

HS-2000

Hydraulic Training System



It is well known that "Factory Automation" is an indispensable measure to reduce labor cost, improve production efficiency and achieve higher product quality. However, it is widely adopted by electronic, semiconductor, LCD and mechanical factories. In factory automation, oil pressuring" plays a very essential and critical role.

The "HS-2000" is launched to offer enriched knowledge from basic oil pressure components, advanced oil-pressure loop design to PLC-based electrical control system. The trainee can prepare themselves to be a high-level automation engineer with the help of the "HS-2000" trainer system.

● Features

1. Improvement on trainees' familiarization of the principles and applications of various oil pressure components.
2. Demonstration of oil-pressure loop design.
3. Training of PLC programming, including architecture, instructions and ladder diagram.

UH-001

Hydraulic Workbench

It is designed to be flexible to satisfy individual's needs.

A complete workbench mainly consists of 3 parts :

1. Electro-Modules Frame UE-001
2. Working Board UH-001-1 (Single or Double Side)
3. Working Table UH-001-2 (Single or Double Side)

The combinations of the workbench can be modified based on different lab requirement.

A complete workbench allows customers to carry out all listed hydraulic experiments. In PART I and PART II, hydraulic components are powered by Hydraulic Power Unit (UH-101) and operated on Working Board area through connected Hose Set (UH-814/5).

In PART III and PART IV, the electrical components mounted on Electro-Modules Frame are linked to the hydraulic system through Connecting Lead (UE-501) and powered by Hydraulic Power Unit (UH-101).

End user are also welcome to adopt Programmable Logic Controller (PLC) for implementation of PART III and PART IV. That means trainer PLC-220 is an alter native to Electro-Modules Frame and a corresponding electrical device.

PLC-220

PLC Trainer (Optional)

Specifications :

1. PLC Main Unit : SIEMENS SIMATIC S7-1214C
2. Digital Input : 14
3. Digital Output : 10
4. Analog Input : 2

Accessories :

1. Experiment Manual
2. Connecting Leads Set



PLC Trainer Requirements

1. PC : Intel® Core™ i5-3320M 3.3GHz or better, 8GB RAM, 10GB on system drive
2. OS: Windows 7 (64-bit) SP1 / Windows10 (64-bit) 1703
3. Industrial Ethernet Cable, CAT 6, Length 6M
4. SIMATIC STEP 7 BASIC TIA Portal Software DVD

UE-001

Electro-Modules Frame (Excluding Electrical Components)

A cabinet frame is available for mounting electrical components on either side.

This steel frame can accommodate up to 15 electro-modules at least.

Size : (1260(W) x 250(D) x 360(H))mm $\pm 10\%$



UH-001-1

Working Board

Aluminum extruded profile panel - (1260x750)mm and a working surface up to (1200 x 700)mm including :

1. UH-801 Pressure Distributor
 - 4 Quick couplings with 1 pressure gauge
 - Connect to Hydraulic Power Unit using 3/8" hose
2. UH-803 Return Distributor
 - 4 Quick couplings
 - Connect to Hydraulic Power Unit using 3/8" hose



UH-001-2

Working Table

1. Single-side worktable size is (1500(W) x 700(D) x 850(H))mm $\pm 10\%$, oil-catcher setting upon the table
 - Drawer units in steel with one flat drawer and four large drawers that can be loaded up to 20kg per drawer.
2. Double-side worktable with (1500(W) x 800(D) x 850(H))mm $\pm 10\%$, two oil-catchers setting upon the table
 - Two drawer units in steel with one flat drawer and four large drawers that can be loaded up to 20kg per drawer.
3. The drawers with different rollers that feature an easy-gliding system for quiet running and additional breaking.
 - A cabinet is also available for mounting Hydraulic Power Unit UH-101 on either side.



