# RMS INSTRUMENTS
## Data Recording Systems

# DGR33A

# DATA ACQUISITION/GRAPHIC RECORDER



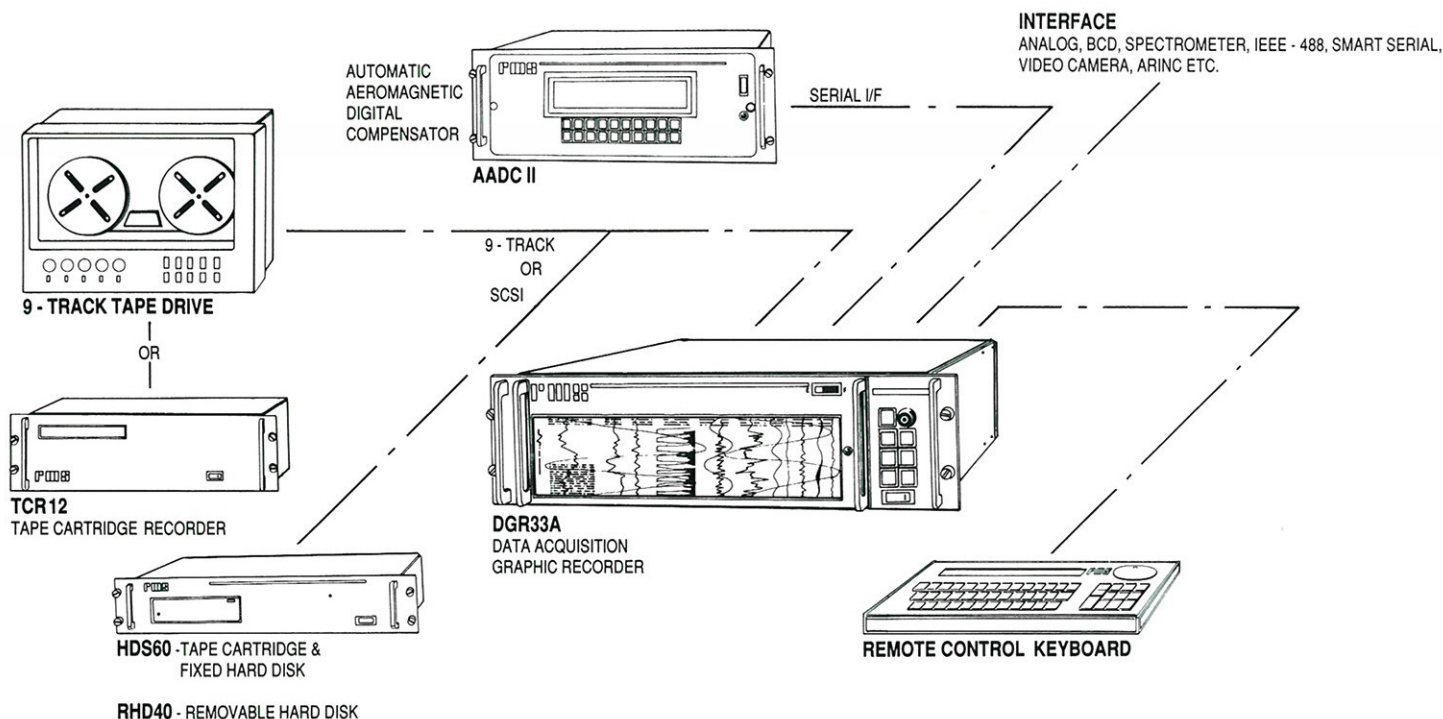# USER PROGRAMMABLE

# DESCRIPTION

The DGR33A is an extremely compact data collection, monitoring and distribution system combined with a wide multi-channel chart recorder. The system is a multiprocessor based system and includes a movable keyboard/display for operating, programming and monitoring the instrument. It is designed to operate in moderately harsh environments, and is ideally suited for airborne and mobile applications. The modular approach allows the flexibility of selecting a cost effective system for an immediate specific data acquisition requirement, yet provides for future alteration and expansion as requirements change and grow.

