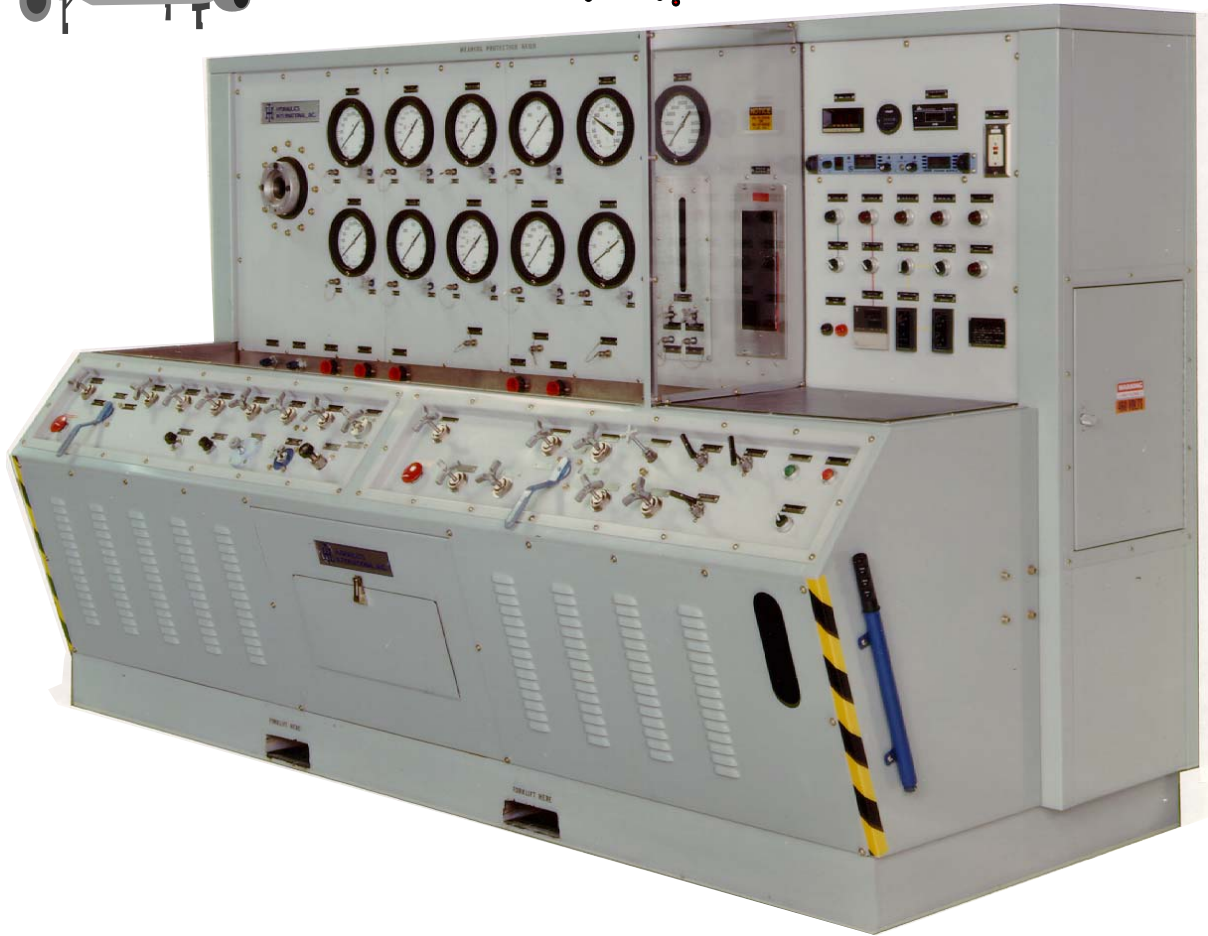


Universal Hydraulic Components Test Machines HIS-300 Series



Hydraulics Int., Inc. has maintained its leadership in the design, development and manufacture of hydraulic testing machinery for airline, aircraft and accessory manufacturers and military services for well over 20 years. This period of continuous experience in creative design and manufacture, coupled with the recommendations from our world-wide field service organization, has brought into being the advanced design concept represented by the HIS Series of Hydraulic Test Machines and described in this brochure.

