DISCOVERY

Transmitter

- Up to eight transmitters
- Configurable to cover a frequency range of 2 kHz to 3.5 GHz
- 1 x 10^{-6} Hz frequency resolution
- 5 x 10^{-10}/day stability
- 14-bit (0.02°) phase shifting ≤ 100 ns
- RF spoiling pulses with 14-bit (0.02°) phase resolution on MRI consoles
- Phase continuous frequency switching over a 20 MHz range in less than 200 ns
- Absolute phase reset
- Pulse rise time ≤ 30 ns (10 to 90%, at 0 dBm output)
- 96-dB of amplitude control with 100 ns switching time
- 12-bit 32-dB linear RF modulator (effective resolution < 0.05 dB)
- 7-bit 64-dB (0.5-dB steps) digital attenuator
- 500,000 point waveform memory (amplitude and phase) for each transmitter channel
- Simultaneous amplitude, phase and frequency shape any RF pulse

RF Power Amplifiers

^{1}H/^{19}F:

- Linear, class AB
- 500 W pulsed with 100 ms maximum pulse width
- 100 W pulsed with 1 s maximum pulse width
- ≤ 1 µs blank/unblank time
- ≤ 100 ns rise time; ≤ 5% droop over 100 ms
- Standard available frequency ranges:
  100 MHz to 600 MHz for up to 14.1T.
- Other frequency ranges and higher power are available, please contact Tecmag.

X Channels:

- Linear, class AB
- 1000 W pulsed with 100 ms maximum pulse width
- 100 W pulsed with 1 s maximum pulse width
- ≤ 200 ns rise time; ≤ 5% droop over 100 ms
- ≤ 1 µs blank/unblank time
- Standard available frequency ranges:
  10 - 130 MHz
  10 - 175 MHz
  6 - 220 MHz
  10 - 245 MHz
  5 - 400 MHz
- Other frequency ranges available, please contact Tecmag

tecmag

Tecmag, Inc.
10161 Harwin Dr., Suite 150
Houston, TX 77036 USA

Ph: 713-667-8747
Fx: 713-667-3180

info@tecmag.com
www.tecmag.com

DISCOVERY

Digital Receiver

- Up to 1024 digital receivers

Single Receiver Operation:

- 14-bit 50 MHz ADC with oversampling providing an effective dynamic range of up to 24-bits
- Direct digitization at the intermediate frequency (12.5 MHz) with digital quadrature detection
- 3.3 MHz receiver bandwidth
- Digital filtering
- Variable spectral widths within a sequence; up to 64 different spectral widths
- Fast <1 µs receiver recovery time
- 66-dB of variable gain with > 115-dB of total gain (with preamplifier)
- Burst Mode: up to 4096 complex points can be acquired at 300 ns per complex point (3.3 MHz spectral width)
- Normal Mode: data (any size) is acquired at up to 1 µs per complex point (1 MHz)
- Direct Digital Detection available over a frequency range of 2 kHz to 100 MHz with a 12.5 MHz bandwidth

Multiple Receiver Operation:

- Independent LO's optionally available for detection of different nuclei during the same pulse sequence
- Minimum dwell time of 1 µs per complex point times the number of active receivers for multi-receiver, simultaneous interleaved acquisitions

RF Probe Interface

- Fast-recovery (<1µs), low noise figure preamplifiers for $^{1}H/^{19}F$ and all X channels
- 1 kW power handling
- Fast-recovery passive transmit/receive switch for all channels
- Standard filter configuration: bandpass filter for $^{1}H/^{19}F$ channel and low-pass filter for all X channels

For other filter combinations, please contact Tecmag.

- RF Probe Interface with directional extractor for monitoring forward/reflected power
- Automatically switches for detection and calibration on any channel without moving cables for most configurations

Signal Averager

- 32-bit 256 Mbytes (512 x 256 x 256) memory; expandable to 1 Gbyte
- Up to 8 receivers connected to a single signal averager
- Maximum of 128 signal averagers
- Dedicated ultra-fast real-time display memory for adjusting instrument control settings and experiment monitoring
- Fast (480 Mbits/s) USB 2.0 interface for uploading of data