# Features:

- Integrated data acquisition and graphic recorder

- Compact rugged package, ideal for airborne and mobile applications

- Multiple scans with variable rates

- Movable display keyboard allows remote control

- PC compatible data when used with the SCSI interface

- User programmable data collecting and monitoring
  from extensive configuration menus

- Modular approach with a wide selection of interface modules:
  Analog, Serial, Hard Disk (SCSI), Magnetic Tape, Video,
  ARINC, BCD, Spectrometer, IEEE-488, and many more

- Directly interfaces with the RMS Instruments':
  HDS60  Hard Disk and Streamer Tape Drive
  RHD40  Removable Hard Disk Cartridge Drive - data format
          MS-DOS compatible
  TCR12  Magnetic Tape Cartridge or an industry standard
          9-Track 1/2 inch drive



INTERFACE
ANALOG, BCD, SPECTROMETER, IEEE - 488, SMART SERIAL,
VIDEO CAMERA, ARINC ETC.

AUTOMATIC
AEROMAGNETIC
DIGITAL
COMPENSATOR
AADC II

SERIAL I/F

9 - TRACK TAPE DRIVE

9 - TRACK
OR
SCSI

OR

TCR12
TAPE CARTRIDGE RECORDER

DGR33A
DATA ACQUISITION
GRAPHIC RECORDER

HDS60 -TAPE CARTRIDGE &
FIXED HARD DISK

RHD40 - REMOVABLE HARD DISK

REMOTE CONTROL  KEYBOARD

## DATA ACQUISITION

The system software allows the user to easily program a routine(s) to acquire data from a number of different sources, analog or digital, and to output to various recording media such as hard disk drives, and tapes etc., as well as to the integral GR33A graphic recorder. When interface modules are added or removed, the software automatically provides access to the related menus for easy programming. There is no need to return the system to the factory for application specific software. A current program that is stored in the system's nonvolatile memory is ready for immediate use at power on. Other programs can be stored on disk or tape and loaded when required. Three separate scans are provided allowing different data to be sampled or functions to be performed at different rates.

## GR33A GRAPHIC RECORDER

The integral GR33A graphic recorder uses a thermal array printhead to produce graphic images on the 12.625 in. (321mm) wide chart paper. The chart recorder can produce up to 32 traces in strip chart format from analog or digital data which are defined by the data system, complete with alphanumeric annotation for signal identification, operating parameters, header messages, fiducial numbers, and time. The GR33A can be programmed fully or partially from the data system depending on the application. Refer to the GR33A data sheet for a detailed description. The chart recorder can also be easily configured to a basic multichannel recorder as outlined in the data sheet.

## COMPLETE DATA ACQUISITION SYSTEM

When the DGR33A is combined with any of the RMS Instruments' magnetic recording media, such as the HDS60, RHD40, or TCR12 series of hard disk and tape drives, a very compact system is realized. These systems combine a programmable data acquisition system with a hard copy multi-channel chart recorder, and also the ability to store data on an easily transportable medium for processing and analysis in the field or at a data centre.

## EASY OPERATION

Upon power-up, the operator can quickly begin to collect and monitor data using the program stored in the nonvolatile memory. In addition, provisions are made for manual entries such as project numbers etc. Monitoring of the systems' performance is conveniently and clearly presented on the graphic recorder, as well as on the keyboard/display which can be relocated up to 5 meters away for remote operation.



DGR33A and HDS60 Data Acquisition and Recording System.

## EASY PROGRAMMING

The built-in system software allows the user to configure a data collecting routine to suit their own requirement even when modules are added or deleted from the system. The system software provides this flexibility through an extensive array of menus that allows the user to select the data, the rate of sampling as well as the organization of how the data is to be recorded on both the chart recorder and the magnetic media. Data and function routines are referred to by system 'names' and 'letters', and when these symbolic names are included in a list, they are executed automatically when the scanning sequence encounters them - **NO SOFTWARE PROGRAMMING BACKGROUND IS NECESSARY!**

## EASY DATA VERIFICATION

With the use of the resident utility programs, a user may confirm or verify data by reading back the contents of the tape, disk or a data buffer, and display it on the keyboard/display, the built-in recorder, or a terminal. Other routines are provided to copy from disk to tape/tape to disk, upload programs or to produce traces from recorded data onto the recorder, and many more.

