

JAPAN INTERNATIONAL COOPERATION AGENCY

No. 1

MINISTRY OF INFORMATION  
SYRIAN ARAB REPUBLIC

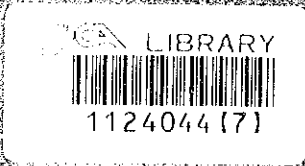
**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT FOR THE REINFORCEMENT  
OF  
EDUCATIONAL BROADCASTING  
IN  
THE SYRIAN ARAB REPUBLIC**

JICA  
BASIC DESIGN STUDY REPORT ON THE PROJECT FOR THE REINFORCEMENT  
OF EDUCATIONAL BROADCASTING IN THE SYRIAN ARAB REPUBLIC

FEBRUARY, 1994

NHK Integrated Te

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*NHK Integrated Technology Inc.*

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## PREFACE

In response to a request from the Government of the Syrian Arab Republic, the Government of Japan decided to conduct a basic design study on the Project for the Reinforcement of Educational Broadcasting in the Syrian Arab Republic and entrusted the study to the Japan International Cooperation Agency (JICA).

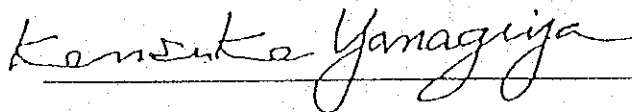
JICA sent to Syria a study team headed by Ms. Chiho MURAMATSU, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs and constituted by members of NHK Integrated Technology Inc., from August 19 to September 12, 1993.

The team held discussions with the officials concerned of the Government of the Syrian Arab Republic, 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 Syria in order to discuss a draft report and 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 the Syrian Arab Republic for their close cooperation extended to the teams.

February 1994



Kensuke Yanagiya

President

Japan International Cooperation Agency

February 1994

Mr. Kensuke Yanagiya  
President  
Japan International Cooperation Agency  
Tokyo, Japan

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for the Reinforcement of Educational Broadcasting in the Syrian Arab Republic.

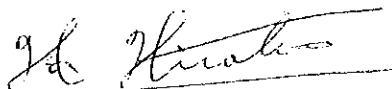
This study was conducted by NHK Integrated Technology Inc. under a contract to JICA, during the period from August 19, 1993 to February 4, 1994. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Syria and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, and the Ministry of Posts and Telecommunications.

We would also like to express our gratitude to the officials concerned of the State Planning Commission, the Ministry of Information, the BTA, JICA Syria Office and the Embassy of Japan in Syria for their cooperation and assistance throughout our field survey.

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

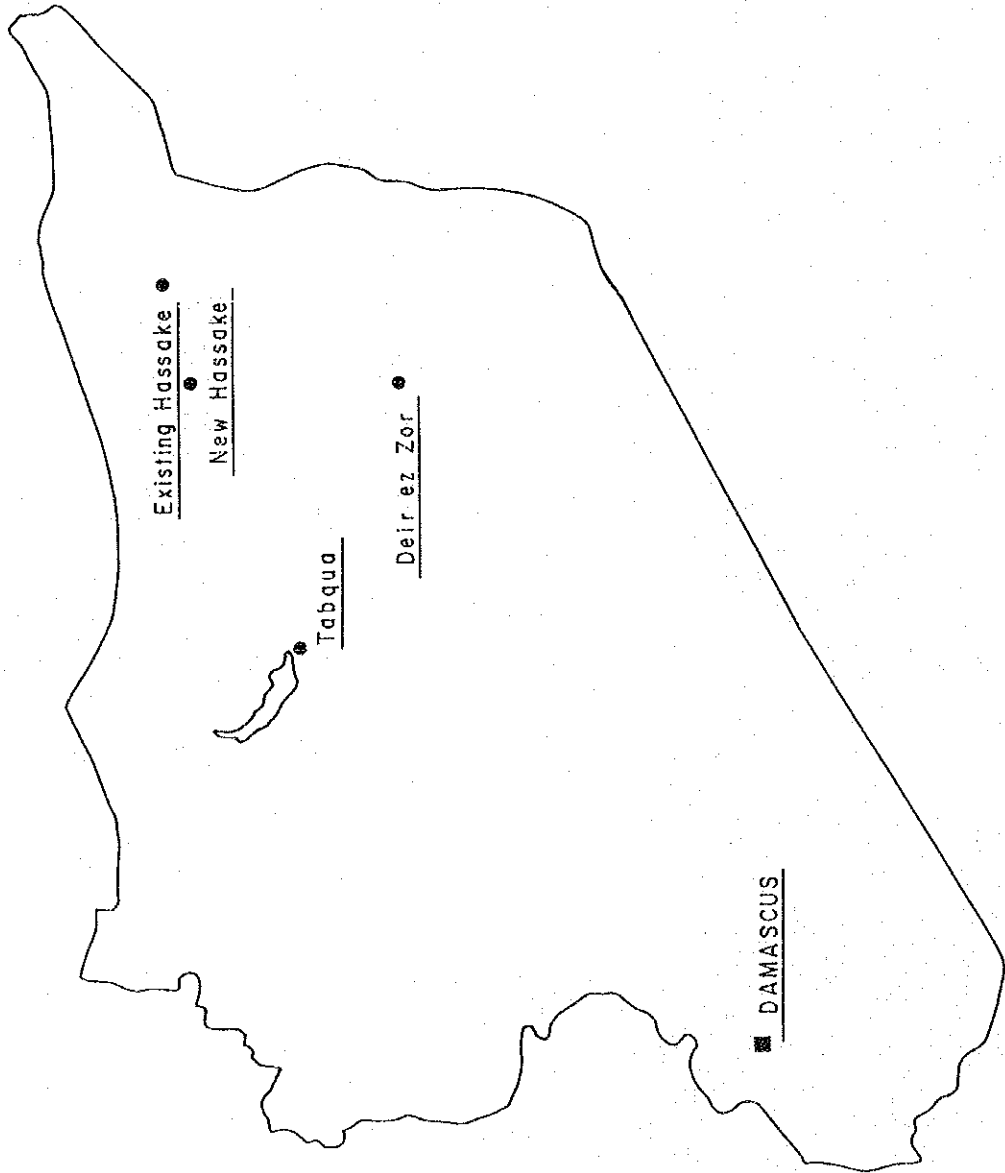
Very truly yours,



---

Hideo Hiroba  
Project Manager  
Basic design study team on the Project for  
the Reinforcement of Educational  
Broadcasting in the Syrian Arab Republic  
NHK Integrated Technology Inc.

# SYRIAN ARAB REPUBLIC







## Summary

## SUMMARY

The Syrian Arab Republic is situated on the eastern shore of the Mediterranean Sea and has a total land area of 185,180km<sup>2</sup> which is just about a half of that of Japan. The northeastern part of Syria is located in the upper basin of the Euphrates River, and a wide desert area extends from the middle to the southern regions. The land is full of variety; the coastal regions facing the Mediterranean, the mountain regions closing in on the coastal regions and the Orontes basin to the south. While all of these coastal, mountain and river-basin regions are full of greenery, the Syrian desert spreads from the central to the southeastern part of the country. Along the Mediterranean coast in the west and the Euphrates basin in the northeast, there are expanses of fertile land where most of the population is concentrated.

The country is composed of 14 provinces and the capital is Damascus. Its population, as of 1992, is 12,958,000 and per-capita GNP is 1,110 US dollars (1991 statistics).

The Syrian Arab Republic's main industry is agriculture, while other products include phosphate rocks and petroleum. The regions facing the Mediterranean as well as the basins of the Euphrates and the Orontes River are agricultural areas. Production of petroleum, as compared with other Middle Eastern countries, is small. However, with an abundance of new oilfields, there is the potential of further growth. Expectations are further heightened by the increasing output of light and low-sulfur oil.

The Broadcasting in the Syrian Arab Republic was started in 1947, the year following the nation's independence, in radio. In 1960, the 1st TV broadcasting service was inaugurated and, in 1985, the 2nd TV broadcasting service went into operation as a service for exclusive use in broadcasting educational programmes. Both of the two TV services as well

as the radio service are operated by the Broadcasting and Television Authority (BTA). It is a state-operated organization under the jurisdiction of the Ministry of Information.

As for TV broadcasting in 1993, services are conducted through 18 transmitting stations. TV coverage at present reaches 90% of the total population in the case of the 1st TV service and 60% in the case of the 2nd TV broadcast service. As for the channel and color TV system, the European channel "E" is currently used and PAL-B is adopted for the VHF band and PAL-G for the UHF band.

BTA is a national organ responsible for the management, administration and planning of broadcasting and also for the operation and maintenance of broadcasting stations throughout the country. Its overseeing organ is the Ministry of Information.

With the General Director as the highest responsible officer, BTA management consists of six department heads of the following departments; Finance, TV Programmes, Engineering, Radio, General Affairs and the 2nd TV programme service.

The regional radio and TV broadcasting stations are placed under the control of the Director of the Engineering Department.

BTA's total number of personnel is 2,435, of which 692 are at the headquarters and general-affairs divisions, 679 at the engineering divisions, 520 in TV & radio programme production divisions, 170 in the programme engineering division in Damascus and 374 personnel at 18 regional transmitting stations.

BTA's fiscal 1992 budget was about 270,000,000SP (Syrian Pounds) which is generous financing showing a growth of 3.8-4.2% during the past three years. The sources of income include government funds (86%), advertisement broadcasting (9%), TV receiver tax (4%) and production of TV programmes on request (1%).

In the case of the existing 2nd TV broadcast service area, a sufficiently wide service area has not been attained since the TV transmitter output is only 1kW and, moreover, the number of antenna panels is small. For these reasons, it has been impossible to provide educational TV programmes to many of the people engaged in agriculture who live scattered over a wide area, as is characteristic of agricultural countries. Above all, in order to improve the present situation where the ratio of illiterate people is particularly high in the rural areas, and also to serve the schools and the children studying at home, there is an urgent need to provide educational programmes.

In order to solve these problems, the most effective means will be to install in the three above-mentioned cities reinforced transmitters for educational TV by renewing the existing equipment and increasing their output. Furthermore, it was planned to provide educational programmes to help the resident's educational levels, especially those programmes to promote the diffusion of agricultural knowledge by changing programme compilation of the 2nd TV broadcast service to transmit more educational programmes.

However, in order to carry out these plans, a large amount of funding will be required and it would be extremely difficult for Syria to implement the plans all by itself. Based on such a consideration, the Government of the Syrian Arab Republic made a request to the Government of Japan for grant aid in order to carry out the project for reinforcing the TV broadcasting network relating to the three stations, a project requiring urgent attention.

In response to this request, the Government of Japan decided to carry out a study concerning "The Project for the Reinforcement of Educational Broadcasting in the Syrian Arab Republic" (hereinafter called "the project") and accordingly the Japan International Cooperation Agency sent a Basic Design Study Team to the Syrian Arab Republic from August 19 to September 12, 1993.

The Study Team performed site surveys at the three stations, site selection for New Hassake Station and confirmation of the contents of the request from the Syrian side.

As a result, several requested items were changed in consideration of the most effective design as shown below.

- (a) Change of antenna tower height at new Hassake station.
- (b) Change to Transmitter power of 10kW and engine generator capacity of 150kVA at Deir ez Zor and Tabqua stations.
- (c) Change from standby engine generator of 200kVA for new Hassake station to mobile type engine generator of 150kVA for all three stations.

Contents of the Basic Design are as shown below.

#### Contents of the Basic Design

Station	TV Transmitter	TV Tower	Transmitting Antenna	STL Device	Engine Generator	Power Receiving/Distributing Board	Measuring Instruments for Routine Maintenance Use	Measuring Instruments for Common Use
New Hassake Station	20kW 1 set	Provision of guy wire tower of 198m. Dispatching of construction coordinator	Wideband 2D antenna for CH2 and 4 4-3-3-4 stages 1 set	5W, 6.8GHz 2m <sub>g</sub> Main/Standby 1 set (incl. radio communication equip.)	200kVA 1 set  Common use 150kVA 1 set	1 set	(a) Oscilloscope (b) Tester (c) High-frequency attenuator (d) TV test signal generator	(a) Spectrum analyzer (b) Tracking generator (c) Video envelop delay time measuring equipment (d) Field-strength measuring equipment
Deir ez Zor Station	10kW 1 set		4D antenna 4-4-2-4 stages 1 set		150kVA 1 set		The same as above	
Tabqua Station	10kW 1 set		4D antenna 3-4-2-3 stages 1 set		150kVA 1 set		The same as above	

The project will require three months for implementation of the design work and 11 months for procurement as the 1st Period, and three months for implementation of the design work and 10 months for procurement as the 2nd Period.

