

# IRD FAST TRACK/FS

Data Collector/Analyzer

EFFECTIVE: January 1995

## DESCRIPTION

The IRD FAST TRACK/FS is a full-featured, Full Spectrum data collector with advanced analysis capabilities. It combines the powerful features of the proven IRD FAST TRACK instrument with the ability to accurately measure low frequency vibration data with high confidence. It also includes Spike Energy™ (gSE) Spectrum capability for demodulating vibration signals and detecting incipient microscopic flaws in bearings and gear elements. These advanced features, coupled with the auxiliary startup/coastdown analysis program and the optional balancing module, provide a complete set of vibration detection and analysis tools in one instrument.

The IRD FAST TRACK/FS links with 7090, PMpower™, and IQ2000 predictive maintenance host software for complete trending and advanced analysis of the collected data. For in-field analysis of machinery problems detected during routine measurement activities, the IRD FAST TRACK/FS is capable of providing complete FFT spectral analysis, time waveform analysis, and phase measurements necessary for a complete diagnosis.

## FEATURES

- Large display, 5.0 x 2.8 inch viewing area
- User-friendly menus and help selections
- 12 selectable amplitude ranges (72 dB per range) with autoranging feature and low noise electronics for low-level measurements and maximum dynamic range
- Calibrated to national standards (NIST)
- 35 selectable-frequency ranges from 10 Hz (600 cpm) to 25 kHz (1,500,000 cpm) provide full frequency range capability
- Wakeup feature for automatic data collection
- Accepts most commercially available sensors to record complete range of vibration and process parameters during diagnosis
- Continuous display update of frequency spectrum (FFT), time waveform, and phase information
- Auxiliary startup/coastdown program to positively identify resonant and critical frequencies.
- User selectable low-frequency mode to accurately collect machine data down to 21 CPM
- User-selectable sensitivity for accelerometer input (1 to 1150 mv/g)



**LARGE Display**  
**HIGH SPEED Processing**  
**FULL SPECTRUM Functionality**  
**BALANCING Option**  
**STARTUP/COASTDOWN Tracking**  
**LOW FREQUENCY Capability**  
**ABSOLUTE PHASE Measurements**

- Rugged, sealed case with heavy-duty cables and sensors
- Phase, balance and speed measurement down to 60 RPM
- Independent analysis mode for storing and offloading FFT data (up to 3200 lines), time-waveform and time-synchronous data
- FFT amplitude magnification, frequency zoom, cursor, grid, multiple orders, selectable averaging, units and ranging for easy setup flexibility and frequency identification
- Six programmable frequency bands (independent from FFT data) trend user-defined frequency ranges
- Special detection circuits are incorporated in IRD FAST TRACK to sense microscopic flaws in bearing or gear elements. Frequency analysis of Spike Energy™ (gSE) data identifies specific defects
- Ability to turn overlap averaging off
- Accepts various reference inputs including photocell, non-contact displacement probes, Lasetach, and Model 2021 strobe.
- Photocell and non-contact displacement probes can be set to trigger on leading edge or trailing edge and (+ Volts) or (-Volts)

**IRD Mechanalysis**

**PHASE MEASUREMENT/BALANCING**

Phase data acquisition for additional analysis information and dynamic balancing

Optional full-featured balancing program automatically acquires and calculates balance data for immediate correction

**INPUT**

IRD 970 accelerometer  
IRD 943 accelerometer  
IRD 930L accelerometer  
793L low-frequency accelerometer  
IRD 544, 546 D.P. velocity sensor  
IRD 560 low-frequency sensor  
Common 200 mv/mil displacement sensors  
Accelerometers with sensitivity from 1 mv/g - 1150 mv/g  
Common continuous monitor system outputs  
Temperature - infrared temperature sensor  
Phase - IRD 21000 photoelectric sensor  
DC inputs - voltage ranges 30, 5 or 1 VDC  
Keypanel - manual alphanumeric input  
Data I/O - RS232C communication interface  
Lasetach

