary or enlarged images necessary for scene changeovers during editing. The recording format will be HDV for HD format compatibility, and the camera will be a 1/3-inch CCD or CMOS type. The zoom lens will be integrated into the camera with a zoom ratio of 12 times or more. The zoom lens does not have to be a removable type since this is supplementary equipment.

Digital Still Camera

The reporting crew shoots still pictures of scenery and enlarged pictures of video programs for editing. Thus, they will be equipped with the digital still camera to take required photography. This camera will have a resolution of over 12 mega pixels so that it can be used for program materials, and the recording format will support JPEG as it can be loaded into the non-linear editing equipment. The recording media will be a standard memory card, from which still pictures can be easily uploaded via the memory card reader installed in the non-linear editing equipment.

Portable Audio Mixer

This is to use audio adjustment during field recording when multiple microphones are used for interviews, etc. However, based on the content of the shooting materials and frequency of use, it is determined that a quantity matching the number of crews is not needed. Therefore, in the Project, one (1) audio mixer will be procured for shared use. It will be a battery-operated portable type for outdoor use with four inputs, and will have frequency response accommodating that of the microphone.
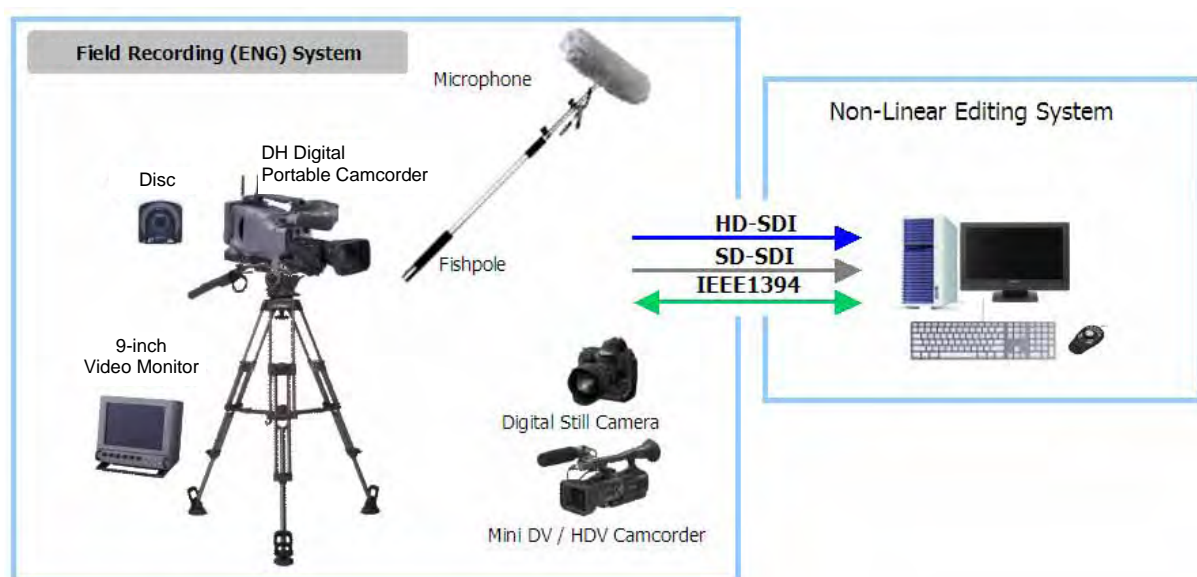
Field Recording Process Chart

System Interconnection Concept

This system consists of equipment for field recording that can be operated independently. Therefore, although it will not be constantly connected to other systems, it will be indirectly connected to the video common sharing network through discs after recording.

For editing equipment that does not have a device for uploading, the camcorder itself can be directly connected to it using cables.

Main Equipment Configurations

Equipment	Key Specifications	Grade	Q'ty
HD Digital Portable Camcorder	Type: Portable camcorder Image sensor: 2/3-inch 3-chip IT CCD Recording/playback format: MPEG2 HD422 (50Mbps) Recording/playback media: Optical disc Shooting function: 1080/24p applicable	Broadcast	3 Nos.
UHF Synthesizer Transmitter	Type: Belt pack transmitter RF output: 50mW or below Transmitter frequency response: more than 100Hz to 15kHz	Broadcast	3 Nos.
AC Operated Cool Light	Type: 27 W fluorescent light - 2-tube type with barn doors Accessories: Carrying case, AC adapter (including spare lamps, K-pole)	Broadcast	3 Nos.
MiniDV/HDV Camcorder	Type: Handy-camcorder Image sensor: 1/3-inch CMOS or CCD Recording/playback format: HDV, DV Recording/playback media: Tape or memory card	Professional	3 Nos.
Digital Still Camera	Type: Digital SLR Image sensor: CMOS sensor Effective pixels: more than 12 megapixels Recording format: JPEG, Exif 2.21 capable Recording media: memory card	Consumer	3 Nos.
Portable Audio Mixer	Type: Portable mixer Analog input/output: 4 inputs, 2 outputs Standard input level (mic): approx. -70 dBu to +30 dBu Standard input level (line): approx. -30 dBu to +10dBu Frequency response: more than 50 Hz to 17 kHz (±1.5 dB)	Broadcast	1 No.

[3] Routing Switcher System

The Routing Switcher System to be introduced under the Project will be installed in the Server Room [162] and will run concurrently with the existing analog lines.   The main equipment is

as follows:

Digital Routing Switcher (64-input× 64-output)

For a digital line, audio and video signals can be transmitted through one cable, decreasing the number of lines. Consequently, the number of lines necessary for operation within EMPC facilities that should be digitalized was investigated. As a result, the number of required digital lines is as follows:

- Video Program Production Studio-1: 6 lines
- Video Program Production Studio-2: 6 lines
- Editing Room: 7 lines
- Duplication Room: 2 lines
- Gyan Darshan Transmission Room: 8 lines
- External Lines: 4 lines
- Edusat Control Room: 6 lines
- Server Room: 5 lines
- Maintenance Room: 2 lines
- CG Room: 4 lines
- Video Common Sharing Network: 10 lines   Total   60 lines

Thus, the widely-used standard 64-input× 64-output routing switcher which is HD/SD-SDI applicable will be installed. However, of the 60 lines mentioned above, the number of lines related to the Project is 14 (excluding the Sync Signal portion). These 14 lines will be digitalized in the Project and added to the patch panel for systemization.

In addition, the minimum amount of monitoring equipment to watch the input and output waveforms and video signals shall be included.

HD Digital Sync Signal Generator

In order to distribute HD sync signals to the systems required, slave sync signal generators will be installed in the following rooms:

Room No	Name of Room	System
162	Server Room	Routing Switcher System
162	Server Room	Multi-Format Video Server
145	Video Common Sharing Network (Ingest)/CG Room-1	CG System-1
146	Video Common Sharing Network (Ingest)/CG Room-2	CG System-2
166	Duplication Room	Master DVD Production System

A/D Converter, D/A Converter, Patch Panel

In order to interconnect the system introduced under the Project and the existing system, two general-purpose up/down bi-directional lines and two down lines for sending analog signals to the existing system will be installed.   The A/D converter will convert the existing analog signal into a digital signal and the D/A converter will convert digital signal to analog signal.   To prevent improper connections, a patch panel will be installed for each of the four different signal lines including analog video, analog audio, SDI and HD-SDI.
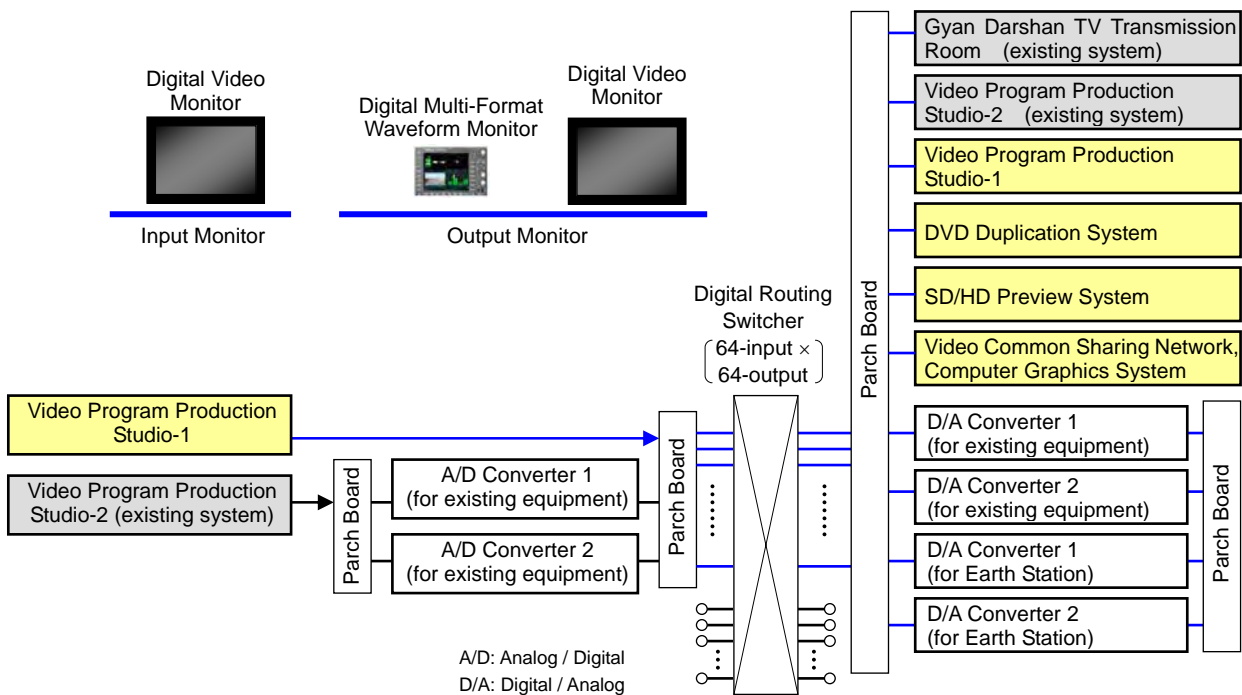
Inter-Room Connection Switching Process Chart

System Interconnection Concept

One (1) cable for HD-SDI signals from Video Program Production Studio-1 to routing switcher system and two (2) cables for HD-SDI signals from routing switcher system to Video Common Sharing Network (Ingest)/CG Room-1 and-2 will be newly installed as a system for directly recording.   (The existing cable will be used from Video Program Production Studio-2 to routing switcher system.)

To accommodate the transition period before complete digitalization, two (2) A/D converters (up lines) and four (4) D/A converters (down lines) will be procured as an interface for the newly installed lines and existing analog lines.

All of the lines to be newly installed are shown in Fig. 2-3   Concept of Connection from Server Room [162].

Main Equipment Configurations (I/F: Interface)

Equipment	Key Specifications	Grade	Q'ty
Digital Routing Switcher (64-input×64-output)	I/F: HD/SD-SDI, BNC Matrix size: more than 64 × 64 Control I/F: Coaxial cable or Ethernet cable	Broadcast	1 No.

HD Digital Sync Signal Generator	External sync signal input:
	    PAL black/3 level sync
	Analog sync signal output:
	    PAL black/ 3 level sync, more than 3 lines
	Digital sync signal output:
	    Word clock / more than 2 AES/EBU lines
		Professional	1 No.

A/D Converter, D/A Converter, Patch Panel	Patch panel
	    Digital lines (75-ohm)
	    Video patch type: HD-SDI
	    Number of video jacks: more than 26
	    Analog audio lines
	    Audio patch type: 110-type
	    Number of audio jacks: more than 26
		Broadcast	1set

[4] Video Common Sharing Network (Video Server System)

In the initial request, a 10,000-hour capacity video server was requested as a library system. However, from an operation and maintenance management viewpoint, it was decided that library management for video programs will continue to be done in the same way as it is using the existing cabinets and database management system after converting tapes to discs by the analog/digital format conversion system.

Thus, this video server system will be installed as a video common sharing network for editing purpose and used to achieve the goals of the Project that include advancing production efficiency for video programs using digital technology, as well as advancing studio usage efficiency.   The taped programs used in existing system of EMPC could not be used by others when they were lent out, thus making sharing of video programs impossible.   With the advancements in digitalization, non-linear editing systems have become widely used.   Also, by configuring a network connected to a video server, multiple editing engineers can share video programs simultaneously, allowing editing work to progress concurrently.

The video common sharing network which consists of the multi-format video server to store video programs that are frequently used and the non-linear editing system to edit programs will be established under the Project.   The capacity of the multi-format video server is to be sufficient to store video programs recorded at EMPC and field recording materials in one year in HD format at 150 hours (300 hours in SD format).

Video programs produced by EMPC in one year: 30 min.× 200 programs = 100 hours

Field recording materials recorded by EMPC in one year: 30 min.× 100 days = 50 hours

Furthermore, for uploading video programs to multi-format server, two (2) SD ingest terminals, two (2) HD ingest terminals, and two (2) HDV ingest terminals will be installed.   As for the VTR for the SD ingest terminals, existing SD-VTRs will be used.

Since editing work is done by four people, four (4) sets of non-linear editing system (equipped with a 4 TB hard disk drive for storing editing materials) and four (4) browsing terminals will be installed.

The uninterruptible power supply (UPS) unit will be installed to prevent loss of data for each computer during power failures. The capacity of UPS will be 1.5kVA equivalent to the power consumption of the computer workstation.

The complete video programs will be recorded on discs, stored in the existing cabinets in the Library Room [168] and managed with the existing management system.

The following equipment items will be divided between and installed in Video Common Sharing Network/Computer Graphics Rooms ([142], [143], [145], [146], [147], [148]).

SD Ingest Terminal   existing SD-VTR to be used   (2 sets)

This terminal is used for uploading SD programs recorded in the tape stored in the library to multi-format video server.   It is a necessary interface for effectively using the existing video programs and materials.

It consists of a computer workstation, up-converter, and video monitor, etc., and is set to allow the operator to check video while uploading.
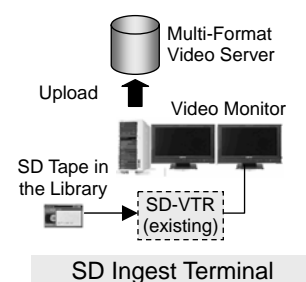
HD Ingest Terminal (2 sets)

This terminal is used for uploading recorded video programs in HD disc to the multi-format video server. The HD digital disc recorder for uploading the HD discs of field recording will be included.

It consists of a computer workstation, HD digital disc recorder, and video monitor, etc., and is set to allow the operator to check video while uploading.
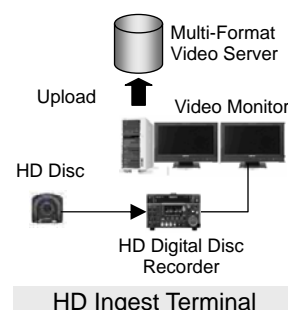
HDV Ingest Terminal (2 sets)

This terminal is used for uploading recorded video programs in HDV tape to the multi-format video server. The HDV-VTR for uploading the video programs recorded in MiniDV tape will be included.