UH-101

Hydraulic Power Unit

The capacity of single-side tank is 30 liters and that of double-side tank is 58 liters excluding circulation oil. Recommend circulation oil type : Shell Tellus 32 (It is a necessary to prepare locally)

Typical characteristics of circulation oil:

1. Kinematic Viscosity : 31.56 cSt at 40°C
2. Viscosity Index : 102
3. Pour Point : -15°C

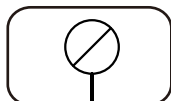
The Set of Equipment Includes :

1. Electric Motor : 1 HP 1Ø 220V AC, 50Hz/60Hz, speed 1720rpm
2. Coupling
3. Oil Strainer
4. Oil Level Indicator
5. Oil-in and Air Filter
6. Pressure Relief Valve : pressure 150kg/cm² Max.
7. Pressure Gauge
8. Oil Thermometer
9. Pressure Pump : delivery 1.9cc/rev Max.(single-side 1pump, double-side 2pumps)
10. Distributor : including completed distribution assembly 220V AC power socket, 20A breaker, over current protection, start switch, stop switch, indicator and emergency device.



● Hydraulic Components

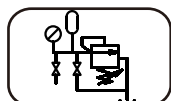
UH-111



Pressure Gauge

Operating pressure : 0 ~ 150kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

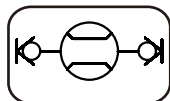
UH-116



Accumulator

Bladder type
Capacity : 1 liter
Operating pressure : 0 ~ 100kg/cm²
Preset pressure : 30kg/cm²
Attached accumulator, pressure regulator valve base
Attached out/inlet valve, pressure gauge

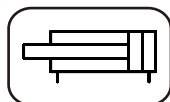
UH-121



Inline Flow Meter

Material : aluminum AND/OR brass
Measuring range : 1L/min ~ 7.5L/min
Operating pressure : 0 ~ 245kg/cm²

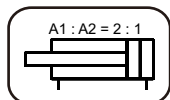
UH-201



Double-Acting Hydraulic Cylinder

Diameter : 30mm
Stroke length : 200mm
Surface area ratio : 1.65:1 approx.
Operating pressure : 0 ~ 140kg/cm²
Quick plug-in locking, safely clamping for mounting on working board

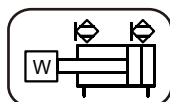
UH-203



Differential Hydraulic Cylinder

Diameter : 30mm
Stroke length : 200mm
Surface area ratio : 2:1 approx.
Operating pressure : 0 ~ 140kg/cm²
Quick plug-in locking, safely clamping for mounting on working board

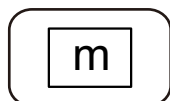
UH-205



Double-Acting Hydraulic Cylinder

With position sensing
Diameter : 30mm
Stroke length : 200mm
Surface area ratio : 1.65:1 approx.
Operating pressure : 0 ~ 140kg/cm²
Stainless steel body with reed switch 2pcs

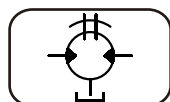
UH-205-1



Loading Weight

Material : iron
Weight : 8.5kg approx.

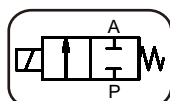
UH-211



Hydraulic Motor

Min. rotary speed : 40rev/min
Max. flow rate : 20L/min
Quick plug-in locking, safely clamping for mounting on working board

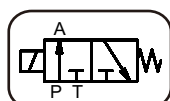
UH-401



2/2-Way Single-Solenoid Valve

Spring return
Solenoid operating voltage: 24V DC
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Max. operating frequency : 240 times/min
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

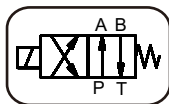
UH-403



3/2-Way Single-Solenoid Valve

Spring return
Solenoid operating voltage: 24V DC
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Max. operating frequency : 240 times/min
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

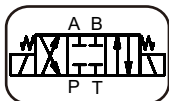
UH-405



4/2-Way Single-Solenoid Valve

Spring return
Solenoid operating voltage : 24V DC
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Max. operating frequency : 240 times/min
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