The following effects can be expected as a result of implementation of this project:

- The total number of viewers of the 2nd TV broadcast service provided by the three stations included in this project will increase from the present 687,000 to 1,390,000, resulting in a 202% increase. Thus, it will become possible to attain a service area that widely covers both urban and rural regions, instead of the present service area which mainly covers the urban regions.
- By changing the installation site of the TV transmitting facilities from the Existing Hassake Station to New Hassake Station, New Hassake Station will be able to obtain the widest service area and the largest viewing population (from 290,000 to 754,000) among the three stations.
- As a result of the expansion of the three stations service areas through implementation of the project, it will become possible to provide educational programmes not only to the illiterate people living scattered in the rural regions and desert zones but also to schools and students at home. Thus, it is reasonable to expect to achieve the objectives of the Government of the Syrian Arab Republic to provide equal educational opportunities to the people and enhance their educational level.

As can be seen from the above, this project is capable of greatly contributing to the achievement of various plans of the Syrian Arab Republic, such as plans for the enhancement of the nation's educational and cultural levels, correction of educational gaps, qualitative improvement of school education and regional activation by means of the development programme for the northeastern regions based on the national development plan. Therefore, there is great significance in this project being carried out with Japanese grant aid.



## Abbreviation List

## ABBREVIATION LIST

### ABBREVIATIONS

APA	:	Audio Power Amplifier
APC	:	Audio Peak Controller
AVR	:	Automatic Voltage Regulator
BTA	:	Broadcasting & Television Authority
CCIR	:	International Radio Consultative Committee
CIN	:	Constant Impedance Notch Filter
dB $\mu$ /m	:	dB related to 1 $\mu$ V/m
EIA	:	Electronic Industries Association
EMDPC	:	Education Media Development Production Center
HT	:	High Tension
ITU	:	International Telecommunication Union
OB VAN	:	Outside Broadcast Van
ORTAS	:	Organisation Radio et Television Arabe Syrienne
PAL	:	Phase Alternate by Line
PDB	:	Power Distribution Board
PTT	:	Post and Telephon-Telegram Public Corporation
STL	:	Studio-to-Transmitter Link
T.N.	:	True North
UHF	:	Ultrahigh Frequency
VDA	:	Video Distribution Amplifier
VHF	:	Very High Frequency
VPA	:	Video Power Amplifier
VSWR	:	Voltage Standing Wave Ratio

# CONTENTS

	Page
PREFACE	
LETTER OF TRANSMITTAL	
PROJECT SITE MAP	
SUMMARY	
ABBREVIATION LIST	
CONTENTS	
Chapter 1 Introduction .....	1
Chapter 2 Background of the Project .....	3
2-1 Present Status of Broadcasting in the Syrian Arab Republic .....	3
2-1-1 Outline of the Broadcasting Service .....	3
2-1-2 BTA's Organization and Management .....	4
2-1-3 Domestic Broadcasts at Present .....	10
2-1-4 Spread of TV Receivers in Syria .....	15
2-2 Outline of Related Plans .....	16
2-3 Background and Contents of the Request .....	18
2-3-1 Background of the Request .....	18
2-3-2 Contents of the Request .....	19
Chapter 3 Contents of the Project .....	23
3-1 Objectives of the Project .....	23
3-2 Examination of the Contents of the Request .....	23
3-2-1 Examination of Appropriateness and Necessity of the Project .....	23
3-2-2 Examination of Execution and Operation Plans .....	27
3-2-3 Examination of Relation to or Overlapping with Similar Projects and Other Aid Projects .....	27
3-2-4 Examination of the Contents of the Equipment Requested .....	28

3-3	Outline of the Project .....	38
3-3-1	Implementing Organization and the Management System .....	38
3-3-2	Operational Plans .....	38
3-3-3	Locations and Conditions of Project Sites .....	39
3-3-4	Outline of Equipment .....	43
3-3-5	Maintenance and Management Plans .....	47
3-4	Technical Cooperation .....	52
Chapter 4	Basic Design .....	53
4-1	Design Policy .....	53
4-2	Study and Examination of Design Criteria .....	54
4-3	Basic Plan .....	56
4-3-1	Equipment Arrangement Plan .....	56
4-3-2	Equipment Composition .....	63
4-3-3	Basic Design Drawings .....	65
4-4	Implementation Plan .....	103
4-4-1	Implementing Organization .....	103
4-4-2	Implementation Policy .....	103
4-4-3	Supervisory Plan .....	104
4-4-4	Scope of Work .....	106
4-4-5	Equipment Procurement Plan .....	108
4-4-6	Implementation Schedule .....	108
4-4-7	Estimated Cost of the Project .....	110
Chapter 5	Project Evaluation and Conclusion .....	111
5-1	Project Evaluation and Conclusion .....	111
5-2	Recommendations .....	113

[ Appendices ]

1. Member List of the Study Team
2. Itinerary of the Study
3. List of Interviewees
4. Minutes of Discussions
5. List of Collected Materials
6. List of TV Studio Equipment in Damascus TV station
7. Table of European TV channel "E"
8. Reference Data
9. Routine Engine Generator Maintenance
10. School Subjects
11. Table of Weekly TV Programmes
12. Table of Educational TV Programmes
13. List of TV Translator Stations
14. List of Medium Wave Radio Stations
15. Result of Measuring of Field Strength

## Chapter 1 Introduction

## Chapter 1 Introduction

With the drastically changing international and regional political situation in the wake of the collapse of the Soviet Union and the end of the Gulf War, the Syrian Arab Republic has been changing its direction slowly but substantially. Politically and diplomatically, Syria is taking a stance leaning more to the West, such as the United States, and economically, it has steadily been shifting to a free economy. Compared with other Arab nations, Syria's living standard (educational and technical levels) is high and the country is rich in human resources. Its economic development so far has been blocked largely by such factors as the repetitive wars, nationalization of enterprises under the centralized economic system, and the shift to a rigid socialistic economy system including the farm reform of 1963.

It is against such international and domestic backgrounds that Syria plans to make effective use of TV broadcasts for such purposes as the improvement of the literacy ratio between the residents of the rural areas and those of urban areas where there is presently a gap of two to four times on average in favor of the latter in each province (filling of the gap in educational levels), and the improvement of the people's educational level as a whole. Especially, in the 7th Five-Year National Development Plan, the expansion of the 2nd TV broadcasting network in the northeastern region, which is an important area from the viewpoint of agriculture, is expected to contribute greatly to the attainment of such objectives as mentioned above and to the activation of regional development.

In these circumstances, BTA has established a plan for carrying out in 3 phases. ① the expansion of the 2nd TV broadcasting network of the three stations at Hassake, Deir ez Zor and Tabqua, ② the reinforcement of

studio facilities and ③ establishment of a nationwide exclusive educational broadcasting network.

However, since the carrying out of these plans will require a large amount of funding which make it difficult for Syria to undertake the entire work alone, the Government of the Syrian Arab Republic has made a request to the Government of Japan for grant aid to assist in the reinforcement of the above-mentioned three stations, the first phase of the plan which is of especially urgent importance.

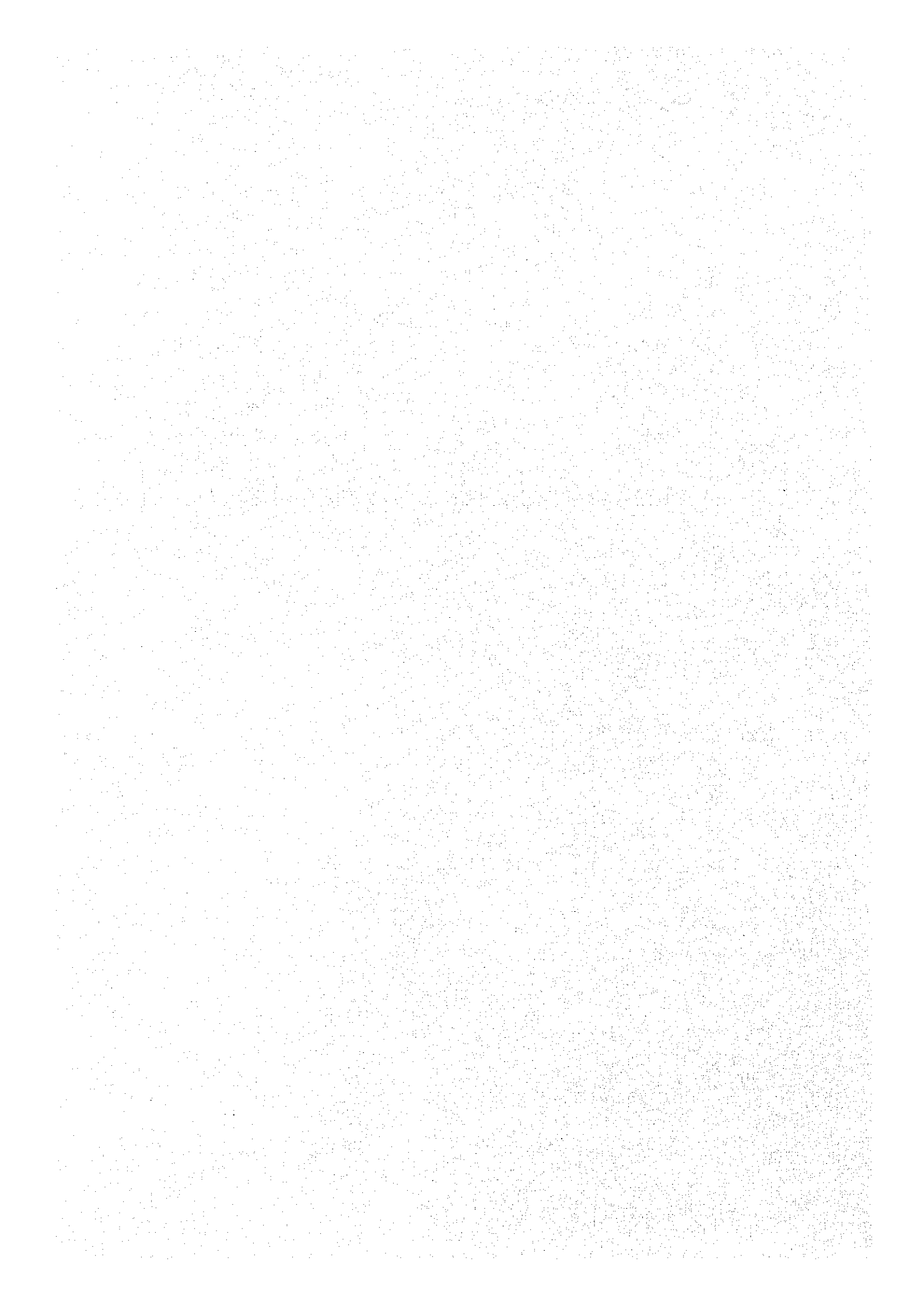
In response to this request, the Government of Japan decided to carry out a study concerning "The Project for the Reinforcement of Educational Broadcasting in the Syrian Arab Republic" (hereinafter called "the project") and accordingly, the Japan International Cooperation Agency (hereinafter called "JICA") sent a Basic Design Study Team to the Syrian Arab Republic from August 19 to September 12, 1993. The team was headed by Ms. Chiho MURAMATSU from the Grant Aid Division, Economic Cooperation Bureau, the Ministry of Foreign Affairs.

While in Syria, the team exchanged views on the project with the officials concerned of the Ministry of Information and also of the BTA as the executing organization to grasp the background of the project and its contents. At the same time, the team surveyed the existing facilities and collected relevant materials. After returning to Japan, the team, through analysis and examination of the data, confirmed the appropriateness of the project to be implemented with Japanese grant aid, and drew up a basic design concerning the contents and scale of facilities that are necessary and most appropriate to be included in the grant aid.

The Minutes of Discussions, survey schedule, composition of the study team and the names of the persons with whom the study team met are all included in the Appendices of this report.



## Chapter 2 Background of the Project



## Chapter 2 Background of the Project

### 2-1 Present Status of Broadcasting in the Syrian Arab Republic

#### 2-1-1 Outline of the Broadcasting Service

Broadcasting in the Syrian Arab Republic started with radio in 1947, the year following the independence of the nation. The 1st TV broadcasting service was inaugurated in 1960 and the 2nd TV service went into operation as an exclusive educational programme channel in 1985. Both the 1st and 2nd TV broadcasting services, as well as the radio service, are run by the Broadcasting and Television Authority (BTA), a state-operated organization under the jurisdiction of the Ministry of Information.

Since the start of radio and TV broadcasting services, their networks have steadily been expanded. Today in 1993, BTA has become able to cover the entire country with radio broadcasting through 11 radio transmitting stations.

