GE
Digital Energy

Multilin™ D20/D200 Substation Controllers

Simple to Advanced Substation Automation Control

The Multilin D20/D200 Substation Controllers offer an industry leading design embedded with high value substation automation applications that provide cost savings, increased reliability, and improved operational efficiencies in electric power substations. The ability to support a wide range of communication protocols and applications, allows the D20 to be interoperable with a broad range of intelligent electronic slave and master devices. The D20 can execute simple to complex local logic, compile and process data [collect and convert] and reports upstream to master stations. The D20's distributed, expandable I/O architecture and mission-critical automation control applications reinforce why the D20 controller is being used in over 40,000 installations around the world.

Key Benefits

In a mission-critical substation-hardened package, the D20/D200 provides:

- Substation client and server functionalities by maintaining a distributed architecture for gathering and controlling data on substation equipment while sending data to master stations via serial RS-232, RS-485, fibre optic or Ethernet interfaces for point to point, multi-drop and remote connections.
- Support for a broad range of SCADA host protocols, IED protocols, Communication options, Input/output (I/O) peripheral modules, and operation and maintenance utilities substation automation applications. Refer to the hardware manual and see the appendix section of this document for more details.

Applications

Functionalities such as data concentrator, protocol converter or a local automation platform to implement popular distribution automation applications such as capacitor bank control, outage prevention programs, feeder resource optimization and control interlocking inhibition and subgrouping. Functionalities such as data concentrator, protocol converter or a local automation platform to implement popular distribution automation applications such as capacitor bank control, outage prevention programs, feeder resource optimization and control interlocking inhibition and subgrouping.

- **Data Concentrator**
  Automatically consolidates collected information from intelligent electrical devices (IEDs), such as relays and meters, and communicates to SCADA, EMS, DMS and Data Historian systems
- **Protocol Converter**
  Translates different data message formats between devices to support interoperability
- **Local Automation Platform**
  Implements popular distribution automation applications such as capacitor bank control, outage prevention programs, feeder resource optimization and control interlocking, inhibition and subgrouping

Flexible and Reliable

- D20 design and processing capabilities make it a flexible and reliable RTU or Gateway
- More than 100 communication protocols and applications
- Simple to complex substation configurations with advanced automation applications
- Easy to use commissioning and maintenance facilities to ensure accurate RTU settings prior to live installations

Scalable Distributed I/O Options

- Complete family of substation hardened I/O modules provide scalability for large and small installations
- Distributed architecture allows redundancy of I/O modules to increase reliability
- A variety of modules are available with I/O ranges up to 300VDC and support for DNP3 and GE's D.20 protocol
  - D20S - 64 channel status input module
  - D20A - 32 channel DC Analog input module
  - D20K - 32 channel control output module
  - D20KI - 8 external interposer relay pairs module
  - D20C - 16 status input, 8 control output, optional 16 DC analog inputs or 8 analog inputs and 8 analog outputs
  - D20AC - 15 channel direct AC input, 1 DC analog input module

Substation Controller Connectivity

The D20/D200 can support a wide range of substation automation communication protocols and enhanced SCADA applications. See Appendix B for a list of supported protocols for both client and server devices. The following summarizes some of the different data translation applications that are equipped in the D20/D200.

Multilin D20/D200 Data Translation Applications

User Programmable Logic:

- LogicLinx™ module: IEC61131-3 compliant PLC-type logic with full support for 5 programming languages
- Calculator module: Soft logic utility to perform mathematical and logical operations

Generation, Transmission, and Feeder Bay Automation Applications:

- Automatic Voltage Control module: Maintains steady voltage base on user-defined targets and settings
- Local / Remote Data Translation module: A master local/remote switch to control the local/remote state of distributed devices
- Secondary Master Trip/Close module: Enables the use of individual relays (with external terminations) as master trip/close relays
- Set-point Adjustment module: Adjust set points based on control request durations or analog input values
- Tap Position Indication module: Translates status points into scaled analog input values to reflect transformer tap positions

Distribution Automation Applications:

- Auto Reclose: Automatically reclose tripped circuit breakers following momentary faults
- Automatic Restoration: Patented load transfer scheme isolates faults and restores power to non-faulted sections if possible
- Distribution Capacitor Control Algorithm: Improves reactive support during peak periods through more effective use of existing capacitor banks
- Fault Localization: Locates and isolate faults to reduce customer outage times
- Load and Dead Bus Transfer: Monitors a network of substations and move load off overloaded transformers to other stations as required
- Load Shedding/Curtailment: Sheds load intelligently during overload conditions

Data Logging / Storage Applications:

- SOE Local Logger: Logs digital and analog SOEs to an external printer, PC or to a CSV file
- Accumulator Freeze: Coordinates freezing of accumulator groups
- Event Storage: Stores history of current values, status, and time-tags of analogs and accumulators for up to 7 days
- Historical Analog: Stores averaged historical values for up to 8 analog inputs

Communication Services Applications:

- Communication Watchdog: Monitors and report the health of communications
- Substation Maintenance: Suppresses SCADA point reporting during substation maintenance
- Virtual Terminal: Directs remote access to connected devices
- Line Switch: Monitors main and secondary communication channels and retransmits on a third channel
- LAN Services: TFTP, SPT Server/Client, Time Server/Client
- COM Statistics: Records a detailed communication pass/fail statistics
- IRIG B Source: Time sync connected devices using IRIG-B
- SNTP Client: Time sync over an Ethernet LAN

Data Reduction and Summarizing Applications:

- Analog Reference: Monitors analog input hardware for good or bad reference values
- Data Change Detect: Toggles a status point every time any data in a configured group changes
- Alarm Prioritization: An alarm filter designed to manage the 3 level alarms reported by GE's DART pole-top/pad-mount distribution RTU
- Analog Averaging: Averages analogs at regular intervals
- General Alarm: Groups alarms together to create summary alarms
- Top of Hour (TOH) Analog Averaging: Averages analogs at regular intervals relative to the top of the hour
- Redundant I/O: Provides data from a backup source if the primary source is off-line

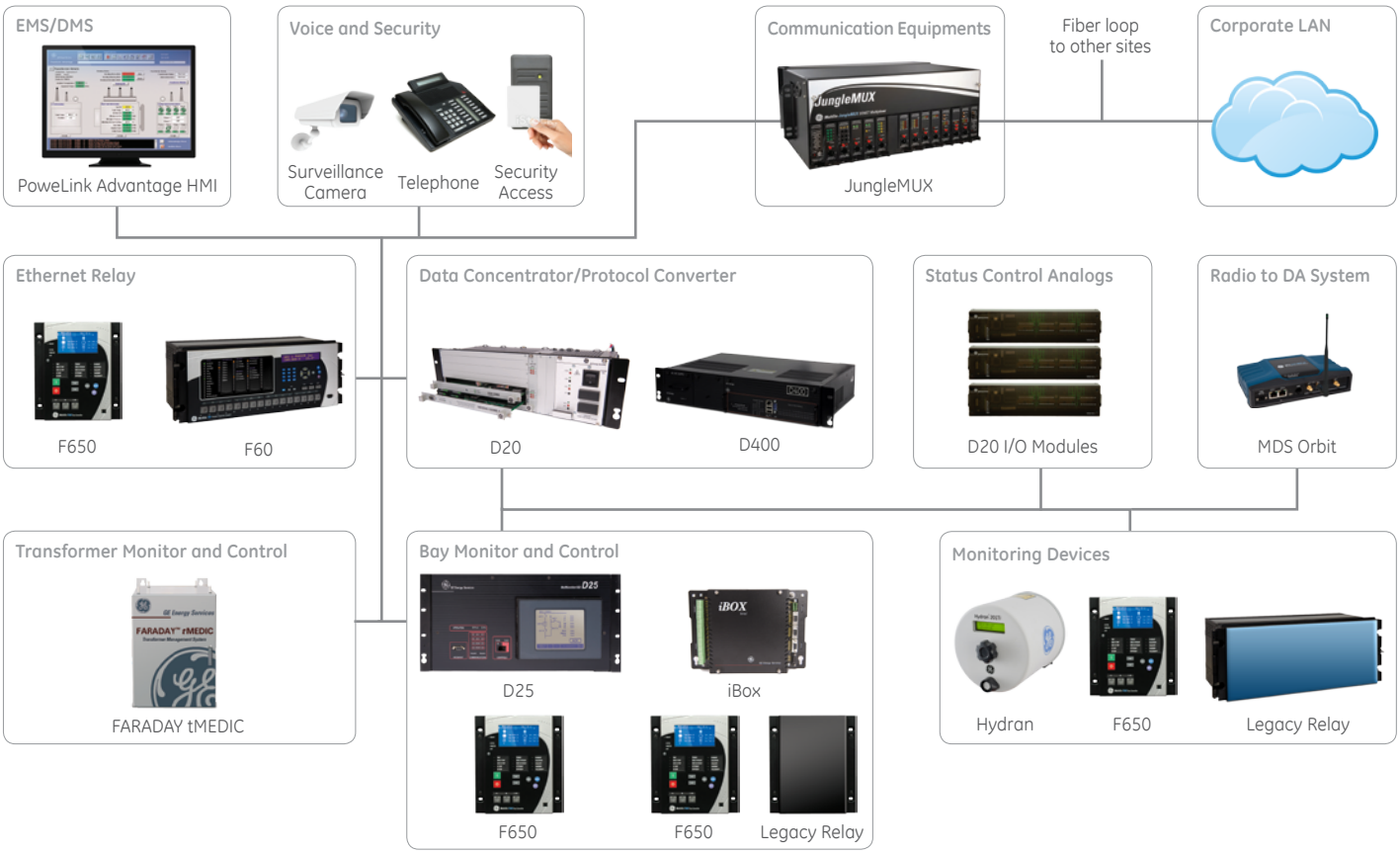
Data Conversion Applications:

