

## 8. CSSの概要



CENTRAL COMPUTER SYSTEM HARDWARE  
DESCRIPTION:

The Central Computer System hardware are grouped into four (4) functional blocks as shown in the system block diagram (figure 1).

The system consists of the following four main system blocks:-

- (i) Central processing unit, peripherals and auxiliary equipment.
- (ii) Data Radio Communication.
- (iii) Remote Terminal Units.
- (iv) Field Instruments and equipment.

The Original Equipment Manufacturer(OEM) for the system is System Control Incorporated (SCI). They designed and built the system mainly utilizing components manufactured by other companies. The major components manufacturers are all based in the United States of America (U.S.A.) and are as follows:-

Digital Equipment Corporation (DEC)  
Intelligent Systems Corporated (ISC)  
Hewlett Packard (HP)  
General Electric (GE)  
Racal Vadic  
Topaz  
R.O. Associated Incorporated (RO)  
Fisher and Porter  
Sybron Taylor  
Robertshaw  
Drexelbrook  
Euroguage  
Rosemont

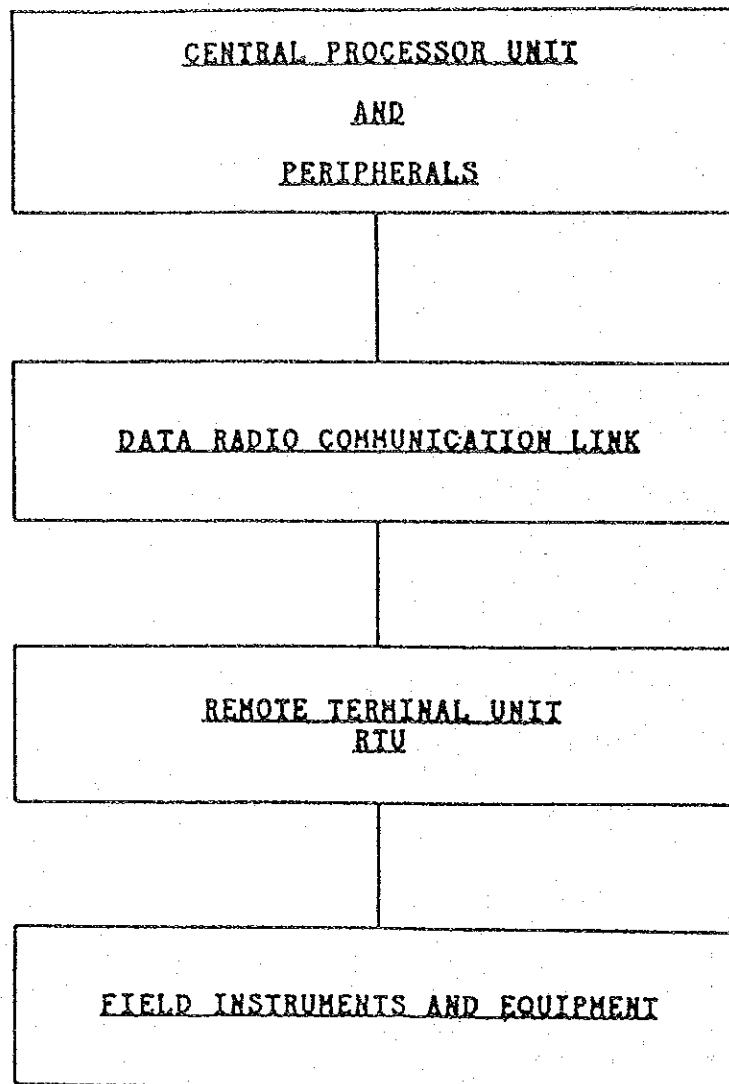


Figure 1

BLOCK DIAGRAM OF CENTRAL SUPERVISORY SYSTEM HARDWARE

1 CENTRAL PROCESSOR UNIT AND PERIPHERALS

This block is comprised of two identical but separate computer systems with some shared components. It was designed this way to ensure that a computer is always carrying out the real time monitoring and controlling of the water system functions. Whenever this computer fails, the a standby was to be switched to carry out the said functions of monitoring and controlling the water system.