Shim Power Supply

- RTS Power Supply with up to 24 channels of ±1 Amp output, combined 5 Amp maximum output, 18-bit computer controlled DACs and software matrixing
- Optional support for RRI matrix shims and power supply

tecmag

Tecmag, Inc.
10161 Harwin Dr., Suite 150
Houston, TX 77036 USA

Ph: 713-667-8747
Fx: 713-667-3180

info@tecmag.com
www.tecmag.com

DISCOVERY

Pulse Programmer

- 100 ns minimum pulse width with 20 ns timing resolution
- 500,000 sequence events
- Hardware and software looping; unlimited number of loop counters
- 500,000 point waveform memory (amplitude and phase) for each RF channel
- No hidden delays
- WYSIWYG graphical pulse sequence creation and editing
- Fast minimum acquisition recycle delay of 40 µs plus 1 dwell period (Normal Mode)
- External trigger
- Rotor Synchronization Module (RSM™) for active rotor synchronization
- Extra user-assignable control lines (7 extra for each transmitter channel)
- High-speed (480 Mbits/s) USB 2.0 interface for loading of the pulse programmer

Air Control Options

Standard:

- MAS Air Control module for manual control of drive and bearing gas (0 - 100 psi)

MAS Spin-Speed Controller Option:

- ± 0.1 Hz settability
- Control up to 100 kHz
- DSP-based controller
- Computer controlled ejection air if required
- Strip chart and text-based log file monitor modes
- Requires > 50 psig input air or nitrogen and 500 mv peak to peak tach signal

Compatible with most probes.

Gradient Control System Options

- Single or triple axis version
- 500,000 point waveform memory for each gradient
- Opto-coupled 20-bit high-speed DACs
- Digital pre-emphasis calculated on-the-fly
- 5 sets of pre-emphasis values (time constant, amplitude and offset) for each gradient
- Gradient rotation calculated by a DSP for oblique imaging
- Auto-shim Z, X & Y through the gradient coils
- Optional digital B_o compensation

Variable Temperature Option

- Microprocessor controlled with efficient VT algorithm minimizes equilibration time
- Internal electronic temperature reference minimizes drift with room temperature
- VT controller range of -150 °C to +250 °C with 0.1 °C settability
- Heater protection circuit and air interlock protection
- Strip chart and text-based log file monitor modes

Compatible with most probes, please contact Tecmag.

tecmag

Tecmag, Inc.
10161 Harwin Dr., Suite 150
Houston, TX 77036 USA

Ph: 713-667-8747
Fx: 713-667-3180

info@tecmag.com
www.tecmag.com

DISCOVERY

Digital Lock with Liquid-State NMR Air Control Option

- Digital Lock System with broadband (5 MHz to 500 MHz) transmitter, digital lock receiver, digital filtering and lock blanking
- Digital air control and tachometer for liquid-state NMR
- Strip chart and text-based log file monitor modes

Compatible with most probes and upperstacks, please contact Tecmag.

Computer

- External mini-tower Dell Optiplex GX755
- Quad Core 2.4 GHz processor with 800 MHz system bus
- 2 Gbyte of RAM, DDR2
- 250 Gbyte 7200 rpm SATA II hard disk
- 16xDVD+/-RW SATA drive
- 256 Mbyte ATI Radeon HD 2400 XT, dual monitor PCI Express video card
- 10/100/1000 Base T Ethernet (RJ-45 port)
- AC'97 Audio
- Windows XP Professional SP2
- Dell USB keyboard
- Dell USB Optical Mouse with scroll
- Fast FFT, 1k x 1k in < 1s; 256 x 256 x 8 in < 0.5s

- NTNMR software site license for instrument control and processing of spectroscopy and imaging data

- NMRscripts for automating any task. Includes a suite of NMRscripts

- Pulse sequence library of spectroscopy and imaging sequences

Cabinets

- One to three cabinets (22"W x 31"L x 46"H) with an external computer and monitor
- Cabinets with internal power distribution, rear interface panel(s) and double-shielded RF cables
- AC line voltage - 230 VAC, ±10%, single phase, 47-63 Hz

For more details on system layout, power requirements and general siting information please contact Tecmag.

tecmag

Tecmag, Inc.
10161 Harwin Dr., Suite 150
Houston, TX 77036 USA

Ph: 713-667-8747
Fx: 713-667-3180

info@tecmag.com
www.tecmag.com