As for TV broadcasting, BTA today in 1993 is conducting its services through 18 TV transmitting stations. The broadcasting coverage area of the TV services at present are 90% of the total population in the case of the 1st TV broadcast service and 60% in the case of the 2nd TV broadcast service. As for the television channel, the European channel "E" is currently used (Refer to the Appendices.). However, the channel 2A is not used in Syria. As to the color TV system, PAL-B is adopted for the VHF band and PAL-G for the UHF band. (Syria's color TV system used to be the SECAM-B system but this was changed about 20 years ago.)

Incidentally, TV broadcasting in Syria is operated exclusively by BTA, and there is no commercial TV station in this country.

BTA is a member of the ARABSAT and receives educational programmes which it uses in its broadcasts.

It uses the following satellite circuits:

- 1) Intelsat
- 2) Arabsat
- 3) Intersputnik

Via the Intelsat, some of NHK's programmes are also delivered to BTA from Japan.

BTA is also a member of ASBU (Arab States Broadcasting Union), as well as of EBU and ITU.

BTA is an organization which separated from the PTT (Post and Telephone-Telegram Public corporation) and became independent in 1952. Their respective responsibilities, unlike in the case of Japan, are that BTA takes charge of broadcasting services and domestic TV transmissions and PTT is in charge of telegraph, telephone and facsimile business.

The reception of international TV transmissions coming through satellite is the responsibility of PTT. Its earth station is located at Sydnaya.

## 2-1-2 BTA's Organization and Management

### (1) Organization

BTA is a national organ responsible for the management, administration and planning of broadcasting, and also for the operation and maintenance of transmitting facilities throughout the country. Its overseeing organ is the Ministry of Information.

With the General Director as the highest responsible officer, BTA management consists of six department heads of the following departments;

Finance, TV Programmes, Engineering, Radio, General Affairs and the 2nd TV programme service.

The regional radio and TV transmitting stations are placed under the control of the Director of the Engineering Department.

The official names of the broadcasting stations are given either in French or English as follows:

Table 2-1-1

French name as registered with the ITU	ORTAS (Organisation Radio et Télévision Arabe Syrienne)
English translation of the above	Syrian Radio and TV Organization
Name of the organization used within the Ministry of Information	BTA (Broadcasting & Television Authority)

(2) Staff

BTA's total number of personnel is 2,435, of which 692 are at the headquarters and general affairs divisions, 679 at the engineering divisions, 520 in TV & Radio programme production divisions, and 170 in the programme engineering division in Damascus and a total of 374 personnel at 18 regional transmitting stations.

The organizational chart of BTA is shown in Fig. 2-1-1.

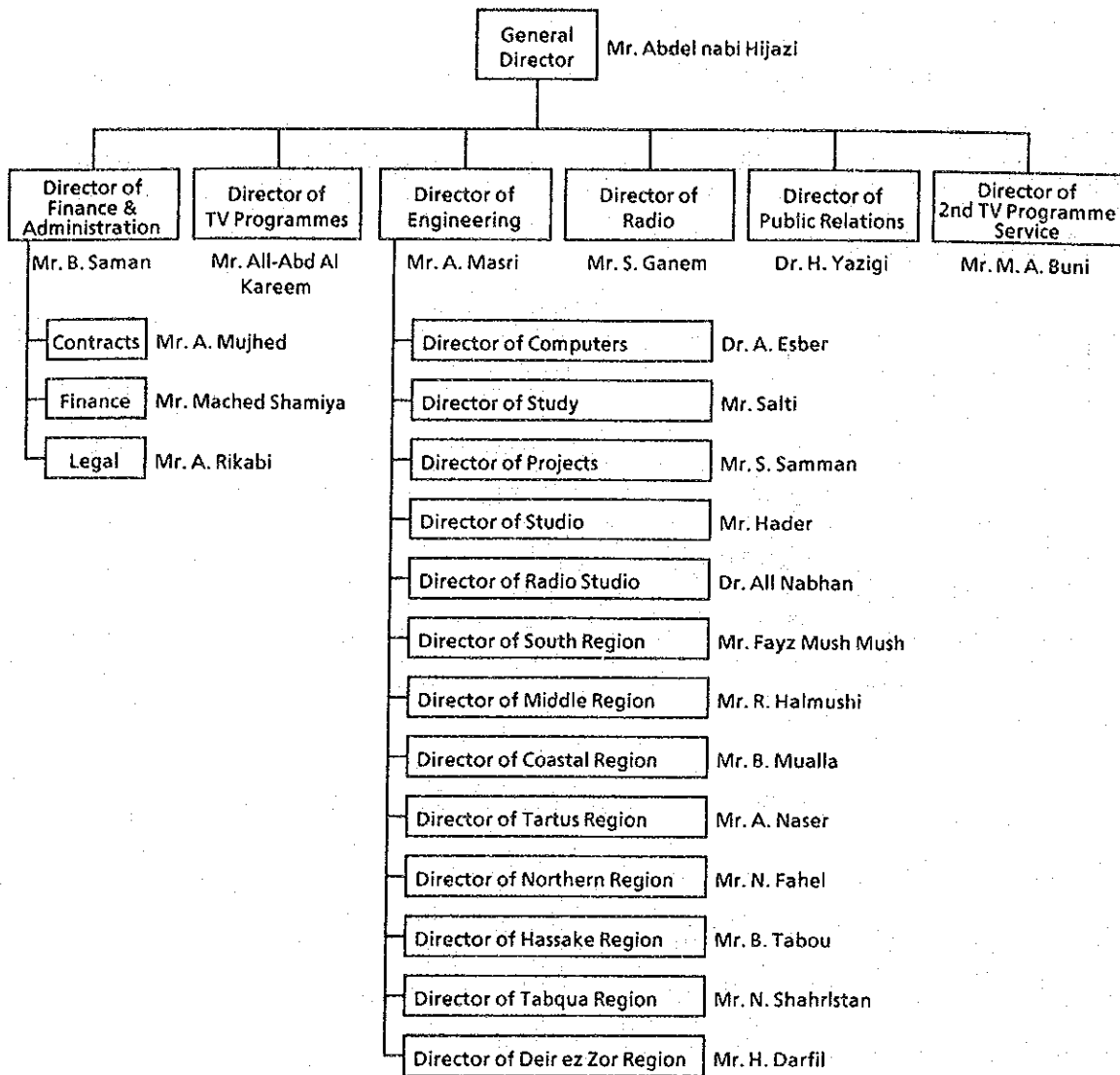


Fig. 2-1-1 The Organizational Chart of BTA (As of August, 1993)

Table 2-1-2

Number of Staffs	<u>2,435</u>
Public Relations division, etc.	<u>692</u>
Engineering division	<u>1,053</u>
Engineering section	<u>75</u>
Operation & maintenance (Regional stations)	557 (374)
Transmitting	221
Others	200
Television & Radio Programme division	<u>520</u>
Announcer	300
Reporter, Cameraman	150
Producer	10
Programme director	30
Programme assistant director	30
Television & Radio Broadcasting engineering section	<u>170</u>
Floor director	5
Studio director	6
Scripter	5
Technical director	6
Switcher	12
Video operator	45
Video engineer	15
Sound mixer	20
Boom operator	4
Lighting director	8
Cameraman	22
Artist	18
Make-up artist	4

(Source: BTA)

(3) Financial Status

BTA's budget amounted to 272.9 million SP in 1992, of which government funds, make up 86% of the total. In addition, indirect revenue related to BTA, such as advertisement fees, the TV receiver tax, etc., are paid to the Ministry of Finance. At the time of completion of this project (1994), as the table below indicates, it will be necessary to increase the annual budget from government funds.

Table 2-1-4 Breakdown of the Budget (1992)

Unit: million SP

Government funds	234.4
Advertisement broadcasts	25.0
TV receiver tax	10.0
Imported radio receiver tax	3.0
Total	272.4

Source: BTA



Table 2-1-5 Balance Sheet of BTA Budget

Unit: thousand SP

Contents	1989/1990	1990/1991	1991/1992	1992/1993
(Revenue)				
Government funds	238,652	249,352	257,598	272,857
Compared with the previous year (%)		104.5	103.3	105.9
Advertisements ※	_____	_____	_____	_____
Others ※	_____	_____	_____	_____
Total revenue	238,652	249,352	257,598	272,857
Compared with the previous year (%)		104.5	103.3	105.9
(Expenditure)				
Personnel	3,882	3,978	4,053	4,131
Compared with the previous year (%)		102.5	101.9	101.9
Programme production	42,000	48,000	57,000	65,000
Compared with the previous year (%)		114.3	118.8	114.0
Programme transmission fee	19,000	21,000	23,000	25,000
Compared with the previous year (%)		110.5	109.5	108.7
Equipment	145,000	150,000	156,000	160,000
Compared with the previous year (%)		103.4	104.0	102.6
Maintenance	1,521	1,650	2,200	2,500
Compared with the previous year (%)		108.5	133.3	113.6
Administration	120	130	145	165
Compared with the previous year (%)		108.3	111.5	113.8
Electricity, water, telephone, etc.	5,000	8,500	9,000	10,000
Compared with the previous year (%)		170.0	105.9	111.1
Others	1,132	1,205	1,247	1,291
Compared with the previous year (%)		106.4	103.5	103.5
Total expenditure	217,655	234,463	252,645	268,087
Compared with the previous year (%)		107.7	107.8	106.1
Balance	20,997	14,889	4,953	4,770

※ All revenue related to BTA, that is, advertisement fees, the TV receiver tax and programme production fees paid by other Ministries are paid to the Ministry of Finance.

2-1-3 Domestic Broadcasts at Present

(1) TV Broadcasts

1) Outline of Programmes

BTA's broadcast hours are as shown in the following table. The 1st TV programme service broadcasts about 8 hours day on weekdays, while the 2nd TV programme service broadcasts about 6 hours a day. The broadcasting hours of different categories of programmes are shown in percentages in Tables 2-1-5 and 2-1-6.

Table 2-1-5 TV Broadcasting Hours (as of Sept. '93)

Day of the Week	1st TV Service	2nd TV Service
Weekdays (excepting Fridays)	15:00 - 24:00 (8 hours)	18:00 - 24:00 (6 hours)
Sundays	14:00 - 24:00 (10 hours)	18:00 - 24:00 (6 hours)
Fridays	9:00 - 12:30 14:00 - 24:00 (13.5 hours)	17:00 - 24:00 (7 hours)
Special days (election, etc.)	8:00 - 24:00 (16 hours)	Normal hours

Table 2-1-6 Ratios of Broadcast Programmes (weekly)

Programmes	1st TV Service	2nd TV Service
News	15%	15%
Information programmes	5	5
Educational programmes	10	10
Cultural & documentaries	25	15
Sports programmes	10	10
Music programmes	10	10
Entertainment programmes	20	30
Advertisement programmes	5	5
Total:	100%	100%

## 2) Outline of TV Facilities

### a) Programme Facilities

The studio facilities for the production of TV programmes are installed not only in the broadcasting center in Damascus but also in two other cities, viz., Aleppo and Latakia. Main facilities and equipment available in the three cities are as follows:

Damascus Broadcasting Center:	Multi-purpose studio	250m <sup>2</sup>	1 set
	(Studio 1)		
	Production studio	380m <sup>2</sup>	1 set
	(Studio 2)		
	News studio	70m <sup>2</sup>	1 set
	(Studio 3, for 2nd TV)		
	Continuity studio	100m <sup>2</sup>	1 set
	(Studio 4)		
	OB vans		6 vehicles
	Master control equipment		1 set
Aleppo Station	Production studio	200m <sup>2</sup>	1 set
Latakia Station	Production studio	300m <sup>2</sup>	1 set