It consists of a computer workstation, HDV-VTR, and video monitor, etc., and is set to allow the operator to check video while uploading.

HDV Ingest Terminal
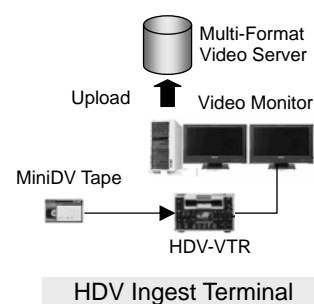
Browsing Terminal (4 sets)

In order to check the content of video programs and materials stored on the multi-format video server, a computer workstation for browsing will be installed on the network.

Administration Terminal (1 set)

In order to manage the video common sharing network, an administration computer will be installed on the network.

Non-Linear Editing System (4 sets)

Consisting of a computer workstation (including non-linear editing software), one (1) HD digital disc recorder, two (2) 17-inch computer displays, and one (1) 17-inch LCD video monitor, etc., this system is used for accessing the multi-format video server to retrieve video programs for editing. The computer workstation is equipped with a 4 TB hard disk to read and store the shared video materials. Data other than shared video materials will also be saved on a 4 TB hard disk in the workstation to decrease the sharing load on the multi-format video server.

Non-linear Editing System
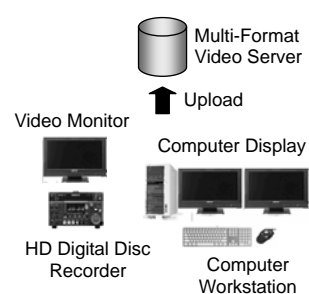
Reading discs and writing complete video programs after editing to disc are done with the HD digital disc recorder. Complete video programs will be written to discs and stored in cabinets at the Library Room.

Saving complete video programs on the multi-format video server can cause the accumulated volume to overflow in a short period of time. Therefore, operations will be performed under the principle that video materials that are not for sharing or complete video programs will be written to discs.

Multi-Format Video Server

This is the network hard disk unit that can record 150 hours of 422 HD format (50 Mbps) signal with RAID system redundancy. In order to improve server reliability, the RAID configuration will adopt RAID 10. Also, it will be combined with two (2) switching hubs to make it to function as a server.

This system will be optimized for video editing, and even when accessed by multiple

terminals concurrently, there will be no interruption on any terminal for smooth editing. Taking into account that it will be running 24 hours, and the heat is dissipated by such, the multi-format video server will be installed in the Server Room [162].

HD-SDI Input Board

This is an input board for the interface allowing the HD-SDI signals sent from Video Program Production Studio-1 or -2 through routing switcher system to be directly input into the multi-format video server and recorded. It will be installed in the computer workstation of HD ingest terminal. The interface with the computer workstation will use high-speed PCI Express. For external synchronization, it will have terminals for PAL black signals and tri-level sync signals.

Application Software

Browsing software necessary for checking video programs stored on the multi-format video server will be installed on the browsing terminals and non-linear editing system.
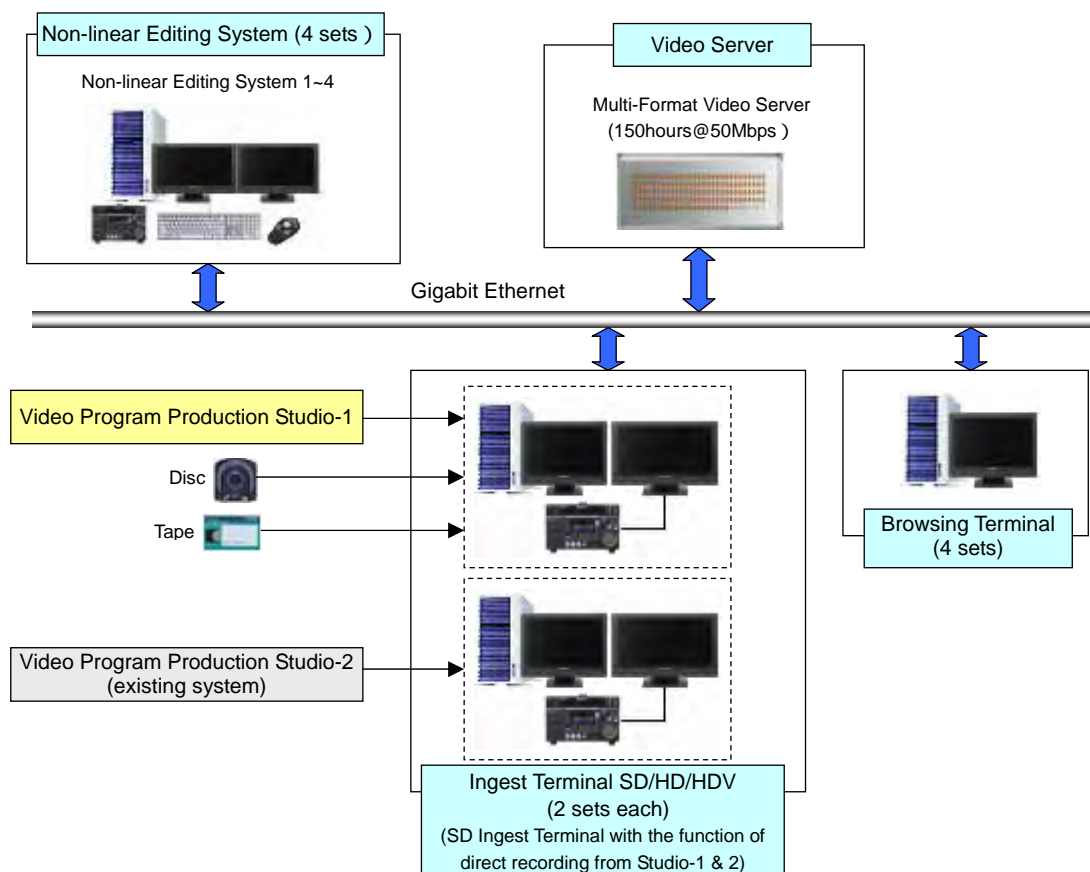
Process Chart for Storing/Editing of Video Programs

System Interconnection Concept

As explained with the routing switcher system, this video common sharing network will make direct recording possible from Video Program Production Studio-1 and -2 to the multi-format video server. With this, editing work can be done immediately after

recording to save the time required to complete the video programs.

Main Equipment Configurations   (I/F: Interface)

Equipment	Key Specifications	Grade	Q'ty
SD Ingest Terminal (existing SD-VTRs to be used)	LCD Computer Display Resolution: SXGA or more Screen size: 17-inch or more LCD Video Monitor Input: SDI Screen size17-inch or more Up-Converter Input: SD-SDI Output: HD-SDI Computer Workstation: Dual Xeon equivalent CPU, more than 4 GB RAM	Broadcast /Professional	2 sets
HD Ingest Terminal	LCD Computer Display Resolution: SXGA or more Screen size: 17-inch or more LCD Video Monitor Input: SDI Screen size: 17-inch or more HD Digital Disc Recorder Recording/playback format: MPEG2 HD422(50Mbps) Recording/playback media: optical disc Quantization bit: 8 bits Video I/F: SDI (SD/HD) Audio I/F: AES/EBU Computer Workstation: Dual Xeon equivalent CPU, more than 4 GB RAM	Broadcast /Professional	2 sets
HDV Ingest Terminal	LCD Computer Display Resolution: SXGA or more Screen size: 17-inch or more LCD Video Monitor Input: SDI Screen size: 17-inch or more HDV-VTR Recording/playback format: HDV, MiniDV Recording/playback media: MiniDV Tape Computer Workstation: Dual Xeon equivalent CPU, more than 4 GB RAM	Broadcast /Professional	2 sets
Browsing Terminal	Dual Xeon equivalent CPU, more than 4 GB RAM	Professional	4 sets
Administration Terminal	Dual Xeon equivalent CPU, more than 4 GB RAM	Professional	1 set

Equipment	Key Specifications	Grade	Q'ty
Non-Linear Editing System	Computer Display (2 sets) Resolution: SXGA or more Screen size: 17-inch or more LCD Video Monitor Input: SDI Screen size: 17-inch or more HD Digital Disc Recorder Recording/playback format: MPEG2 HD422 (50Mbps) Recording/playback media: optical disc Quantization bit: 8 bits Video I/F: SDI(SD/HD) Audio I/F: AES/EBU Computer Workstation HDD capacity: more than 4 TB Non-Linear Editing Software	Broadcast /Professional	4 sets
Multi-Format Video Server	Capacity: 150 hours/50 Mbps (more than 4 TB) RAID configuration: RAID10 Switching Hub (2 hubs): more than 20 ports, layer 3	Broadcast	1 set
HD-SDI Input Board	Slot configuration: PCI Express Video Signal Input/Output: SD/HD-SDI Sync Signal Input: PAL black or tri-level sync	Broadcast	2 Nos.
Network Management Application Software	Browsing application software license Software operation environment: Windows XP or later	Broadcast	1 set

[5] DVD Duplication System

This system is for duplicating video programs to DVDs for distribution to Regional Centres, Study Centres and students, as well as for producing master DVDs for duplication. The system will be installed in the Duplication Room [166]. The main equipment is as follows:

Master DVD Production System (2 sets)

Since the video programs produced in HD format cannot be duplicated to DVDs directly, the master DVDs for duplication shall be produced by converting the video programs produced in HD format to SD analog format at first. Then DVDs will be duplicated by using master DVDs. This system is to produce the master DVDs, consisting of a computer workstation, an external DVD drive, and a digital video monitor. Master DVDs will be produced by using analog output signals from the slave HD digital disc recorders which are a part of analog/digital format conversion system. When the HD digital disc recorder plays recorded video discs, the HD digital disc recorder will simultaneously read and output analog signals. The master

DVDs will be produced by recording the analog signals of HD digital disc recorder to be ingested to the master DVDs production system through the capturing software installed in the master DVDs production system. Final video quality evaluation will be done with a PAL signal that is output to the monitor.

Since the analog signal decoded by the HD digital disc recorder is captured directly, its video quality is good, thus making it usable as a master DVD.

The uninterruptible power supply (UPS) unit will be installed to prevent loss of data for each computer workstation during power failures. The capacity of UPS will be 1.5kVA equivalent to the power consumption of the computer workstation.

DVD Duplication System (1 set)

The scale of duplication will be to copy the approximately 3,000 DVDs necessary per year. As supplementing textbooks, duplication of DVDs will be done concurrently with textbooks preparation, mainly prior to the start of the first and second semesters in February to March and August to September. Therefore, the actual duplication production period is set at four months. Consequently, the equipment that can duplicate at least 750 DVDs in one month (approx. 40 per day) shall be procured. Therefore, one duplicator equipped with eight DVD drives so that eight discs can be automatically duplicated at the same time. (5 times duplication per day) Copy speed of DVD will be 18× speed/DVD.
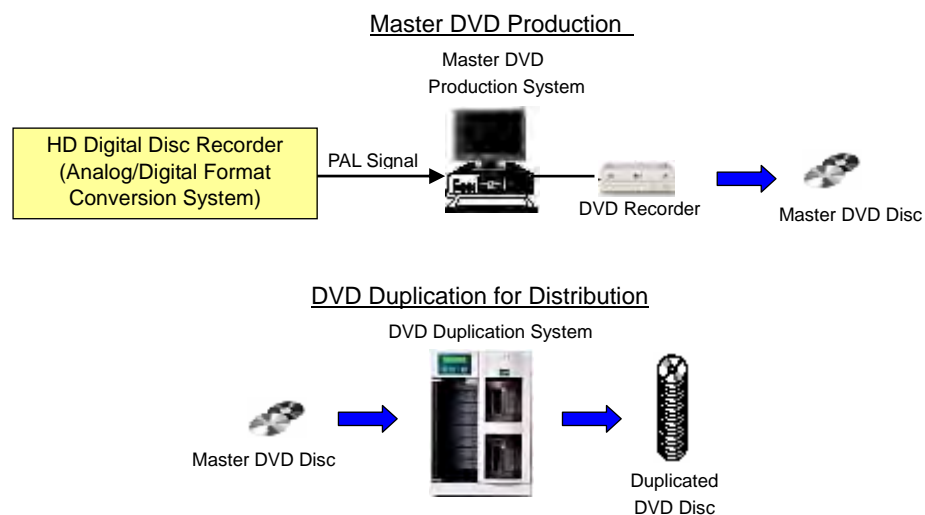
DVD Duplication Process Chart

System Interconnection Concept

This will be connected with analog/digital format conversion system by analog signals.

Main Equipment Configurations

Equipment	Key Specifications	Grade	Q'ty

Master DVD Production System	Computer Workstation configuration:
	    Xeon equivalent CPU, more than 4 GB
	    RAM/200 GB HDD
	Video Capture Functions:
	    HD/SD-SDI input/output, sync input
	DVD Authoring Software Functions:
	    Movie/DVD multi-menu production ability
		Professional	2 sets

DVD Duplication System	Type: fully automatic 100-disc auto loader Compatible formats: DVD-VIDEO, DVD-R Writer: 8 internal 18x speed DVD writers	Professional	1 set

[6]   Computer Graphics (CG) System

The main purpose of this system is to create backgrounds (set scenes) of video programs for the virtual studio system.   As there are two existing CG systems, the same quantity will also be procured under the Project so that operation efficiency will not be lowered.   They will be installed in Computer Graphics Room [145] and [146]

The application software installed will be CG industry standard software so that 3-D and 2-D graphics can be created easily.

Since operation of the CG system is complicated, and efficiency drops considerably if the operator does not look at the CG creation constantly while operating it, monitors for creation display and operation screen will be installed independently.

Additionally, a flat bed scanner will be installed for input from paper media.

The main equipment is as follows.

Graphics Workstation

This is a computer workstation for creating graphics.   It will have 24 GB of memory with improved graphics capabilities.

19-inch LCD Monitor

This is to be used in connection with the graphic workstation.   With a resolution of 1280 × 1024 (SXGA) or more, two monitors will be used for the creation display and operation screen showing creations separately.

Software for Graphic System

With the ability to handle 2 dimensions (2-D) and 3 dimensions (3-D) graphics, this software is to be used to produce background images of video programs produced by the virtual studio system.   Stable, global de facto standard software will be chosen.

Flat Bed Scanner

This A4 size flat bed scanner will have a resolution for 1200 dpi or more and will be used for input of 2D images that are used complementary of background images when creating background images.