LIST OF COMPONENTS AND MANUFACTURERS (TABLE 1)

ITEM	COMPONENTS	QUAN- TITY	TYPE	MANUFAC- TURERS
1.	Uninterruptable Power Supply	1	81415-17	Topaz
2.	Central Processing Unit	2	PDP11/34	DEC
3.	Fixed Disk Drive	2	RK05-F	DEC
4.	Cartridge Disk Drive	2	RK05-J	DEC
5.	Magnetic Tape Drive	2	TS03	DEC
6.	High Speed Printer	1	LA180PA	DEC
7.	Graphic Printer	1	7202A	HP
8.	Video Terminal	1	VT52	DEC
9.	Printer Terminal	2	LA-36-CE	DEC
		1	LA-36-DE	DEC
		1	LA-36-DK	DEC
10.	Color Video Terminal	2	8100	ISC
11.	Modem	2	VA1230K	Racal/ Vadic
12.	Switch Panel	1		SCI

Data Radio Communication

The Data Radio Communication Link is made up of the following:-

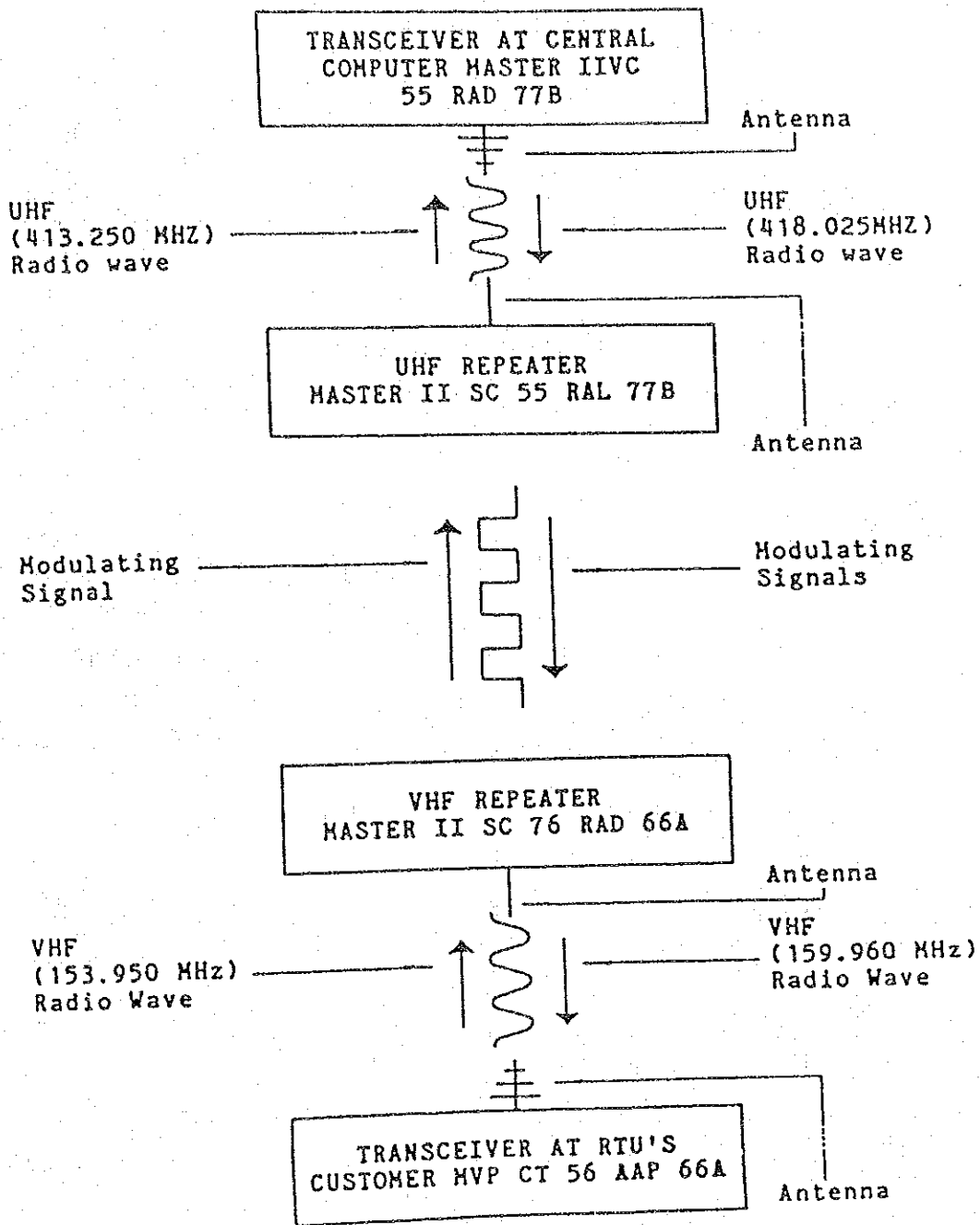
- (a) Data Radio Transceivers at the Central Supervisory System Building.
- (b) Data radio repeaters at Pepper Hill (Central Trinidad).
- (c) Data radio transceivers at each RTU.

