

SpectrOil M/N-W

MILITARY OIL ANALYSIS SPECTROMETER

JOAP standard for spectrometric oil analysis



Originally designed for military applications in the mid 1990s and enhanced over the last two decades, the SpectrOil M/N-W is the only approved in service oil analysis spectrometer in the US Department of Defense (DoD) Joint Oil Analysis Program. It has been the industry standard for rapid, deployable and reliable spectrometers for the Air Force, Navy, Army and Marines. The SpectrOil M/N-W performs the rapid analysis of in service oils so the military's high value assets are ready to deploy when needed.

The SpectrOil M/N-W is the military version of the SpectrOil M family of oil and fuel analysis spectrometers. It is a compact, rugged, transportable and easy to use spectrometer designed for the analysis of wear metals, contaminants and additives in lubricants, hydraulic fluids and coolants. The SpectrOil M/N-W uses the time-tested and reliable rotating disc electrode (RDE) technique to measure quantities of dissolved and suspended fine particles in natural or synthetic petroleum based products and coolants. It was tested and selected by the U.S. Department of Defense (DoD) Joint Oil Analysis Program (JOAP) as its solely approved oil analysis spectrometer.

SpectrOil M/N-W Key Features

- Rugged frame and optics system that meets military shock and vibration and environmental test standards (JOAP CID-0191 and CID-486J)
- Designed for remote locations and frequent transportation
- No sample preparation
- 30 second analysis time
- Analyzes up to 31 elements simultaneously
- Self-sustained with built-in industrial touch panel PC
- Simple to operate; does not require special training
- No special utilities or gases required, only AC power
- Optional transit case for easy transportation



The optional transit case features a shock mounted cradle and a gas cylinder mechanism to raise the spectrometer to a comfortable operating height (variable).

Laboratory Precision

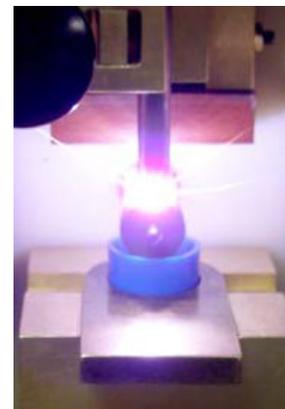
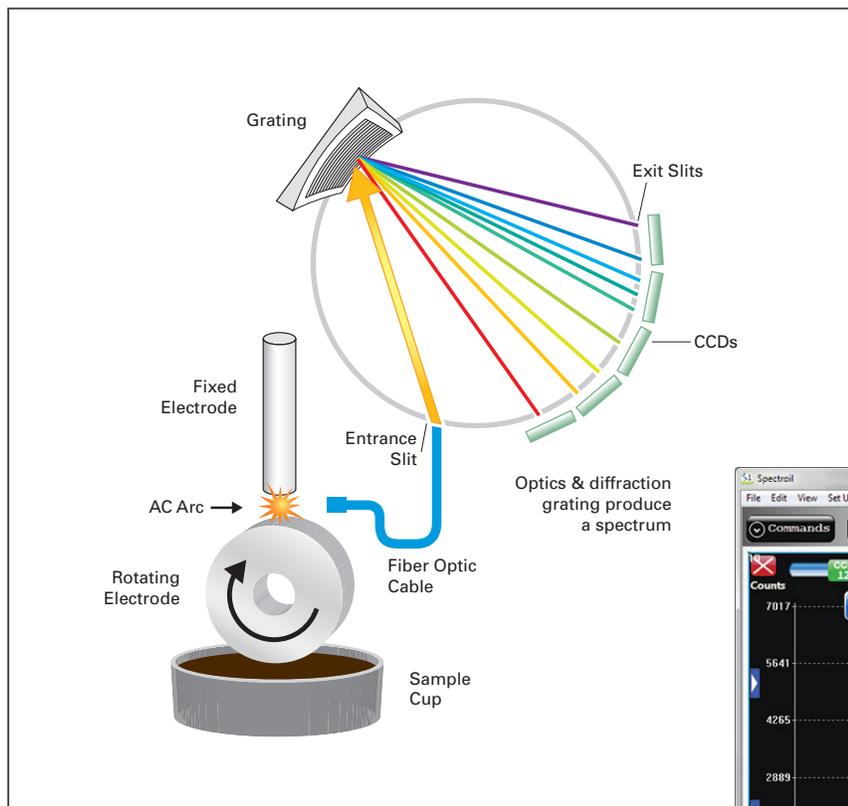
SpectrOil M is a rugged and precise Rotating Disc Electrode Optical Emission Spectrometer (RDE-OES).