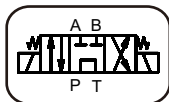
UH-411



4/3-Way Double-Solenoid Valve

Closed center
Solenoid operating voltage : 24V DC
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Max. operating frequency : 240 times/min
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

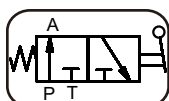
UH-419



4/3-Way Double-Solenoid Valve

Center PT type
Solenoid operating voltage : 24V DC
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Max. operating frequency : 240 times/min
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

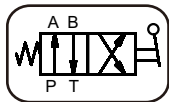
UH-503



3/2-Way Directional Control Valve

NC type
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

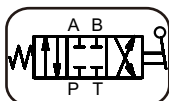
UH-505



4/2-Way Directional Control Valve

Hand lever operated, spring return
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

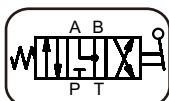
UH-511



4/3-Way Directional Control Valve

Closed center, spring return
Actuation : direct operated
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

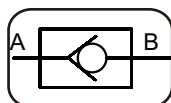
UH-517



4/3-Way Directional Control Valve

Center ABT type, spring return
Actuation : direct operated
Max. flow rate : 50L/min
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

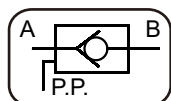
UH-601



Check Valve

One-way control
Max. flow rate : 30L/min
Operating pressure : 5kg/cm² ~ 210kg/cm²

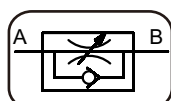
UH-603



Pilot-Operated Check Valve

Max. flow rate : 30L/min
Operating pressure : 3.5kg/cm² ~ 210kg/cm²

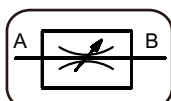
UH-611



Flow Control Valve

Attached non-return, one-way flow control
Max. flow rate : 40L/min
Operating pressure : 5kg/cm² ~ 210kg/cm²

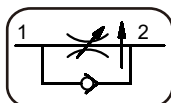
UH-613



2-Way Throttle Valve

2-way flow control
Max. flow rate : 40L/min
Operating pressure : 0 ~ 210kg/cm²

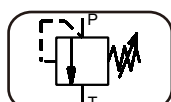
UH-615



Pressure-Compensated Flow-Control Valve

Scale selector flow control
Max. flow rate : 25L/min
Operating pressure : 5kg/cm² ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

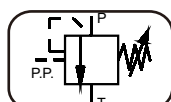
UH-701



Pressure Relief Valve

Direct-operated, ball-screw adjusting
Pressure adjusting range : 25kg/cm² ~ 70kg/cm²
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

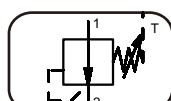
UH-703



Pilot-Operated Pressure-Relief Valve

Piston balance type, anti-leak, ball-screw adjusting
Pressure adjusting range : 25kg/cm² ~ 70kg/cm²
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

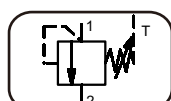
UH-711



3-Way Pressure Reducing Valve

Pressure adjusting range : 25kg/cm² ~ 70kg/cm²
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

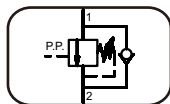
UH-723



Sequence Valve

Internal pilot, ball-screw adjusting
Pressure adjusting range : 15kg/cm² ~ 70kg/cm²
Operating pressure : 0 ~ 210kg/cm²
Quick plug-in locking, safely clamping for mounting on working board
Precise connectors located on the top of component for easy and quick access.

UH-733



Counterbalance Valve

Pressure adjusting range : 20kg/cm² ~ 70kg/cm²

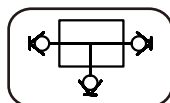
Max. flow rate : 60L/min

Operating pressure : 5kg/cm² ~ 210kg/cm²

Quick plug-in locking, safely clamping for mounting on working board

Precise connectors located on the top of component for easy and quick access.