## EXTENDED DATA BUFFERING

The Tape and SCSI Interface modules, provide 60 Kbytes (15 pages x 4K) of buffering which greatly minimizes any data loss that could occur when another acquisition period begins and the recording device reports "busy". Without buffering, this can be a serious problem in real time data acquisition and recording.

## EASY INTERFACING

The modular approach of the DGR33A makes expanding a basic system a simple matter of installing an interface module and using the built-in configuration menus to program a new data collecting routine. A wide selection of interface modules are available to meet most applications and details follow.

## BASIC DGR33A DATA ACQUISITION SYSTEM

DGR33A 32 trace GR33A Chart
    Recorder
RMS4183A Microcomputer Module
RMS4185A 32 channel Analog Input
    Module (plus 6 event inputs)
RMS4526 SCSI Interface Module
RMS4137 Digital Interface Module
    (20 digit BCD)
RMS4186 Keyboard/Display

A total of 5 modules may be installed.
For applications requiring more, refer to
the model DAS8.

## OPTIONAL INTERFACE MODULES

RMS4272A  4 channel Smart Serial
    Interface
RMS4190 Video Interface
RMS4241A Spectrometer Interface
RMS4429A ARINC Interface
RMS4239A Tape Interface (9-track
    industry standard)
RMS4088 IEEE-488 Instrument Bus
    Interface
RMS4418  General  Purpose Interface
    (1 parallel, 2 serial, 4 analog o/p,
    4 pulse o/p and 4 counters)

Enquire regarding additional interfaces

## MAGNETIC RECORDING SYSTEMS:

HDS60
    Hard disk & Streamer Drive
RHD40
    Removable  Hard  Disk  Cartridge
TCR12
    Magnetic Tape Cartridge

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# MODULE DESCRIPTIONS

## RMS4183A MICROCOMPUTER MODULE

The RMS4183A Microcomputer Module (MCM) is a high performance, multiprocessor controlled module which contains in EPROM, the built-in system software. The data system is in a multiprocessor configuration with the MCM in a supervisory role controlling data transfer functions and timing between the keyboard, other interface modules, and the Chart Recorder. The nonvolatile memory for the storing of a program is also located on this module, as well as the CMOS real-time calendar clock with battery backup. The MCM also has an interface controlled by a separate processor to communicate directly with the Chart Recorder. Menus are provided for the configuring of the Recorder where the user has the choice of fully or partially controlling the Recorder.

## RMS4185A ANALOG INPUT MODULE

The microprocessor based Analog Input Module provides 32 differential analog voltage inputs, plus 6 TTL/CMOS compatible event inputs, and one pulse input. The analog inputs are digitized to 16 bit resolution over the range of ±10V. The data is available in 2's complement form (2 bytes/channel) or can be converted to ASCII (7 bytes/channel) by programming in one of the built-in routines. Menus are provided for the application of built-in digital filters, the assignment of

signals to the Recorder, polarity inversion, etc.

**Analog Inputs:** 32 differential (balanced), 1 megohm each input to common 1.4 megohm differential
**Maximum Safe Input Voltage:** ±20 volts continuous, 75V pulse at 1ms.
**Input Voltage Range:** ±10 volts
**Sensitivity:** 300 µV
**Resolution:** 16 bits
**Accuracy/Linearity:** 0.07%/0.007% of full scale
**Full Scale Drift:** ±15 ppm/°C
**Crosstalk Rejection Ratio:** DC -89 dB typical 100KHz -65 dB maximum
**Common Mode Rejection:** DC - 60 Hz 1K balanced Rs -89 dB typical, 1K unbalanced Rs -60 dB
**Sampling Rate:** Programmable by scan rate
**Event Inputs:** 6 event marker inputs plus remote chart On/Off CMOS/TTL compatible Vmax. = 30V, Rin = 10K ohm, minimum pulse width = 10 msec.