For functional and operational testing of all types and sizes of aircraft, missiles, ground support and industrial hydraulic components, valves, actuators, pumps, hydraulic motors, systems and sub-systems.

- Flow capacities from 5 to 65 GPM.
- Constant or infinitely variable flow controls.
- Multiple circuits.
- Static test circuits to 30,000 PSI.
- Automatic Temperature control - Automatic Pressure Control
- Constant or infinitely variable pressure controls.
- Separate instrumentation for separate circuits.
- Pressure capacities from 500 to 5,000 PSI.
- Accurate, dependable. Minimum maintenance.
- Long trouble-free service.

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DETAIL SPECIFICATIONS CONSOLE

This console is constructed of heavy gauge sheet steel, bent into self-supporting sections and welded together, and welded to a sturdy 6" to 8" channel base. The front of the lower section contains large, louvered access panels which are easily removable. A full length door on the right end allows easy access to an enclosure which houses the electrical components. The rear of the machine is open for access and ventilation or as an option doors with louvers can be provided. The instrument panel is made up of multiple sections of steel sheet with the vertical edges turned in for rigidity. These panels are flush-mounted to the vertical surfaces of the console above the work table on a jogged section provided for the purpose. A deep sink, fabricated from corrosion resistant material, covers the whole work table section of the console. A stainless steel perforated plate is mounted over the full sink. A recessed, sloping control panel, incorporating the control valves, is mounted on the front of the machine and can be removed as a module.

DIMENSIONS

See Figure 1.

POWER SUPPLY

The power supply unit is shown in schematic diagram in Figure 2 and consists of the basic components listed. All reservoirs are made of stainless steel and are equipped with baffles, access plates for cleaning, site gauge, fill and vent caps. Vents contain micronic filters and fill caps contain strainers. The hydraulic power supply system is designed as a unit mounted on its own base and installed in the console under the working sump. The main pumps are axial, piston types with guaranteed delivery capabilities of 5,000 PSI for a minimum of 1,000 hours. The variable volume and compensator controls of the main pressure pump are mounted on the valve panel at the front where they are readily accessible to the operator. The pump is integrally mounted on the face of the motor with the shafts precisely aligned and operated through a flexible coupling. Boost pumps are utilized to extend the life of the main pump, and to deliver operating oil to the main pump, thus eliminating possible cavitation.

A filter installed between the main pump and the boost pump utilizes 10 micron elements. The filter sizes employed are a minimum of two times the rate of flow capacity. The elements can be removed from the outside of the machine with standard hand tools.

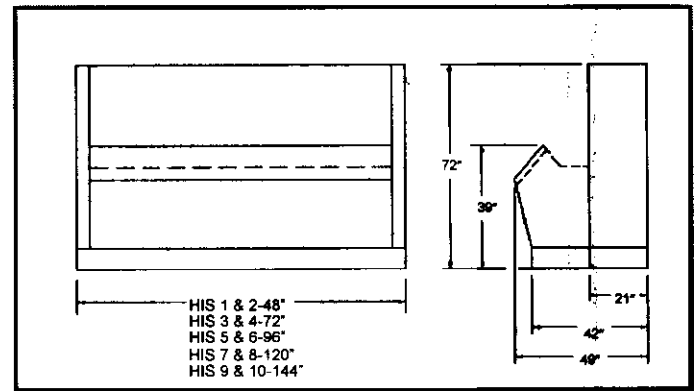


Figure 1. Dimensions All Models

A heat exchanger of sufficient capacity is provided so that normal plant water flowing through the heat exchanger will maintain the required temperature of the hydraulic fluid automatically at all ambient temperatures up to 180°F.

