



PROJECT OVERVIEW : WEB ARUBA, BALASHI PLANT, SINGLE EXTRACTION STEAM TURBINE

Speed, Load, Extraction Control and HMI System Monitoring

CS 7534-prov1

TYPE OF PLANT

Power House, Water treatment plant

- Power Generation
- 2.8Bar extraction for water treatment process

PRIME MOVER

TG3 Single Extraction-Generators

- Westinghouse 34MW
- 3600rpm
- 13.8KV Wye

CONTROL TECHNOLOGIES

Woodward Atlas II Digital Control

Custom designed Speed control, load-control, Loadsharing, Extraction pressure control, auto synchronisation, monitoring and overspeed detection.

Woodward Protech GII

An independent overspeed device with two out of three voting architecture to prevent false trips on speed sensor failures and providing a greater level of safety.

V1 & V2 Valve Actuation

V1 servo valve and main steam valve were replaced with a parker actuator and independent HPU oil system. LVDT valve feedback was added to both valves

Allen Bradley ControlLogix PLC

Custom designed alarm handler, trip handler, jacking oil pump control, starting gear control, temperature monitoring.

Wonderware HMI / SCADA System

Touch-screen terminal control, monitoring, alarming, and trending

ABB Unitrol 1020

Automatic voltage regulator.

ABB REG670

Generator protection relay.

Bently Nevada 3500

Vibration detection.

WATER PLANT OVERVIEW

Seven boilers are used to produce up to 860 tons per hour of steam. 4 steam turbines are used to generate power with a total capacity of 103MW at this location. Steam is also used in the desalination process which has an Installed capacity 42 thousand tons per day. During the desalination process, high quality water vapor produced under vacuum conditions is condensed into distilled water. The remaining salt water is diluted with sea water to form an environmentally safe mixture which is sent back to the sea. The desalination process eliminates all bacteria and guarantees that the water is pure and healthy. No chlorine is added to the drinking water. Tap water throughout Aruba is potable and can be used without any health risks



PROJECT OVERVIEW

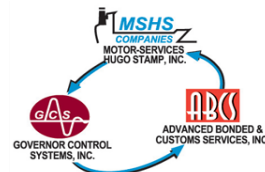
GCS custom-designed a digital Woodward control system for the TG3 single extraction condensing turbine. TG3 is primarily used to produce power but is also used to maintain the 2.8Bar steam header that the water treatment process requires.