- Digital-Analog Value Conversion: Converts digital input groups to analog data using binary, BCD, or gray code encoding
- Digital Input to Counter: Counts the number of SOE or COS transitions on status points
- BCD Setpoint: Translates analog output requests into a group of BCD encoded control points
- Accumulator Delta to Analog: Converts accumulators to analog values for protocols that do not support counters
- Time Stamp: Interprets each bit in an analog input as a status point, and create SOEs appropriately
- Analog to Digital Conversion: Converts analog inputs into groups of binary coded control outputs
- Mailbox: Converts analog outputs into analog inputs so they can be read by all masters

Others:

AGA Gas Flow: Computes Gas flow rate and energy flow rate calculations

Figure 1: D20 Integerated Control System Connectivity



Configuration and Maintenance Facility

The D20/D200 is equipped with a range of maintenance utilities to assist the user in configuring, testing and monitoring the system.

ConfigPro

ConfigPro is a tool, installed on a personal computer, which helps you manage information associated with your GE Energy equipment. The primary use of ConfigPro is to facilitate the configuration of D20/D200 hardware and software through the maintenance port on the main processor and I/O peripheral.

Information is accessed through a hierarchy of windows, as follows:

Project Window: Provides a graphical representation of your project. Each device in the project is represented by a corresponding icon. Connections between devices are shown by a series of lines and arrows.

Device Window: When you double-click on a device, the device window is opened in the main area. The device window will display all of the configurable applications for the device. The device window has four tabs:

- Data collection applications
- Data translation applications
- System point database applications
- Data processing applications

Application Window: Displays the tables for a particular application

Report Window: Allows you to select and print reports.

SGConfig

SGConfig is the latest software used to configure D20/D200. SGConfig replaces ConfigPro because it supports Windows 7 - 32 and 64-bit operating systems while maintaining backwards compatibility with Windows XP. It is a PC software-based user interface that allows users of GE Substation Gateways to efficiently manage configuration files for the RTUs series of Substation controllers.

SGConfig includes all of the functionality available in the ConfigPro software, provides enhanced visual representation of your substation hardware configuration and device software configuration.

In addition to the ConfigPro functionality, SGConfig provides support for::

- Importing and exporting xml representation of D2x devices
- D25 KT control card
- D25 Ethernet 100/10 MB card
- Secure configuration transfer to/from D20 devices with D20MX processors over Ethernet connections

SGConfig (cont'd)

- Added support for including all referenced application definitions when creating device/project/local repository archives. Device/project/local repository archives are self-contained and include all the application definitions referenced by any D2x devices contained in them. There is no need to copy or import application definitions separately.
- Improved usability and overall performance of all operations in the Migration Wizard.
- Improved speed when browsing the file system.
- Added support for specifying the licenses available on D400 devices.
- Ability to extract electronic documentation for D2x devices and display it while configuring D2x embedded applications
- Ability to view multiple windows simultaneously

Request access to the GE's substation automation technical support website by contacting the substation automation technical support team; then, download and install SGConfig: http://site.ge-energy.com/prod_serv/products/substation_automation/en/tech_support_login.htm

WESMAINT

WESMAINT is a maintenance facility that resides in the D20 and D200. It uses a series of menu and screens displayed on a PC or VT100 terminal to create a simple interface. WESMAINT presets a window through which field technicians and programmers can look directly into the equipment to view collected data and system status and, for some applications, make changes to the configuration. The wesmaint facility makes commissioning, troubleshooting and regular maintenance of the RTU database easy to do.

Using the WESMAINT facility, you can access standard data displays such as:

- Digital inputs and outputs
- Analog inputs and outputs
- Transition counters
- Sequence-of-event (SOE) and change-of-state (COS) data
- Device status information
- Error log
- User log
- System status
- CCU (central control unit) communication status, if a redundant system is installed.

PROMAINT

Similar to WESMAINT, PROMAINT is the maintenance facility for the I/O peripheral modules. PROMAINT combines maintenance and monitor functions. The maintenance portion is used to view data, or to verify that the board is functioning correctly by, for example, forcing a control point and then checking to see whether the control operation took effect.

This monitor facility is intended for advanced users to interpret commands from the maintenance port, such as storing data to memory. It can also execute various application-dependent commands once an application program has been downloaded from the D20/D200.

68K Monitor

The 68K Monitor functions are primarily debugging tools that users can access via a PC or a VT100 terminal with a keyboard. Monitor functions include memory examination, dumping and editing, setting break points, single-step modes, communication port loop-back tests, mark and space modem adjustments, and CPU usage and process profiling.

Table 1: D20/D200 Product Comparison

	D20	D200
Maximum Processor Boards	• 1 when a non-VME chassis is used • 2 processor boards plus Ethernet module when a VME chassis is used	6 processor boards plus Ethernet module
Maximum I/O Boards	• 31 (without repeaters) • 120 (with repeaters)	• 124 (without repeaters) • 480 (with repeaters)
VME Backplane	Optional	Standard
Maximum Serial Ports	• 7 + 1 Maintenance Port – Non-VME chassis • 21 + 3 Maintenance Port – VME chassis	49 + 7 maintenance ports
Base Software	Standard D20 Base, CCU Base	CCU Base
Applications Software	Full suite of GE Energy automation application software and protocols	Full suite of GE Energy automation application software and protocols
Typical Number of Applications *	5 - 7*	5 - 7 per node*

Hardware Overview

There are basically three types of D20 RTU hardware arrangements:

- D20 Chassis, Single-slot (or non-VME) – supports one processor module
- D20 Chassis, Multiple-slot (VME) – supports up to 2 processor modules plus an Ethernet module
- D200 Chassis, Multiple-slot (VME) – supports multiple processor modules plus an Ethernet module

Figure 2: D20 Chassis single-slot non-VME type

D20 Chassis (single-slot, non-VME)

The D20 chassis is a 3U horizontal slot chassis. The non-VME version of the D20 chassis is equipped with a rear-mounted termination board that provides power connection and serial port access to the D20 system.

Non-VME versions of the D20 provide a single horizontal Eurocard slot, into which the D20ME board is installed.

D20 Chassis (multiple-slot, VME)

The VME version of the D20 chassis is equipped with five horizontal expansion slots for VME-compatible modules:

The VME version of the D20 chassis is equipped with a rear-mounted termination board for power connections and serial ports for one processor board. An optional rack-mounted serial port panel is available to support the seven serial ports on a second processor board.

The D20 hardware consists of a rack-mountable chassis containing one or more processor boards, power supplies and modems.