**MEASUREMENT PARAMETERS**

Acceleration (g)  
Velocity (in/s or mm/s)  
Displacement (mils or microns)  
SPIKE ENERGY (gSE)  
Temperature (degrees, F or C)  
Phase (rpm, degrees and 1 x rpm amplitude)  
DC voltage  
Other user-specified units

**AMPLITUDE RANGES**

**English**  
0-100 in 12 overlapping ranges (0.01-100 in 1, 2, 5 increments)

**Metric (velocity and displacement only)**  
0-3000 in 12 overlapping ranges (0.3-3,000 in 3, 6, 15 increments)

**Decibel**  
85-160 dB in 12 overlapping ranges  
Autoranging feature to select range for maximum resolution (Manual override for fixed ranging)  
Dynamic range 72 dB per range (130 dB total)

**NOISE LEVEL\***

**Acceleration input mode**  
Acceleration: 0.005 g  
Velocity: 0.005 in/s 0.127 mm/s  
Displacement: 0.020 mils, H; 0.508  $\mu$ M, H  
0.025 mils, L; 0.635  $\mu$ M, L  
SPIKE ENERGY: 0.005 gSE

**Velocity input mode**  
Velocity: 0.001 in/s 0.025 mm/s  
Displacement: 0.015 mils, H; 0.381  $\mu$ m, H  
0.020 mils, L; 0.508  $\mu$ m, L

**Displacement input mode**  
Displacement: 0.010 mils, H; 0.254  $\mu$ m, H  
0.010 mils, L; 0.254  $\mu$ m, L

\*Noise floor levels are slightly higher in the low-frequency mode of operation. (Numbers specified are for the IRD Model 970 (50 mv/g) transducer.)

**DISPLAY**

5.0 x 2.8" (12.6 x 7.1cm) viewing area  
Text displayed in eight lines (20 characters/line)  
Backlit supertwist LCD/with variable contrast control  
Visual feedback of data collection process  
User-friendly menus  
Help screens minimize operator training time  
Detailed operator prompting  
Measurement-point identification  
Visual, overall-alarm indication  
Graphic amplitude-versus-time display  
Graphic FFT and time waveform display  
gSE spectrum display  
Measured rpm, phase and amplitude  
Independent analysis mode

**PHASE**

Lifetime (absolute) phase measurement in degrees (1 x rpm filtered amplitude)  
Accuracy to three degrees: 600 to 120,000 rpm (10 to 2000 Hz)  
Accuracy to six degrees: 60 - 300 RPM (1 to 5 Hz) and 120,000 - 240,000 rpm (2000 - 4000 Hz)

**AVERAGING**

Selectable averaging in collection mode (1, 2, 4, 8, 16, 32, 64)  
Applies to six frequency bands and FFT data  
Additional running averages available for FFT data. Individual sets of time domain data are transformed then averaged for display and storage

**VISUAL INSPECTION/NOTEPAD**

100 condition codes with explanations  
Notepad for additional comments

**DATE/TIME/TEST**

Internal calendar/clock  
Data tagged with date/time to nearest minute  
Microprocessor functional test  
Battery voltage display

**CONFIGURATION**

English/metric or dB units  
Frequency (cpm or Hz)  
Calibration (peak or RMS velocity/acceleration)  
Selectable sensor type  
Selectable 817, 818, or 890/FAST TRACK mode  
User-selectable timer settings  
Variable-communication baud rate  
Selectable data display options

**MEMORY**

768 kilobytes

**MEASUREMENT POINT IDENTIFICATION**

Machine ID (up to 30 alphanumeric characters)  
Position (up to three alphanumeric characters)  
Direction: Horizontal (H), Vertical (V), Axial (A), None (-)  
Units (up to six alphanumeric characters)  
Alarm level (four digits including decimal point)  
Rotating speed (rpm - six digits)