Option: Power supply can be supplied as a separate module in order to reduce noise at the test shop area.

HYDRAULIC SYSTEM

The HIS Series Test Machines are as shown in Figure 3. This system consists of the power supply unit as described in Figure 2, a control system, and an instrumentation system.

The control valves are mounted behind and on an inclined panel in front of the test machine within easy reach of the operator. Control valves utilized are manufactured by Hydraulics International, Inc. and are installed as cartridge units so that the working parts of the valve can be removed from the front of the panel by a single operator without the necessity of opening the system, and without removing any other parts.

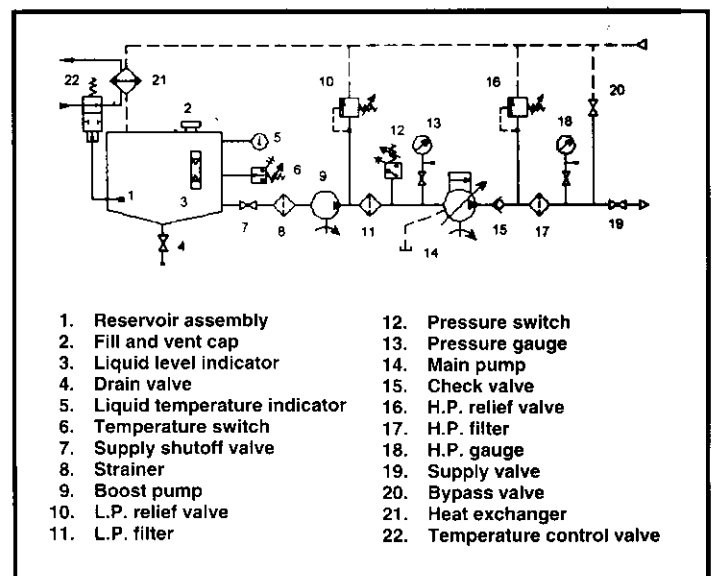


Figure 2. Power Supply Circuit

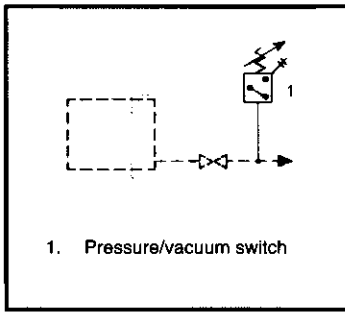


Figure 5.
Automatic Shutdown Circuit
(Code 3)

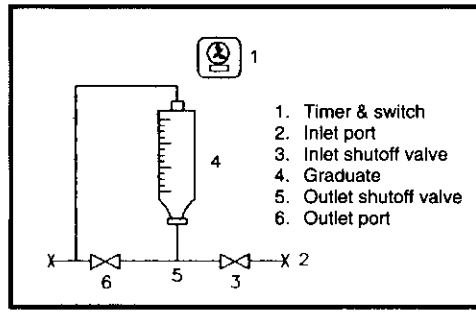


Figure 6.
Leakage Circuit
(Code 4)

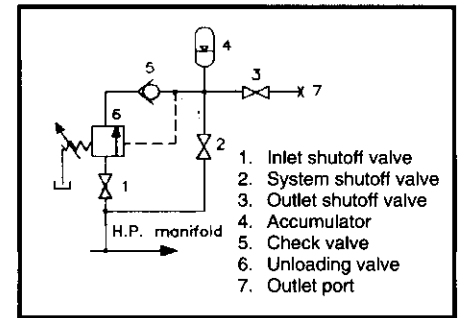


Figure 7.
Unloading Circuit
(Code 5)

A 6" Dial Compound Gauge, calibrated 0-300 PSI and 0-30 in HG suction leading to an outlet port. This gauge also has a gauge cutoff valve, gauge shutoff, and calibration port.