The D20 interfaces with substation equipment either through D.20 peripheral I/O modules, or directly through RS-232, RS-485, or Ethernet links.

The D20 can support up to:

- Two D.20 ports, each supporting up to 31 I/O peripherals, without repeaters, and
- 120 I/O D.20 peripherals, with repeaters
- 21 RS-232 or RS-485 ports (7 per processor board)
- Two Ethernet channels

D200 Chassis (multiple-slot, VME]

The D200 chassis is equipped with a rear-mounted termination board for power connections and serial-port access.

The D200 has the computing power and expandability needed to provide substation automation in larger substations. This is achieved through an innovative design that employs multiple D20 processors, communicating over a VME bus:

- RS-232/RS-485 ports support large numbers of host systems and IEDs
- VME bus architecture provides high scalability and performance for adding serial ports, LAN options, and memory
- Data is integrated and coordinated, so different applications access a single, real-time database
- Optional redundant configuration for high reliability at critical sites
- ironment, in accordance with applicable IEEE® and IEC® standards

D200 hardware is similar in design to the D20 hardware, but it has significantly more physical capacity. Based on a 9-slot VME chassis, the D200 illustrated in figure 4 can support up to:

- 4 D.20 ports, each supporting up to 31 I/O peripherals, without repeaters, and 120 I/O peripherals, with repeaters
- 49 RS-232 or RS-485 ports (seven per D20ME or D20ME II Main Processor)
- Two Ethernet channels

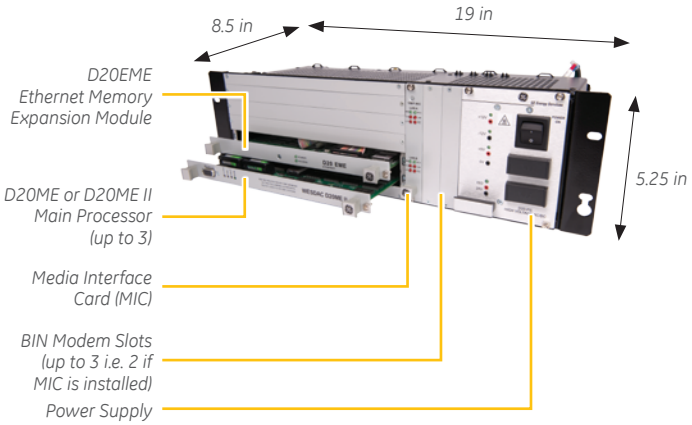


Figure 3: D20 Chassis, multiple-slots, VME type

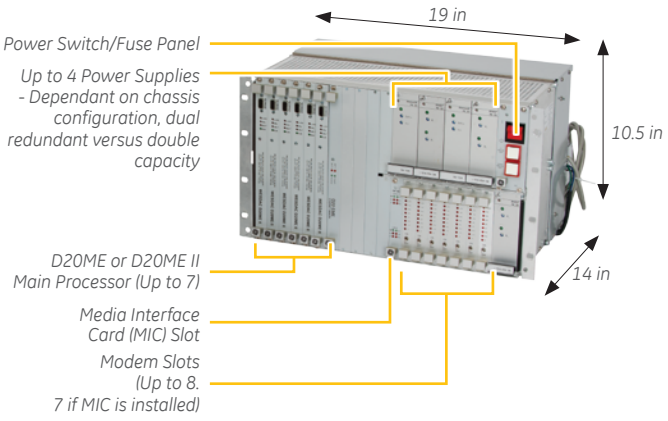


Figure 4: D200 Chassis, multiple-slots, VME-type

D20 Accessories

D20 Power Supplies

D20 power supplies are switch-mode converters that provide output power for the D20 main processor, VME cards, modems and D20 peripheral I/O modules, as required. The power supplies are designed to accept standard voltage inputs and meet the power requirements of the D20.

Table 2: Commonly used D20 Power Supplies

TYPE	OLD LEGACY PART NUMBER	NEW SMART PART NUMBER	INPUT	OUTPUT	MOUNTING
Chassis-mounted (D20)	580-2004	D20ME-S-A-U-U	20 – 60 VDC	+5 V, 7 A +12 V, 2 A -12 V, 1 A 24 VDC, 3 A	Chassis
Chassis-mounted (D20)	580-2005	D20ME-S-B-U-U	20 – 60 VDC	+5 V, 7 A +12 V, 2 A -12 V, 1 A 48 VDC, 1.5 A	Chassis
Chassis-mounted (D20)	580-2006	D20ME-S-C-U-U	100 – 300 VDC or 85 – 264 VAC	+5 V, 7 A +12 V, 2 A -12 V, 1 A 24 VDC, 3 A	Chassis
Chassis-mounted (D20)	580-2007	D20ME-S-D-U-U	100 – 300 VDC or +85 – 264 VAC	+5 V, 7 A +12 V, 2 A -12 V, 1 A 48 VDC, 1.5 A	Chassis

Please refer to the hardware users manual for details on the available power supply options in the D20.

D20 Modems

The D20 modems handle communications to the host computer or other intelligent device.

Special modem requirements can be addressed through the use of third-party modems, which are connected to the D20/D200 through external RS-232 connections.

Table 4 D20/D200 Modems

MODEM	SPECIFICATIONS
WESDAC 202/V.23 Chassis-mount and Rack-mount	• 1200 bps Bell 202 or CCITT V.23 • Designed for 300 to 1200 bps asynchronous operation on unconditioned lines • Available as a 19" rack-mount assembly (GE Part Number 520-0090), or as a BIN mount or chassis mount module that can be installed in the D20/D200 chassis (GE Part Number 520-0120).
Telenetics Chassis-mount	• Dial-up or leased line • 2-wire or 4-wire • Various versions available, up to 57.6 kbps

WESDAC 202/V.23 Modem Specifications

Table 5 WESDAC 202/V.23 Modem Specifications

ITEM	DESCRIPTION
Mounting	• Chassis (520-0120) • Rack (520-0090)
Standards	Jumper configurable for: • Bell 103 and 202 • CCITT V.23
Circuits	• 2 wire half-duplex • 4 wire half- or full-duplex
Equipment Interface	RS-232/CCITT V.24 data interface
Data Rate	300 and 1200 bps
Transmit and Receive Frequencies	• -45 dBm to +2.0 dBm • Continuous or RTS-keyed
Transmit Output Level	• -45 dBm to +2.0 dBm • Continuous or RTS-keyed
Receive Sensitivity	• Jumper configurable for steps -42, -36, -30, -24, -18, or -12 dBm • 5 dB typical carrier dropout hysteresis
Soft Carrier Turn-Off	• WESDAC 202/V.23 (vertical): Fixed at 8 ms • WESDAC 202/V.23 (rack): 24 ms, optional 7910 chip • Soft carrier frequency 900 Hz
DCD on Detection of Carrier	3 to 7 ms maximum
DCD on Loss of Carrier	3.4 to 11.3 ms maximum
CTS Delay after RTS	• 8 ms • RTS - CTS delay set on software
Line Impedance	600 ohms
LED Indicators	Tx, Rx, DCD, RTS (all RED)
Jack	• WESDAC 202/V.23 (vertical): RJ11 telephone jack for line connections • WESDAC 202/V.23 (rack): Optional integral or external jack termination (Line, monitor and equipment, for both Tx and Rx).
Protection	• 1500 V line isolation • SWC ANSI/IEEE C37.90.1-1974 (2.5 kV) • SWC (Fast Transient) ANSI/IEEE C37.90.1-1989 (5.0 kV) • Relay systems test, in accordance with ANSI/IEEE C37.90-1978 • Optional impulse/lighting protection gas-tube arresters
Error Rate	Back-to-back error rate is 1 bit error in 60,000 at 1200 bps
Mechanical	• WESDAC 202/V.23 (rack) • Dimensions: 1.75" (4.4 cm) x 19" (48 cm) • WESDAC 202/V.23 (vertical) • Vertical mounting in D20/D200 chassis card slot as shown in figure • Screw compression type terminals for 2W/4W connections. Female DB25 connector for RS-232 connection.
Environmental	• Temperature: -20 C to +60 C • Humidity: 0 to 95% non-condensing