UH-805

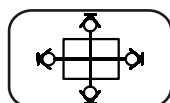


3-Way Distributor

Inlet : quick coupling (female) x 1

Outlet : quick coupling (male) x 2

UH-807

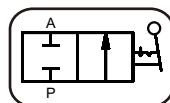


4-Way Distributor

Inlet : quick coupling (female) x 1

Outlet : quick coupling (male) x 3

UH-809



Shut-off Valve

Actuation : manual

Max. flow rate : 50L/min

UH-814

UH-815



Hose Set

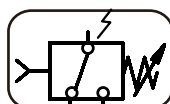
Hose inside diameter : 1/4"

Operating pressure : 0 ~ 105kg/cm²

Attached quick connector (female)

Length: UH-814 (1M), UH-815 (1.5M)

UH-821



Pressure Switch

Operating pressure : 15kg/cm² ~ 100kg/cm²

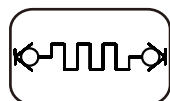
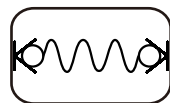
Electrical connection via 4mm safety plugs or standard 4mm plugs

Normally open (NO), normally closed (NC) and COM contacts

Continuous load: 5A

UH-824

UH-825



Flow Resistance Measuring Hose

Uh824 : diameter 5mm, length 5M, round type

Uh825 : diameter 5mm, length 5M, square type

UE-501



Connecting Lead

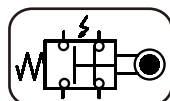
Lead diameter: 4mm

Length: 0.25M, 0.5M, 1M

Color : red, yellow, blue

1set : 60pcs

UE-907



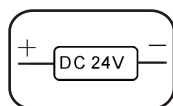
Limit Switch

Roller lever type

Contacts : NO, NC.

● Electrical Components

UE-101



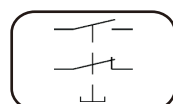
DC Power Supply

Input voltage : 100V ~ 240V AC / 1.7A

Output voltage : 24V DC / 4.2A

Terminal : 2sets for $\pm$ DC output
with power I/O indicator
2 Terminal sets for power output

UE-201



Pushbutton Switch

Spring return

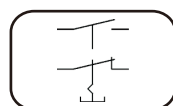
Pushbutton switch with illuminated indicator

Including NC, NO contacts

Operation voltage : 24V DC

Max. current : 3A

UE-203



Selector Switch

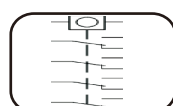
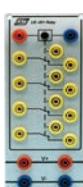
Selector switch with illuminated indicator

Including NC, NO contacts

Operation voltage : 24V DC

Max. current : 3A

UE-401



Relay

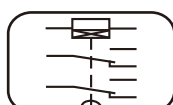
4sets of NC, NO, COM contacts

With LED indicator

Operation voltage : 24V DC

Max. current : 5A

UE-404



Timing Relay

ON-delay type

Operation voltage : 24V DC

Max. current : 5A

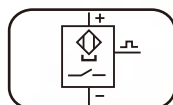
Time delay : 0.05sec ~ 300 hour multi switch

2sets of NC, NO, COM contacts

With LED indicator

● Optional Components

UE-911



Reed Switch (Optional)

Operating voltage : 24V DC

Max. current : 200mA

Frequency range : 3Hz ~ 250Hz

UH-003



Hose Holder (Optional)

Mobile type, with 5-foot tubular and 5 casters

Iron plate suitable for 30 slots

With oil-catcher

EM-3390-1A



Connecting Lead Holder (Optional)

Mobile type, with 5-foot tubular and 5 casters

Height : 1400mm, iron plate suitable

For 20 connecting leads slots



● List of Experiments

PART I : Basic Hydraulic Components

1. Hydraulic Pump
2. Pressure Relief Valve
3. Pressure Reducing Valve
4. Pressure Losses from Hoses
5. Flow Control Valve
6. Line Check Valve
7. Pilot-Operated Check Valve
8. Directional Control Valves
9. Single-Acting Hydraulic Cylinder
10. Double-Acting Hydraulic Cylinder
11. Hydraulic Motor