- Measures sub-ppm elemental concentrations with high-purity carbon electrodes
- Detects elements in solution or particles as large as 10µm with RDE's precise pulsed-power, high-temperature plasma
- Accurately identifies elements in a wide variety of substances without sample preparation or dilution

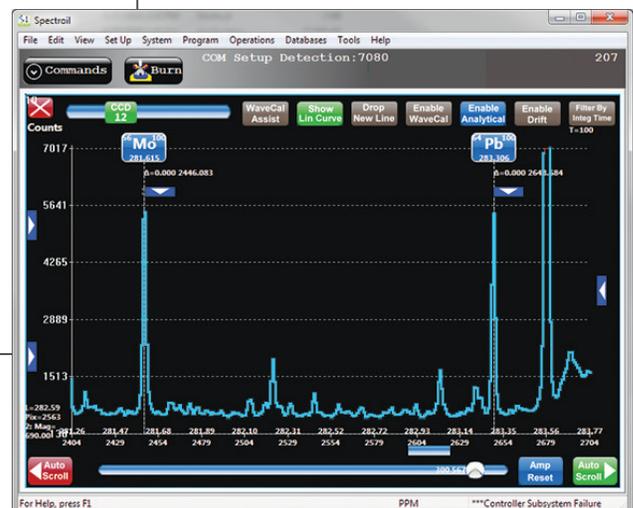
SpectrOil M Series consists of three main components

- 1. Excitation Source** – introduces energy to the sample. This includes a high voltage AC source that applies voltage across a small gap formed by the highly purified graphite rod and disc with the disc rotating and picking up oil from the sample holder under it.
- 2. Optical System** – At the core of the spectrometer is a Rowland circle grating optics system with 400 mm focal length. The temperature of the optics is tightly controlled at 40°C for the most stable result. Fourteen CCD array chips are precisely aligned on the edge of the optics. Light emitted from the burning sample is transmitted by optical fiber into the optics and diffracted by the grating into different wavelengths and picked up by the CCD chips.
- 3. Readout System** – detects and measures the light that has been separated into its component wavelengths by the optical system and presents this information to the operator in a usable fashion.

A specific calibration program is applied to raw spectrum which eliminates the matrix effect, so results are compliant to ASTM standards. Then, the user only needs to select the calibration profile for specific fluids. So, switching from oil to fuel to coolant or water only takes seconds, not hours like ICP and other instruments.



Schematic of how a SpectrOil analyzes a fluid sample to determine sub-ppm elemental content



SpectrOil M Series Programs and Calibration Ranges in ppm

			JOAP Airforce	JOAP Army	NAVAIR	Commercial 24	Commercial Extended 24+7	Aviation 15	Aviation 20	Aviation 30	Synthetic Aviation POE/Turbo	Fuel	Low Detection Fuel (LD)	Glycol	Water
P/N->			M99941	M99940	800-00182	M99947	M99948	800-00226	800-00225	800-00183	M99950	M99977	M99949	M99903	M99917
Elements Tested			15	20	30	24	31	15	20	30	8	15	15	13	7
Element	Symbol	Common Source	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)	Range (ppm)
Silver	Ag	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-50	x	x	x	x
Aluminum	Al	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-50	0-500	0-100	0-50	x
Boron	B	Contaminants/ Additives	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	x	x	x	0-1,000	x
Barium	Ba	Additives	x	0-10,000	0-1,000	5-6,000	5-6,000	x	0-10,000	0-1,000	x	x	x	x	x
Calcium	Ca	Contaminants/ Additives	x	0-10,000	0-1,000	0-6,000	0-6,000	x	0-10,000	0-1,000	x	0-500	0-100	0-50	0-5
Cadmium	Cd	Wear Metal	x	0-1,000	0-1,000	0-1,000	0-1,000	x	0-1,000	0-1,000	x	x	x	x	x
Chromium	Cr	Wear Metal/ Additives	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-50	0-500	0-100	x	x
Copper	Cu	Wear Metal/ Additives	0-1,000	0-10,000	0-1,000	0-1,000	0-1,000	0-1,000	0-10,000	0-1,000	0-50	0-500	0-100	0-50	x
Iron	Fe	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-50	0-500	0-100	0-50	0-5
Potassium	K	Contaminants	x	0-1,000	0-1,000	0-1,000	0-1,000	x	0-1,000	0-1,000	x	0-500	0-100	0-1,000	0-5
Lithium	Li	Contaminant	x	x	0-1,000	0-1,000	0-1,000	x	x	0-1,000	x	0-500	0-100	x	0-5
Magnesium	Mg	Wear Metal/ Additives	0-1,000	0-10,000	0-1,000	0-6,000	0-6,000	0-1,000	0-10,000	0-1,000	0-50	0-1500	0-100	0-50	0-5
Manganese	Mn	Wear Metal	x	x	0-1,000	0-1,000	0-1,000	x	x	0-1,000	x	0-500	0-100	x	x
Molybdenum	Mo	Wear Metal/ Additives	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	x	x	x	0-500	x
Sodium	Na	Contaminants	0-1,000	0-1,000	0-1,000	0-6,000	0-6,000	0-1,000	0-1,000	0-1,000	x	0-500	0-100	0-1,000	0-5
Nickel	Ni	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-50	0-500	0-100	x	x
Phosphorus	P	Additives	x	10 -10,000	0-1,000	10-6,000	10-6,000	x	10 -10,000	0-1,000	x	x	x	0-2,500	x
Lead	Pb	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	x	0-500	0-100	0-50	x
Silicon	Si	Contaminants/ Additives	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	x	0-500	0-100	0-500	0-5
Antimony	Sb	Wear Metal	x	x	x	0-1,000	0-1,000	x	x	x	x	x	x	x	x
Tin	Sn	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	x	x	x	x	x
Titanium	Ti	Wear Metal	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-1,000	0-50	x	x	x	x
Vanadium	V	Wear Metal	x	x	0-1,000	0-1,000	0-1,000	x	x	0-1,000	x	0-500	0-100	x	x
Zinc	Zn	Wear Metal/ Additives	0-1,000	0-10,000	0-1,000	0-6,000	0-6,000	0-1,000	0-10,000	0-1,000	x	0-500	0-100	0-50	x
Bismuth	Bi	Wear Metal	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Arsenic	As	Contaminant	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Indium	In	Wear Metal	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Cobalt	Co	Wear Metal/ Additives	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Zirconium	Zr	Wear Metal	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Tungsten	W	Wear Metal	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Cerium	Ce	Wear Metal	x	x	0-100	x	0-100	x	x	0-100	x	x	x	x	x
Matrix			Mineral - DTL 85694	Mineral - DTL 85694	Mineral - DTL 85694	Mineral - 75 cSt	Mineral - 75 cSt	Mineral - DTL 85694	Mineral - DTL 85694	Mineral - DTL 85694	POE- 3514	Mineral - 75 cSt	Mineral - 75 cSt	Glycol	Water