Specifications and Supported Standards

STANDARD	TEST	TEST SPECIFICATION	MODULES TESTED
MECHANICAL & ENVIRONMENTAL			
IEC 60068-2-6	Sinusoidal Vibration	10Hz to 150Hz at a sweep rate of 1 octave/minute. Acceleration level of 1g. One sweep cycle	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A, D20S, D20K, D20C
IEC 60068-2-6	Sinusoidal Vibration	10Hz to 150Hz at a sweep rate of 1 octave/minute. Acceleration level of 1g. 20 sweep cycles	High Voltage: D20A, D20S, D20K, D20C
IEC 60068-2-1	Cold Test	-10°C for 16 hours	Low Voltage: D20S, D20K D20AC High Voltage: D20S, D20K, D20C D20 Power Supply and D20 CPUs
IEC 60068-2-2	Dry Heat	55°C for 16 hours	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A
IEC 60068-2-2	Dry Heat	70°C for 16 hours	Low Voltage: D20A, D20S, D20K, D20 Power Supply, D20 CPUs
IEC 60068-2-30	Damped heat humidity	25°C to 55°C for 3 hours at 95% Relative Humidity 55°C for 9 hours at 95% Relative Humidity 55°C to 25°C for 6 hours no less then 80% Relative Humidity 25°C for 6 hours at 95% Relative Humidity Repeated for 6 cycles	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A
IEC 60068-2-30	Damped Heat Humidity	+40°C at 95% Relative Humidity; 4 cycles	D20 Power Supply, D20 CPUs
	Drop Test	1 drop of 50 mm on rest surface	High Voltage: D20A, D20S, D20K, D20C
	Burn in test	55°C for 100 hours	High Voltage: D20A, D20S, D20K, D20C
EN 60068-2-3	Damped Heat, Steady State	20°C to 0°C for 20min at 10% Relative Humidity 0°C to 20°C for 6 hours at 95% Relative Humidity Dwell at 20°C for 3 hours at 95% Relative Humidity 20°C to 40°C at 95% Relative Humidity Dwell at 40°C for 3 hours at 95% Relative Humidity 40°C to 55°C for 3 hours at 95% Relative Humidity Dwell at 55°C for 6 hours at 95 % Relative Humidity Return to 20°C with uncontrolled Relative Humidity in 35 minutes. Repeated for 2 cycles	High Voltage: D20A, D20S, D20C
SAFETY			
IEC 60255-5: 2001	Impulse Voltage Withstand	500 to 2000V	Low Voltage: D20A, D20S, D20K, D20C High Voltage: D20A, D20S, D20K D20 Power Supply, D20 Chassis, D20 CPUs, D.20 Converter and D.20 DC Interface
IEC 60255-5: 2001	Dielectric test	710 to1000VDC for D20 Analog Modules and D20 Status Modules; 710 to 1500VDC D20 Control Modules	Low Voltage: D20A, D20S, D20K, D20C High Voltage: D20A, D20S, D20K D20 Power Supply, D20 Chassis, D20 CPUs, D.20 Converter and D.20 DC Interface
IEC 60255-5: 2001	Insulation resistance test	1.5G Ohm min	Low Voltage: D20A, D20S, D20K, D20C High Voltage: D20A, D20S, D20K D20 Power Supply, Chassis, D20 CPUs, D.20 Converter, D.20 DC Interface
EMISSIONS			
CISPR 11:2006	Conducted Emissions	150khz - 30Mhz	Low Voltage: D20A, D20S, D20K, D20C, D20AC, D20KI, D20 Power Supply and D20 Chassis
CISPR 22: 2008-09 EN 55022: 2010	Radio Disturbance Characteristics	Class A	D.20 Converter, D.20 DC Interface

Legend

D20AC	D20 Alternating Current Module
D20A	D20 Analog Module
D20S	D20 Status Module
D20K	D20 Control Module
D20C	D20 Combination Module

Specifications and Supported Standards (cont'd)

STANDARD	TEST	TEST SPECIFICATION	MODULES TESTED
IMMUNITY			
IEC 61000-4-2: 2001	Electrostatic Discharge	Criteria / Class: B	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A, D20S, D20K, D20C D20KI, D20 Power Supply
EN 61000-4-2: 1995+A2:2000	Electrostatic Discharge	Levels 1,2,3 and 4; Criteria / Class: B	Low Voltage: D20A, D20S, D20K, D20C D20 CPU
IEC 61000-4-2: 2001	Electrostatic Discharge	Criteria / Class: B	D20 Power Supply, D20 Chassis
IEC 60255-22-2	Electrostatic Discharge	+/- 6 and 8kV	D.20 Converter, D.20 DC Interface
EN 61000-4-3: 2006	Radiated Immunity	80Mhz-1Hhz; Criteria / Class: A	Low Voltage: D20A, D20S, D20K, D20C High Voltage: D20K, D20C D20 CPU
IEC 60255-22-3	Radiated Electromagnetic Field Immunity	80 to 1000 Mhz: 10 V/m, 80% AM modulation with 1kHz Sine wave signal 1400 to 2700 Mhz: 10 V/m, 80% AM modulation with 1kHz Sine wave signal	D.20 Converter, D.20 DC Interface
IEC 61000-4-4: 2004	Electrical Fast Transients/ Burst	Criteria / Class: B	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A, D20S, D20K, D20C D20KI, D20 Power Supply
EN 61000-4-4: 2004	Electrical Fast Transients/ Burst	Levels 1,2,3 and 4; Criteria / Class: B	Low Voltage: D20A, D20S, D20K, D20C D20 CPU
EN 61000-4-4: 2004	Electrical Fast Transients/ Burst	Criteria / Class: B	D20 Power Supply, D20 Chassis
EN 61000-4-4: 2004	Fast Transient	PS: 4kV, Comm: 2kV	D.20 Converter, D.20 DC Interface
EN 61000-4-5: 2006	Surge Immunity	Criteria / Class: B	Low Voltage: D20A, D20S, D20K, D20C High Voltage: D20K D20 Power Supply, D20 Chassis and D20 CPU
EN 61000-4-5: 1995	Surge Immunity	PS: 2kV, Comm: 1kV	D.20 Converter, D.20 DC Interface
EN 61000-4-6: 2005	Conducted Immunity	150khz - 80Mhz; Criteria / Class: A	Low Voltage: D20A, D20S, D20K, D20C D20 CPU
IEC 60255-22-6	Conducted RF Immunity	3	D.20 Converter, D.20 DC Interface
EN 61000-4-6: 1996	Conducted Immunity	0.15 to 80MHz, Performance Criterion: A	D20 Power Supply, D20 Chassis
EN 61000-4-6: 2007	Conducted Immunity	150khz - 80Mhz; Criteria / Class: A	D20K High Voltage Module
IEC 61000-4-8: 2001	Power Frequency Magnetic Field	Criteria / Class: A	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A, D20S, D20K, D20C D20KI, D20 Power Supply, D20 Chassis
IEC 61000-4-8: 2009	Power Frequency Magnetic Field	5	D.20 Converter, D.20 DC Interface
IEC 61000-4-11: 2004	Voltage Dips and Interruptions	Criteria / Class: B/C	Low Voltage: D20A, D20S, D20K, D20C, D20AC High Voltage: D20A, D20S, D20K, D20C D20KI, D20 Power Supply
EN 61000-4-11: 2004	Voltage Dips and Interruptions	30, 60 and 100% of UT: Voltage Dip of 70, 40 and 0% of UT: Duration 0.5, 5, 50 and 250 (periods) Criteria / Class: B&C	Low Voltage: D20A, D20S, D20K, D20C D20 CPU
EN 61000-4-11: 2004	Voltage Dips and Interruptions	Criteria / Class: B/C	D20 Power Supply, D20 Chassis
EN 61000-4-11: 2004	Voltage Dips and Interruptions	0, 40, 70 and 80% dips and 250/300 cycles interuption	D.20 Converter, D.20 DC Interface
IEC 61000-4-29	Voltage dips, short interruptions and variations to DC Power Immunity test	0% Interupts 60%, 30% Dips 80% and 120% variation	D.20 Converter, D.20 DC Interface
IEC 61000-4-12: 2001	Damped Oscilatory 1Mhz Bursts	Criteria / Class: B	D20KI, D20 Power Supply
IEC 61000-4-12: 2001	Ring Wave	Criteria / Class: B	High Voltage: D20A, D20S, D20K, D20C D20 Power Supply, D20 Chassis
IEC 61000-4-16: 2006	Conducted Disturbances	Criteria / Class: A	High Voltage: D20A, D20S, D20K, D20C D20 Power Supply, D20 Chassis
IEC 61000-4-12: 2001	Damped Oscilatory 1Mhz Bursts	Criteria / Class: B	Low Voltage: D20A, D20S, D20K, D20C, D20AC
IEC 61000-4-17	Ripple on DC Input power port immunity test	4	D.20 Converter, D.20 DC Interface