Uninterruptible Power Supply (UPS)

UPS with 1.5kVA capacity which is the equivalent power consumption of graphics workstation will be installed to protect the computer system and data in the computer during power outages.
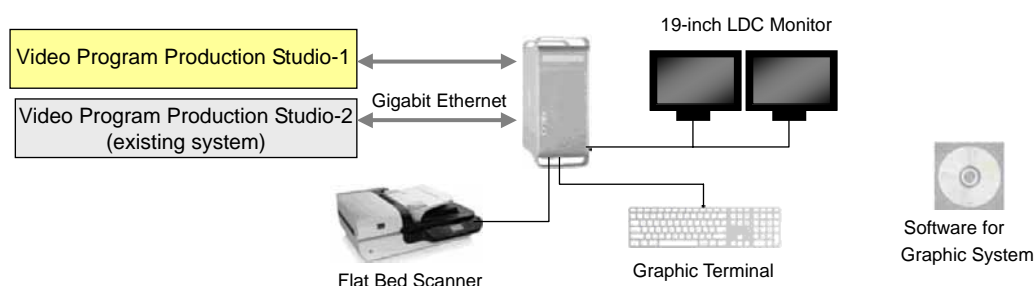
Process Chart of Background Production for Virtual Studio System

System Interconnection Concept

The created CG background images are to be used in Program Production Studio-1, but there will be no electrical interconnectivity.

Main Equipment Configurations   (I/F: Interface)

Equipment	Key Specifications	Grade	Q'ty
Graphics Workstation	CPU: Intel Xeon equivalent dual processor Memory: approx. 24 GB GPU memory: 2 GB or more I/F: PCI Express×16	Professional	2 Nos.
19-inch LCD Monitor	Type: Multi-scan LCD monitor Screen size: approx. 19-inch Resolution: 1280 × 1024 or more I/F: VGA (D-Sub) or DVI	Professional	4 Nos.

Application Software	Operating System: Windows XP or later
	2D software functions:
	    Photo retouching and paint
	3D software functions:
	    Modeling, rendering, animation
		Professional	2 Setrs

Flat Bed Scanner	Type: A4 flat bed scanner Resolution: approx. 1200 dpi Paper feeding: Document auto-feeder I/F: USB/Ethernet	Professional	2 Nos.

Equipment	Key Specifications	Grade	Q'ty
Uninterruptible Power Supply (UPS)	Type: Rack Mount Type (EIA 19-inch) Input voltage: 200 V to 240 V Output capacity: 1.5kVA or more Power supply method: Constant inverter Battery: Lead storage battery Communications: RS232	Professional	2 Nos.

[7] Measuring Equipment

Although a lot of digital equipment will be procured under the Project, the only measuring equipment currently owned by EMPC is superannuated and analog type only.   There is not any digital type measuring equipment to maintain the digital equipment.   Therefore, in order to keep the digital equipment to be procured under the Project in good condition for a long time, the minimum necessary digital measuring equipment will be introduced.

Even though the digital equipment is introduced, in case of audio signal, the digital audio signal will be converted to analog signal at the input and output ends.   Therefore, the audio analyzer to measure digital and analog audio signals will be introduced.   Measuring equipment will be stored and managed in the Maintenance Room [160].

Video Analyzer

With the following signal generator functions, this will be mainly used for maintaining the quality of the video transmission lines and for repair/adjustments during malfunctions of transmission lines.

(Function)

- Video test signal generator
- 16-channel audio signal generator
- SDI embedded audio signal output
- AES audio signal output

(Measurement item)

- SDI eye pattern, jitter measurement
- SDI de-embedded audio measurement
- AES audio measurement
- Various audio characteristics measurement

Digital Multi-Format Waveform Monitor

In contrast with the video analyzer, which mainly measures numerical characteristics, this measuring equipment is characterized by ease of checking intuitively through visual measurements.   It is used for maintenance, adjustment and repair of video

program production equipment.　However, it does not generate a test signal. Functions that can be measured are as follows: (Input signal: SD/HD-SDI, PAL analog, AES/EBU)

- Waveform monitor
- Vector scope
- Picture
- Eye pattern

Oscilloscope

This is the multi-purpose measuring equipment.　Not limited to television signals, it has an input band from direct current to high frequency (500 MHz) and can be used for a broad range of maintenance and inspections.

8-channel Audio Analyzer

Since the analog signals of the existing analog equipment and the digital signals of digital equipment procured under the Project will be mixed, A/D and D/A signal conversion will be performed at the interfaces.　Therefore, measurement of video and audio signal characteristics is indispensable to maintain signals in good condition. However, as EMPC does not have analog audio signal measuring equipment, the audio analyzer will be introduced.　It will automatically measure audio level, crosstalk, S/N ratio, etc. and display numerical values.

Reference Audio Monitor (with HD-SDI option)

With this measuring equipment, audio signal can be extracted from the SD-HDI signals in assessable tones by listening.　It is essential for monitoring audio signal of embedded audio transmission lines.

Clamp Meter

This is a tester that indirectly measures the electrical current of an AC power source. It is used to measure the power source load when installing the equipment.　In addition to measure load current, it is also used to measure the balance of 3-wire single phase power supply.

Digital Multi Meter

A general-purpose tester to measure voltage, current, and electrical resistance can be used for various purposes such as repairs and maintenance of the equipment.

Video Signal Generator

This is a high-precision signal generator that generates test signals including HD-SDI

test patterns and color bars necessary for adjustment of the equipment.

Tool Set

This consists of general tools and specialized tools used for equipment repair.   The alignment disc for the adjustment of HD digital disc recorder and alignment tape for HDV-VTR are included in these specialized tools.

Measuring Equipment and Tools for Maintenance and Adjustment of the Equipment

System Interconnection Concept

Since measuring equipment is used independently, there will be no interconnectivity in the system.

Main Equipment Configurations

Equipment	Key Specifications	Grade	Q'ty
Video Analyzer	Input/output format: SD/HD-SDI Test signal: More than 24 types Measurement items: Eye pattern/ jitter, etc.	Broadcast	1 No.
Digital Multi-Format Waveform Monitor	Monitor display: Waveform, vector, picture, eye pattern Input format: SD/HD-SDI, PAL analog, AES/EBU	Broadcast	1 No.
Oscilloscope	Type: 4-channel digital oscilloscope Frequency band: approx. 500 MHz Sample rate: approx. 10 GS/s	Professional	1 No.

8ch Audio Analyzer	Analog input/output: 8 channels
	Digital input/output:
	    1 channel, AES/EBU
	Measurement items:
	    Level/ crosstalk/ SN ratio/ THD+N,
	    etc.
		Broadcast	1 No.

Equipment	Key Specifications	Grade	Q'ty
Reference Audio Monitor with HD-SDI option	Type: Rack mounted audio monitor (EIA 19-inch) Input format: SD/HD-SDI, AES/EBU, Analog Meter: 2-channel bar graph with 12 or more segments	Broadcast	1 No.
Clump Meter	Measured AC voltage range: approx. 600V Measured alternating current range: 400A or more	Professional	1 No.
Digital Multi Meter	Measurement items: Voltage (direct/alternating voltage), current (direct/alternating voltage), resistance, conduction, condenser capacity I/F: RS232 or USB	Professional	1 No.
Video Signal Generator	Video signal output: 2 HD-SDI lines, 2 PAL lines Audio signal output: 4 AES/EBU lines	Broadcast	1 No.
Tool set	Special jigs for adjustments: Alignment disc (HD digital disc recorder), alignment tape (HDV-VTR) Kinds of tool: more than 70 types	Professional	1 Set

[8] Analog/Digital Format Conversion System

In changing the video recording media from tape to disc, the system for converting the large amount of recorded video programs currently stored in the library from tape to disc media will be introduced and installed in the Duplication Room [166]. For digitalizing the approximately 3000 existing video programs stored in the library, taking into consideration that the slave recorders of this system will be used commonly with master DVD production system as mentioned above, 1000 video programs produced before year 2000 (of which storage period has exceeded 10 years) will be converted in the first fiscal year (1000 video programs will be converted in 200 days per year. This means 5 video programs will be converted per day.). The remaining 2000 video programs will be converted at a rate of 500 every year from the second to fifth fiscal year. Conversion of video programs will be implemented over a period of five years.

For this system, three (3) existing SD-VTRs will be used on the master side, with three (3) HD digital disc recorders placed on the slave side to perform the digital conversion of video programs.

As this is a transitional period from analog to digital, conversion functions in the other direction -- from digital to analog, are also necessary. Therefore, a routing switcher will be

installed between the SD-VTR and HD digital disc recorder to make inter-conversion possible. The main equipment is as follows.

Up-Converter (for existing SD-VTR)

This is the connecting interface that will allow the continued use of the existing SD-VTR. The playback output signal of the existing SD-VTR will be converted to an HD-SDI signal with the up-converter and input to the HD digital disc recorder.

HD Digital Disc Recorder

The converted HD-SDI input signal from SD-VTR is recorded on disc in MPEG-2 HD422 format with the HD digital disc recorder. In addition, disc playback function shall also be possessed.

HD Routing Switcher

Up: Existing SD-VTR + Up-Converter   HD Digital Disc Recorder

Down: HD Digital Disc Recorder   Existing SD-VTR + Up-Converter

The routing switcher performs the above routing for inter-conversion of up/down lines. It will also be SD/HD applicable type.

Monitor Switcher

The monitor switcher connects to the audio, video and waveform monitors and switches the input and output of audio and video signals to monitor and control signal quality during format conversion. Using the routing switcher bus, the monitor switcher controls the monitor systems remotely with the X-Y control panel.

Monitor Speaker

This is a speaker for monitoring the audio signal selected by the monitor switcher. It will be equipped with bar graph display meter.

HD Multi-Format Monitor

This is SD/HD applicable type video display to monitor the video signal selected by the monitor switcher. It will have a resolution of 1280×768 or more so that HD video quality can be checked.

Digital Multi-Format Waveform Monitor

This is SD/HD applicable type waveform monitor to check the waveform of the video signal selected by the monitor switcher. This will be capable of multi-input, multi-display, and multi-monitoring for early response to irregularities in the transmission route or transmission signal.
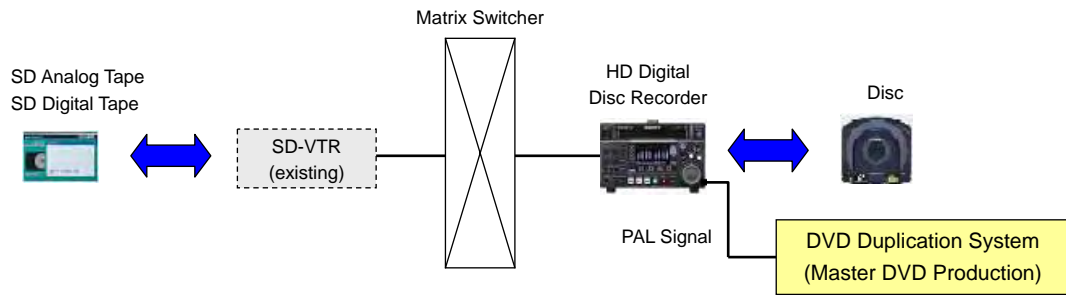
Analog/Digital Format Conversion Process Chart

System Interconnection Concept

Two (2) of three (3) slave HD digital disc recorders will be connected to the capturing computer for master DVD production system of the DVD duplication system by analog PAL signals.

Main Equipment Configurations   (I/F: Interface)

Equipment	Key Specifications	Grade	Q'ty
Up-Converter (for existing SD-VTR)	A/D conversion format: 　PAL analog/SD-SDI convert Quantization bit: 10 bits or more Up-Converter format: 　SD-SDI/HD-SDI convert Up-Converter audio functions: 　Audio ANC data passing	Broadcast	3 Nos.
HD Digital Disc Recorder	Recording/playback format: 　MPEG2 HD422 (50Mbps) Recording/playback media: Optical disc Quantization bit: 8 bits Digital video I/F: SDI Digital audio I/F: AES/EBU	Broadcast	3 Nos.
HD Routing Switcher	I/F: SD/HD-SDI (BNC), AES/EBU (BNC) Matrix size: 16×16 or more Control I/F: Coaxial cable or Ethernet cable Selection type: X-Y and multi bus control	Broadcast	1 No.
Monitor Switcher	Selection type: X-Y and multi bus control	Broadcast	1 No.
Monitor Speaker	Type: Rack mount type audio monitor (EIA 19-inch) Input format: SD/HD-SDI, AES/EBU, Analog Meter: 2-channel bar graph with12 or more segments	Broadcast	1 No.
HD Multi-Format Monitor	Type: LCD Monitor Screen size: more than 14-inch Resolution: 1280×768 or more Video input: PAL analog, SD/HD-SDI	Broadcast	1 No.
Digital Multi-Format Waveform Monitor	Monitor display: Waveform, vector, picture, status Monitor input: SD/HD-SDI Monitor input (for VE): 　SD/HD-SDI, PAL analog, AES/EBU Accessories: Rack mount kit	Broadcast	1 No.

[9] SD/HD Preview System

The produced video programs will be delivered to students through broadcasts or duplicated DVDs as the supplement materials.   However, before broadcast or duplication, it is necessary to evaluate the produced video programs to ensure that there are no problems academically or with the video quality.   To do this, an SD/HD applicable preview system will be introduced in the Preview Room [170], where the existing SD preview system has been installed.   The SD/HD preview system will be as follows:

- The existing SD-VTR will be diverted for SD video playback use.
- Unrelated to the previously mentioned program evaluation, the Preview Room may be widely used for lectures.   Taking this into account, in addition to one (1) set of SD/HD video projector, it will also be equipped with one (1) HD digital disc recorder, one (1) DVD player and one (1) HDV-VTR.
- This system will be connected to the routing switcher system installed at the Server Room [162] where all of the signal transmission lines assembled so that signals from the existing system can also be used.

The main equipment is as follows:

HD Video Projector

This projector will be capable of projecting SD signals (analog PAL), HD signals (1080/50i), and VGA signals from computers.   It also will be able to project on to the screen with a brightness level of 3600 lumens or above.   150-inch (aspect ratio 16:9) screen needed to check HD video programs will be included.

HD Digital Disc Recorder

This is to playback video programs recorded on disc to send video programs to the HD video projector.   This will be capable of handling MPEG-2 HD 422 (50 Mbps) and MPEG-HD (35/25 Mbps) compression formats.

HDV-VTR

This is to playback video programs recorded on MiniDV tape stored in the library.   It will be able to playback HDV format recorded by outdoor shooting and MiniDV format of existing video programs.

DVD Player

This is for playing and evaluating DVD video programs duplicated for distribution to students or recorded in Video Program Production Studio-1.   It will be capable of handling PAL format (Region Code 5) for DVD.

9-inch Multi-Format Monitor

This is a compact 9-inch monitor that can be used to check the video programs or other preview video in advance.

A/V Switcher with Audio Mixer

This will be able to function as a switcher for adjusting audio signals and video signals of video programs projected by the HD video projector.   It also will have volume adjustment functions and SD/HD up-conversion functions.   This switcher will be an easily movable type.   In addition, terminals in which microphones can be directly input, the phantom power source for condenser microphones built into the mixer are necessary. UPS with 1.5kVA capacity which is the equivalent power consumption of A/V switcher with audio mixer will also be installed to protect the computer system during power outages.