Data radio components in the data radio link were manufactured by General Electric Company.

TABLE 2

LIST OF DATA RADIO COMMUNICATION COMPONENTS

COMPONENT	QUAN- TITY	MODEL	TYPE
Transceivers	2	Master II VC 55 RAD 77B	
Repeaters	2	Master II SC 55 RAL 77B	
Repeaters	2	Master II SC 76 RAD 66A	
Transceivers	6	Custom MVP CT 56 AAP 66A with duplexers	
	19	Custom MVP CT56 AAP 66A without duplexers.	



DATA RADIO SIGNAL MODULATION

Figure 15

Remote Terminal Unit(RTU)

The Central Computer System was to be delivered to WASA initially with twenty-four (24) RTU's installed and operating. When efforts were being made to have WASA accept the supervisory system in 1981, nineteen (19) RTU's were installed at one time or the other and communicated successfully with the Central Computer.

The following are types, quantities and manufacturers of components in a typical RTU. The components are more or less standard in each RTU except that there are different quantities of input/output interfaces in each RTU.

TABLE 3  
LIST OF COMPONENTS AND MANUFACTURERS

<u>COMPONENT</u>	<u>Q'TY</u>	<u>TYPE</u>	<u>MANUFACTURER</u>
Modem Watch Dog Timer	1	PC7373515	SCI
Micro Processor Unit	1	M68MM01A	Motorola
AC/DC Power Supply	1	Model 750	R/O
DC/Dc Power Converted	1	AD7573540	SCI
<u>INPUT/OUTPUT INTERFACES</u>			
Two Status input PC Card		AD7573505	SCI
Relay Driver output PC Card		AD7573510	SCI
Multiplexed analog input PC Card		AD7573500	SCI
analog output PC Card		AD753520-2	SCI



LIST OF INSTRUMENTS AND MANUFACTURERS

INSTRUMENT	QUANTITY	TYPE	MANUFACTURER
Press. Diff. Transmitter	(4) Four	117-C1-A1-A	Rosemount
"	(2) Two	50 EP2000	Fisher & Porter
"	(8) Eight	50 DP 2000	Fisher & Porter
"	(5) Five	1302 TD 11221	Sybron-Taylor
"	(1) One	1302 TF 11821	Sybron-Taylor
"	(1) One	117-C1-A1-A	Robertshaw
Press. Transmitt.	(6) Six	50EP 1000	Fisher & Porter
"	(3) Three	1333 TF 1121	Sybron-Taylor
Level Transmitter	(2) Two	506-6000 LCST <sup>TM</sup>	Drexelbrook
"	(1) One	508-1101-1 LCST <sup>TM</sup>	Drexelbrook
"	(6) Six	160-B1	Robertshaw
"	(6) Six	3664-50	Eroguage
Square Root Extractors	(9) Nine	50ES3000	Fisher & Porter
"	(5) Five	1336NA11000	Sybron-Taylor
Indicating Recorders	(1) One		Fisher & Porter
"	(3) Three	1333JA14102	Sybron-Taylor
Indicators	(8) Eight	51-1371	Fisher & Porter
"	(16) Sixteen	51-1372	Fisher & Porter