Legend

D20AC	D20 Alternating Current Module
D20A	D20 Analog Module
D20S	D20 Status Module
D20K	D20 Control Module
D20C	D20 Combination Module

D20/D200 Main Processor Specifications

ITEM	DESCRIPTION
CPU/Memory	• 32 bit Free scale 68030 microprocessor • 40 MHz MPU clock • Real-time clock, 1.0 ms resolution accurate to ±2.0 ppm • On-board memory - 2 MB Flash memory - 2 MB SRAM (incl. 512 K battery backup) - 512 KB BootROM
Self Diagnostics	• Program memory checksums • RAM test • Configuration verification • Interrupt controller verification • Serial port test • Watchdog and power monitor • Peripheral communi¬cation checks • Error logger

ITEM	DESCRIPTION
Communications	• Two HDLC ports for link to peripheral modules • The D20ME has seven programmable RS-232 serial ports for communications to SCADA master, satellite RTUs and IEDs. The D20ME II has seven programmable serial ports, any combination of RS-232 and RS-485. • 38,400 kbps on all 7 ports, all running half duplex and 100% utilization (D20ME and D20ME II) • 9600 baud, RS-232 maintenance port (D20ME and D20ME II) • Support leased/dial up telephone lines, modems, 900 MHz radio, trunked radio, spread spectrum radio, microwave, and fiber optic communications
Power Requirements	Power consumption: 3.5 W typical, 5 W maximum
Physical	LED indications: Run/Halt and System Fail

Supported Protocols

Supported Host Protocols

The following list is a sampling of the host protocols supported by the D20/D200. GE is continually adding to this list. Please contact GE for the latest developments.

ABB® Indactic 33/41 (16-bit)	Conitel C3000	Megadata MD3000
ABB® Indactic 35	Datap DCP-1	Modbus® (Serial)
ABB® Systems Control SC1801	DNP 3 (Serial)	MPS 9000
ADLP-180	DNP 3 (TCP/IP)	Pert 26/31
AMTRAK™ SDLC	DNP 3 (UDP/IP)	PG&E® (Rev. 11)
Allen-Bradley® ANSI X3.28	ESCA®/WELCO®	Rockwell®
ASW	Ferranti® Mark IIA	SANGAMO®
BBC 7200	Ferranti® TRW 9550	SCADA Consultants (Sensa®)
Boeing™ BETAC/ GETAC® 7020	Ferranti® TRW S9000	SES®-91
CDC® 44-500 Type I	Ferranti® Vancomm	SES®-92
CDC® 44-550 Type II	GETAC® 7020	Siemens® Sinaut® 8FW-1024 (DPDM)
Cegelec® HNZ	GETAC® 7020 LP	Siemens® Sinaut® 8FW-512 (PCM)
Conitel C0300	Georgia Power Company	Telegyr® TG809
Conitel C0200	Harris® HR5000	UCA™ 2.0
Conitel 2000	Harris® HR6000/XA-21	Valmet® TEJAS V
Conitel C2020	Harris® Micro II	Valmet® TEJAS III
Conitel C2025	IEC® 60870-5-101	Westinghouse® REDAC 70H
Conitel C2100H	IEC® 60870-5-104	Westinghouse® WESDAC 4F
Conitel C2100M	Landis & Gyr 8979	Westinghouse® WISP+

Supported IED Protocols

The ability to acquire data from all substation Intelligent Electronic Devices (IEDs) is essential to any utilities substation automation program. GE has the largest IED protocol libraries in the industry allowing for fast and efficient integration of the following types of IEDs:

- Protection Relays
- Power Meters
- Digital Fault Recorders
- Power Quality Monitors
- Capacitor Bank Controllers
- Load Tap Changer (LTC) Controllers
- PLC

The following list summarizes the sub-master communication protocols supported by the D20/D200:

8979	HARLEY LTC-MAP	PROGRAMMABLE SYNCROCHECK RELAY (PSR)
ACCUSONIC FLOW METER	HARRIS 6000	PSI QUAD 4+
Allen Bradley ANSI X3.28 DCA	HNZ	QUANTUM METERS SCANNER
BECO 2200	IEC® 870-5-101	ROCKWELL
BOEING 3050	IEC 870-5-103	RUGBY CLOCK
CDC TYPE II	INCOM	SAG® PROTECTIVE DEVICE
COOPER 2179	INDACTIC 33	SC1801
DNP V1.00 (QUANTUM METERS)	JEM 2	SEL GATEWAY
DNP V3.00	LEEDEX DTMF	SINAUT 8-FW 512/1024
DPU	LILCO ASCII	SINAUT 8FW-512-PCM
ENVIC DMCP-20A	MD3000	SPA BUS
FLUKE® TEMPERATURE RECORDER	MICRO II	SUNDAS RMS
GE® DGP	MODBUS	SYPROTEC HYDRAN
GEC COURIER PROTOCOL	POWER MEASUREMENT LIMITED 3710 ACM METER	UCA™ 2.0
GEC SCADA PACKET	Procontrol P14	VANCOM

Ordering

D20 Single CPU (non-VME)

D20 -	*	*	*	*	*	*	*	*	*	Description
Data Display Panel	U									Not required
	A									WESDAC data display panel, 12in cable
D20 NON-VME Processor		U								Not required
		A								D20ME, Non-VME, RS232
		B								D20ME II, Non-VME. RS232/RS485
D20 Power Supply			U							Not required
			A							D20 Power Supply, 20-60VDC Input, 24V ISO Output
			B							D20 Power Supply, 20-60VDC Input, 48V ISO Output
			C							D20 Power Supply, 100-300VDC/85-264VAC Input, 24V ISO Output
			D							D20 Power Supply, 100-300VDC/85-264VAC Input, 48V ISO Output
Modem Slot 1				U						Empty Slot with Cover Plate
				A						WESDAC D20 202 BIN MODEM
				C						TELENETICS 14400 BAUD modem 2-wire dial up
				D						TELENETICS 14400 BAUD modem 4-wire leased line
Modem Slot 2					U					Empty Slot with Cover Plate
					A					WESDAC D20 202 BIN modem
					C					TELENETICS 14400 BAUD modem 2-wire dial up
					D					TELENETICS 14400 BAUD modem 4-wire leased line
Modem Slot 3						U				Empty Slot with Cover Plate
						A				WESDAC D20 202 BIN MODEM
						C				TELENETICS 14400 BAUD modem 2-wire dial up
						D				TELENETICS 14400 BAUD modem 4-wire leased line
D20 Terminator Options							U			D20 terminator not required
							1			D.20 terminator (one required per D.20 link)
D20 BOOTROM								U		BOOTROM is not required
								N		Factory selected
								A		P149-0 VER.129, D20ME D20 Base BOOTROM
								B		P130-0 VER.204, D20ME CCU BOOTROM
								C		P130-0 VER.134, D20ME CCU BOOTROM
								D		P130-0 VER.133, D20ME CCU BOOTROM
								E		P130-0 VER.132, D20ME CCU BOOTROM
								F		P130-0 VER.130, D20ME CCU BOOTROM
								G		P130-0 VER.131, D20ME CCU BOOTROM
								H		P130-0 VER.129, D20ME CCU BOOTROM
								I		P130-0 VER.128, D20ME CCU BOOTROM
								J		P130-0 VER.127, D20ME CCU BOOTROM
								K		P130-0 VER.126, D20ME CCU BOOTROM
								L		P130-0 VER.123, D20ME CCU BOOTROM
								M		P130-0 VER.205, D20ME CCU BOOTROM
								O		P130-0 VER.206, D20ME CCU BOOTROM
								P		P130-0 VER.210, D20ME CCU BOOTROM
								Q		P130-0 VER.212, D20ME CCU BOOTROM
WESMAINT Cable Options									U	Not required
									1	WESMAINT Maintenance Cable 3' (DB9/DB9)
									A	WESMAINT Maintenance Cable 8' (DB9/DB9)
									B	WESMAINT Maintenance Cable 16' (DB9/DB9)