Note: In addition, there is a 6" dial system pressure gauge 0-6,000 PSI, and a system temperature gauge 6" dial 20-240°F mounted on the panel. These two instruments are included as part of the power supply system.

Codes 1 and 2: A Flowmeter System is included with options of either 250 mm scales or 600 mm scales, depending upon the requirements of the customer. Single or multiple tubes are available to meet the reading accuracies and ranges required. Code numbers for flowmeters required should be selected from the chart, Figure 4.

Code 3: Filter Signal. This consists of a suction switch mounted between the reservoir and the main filter so that when the filter becomes clogged and requires replacement the

switch will automatically cutoff the electric motor and actuate a light on the instrument pane. See Figure 5.

Code 4: Special Leakage Graduate (10 cu.in.) and circuit for testing external hand pumps is incorporated into the static leakage test circuit. A timer is used for leakage measurements, as shown in Figure 6.

Code 5: Pressure Unloading Circuit. See Figure 7. This circuit can be provided to test accessories which require a pressure unloading system either in complete pressure manifold of the machine and/or through an outlet port. It consists of a pressure unloading valve, check valve and accumulator with isolating shutoff valves.

Code 6: Bladder Type Accumulator (3,000 PSI) circuit, consisting of a bladder accumulator, an isolating valve, a connecting port and shutoff valve, as shown in Figure 8, with its accessories as required for testing pressure unloader regulator valves if unloading circuit in Code 5 is not included.

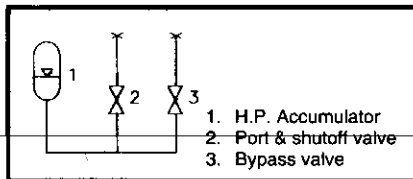


Figure 8. Accumulator Circuit (Codes 6 & 7)

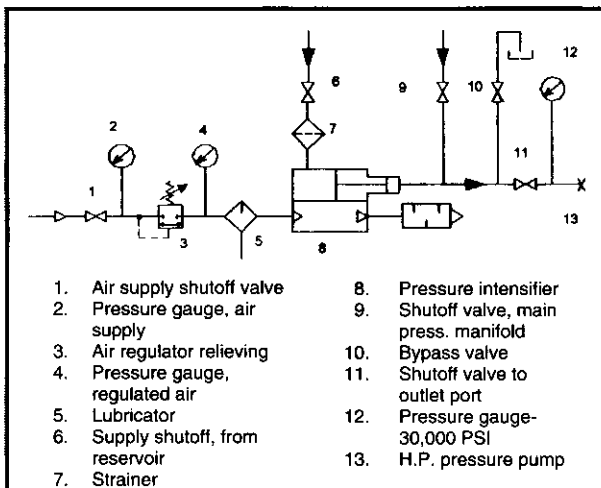


Figure 9. Boost Pressure System (Code 8)