## RMS4526 SCSI INTERFACE MODULE

The SCSI (small computer system interface allows the data collected by the DGR33A to be recorded on hard disks, optical disks and tape recorders that are readily available on this bus. This module is totally compatible with the RMS Instruments' HDS60 Hard Disk and Tape Streamer Drive, and the RHD40 Removable Disk Cartridge recording

systems. Refer to the data sheets for more details on these products. The data format on these hard drives is MS-DOS compatible making it ideal for those processing data in the PC environment.

**Maximum number of drives:**
    2 (1 Random access device - hard disk & 1 sequential device - tape)
**Record Length:**
    Variable to 4 Kbytes max
**Buffering:** 15 x 4 Kbytes
**Maximum Throughput to Recording Device:** 16 Kbytes/sec

## RMS4137 DIGITAL INTERFACE MODULE (2 modules maximum)

Each Digital Interface Module provides 20 parallel BCD digit inputs or 80 general purpose lines. The data system provides BCD to ASCII conversion as well as access to the raw data.

- Configurable as 20 BCD or hexadecimal digits, 10 ASCII characters, or 80 general purpose digital lines.
- Data can be externally strobed, or an internal strobe can be programmed from a scan.
- 4 programmable output pulses
- Traces for the chart recorder can be defined directly from the input data.

## RMS4186 REMOTE CONTROL KEYBOARD/DISPLAY

The movable keyboard/display is an intelligent unit containing its own microprocessor, communicating via a serial link to the Microcomputer Module in the DGR33A console. The backlit LCD display provides 2 lines of 80 characters each for system monitoring and programming with the menu driven items. The keyboard/display is also equipped with a rotary encoded wheel to facilitate cursor positioning, and for scrolling vertically or horizontally through messages which are greater in size than the LCD display window. During programming, the wheel is also used for scrolling through lists of items for selection.

- Qwerty type keyboard with numeric keypad
- Flywheel cursor positioning and parameter modification
- 5 function keys
- **Size:** 5.25 x 1.75 x 16.0 inches (133 x 44.5 x 406 mm)
- **Weight:** 3 pounds (1.36 Kg)

## RMS4239A TAPE INTERFACE MODULE

The microprocessor based Tape Interface Module provides an interface between the DGR33A Data Acquisition System and an industry standard 9-track 1/2 inch tape drive with built-in formatter, or the RMS Instruments' TCR12 Tape Cartridge Recorder. Menus are provided to configure block (record) data transfers, control tape movement, as well as utilize the built-in utilities to play back data.

**Maximum number of drives:**
> Up to four tape transports with autostepping

**Maximum Speed:** 9-track 1/2 inch tape - 37.5 ips
> TCR12 Tape Cartridge - 30 ips @ 6400 BPI

**Record Length:** Variable to 4 Kbytes max.

**Maximum Throughput to Recording Device:** 16 Kbytes/sec

**Buffering:** 15 x 4 Kbyte

## RMS4272A SMART SERIAL INTERFACE MODULE

The microprocessor based Serial Interface Module is a 4-channel synchronous/asynchronous full duplex RS232/RS422 interface with high speed capabilities used to transmit or receive serial data streams.

- Baud Rates programmable for each channel: RS232C, 300 - 19.2 Kb; High Speed to 61.5 Kb
- Parity/Stop bits programmable for each channel
- Programmable preamble for keying received data fields
- Define up to 6 masks for extracting data
- Programmable transmit data list
- Traces may be defined from serial data and assigned to the Chart Recorder channels.

## RMS4429A ARINC INTERFACE MODULE

This four channel ARINC microprocessor based interface can be individually configured for the following ARINC data transfer standards: 429 (high or low speed),419, 561, 568, 571, 575, and 579 formats. The ARINC data can be recorded on tape, transmitted out of the data system via the RMS4272A Serial Interface, or produce a trace or alphanumeric printout on the Recorder.

- Programmable label masking
- Programmable equipment I.D. masking

## RMS4088 IEEE-488 INSTRUMENT BUS INTERFACE MODULE

The IEEE-488 Interface Module permits operation as a talker/listener on an IEEE-488 compatible instrument bus. The interface provides for the sending or receiving of data, as well as the receiving of control and programming data.