### b) Transmitting Facilities

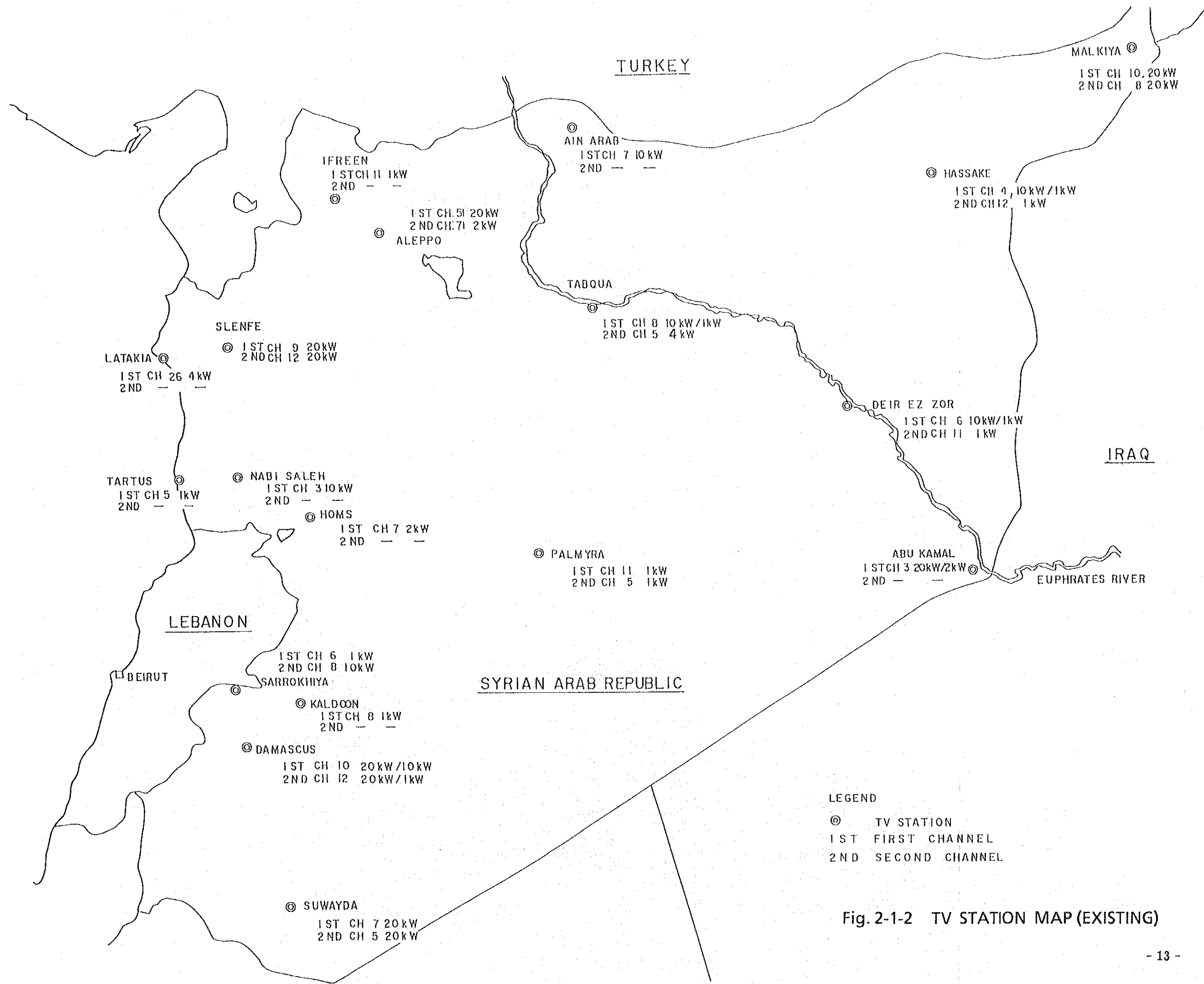
BTA has 18 key stations whose transmitter outputs and channels are as shown in the following table.

Table 2-1-7 List of Stations

Station Name	1st TV Broadcasting Service		2nd TV Broadcasting Service	
	Transmitter Output	Channel	Transmitter Output	Channel
Damascus	20kW (standby 10kW)	10	20kW (standby 1kW)	12
Suwayda	20kW	7	20kW	5
Sarrokhiya	1kW	6	10kW	8
Kaloon	1kW	8	—	—
Homs	2kW	7	—	—
Nabi Saleh	10kW	3	—	—
Tartus	1kW	5	—	—
Latakia	4kW	26	—	—
Slenfe	20kW	9	20kW	12
Ifreen	1kW	11	—	—
Aleppo	20kW	5	2kW	7
Ain Arab	10kW	7	—	—
Tabqua*	10kW (standby 1kW)	8	4kW	5
Deir ez Zor*	10kW (standby 1kW)	6	1kW	11
Hassake*	10kW (standby 1kW)	4	1kW	12
Abu Kamal	20kW (standby 2kW)	3	—	—
Malkiya	20kW	10	20kW	8
Palmyra	1kW	11	1kW	5

Notes: Stations marked with an asterisk (\*) are projected stations.





**LEGEND**  
 © TV STATION  
 1ST FIRST CHANNEL  
 2ND SECOND CHANNEL

**Fig. 2-1-2 TV STATION MAP (EXISTING)**







#### 2-1-4 Spread of TV Receivers in Syria

As of 1992, the number of TV receivers in use in Syria is estimated at 1,000,000 sets, Note) which means that there is one TV receiver to about every twelve persons.

TV receivers in Syria are import-prohibited goods, so in principle the people in this country are supposed to use only domestic products (maker: SYRONICS).

Unlike in other countries, no import duty is imposed on TV receivers. As a result, TV receivers are sold on the market at a considerably low price; for example, a 20-inch model is sold at 18,000SP (429US\$). Every purchaser should pay 200SP (=4.8US\$) as a TV receiver tax only once at the time of purchase.

Therefore, the further spread of TV receivers can be expected in the future in Syria as the prices of TV receivers are low compared with other countries and the service area is being expanded further.

Note) (1) Questionnaire administered to BTA said there are one million TV sets in Syria.

(2) UNESCO's Cultural Statistics Yearbook-1992 says that the number of TV receivers in use in Syria is estimated at 740,000.

## 2-2 Outline of Related Plans

According to the 7th Five-Year Plan (1991 - 1995), the National Planning Committee announced that it attaches great importance to the promotion of agriculture and irrigation. Achieving this goal is an indispensable policy for the national development plan. Especially in the northeastern region, which has occupied an important position over the years as the nation's granary, the Committee plans to promote the irrigation plan for the Euphrates basin, as it believes that carrying out this plan will also be of great use in promoting the development of the remote, isolated regions. It is under these circumstances that BTA has established the following short, medium and long-term objectives in making effective use of the 2nd TV broadcasting service as a means of helping in the National Planning Committee's agricultural promotion plan.

### (Short-term Objectives)

- (a) Expansion of the 2nd TV broadcasting network toward the northeastern regions.
- (b) Activation of the development programme aimed at the northeastern regions based on the 7th Five-Year National Development Plan, and contributing to such activation.
- (c) Enhancement of the quality of school education by means of providing purely educational programmes to schools through the 2nd TV broadcasting network.

(Medium and Long-term Objectives)

TV broadcasting enables not only effective conveyance of information but also a type of education making effective use of excellent video images and sound effects. TV broadcasting is an important and powerful means of communication for enhancing the educational level of the people throughout the country. Therefore, BTA hopes to continue quantitative and qualitative improvements in TV broadcasting, especially in this educational aspect of the media.

## 2-3 Background and Contents of the Request

### 2-3-1 Background of the Request

The 2nd TV Broadcasting Service went into operation in 1985. At present, it covers 60% of the population, but does not yet sufficiently cover the northeastern region of the country. The official announcement made by the government to the people was that this 2nd TV broadcast service was to offer complete educational programming and that it was going to be a nation-wide network. In reality, however, this objective has not been achieved and the government is not in a position to provide equal educational opportunity to the people.

The important and necessary improvements in this regard can be achieved by the following project:

- (a) With the establishment of the nation-wide 2nd TV broadcasting network, the government and BTA will become able to officially announce the start of nation-wide educational broadcasting. And it is hoped that this educational broadcasting will be able to contribute to the enhancement of the educational level of the majority.
- (b) In particular, expansion of the 2nd TV broadcasting network to the northeastern region, which is an important area in the aspects of agriculture and irrigation based on the 7th Five-Year Plan (1991 - 1995), will contribute to the correction of information gaps among different regions, enhancement of the educational level of the local inhabitants, diffusion of agricultural knowledge and spreading of various know-how. As a result of such a contribution, the activation of regional development can be expected.

Furthermore, construction of TV stations will have direct effects on the people in the areas of publicity, information and education. In addition, the continuous educational broadcasting service attained through the expansion of the 2nd TV broadcasting network will enable achievement of BTA's short, medium and long-term objectives as outlined in item 2-3 concerning the related development plans. It was against such a background that the Syrian Arab Republic made a request to the Government of Japan for grant aid to enable realization of the above-mentioned project.

#### 2-3-2 Contents of the Request

The contents of the request include the provision and installation of TV transmitters, antenna systems, a steel tower (for Hassake station only), instruments for measurement and maintenance, spare parts and installation materials for New Hassake Station, Deir ez Zor Station and Tabqua Station.

The contents of the final requests concerning each of the three stations are as follows:

Table 2-3-1 New Hassake Station

Equipment Names	Quantity	Specifications
TV transmitter	1 set	20kW, (solid-state), E-CH2
Coaxial output equipment	1 set	
Programme input and monitoring equipment	1 set	
Programme transmission device (STL)	1 set	Normal/standby type
Transmitting antenna	1 set	
Transmitting antenna tower	1 set	200m guy wire tower: provision of tower materials and dispatch of a construction coordinator only.
Engine generator	2 sets	Emergency generator 200kVA
Power receiving and distribution device	1 set	
Measurement instruments for routine work	1 set	
Measuring instruments for maintenance for 3 stations in common	1 set	
Spare parts	1 set	

Table 2-3-2 Deir ez Zor Station

Equipment Names	Quantity	Specifications
TV transmitter	1 set	20kW, (solid-state), E-CH11
Coaxial output equipment	1 set	
Programme input and monitoring equipment	1 set	
Transmitting antenna device	1 set	
Engine generator	1 set	Emergency generator 200kVA
Measurement instruments for routine work	1 set	
Spare parts	1 set	

Table 2-3-3 Tabqua Station

Equipment Names	Quantity	Specifications
TV transmitter	1 set	20kW, (solid-state), E-CH10
Coaxial output equipment	1 set	
2-channel combiner	1 set	
Programme input and monitoring equipment	1 set	
Transmitting antenna device	1 set	
Engine generator	1 set	Emergency generator 200kVA
Measurement instruments for routine work	1 set	
Spare parts	1 set	





## Chapter 3 Contents of the Project



## Chapter 3 Contents of the Project

### 3-1 Objectives of the Project

The objective of the project is to carry out the expansion of the nationwide educational TV broadcasting network in line with the promotion of agricultural production and the irrigation project in the northeastern part of the Syrian Arab Republic based on the 7th Five-Year National Development Plan. Through this measure, the project aims at enhancing the educational level in the regional cities by offering information and know-how on agricultural techniques and thereby filling the gaps in educational levels between the major cities and rural areas.

### 3-2 Examination of the Contents of the Request

#### 3-2-1 Examination of Appropriateness and Necessity of the Project

In the Syrian economy, which has been suffering from recession for a long time, the economic liberalization policy using various deregulatory measures has been under way and, as a result, a bright outlook has been opening up in such aspects of the economy as increased oil production and improved agricultural production.

Syria is basically an agricultural country. The northeastern part of Syria is located in the "Fertile Crescent" area and is called the "granary" area of the Middle East. The GDP share of the agricultural sector in 1991 was about 31%.

President al-Assad at the People's Assembly (corresponding to Japan's National Diet or Parliament) in March 1992 clearly set out his plan to give top priority to the promotion of agriculture and enhancement of the people's level of education. As the basic policies, the following points have been expressed:

- 1) Improvement of agricultural production methods.
- 2) Afforestation of desert area.
- 3) Tree planting and fruit cultivation.
- 4) Dam construction for the effective use of water resources.
- 5) Attaching great importance to animal resources.

In November 1992, a policy speech by Prime Minister Zoubi announced the positioning of agriculture as the central sector for the development of the national economy.

As shown in Table 3-1-1, in Hassake Province there are four state-operated farms. Some of the farms in this province rank 2nd or 3rd in the country in the production of cereals and legumes. Also, a state-operated farm in Deir ez Zor Province occupies the top position in production of feed crops.

Table 3-1-1 Agricultural Production in the 3 Provinces Affected by the Project

Province	State-operated Farm	Cereals		Legumes		Feed Crops	
		Area (ha)	Production (ton)	Area (ha)	Production (ton)	Area (ha)	Production (ton)
Hassake Province (New Hassake Station)	Malkiye	3,858	5,200 (2nd)	250	110 (2nd)	-	-
	Ras al Ain	22,139	4,963 (3rd)	-	-	-	-
	Al-Manajeer	532	738	15	9 (3rd)	-	-
	Al Khatuniyah	272	187	5	2 (4th)	-	-
Deir ez Zor Province (Deir ez Zor Station)	Salo	795	329	-	130	1,300 (1st)	-
Raqqaq Province (Tabqua Station)	Al-Raakeed	12,350	3,151 (4th)	-	-	-	-

(Figures in ( ) show the rankings of production in Syria)

With this background, the three stations under the project, viz, New Hassake Station, Deir ez Zor Station and Tabqua Station, are located in the above-mentioned "granary" area and therefore are the transmitting stations in the region to which the government attaches highest importance in promoting agriculture as explained above.