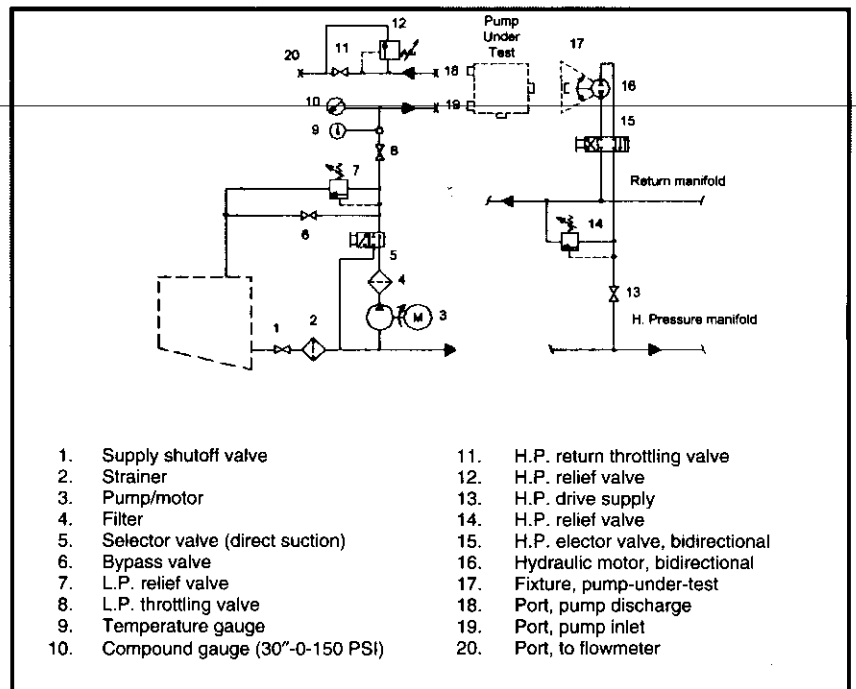


Figure 10. Reversible Pump Test Drive Circuit (Code 9)

- A Structure Assembly as previously described.
- A Power supply referred to and described in Figure 2.
- Selector Valve Assembly, consisting of a cone type, four-way selector valve with two cylinder outlets, and pressure shutoff valve Figure 3.
- A Single Outlet Valve Assembly, consisting of a system shutoff valve and a port assembly, a gauge shutoff valve and connecting port.
- Dual Outlet Valve Assembly, consisting of a system shutoff valve, two pressure shutoff valves and matching outlet ports, a gauge shutoff valve and connecting port, plus a pressure bypass valve to the return manifold block.
- A Flowmeter Bypass System, consisting of a connection from the pressure manifold through a pressure shutoff valve to the flowmeter assembly, a connection from an outlet through a shutoff valve to the flowmeter assembly and from the flowmeter to the return manifold.
- A High Pressure Static System, contains a hand pump, outlet and return ports with port shutoff valves, a filler and check valve, a connection to the power supply reservoir, connecting valves to the pressure manifold, and a bypass valve to the return manifold and a 20,000 PSI pressure gauge. (As an option a 30,000 PSI booster system is available.)
- A Return Manifold, contains connections to all bypass valves, the flowmeter return, and incorporates two shutoff valves leading to return port connection.

NOTE: All pressure ports are located on an inclined panel in the sump facing away from the operator for safety. All return ports are mounted in the sump facing the operator.

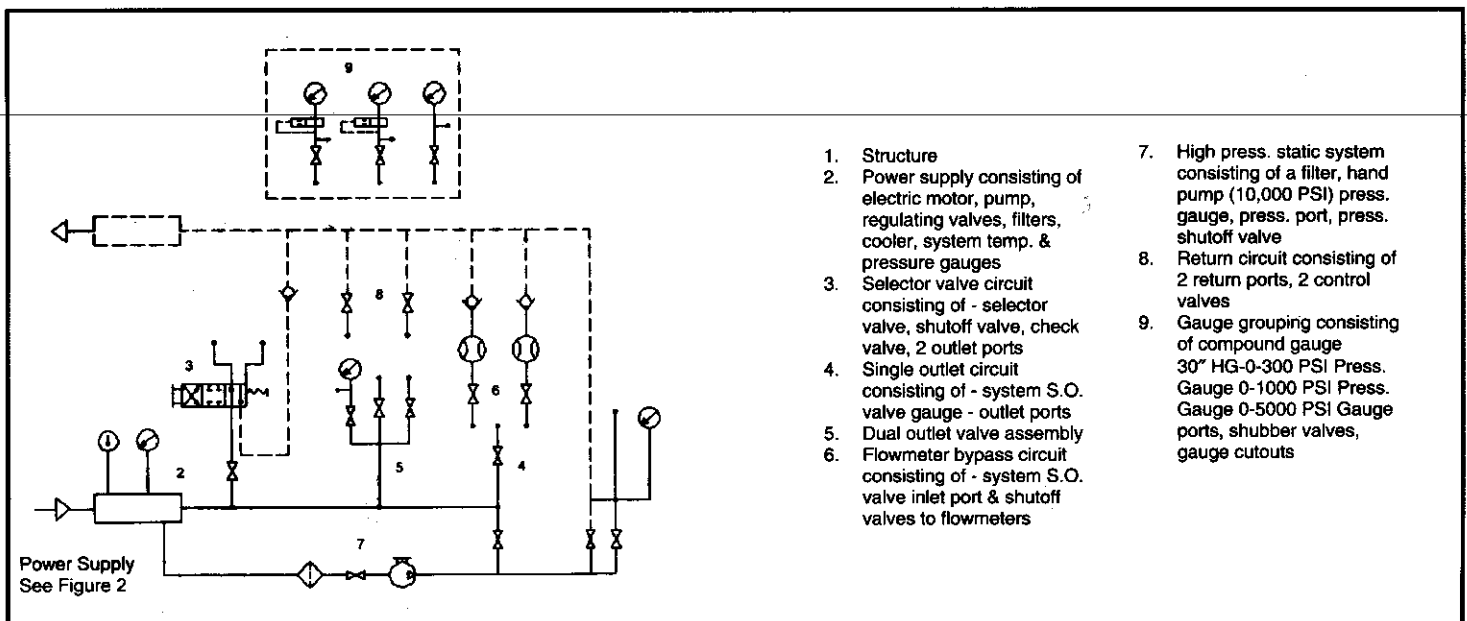
- An Instrument Panel with Gauge Grouping consists of the following:

FLOWMETER OPTIONS		
SPECIFY CODE NO.		MAX. FLOW IN GPM
600 MM ± 1% ACC.	250 MM ± 2% ACC.	
1A	2A	6
1B	2B	8
1C	2C	10
1D	2D	12
1E	2E	20
1F	2F	25
1G	2G	30
1H	2H	35
1J	2J	40
1K	2K	50
1L	2L	60
1M	2M	75

Figure 4. Selection of Flowmeters (Code 1 and 2)

A 6" Dial Pressure Gauge, calibrated 0-6,000 PSI leading to an outlet port on the instrument panel with gauge shutoff and calibration port.

A 6" Dial Pressure Gauge, calibrated 0-1,000 PSI, leading to an outlet port mounted on the instrument panel with an automatic gauge cutoff valve, gauge shutoff valve, and calibration port. The gauge cutoff is set so that pressure above 1,000 PSI cannot reach the gauge.



1. Structure
2. Power supply consisting of electric motor, pump, regulating valves, filters, cooler, system temp. & pressure gauges
3. Selector valve circuit consisting of - selector valve, shutoff valve, check valve, 2 outlet ports
4. Single outlet circuit consisting of - system S.O. valve gauge - outlet ports Dual outlet valve assembly
5. Flowmeter bypass circuit consisting of - system S.O. valve inlet port & shutoff valves to flowmeters
6. High press. static system consisting of a filter, hand pump (10,000 PSI) press. gauge, press. port, press. shutoff valve
7. Return circuit consisting of 2 return ports, 2 control valves
8. Gauge grouping consisting of compound gauge 30" HG-0-300 PSI Press. Gauge 0-1000 PSI Press. Gauge 0-5000 PSI Gauge ports, shubber valves, gauge cutouts

Figure 3. Basic Hydraulic System

Code 7: Bladder Type Accumulator (5,000 PSI) circuit, consisting of an accumulator, an isolating valve, a connecting port and shutoff valve, as shown in Figure 8, with its accessories as required for testing pressure unloader regulator valves, if unloading circuit in **Code 5** is not included.

Code 8: Boost Pressure System - Figure 9. This is a 30,000 PSI static pressure system for performing high pressure static and leakage tests. This system connects to the main pressure manifold through a system shutoff valve, to an air-to-oil intensifier with 120 PSI air applied to one end of the intensifier will develop 30,000 lbs. oil static pressure. The ultra high pressure valve system is supplied with a high pressure outlet port and connects to a 30,000 PSI, 6" precision gauge.