Condenser Microphones

Two (2) microphones and two (2) microphone stands are for the announcements of the emcee and the comments of the viewers when running a preview.   Condenser microphone is appropriate for use of preview; it will be omni-directional type.

Power Amplifier

This will be used to amplify announcements, comments and audio of preview programs.   The power capacity will be set based on the size (72 m^2) and capacity (75 people) of the Preview Room [170]
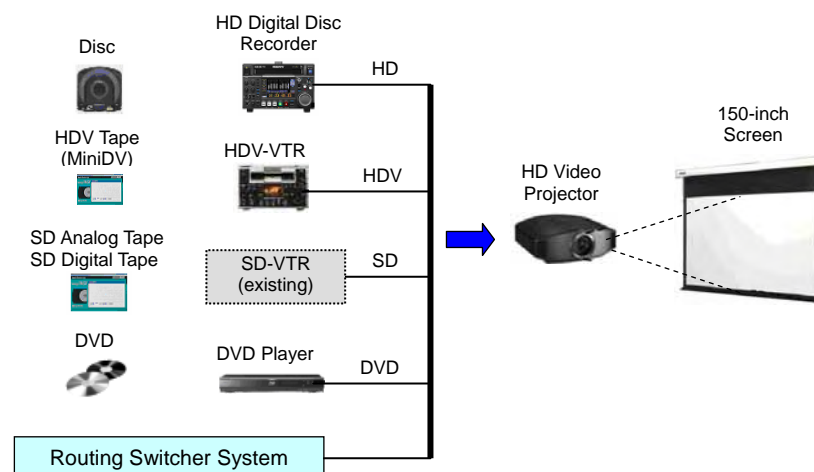
Video Program Evaluation Process Chart

System Interconnection Concept

Assuming that the Preview Room will be used for multiple purposes, a digital transmission

line will be installed between the Preview Room and the routing switcher at Server Room [162].

A system will be used in multi-purpose usage including direct viewing of GD-1, GD-2 programs and browsing of video programs stored in the existing servers.

Main Equipment Configurations

Equipment	Key Specifications	Grade	Q'ty
HD Video Projector	Projection method: 3-chip transmissive LCD or single-chip DLP Projection screen size: approx. 40 to 600 Light output: 3,600 lumens or more 150-inch screen included	Professional	1 set
HD Digital Disc Recorder	Recording/playback format: MPEG2 HD422 (50Mbps) Recording/playback media: Optical disc Quantization bit: 8 bits Digital Video I/F: SDI Digital Audio I/F: AES/EBU	Broadcast	1 No.
HDV-VTR	Recording/playback format: HDV, MiniDV Recording/playback media: Tape Quantization bit: 8 bits Digital Video I/F: SDI Digital Audio I/F: AES/EBU	Professional	1 No.
DVD Player	DVD video standard: PAL format, Region Code 5	Consumer	1 No.
9-inch Multi-Format Monitor	Screen size: 8 to 9 inch Resolution: 640×480 or more Video Input: PAL analog, SD/HD-SDI Accessories: Rack mount kit (EIA 19-inch)	Broadcast	1 No.

A/V Switcher with Audio Mixer	Video input/output:
	   PC RGB/SD-SDI/HD-SDI
	Audio input/output:
	   Analog 8 inputs/8 outputs
	A/V switcher functions:
	   Character generator/camera control
	Mixer configuration: Rack mount type
	Mixer input/output:
	   6 microphone inputs, 3 stereo outputs or more
		Professional	1 No.

Condenser Microphone	Polar pattern: Omni-directional Frequency response: 100Hz to 15kHz or more	Broadcast	2 Nos.

Power Amplifier	Output (8-ohm, 20 Hz to 20 kHz):
	   approx. 500 W + 500W
	Frequency response:
	   approx. 20Hz to 20kHz (±2dB)
	S/N ratio: 100 dB or more
		Professional	2 Nos.

[10] Spare Parts

Policy on spare parts

For parts replacement necessary for maintenance and repair of the equipment, especially those that require considerable time for procurement with a high level of urgency will be pre-stocked. In particular, amount for one year operation of wear-out parts for the equipment with mechanical moving parts will be prepared.

Video recording media is considered a consumable supply and enough stock will be prepared so that each system can operate without problems for one year.

Main Spare Parts Configurations

Equipment	Key Specifications	Grade	Q'ty
Spare Parts	Equipment: Camera / Switcher / Routing Switcher / HD Projector / Audio Mixer	Broadcast	1 set
Recording Media			
Disc for Video Program	Video recording capacity: over 23 GB	Broadcast	1300 Pcs.
Memory Card for Still Camera (4GB)	Still image recording capacity: over 4 GB	Consumer	6 Pcs.
Cassette for Mini DV	Tape length: over 75 m	Professional	100 Pcs.
DVD Disc	DVD capacity: 4.7 GB (one-sided/video use)	Consumer	3000 Pcs.

(6) Planned Equipment List

The list of planned equipment to be procured under the Project is shown in Table 2-6.

Table 2-6 Planned Equipment List

Item	Equipment	Specifications	Grade	Q'ty
1	Video Program Production Studio-1 (Virtual Video System)			
1.1	Digital SD/HD Color Camera			
(1)	3-Chip CCD SD/HD Color Camera	Image sensor: 2/3-inch 3-chip IT CCD	Broadcast	3 Nos.
(2)	Tripod Attachment with Fluid head for Virtual Application	Encoder input: Pan, tilt, zoom, focus	Broadcast	1 No.
(3)	Camera Adaptor	Function: Camera position adjustment	Broadcast	3 Nos.
(4)	Multi-Purpose HD Remote Camera	Image sensor: 1/3-inch 3-chip CCD	Professional	1 No.
(5)	Camera Remote Control Unit for 1.1.(4)	Control functions: Pan, tilt, zoom, focus	Professional	1 No.
(6)	6-inch Color HD View Finder	Type: Color LCD Size: 6-inch or more	Broadcast	3 Nos.
(7)	Zoom Lens			
(a)	Portable Zoom Lens	Magnification: more than 21×	Broadcast	2 Nos.

Item	Equipment	Specifications	Grade	Q'ty	
(b)	Portable Zoom Controller	Control: Focus, zoom	Broadcast	2	Nos.
(8)	Portable Zoom Lens for Virtual Application	Magnification: more than 21×	Broadcast	1	No.
(9)	Potable Zoom Controller for Virtual Application	Control: Focus, zoom	Broadcast	1	No.
(10)	Camera Control Unit for 1.1 (1)	I/F: Triaxial or optical fiber connector	Broadcast	3	Nos.
(11)	Camera Remote Control Panel	Function: Control of general camera function	Broadcast	3	Nos.
(12)	Pedestal	Material: Iron or aluminum	Broadcast	3	Nos.
(13)	Camhead (Included in Pedestal)	Load range: approx. 30kg	Broadcast	3	Nos.
(14)	Script Holder	Material: Steel (Iron)	Broadcast	3	Nos.
(15)	Camera Cable				
(a)	Cable for CCU to Camera Connector (CN) Plate	Type: Triaxial or optical fiber connector	Broadcast	3	Nos.
(b)	Cable for Camera CN Plate to Camera	Type: Triaxial or optical fiber connector	Broadcast	3	Nos.
(16)	Camera CN Plate	Material: Metal (iron, aluminum)	Broadcast	1	No.
(17)	Test Chart				
(a)	Test Chart Set	Gray scale: 16:9	Broadcast	2	Nos.
(b)	Test Chart Stand	Stand: Telescopic type	Broadcast	1	No.
(18)	Video Selector	Select button: more than 16	Broadcast	2	Nos.
(19)	Camera Command Network Unit				
(a)	Master Setup Unit	Setup control: more than 12	Broadcast	1	No.
(b)	Command Cable	Type: Ethernet	Broadcast	1	Set
(20)	Cyclorama for the Virtual Set	Color: Blue or green	Broadcast	1	Set
(21)	Virtual Processor with Software (1 camera virtual)				
(a)	Computer Workstation (with 1.5kVA UPS)	CPU: Dual Xeon equivalent CPU	Broadcast	2	Nos.
(b)	19-inch LCD Display	Screen size: 19-inch or more	Broadcast	2	Nos.
(c)	Calibration Software	Function: Virtual calibration	Broadcast	2	Nos.
(d)	Virtual Reality (VR)-Basic Software License	Basic software license	Broadcast	1	No.
(e)	3D Real-time Graphics Software License	3D graphics software license	Broadcast	1	No.
(f)	VR Camera Software	Function: Process for camera position (fixed camera without sensors)	Broadcast	2	Nos.
(g)	VR Camera Control Unit	Function: Camera control	Broadcast	1	No.
(h)	Computer Graphics (CG) Processor with Setup Library	Function: Process for CG	Broadcast	2	Nos.

Item	Equipment	Specifications	Grade	Q'ty
1.2	Digital Disc Recorder			
(1)	UP Converter (for existing SD-VTR)	Video input: SD-SDI (for PAL) Video output: HD-SDI (1080i/50 capable)	Broadcast	1 No.
(2)	HD Digital Disc Recorder	Recording/playback format: MPEG-2 HD 4:2:2 (50Mbps) Recording/playback media: Optical disc	Broadcast	3 Nos.
(3)	Rack Mount Kit	EIA 19-inch size	Broadcast	3 Nos.
(4)	Video Monitor (Rack Mount Type)	Screen size: 9-inch or more	Broadcast	4 Nos.
(5)	Audio Monitor Speaker (Rack Mount Type)	Type: Stereo, built-in amplifier	Professional	4 Nos.
(6)	TBC Remote Control Unit			
(a)	TBC Remote	Communication Port: RS-422	Broadcast	3 Nos.
(b)	Remote Control Panel	Transport control	Broadcast	3 Nos.
(c)	Remote Control Unit	Router cross point control	Broadcast	3 Nos.
(7)	Rack Mount Kit (Slide Rail Kit)	For existing SD-VTR	Broadcast	2 Nos.
1.3	Digital Video System			
(1)	HD Digital Production Switcher & Effecter (2D, 3D)			
(a)	HD Digital Video Switcher (16ch Input)	Mix/Effect BUS: 1.5 ME Video inputs: 16 inputs or more	Broadcast	1 No.
(b)	Input/Output Connector Board	For 1.3 (1) (a)	Broadcast	1 Set
(c)	Control Panel	For 1.3 (1) (a)	Broadcast	1 Set
(d)	Device Control Unit	For 1.3 (1) (a)	Broadcast	1 Set
(e)	Frame Memory Board	For 1.3 (1) (a)	Broadcast	1 Set
(f)	DME Board	For 1.3 (1) (a) Effect: 2D, 3D	Broadcast	1 Set
(2)	Video Distribution Amplifier (VDA), Digital Distribution Amplifier (DDA), VJ, Patch Cable			
(a)	Interface Unit	Analog signal: PAL Digital signal: SD-SDI, HD-SDI	Broadcast	1 Set
(b)	Digital Video Distribution Board	HD-SDI applicable	Broadcast	1 Set
(c)	Audio/Video Interface Board (Included in Audio/Video MXP Board)	Embedded AES/EBU 4ch or more	Broadcast	1 Set
(d)	Patch Panel	Number of jacks: more than 26	Broadcast	1 Set
(e)	Patch Cable (30cm)	Coaxial cable applicable	Broadcast	1 Set
(f)	Patch Cable (50cm)	Coaxial cable applicable	Broadcast	1 Set
(g)	Patch Cable (100cm)	Coaxial cable applicable	Broadcast	1 Set

Item	Equipment	Specifications	Grade	Q'ty	
(3)	Rack & Accessories				
(a)	System Rack with Channel Base	EIA 19-inch	Broadcast	1	Set
(b)	Input/Output (I/O) Connecting Plate	Connector: BNC, XLR, D-sub, RJ45, etc.	Broadcast	1	Set
(c)	Mini Rack for Lighting Director (LD)/Video Engineer (VE) Switcher Panel	Size: less than 24RU Depth: between 700mm to 800mm	Broadcast	2	Nos.
(4)	Console	EIA 19-inch Operator: Switcher, VE, PD, Time keeper	Broadcast	1	Set
(5)	Video Monitor Switcher				
(a)	Video Monitor Switcher Shelf	Matrix: 32 × 32	Broadcast	1	No.
(b)	Select Panel for VE	Coaxial cable or Ethernet cable	Broadcast	1	No.
(c)	Select Panel for LD	Coaxial cable or Ethernet cable	Broadcast	1	No.
(6)	UP/Down Converter				
(a)	Video Interface Unit	Redundant power supply	Broadcast	1	No.
(b)	625 HD Up-Converter	Input: SD-SDI (PAL)	Broadcast	2	Nos.
(c)	HD 625 Down Converter	Input: HD-SDI (1080/50i)	Broadcast	4	Nos.
(d)	DVD Recorder	PAL analog	Consumer	2	Nos.
1.4	Character Generator				
(1)	HD Character Generator	Hard disk capacity: 300 GB or more	Broadcast	1	No.
(2)	14-inch HD Video Monitor	Screen size: 14-inch or more	Broadcast	1	No.
(3)	17-inch Multi-scan Display	Screen size: 17-inch or more	Professional	1	No.
(4)	Table	Materials: Steel and wood	Professional	1	No.
(5)	Take Switch Panel	Function: Control of take, next, back, skip	Broadcast	1	No.
(6)	Digital Scan Converter with Genlock	Input: Analog RGBHV	Professional	3	Nos.
(7)	Uninterrupted Power Supply (UPS)	Capacity: 1.5kVA Type: Rack mount (EIA 19-inch)	Professional	1	No.
1.5	Digital Audio System				
(1)	Digital Audio Mixer (20 inputs)	Mic./Line Input: 20 or more	Professional	1	No.
(2)	A/D Converter	Quantization bit: 24 bits or more	Professional	1	Set
(3)	D/A Converter	Quantization bit: 24 bits or more	Professional	1	Set
(4)	Memory Recorder	Quantization bit: 16 bits or more	Professional	3	Nos.
(5)	CD Player	Output: Analog (balanced)	Professional	2	Nos.
(6)	Audio Monitor Speaker	Type: 2 way, Built-in amplifier	Professional	1	Pair
(7)	Audio Effecter	Quantization bit: 24 bits or more	Professional	2	Nos.
(8)	Digital Telephone Hybrid	No. of line: more than 1 line	Professional	1	No.