**DATA COLLECTION**

817 or 818 mode (8-bit data) - \*Minimum 950 data sets with up to three overall measurements, six frequency-band amplitudes and a 400-line FFT for each  
890/ IRD FAST TRACK mode (12-bit data) - \*Minimum 460 data sets (320 sets with optional balance or startup/coastdown program loaded) up to 1150 measurement points can be loaded  
FFT resolution up to 3200 lines

\*Measurement point capacity increases for lower resolution FFTs or storage of fewer FFTs

**SIX FREQUENCY BANDS/BAND ALARMS**

Frequency divided into six user-programmed bands  
Six-band alarms initiate FFT data collection  
Band data passes to host for processing/reports  
Selectable data-collection modes/combinations:  
Overall data only  
Overall and frequency-band data only  
Overall/band and FFT data  
Overall/band and FFT-on-alarm

**TIME WAVEFORM ANALYSIS**

Selectable period: 4.0 m sec to 328 secs  
Variable sample size: 256, 512, 1024, 2048, 4096 or 8192 points  
Time synchronous averaging with 1 x rpm reference input  
Selectable averaged data sets: 2, 4, 8, 16, 32, 64

**TRIGGER INPUT**

Acceptable inputs include:  
21000 photocell  
Lasetach  
5106 Electromagnetic input  
Non-contact proximity probes (- 3V - -20 Volts) Requires Cable 37585  
2021 Strobe  
Other 5V TTL Input sources  
Triggers on either positive or negative going edge of

## FREQUENCY RANGE

DC and 21 cpm (0.36 Hz) to 1,500,000 cpm (25 kHz)  
Spike Energy to ultrasonic  
Vibration signal conditioning true response\* ( $\pm 5\%$ )

## Acceleration Input

21 to 1,500,000 cpm (0.36 to 25,000 Hz) g (LOW) or 120 to 1,500,000 cpm (2 to 25,000 Hz) g (STD)

## Acceleration integrated to velocity

21 to 1,500,000 cpm (0.36 to 25,000 Hz) in/sec; mm/s (LOW) or 300 to 1,500,000 cpm (5 to 25,000 Hz) in/sec; mm/sec (STD)

## Acceleration double-integrated to displacement

21 to 1,500,000 cpm (0.36 to 25,000 Hz) mils;  $\mu\text{m}$  (LOW) or 1500 to 1,500,000 cpm (25 to 25,000 Hz) mils, H;  $\mu\text{m}, \text{H}$  or (STD)  
300 to 1,500,000 cpm (5 to 25,000 Hz) mils, L;  $\mu\text{m}, \text{L}$  (STD)

## Velocity Input

21 to 1,500,000 cpm (0.36 to 25,000 Hz) in/sec; mm/sec (LOW) or 120 to 1,500,000 cpm (2 to 25,000 Hz) in/sec; mm/sec (STD)

## Velocity integrated to displacement

21 to 1,500,000 cpm (0.36 to 25,000 Hz) mils;  $\mu\text{m}$  (LOW) or 1500 to 1,500,000 cpm (25 to 25,000 Hz) mils, H;  $\mu\text{m}, \text{H}$  or (STD)  
300 to 1,500,000 cpm (5 to 25,000 Hz) mils, L;  $\mu\text{m}, \text{L}$  (STD)

## Displacement Input

21 to 1,500,000 cpm (0.36 to 25,000 Hz) mils;  $\mu\text{m}$  (LOW) or 1500 to 1,500,000 cpm (25 to 25,000 Hz) mils, H;  $\mu\text{m}, \text{H}$  (STD)  
120 to 1,500,000 cpm (2 to 25,000 Hz) mils, L;  $\mu\text{m}, \text{L}$  (STD)

## Voltage Input

30 volts DC (AUX 2 input)  
5 volts DC (AUX 1 input)

\*Response at lower frequencies is as follows:

Non-integrated -3dB at either 21 cpm (0.36 Hz), or 120 cpm (2 Hz), depending on LOW or STD configuration, single-integrated -3dB at either 21 cpm (0.36 Hz) or 300 cpm (5 Hz), double-integrated at 21 cpm (0.36 Hz), 300 cpm (5 Hz), or 1500 cpm (25 Hz). Refer to sensor specification sheets for applicable frequency responses.

