KAHN

Dynamometers and Accessories

SERIES 545
DYNAMOMETER CONTROL SYSTEM

Specifically developed for closed-loop control of hydraulic dynamometers, the Kahn Series 545 microprocessor-based control system is ideally suited for engine test procedures that require precise steady-state control and rapid transient response. Typical applications include development, production and post-overhaul testing of turboshaft and turboprop engines, experimental turbines, industrial and marine gas turbines. The Kahn Series 545 closed-loop control system is fully compatible with advanced, fast-response FADEC (Full Authority Digital Electronic Control) controlled engines.

STANDARD FEATURES

Backed by 50 years of experience in aerospace engine testing, the Kahn Series 545 dynamometer controller meets the requirements of the most demanding engine test operations by offering the following:

- Microprocessor-based controller provides fast and precise control action. Control loop time: 12 msec.
- Four selectable control modes (open-loop position control, semi-automatic and fully automatic closed-loop speed, torque and power law control) provide the tools needed for modern engine testing.
- Bumpless transfer feature provides smooth and safe transfer between all operating modes.
- Multiple user programmable PID settings, stored in the controller, provide accurate control for operation at various control modes and with multiple engine or dynamometer configurations.
- Operator interface with keyboard and display features interactive data entry for easy and efficient controller setup and calibration.
- Continuous display of setpoint and feedback signals permits on-the-spot troubleshooting.
- Built-in watchdog timer feature provides continuous monitoring of microprocessor functions.
- Multiple level programmable alarm and shutdown functions protect engine and dynamometer and interface with test cell safety interlock system.
- Analog output signals of torque and speed are continuously available for data acquisition purposes.
- Fast-response electro-hydraulic control valves assure rapid transient response and stable steady-state control.

OPTIONAL FEATURES

- Man-Machine Interface (MMI) software permits setup, calibration, data logging, alarm management, graphical data presentation, test report generation, and control from the host computer via a serial communications interface.
- Modem access permits setup, calibration, troubleshooting and data logging from remote locations.
- Multiple sequence control capability (including non-linear load curves) permits automatic execution of user programmable engine test profiles.

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OPERATOR INTERFACE

Installed in a 19 inch wide rack mounting chassis, the Series 545 dynamometer controller can be used as a stand-alone unit or be remotely operated from a host computer. Its user-friendly operator interface features a number of useful digital and analog displays and contains all tools necessary for setup, calibration, alarm monitoring and operation:

- Front panel mounted keyboard with data display permits interactive data entry for easy and efficient controller setup, calibration and scaling of output signals and displays.
- Continuous display of setpoint and feedback signals and alarm status for on-the-spot trouble shooting.
- Continuous display of rotational speed and torque and corresponding analog output signals for data acquisition purposes.
- Push button switches for selecting control modes, local or remote operation.
- Manual controls for valve position control.
- Analog displays of inlet and outlet valve positions for quick setup of the dynamometer control range during initial operation.
- Analog input signal for remote setpoint adjustment.

ENGINE APPLICATIONS

Typical applications include development, production and post-overhaul testing of turboshaft and turboprop engines, experimental turbines, industrial and marine gas turbines:

- AlliedSignal ASE8, ASE40, ASE50, ASE120, LTP101, LTS101, T53, T55, TF40, TF50A, TPE331
- General Electric CT7, LM500, LM1600, LM2500, LM5000, LM6000, T58, T64, T700
- LHTEC T800, CTP800, CTS800
- Isotov TV2-117A
- MTU/Turbomeca/Rolls Royce MTR 390
- Pratt & Whitney FT4, FT8, FT9, PT6A, PT6C, PT6T, PW100, PW200, ST6
- Rolls-Royce Avon, Gem, Gnome, RB211, Spey, Trent, Tyne, WR-21
- Rolls-Royce Allison 250, 501, 601, AE2100,T406, T56, T63
- Rolls-Royce/Turbomeca RTM 322
- Turbomeca Arriel, Arrius, Artouste, Astazou, Makila, Turmo
- And many others

FAST-RESPONSE CONTROL VALVES

Dynamometer load is controlled with high-performance electro-hydraulic outlet control valves. Equipped with double acting hydraulic piston actuators and fast-response electro-hydraulic servo valves, they provide excellent dynamic response and fast stroking speeds. A secondary position control loop assures precise open and closed-loop control action.

Valve Frequency Response	> 45 Hz
Full Stroking Time (2 inch valve)	70 msec

The water flow rate is controlled with electro-pneumatic inlet control valves. Because high-pressure air is supplied to both sides of the piston, the actuator provides a stiffness uncommon in other actuators, resisting position changes caused by hydraulic forces acting on the valve plug, resulting in superior stability.

TORQUE AND SPEED MEASUREMENT

Engine torque is measured by a bi-directional strain gage load cell or hollow strain gage torque reaction sensor. Load cells are used with trunnion-mounted dynamometers. Torque reaction sensors are used with flange-mounted high-speed dynamometers. Both types of torque sensors are temperature-compensated to obtain best torque measurement accuracy over a wide range of operating conditions. Factory calibration of the load cells and torque reaction sensors is traceable to the U.S. National Institute of Standards and Technology (NIST).

Rotational speed is measured by a magnetic speed sensor operating in conjunction with a multi-tooth gear

SPECIFICATIONS

Overall System Accuracy	
Speed Measurement Accuracy	± 0.1% F.S.
Torque Measurement Accuracy	± 0.2% F.S.
Control Console	
Electric Power Requirements (Single Phase)	115V, 60 Hz or 230V, 50 Hz
Operating Temperature Range	0°C - 50°C
Dimensions WxHxD, inches	19x12.25x20
Console Weight	50 lb

NOTE: The information included herein was correct at the time of publication and supersedes all previous data. It is our policy to continually improve our products to insure even better performance. Consequently current Kahn products may incorporate modifications not shown on these pages.

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