PART II : Basic Hydraulic Control Circuits

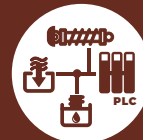
1. Pressure Regulating Circuit
2. Safety Circuit
3. Dual Pressure Regulating Circuit
4. Sequence Control Circuit (1)
5. Sequence Control Circuit (2)
6. Pressure Counterbalancing Circuit
7. Pressure Reducing Circuit
8. Meter-In Flow Control Circuit
9. Meter-Out Flow Control Circuit
10. Bleed-Off Control Circuit
11. Pressure Keeping Circuit
12. Differential Circuit
13. Synchronizing Circuit
14. Accumulator Control Circuit
15. Hydraulic Motor Control Circuit

PART III : Basic Electro-Hydraulic Control Circuits

1. Series Circuit
2. Parallel Circuit
3. Remote Control Circuit
4. Sequence Control Circuit (1)
5. Sequence Control Circuit (2)
6. Cushion Control Circuit
7. Pressure Reducing Control Circuit
8. Meter-In Flow Control Circuit
9. Meter-Out Flow Control Circuit
10. Bleed-Off Control Circuit
11. Two-Speed Control Circuit
12. Differential Control Circuit
13. Synchronous Control Circuit
14. Pressure Keeping Control Circuit
15. Accumulator Control Circuit
16. Hydraulic Motor Control Circuit
17. Pressure Switch Control Circuit

PART IV : Electro-Hydraulic Sequence Control Circuits

1. One-Cycle Cylinder Reciprocation using Pushbutton and Single-Solenoid Valve
2. One-Cycle Cylinder Reciprocation using Pushbuttons and Single-Solenoid Valve
3. One-Cycle Cylinder Reciprocation using Limit Switch and Single-Solenoid Valve
4. Continuous Cylinder Reciprocation using Limit Switches and Single-Solenoid Valve
5. One-Cycle Cylinder Reciprocation using Timer and Single-Solenoid Valve
6. Continuous Cylinder Reciprocation using Timer and Single-Solenoid Valve
7. One-Cycle Cylinder Reciprocation using Pushbuttons and Double-Solenoid Valve
8. One-Cycle Cylinder Reciprocation using Limit Switch and Double-Solenoid Valve
9. Continuous Cylinder Reciprocation using Limit Switches and Double-Solenoid Valve
10. One-Cycle Cylinder Reciprocation using Timer Limit Switch and Double-Solenoid Valve
11. One-Cycle Cylinder Reciprocation using Timer Limit Switches and Double-Solenoid Valve
12. Continuous Cylinder Reciprocation using Timer Limit Switches and Double-Solenoid Valve
13. Two-Cylinder Sequencing (A+B+B-A-) using Single-Solenoid Valves
14. Two-Cylinder Sequencing (A+/ $\frac{B+}{A-}$ / B-) using Single-Solenoid Valves
15. Two-Cylinder Sequencing (A+B+/Timing/A-B-) using Single-Solenoid Valves
16. Two-Cylinder Sequencing (A+B+A-B-) using Double-Solenoid Valves
17. Two-Cylinder Sequencing (A+B+/ $\frac{A-}{B-}$) using Double-Solenoid Valves
18. Two-Cylinder Sequencing (A+B+/Timing/A-B-) using Double-Solenoid Valves