Code 9: Hydraulic Reversible and Variable Speed Drive and

boost pump installation for testing hydraulic pumps. The drive has a speed range of 0-6,000 rpm. Adapter pads AND-20001, AND-20002 and 12 and 16 tooth spline blocks are provided. An electronic tachometer is calibrated 500 to 6,000 rpm. Variable suction or positive pressure heads can be applied to test pump as required. A 6" compound gauge measures pump input pressure. See Figure 10.

Code 10: DC Power Supply. This regulated unit contains a 0-30 volt DC voltmeter, 0-20 amp DC ammeter. The instrument accuracy is 2% of full scale.

Code 11: High Pressure Filter - 10µ Nominal or 3µ Absolute Filtration.

Code 12: Safety and Splash Shield. Transparent safety glass or Plexiglass around test bench or pump test area can be provided as an option.

AVAILABLE MODELS

There are 11 basic models in the HIS series Hydraulic Accessories Test Machines, as described on the Ordering Chart - Figure 11. As shown in the figure the machines are available for either 50 or 60 cycles with constant flow, variable volume or pressure compensated pumps, and for the various fluids including Specification MIL-H-5606, Skydrol 500A or B, Oronite, or as specified. Larger sizes beyond the HIS-12 (125 HP) can be supplied upon request. JEHA MARK II, brochure HIS-100 or the JEHA MARK III, brochure HIS-200.

Additional outlet port systems can be added to the basic model, upon request.

Additional pressure gauge assemblies can be installed on the panel upon request. These gauges are fitted with calibration ports, needle valves, and pressure cutoff valves.

To meet unusual requirements a torquemeter for measuring drive torque of hydraulic pumps, calibrated 0-1,000 in.-lb., accuracy full scale, can be supplied at special request.

ORDERING INSTRUCTIONS

Select basic model number from the Ordering Chart, Figure 11. To this model number add suffixes shown in the Ordering Chart, Figure 11 thereby specifying cycles, pump characteristics, fluid use or explosion proof construction. Add code numbers for accessory systems you wish to include.

EXAMPLE: HIS-3, D, V, S, -1C, -5, -11.

This orders a standard 20 HP HIS-100 Series Universal Hydraulic Accessories Test Machine (HIS-3), for 60 cycle operation (D), variable volume pump type (V), for Skydrol fluid (S), with the following accessory systems: 600 mm flowmeter-maximum flow 10 GPM plus or minus 1% accuracy (1C), Pressure Unloading Circuit (Code 5), High Pressure Filter (Code 11).

NOTE: If hydraulic fluid is not listed in Figure 11, specify fluid and viscosity.

If extra circuits are required, please define. If your basic requirements cannot be met by the HIS-300 Series Test Machines as described in this brochure, please contact the factory for configurations to meet your exact requirements.

BASIC MODEL NO.	SPECIFY SUFFIXES												
	60 CYCLE	50 CYCLE	VAR. VOL.	PRES. COMP.	CON. FLOW	MIL-5606 MIL-H-5606 MIL-H-83282	SKYDROL	ORONITE	SPECIFIED	HORSEPOWER	MAX. PRESSURE P.S.I.	60 CYCLE	50 CYCLE
HIS-1	D	E	X	X	C	M	S	O	X	10	3000	6	5
HIS-2	D	E	X	X	C	M	S	O	X	15	3000	8	6
HIS-3	D	E	V	R	C	M	S	O	X	20	5000 3000	6.5 10	6.5 8.5
HIS-4	D	E	V	R	C	M	S	O	X	30	5000 3000	10 10	8.5 8.5
HIS-5	D	E	V	R	C	M	S	O	X	30	5000 3000	10 17.2	10 16.5
HIS-6	D	E	V	R	C	M	S	O	X	40	5000 3000	13 22	13 22
HIS-7	D	E	V	R	C	M	S	O	X	50	5000 3000	16.5 30	16.5 25
HIS-8	D	E	V	R	C	M	S	O	X	60	5000 3000	20 35	20 35
HIS-9	D	E	V	R	C	M	S	O	X	75	5000 3000	25 40	25 35
HIS-10	D	E	V	R	C	M	S	O	X	100	5000 3000	35 60	35 50
HIS-12	D	E	V	R	C	M	S	O	X	125	5000 3000	40 65	40 60