Item	Equipment	Specifications	Grade	Q'ty
(9)	Rack	EIA 19-inch	Broadcast	1 Set
(10)	Audio Sync Generator (Word Sync)	Output: DARS, 48kHz Word clock	Broadcast	1 No.
(11)	Microphone			
(a)	Lavaliere Microphone	Omni-directional	Broadcast	8 Nos.
(b)	Dynamic Microphone	Hyper cardioid	Broadcast	4 Nos.
(c)	Condenser Microphone	Omni-directional / Hyper cardioid	Broadcast	6 Nos.
(d)	Gun Microphone	Strong hyper cardioid	Broadcast	1 No.
(12)	Wireless Microphone System			
(a)	Wireless Microphone Transmitter			
a)	Handy Microphone Transmitter	Frequency: 800MHz band	Broadcast	3 Nos.
b)	Lavaliere Microphone Type Transmitter	Frequency: 800MHz band	Broadcast	1 No.
(b)	UHF Synthesized Tuner			
a)	Synthesized Tuner Base Unit	Type: Built-in tuner unit	Broadcast	1 No.
b)	Synthesized Tuner Unit	Frequency: 800MHz band No. of Receiving CH: 4	Broadcast	4 Nos.
c)	Antenna Divider	Divide Port: 4	Broadcast	1 No.
d)	Antenna	Type: Diversity	Broadcast	1 No.
(13)	Microphone Stand			
(a)	Boom Stand (Large size, for Gun Microphone)	Type: 2-step boom dolly	Broadcast	1 No.
(b)	Floor Stand	Type: Straight	Broadcast	3 Nos.
(c)	Table Stand	Type: Straight	Broadcast	6 Nos.
(14)	Microphone Cable			
(a)	Microphone Cable (20m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	10 Nos.
(b)	Microphone Cable (10m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	10 Nos.
(c)	Microphone Cable (5m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	10 Nos.
(d)	Multi Cable (30m, 8 pairs with CN-Box & Reel)	Connector type: NK27-21C	Broadcast	1 No.
(15)	Microphone Connector Plate	Connector type: XLR-3-31, XLR-3-32, NK27-32S	Broadcast	1 No.
1.6	Video Sync System			
(1)	Digital Video Sync Generator	External sync signal output: 3 lines for PAL black/3 level sync	Broadcast	2 Nos.
(2)	Sync Distribution Amplifier for HD	Frequency range: till 30MHz	Broadcast	1 No.
(3)	Changeover Unit	for 1.6 (1)	Broadcast	1 No.

Item	Equipment	Specifications	Grade	Q'ty	
1.7	Monitoring System (Audio/Video)				
(1)	14-inch HD Video Monitor	Resolution: 1280×768 or more	Broadcast	24	Nos.
(2)	20-inch HD Video Monitor (HD-SDI input)	Resolution: 1600×1024 or more	Broadcast	4	Nos.
(3)	50-inch Studio Monitor with Accessories (wall mount & stand)	Resolution: 1920×1080 or more	Professional	2	Nos.
(4)	Digital Multi-Format Waveform Monitor with Accessories				
(a)	Digital Multi-Format Waveform Monitor	Display function: Waveform, vector, picture, status	Broadcast	5	Nos.
(b)	Rack Mount Kit	EIA 19-inch	Broadcast	1	Set
(c)	1/2EIA Blank Panel	EIA 19-inch	Broadcast	1	Set
(5)	Audio Monitor Speaker with Amplifier for Mixer (Stereo)	Type: 2 way, Built-in amplifier	Professional	1	Pair
(6)	Audio Monitor Speaker for VE & LD (Stereo)	Type: 2 way, Built-in amplifier	Professional	2	Pairs
(7)	Audition Monitor Speaker (Stereo)	Type: 2 way, Built-in amplifier	Professional	1	Pair
(8)	Studio Audio Monitor Speaker with Amplifier & Stand (Stereo)	Type: 2 way, Built-in amplifier	Professional	1	Pair
(9)	Studio Talk Back Speaker	Type: Full range, Built-in amplifier	Professional	1	Set
(10)	Studio Foldback Speaker	Type: 2way, Buffer-in Amplifier	Professional	1	Pair
(11)	Multi-Format Master Video Monitor				
(a)	Multi-Format Master Video Monitor (14-inch)	Resolution: 1920×1080 or more Input: SDI	Broadcast	1	No.
(b)	NTSC/PAL Input Adaptor	Input: PAL	Broadcast	1	No.
(12)	Air Monitor	Screen size: 14-inch or more	Consumer	1	No.
(13)	Monitor Shelf		Broadcast	1	Set
(14)	A/V Monitor Connector Panel	Connector: Video: BNC Audio: XLR or Multi CN	Broadcast	1	Set
(15)	Stereo Headphone	Type: Airtight dynamic	Professional	7	Nos.
1.8	Intercommunication System				
(1)	Studio Intercommunication System (including UPS)	Matrix: more than 32 ports UPS: 1.5kVA	Broadcast	1	No.
(2)	Head Set				
(a)	Wired Head Set	Type: Dual muff, airtight	Broadcast	7	Nos.
(b)	Wireless Head Set	Type: Dual muff, airtight	Broadcast	5	Nos.
(c)	2.4GHz Base Station with Antenna	Frequency: 2.4GHz band	Broadcast	1	No.
(d)	2.4GHz Beltpack with Battery	Frequency: 2.4GHz band	Broadcast	5	Nos.
(e)	Battery Charger	Belt pack type	Broadcast	1	No.

Item	Equipment	Specifications	Grade	Q'ty	
(3)	Microphone	Type: Goose neck	Broadcast	9	Nos.
1.9	On-Air Light and Tally System				
(1)	On-Air Tally Logic	Circuit: more than 64 (input/output)	Broadcast	1	No.
(2)	On-Air Tally Light	Display: Red or Green LED	Broadcast	27	Nos.
(3)	On-Air Light for Studio Floor and Entrance	Display: Red LED	Broadcast	7	Nos.
1.10	Virtual Set with Accessories				
(1)	Remote Control Computer Workstation with Software & UPS	CPU: Xenon quad core equivalent CPU UPS: 1.5kVA	Broadcast	1	No.
(2)	Switching Hub	1000BASE-T	Professional	1	No.
(3)	SD/HD Chroma Keyer System	HD-SDI/SD-SDI Function: Chroma key	Broadcast	1	No.
(4)	SD/HD Video Delay (with rear connector, power supply)	HD-SDI/SD-SDI Delay: HD-SDI, more than 20 sec.	Broadcast	4	Nos.
(5)	Table, VR Panel and Power Distributor	Voltage: 230V	Broadcast	3	Nos.
1.11	Lighting Equipment				
(1)	Fluorescent Light with Barn Doors (2 Tubes, more than 80W)	2-tube type Rating: more than 80W	Broadcast	30	Nos.
(2)	Fluorescent Light with Barn Doors (4 Tubes, more than 160W)	4-tube type Rating: more than 160W	Broadcast	40	Nos.
(3)	Fluorescent Light with Barn Doors (6 Tubes, more than 240W)	6-tube type Rating: more than 240W	Broadcast	20	Nos.
(4)	Dimmer Control Unit (including Dimmer Control Panel)	Circuit: more than 90 (simultaneous control) Preset fader: more than 80	Broadcast	1	Set
(5)	Fluorescent Light Spare Tube (more than 40W)	Rating: more than 40W	Broadcast	340	Pcs.
(6)	Accessories	Including Luxmeter	Broadcast	1	Set
2	Field Recording (ENG) System				
2.1	HD Digital Camera System				
(1)	HD Digital Portable Camcorder				
(a)	HD Digital Portable Camcorder	Image sensor: 2/3-inch 3-chip IT CCD) Recording/playback media: Optical disc	Broadcast	3	Nos.
(b)	Ethernet Adaptor	Ethernet	Broadcast	3	Nos.

Item	Equipment	Specifications	Grade	Q'ty
(c)	SDI Output Function	HD-SDI	Broadcast	3　Nos.
(d)	Pull-down (24P shooting) Function	Equivalent to 24 frames, progressive type	Broadcast	3　Nos.
(e)	Color View Finder	Size: more than 3.5-inch	Broadcast	3　Nos.
(f)	Tripod Attachment	Weight: less than 1kg	Broadcast	3　Nos.
(g)	Elect ret Condenser Microphone	Hyper cardioid	Broadcast	3　Nos.
(h)	Microphone Cable	For 2.1 (1) (g)	Broadcast	3　Nos.
(2)	27×Zoom Lens (with ×2 extender and Wide Angle Lenz)	Magnification: more than 22×	Broadcast	3　Nos.
(3)	UV Filter	Size: φ105mm	Broadcast	3　Nos.
(4)	Rechargeable Battery Pack	Capacity: more than 90Wh	Broadcast	18　Nos.
(5)	Battery Charger	4 channel simultaneous boost charge	Broadcast	6　Nos.
(6)	Power Adaptor			
(a)	AC Power Adaptor	AC: 230V DC power: more than 100W	Broadcast	3　Nos.
(b)	DC Power Cable	For 2.1 (6) (a)	Broadcast	3　Nos.
(7)	Carrying Case (for Camcorder)	Shock absorbed shoulder back type	Broadcast	3　Nos.
(8)	Tripod/Head/Dolly/Adaptor with Portable Case	Load: approx. 14kg	Broadcast	3　Nos.
(9)	Field Cover and Rain Jacket			
(a)	Field Cover	3D meshed micro-fiber	Broadcast	3　Nos.
(b)	Rain Jacket	Transparent type, water proof	Broadcast	3　Nos.
2.2	9-inch Video Monitor			
(1)	9-inch Video Monitor	Display size: 8 to 9-inch Resolution: more than 640×480	Broadcast	3　Nos.
(2)	ENG Kit	Light shading hood, carrying handle	Broadcast	3　Nos.
(3)	Rechargeable Battery Pack	Capacity: more than 90Wh	Broadcast	6　Nos.
(4)	Battery Adaptor	4 channel simultaneous boost charge	Broadcast	2　Nos.
2.3	UHF Synthesizer Transmitter	Frequency: 800MHz band Belt pack type	Broadcast	3　Nos.
2.4	UHF Synthesizer Tuner	Slot-in type	Broadcast	3　Nos.
2.5	Microphone			
(1)	Dynamic Microphone	Omni-directional	Broadcast	3　Nos.
(2)	Gun Microphone with Carrying Case		Broadcast	
(a)	Gun Microphone	Strong hyper cardioid	Broadcast	3　Nos.
(b)	Carrying Case	Shock absorbed kid bag	Broadcast	3　Nos.

Item	Equipment	Specifications	Grade	Q'ty	
(3)	Hand Grip		Broadcast	3	Nos.
(4)	Window-shield for Gun Microphone	Suspension, Wind proof, Wind jammer	Broadcast	3	Nos.
(5)	Fishpole				
(a)	Fishpole	4-point suspension type	Broadcast	3	Nos.
(b)	Fishpole Adaptor	4-point suspension type	Broadcast	3	Nos.
(6)	Wireless Microphone				
(a)	Wireless Transmitter	Frequency: 800MHz band	Broadcast	3	Nos.
(b)	Lavaliere Microphone	Frequency response: 100Hz to 15kHz or more	Broadcast	3	Nos.
2.6	Microphone Cable				
(1)	Microphone Cable (10m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	3	Nos.
(2)	Microphone Cable (5m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	3	Nos.
(3)	Microphone Cable (3m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	3	Nos.
(4)	Microphone Cable (1.5m)	Connector type: XLR-3-11C-XLR-3-12C	Broadcast	3	Nos.
2.7	Stereo Headphone	Type: Airtight dynamic	Professional	3	Nos.
2.8	Lighting Equipment				
(1)	AC Operated Cool Light	2 fluorescent light tubes	Broadcast	3	Nos.
(2)	Spare Lamp	27W	Broadcast	18	Pcs.
(3)	Accessories	Telescopic Pole, Reflector, Filter, etc.	Broadcast	3	Sets
2.9	Portable Audio Mixer				
(1)	Portable Audio Mixer	Type: Analog 4-input/2-output	Broadcast	1	No.
(2)	AC Power Adaptor	Output power: 100W or more	Broadcast	1	No.
(3)	Battery Case	V mount type	Broadcast	1	No.
(4)	Rechargeable Battery	Lithium type	Broadcast	3	Nos.
(5)	Battery Charger	For 2.9 (4)	Broadcast	1	No.
2.10	MiniDV/HDV Camcorder with Accessories	Image sensor:1/3-inch CMOS or CCD Recording/playback format: HDV, DV	Professional	3	Nos.

Item	Equipment	Specifications	Grade	Q'ty
2.11	Digital Still Camera with Zoom Lens	Effective pixels: more than 12 mega pixels Recording media: Memory card	Consumer	3 Nos.
3	**Routing Switcher System**			
3.1	Routing Equipment			
(1)	Digital Routing Switcher (64-input×64-output)	I/F: HD/SD-SDI, BNC Matrix size: more than 64 × 64	Broadcast	1 No.
(2)	20-inch Digital Video Monitor	Resolution: more than 1600×1024	Broadcast	2 Nos.
(3)	Digital Multi-Format Waveform Monitor	Display: Waveform, vector, picture, status	Broadcast	1 No.
(4)	Rack	EIA 19-inch	Broadcast	1 No.
3.2	Video Sync System			
(1)	HD Digital Sync Signal Generator	External sync signal input: PAL black/3 level sync Analog sync signal output: PAL black/ 3 level sync, more than 3 lines	Broadcast	5 Nos.
(2)	Sync Signal Distribution Amplifier	Frequency range: till 30MHz Output: more than 4 (BNC)	Broadcast	1 Set
3.3	Patch Panel, A/D Converter, D/A Converter			
(1)	Patch Panel	Video patch type: HD-SDI Number of video jacks: more than 26	Broadcast	7 Nos.
(2)	Patch Cable	Coaxial cable	Broadcast	1 Set
(3)	Interface Unit	Slot: 10 or more Redundant power supply	Broadcast	1 Set
(4)	A/D and HD-SDI Up-Converter	A/D type: PAL/SD-SDI/HD-SDI 2-step conversion Quantization bit: 10 bits or more	Broadcast	2 Nos.
(5)	HD-SDI Down Converter and D/A	Down converter: HD-SDI/SD-SDI/PAL 2-step conversion Processing time: within 1 frame	Broadcast	2 Nos.
(6)	HD-SDI SDI (for PAL) Converter	Down converter: HD-SDI/SD-SDI/PAL 2-step conversion Processing time: within 1 frame	Broadcast	2 Nos.