In the service area of the existing 2nd TV broadcasting service, sufficiently wide coverage has not been attained since the TV transmitter output is only 1kW and, moreover, the number of antenna panels is small. For these reasons, it has been impossible to provide educational TV programmes to people engaged in agriculture who live scattered over a wide area as is characteristic of agricultural countries. There is an urgent need to provide educational programmes in order to improve the situation where there is a large number of illiterate people in the rural areas in particular. Equally urgent is the need to provide educational programmes to schools and to children at home.

In order to solve these problems, the most effective means will be to install reinforced transmitters for educational TV by renewing the existing equipment and increasing their output in the three project sites. In particular, providing educational programmes can help ① to enhance the residents' educational level, ② to promote social development, ③ to raise national prosperity, and ④ to diffuse agricultural knowledge. This can also lead to the development of the area concerned, and provide equal opportunity of education for the people. These purposes conform to BHN (Basic Human Needs) which are the keywords of grant aid.

### 3-2-2 Examination of Execution and Operation Plans

This project concerns the renewal and increase in output of the transmitters, and renewal of engine generators for the 2nd TV broadcasting service.

Therefore, the stations can be operated with the present work force; no increase in number of personnel will be required. From the aspect of maintenance, the adoption of complete solid-state TV transmitters will enhance reliability, and the equipment will become almost maintenance-free. As for the engine generators, however, judging from the fact that they are in daily operation, periodical maintenance will be required each year (see item 9 of the Appendices). As mentioned in Chapter 2, item 2-1-2, BTA's annual budget has been growing during the last three years at the rate of 3~6% a year and the closing accounts have invariably been in the black. Its financial status is sound and there is no problem in this regard.

In this project, arrangements have been made for a one-year guarantee on the equipment and the allocation of spare units for the main portions of the transmitter. It is desired that, during the operation period, equipment failure trends are understood, so that preparations may be made well in advance for application for any foreign exchange allocation required for the purchase of spare parts or units.

### 3-2-3 Examination of Relation to or Overlapping with Similar Projects and Other Aid Projects

The Ministry of Information and BTA are proposing the following three scenarios for the purpose of establishing an educational TV broadcasting network along the lines of that envisioned in government policies.

1st Phase : Expansion of 2nd TV network.

In order to expand the service area in the large northeastern part of the country which has not yet been covered by the 2nd broadcast service, the transmitter outputs of the three existing stations in the area will be increased.

2nd Phase : Expansion of the TV studios.

A 200m<sup>2</sup> class multi-purpose studio, post production studio, transmission control room and associated equipment will be additionally installed.

3rd Phase : Establishment of nationwide exclusive educational TV network.

Establishment of the educational broadcasting network by means of complementary installation of microwave links or off-air relay stations.

The present project is part of the 1st Phase. Furthermore, BTA has been carrying out its plans one by one through its own efforts. With regard to this project, there are no related aid projects assisted by international organizations.

#### 3-2-4 Examination of the Contents of the Equipment Requested

The contents of the request made by Syria may roughly be divided into two parts. The first is the selection of the transmitting point of New Hassake Station, and the second includes the equipment listed in Chapter 2, item 2-3-2.

As for the selection of the transmitting point, the results are shown in item (1). As for the equipment requested, the optimum scale of this project will be established after examining the various devices



constituting each unit of equipment on the basis of the results of the field survey and consultations with BTA. The results of the examination are shown in item (2).

(1) Results of the field survey concerning the selection of the transmitting point of New Hassake Station

As to the Hassake Station, a request for a survey to be conducted to choose the optimum site for the new transmitting point was made by the Syrian side. Accordingly, a field survey was conducted on two sites.

Both Site 1 and Site 2 are located on the Abd al Aziz mountains which stretch along a highway in the suburbs of Hassake city; their height above sea level is 920m.

The locations of the two sites are shown in Fig. 3-2-1 and the comparative data on examined items are given in Table 3-2-1.

(2) Examination of the contents of requests for the three stations included in the project

The contents of requests made by the Syrian side and the results of examinations performed by the study team are shown in Table 3-2-2.

In deciding on the scale of the transmitting facilities, consideration has been given to ensure that the Syrian side attains its objectives and that an economical design and efficient construction work will be feasible.

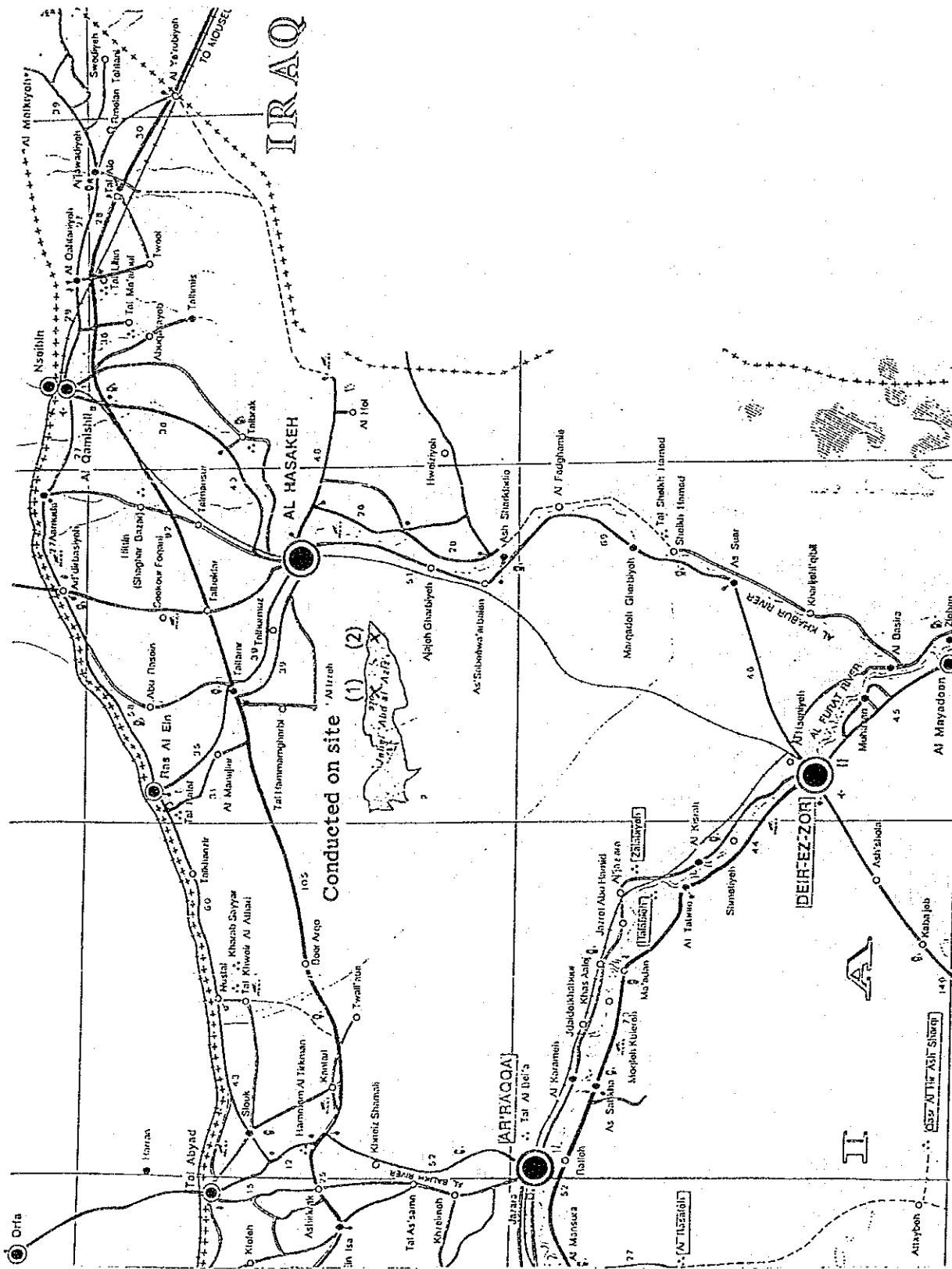


Fig.3-2-1 Location of conducted on site for New Hassake station

Table 3-2-1 Comparison of Two Sites as New Transmitting Point of Hassake Station

Item	Site 1	Site 2
1. Location	N 36° 25' 64.8" E 40° 18' 02.2"	N 36° 26' 17.8" E 40° 29' 39.1"
2. Existence of flat ground for construction of a guy wire tower	Guy wire type 200m OK Self-supporting type OK	Guy wire type 200m NO Self-supporting type OK
3. Access road and its condition	There is one. Unpaved but can reach the top. Road is in good repair at critical points.	There is one. (1) Cut off by rain at two points. But even if restored, reaching the top by car is impossible. (2) Slope is steep, too.
4. Existence of city power line	The city power line reaches houses at the foot of the mountain. Laying of a city power line of 3km is necessary.	The city power line reaches the rock-crushing factory at the foot of the mountain. Laying of a city power line of 3km is necessary.
5. Distance to Hassake city	46km (1) Long distance from Hassake city. At least within 20km is desirable. If serving Qamishli city is considered, this point would be an undesirable distance from the city. (2) Since the area from the transmitting point to Hassake city is a desert, viewer population is low. (3) On the other hand, this transmitting point could be effective from the point of view of offering educational programmes to the poor residents in the desert area.	26km (1) Fairly close to Hassake city, and if service for Qamishli city is considered, this site is better than Site 1 as a transmitting point.

Item	Site 1	Site 2
6. STL for programme transmission	<p>As an STL transmitting station, the following two points have been proposed, and it was left undecided at the time of the survey.</p> <p>(1) Existing Hassake Station → new station (Site 1) The propagation distance by the microwave of the STL device becomes as long as 52km and the transmission scale becomes larger. (5W output, 2.0m<math>\phi</math> parabolic antenna)</p> <p>(2) Hill 428 station → new station transmission The propagation distance by the microwave of the STL device would be a standard 30km. So, the transmission scale is normal. (2W output, 2.0m<math>\phi</math> parabolic antenna)</p>	<p>Same as at left.</p> <p>(1) Existing Hassake Station → new station (Site 2) The propagation distance by the STL device is 32km and the transmission scale can be confined to a normal level.</p> <p>(2) Hill 428 station → new station Same as at left.</p>
	<p>Different STL transmitting points (Existing Hassake Station or Hill 428 Station) from the hardware aspect, will affect the transmission scale, but if future local broadcasts are taken into account, it would be more advantageous to select Existing Hassake Station as the STL transmitting point.</p>	
7. Altitude of the transmitting point	900m. 325m higher than Mt. Kokab (575m) on which Existing Hassake Station is located.	About 800m. 225m higher than Mt. Kokab

Item	Site 1	Site 2
8. Overall Assessment	<p>Site 1 is more advantageous than Site 2.</p> <p>(Reasons)</p> <p>(1) Since the bad road conditions at Site 2 affect the progress of construction and operation/maintenance, Site 1, which can be reached by car at this stage, is desirable.</p> <p>(2) In the case of Site 2, the entire mountain top is occupied by a cemetery. So, if a transmitting station were to be constructed there, negotiations with the residents would become necessary. This would affect the construction period, which is not desirable.</p> <p>(3) Construction of a new transmitting station has been strongly desired by the Syrian side. So, even if Site 1 may not be the best point for TV transmission to the cities, it is judged that early construction of the new transmitting station is possible.</p> <p>(4) In the case of New Hassake Station, judging from the fact that the Syrian side has the objective of providing educational programmes to the poor residents of the desert as a target of broadcasting service, it is considered possible to overlook to some extent the disadvantage of Site 1 being far away from Hassake city.</p>	

Table 3-2-2 Examination of the Contents of the Requested Equipment

Contents of Requests concerning 2nd TV Service	New Hassake Station		Deir ez Zor Station		Tabqua Station	
	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service
1. Site	New site: N 36° 25' 64.8", E 40° 18' 02.2" Altitude 920m (Mt. Abd al Aziz)	With the establishment of the station on the new site, it becomes possible to cover rural areas of Hassake, a part of Rakka and Deir ez Zor Provinces. Consequently, population coverage of the 2nd TV service is estimated to increase from 290,000 to 754,000.	Existing site: N 35° 26', E 40° 10' Altitude 400m	As requested by BTA, almost the same as that of 1st TV Service area. With the increase in transmitter output and in the number of antenna panels as requested under this project, population coverage will increase from the current 154,000 to about 216,000.	Existing site: N 35° 50', E 38° 32' Altitude 342m	As requested by BTA, almost the same as that of 1st TV Service area. With the increase in the antenna height and in the number of antenna panels, population coverage will increase from the current 243,000 to about 420,000.
2. Broadcasting areas H: Wide service area D: The same as the 1st TV service area T: The same as the 1st TV service area	Existing service area		Existing service area		Existing service area	
3. Transmitter output H: 20kW D: 20kW T: 20kW	10kW/1kW (Main/Standby) BTA itself will move a 10kW transmitter. They have the plan of increasing the output to 20kW in the future.	1kW→20kW (Dual Exciter) Output will be increased to 20kW as requested by BTA.	10kW/1kW (Main/Standby) No change.	1kW→10kW (Dual Exciter) Although BTA's request was for 20kW, as a result of examining the service area, it has been decided that it should be 10kW, the same as in the case of 1st TV Service area. Reason is that, if 20kW output is adopted, not much expansion of service area can be expected, since the site is surrounded by high land except for certain directions. Little effect can be expected, only effect being an extension of transparent distance in the two directions.	10kW/1kW (Main/Standby) No change.	4kW→10kW (Dual Exciter) BTA's request is for the same coverage area as that of 1st TV Service. So, the same as in the case of 1st TV Service, the output of the transmitter for the 2nd TV Service will also be 10kW. Even if the output is raised to 20kW, not much effect can be expected, since the 0°, 135° and 180° directions are all blocked by mountains. The existing 10kW transmitter is rented equipment which cannot be used for an unlimited period.