MODEL	CALIBRATION INCLUDED	OPTIONAL CALIBRATION
M/N	M99941	Any above
800-00100	800-00182	Any above
M/C	M99947	Any above
M/F	M99977	Any above
M/F LD	M99949	Any above

SpectroOil M/N-W Product Information

PRODUCT INFORMATION	
Part Numbers	Spectro-M/N-W 800-00100 (NAVAIR)
Applications	New and in-service lubricant, hydraulic
Output	mg/kg (ppm)
MIL Spec	JOAP CID 0191 (1999), CID 486J (2017)
Calibration	Factory set, no re-calibration needed
HARDWARE SPECIFICATIONS	
Excitation Source	Oscillatory arc discharge
Optical system	Rowland Circle polychromator Optic. Temperature controlled at 40C +/- 1C
Spectral Range	203 nm to 810 nm
Detectors	CCD array
OPERATIONAL SPECIFICATIONS	
Sample Volume	2 ml of fluid
Ambient Operating Temperature	10-43.3°C (50-110°F) per MIL-STD-810
Relative Humidity	0 to 90%, MIL-STD-810
Vibration	Transportation: MIL-STD-810, Method 514.5 Procedure I; Shipboard: MIL-STD-167
Shock	MIL-DTL-901E, Grade B, Class 1, Type A
EMI	MIL-STD-461G, test methods CE101, CE102, CS101, CS114, CS116, CS117, RE102, RS101 and RS103
Storage/Transport	Temperatures 10-43.3°C (50-110°F) per MIL-STD-810 Humidity 0-95% (non-condensing) per MIL-STD-810
Safety	MIL-STD-882
USER INTERFACE SPECIFICATIONS	
Operating System	Windows 10 Pro, SHB 64 bit, US English version
PC and Display	Industrial touch panel PC, 12" display
Data Storage	Internal PC, USB, CD-RW
POWER REQUIREMENTS	
Voltage Input	AC 120/240V, 50/60Hz
Power Consumption	1000 Watts at test
MECHANICAL SPECIFICATIONS	
Dimensions	80 cm (L) x 63.5 cm (W) x 70 cm (H) (31.5 in x 25 in x 27 in)
Weights	114 kg (250 lbs) M/N 132 kg (290 lbs) M/N/R
Shipping Dimensions	102 cm (L) x 91 cm (W) x 94 cm (H) (40 in x 36 in x 37 in) for M/N 152 cm (L) x 91 cm (W) x 94 cm (H) (60 in x 36 in x 37 in) for M/N/R
Shipping Weights	261 kg (575 lbs) M/N 295 kg (650 lbs) M/N/R

National Stock Numbers and Configurations

NSN	CONFIGURATION
6650-01-535-4271	15 elements (p/n M99941)
6650-01-415-1767	15 elements (p/n M99941) with transit case P/N M94012
6650-01-535-4276	20 elements (P/N 99940)
6650-01-535-4273	20 elements (P/N M99940) with transit case P/N M94012

Consumables

SpectroOil M/N-W uses special JOAP-approved consumables.

PART NUMBER	DESCRIPTION
M97200	Graphite discs, 500, JOAP only
M97201	Graphite rod, 50, JOAP only
M90909	Reusable sample holder