## FREQUENCY ANALYSIS

FFT constant-bandwidth (Hanning) filter\*\*

Variable-frequency anti-aliasing filter

Variable lines of resolution (25, 50, 100, 200, 400, 800, 1600 and 3200)

Variable frequency range (35 ranges):

0 to 600 cpm (10 Hz)	0 to 96,000 cpm (1600 Hz)
0 to 1500 cpm (25 Hz)	0 to 102,000 cpm (1700 Hz)
0 to 3000 cpm (50 Hz)	0 to 108,000 cpm (1800 Hz)
0 to 6000 cpm (100 Hz)	0 to 114,000 cpm (1900 Hz)
0 to 12,000 cpm (200 Hz)	0 to 120,000 cpm (2000 Hz)
0 to 18,000 cpm (300 Hz)	0 to 180,000 cpm (3000 Hz)
0 to 24,000 cpm (400 Hz)	0 to 240,000 cpm (4000 Hz)
0 to 30,000 cpm (500 Hz)	0 to 300,000 cpm (5000 Hz)
0 to 36,000 cpm (600 Hz)	0 to 360,000 cpm (6000 Hz)
0 to 42,000 cpm (700 Hz)	0 to 420,000 cpm (7000 Hz)
0 to 48,000 cpm (800 Hz)	0 to 480,000 cpm (8000 Hz)
0 to 54,000 cpm (900 Hz)	0 to 540,000 cpm (9000 Hz)
0 to 60,000 cpm (1000 Hz)	0 to 600,000 cpm (10 kHz)
0 to 66,000 cpm (1100 Hz)	0 to 780,000 cpm (13 kHz)
0 to 72,000 cpm (1200 Hz)	0 to 1,080,000 cpm (18 kHz)
0 to 78,000 cpm (1300 Hz)	0 to 1,200,000 cpm (20 kHz)
0 to 84,000 cpm (1400 Hz)	0 to 1,500,000 cpm (25 kHz)
0 to 90,000 cpm (1500 Hz)	

\*\*Bandwidth = upper frequency range divided by lines of resolution.

## ANALYSIS DATA STORAGE\*

10 3200-line FFTs  
20 1600-line FFTs  
40 800-line FFTs  
80 400-line FFTs; 30 1024-point time waveforms  
160 200-line FFTs; 60 512-point time waveforms  
320 100-line FFTs; 120 256-point time waveforms

\*Analysis data storage is independent of data collection storage.

## OUTPUT

RS232C port with UART for communication to 115,200 baud  
Direct or modem communication to host computer  
Direct output to serial printer

## POWER

6-Volt, 2.4 Amp hr rechargeable battery  
Two-level battery condition warning  
Power management system extends operating life  
Minimum operating time - 6.5 hours  
Data maintained 10 days (minimum) with unit off (100 days with fully charged batteries)  
Memory backup - Data/memory retained for a minimum of 30 minutes during battery change  
Quick-change-battery packaging

## ENVIRONMENT

Operating temperature range: 0° to 140° F (-18° to 60° C)  
Relative humidity: 0 to 95% non-condensing  
Splash-resistant, sealed case

## PHYSICAL DATA

Length: 9.44 in (24.0 cm)  
Width: 7.44 in (18.9 cm)  
Height: 2.50 in (6.4 cm)  
Weight: 6.0 lb (2.72 kgm)  
Case: Aluminum with rubber seal

## SAFETY RATING

Designed to meet non-incendive rating in accordance with National Electrical Code (NEC) Class 1, Division 2, Group A, B, and C conditions

## STANDARD ACCESSORIES

- IRD 428 battery charger, 115/230 VAC 50/60 cycle - P/N 32745
- IRD *FAST TRACK* operator manual - P/N 34659
- Carrying case with neck strap - P/N 34658
- Instrument and accessory storage case - P/N 25345
- Cable RS232C, 6ft., 9-pin male to 9-pin female - P/N 34752
- Adapter, RS232C, 9-pin male to 25-pin female - P/N 34640
- Adapter cable, RS232C, 9-pin female to 25-pin male - P/N 33234
- Cover, protective, 6 mil poly - P/N 34957
- Applications software package  
Disk size 3 1/2 - P/N 35587
- Auxiliary Startup/Coastdown software package  
Disk size 3 1/2 - P/N 36098

Note: Select a transducer kit from the options listed or one of your own choice.