Item	Equipment	Specifications	Grade	Q'ty
4	Video Common sharing Network (Video Server System)			
(1)	SD Ingest Terminal with 17-inch Video Monitor (2sets)	Existing SD-VTR to be used		
(a)	17-inch LCD Computer Display	Resolution: 1280×1024 or more	Professional	2　Nos.
(b)	17-inch LCD Video Monitor	Resolution: 1280×768 or more	Broadcast	2　Nos.
(c)	Up-Converter	Output: HD-SDI	Broadcast	2　Nos.
(d)	Computer Workstation	CPU: dual Xeon equivalent CPU	Broadcast	2　Nos.
(e)	UPS	Capacity: 1.5kVA	Professional	2　Nos.
(2)	HD Ingest Terminal with HD Digital Disc Recorder and 17-inch Monitor (2 sets)			
(a)	17-inch LCD Computer Display	Resolution: 1280×1024 or more	Professional	2　Nos.
(b)	17-inch LCD Video Monitor	Resolution: 1280×768 or more	Broadcast	2　Nos.
(c)	HD Digital Disc Recorder	Recording/playback media: optical disc	Broadcast	2　Nos.
(d)	Computer Workstation	CPU: Dual Xeon equivalent CPU	Broadcast	2　Nos.
(e)	UPS	Capacity: 1.5kVA	Professional	2　Nos.
(3)	HDV Ingest Terminal with HDV-VTR and 17-inch Video Monitor (2 sets)			
(a)	17-inch LCD Computer Display	Resolution: 1280×1024 or more	Professional	2　Nos.
(b)	17-inch LCD Video Monitor	Resolution: 1280×768 or more	Broadcast	2　Nos.
(c)	HDV-VTR	Recording/playback media: MiniDV tape	Professional	2　Nos.
(d)	Computer Workstation	CPU: Dual Xeon equivalent CPU	Broadcast	2　Nos.
(e)	UPS	Capacity: 1.5kVA	Professional	2　Nos.
(4)	Browsing Terminal (including 1.5kVA UPS)	CPU: Dual Xeon equivalent CPU	Broadcast	4　Nos.
(5)	Administration Terminal (including 1.5kVA UPS)	CPU: Dual Xeon equivalent CPU	Broadcast	1　No.
(6)	Non-Linear Editing System with HD Digital Disc Recorder and 17-inch Video Monitor (4 sets)			
(a)	17-inch LCD Computer Display	Resolution: 1280×1024 or more	Professional	8　Nos.
(b)	17-inch LCD Video Monitor	Resolution: 1280×768 or more	Broadcast	4　Nos.
(c)	HD Digital Disc Recorder	Recording/playback media: optical disc	Broadcast	4　Nos.
(d)	Computer Workstation	CPU: Dual Xeon equivalent CPU	Broadcast	4　Nos.
(e)	Non-Linear Editing Software		Broadcast	4　Nos.
(f)	UPS	Capacity: 1.5kVA	Professional	4　Nos.
(7)	Multi-Format Video Server			
(a)	Multi-Format Video Server	Capacity: 4TB or more	Broadcast	1　No.

Item	Equipment	Specifications	Grade	Q'ty
	(150hours@50Mbps)	RAID: RAID 10		
(b)	Switching HUB	Type: 20 port or more, Layer 3	Professional	1　No.
(c)	UPS	Capacity: 1.5kVA	Professional	1　No.
(8)	HD-SDI Input Board	Input/output: HD/SD-SDI Sync input: 　PAL black or 3 level sync	Broadcast	2　Nos.
(9)	Network Management Application Software	Software license for each terminal	Broadcast	1　Set
5	DVD Duplication System			
(1)	Master DVD Production System (including 1.5kVA UPS)	Configuration: 　Xeon equivalent CPU, more than 　4 GB RAM/200 GB HDD Video capture functions: 　HD/SD-SDI input/output, sync 　input	Professional	2　Sets
(2)	DVD Recorder	Built-in 3.5-inch bay type	Professional	2　Nos.
(3)	Digital Video Monitor	Screen size: 14-inch or more Resolution: 1280×768 or more Input: PAL, SDI	Broadcast	2　Nos.
(4)	DVD Duplication System	Type: fully automatic 100-disc auto 　loader Writer: 8 internal 18× speed DVD 　writers	Professional	1　No.
6	Computer Graphics System			
(1)	Graphics Workstation	CPU: Intel Xeon equivalent dual 　processor Memory: approx. 24 GB	Broadcast	2　Nos.
(2)	19-inch LCD Monitor	Resolution: 1280 × 1024 or more I/F: VGA (D-Sub) or DVI	Professional	4　Nos.
(3)	Software for Graphic System	2D & 3D software functions	Broadcast	2　Sets
(4)	Flat Bead Scanner	Type: A4 Flat Bed Scanner Resolution: approx. 1200 dpi	Professional	2　Nos.
(5)	UPS	Capacity: 1.5kVA	Professional	2　Nos.
7	Measuring Equipment			
(1)	Digital Video Analyzer	Measurement items: 　waveform/ eye pattern/ jitter, etc.	Broadcast	1　No.
(2)	Digital Multi-Format Waveform Monitor	Monitor display: 　Waveform, Vector, Picture, Eye 　pattern	Broadcast	1　No.

Item	Equipment	Specifications	Grade	Q'ty
(3)	Oscilloscope	Type: 4-channel digital oscilloscope Frequency band: approx. 500 MHz	Professional	1 No.
(4)	8ch Audio Analyzer	Measurement items: Level/ crosstalk/ SN ratio/THD+N, etc.	Broadcast	1 No.
(5)	Reference Audio Monitor with HD-SDI Option	Input format: HD/SD-SDI, AES/EBU, analog Meter: 2-channel bar graph with 12 or more segments	Broadcast	1 No.
(6)	Clump Meter	Measured AC voltage range: approx. 600V Measured alternating current range: 400A or more	Professional	1 No.
(7)	Digital Multi Meter	Measurement items: Voltage (direct/alternating currents), current (direct/alternating current), resistance, conduction, condenser capacity	Professional	1 No.
(8)	Video Signal Generator	Video signal output: 2 HD-SDI lines, 2 PAL lines Audio signal output: 4 AES/EBU lines	Broadcast	1 No.
(9)	Tool Set (including Coaxial Connector Clump Tool)	Shoulder case type More than 70 items	Professional	1 Set
8	Analog/Digital Format Conversion System			
(1)	Up-Converter (SDI to HD-SDI) for existing SD-VTR	A/D conversion format: PAL analog/SD-SDI convert Quantization bit: 10 bits or more	Broadcast	3 Nos.
(2)	HD Digital Disc Recorder	Recording/playback format: MPEG2 HD422 (50Mbps) Recording/playback media: Optical disc	Broadcast	3 Nos.
(3)	HD Routing Switcher	I/F: HD/SD-SDI (BNC), AES/EBU (BNC) Matrix size: 16 × 16 or more	Broadcast	1 No.
(4)	Monitor Switcher	Selection type: X-Y and multi bus control	Broadcast	1 No.
(5)	Monitor Speaker	Type: Rack Mount Type Audio Monitor Input format: HD/SD-SDI, AES/EBU, analog	Professional	1 No.

Item	Equipment	Specifications	Grade	Q'ty
(6)	HD Multi-Format Monitor	Type: Rack Mount Type Audio Monitor Input format: HD/SD-SDI, AES/EBU, analog	Broadcast	1 No.
(7)	Digital Multi-Format Waveform Monitor	Monitor display: Waveform, vector, picture, status Monitor input: HD/SD-SDI	Broadcast	1 No.
9	SD/HD Preview System			
(1)	HD Video Projector (including 150-inch (16:9) Screen)	Projection screen size: approx. 40 to 600-inch Light output: 3,600 lumens or more	Professional	1 No.
(2)	HD Digital Disc Recorder	Recording/playback format: MPEG2 HD422 (50Mbps) Recording/playback media: Optical disc	Broadcast	1 No.
(3)	HDV-VTR	Recording/playback media: MiniDV tape	Professional	1 No.
(4)	DVD Player	DVD video standard: PAL format, region code 5	Consumer	1 No.
(5)	9-inch Multi-Format Monitor	Screen size: 8 to 9 inch Resolution: 640×480 or more	Broadcast	1 No.
(6)	A/V Switcher with Audio Mixer	Audio input/output: Analog – 8 inputs/8 outputs A/V switcher functions: Character generator/camera control	Professional	1 No.
(7)	Graphic Equalizer	1/3 octave/30 band equalizer Frequency response: 100Hz to 15kHz or more	Professional	2 Nos.
(8)	Condenser Microphone	Omni-directional/unidirectional Frequency response: 100Hz to 15kHz or more	Broadcast	2 Nos.
(9)	Microphone Stand	Strait type Height: 800mm to 1600mm	Broadcast	2 Nos.
(10)	Power Amplifier	Output (8Ω, 20 Hz to 20 kHz): approx. 500 W + 500W Frequency response: approx. 20Hz to 20kHz ($\pm$2dB)	Professional	2 Nos.
(11)	Audio Speaker	Type: 2 way Allowable input power: approx. 500W	Professional	2 Pairs
(12)	Rack	EIA 19-inch	Broadcast	1 No.
(13)	UPS	Capacity: 1.5kVA	Professional	1 No.

Item	Equipment	Specifications	Grade		Q'ty
10	Spare Parts				
(1)	For 3CCD SD/HD Color Camera				
(a)	Optical Filter Unit		Broadcast	1	No.
(b)	Grip		Broadcast	1	No.
(c)	Inside Cover Assembly		Broadcast	1	No.
(d)	Shoulder Pad Assembly		Broadcast	1	No.
(e)	Service Manual		Broadcast	1	No.
(2)	Redundant Power Supply for HD Digital Video Switcher		Broadcast	1	No.
(3)	Redundant Power Supply for Digital Routing Switcher		Broadcast	1	No.
(4)	Spare Lamp for HD Video Projector		Professional	5	Nos.
(5)	Fader Knob for Digital Audio Mixer		Professional	20	Nos.
(6)	For Intercom				
(a)	AC Adaptor for User Panel			2	Nos.
(b)	Headset			2	Nos.
(7)	Alignment Disc for HD Digital Disc Recorder			1	No.
(8)	For HDV/MiniDV Recorder				
(a)	Tape Guide Adjustment Driver		Professional	1	No.
(b)	Tape Path Adjustment Board		Professional	1	No.
(c)	Power Supply Cable for Tape Path Tool		Professional	1	No.
(d)	Small Mirror for Adjustment		Professional	1	No.
(e)	Cleaning Cloth		Professional	1	No.
(f)	DC Regulated Power Supply		Professional	1	No.
(g)	HDV Alignment Tape		Professional	1	No.
(h)	MiniDV Alignment Tape		Professional	1	No.
(9)	Recording Media				
(a)	Disc for Video Program		Broadcast	1300	Pcs.
(b)	Memory Card for Still Camera (4GB)		Consumer	6	Pcs.
(c)	Cassette for Mini DV		Industrial	100	Pcs.
(d)	DVD Disc		Consumer	3000	Pcs.
11	Installation Materials			1	Lot

2-2-2-4   Facility Plan

The existing building of EMPC, including power supply and air conditioning facilities were constructed by Japan's Grant Aid in 1993.   Rooms used for the Administration Unit and Research/Survey Unit that are not directly related to program production have been designed and constructed with a design and structure plan that will allow the IGNOU side to expand in the future.

From 2000, broadcasting and transmission activities have been added at EMPC, making it necessary to alter the usage purpose for various rooms.   Building additions were made in 2002, and in 2004, the Administration Unit offices and a portion of the Research/Survey Unit were housed within the same facility.   Gyan Darshan Transmission Room is placed on the north side and the south side is used as a storage facility.   In addition, during the preparatory survey period for the Project, building expansion work was done on the second floor courtyard to supplement the insufficient number of rooms.

These expansions and modifications to facilities, as well as maintenance management are implemented by the Campus Construction and Maintenance Division (CCMD), which is a part of the IGNOU organization.   With this, the buildings are kept in good condition and the ancillary facilities are operated and managed well.

(1)   Existing Building

There was some evidence of termite damage on the baseboards of the video control room in the Video Program Production Studio-1.   As that damage became noticeable in 2007, the wood finishings and foundations in each program production related room were injected with pesticides to prevent any further damage.

Also, there is unevenness on the free access floor, peeling paint on the walls, and damage to the soundproofing boards in one or two areas.   However, other than these, the facilities are maintained in good condition, and no particular repairs are necessary.

(2)   Electrical Power Supply Facility

After the 11kV (50Hz) commercial power is received by the Substation on EMPC's northwest side, it is stepped down to 400V/230V (3-phase 4-wire, 50 Hz) with a transformer.   Passing through two (2) sets of 750kVA Induction Voltage Regulators (IVR), the 400V/230V power is supplied to the power distribution board in Power Room at the EMPC building.

General electricity including outlets in each room, lights and air conditioning power is supplied directly from the power distribution board in Power Room to distribution boards in each room. In addition, the electrical power for the program production equipment is supplied from the

power distribution board in the Power Room, through three (3) sets of automatic voltage regulators (AVR-1: 40kVA, AVR-2: 40kVA, AVR-3: 20kVA) installed in the same room, to the distribution boards as well as outlets installed in various rooms for program production equipment.

At the Substation, two (2) sets of standby generators (200kVA and 500kVA) are installed.

Since the quality of supplied electrical power may affect the operation of the equipment for audio/video program production, the power voltage within the building was measured. The measurement conditions, results and observations are as follows:

1) Measurement place and period

General power source line : Meeting room

12:00, October 29 to 12:00, October 30, 2009

: Meeting room

12:00, November 2 to 12:00, November 3, 2009

Line through AVR : Video Control Room in Video Program Production Studio -1

12:00, October 28 to 12:00, October 29, 2009

: Audio Control Room in Video Program Production Studio -1

12:00, November 10 to 12:00, November 11, 2009

2) Voltage rating: 230V (single phase, 2-wire)

3) Measurement results and observations (refer to Fig. 2-7.)

The general electrical voltage that passed through the IVR installed at Substation had a maximum value of 247.8V and a minimum value of 235.4V. Electrical voltage that passed through the AVR had a maximum value of 228.3V and a minimum value of 220.3V.

Compared to the voltage rating of 230V, the general electricity value was high, and the electricity that passed through the AVR showed low values, albeit within the ±10% range of the voltage rating (207V to 253V). Thus it was confirmed that for use in audio/video program production equipment, electricity quality will not cause problems.