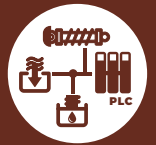


PART I Basic Hydraulic Components

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	Q'ty
UH-001	Hydraulic Workbench	1	1	1	1	1	1	1	1	1	1	1	1
UH-101	Hydraulic Power Unit	1	1	1	1	1	1	1	1	1	1	1	1
UH-111	Pressure Gauge	1	1	2	3	3	1	1	2	1	2	2	3
UH-121	Inline Flow Meter	1	2	2	1	1	2	1	2	2			2
UH-201	Double-Acting Hydraulic Cylinder										1		1
UH-205	Double-Acting Hydraulic Cylinder									1			1
UH-205-1	Loading Weight									1			1
UH-211	Hydraulic Motor											1	1
UH-503	3/2-Way Directional Control Valve								1	1			1
UH-505	4/2-Way Directional Control Valve							1	1		1	1	1
UH-511	4/3-Way Directional Control Valve								1		1		1
UH-601	Check Valve						1						1
UH-603	Pilot-Operated Check Valve							1					1
UH-613	2-Way Throttle Valve					1							1
UH-615	Pressure-Compensated Flow-Control Valve				1	1							1
UH-701	Pressure Relief Valve	1	1	1	1	2							2
UH-703	Pilot-Operated Pressure-Relief Valve		1										1
UH-711	3-Way Pressure Reducing Valve			1				1					1
UH-733	Counterbalance Valve											1	1
UH-805	3-Way Distributor		1	1	1	1	1	1					1
UH-809	Shut-Off Valve		1	1	1		1	1	1	1	1	1	1
UH-814	Hose, 1M	5	9	10	10	9	6	9	8	7	5	8	10
UH-815	Hose, 1.5M	2	2	3	2	2	2	2	2	2	2	2	3
UH-824	Flow Resistance Measuring Hose, Round Type				1								1
UH-825	Flow Resistance Measuring Hose, Square Type				1								1

PART II Basic Hydraulic Control Circuits

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	Q'ty
UH-001	Hydraulic Workbench	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-101	Hydraulic Power Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-111	Pressure Gauge	2	2	1	2	1	1	2	2	2	2	2	2	2		2	2
UH-116	Accumulator														1		1
UH-121	Inline Flow Meter	1															1
UH-201	Double-Acting Hydraulic Cylinder	1			1	2		2			1		1	2	1		2
UH-203	Differential Hydraulic Cylinder												1				1
UH-205	Double-Acting Hydraulic Cylinder		1	1	1		1		1	1		1					1
UH-211	Hydraulic Motor															1	1
UH-503	3/2-Way Directional Control Valve												1				1



PART II Basic Hydraulic Control Circuits

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	Q'ty
UH-505	4/2-Way Directional Control Valve			1		1						1	1				1
UH-511	4/3-Way Directional Control Valve	1	1		1	1	1	1	1	1	1			1	1	1	1
UH-517	4/3-Way Directional Control Valve											1					1
UH-601	Check Valve		1		1			1								4	4
UH-603	Pilot-Operated Check Valve											1					1
UH-611	Flow Control Valve								1	1			1	2		2	2
UH-615	Pressure-Compensated Flow-Control Valve										1						1
UH-701	Pressure Relief Valve		1	1													1
UH-703	Pilot-Operated Pressure-Relief Valve															2	2
UH-711	3-Way Pressure Reducing Valve							1									1
UH-723	Sequence Valve				1	1											1
UH-733	Counterbalance Valve						1		1		1						1
UH-805	3-Way Distributor		3	1	3	1	1	3	1		1	2	1	2	1	3	3
UH-807	4-Way Distributor							1								3	3
UH-809	Shut-Off Valve					1						1			1		1
UH-814	Hose, 1M	5	10	6	10	10	7	10	8	5	10	7	6	10	6	10	10
UH-815	Hose, 1.5M	2	3	2	2	2	2	2	2	2	2	2	2	2	2	5	5