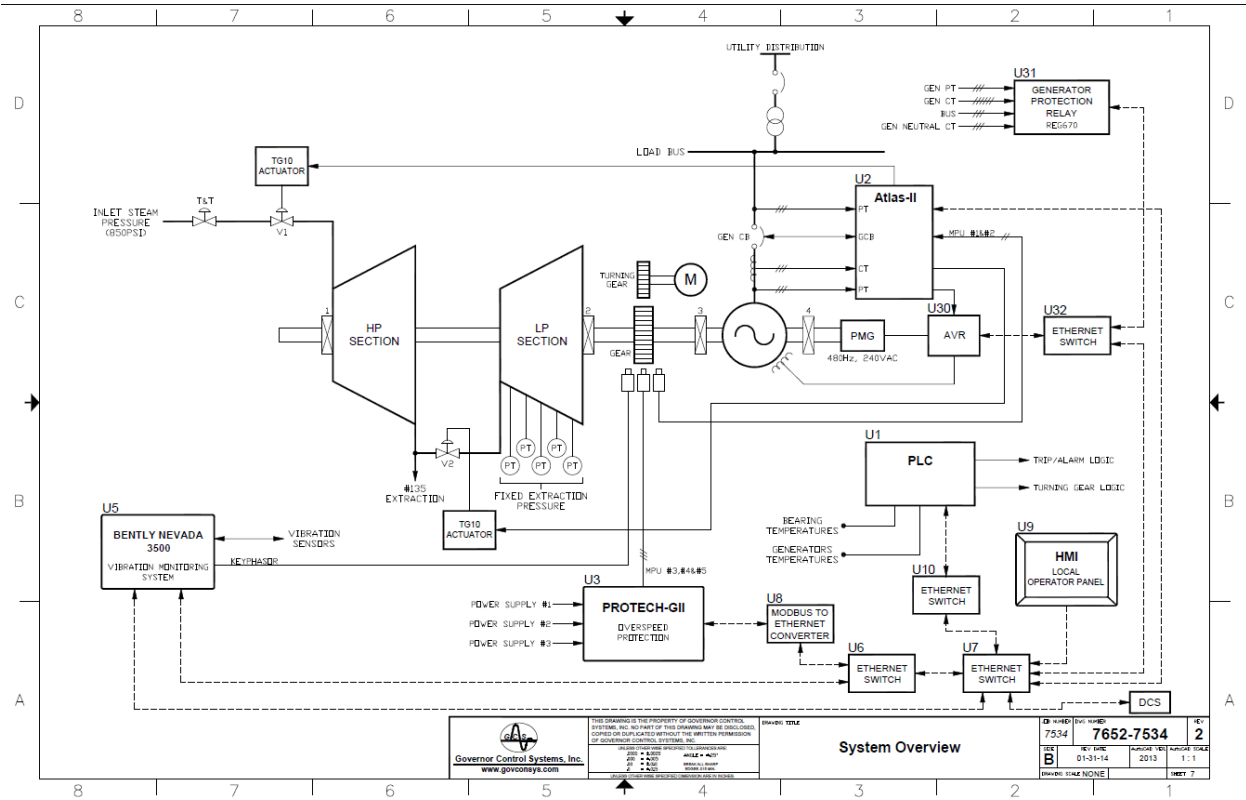


The Woodward AtlasII digital control replaced the original 505E governor control that had been installed in the mid 90's. The actuation was converted from the original TG13 actuator acting on the pilot valve to a parker actuator working directly on the main steam rack, improving the response times of the valve. With the faster and better speed control TG3 was able to be left in frequency control of the utility which was previously a problem. A separate hydraulic system (HPU) was used to replace the turbine oil to a cleaner and more reliable control oil for the actuator.

The vibration monitoring was also upgrade from the earlier 3300 to a newer 3500 allow us to be able to easily extract the vibration data for monitoring and historical archiving.

The new excitation system is based on a digital platform that improves performance but also allows the site to reclaim cabinet space.





CONTROL SYSTEM FEATURES

Master/Supervisory Control: Woodward AtlasII Controls

- Isochronous speed Control
- Isochronous Load Share or Droop Mode
- 2.8Bar extraction control
- Load limiter

Master/Supervisory Control: Woodward Protech GII

- Independent electronic overspeed
- Two out of three voting

Supervisory Control: AB Compact Logix

- Alarm/Trip handler, first out log
- Jacking Oil Pump start/stop control logic
- Turning Gear start/stop logic
- Turbine temperature monitoring/alarm/trip
- Turbine process sensor monitoring/alarm/trip

Supervisory Control: Bently Nevada 3500

- Bearing vibration
- Thrust vibration
- Case expansion
- Eccentricity measurement

Supervisory Control ABB Unitrol 1020

- Automatic voltage control

Supervisory Control ABB REG670

- Generator protection relay

HMI / SCADA System

- 19" Touch-screen HMI
- Turbine control
- System Monitoring
- Alarm Handling and Performance Data Trending
- Multiple User Access Levels

Redundancy

- Double 120V supply input (AC/DC)
- Internal dual 24Vdc supplies

GCS offers comprehensive control system support, from engine and turbine systems integration to turnkey project management for a broad range of marine, power generation and industrial projects. GCS is a member of the MSHS Group. **Learn more at www.govconsys.com.**

Southeast Office
 3101 SW 3rd Avenue
 Fort Lauderdale, FL 33315
 Phone: 954-462-7404
 Toll Free: 877-659-6328
 Fax: 954-761-8768

Gulf Coast Office
 2022 Tamvest Court
 Mandeville, LA 70448
 Phone: 985-626-8707
 Toll Free: 888-GCS-GULF
 Fax: 985-626-8732

Mid-Atlantic Office
 3120 Arizona Avenue
 Norfolk, VA 23513
 Phone: 757-852-5808
 Toll Free: 877-659-6328
 Fax: 757-852-5809