Figure 11. Ordering Chart (see example)

HIS-300 Series

**offers accuracy,
maintainability,
reliability,
and long-life**

FEATURES. Functional arrangements are such that testing of components is easy, fast and efficient. All controls are mounted on an inclined panel at the front of the machine within easy reach of the operator. Pressure connecting ports are mounted on an inclined panel on the front of the sump and face away from the operator so that pressure connections to the equipment under test are within easy reach. These ports are positioned adjacent to the control valves for ease of identification. Return ports are mounted on the vertical panel of the sump facing the operator and opposite the pressure ports. With this arrangement the operator is protected against discharge of hot oil if a valve is inadvertently left open. This arrangement also makes it unnecessary to reach across and around the equipment under test in order to operate the valves. A perforated stainless steel work table is mounted in the sump below the valve ports and above the inclined bottom of the sump to provide a flat, clean, oil-free working area.

ACCURACY. All gauges, flowmeters and other instrumentation are mounted on a vertical instrument panel behind the sump and are located for easy reading from any position. All instruments are calibrated to a high degree of accuracy consistent with the most rigid specifications in the aircraft industry. All gauges and meters are provided with facilities for contamination-free re-calibration, without removal from the machine. All gauges utilize 6" dials and are guaranteed to 1/2 of 1% accuracy full-scale. Flowmeters are guaranteed to 1% accuracy full-scale. Higher degrees of accuracy can be obtained upon request.

GENERAL SPECIFICATIONS.

This brochure covers the Hydraulics International, Inc. Standard Series of Universal Hydraulic Accessory Test Machines, designated as the HIS Series, for the purpose of testing airplane, missile or support equipment hydraulic components such as actuators, control valves, regulators, accumulators, specialty valves, manifolded sub-systems and systems.

The machines in the HIS-300 series are rated for 5,000 PSI maximum, 3,000 PSI normal operating pressures and flows from 5 to 65 gallons per minute. 5 sizes of consoles are available. See Figure 1.

MAINTAINABILITY. With the exception only of the pump and motor assembly, every component is accessible from the outside of the machine and can be readily repaired. The pump and motor assembly can be removed as a unit by disconnecting two swivel hose connections, and four bolts. All the electrical equipment is housed in a single box mounted on the side of the machine and is installed in such a manner that repairs or replacements can be made from the outside of the machine without disturbing any other component.

RELIABILITY. Hydraulics International, Inc., with extensive experience dictates the choice of the finest components and instruments, with years of proven dependability. This, coupled with the expert, specialized craftsmanship of men who take pride in their work, and backed by a management philosophy devoted to turning out the very finest test machinery in the industry, results in equipment with a high built-in reliability factor.

LONG-LIFE. Hydraulics International, Inc. Test machines are famous for their long service life, resulting from experience in building the finest hydraulic test equipment of its kind. Many machines have been in continuous operation better than 20 years with a minimum amount of maintenance. The construction and selection of components is such that a 20 year life span can be expected with proper use.

Electric motor and starter combinations are available for 230/460-60 cycle-3 phase; 208/380-50 cycle-3 phase. Special voltages are available. Contact the factory with specifications. "Part-winding" starting is available on motors above 50 HP.

The electric motors utilized are open drip-proof, in accordance with the requirements of American Standard C-50 N.E.M.A. Standard MG-I and National Board of Fire Underwriters Pamphlet #70. Fully enclosed or explosion-proof electrical equipment is available upon request.

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