(Notes) H : Hassake, D : Deir ez Zor, T : Tabqua

Contents of Requests Concerning 2nd TV Service	New Ilasake Station		Deir ez Zor Station		Tabqua Station	
	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service
4. Transmission Channels H: CH12→CH2 D: CH11 T: CH5→CH10	CH4 (existing channel)	CH12→CH2 While the existing channel is CH12, CH2 will be used instead for the following reasons: (1) TV waves from Iraq are arriving on a higher level of CH12 and (2) to avoid mutual interference with the neighboring Deir ez Zor Station which is broadcasting on CH11.	CH6 (existing channel)	CH11 Existing channel will be used.	CH8 (existing channel)	CH5→CH10 The existing channel is CH5. Both Aleppo Station and Palmyra Station are broadcasting on CH5. In order to avoid the interference resulting from the expansion of service area this time, the channel will be changed from CH5 to CH10.
5. Antenna Tower H: 200m guy wire type tower	Japan will cooperate in the construction of a 198m guy wire type tower based on the American design standards of EIA-222-C. Reasons why 198m has been proposed in response to the request for 200m are: 1) A 198m tower has been standardized in the EIA-222-C standards. 2) When a 200m tower and a 198m tower are compared in TV service, service areas are almost the same and the main difference is lower to higher cost.	112m steel tower (existing)	82m tower Existing tower will be used.	167m tower Existing tower will be used.	The tower for 1st TV Service will be shared. (Existing 60m tower is used for 2nd TV service) The existing tower is a temporary structure and cannot be used in this project. On the other hand, manufacturing a new tower would be too costly. So, the 167m tower for the 1st TV Service should be shared.	
6. Transmitting antenna H: Wide service area D: The same as the T: 1st TV Service area	2D antenna. 3-3-3-1 stages. To be arranged by BTA itself.	Wideband 2D antenna for CH2 and 4. 4-3-3-4 stages. Based on BTA's plan, a part of areas in Rakka and Deir ez Zor provinces will be brought into the service area for the purpose of further extending the present service area. Also, attention will be paid to reducing the antenna energy radiated toward Turkish territory.	4D antenna. 4-6-3-1 stages. No change.	4D antenna. 4-4-2-4 stages. For the purpose of daily TV service during the construction period, 2-main feeder line system will be used with existing feeder and antenna panels, if possible.	4D antenna. 3-4-2-3 stages Common antenna will be adopted for 1st and 2nd TV transmitter carriers for reasons given below: 1) It is not possible to install on the 167m tower a new antenna for the 2nd TV Service. 2) The tentative tower for the 2nd TV Service is not of a structure that enables installation of antennas on four sides. 3) Because of its being a temporary structure, the existing tower for the 2nd TV Service is as low as 60m. This is too low to secure the same service area as that of the 1st TV Service.	

Contents of Requests Concerning 2nd TV Service	New Hassake Station		Deir ez Zor Station		Tabqua Station	
	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service
7. STL H: One set of MAIN/STANDBY type STL	BTA itself will arrange STL for 1st TV service.	5W output (Main/Standby) Parabolic antenna: 2m $\phi$	---	---	---	---
8. Engine Generator H: 200kVA 2 D: 200kVA 1 T: 200kVA 1	200kVA 1 set This engine generator can supply power for a 2nd TV transmitter and others (1st TV transmitter, microwave equipment and air-conditioner, etc.)		150kVA 1 set It will provide an engine generator with a capacity of 150kVA which is sufficient to supply power for the 2nd TV transmitter in addition to the existing equipment (1st TV transmitter, microwave equipment and air-conditioner). Connection with existing equipment of 2nd TV transmitter included in this project will be conducted by the Japanese side, however, except for the 1st TV transmitter, etc.		150kVA 1 set The same as at left.	
Engine generator 150kVA (mobile type) for common use						
9. Power Receiving/Distributing Device H: Power receiving/distributing device 1 set D: AVR and T: lightning-proof transformer 1 set	One power receiving/distributing device set (including AVR 90kVA) will be provided. In view of the present conditions in Syria where damage from lightning is extremely rare, it is judged that, rather than installing a lightning-proof transformer, installation of an arrester in the power-receiving board will be sufficient as measures to withstand lightning.		AVR 50kVA will be installed for 2nd TV transmitter. As measures to prevent lightning damage, a power-receiving board with arrester will be installed instead of a lightning-withstanding transformer. Connection with existing equipment of 2nd TV transmitter included in this project will be conducted by the Japanese side, however, except for the 1st TV transmitter, etc.		The same as at left.	
10. Measuring for routine maintenance H: For each station, T: oscilloscope, tester and high frequency attenuator	Will be provided as requested.		The same as at left.		The same as at left.	



Contents of Requests Concerning 2nd TV Service	New Hassake Station		Deir ez Zor Station		Tabqua Station	
	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service	1st TV Service	2nd TV Service
<p>11. Measuring instruments common to the three stations:</p> <p>(a) Spectrum analyzer (incl. tracking analyzer)</p> <p>(b) Network analyzer (incl. X-Y plotter)</p> <p>(c) VSWR meter</p> <p>(d) Video envelope delay time measuring instrument</p> <p>(e) Field strength measuring equipment</p>	<p>1. Related to requested item (a), (b) and (c), integrated measuring instruments will be provided, that is;</p> <p>(a) Spectrum analyzer</p> <p>(b) Tracking generator (built-in type)</p> <p>(c) directional bridge</p> <p>(d) Printer</p> <p>2. Network analyzer has seldom or never been used at transmitting stations, so this is only for the Institute of Communication.</p> <p>3. Items (d) and (e) will be provided as requested.</p> <p>4. Purpose of each instrument:</p> <p>(a) Spectrum analyzer: Measurement of strength of several TV waves, etc.</p> <p>(b) Tracking generator with spectrum analyzer: Band characteristic of video transmitter, etc.</p> <p>(c) Directional bridge with spectrum analyzer and tracking generator: Measurement of VSWR of antenna.</p> <p>(d) Video envelope delay time measuring instrument: Measurement of delay time between color and luminance signal</p> <p>(e) Field strength meter: Measurement of TV field strength.</p>					

### 3-3 Outline of the Project

#### 3-3-1 Implementing Organization and the Management System

The implementing organization of this project is BTA and the project will be carried out by BTA in tight cooperation with the Ministry of Information which is BTA's overseeing organ. Management of work after completion of the project will also be taken charge of by BTA as usual.

The BTA's Engineering Department is working on this project systematically and according to the established plans. According to the field survey of New Hassake, Deir ez Zor and Tabqua Stations where the transmitters are to be installed, the operation and maintenance work at each station is conducted by 18 to 31 technicians, and at each station the station director and his staff are making great efforts to secure transmission of broadcast waves by taking appropriate measures in various aspects of operation including measures against power failure. When New Hassake Station goes into operation upon completion of this project, it will be necessary to divide the current work force of 31 staff members at Existing Hassake Station into two groups and have one of them attend to the operation of the new station. Each station has secured enough space and, regarding the capacity of the power-receiving transformer that will become necessary with the introduction of a high-power transmitter, the BTA side will make provisions for a change in capacity in line with the plans. Hence, it has been judged that BTA is fully qualified to act as the implementing organization for this project.

#### 3-3-2 Operational Plans

According to the provisions of this project, the expansion of the 2nd TV broadcasting area will be carried out by increasing the transmitter output of the 3 stations located in the northeastern region.

After the completion of this project, programme categories related to the 1st and 2nd TV services are shown in the following table.

This table indicates that the ratio of educational programme hours will increase from the present 20% to 60%. As a result of this project, there will be an expansion of broadcasting area, an increase in viewers (approximately 2 times), and, moreover, the education gap between the main cities and the regional zone will be corrected on the basis of the Syrian Government policy.

Table 3-3-1

Programme Category	1st TV Service	2nd TV Service
News	15 → 25%	15 → 15%
Information	5 → 10%	5 → 5%
Education	10 → 5%	10 → 60%
Culture & Documentaries	25 → 20%	15 → 15%
Sports	10 → 10%	10 → 0%
Music	10 → 5%	10 → 0%
Entertainment	20 → 21%	30 → 0%
Advertisements	5 → 4%	5 → 5%
Total	100%	100%

### 3-3-3 Locations and Conditions of Project Sites

#### (1) New Hassake and Existing Hassake Station Site in Hassake Province

##### 1) Hassake Province

Hassake Province has a population of about 965,000 which accounts for 7.4% of the total population (12,958,000) of the country. 378,000 people live in the urban sections and 587,000 live in the regional sections. Its distance from the capital city of Damascus is 642km via Palmyra, and it is 180km from Deir ez Zor.

## 2) New Hassake Station Site

New Hassake Station site is located about 50km to the west of Hassake city, at an altitude of 900m near the top of the Abd al Aziz mountains. The conditions of the site are as follows:

- Location data by GPS (Global Positioning System)
  - : N 36° 25' 64.8"
  - E 40° 18' 02.2"
- Access road : Unpaved, but the mountain top can be reached by car.
- City power : The city power line reaches the foot of the mountains. New installation of a 3km city power line will be required.

## 3) Existing Hassake Station

Existing Hassake Station is located at the top of Mt. Kokab which is 5km away from Hassake city. The existing station facilities are as follows:

- Station building : 2 stories (concrete) 349m<sup>2</sup>
- TV antenna towers : The one for the 1st TV Service is a self-supporting type of 127m.  
The other tower for the 2nd TV Service is a microwave tower.
- Space for installation of new antenna on the tower : None
- Capacity of power-receiving transformer : 100kVA
- Power source rating : 380V/220V 3-phase 4-line 50kHz
- Engine generator : 70kVA × 2 sets, 20kVA × 2 sets
- Access road : Paved road

(2) Deir ez Zor Station in Deir ez Zor Province

1) Deir ez Zor Province

Deir ez Zor Province has a population of about 565,000 which accounts for 4.4% of the total population (12,958,000) of the country. In the urban sections live 389,000 people, and there are 176,000 people in the regional sections. Its distance from the capital city of Damascus is 421km.

2) Deir ez Zor Station

Deir ez Zor Station is located at a distance of about 15km from Deir ez Zor city. The conditions of the existing station facilities are as follows:

- Station building : 2 stories (concrete) 349m<sup>2</sup>
- Space for installation of a TV transmitter  
: Adequate space has been secured.
- TV antenna towers : The one for the 1st TV Service is a self-supporting type of 112m.  
The other tower for the 2nd TV Service is a microwave steel tower of 82m.
- Space for installation of new antenna on the tower  
: None
- Capacity of power-receiving transformer  
: 100kVA
- Power source rating : 380V/220V 3-phase 4-line 50kHz
- Engine generator : 70kVA x 2 sets, 20kVA x 2 sets
- Access road : Paved road

(3) Tabqua Station in Rakka Province

1) Rakka Province

Rakka Province has a population of about 485,000 which accounts for 3.7% of the total population (12,958,000) of the country. In the urban sections live 173,000 people and there are 312,000 people in the regional sections. Its distance from the capital city of Damascus is 550km.