# IRD Mechanalysis

sets the industry standard

## OPTIONAL ACCESSORIES

- Case with belt loop for temperature and photocell sensors - P/N 32668
- Infrared temperature sensor with coiled cable - P/N 32666
- Cable, 970, 12 ft (3.66 m) - P/N 34852
- IRD 544 velocity sensor - P/N 4526
- Cable, 544, 12 ft (3.66 m) - P/N 34847
- Magnetic shield for IRD 544 - P/N 10449
- IRD 560 low-frequency sensor - P/N 24957
- Cable, 560, 12 ft (3.66 m) - P/N 34848
- Photocell phase sensor - P/N 21000
- Photocell cable, 18 in (45.7 cm) to 6 ft (1.83 m) - P/N 32669
- Photocell cable, 25 ft (7.26 m) - P/N 24761
- Photocell reflective tape, 150 ft (45.72 m) roll - P/N 21200
- Photocell magnetic flex-arm holder - P/N 26383
- Cable, 30 Volt input, 6 ft (1.83 m) - P/N 35306
- Cable, 200 mv/mil input, spade lugs, 12 ft (3.66 m) - P/N 34850
- Cable, 200 mv/mil input, BNC connector 12 ft (3.66 m) - P/N 34849
- Magnetic holder, 25 lb (9.3 kg) holding force - P/N 24746
- Calibrator for 970 input - P/N 21073
- Data I/O, RS232C, 25-pin male/male, serial printer - P/N 28928 (requires adapter, P/N 34640)
- Adapter, charger to battery pack - P/N 34817
- Battery pack, 6V, 2.8 AH sealed lead acid - P/N 34816
- Two-plane switch box adapter - P/N 35453
- Y-connector for charger and photocell - P/N 35568
- Cable, 15-pin to 9-pin universal transducer interface - P/N 35706
- Cable, Proximity Probe Ref. Input, BNC to AUX1 - P/N 37585

## TRANSDUCER OPTIONS

- 970 Kit - P/N 36392
  - IRD 970 accelerometer - P/N 19697
  - Cable, 18 in (45.7cm) to 6 ft (1.83m) - P/N 34832
  - Straight probe, 9 in (22.86cm) - P/N 01103
  - Magnetic holder, 65 lb (24.3kg) holding force - P/N 04332
- 970L Kit - P/N 36393
  - 970L low frequency accelerometer - P/N 36264
  - Cable, 10 ft straight, BNC - P/N 36265
  - Straight probe, 9 in (22.86cm) - P/N 01103
  - Magnetic holder - P/N 24746
- 943 Kit - P/N 36394
  - IRD 943 accelerometer - P/N 35530
  - 943 cable, 18 in (45.7cm) to 6 ft (1.83m) - P/N 35976
  - 943 probe 1/2 in (1.3 cm) - P/N 35973
  - 943 probe 5 in (12.7 cm) - P/N 35540
  - 943 magnetic holder - P/N 35536
  - 943 handle with STORE button - P/N 35541

## OPTIONAL SOFTWARE

- Balancing - P/N 35593
- Bearing Database - P/N 35627

## OPTIONAL KITS

- Two-plane Balancing - P/N 35636 includes switchbox, accelerometer, magnet, cables
- Spare Battery Pack - P/N 35641 includes battery and adapter cable
- Model 2021 Strobe Light Kit - P/N 35979 (specify for IRD FAST TRACK) Includes: Stroboscope, interconnecting cables, carrying case, charger, and operator manual.

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