(Continued)

LIST OF INSTRUMENTS AND MANUFACTURERS

INSTRUMENT	QUANTITY	TYPE	MANUFACTURER
Indicators	(4) Four	51-1373	Fisher & Porter
"	(5) Five	1301KA10020	Sybron-Taylor
"	(5) Five	1301KA10000	Sybron-Taylor
Adder/ Subtractor	(3) Three	50 As 3000	Fisher & Porter
Integrators	(2) Two	1310NA14500	Sybron-Taylor
"	(2) Two	1310NA14200	Sybron-Taylor
Totalizers	(4) Four	1315NA10000	Sybron-Taylor
"	(1) One		Fisher & Porter

出所 WASA

## 9. 1989年度 WASA 開発予算内訳



添付資料9. 1989年度WASA開発予算内訳

36 - MINISTRY OF PUBLIC UTILITIES AND SETTLEMENTS

001 WATER AND SEWERAGE AUTHORITY

09 APPROVED DEVELOPMENT PROGRAMME 1989

ITEM NO.	HEAD/SUB HEAD/PROJECT NAME	ESTIMATED COST	PROJECT DESCRIPTION
	<u>SANITARY SERVICES</u>	\$ <u>30,000,000</u>	
	<u>Improvement to Treatment Works</u>	\$ <u>2,800,000</u>	
444	Beetham Highway STP	\$ 2,500,000	(1) Replacement of force main (3) Renovation of Plant (2) Desludging of ponds
	San Fernando STP	\$ 100,000	(1) Refurbishment of digester (3) Renovation of Plant (2) Repairs to trickling filter
	Arima STP	\$ 150,000	Construction of Access Bridge and Renovation of Plant
	Diego Martin Pumping Station	\$ 50,000	Replacement of main from Plant to Mucurapo and Renovation of Plant

ITEM NO.	HEAD/SUB HEAD/PROJECT NAME	ESTIMATED COST	PROJECT DESCRIPTION
	<u>WATER FACILITIES AND SUPPLY</u>	\$ 27,200,000	
	<u>Development of Major Sources</u>	\$ 14,100,000	
458	Caroni Area	\$ 1,200,000	Refurbishment of Plant and equipment at Treatment Plant and Booster Station
480	Toco	\$ 300,000	1. Laying of main between Cumana and Morne Cabrite 2. Construction of Storage Reservoir - Morne Cabrite
495	Navet	\$ 1,200,000	Improvement of Treatment Facilities and replacement of switchgear at Navet Networks and Booster Stations
492	Moruga	\$ 400,000	Laying of main along Moruga Road (7km-300mm Ø)
483	St. Patrick	\$ 11,000,000	Continuation of Construction of the St. Patrick Water Supply Project (This project is partly funded by a loan from EEC)
	<u>Development of Local Sources</u>	\$ 4,350,000	
471	Tucker Valley/Chaguaramas	\$ 500,000	1. Construction of pumping station at Carenage and Tucker Valley 2. Construction of Booster Station at West Vale 3. Drill and equip 2 wells at Tucker Valley