Ordering

D20 VME Mutli-Node Gateway

D20 -	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Description
D20 VME Processor/ Ethernet/Memory Slot 1	A														D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM
	B														D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM
D20 VME Processor/ Ethernet/Memory Slot 2		U													EMPTY SLOT WITH COVER PLATE
		A													D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM
		B													D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM
		C													D20 EME ETHERNET MEMORY, 0MB KIT
		D													D20 EME ETHERNET MEMORY, 8MB KIT
		E													D20 EME ETHERNET MEMORY, 16MB KIT
		L													D20 EME 8MB MEMORY CARD KIT (No Ethernet)
		M													D20 EME 16MB MEMORY CARD KIT (No Ethernet)
		N													D20 EME2 8MB MEMORY CARD
		O													D20 EME2 ETHERNET MEMORY, 16MB KIT
D20 VME Processor/ Ethernet/Memory Slot 3			U												EMPTY SLOT WITH COVER PLATE
			A												D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM
			B												D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM
			C												D20 EME ETHERNET MEMORY, 0MB KIT
			D												D20 EME ETHERNET MEMORY, 8MB KIT
			E												D20 EME ETHERNET MEMORY, 16MB KIT
			L												D20 EME 8MB MEMORY CARD KIT (No Ethernet)
			M												D20 EME 16MB MEMORY CARD KIT (No Ethernet)
			N												D20 EME2 8MB MEMORY CARD
			O												D20 EME2 ETHERNET MEMORY, 16MB KIT
D20 VME Processor/ Ethernet/Memory Slot 4				U											EMPTY SLOT WITH COVER PLATE
				D											D20 EME ETHERNET MEMORY, 8MB KIT
				E											D20 EME ETHERNET MEMORY, 16MB KIT
				L											D20 EME 8MB MEMORY CARD KIT (No Ethernet)
				M											D20 EME 16MB MEMORY CARD KIT (No Ethernet)
				N											D20 EME2 8MB MEMORY CARD
				O											D20 EME2 ETHERNET MEMORY, 16MB KIT
D20 VME SIO Term Panel - Processor 1					B										Rear Mounted SIO Westerm Panel
					A										Rack Mounted SIO Westerm Panel with 15" Ribbon Cable
					C										Rack Mounted SIO Westerm Panel with 24" Ribbon Cable
D20 VME SIO Term Panel - Processor 2						U									Not required
						C									Rack Mounted SIO Westerm Panel with 24" ribbon cable
D20 VME SIO Term Panel - Processor 3							U								Not required
							C								Rack Mounted SIO Westerm Panel with 24" ribbon cable
D20 Power Supply								U							Not required
								A							D20 Power Supply, 20-60VDC Input, 24V ISO Output
								B							D20 Power Supply, 20-60VDC Input, 48V ISO Output
								C							D20 Power Supply, 100-300VDC/85-264VAC Input, 24V ISO Output
								D							D20 Power Supply, 100-300VDC/85-264VAC Input, 48V ISO Output
Modem Slot 1									U						Empty Slot with Cover Plate
									A						WESDAC D20 202 BIN modem
									C						TELENETICS 14400 BAUD modem 2-wire dial up
									D						TELENETICS 14400 BAUD modem 4-wire leased line
									L						D20 EME 10BASE-T kit
									U						Empty Slot with Cover Plate
									K						D20 EME 10BASE-FL kit
Modem Slot 2										U					Empty Slot with Cover Plate
										A					WESDAC D20 202 BIN modem
										C					TELENETICS 14400 BAUD modem 2-wire dial up
										D					TELENETICS 14400 BAUD modem 4-wire leased line
Modem Slot 3											U				Empty Slot with Cover Plate
											A				WESDAC D20 202 BIN modem
											C				TELENETICS 14400 BAUD modem 2-wire dial up
											D				TELENETICS 14400 BAUD modem 4-wire leased line
D20 Terminator Options												U			D20 terminator not required
												1			D.20 terminator (one required per D20 link)
D20 BOOTROM													U		BOOTROM is not required
													N		Factory selected
													A		P149-0 VER.129, D20ME D20 Base BOOTROM
													B		P130-0 VER.204, D20ME CCU BOOTROM
													C		P130-0 VER.134, D20ME CCU BOOTROM
													D		P130-0 VER.133, D20ME CCU BOOTROM
													E		P130-0 VER.132, D20ME CCU BOOTROM
													F		P130-0 VER.130, D20ME CCU BOOTROM
													G		P130-0 VER.131, D20ME CCU BOOTROM
													H		P130-0 VER.129, D20ME CCU BOOTROM
													I		P130-0 VER.128, D20ME CCU BOOTROM
													J		P130-0 VER.127, D20ME CCU BOOTROM
													K		P130-0 VER.126, D20ME CCU BOOTROM
													L		P130-0 VER.123, D20ME CCU BOOTROM
													M		P130-0 VER.205, D20ME CCU BOOTROM
													O		P130-0 VER.206, D20ME CCU BOOTROM
													P		P130-0 VER.210, D20ME CCU BOOTROM
													Q		P130-0 VER.212, D20ME CCU BOOTROM
WESMAINT Cable Options														U	Not required
														1	WESMAINT Maintenance Cable 3' (DB9/DB9)
														A	WESMAINT Maintenance Cable 8' (DB9/DB9)
														B	WESMAINT Maintenance Cable 16' (DB9/DB9)