Regarding electricity passed through the AVR, it was confirmed that because of the discrepancy in voltage values with general electricity, the AVR was functioning normally. However, it is preferable to adjust the AVR output settings in order to bring it closer to the 230V voltage rating. Also, as general electricity is supplied at a voltage higher than the rating, it would be preferable to adjust the Substation transformer and IVR output in order to bring it closer to the voltage rating.
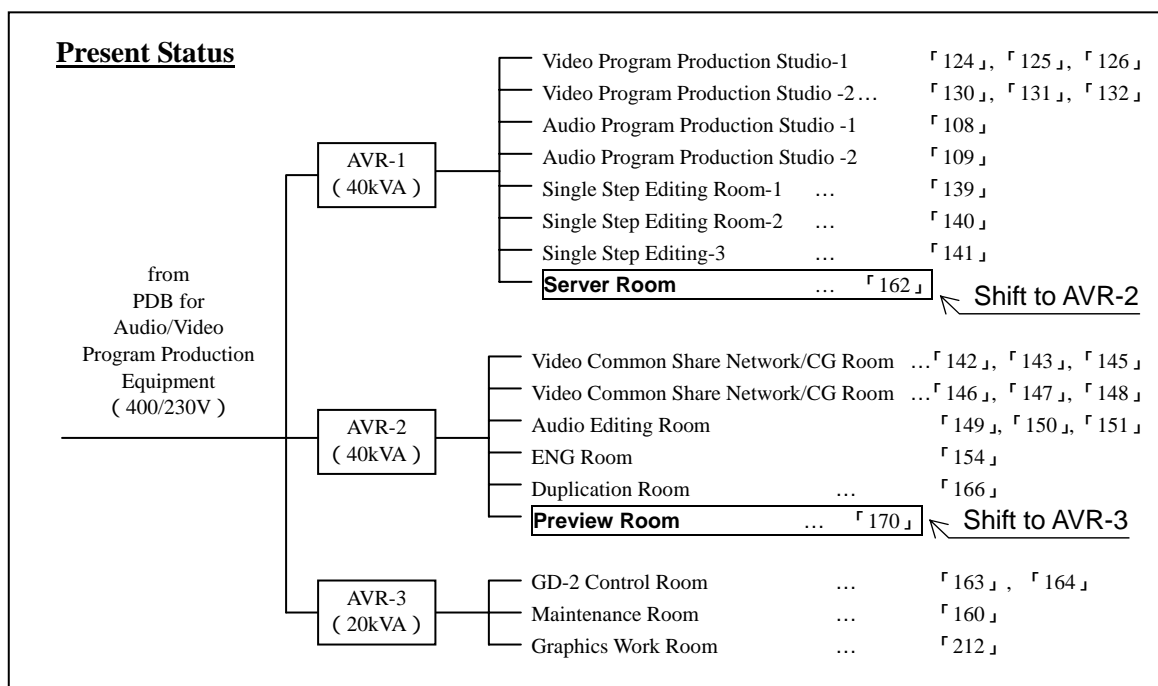
4) Measures regarding electrical power consumption for the equipment

Regarding power consumption in each room after installing the equipment procured under the Project, the load capacity of AVR and power input circuit breakers (MCCB) in each room were examined. These results are as shown in Table 2-7. With the present connection, the load for each of the three AVRs is: AVR-1 (40kVA capacity) = 49.8kVA (existing load capacity: 24.5kVA), AVR-2 (40kVA capacity) = 39.8kVA (existing load capacity: 8kVA), AVR-3 (20kVA capacity) = 16kVA (existing load capacity: 16kVA). This shows that the load of AVR-1 (40kVA) exceeds its capacity. Therefore, in order to resolve this situation, the load for each AVR will be leveled as shown in the figure below. The power supply connection to the Server Room [162] will be changed from AVR-1 to AVR-2 and the connection to Preview Room will be changed from AVR-2 to AVR-3. After changing these connections, the load capacity for each AVR will be: AVR-1 = 40kVA, AVR-2 = 38.4kVA, AVR-3 = 18.4kVA. The existing power input circuit breakers for each room have sufficient capacity for their loads, and usage can be continued.
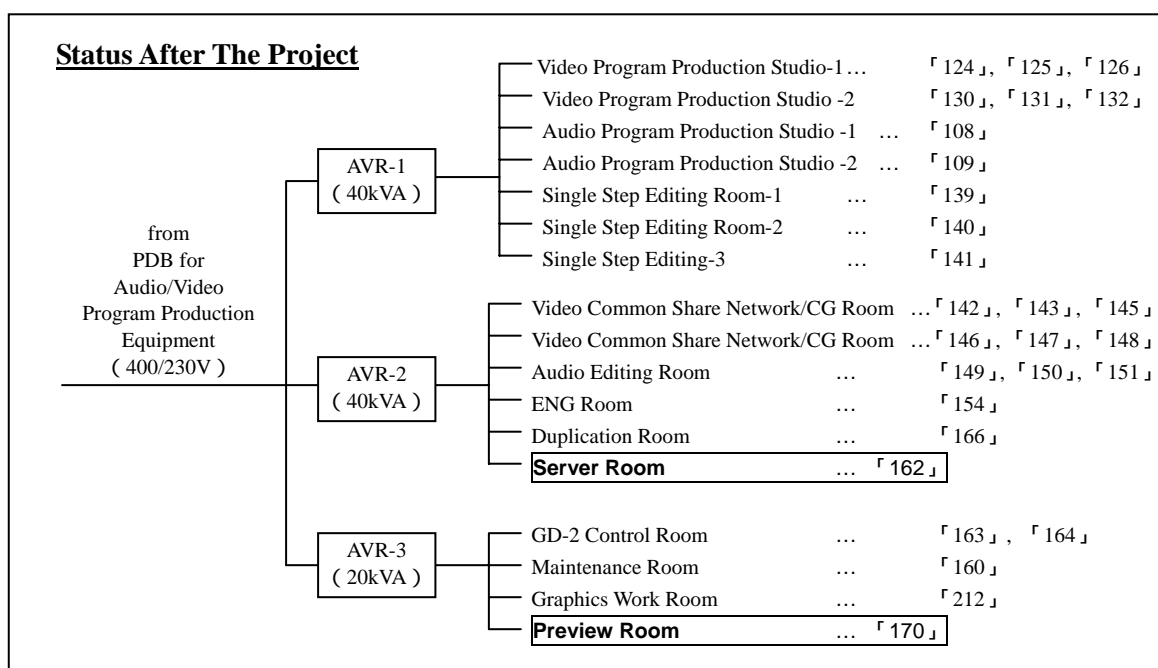
Table 2-7 Power Consumption at each Room

Room No.	Room	Power Consumption	AVR		MCCB	
			Present Status	After the Project	Capacity of Existing MCCB	Availability after the Project
	Video Program Production Studio-1					
124	Audio Control Room-1	15kVA	AVR-1	AVR-1	100/100A	Continuing use of existing MCCB
125	Video Control Room-1					
126	VTR Room-1					
127	Studio Floor (Lighting Equipment)	20kVA	—		200/200A ×2	Continuing use of existing MCCB
142	Video Common Sharing Network (Browse/Edit) Room-1	8.8kVA	AVR-2	AVR-2	100/50A	Continuing use of existing MCCB
143	Video Common Sharing Network (Browse/Edit) Room-2					
145	Video Common Sharing Network (Ingest) /CG Room-1					
146	Video Common Sharing Network (Ingest) /CG Room-2	11.3kVA	AVR-2	AVR-2	100/75A	Continuing use of existing MCCB
147	Video Common Sharing Network (Browse/Ingest/Edit) Room-3					
148	Video Common Sharing Network (Browse/Ingest/Edit) Room-4					
162	Server Room	10.3kVA *1	AVR-1	AVR-2	100/50A	Continuing use of existing MCCB
166	Duplication Room	4.9kVA	AVR-2	AVR-2	100/100A	Continuing use of existing MCCB
170	Preview Room	2.4kVA	AVR-2	AVR-3	100/30A	Continuing use of existing MCCB

(*1: Including power consumption of existing equipment)

Present Status

AVR-1 40kVA	Video Program Production Studio-1 — 124 , 125 , 126
	Video Program Production Studio -2… — 130 , 131 , 132
	Audio Program Production Studio -1 — 108
	Audio Program Production Studio -2 — 109
	Single Step Editing Room-1 … — 139
	Single Step Editing Room-2 … — 140
	Single Step Editing-3 … — 141
	Server Room … 162 — Shift to AVR-2

from
PDB for
Audio/Video
Program Production
Equipment
400/230V

AVR-2 40kVA	Video Common Share Network/CG Room … 142 , 143 , 145
	Video Common Share Network/CG Room … 146 , 147 , 148
	Audio Editing Room — 149 , 150 , 151
	ENG Room — 154
	Duplication Room … — 166
	Preview Room … 170 — Shift to AVR-3

AVR-3 20kVA	GD-2 Control Room … — 163 , 164
	Maintenance Room … — 160
	Graphics Work Room … — 212

To be changed to

Status After The Project

AVR-1 40kVA	Video Program Production Studio-1 … 124 , 125 , 126
	Video Program Production Studio -2 — 130 , 131 , 132
	Audio Program Production Studio -1 … 108
	Audio Program Production Studio -2 … 109
	Single Step Editing Room-1 … 139
	Single Step Editing Room-2 … 140
	Single Step Editing-3 … 141

from
PDB for
Audio/Video
Program Production
Equipment
400/230V

AVR-2 40kVA	Video Common Share Network/CG Room … 142 , 143 , 145
	Video Common Share Network/CG Room … 146 , 147 , 148
	Audio Editing Room … 149 , 150 , 151
	ENG Room … 154
	Duplication Room … 166
	Server Room … 162

AVR-3 20kVA	GD-2 Control Room … 163 , 164
	Maintenance Room … 160
	Graphics Work Room … 212
	Preview Room … 170

Room No.

(3) Air Conditioning Facility

The equipment for audio/video program production is precision equipment. In order to prevent dew condensation due to sudden changes in room temperature and humidity, appropriate air conditioning is necessary to maintain a constant temperature and humidity level. In order to check the operational capacity and performance of the existing air conditioning facilities (water-cooled central-air type), the temperature and humidity level changes both indoors and

outside were measured with digital measuring instruments, which allow for recording over a long period of time.　The measurement conditions (period/place/corresponding graph), measurement results and observations are as follows:

1)　Measurement period/place/corresponding graph

Measuring equipment − 1　:　13:00, October 28 to 16:50, October 29, 2009

Video Control Room in Video Program Production Studio-1

…　(Fig. 2-8)

:　12:00, October 30 to 14:00 November 2, 2009

Audio Control Room in Video Program Production Studio-1

…　(Fig. 2-9)

Measuring equipment − 2　:　17:30, October 28 to 16:00, November 4, 2009

Duplication Room　　　　　…　(Fig. 2-10)

Measuring equipment − 3　:　13:00, October 28 to 10:50, October 29, 2009

Single Step Editing Room-1　…　(Fig. 2-11)

:　12:00, October 29 to 10:50, November 10, 2009

Computer Graphics Room　　…　(Fig. 2-12)

Measuring equipment − 4　:　13:00, October 28 to 16:50, October 29, 2009

measuring of outside temperature and humidity level at

courtyard　　　　　　…　(Fig. 2-13)

:　18:00, October 29 to 12:30, November 1, 2009

Conference Room　　　…　(Fig. 2- 14)

2)　Measuring results and observations (Refer to Fig. 2-8 to Fig. 2- 14)

The results of the outdoor temperature and humidity measurements show that the high and low temperatures were 29.2°C and 16.0°C, and the high and low humidity levels were 69% and 20%.　According to metrological statistics, the temperature shows a gradual downward trend after this period, with the lowest temperatures in January (average monthly low temperature: 7.2°C).

The state of use for each room and the state of air conditioning operations were not uniform. Measurements were made under various circumstances, including occurrences like doors being open while the room was in use, or someone stopping the ventilation fan.　However, in the Duplication Room, the door was not left open and the air conditioner was constantly running.　Although the room temperature setting was on the low side, a generally uniform room temperature of 20.5°C to 24°C was shown.　In other rooms as well, the temperature never reached above 26°C and the air conditioner ran normally.　(It was also confirmed

through EMPC staff that the air conditioning facility is running smoothly.)

Regarding humidity, although there is no humidity-controlling equipment such as humidifiers for the existing air conditioning facilities, humidity was kept within a range of 35% to 73%． The only place where a humidity level exceeding 65% was detected was in Video Common Sharing Network (Ingest/Browsing)/CG Room -2．   However, this room is currently not in use and the ventilation fan was turned off, which was the primary factor.

The measurement results confirm that the operational capacity and performance of the existing air conditioning facilities will not have a negative effect on audio/video program production equipment operations, and that the facilities are functioning normally. However, there is a tendency to set the room temperature too low．   From an energy conservation viewpoint, it would be preferable to raise the room temperature setting by about two degrees.

From the measurement results noted above, it can be seen that the electrical power facilities and air conditioning facilities are operating normally．   Therefore, implementation of repairs, etc. is not needed.

Furthermore, CCMD staff are always on duty at the A/C Plant Room and Substation for the operations and maintenance management of the facilities, including air conditioning and power supply facilities．   Thus, the maintenance management system for the existing facilities is functioning satisfactorily.
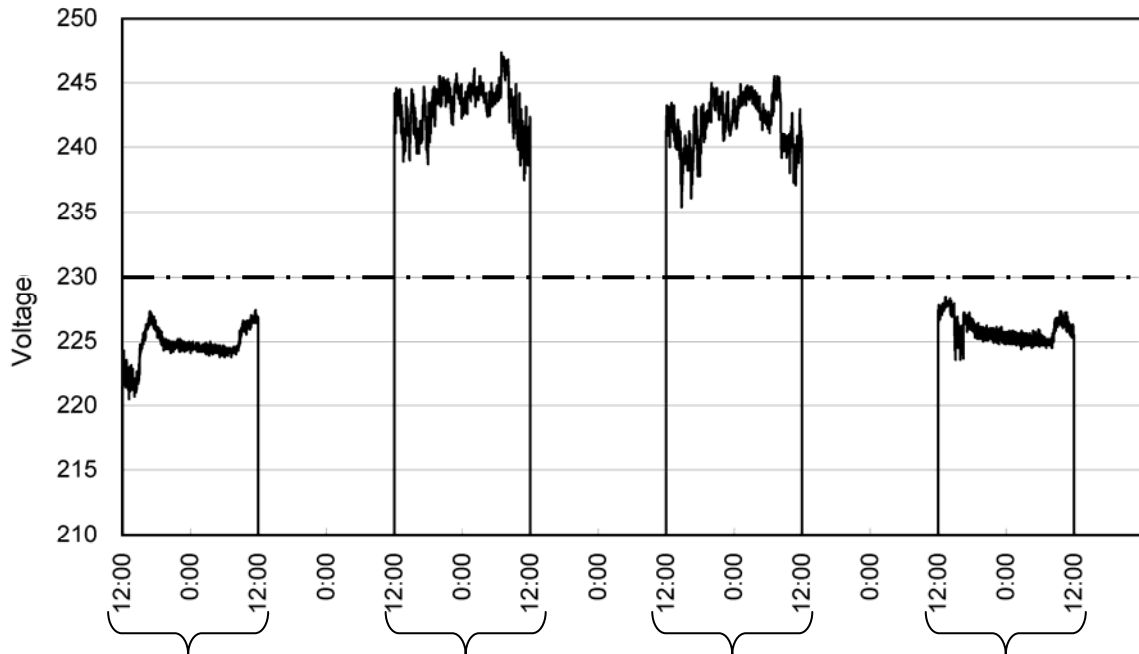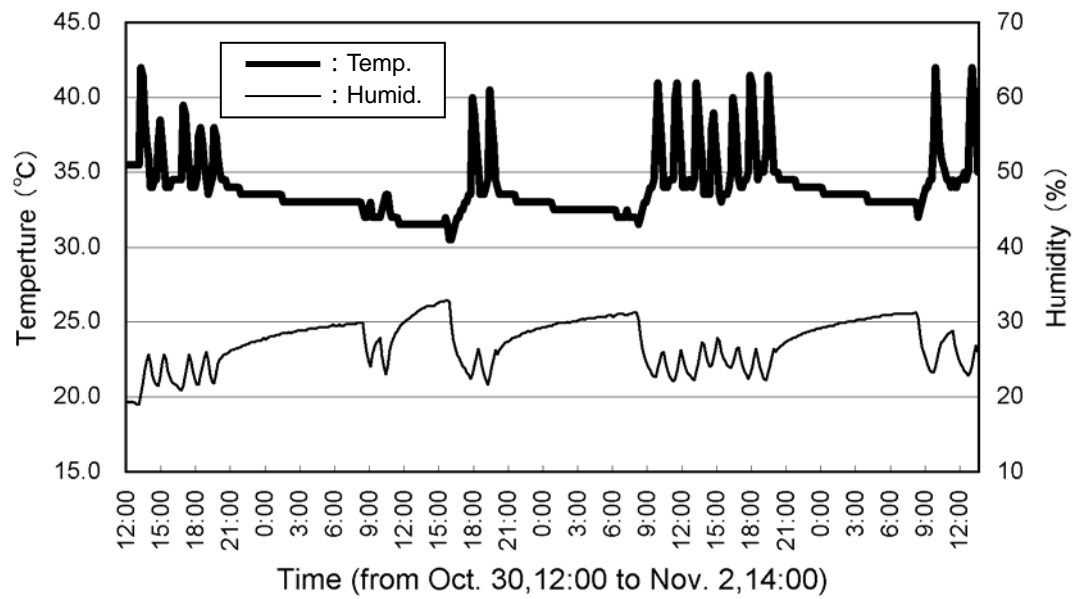
: Video Control Room in Video Program Production Studio-1 (Power line through AVR)
: Conference Room (General Power Line)
: Conference Room (General Power Line)
: Audio Control Room in Video Program Production Studio-1 (Power line through AVR)