## RMS4190 VIDEO INTERFACE MODULE

The Video Interface Module provides for the superimposing of data from the DGR33A onto a video signal for display and recording. Up to 2 lines of 32 characters each of alphanumeric information can be defined and superimposed on the video signal, e.g. the real-time clock, project I.D., event number, navigation data, etc. A moving crosshair can be activated by the user and is positioned on the X and Y axis by 2 signals applied to the RMS4185A Analog Input Module.

- Interfaces easily to readily available video cameras and VCR's
- Programmable video overlay

## RMS4241A SPECTROMETER INTERFACE MODULE

The microprocessor based Spectrometer Interface Module is compatible with the EG&G Geometrics' GR-800D and Exploranium's GR-820 Spectrometers (inquire regarding other makes and models). This module utilizes a parallel interface for the digital data transfer.

- Data can be converted to ASCII and monitored on the keyboard/display utilizing the User Defined Display facility
- Programmable data length to 2K bytes
- 100KHz throughput (bytes or nibbles)
- The spectrometer can be a scan source or be triggered by the DGR33A via the module
- Traces can be defined from the data and assigned to the recorder
- Spectrum can be plotted on the graphic recorder using the built-in utilities.
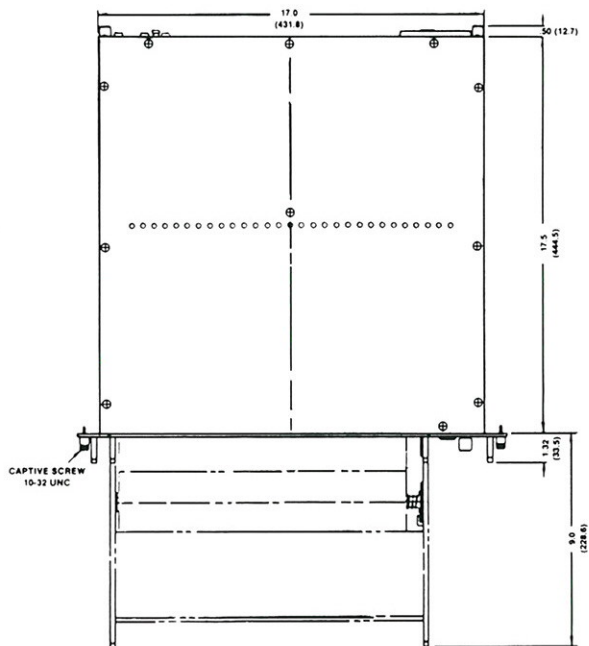
**Top view with paper transport extended**
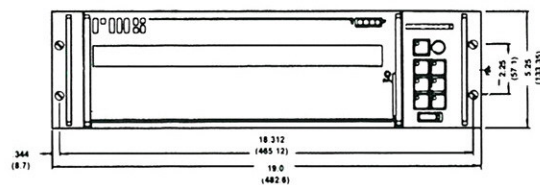


**Front View**
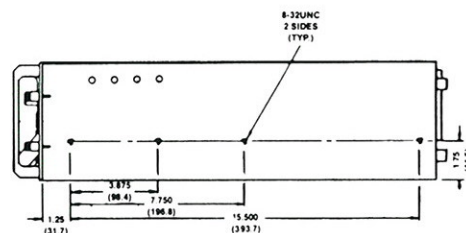


**Side View**

DIMENSIONS: Inches (mm)

## INSTALLATION

SIZE: 19.0 X 5.25 inches (483 X 133.4 mm) 19 inch rack mount
19.3 inch (490 mm) overall depth, extending 17.5 inch
behind mounting surface

POWER: 28 VDC, 7 Amps average

WEIGHT: 33 lbs. (15 Kg), including 5 modules and keyboard

TEMPERATURE: Operation: -10 ° C to +45 ° C
Storage: -40 ° C to +70 ° C

HUMIDITY: 5% - 95% non-condensing

*For additional information on these and other products, contact;*

Distributed By:

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