D200 Multi Processor Gateway

D200 -	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Description
Chassis Options	A B C D																				6U CCU CHASSIS, D200 VME, SINGLE 115/230VAC 6U CCU CHASSIS, D200 VME, SINGLE 48VDC 6U CCU CHASSIS, D200 VME, SINGLE 48VDC epoxy conformal coat 6U CCU CHASSIS, D200 VME, DUAL 48VDC
D200 VME PROCESSOR/ ETHERNET/MEMORY Slot 1		A B C																			D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM WESDAC D20ME II (VME) – Epoxy Conformal Coat
D200 VME PROCESSOR/ ETHERNET/MEMORY Slot 2			U A B C																		NO PROCESSOR REQUIRED D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM WESDAC D20ME II (VME) – Epoxy Conformal Coat
D200 VME PROCESSOR/ ETHERNET/MEMORY Slot 3				U A B C																	NO PROCESSOR REQUIRED D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM WESDAC D20ME II (VME) – Epoxy Conformal Coat
D200 VME PROCESSOR/ ETHERNET/MEMORY Slot 4					U A B C																NO PROCESSOR REQUIRED D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM WESDAC D20ME II (VME) – Epoxy Conformal Coat
D200 VME PROCESSOR/ ETHERNET/MEMORY Slot 5						U N O P															NO PROCESSOR REQUIRED D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM WESDAC D20ME II (VME) – Epoxy Conformal Coat
D200 VME PROCESSOR/ ETHERNET/MEMORY Slot 6							U Q R S														NO PROCESSOR REQUIRED D20ME (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM D20ME II w RS232/485 (VME) 2M FLASH, 512kNVRAM, 1.5M SRAM WESDAC D20ME II (VME) – Epoxy Conformal Coat
D200 EME Slot 9								U D H F L E M													No Memory Required D20 EME ETHERNET MEMORY CARD, 0MB D20 EME ETHERNET MEMORY CARD, 8MB WESDAC D20 EME (ETHERNET, 8MB) – Epoxy Conformal Coat D20 EME ETHERNET MEMORY CARD, 8MB, NO ETHERNET D20 EME ETHERNET MEMORY, 16MB KIT D20 EME 16MB MEMORY CARD KIT
D200 Additional Power Supply**									U A B												NOT REQUIRED 115/230 VAC Additional Power Supply 48VDC Additonal Power Supply
D200 Slot 1 Modem/ Clock Options										U E G K B											Empty Slot with Cover Plate D20 EME 10BASE-T KIT D20 EME 10BASE-T media interface card epoxy conformal coat D20 EME 10BASE-FL KIT WESDAC D20 EME 10BASE-FL MIC – Epoxy Conformal Coat
D200 Slot 2 Modem/ Clock Options											U A C D										Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD modem 4-wire leased line
D200 Slot 3 Modem/ Clock Options												U A C D									Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD modem 4-wire leased line
D200 Slot 4 Modem/ Clock Options													U A C D								Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD modem 4-wire leased line
D200 Slot 5 Modem/ Clock Options														U A C D							Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD modem 4-wire leased line
D200 Slot 6 Modem/ Clock Options															U A C D						Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD modem 4-wire leased line
D200 Slot 7 Modem/ Clock Options																U A C D					Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD modem 4-wire leased line
D200 Slot 8 Modem/ Clock Options																	U A C D				Empty Slot with Cover Plate WESDAC D20 202/V.23 MODEM TELENETICS 14400 BAUD MODEM 2-WIRE DIAL UP TELENETICS 14400 BAUD MODEM 4-WIRE LEASED LINE
D200 Bootrom																		U N A B C D E F G H I J K L M O P Q			BOOTROM IS NOT REQUIRED FACTORY SELECTED P149-0 VER.129, D20ME D20 Base BOOTROM P130-0 VER.204, D20ME CCU BOOTROM P130-0 VER.134, D20ME CCU BOOTROM P130-0 VER.133, D20ME CCU BOOTROM P130-0 VER.132, D20ME CCU BOOTROM P130-0 VER.130, D20ME CCU BOOTROM P130-0 VER.131, D20ME CCU BOOTROM P130-0 VER.129, D20ME CCU BOOTROM P130-0 VER.128, D20ME CCU BOOTROM P130-0 VER.127, D20ME CCU BOOTROM P130-0 VER.126, D20ME CCU BOOTROM P130-0 VER.123, D20ME CCU BOOTROM P130-0 VER.205, D20ME CCU BOOTROM P130-0 VER.206, D20ME CCU BOOTROM P130-0 VER.210, D20ME CCU BOOTROM P130-0 VER.212, D20ME CCU BOOTROM
D20 Terminator																			U 1		D20 TERMINATOR NOT REQUIRED D.20 TERMINATOR (ONE REQUIRED PER D.20 LINK)

Ordering

D20 ME Substation Controller Spare Parts

D20ME-	*	*	*	*	Description
PROCESSOR	P	A			D20ME non-VME Processor, 7 x RS232 ports (526-2004)
		E			D20ME non-VME Processor, 7 x RS232 ports, conformal coated (526-2004-CC)
		B			D20ME non-VME Processor, 7 x RS232 / RS 485 ports (526-2006)
		F			D20ME VME non-VME Processor, 7 x RS232 / RS 485 ports, conformal coated (526-2006-CC)
		C			D20ME Processor, 7 x RS232 ports (526-2005)
		G			D20ME VME Processor, 7 x RS232 ports, conformal coatd (526-2005-CC)
		D			D20ME VME Processor, 7 x RS232 / RS 485 ports (526-2007)
		H			D20ME VME Processor, 7 x RS232 / RS 485 ports, conformal coated (526-2007-CC)
		I			D20ME VME Processor, 7 x RS232 / RS 485 ports Epoxy Conformal Coated (526-2007-ECC)
PROCESSOR Firmware			1		Firmware Loading Required
			0		Firmware Load NOT Required
			U		Not Applicable
ETHERNET	E	H			D20 EME ETHERNET MEMORY, 0MB KIT (526-2101)
		P			D20 EME ETHERNET MEMORY, 0MB KIT, Conformal Coated (526-2101-CC)
		C			D20 EME Ethernet Memory Expansion, 8MB (526-2100)
		F			D20 EME Ethernet Memory Expansion, 8MB, conformal coated (526-2100-CC)
		G			D20 EME Ethernet Memory Expansion, 8MB, conformal coated (526-2100-ECC)
		N			D20 EME2 Ethernet Memory Expansion, 8MB [use with 526-2116] (526-2117)
		L			D20 EME Ethernet Memory Expansion, 8MB, NO ETHERNET (526-2102)
		E			D20 EME Ethernet/Ethernet Memory Expansion, 16MB (526-2100 & 526-2115)
		M			D20 EME Ethernet Memory Expansion, 16MB, no ethernet (526-2102 & 526-2115)
		O			D20 EME2 Ethernet Memory Expansion, 16MB (517-2117 & 517-2115) [use with 526-2116)
		U			None
MODEM	M	A			Wesdac D20 202/V.23 Modem, bin mount (520-0120)
		B			Wesdac D20 202/V.23 Modem, bin mount, conformal coated (520-0120-CC)
		C			Modem, Telenetics 14.4K 2 wire Dialup, Bin mount (580-0771)
		D			Modem, Telenetics 14.4K 4 wire Leased line, bin mount (580-0772)
		E			Wesdac 202/V.23 Modem, 19 inch rack mount (520-0090)
		F			Wesdac 202/V.23 Modem, 19 inch rack mount, conformal coated (520-0090-CC)
		U			None
TERMINATION PANEL	T	A			Westerm D20 termination Panel, Panel Mount, 15 inch ribbon I/F cable (517-0225)
		D			Westerm D20 termination Panel, Panel Mount, 15 inch ribbon I/F cable, conformal coated (517-0225-CC)
		B			Westerm D20 termination Panel, Chassis Mount (517-0230)
		C			Westerm D20 termination Panel, Panel Mount, 24 inch ribbon I/F cable (517-0300)
		U			None
POWER SUPPLY	S	A			D20 Power Supply, 20-60VDC Input, 24V ISO Output (580-2004)
		B			D20 Power Supply, 20-60VDC Input, 48V ISO Output (580-2005)
		C			D20 Power Supply, 100-300VDC/85-264VAC Input, 24V ISO Output (580-2006)
		D			D20 Power Supply, 100-300VDC/85-264VAC Input, 48V ISO Output (580-2007)
		U			None
MEDIA INTERFACE	X	K			D20 EME 10BASE-FL Media Interfase Card (526-2112 & 977-0298)
		A			D20 EME 10BASE-FL Media Interfase Card, conformal coated (526-2112-CC & 977-0298)
		B			D20 EME 10BASE-FL Media Interfase Card, Epoxy conformal coated (526-2112-ECC & 977-0298)
		L			D20 EME 10BASE-TX Media Interfase Card (526-2116 & 977-0298)
CHASSIS	C	A			D20 Chassis assembly nonVME 3U, single slot (500-0305)
		B			D20 Chassis assembly VME 3U (500-0280 & COVER PLATES)
		C			D20 Chassis assembly nonVME 3U, single slot, Conformal Coated (500-0305-CC)
		D			D20 Chassis assembly VME 3U, Conformal Coated (500-0280-CC & COVER PLATES)
		U			None
Bootrom chosen for processor spare				U	BOOTROM IS NOT REQUIRED - Ship Blank
				N	FACTORY SELECTED
				A	P149-0 VER.129, D20ME D20 Base BOOTROM
				B	P130-0 VER.204, D20ME CCU BOOTROM
				C	P130-0 VER.134, D20ME CCU BOOTROM
				D	P130-0 VER.133, D20ME CCU BOOTROM
				E	P130-0 VER.132, D20ME CCU BOOTROM
				F	P130-0 VER.130, D20ME CCU BOOTROM
				G	P130-0 VER.131, D20ME CCU BOOTROM
				H	P130-0 VER.129, D20ME CCU BOOTROM
				I	P130-0 VER.128, D20ME CCU BOOTROM
				J	P130-0 VER.127, D20ME CCU BOOTROM
				K	P130-0 VER.126, D20ME CCU BOOTROM
				L	P130-0 VER.123, D20ME CCU BOOTROM
				M	P130-0 VER.205, D20ME CCU BOOTROM
				O	P130-0 VER.206, D20ME CCU BOOTROM
				P	P130-0 VER.210, D20ME CCU BOOTROM
				Q	P130-0 VER.212, D20ME CCU BOOTROM