ITEM NO.	HEAD/SUB HEAD/PROJECT NAME	ESTIMATED COST	PROJECT DESCRIPTION
504	Port of Spain ±	\$ 400,000	<ol style="list-style-type: none"> <li>1. Construction of Highlift Station - Picton -</li> <li>2. Construction of mains, Booster Station and Storage Tank at Marie Road, Morvant</li> </ol>
542	Le Platte - Paramin	\$ 250,000	Continuation of Construction of Treatment Facilities at well
543	Santa Cruz	\$ 400,000	<p>Provides for:</p> <ol style="list-style-type: none"> <li>1. Equipping of 2 wells - Santa Cruz</li> <li>2. Upgrading Booster Station - La Canoa</li> <li>3. Laying of main between Meadows and La Canoa</li> </ol>
545	Yalsayn	\$ 300,000	Installation of pumping equipment and interconnecting pipework at wells
513	Tacarigua	\$ 300,000	Installation of pumping equipment and interconnecting pipework at wells
485	Freeport	\$ 500,000	Equipping of wells and construction of Treatment Facilities
452	Las Lomas	\$ 150,000	Construction of retaining wall at Plant
522	Penal	\$ 500,000	<ol style="list-style-type: none"> <li>1. Equip, treat and commission one (1) Trintoc Well at - Barrackpore</li> <li>2. Drill, treat and commission three (3) wells at Morne Diablo, and construction of transmission main (3km-200m)</li> <li>3. Drill and equip four (4) wells and construction of water Treatment Plant in Penal</li> </ol>

ITEM NO.	HEAD/SUB HEAD/PROJECT NAME	ESTIMATED COST	PROJECT DESCRIPTION
490	Fyzabad	\$ 500,000	<ol style="list-style-type: none"> <li>1. Rehabilitation of three (3) wells (oil company) and drilling of two (2) wells at Fyzabad</li> <li>2. Drill and equip three (3) wells at Avocat and lay transmission main</li> <li>3. Drill and equip seven (7) wells at Forest Reserve, lay 15.5km-200mm transmission main and modify Forest Reserve Water Treatment Plant</li> </ol>
	Granville	\$ 200,000	Equip and treat one (1) well
519	Cap-de-Ville	\$ 300,000	<ol style="list-style-type: none"> <li>1. Chatham Water Treatment Plant resize pumps equip existing wells and equip four (4) wells</li> <li>2. Laying of 17km-300mm main from Cap-de-Ville to La Brea and construction of Booster Station at Cap-de-Ville</li> </ol>
	Siparia	50,000	Equipping of one (1) well at Coora
	<u>TRANSMISSION/DISTRIBUTION MAINS</u>	<u>\$ 1,150,000</u>	
433	Diego Martin	\$ 300,000	<ol style="list-style-type: none"> <li>1. Construction of Booster Station and Pipeline - Union Road -</li> <li>2. Rehabilitation works at Four Roads and Carenage Pumping Stations</li> </ol>



ITEM NO.	HEAD/SUB HEAD/PROJECT NAME	ESTIMATED COST	PROJECT DESCRIPTION
473:475	Sangre Grande/Guatico	\$ 500,000	Construction of Booster Station and continuation of mains laying
474	Point Fortin	\$ 350,000	<ol style="list-style-type: none"> <li>1. Rehabilitation and commission six (6) wells: lay transmission lines and upgrade Treatment Plant at Guapo</li> <li>2. Drill and equip two (2) wells at Techier, lay 3km 150mm Pipeline and upgrade Water Treatment Plant at Techier</li> </ol>
531	<u>Development of Rural Supplies</u>	<u>\$ 700,000</u>	Purchase and installation of pumps, laying of transmission and distribution mains
	Mt. D'or - Spring Valley	\$ 350,000	Repair of intake, construction of Storage Reservoir and laying of 850m 150mm and 100mm Pipeline
	Lopinot	\$ 350,000	
	<u>Research &amp; Development</u>	<u>\$ 2,300,000</u>	
654	Leak detection and System Control	\$ 400,000	Acceleration of the islandwide leak detection and waste control programme