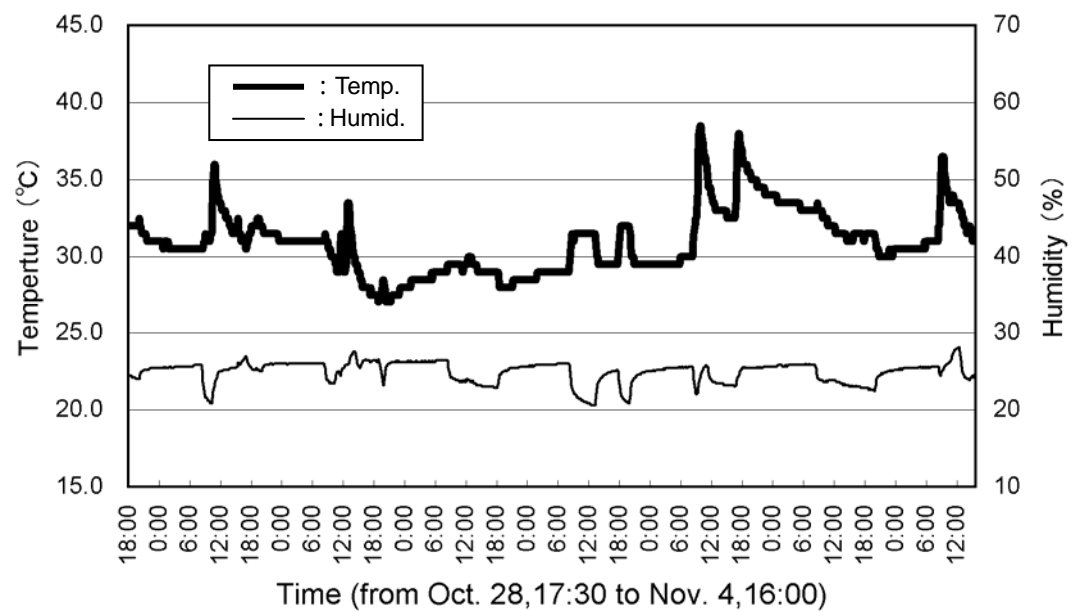**Fig. 2-7   Power Supply Voltage Fluctuation Graph**
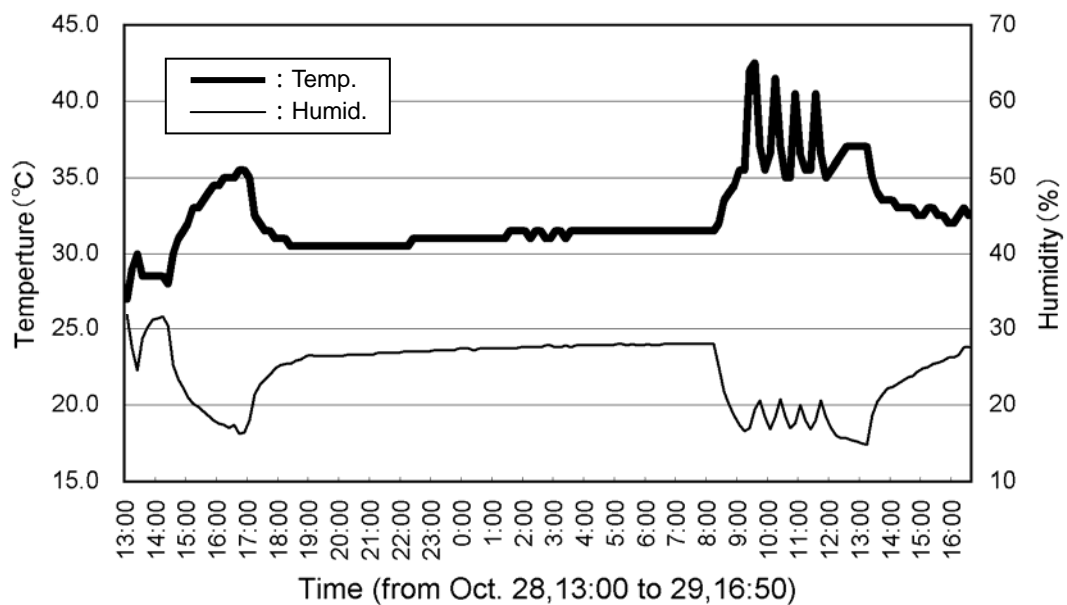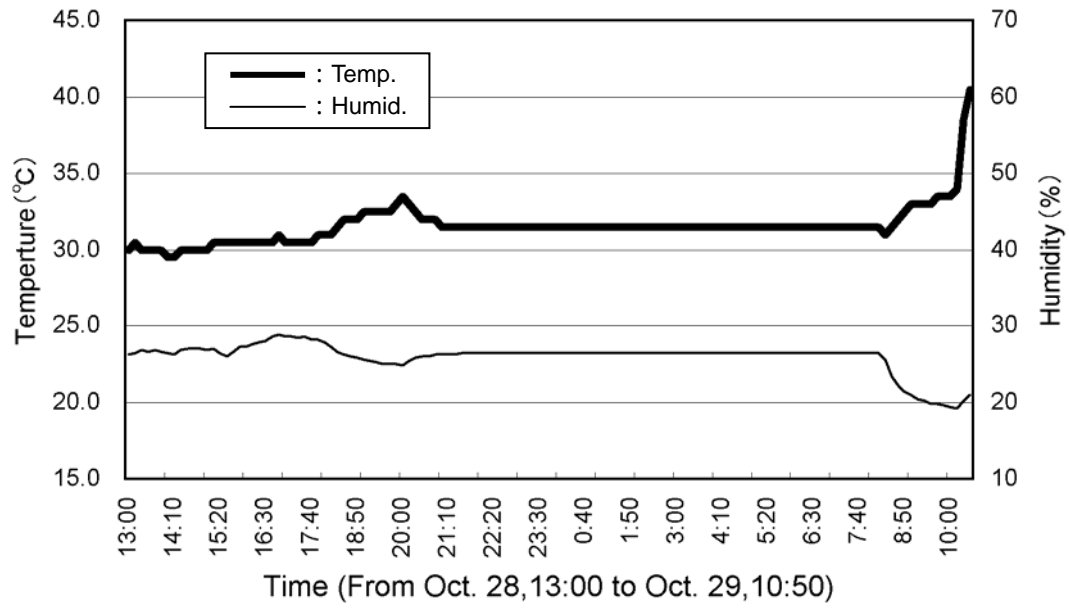

Fig. 2-8   Temperature/Humidity Graph

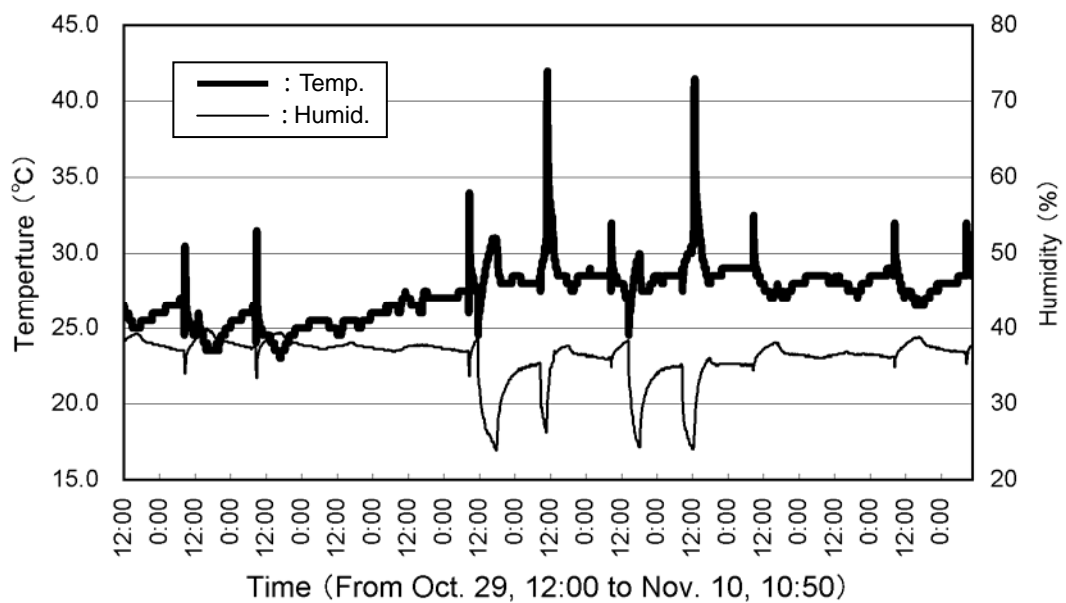**[Video Control Room in Video Program Production Studio-1 (124)]**

Fig. 2-9   Temperature/Humidity Graph

[Audio Control Room in Video Program Production Studio-1 (108)]
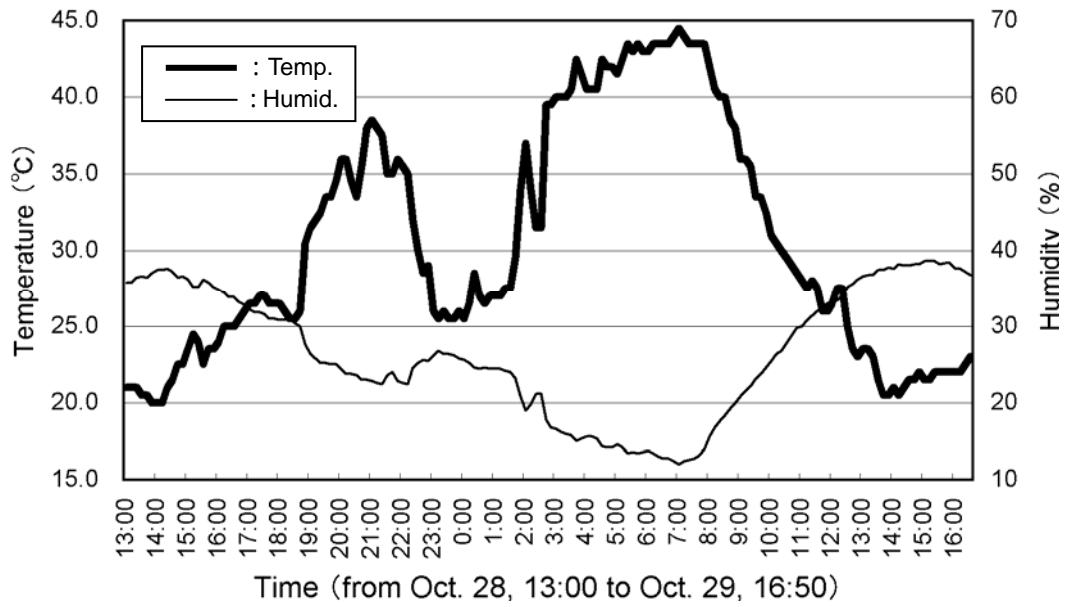

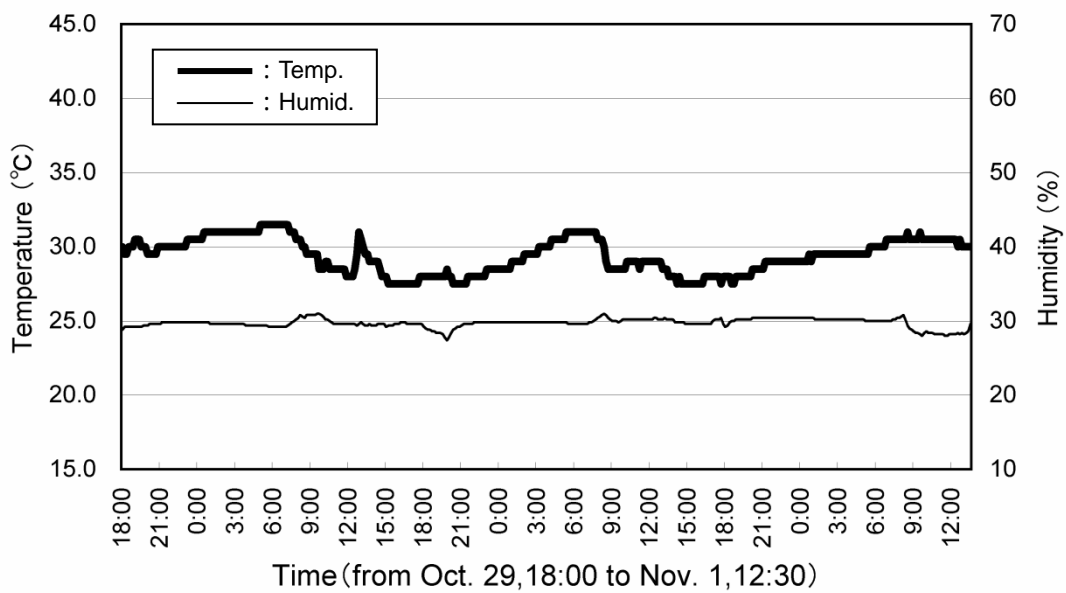**Fig. 2-10   Temperature/Humidity Graph [Duplication Room (166)]**

Fig. 2-11   Temperature/Humidity Graph [Single Step Editing Room-1 (139)]

Fig. 2-12   Temperature/Humidity Graph [Computer Graphics Room-2 (146)]

Fig. 2-13   Temperature/Humidity Graph [Outside (Courtyard)]

Fig. 2- 14   Temperature/Humidity Graph [Conference Room (234)]