D20 ME Spare Parts Cross Reference

PROCESSORS		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE X-X REPRESENTS FIRMWARE AND BOOTROM CHOICE RESPECTIVELY**
D20ME non-VME Processor, 7 x RS232 ports	526-2004	D20ME-P-A-X-X
D20ME non-VME Processor, 7 x RS232 ports, conformal coated	526-2004-CC	D20ME-P-E-X-X
D20ME non-VME Processor, 7 x RS232 / RS 485 ports	526-2006	D20ME-P-B-X-X
D20ME VME non-VME Processor, 7 x RS232 / RS 485 ports, conformal coated	526-2006-CC	D20ME-P-F-X-X
D20ME Processor, 7 x RS232 ports	526-2005	D20ME-P-C-X-X
D20ME VME Processor, 7 x RS232 ports, conformal coatd	526-2005-CC	D20ME-P-D-X-X
D20ME VME Processor, 7 x RS232 / RS 485 ports	526-2007	D20ME-P-G-X-X
D20ME VME Processor, 7 x RS232 / RS 485 ports, conformal coated	526-2007-CC	D20ME-P-H-X-X
D20ME VME Processor, 7 x RS232 / RS 485 ports Epoxy Conformal Coated	526-2007-ECC	D20ME-P-I-X-X
ETHERNETS		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE U-U REPRESENTS "NOT NEEDED"**
D20 EME ETHERNET MEMORY, 0MB KIT	526-2101	D20ME-E-H-U-U
D20 EME ETHERNET MEMORY, 0MB KIT, Conformal Coated	526-2101-CC	D20ME-E-P-U-U
D20 EME Ethernet Memory Expansion, 8MB	526-2100	D20ME-E-C-U-U
D20 EME Ethernet Memory Expansion, 8MB, conformal coated	526-2100-CC	D20ME-E-F-U-U
D20 EME Ethernet Memory Expansion, 8MB, conformal coated	526-2100-ECC	D20ME-E-G-U-U
D20 EME2 Ethernet Memory Expansion, 8MB [use with 526-2116]	526-2117	D20ME-E-N-U-U
D20 EME Ethernet Memory Expansion, 8MB, NO ETHERNET	526-2102	D20ME-E-L-U-U
D20 EME Ethernet/Ethernet Memory Expansion, 16MB	526-2100 & 526-2115	D20ME-E-E-U-U
D20 EME Ethernet Memory Expansion, 16MB, no ethernet	526-2102 & 526-2115	D20ME-E-M-U-U
D20 EME2 Ethernet Memory Expansion, 16MB [use with 526-2116]	517-2117 & 517-2115	D20ME-E-O-U-U
MODEMS		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE U-U REPRESENTS "NOT NEEDED"**
Wesdac D20 202/V.23 Modem, bin mount	520-0120	D20ME-M-A-U-U
Wesdac D20 202/V.23 Modem, bin mount, conformal coated	520-0120-CC	D20ME-M-B-U-U
Modem, Telenetics 14.4K 2 wire Dialup, Bin mount	580-0771	D20ME-M-C-U-U
Modem, Telenetics 14.4K 4 wire Leased line, bin mount	580-0772	D20ME-M-D-U-U
Wesdac 202/V.23 Modem, 19 inch rack mount	520-0090	D20ME-M-E-U-U
Wesdac 202/V.23 Modem, 19 inch rack mount, conformal coated	520-0090-CC	D20ME-M-F-U-U
TERMINATIONS		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE U-U REPRESENTS "NOT NEEDED"**
Westerm D20 termination Panel, Panel Mount, 15 inch ribbon I/F cable	517-0225	D20ME-T-A-U-U
Westerm D20 termination Panel, Panel Mount, 15 inch ribbon I/F cable, conformal coated	517-0225-CC	D20ME-T-D-U-U
Westerm D20 termination Panel, Chassis Mount	517-0230	D20ME-T-B-U-U
Westerm D20 termination Panel, Panel Mount, 24 inch ribbon I/F cable	517-0300	D20ME-T-C-U-U
POWER SUPPLY		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE U-U REPRESENTS "NOT NEEDED"**
D20 Power Supply, 20-60VDC Input, 24V ISO Output	580-2004	D20ME-S-A-U-U
D20 Power Supply, 20-60VDC Input, 48V ISO Output	580-2005	D20ME-S-B-U-U
D20 Power Supply, 100-300VDC/85-264VAC Input, 24V ISO Output	580-2006	D20ME-S-C-U-U
D20 Power Supply, 100-300VDC/85-264VAC Input, 48V ISO Output	580-2007	D20ME-S-D-U-U
MEDIA INTERFACES		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE U-U REPRESENTS "NOT NEEDED"**
D20 EME 10BASE-FL Media Interfase Card	526-2112 & 977-0298	D20ME-X-K-U-U
D20 EME 10BASE-FL Media Interfase Card, conformal coated	526-2112-CC & 977-0298	D20ME-X-A-U-U
D20 EME 10BASE-FL Media Interfase Card, Epoxy conformal coated	526-2112-ECC & 977-0298	D20ME-X-B-U-U
D20 EME 10BASE-TX Media Interfase Card	526-2116 & 977-0298	D20ME-X-L-U-U
CHASSIS		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX; WHERE U-U REPRESENTS "NOT NEEDED"**
D20 Chassis assembly nonVME 3U, single slot	500-0305	D20ME-C-A-U-U
D20 Chassis assembly VME 3U	500-0280 & COVER PLATES	D20ME-C-B-U-U
D20 Chassis assembly nonVME 3U, single slot, Conformal Coated	500-0305-CC	D20ME-C-C-U-U
D20 Chassis assembly VME 3U, Conformal Coated	500-0280-CC & COVER PLATES	D20ME-C-D-U-U

Ordering

D20 Programmed Chip Set

BOOTROM		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX**
P149-0 VER.129, D20ME D20 Base BOOTROM	P149-0 VER.129	D20CP-3A
P130-0 VER.204, D20ME CCU BOOTROM	P130-0 VER.204	D20CP-3B
P130-0 VER.134, D20ME CCU BOOTROM	P130-0 VER.134	D20CP-3C
P130-0 VER.133, D20ME CCU BOOTROM	P130-0 VER.133	D20CP-3D
P130-0 VER.132, D20ME CCU BOOTROM	P130-0 VER.132	D20CP-3E
P130-0 VER.130, D20ME CCU BOOTROM	P130-0 VER.130	D20CP-3F
P130-0 VER.131, D20ME CCU BOOTROM	P130-0 VER.131	D20CP-3G
P130-0 VER.129, D20ME CCU BOOTROM	P130-0 VER.129	D20CP-3H
P130-0 VER.128, D20ME CCU BOOTROM	P130-0 VER.128	D20CP-3I
P130-0 VER.127, D20ME CCU BOOTROM	P130-0 VER.127	D20CP-3J
P130-0 VER.126, D20ME CCU BOOTROM	P130-0 VER.126	D20CP-3K
P130-0 VER.123, D20ME CCU BOOTROM	P130-0 VER.123	D20CP-3L
P130-0 VER.205, D20ME CCU BOOTROM	P130-0 VER.205	D20CP-3M
P130-0 VER.206, D20ME CCU BOOTROM	P130-0 VER.206	D20CP-3O
P130-0 VER.210, D20ME CCU BOOTROM	P130-0 VER.210	D20CP-3P
P130-0 VER.212, D20ME CCU BOOTROM	P130-0 VER.212	D20CP-3Q
PCOMMON		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX**
PCOMMON V212	SBA0001/00	D20CP-11
PCOMMON V213	SBA0003/00	D20CP-12
PCOMMON V220	SBA0004/00	D20CP-13
PCOMMON V221	SBA0007/00	D20CP-14
PCOMMON V300	SBA0005/00	D20CP-15
PCOMMON V301	SBA0006/00	D20CP-16
PCOMMON V305	SBA0009/00	D20CP-17
PCOMMON V306	P010-0 VER. 306	D20CP-18
PCOMMON2		
DESCRIPTION	**LEGACY PART NUMBER**	**SMART PART NUMBER PREFIX**
PCOMMON2 V221	P022 VER.221	D20CP-29
PCOMMON2 V305	P022 VER.305	D20CP-20

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