2) Tabqua Station

Tabqua Station is located at a distance of about 50km from Rakka city. The conditions of the existing transmitting station facilities are as follows:

- Station building : 2 stories (concrete) 425m<sup>2</sup>
- Space for installation of a TV transmitter
  - : Adequate space has been secured.
- TV antenna towers : The one for the 1st TV Service is a self-supporting type of 167m.  
The other tower for the 2nd TV Service is a temporary construction tower of 60m.
- Space for installation of new antenna on the tower
  - : None
- Capacity of power-receiving transformer
  - : 260kVA
- Power source rating : 380V/220V 3-phase 4-line 50kHz
- Engine generator : 90kVA x 1 set
- Access road : Paved road

### 3-3-4 Outline of Equipment

In carrying out this project, the outline of the equipment to be provided under Japanese grant aid is as follows:

#### (1) TV Transmitter Equipment

One set of 20kW TV transmitter equipment will be provided to New Hassake Station, and one set each of 10KW transmitter equipment to Deir ez Zor Station and Tabqua Station.

(a) Each TV transmitter will be of a structure comprising a double system exciter and blower. At the time of an equipment failure, the use of the redundancy system facilitates securing the TV wave. Furthermore, as the power amplification section consists of 8~16 power amplification units, the reduction of transmitting power owing to the failure of one power amplification unit is kept minimal.

(b) As accessory devices for the transmitter, a CIN (Constant Impedance Notch Diplexer — video-audio output mixing device), a dummy antenna and programme input and monitoring equipment will be provided.

(c) The CIN is used as a device to mix the outputs of video transmitter and audio transmitter and supply the mixed output to the antenna.

(d) The dummy antenna is used for the testing of the characteristics of the video or the audio transmitter, and it is used by switching from the antenna to the dummy antenna side at the U-link panel. The dummy antenna is effective when testing the characteristics of a transmitter without emitting test signals to the service area.

(e) The programme input and monitoring equipment supplies the programme signals, which are sent over from the studio through the microwave link, to the TV transmitter and, at the same time, monitors the performance of the transmitter. This device consists of such units as an audio limiter-amplifier, TV demodulator and audio speaker.

(2) Transmitting Antenna Equipment

As to the transmitting antenna, a 2-dipole antenna with wide antenna bandwidth will be provided to the stations adopting VHF low channel and a 4-dipole antenna to the station adopting high channel. (See Appendices, item 7)

At Hassake Station and Deir ez Zor Station, the transmitting antenna will be used for single channel transmission.

However, Tabqa Station will adopt the 2-channel feeding system (that is, a system whereby two channels of TV waves are transmitted with one transmitting antenna) will be adopted. In this case, the transmitting antenna will require a bandwidth of 21MHz (in the case of the 2-channel feeding system for CH8 and CH10) and it is important that the transmitting antenna has considerably wide bandwidth characteristics. Generally speaking, the bandwidth of a transmitting antenna is said to require about 15-20% of the carrier frequency. So, in the case of a high channel (198MHz in the case of the center frequency of CH8), the antenna bandwidth is about 40MHz. Therefore, adoption of a 2-channel feeding system is possible. Next, according to BTA's planning, 2 channels feeding (CH2 and CH4) for New Hassake Station is planned. Consequently, transmitting antenna for this project should be adopted wide band antenna so as to transmit CH2 and CH4.



### (3) STL Device Equipment

For use in transmitting programme signals between Existing Hassake Station and New Hassake Station, an STL device (Main/Standby) set will be provided.

The output of the STL transmitter shall be 5W on 6.8GHz band and will consist of 2 units of basic devices with 1W output and a 5W power amplification section. The STL receiver will also consist of two receivers, Main and Standby. Thus, because both the transmitting and the receiving system each have a standby system, the reliability of the system as a whole has been enhanced.

### (4) Engine Generator Equipment for Emergency Use

In Syria, planned power stoppages are conducted 3-4 hours every day and the power-supply condition is not good in this country at present. Therefore, for the purpose of ensuring continuation of TV broadcasting services even during the hours of power supply stoppages, the obsolete engine generators for emergency use will be renewed. As the type of engine generator for emergency use, diesel engine generators with low fuel cost in comparison with gasoline engines will be adopted. And the direct-injection type with a short start-up time will be adopted.

The output shall be of 3-phase 4-line type, 380V/220V, 200kVA or 150kVA.

The engine generators will automatically start up when the city power supply is cut, switch to the generator side and start supplying power to the broadcasting equipment. When the power supply returns, switching will in principle be done by hand after the operator has confirmed the stable supply of power; automatic switching to the city power side will be avoided.

(5) Power Source Equipment

Since the voltage stability of the 380V 50Hz power supply is not good, an AVR (Automatic Voltage Regulator) will be provided.

As for the power supply voltage, the primary voltage variation range of the AVR will be designed at  $\pm 15\%$ , since voltage drops of about  $-10\%$  are constantly occurring at the source. The line capacity of the AVR will be designed at 90kVA, considering the load of the transmitter for the 2nd TV Service.

As for the power receiving board, the existing one will be replaced with a new one, because the input current will increase as a result of the increase in output of the new transmitter (10kW; 52A, 1kW; 7.6A) for the 2nd TV Service, thus making it impossible to use the present device with this line.

Furthermore, considering lightning damage, an arrester will be installed for each line so as to avoid damage to equipment by lightning.

(6) Measuring Instruments for Maintenance Use

An oscilloscope, tester, high frequency attenuator and TV test signal generator for routine maintenance and check-up will be provided.

(7) Measuring Instruments for Common Use at the Three Stations

For measuring the characteristics of TV transmitters, such measuring instruments as a spectrum analyzer with printer, field strength measuring equipment, tracking generator, and video envelope delay time measuring instrument will be provided. With these measuring instruments, maintenance and management of the required performance of TV transmitters will become possible.

(8) Spare Parts and Modules

Spare parts for the main sections of such equipment as TV transmitters and engine generators for emergency use will be provided.

The details of the contents of such spare parts will be determined at the time of design stage, but the following items will be included as the minimum so as to be made use of in the maintenance of equipment.

- Spare units for transmitters
- Module units for main equipment

### 3-3-5 Maintenance and Management Plans

#### (1) Personnel and Management System

The personnel for the three stations under this project (Hassake, Deir ez Zor and Tabqua), are as shown in Table 3-3-2, and number 31, 18 and 24 persons, respectively. When conducting future maintenance and management work at the TV stations, the matters stated following the table should be taken into account.

Table 3-3-2 Numbers of Personnel at each TV Transmitting Station

Station Name	Engineer	Technician	Administration Worker	Total
Abu Kamal	2	9	10	21
Nabi Saleh	6	17	27	50
Hassake	3	16	12	31
Aleppo	5	10	5	20
Palmyra	1	5	1	7
Sweyda	3	22	2	27
Tabqua	4	10	10	24
Tartus	2	4	3	9
Deir ez Zor	2	8	8	18
Sarrokhiya	—	3	3	6
Ain Arab	3	8	7	18
Homs	4	21	16	41
Kaldoon	—	11	6	17
Malkiya	2	8	12	22
Slente	8	5	7	20
Damascus	6	19	2	27
Ifreen	—	1	4	5
Latakia	2	7	2	11
Total 18 Stations	53	184	137	374

- (a) Basically, the provision of equipment under this project concerns the increase in output of TV transmitters and the renewal of obsolete engine generators. Consequently, as no increase in the number of equipment is involved, there is no need to increase the number of personnel. Increase in the volume of work is also expected to be minimal.
- (b) After completion of the project on Hassake Station, the personnel will be divided among New Hassake Station and Existing Hassake Station; the former taking charge of TV transmitting work and the latter, the operation of TV microwave equipment. As a result, it becomes necessary to assign the 31 present personnel to each station as shown in Table 3-3-3.

Table 3-3-3 Personnel Assignment at Hassake Stations

Station name	Engineer	Technician	Worker
New Hassake (TV)	2	10	7
Existing Hassake (TV microwave)	1	6	5

- (c) In order to integrate the functions of various TV equipment, it is necessary for BTA to move all the TV-related equipment in Existing Hassake Station to New Hassake Station. The obsolete equipment should be discarded so as to avoid unnecessary maintenance expenses. The obsolete engine for the TV transmitter is one such example.

(2) Budget Plans

- 1) Normally, the items of annual maintenance and management expenses that would be expected to increase after completion of the project are as follows:

(a) Personnel expenses resulting from the increase in the number of personnel.

(b) City power charges due to the increase in transmitter output and the fuel charge for engines resulting from such changes as the expansion of facilities.

(c) Material and consumable goods expenses.

Since the increase in output of transmitters is the main part of this project, item (b) above will be the main reasons for the increase in expenditure.

Of these, the increase in fuel costs at the three stations resulting from the increase in the capacity of the engine generators (70kVA → 200kVA or 150kVA) is, as can be seen from Tables 3-3-3~4, 709,300SP.

In addition, the increase in the consumption of power by the TV transmitters is 649,890SP as shown in Tables 3-3-5~6.

Compared with the 270 million SP which is BTA's annual budget for fiscal 1992, the increases in fuel costs and city power charge are only 0.5% of the total annual budget, and so there will only be a small effect.

Meanwhile, the estimated annual budgets of the three stations under the project, after completion of the project, are shown in Table 3-3-5. Table 3-3-5 is a summary of Tables 3-3-3~4. From Table 3-3-5, it is clear that the greater part of the annual operational expenses are accounted for by fuel and power costs.

2) (a) At present, a power generation project is under way in Syria.

Under this power generation project, power generation is expected to increase from 2.174 million kW in 1991 to 3.284 million kW in 1995 and to reach 4.882 million kW in the year 2000.

(b) Furthermore, in June 1993 Syria signed a power agreement linking Syria, Jordan, Turkey etc. with a common power transmission network. This agreement is scheduled to go into effect from 1997. Therefore, the present planned power supply stoppage of 3-4 hours a day in Syria will decrease gradually, and consequently the fuel expenses are expected to decrease accordingly.

Table 3-3-3 Annual Fuel Cost at Each Station

Station name	Annual fuel cost after completion of the project (SP)	Annual increased cost compared with the preceding year (SP)
New Hassake (70kVA → 200kVA)	748,800	354,600
Deir ez Zor (70kVA → 150kVA)	591,300	197,100
Tabqua (90kVA → 150kVA)	591,300	157,600
Total:	1,931,400	709,300

(Calculated from 9 SP/ℓ)

Table 3-3-4 Annual City Power Charge at Each Station

Station name	2nd TV Service	1st TV Service	Annual total city power charge (SP)	Annual increased city power charge with this project (SP)
New Hassake	1 kW → 20kW	10kW	330,260	317,660
Deir ez Zor	1 kW → 10kW	10kW	215,520	202,920
Tabqua	4 kW → 10kW	10kW	215,520	129,310
Total			761,300	649,890

(Calculated from 2 SP/kW)

Table 3-3-5 Operation Cost at 3 Stations (estimated)

SP/year

Item	New Hassake		Deir ez Zor		Tabqua	
	Required amount	%	Required amount	%	Required amount	%
Fuel expenses	748,800	44	591,300	40	591,300	34
City Power expenses	330,260	19	215,520	14	215,520	13
Personnel expenses (minimum)	619,200	37	691,200	46	936,000	53
Total	1,698,260	100	1,498,020	100	1,742,820	100

The estimated budget for the Syrian side is shown in Table 3-3-6.

Table 3-3-6 Operation Cost at 4 Stations (after completion of this project)

SP/month

	New Hassake	Existing Hassake	Deir ez Zor	Tabqua
Electricity	40,000	45,000	45,000	50,000
Water	20,000	15,000	15,000	10,000
Personnel	60,000	70,000	80,000	75,000
Others	120,000	125,000	135,000	130,000
Total	240,000 SP/month	255,000 SP/month	275,000 SP/month	265,000 SP/month
	2,880,000 SP/year	3,060,000 SP/year	3,300,000 SP/year	3,180,000 SP/year

### 3-4 Technical Cooperation

BTA, since its start of TV broadcasting, has gained the experience of more than 33 years and its technical level is high. There are no particular problems expected concerning BTA's operation after completion of this project. BTA, however, earnestly desires to enhance its overall technical level to cope with the new equipment to be introduced into the 3 stations and also to ensure the effective operation of such equipment. Consequently, BTA has already made an application to receive experts from Japan and to send trainees to Japan.

In this respect, the conducting of technical cooperation along the Syrian side's proposed lines is most desirable.

Concerning this technical cooperation, the BTA side has made their requests with the following contents:

Items	Numbers	Sectors
Short-term Experts from Japan	4	TV transmission technology
Long-term Experts from Japan	2	Maintenance
Acceptance of trainees in Japan	6	TV training



## Chapter 4 Basic Design



## Chapter 4 Basic Design

### 4-1 Design Policy

This project is designed to expand the coverage area of the BTA-operated the 2nd TV Broadcasting Service in the northeastern part of Syria. It should take into consideration minimizing changes to the existing transmission facilities in the 3 affected stations, that is, Hassake, Deir ez Zor and Tabqua. To achieve this objective, the following points must be considered in the design.