ITEM NO.	HEAD/SUB HEAD/PROJECT NAME	ESTIMATED COST	PROJECT DESCRIPTION
105	Water Resources Survey	\$ 1,000,000	Continuation of the islandwide survey to assess the Water Resources of the country
117	Rehabilitation of Wells	\$ 300,000	Renovation of wells which have cut back in production
123	Technical Assistance	\$ 200,000	Counterpart funds for the Technical Assistance Programme
125	Inspection of Dams	\$ 400,000	Repair of existing dams
	<u>Specialist Plant and Equipment</u>	<u>\$ 3,700,000</u>	
	Pumps, spares and specialist equipment	\$ 3,000,000	Purchase of pumps, spares and Specialist equipment
	Vehicles	\$ 700,000	Purchase of new (?) vehicles
555	<u>BUILDINGS AND GROUNDS</u>		
555	<u>Accommodation</u>	<u>\$ 900,000</u>	
	Head Office	\$ 200,000	Refurbishment of Old Head Office Building
		\$ 700,000	Renovation and Repairs to Area Offices
	N.P.C.U. 39.01.17		

SUMMARY

1. Collection System	
2. Improvement to Treatment Works	\$ 2,800,000
3. Feasibility Studies and Design	
4. New Systems Construction	\$ _____
	\$ 2,800,000

WATER FACILITIES AND SUPPLY

1. Development of Major Sources	\$ 14,100,000
2. Development of Local Sources	\$ 4,350,000
3. Transmission and Distribution Mains	\$ 1,150,000
4. Rural Supplies	\$ 700,000
	\$ 20,300,000
Research and Development	\$ 2,300,000
Specialist Plant and equipment	\$ 3,700,000
Buildings and Grounds	\$ 900,000
TOTAL:	<u>\$ 30,000,000</u>



## 10. 渴水に関する新聞記事



# WATER CRISIS

9/27  
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## Level at Arena Reservoir plunges to a record low

THE WATER LEVEL at the country's largest reservoir — Arena — has plunged to a record low, from a top reading of 119 feet to a current 86.7 feet, following the very dry season.

On Friday WASA (Water and Sewerage Authority) announced that water levels at all its reservoirs had dropped critically despite recent rains, adding that it was now impossible to adequately supply consumers as accustomed. WASA will take the media on a tour tomorrow on two of its reservoirs — Hollis and Arena.

WASA officials said the Arena situation was critical, pointing out the reservoir, which pumps between 55 and 60 million gallons a day into the water distribution system, or more than 70 percent, has reached the lowest level in its seven-year history.

### Severe Problems

The authority is busily pumping water from the Tumpuna River "back to storage" and praying for heavy rains.

The water level at Arena on June 1 was at 89.7 feet, as opposed to 99.2 feet on June 1 last year. Six days later it slipped to 86.7 feet.

"It is lucky for the country that the rainy season

began in mid-June," an official stated, but cautioned that an indifferent rainy season could create severe problems.

Officials said even though the water level at Navet on June 1 was higher than on June 1 last year — 285.54 feet compared with 277.56 feet — there was still cause for concern. Navet provides the system with approximately 17 million gallons of water daily. Navet's top water level is 312 feet.

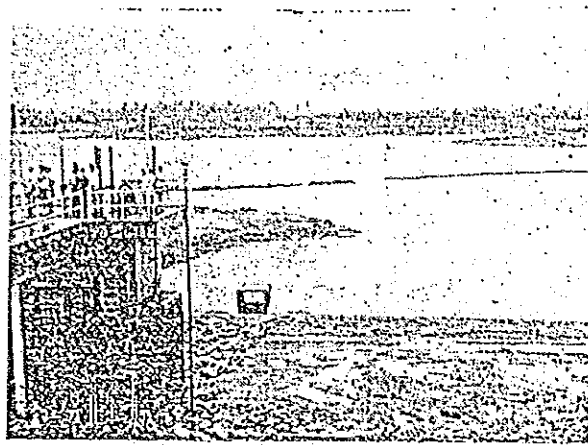
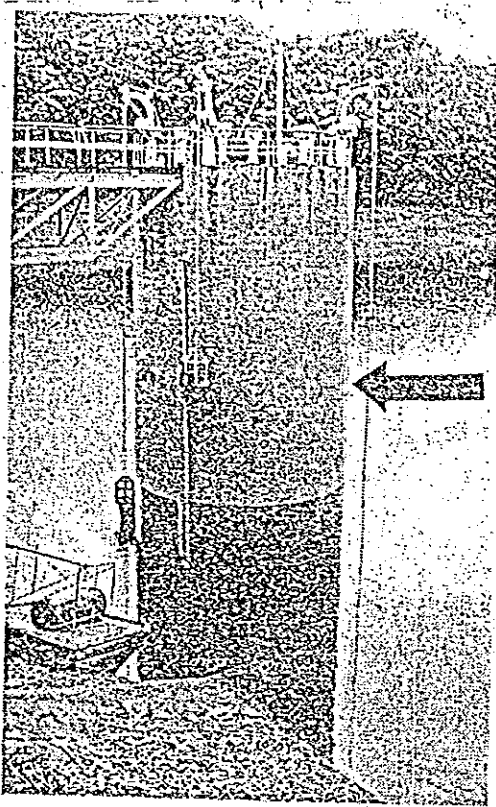
"Hollis Reservoir is not so bad," said another official, "because the withdrawal rate had been cut back early. We saw the problem and were able to deal with it this way, as the water stored at Hollis is way below that of the Navet and Arena reservoirs," he added:

### Record Low

Hollis, in normal times, has a withdrawal rate of approximately six million gallons a day. Its top water level is 620 feet. The low lake level as of June 1 was 593 feet, four and a half inches, or about the same as that of June 1, 1987, which was 593 feet two and a half inches.

Meanwhile, the water level at Tobago's Hillsborough Dam stood at 854 feet last June 1, a bare six feet above the 1973 record low of 848 feet. Last year's June 1 water level was 854.4 feet. The top water level at Hillsborough is 870 feet.

The country's critical water situation has led to the prohibition of the use of hoses and sprinklers at residences for the watering of lawns, etc., and the use of hoses for the washing of cars.



## Critical water levels

THE WATER LEVELS at all of WASA's reservoirs have reached the critical stage and, according to the Authority, the rains have not served to reverse the downward trend.

In order to draw public attention to the critical water levels at its reservoirs, WASA yesterday took the media on tour. Among the reservoirs, Arena was the most critical, having dropped to its lowest in its seven-year history.

In the photo above, the receding water level at the Arena Reservoir revealed yesterday much visible land in the foreground, while in the photo at left the reduced water level at Hollis — from the line of the arrow downwards — was said to be not so bad because WASA had moved early to cut back the withdrawal rate.

However, with the present daily rainfall, a WASA official hinted yesterday of hopes for an improved situation soon. *Photos by RATTAN JADOO*



# Trinidad Guardian

**DAT'S DAT...**



NABE, Y'KNOW DE WATER STILL LOCK-ORF ?!  
 AH BETCHUDH IS AH RESULT OF ALL DOSE  
 SETTA BUSH FIRE DAT WE HAD !!

## Water problems at Point Fortin

**THE EDITOR:** Please permit me some space in your paper to make a few comments about the general situation in this fair land of ours.

It seems to me that the more you pay for something, the less you get. This is particularly true of the public utilities. It would seem that the level of efficiency and quality of service varies in inverse proportion to the rates.

Take for example WASA.

### Rate Increase

Over the last few years WASA has received the largest rate increase among the utilities, almost 500 percent in some cases.

Still, and in spite of this, their service is the worst.

Sometimes I wonder if there has been a mistake in classifying WASA as a public utility. Maybe the correct term should be Public Futility!

I say this because daily one hears complaints from members of the public whose efforts to obtain a reliable supply from WASA have been futile.

Where I live in Point Fortin we have been without water for the past five weeks.

### Unfortunate Situation

All efforts to obtain an explanation from WASA to the cause of our misfortune were met with only double talk, not even a promise of better days to come. Is this what we're paying for?

One day in a fit of desperation I called one of the radio stations, and asked the announcer to let the public know about our situation on his morning programme.

You may not believe this, but one hour later, after the announcement, we received water. Maybe this announcer should be made Chairman on the WASA Board of Directors.

I hope someone somewhere reads this letter and is able to do something to remedy our unfortunate situation.

**DISGUSTED AND FEDUP, Point Fortin.**





JICA