- (1) In order to obtain the best results within the scope of the grant aid, the most suitable facilities for the project should be effectively designed.
- (2) New equipment should be functionally matched to existing facilities to avoid any detrimental influence.
- (3) Existing facilities should be utilized as much as possible.
- (4) To determine the most suitable models and functions of the new equipment, several factors need to be considered; easy operation and maintenance, simple and durable structure, and easy acquisition of spare parts and consumable goods.
- (5) The performance and design standards of the transmitters should conform to the technical standards stipulated by the International Radio Consultative Committee (CCIR).
- (6) The system should be as unified as possible to facilitate cost-effective operation and maintenance. Furthermore, the system should be designed taking its long-term operation into consideration.
- (7) The construction work should be conducted in such a way as to be completed within the period designated by Japan's Grant Aid System. Also, project costs should be minimized as much as a technological conditions and the construction period permit.

## 4-2 Study and Examination of Design Criteria

Design criteria are categorized into (1) Transmitter output, (2) Transmitting channel, (3) Antenna tower, (4) Antenna gain and radiation pattern, (5) Studio to transmitter link, and (6) Engine generator capacity.

### (1) Transmitter Output

The most effective transmitter output should be determined based on the required ERP (Effective Radiation Power) which is suitable for the same coverage area as the existing 1st TV Service coverage area.

### (2) Transmitting Channel

The channels should be assigned in consideration of the 1st TV channel, neighboring station channels and foreign TV channels.

### (3) Antenna Tower

It must be determined whether existing towers can be utilized. If it is necessary to construct a new tower, it should be high enough to cover the target area. The design criteria of any new tower must satisfy EIA-RS222-C which is the antenna tower standard in the U.S.A. In the case of New Hassake Station, design wind velocity shall be determined 50 m/s at 198m high as the zone-B of the above standard.

### (4) Antenna Gain and Radiation Pattern

The transmitting antenna gain and its radiation pattern should be so determined that radiation power can be effectively minimized by considering the geographical conditions and population density distributions of the coverage area.

(5) Studio to Transmitter Link

In New Hassake Station, an STL (Studio to Transmitter Link) should be installed. Two candidate stations, that is, Existing Hassake Station (N36°25'64.8", E40°18'02.2") and the Hill 428 station (N36°26'17.8", E40°29'39.1"), have been proposed as STL transmission stations. Considering easy monitoring and maintenance in future local broadcasting services, Existing Hassake Station should be chosen.

(6) Engine Generator Capacity

Since planned periodical power stoppages occur for several hours every day in Syria, an engine power generator should be installed as a backup. This engine generator should have sufficient capacity to cover the first and second TV transmitter and other power needs during these power stoppages. Moreover, as a backup for this generator, a mobile engine generator should also be installed.

The requirements for the engine generator are:

- \* Use of diesel engine.
- \* Automatic start and switch over when power is cut.
- \* Manual switch over when power restored.

## 4-3 Basic Plan

### 4-3-1 Equipment Arrangement Plan

Equipment provided as part of this project should be assembled and installed in New Hassake, and the existing Deir ez Zor and Tabqua Stations.

#### (1) New Hassake Station

On the top of Mt. Abd al Aziz, 52km to the west of Existing Hassake Station, BTA should construct a new station building in which the transmitting facilities for the 2nd TV Broadcasting Service will be installed. These facilities should include a TV Transmitter, Coaxial Output Equipment, Programme Input-Monitoring Equipment, an STL, a Transmitting Antenna, an Antenna Tower, and an Engine Generator and Reception-Distribution Board.

##### 1) TV Transmitter

The TV transmitter with an output of 20kW includes 2 exciters and 2 cooling fans each for main and standby use, operating individually on CH2. A Constant Impedance Notch Filter (CIN) is connected to the output of the transmitter.

##### 2) Coaxial Output Equipment

This equipment includes a U-link coaxial feeder panel capable of switching over the transmitter output into the antenna and the dummy load, an air-cooled dummy load used to carry out maintenance, and an indoor feeder.

##### 3) Programme Input-Monitoring Equipment

This equipment adjusts and monitors transmitter input signals, while simultaneously monitoring transmitter output.

#### 4) STL

The STL consists of 2 sets for main and standby use. Each set is a 6.8GHz-range STL with an output of 5W. An STL transmitter should be installed at Existing Hassake Station and an STL receiver should be installed at New Hassake Station. A parabolic transmitting antenna with a diameter of 2m, and a parabolic receiving antenna with a diameter of 1.8m should be installed on the roofs of the respective station buildings.

#### 5) Antenna

Wideband 2 dipole antenna for CH2 and 4, which has a 4-3-3-4 stages structure.

#### 6) Antenna Tower

Steel material and construction coordinators should be provided to construct a 198m guy wire tower. The Antenna Tower will consist of 26 sections, the guy wire of 6 stages 3 directions, lightning rod and aeronautical obstruction lights. To accommodate the guy wire, BTA should secure a transmission site that has an area of at least 300m x 300m. BTA should also ensure that the level difference at the site should be less than 20m in the range of 300m x 300m. BTA should also carry out the foundation and erection work for the guy wire tower.

#### 7) Engine Generator

As part of this project, a 200kVA diesel-engine power generator should be installed for use during power stoppages. A 150kVA mobile generator should also be provided as a backup to be shared with the other two stations (Deir ez Zor and Tabqua Stations).

BTA should provide the commercial electric power needed by the new station building (380V/220V, low-voltage 50Hz with 3 phases and 4 lines.)

#### 8) Measurement Equipment

To ensure that the various devices remain in a proper operating condition, adequate daily maintenance work is required. Therefore, measurement equipment that can properly check the status of these devices should be installed.

#### 9) Spare Parts

Details should be decided in the design stage. However, at least, the following basic parts should be included to maintain the equipment.

- \* Transmitter's Spare Unit

- \* Main Equipment Module Unit

10) As the design policy to natural condition on site, the design wind velocity for antenna tower should be determined as 50 m/s in consideration of the fact that maximum wind velocity was 27 m/s for the past 30 years, and as zone-B of RS-222c standard in U.S.A.

#### (2) Deir ez Zor Station

Transmitting facilities should be installed at the existing Deir ez Zor Station. These facilities include a TV Transmitter, Coaxial Output Equipment, Programme Input-Monitoring Equipment, a Transmitting Antenna, and an Engine Generator.

As a rule, the installation work should be conducted without interrupting the daily broadcasting conducted by the existing transmission equipment used by the 2nd TV Broadcasting Service.



1) TV Transmitter

The TV transmitter includes 2 exciters and 2 cooling fans for main and standby use, with an output of 10kW, operating on CH11.

2) Coaxial Output Equipment

This equipment includes a U-link coaxial feeder panel capable of switching over the transmitter output into the antenna and the dummy load, an air-cooled dummy load used to carry out maintenance, and an indoor feeder.

3) Programme Input-Monitoring Equipment

This equipment adjusts and monitors the transmitter input signals while simultaneously monitoring the transmitter output.

4) Antenna

The existing 4-dipole antenna, which has a 3-3 stage structure at present, should be modified to give it a 4-4-2-4 structure. The existing antenna panel and main feeder should be utilized to make this modification, if possible. After additional antenna panels are attached, the antenna gain and radiation pattern should match the characteristics of the 1st TV Broadcasting Service. The new antenna should adopt a double feeder system with an additional main feeder to adequately handle the resulting transmission output increase.

5) Antenna Tower

The existing 82m steel tower for the 2nd TV Broadcasting Service should be utilized.

6) Engine Generator

In place of the existing engine generator which should be removed by BTA, a new 150KVA engine generator should be installed under this project.

### 7) Measuring Instruments

To ensure that the various equipment installed is in good operating condition, adequate daily maintenance work is required. Therefore, measuring instruments that can properly check the status of this equipment should be provided.

### 8) Spare Parts

Details should be decided in the design stage. However, at least, the following basic parts should be included to maintain the equipment.

- \* Transmitter's Spare Unit

- \* Main Equipment Module Unit

### (3) Tabqua Station

Transmitting facilities should be installed at the existing Tabqua Station.

These facilities include a TV Transmitter, Coaxial Output Equipment, Programme Input-Monitoring Equipment, a Transmitting Antenna, and an Engine Generator.

As a rule, the installation work should be conducted without interrupting the daily broadcasting conducted by the existing transmission equipment used by the 2nd TV Broadcasting Service.

#### 1) TV Transmitter

The TV transmitter consists of 2 drivers and 2 cooling fans for main and standby use, with an output of 10kW, operating on CH10.

#### 2) Coaxial Output Equipment

This equipment includes a U-link coaxial feeder panel capable of switching over the transmitter output into the antenna and the dummy load, an air-cooled dummy load used to carry out maintenance, and an indoor feeder.

3) 2-channel combiner

A 2-channel combiner device should be installed at this site because there is no space for the 2nd TV antenna on the tower. 2-channel combiners have the function that one TV transmitting antenna can transmit two channels' TV waves, that is, CH10 and CH8.

4) Programme Input-Monitoring Equipment

This equipment adjusts and monitors the transmitter input signals while simultaneously monitoring the transmitter output.

5) Antenna

As part of this project, the existing antenna should be replaced by a new one which can be shared by the 1st and 2nd TV Broadcasting Service. This antenna panel should include a 4-dipole antenna with a 3-4-2-3 structure, which is the same as the number of antenna panels currently being used by the 1st TV Broadcasting Service.

6) Antenna Tower

The tower currently being used by the 2nd TV Broadcasting Service is a temporary one, which cannot be used for the reasons outlined below. Therefore, the existing 167m tower used by the 1st TV Broadcasting Service should be utilized for the 2nd TV Broadcast Service, also.

- (a) The structure of the existing tower (60 m) does not allow antennas to be installed on all 4 sides.
- (b) The existing tower is only a temporary structure, and is only 60m high. Therefore, it cannot ensure the same coverage as that secured by the 1st TV Broadcasting Service.

(c) At this site, the 167m tower used by the 1st TV Broadcasting Service does not have enough space to install the 2nd TV Service's transmitting antenna. Therefore, as mentioned above, an antenna that can be used by both broadcasting services should be installed.

7) Engine Generator

In place of the existing 90kVA engine generator which should be removed by BTA, a new 150kVA engine generator should be installed under this project.

8) Measuring Instruments

To ensure that the various equipment installed is in good operating condition, adequate daily maintenance work is required. Therefore, measuring instruments that can properly check the status of this equipment should be installed.

9) Spare Parts

Details should be decided in the design stage. However, at least, the following basic parts should be included to maintain the equipment.

\* Transmitter's Spare Unit

\* Main Equipment Module Unit

#### 4-3-2 Equipment Composition

The composition of the equipment to be installed in each station is determined as follows, in accordance with design policy and in consideration of design conditions.

##### (1) Hassake Station

###### 1) New Hassake Station

Equipment	Amount	Specifications
TV Transmitter	1 set	20kW, (All Solid State), E-CH2
Coaxial Output Equipment	1 set	levis panel with dummy load
Programme Input-Monitoring Equipment	1 set	
Studio-to-Transmitter Link (Receiver)	1 set	6.8GHz 1.8m $\phi$ for the main and standby
Transmitting Antenna	1 set	Wideband 2 dipole, 14 panels antenna for CH2 and 4
Antenna Tower	1 set	198m guy wire type and tower material for construction coordinator provided
Engine Generator	1 set	200kVA Engine Generator
Power Reception-Distribution Board	1 set	
Measuring Instruments for Daily Maintenance	1 set	
Measuring Instruments for shared use by 3 Stations for maintenance	1 set	
Spares	1 set	
Mobile type Engine Generator	1 set	150kVA Engine Generator

###### 2) Existing Hassake Station

Equipment	Amount	Specifications
Studio-to-Transmitter Link (Transmitter)	1 set	5W, 6.8GHz 2m $\phi$ antenna

(2) Deir ez Zor Station

Equipment	Amount	Specifications
TV Transmitter	1 set	10kW, (All Solid State), E-CH11
Coaxial Output Equipment	1 set	U-link panel with dummy load
Programme Input-Monitoring Equipment	1 set	
Transmitting Antenna	1 set	4 dipole, 14 panels
Engine Generator	1 set	150kVA engine generator
Measuring Instruments for Daily maintenance	1 set	
Spares	1 set	

(3) Tabqa Station

Equipment	Amount	Specifications
TV Transmitter	1 set	10kW, (All Solid State), E-CH10
Coaxial Output Equipment	1 set	U-link panel with dummy load
2-Channel combiner	1 set	
Programme Input-Monitoring Equipment	1 set	
Transmitting Antenna	1 set	4 dipole, 12 panels
Engine Generator	1 set	150kVA engine generator
Measuring Instruments for Daily maintenance	1 set	
Spares	1 set	