PART III Basic Electro-Hydraulic Control Circuits with Electro-Modules Frame

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	EX.16	EX.17	Q'ty
UH-001	Hydraulic Workbench	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-101	Hydraulic Power Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-111	Pressure Gauge	1	1			1	1	1	1	1		1	1			1	2	1	2
UH-116	Accumulator															1			1
UH-201	Double-Acting Hydraulic Cylinder	1	1	1	1	1		1	1	1		1		1		1		1	1
UH-203	Differential Hydraulic Cylinder	1	1		1	1		1					1						1
UH-205	Double-Acting Hydraulic Cylinder						1		1	1	1			1	1				1
UH-211	Hydraulic Motor																1		1
UH-401	2/2-Way Single-Solenoid Valve			1								1							1
UH-403	3/2-Way Single-Solenoid Valve												1		1				1
UH-405	4/2-Way Single-Solenoid Valve					1								1	1	1		1	1
UH-411	4/3-Way Double-Solenoid Valve	1	1	1			1		1	1	1	1					1	1	1
UH-419	4/3-Way Double-Solenoid Valve	1	1		1	1		1											1
UH-601	Check Valve				1	2		1					1				4		4
UH-603	Pilot-Operated Check Valve	1													1				1
UH-611	Flow Control Valve								2	2		1		2			2		2
UH-613	2-Way Throttle Valve										1		1						1
UH-701	Pressure Relief Valve	1	1	1		1													1

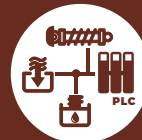


PART III Basic Electro-Hydraulic Control Circuits with Electro-Modules Frame

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	EX.16	EX.17	Q'ty
UH-703	Pilot-Operated Pressure-Relief Valve																2		2
UH-711	3-Way Pressure Reducing Valve							1											1
UH-723	Sequence Valve				1	1													1
UH-733	Counterbalance Valve						1		1										1
UH-805	3-Way Distributor	3	2	1	4	3	1	2	1		1	2	1	2	1	1	3	1	4
UH-807	4-Way Distributor																3	1	3
UH-809	Shut-Off Valve	1	1		1			1								1			1
UH-814	Hose, 1M	10	10	8	10	10	7	10	9	6	6	9	7	10	10	7	10	7	10
UH-815	Hose, 1.5M	3	3	2	3	5	2	2	2	2	2	2	2	2	2	2	5	2	5
UH-821	Pressure Switch																	1	1
UE-101	DC Power Supply Module	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UE-201	Pushbutton Switch Module	3	2	2	2	1	2	1	2	2	2	2	2	1	6	2	4	2	6
UE-203	Selector Switch Module			1			2		2	2	2							1	2
UE-401	Relay Module	2	2	2	3	2	2	2	3	3	2	4	2	2	4	2	2	3	4
UE-404	Timing Relay Module					1		1		1		1	1	1					1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch	2	4	2	4	3		4	2	2		3	2	1		2		1	4

PART IV Electro-Hydraulic Sequence Control Circuits with Electro-Modules Frame

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	EX.16	EX.17	EX.18	Q'ty
UH-001	Hydraulic Workbench	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-101	Hydraulic Power Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-201	Double-Acting Hydraulic Cylinder	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-203	Differential Hydraulic Cylinder													1	1	1	1	1	1	1
UH-405	4/2-Way Single-Solenoid Valve	1	1	1	1	1	1							2	2	2				2
UH-411	4/3-Way Double-Solenoid Valve							1	1	1	1	1	1				2	2	2	2
UH-805	3-Way Distributor													1	1	1	1	1	1	1
UH-814	Hose, 1M	4	4	4	4	4	4	4	4	4	4	4	4	9	9	9	9	9	9	9
UE-101	DC Power Supply Module	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UE-201	Pushbutton Switch Module	1	2	1	2	1	2	2	1		1	1	2	1	1	1	2	2	2	2
UE-203	Selector Switch Module							1	1	1			1							1
UE-401	Relay Module	1	1	1	2	1	3	2	2	2	2	2	3	3	2	3	4	2	1	4
UE-404	Timing Relay Module					1	1				1	1	1			1			1	1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch			1	2	1	2		1	2	1	2	2	4	3	2	4	4	4	4



PART III Basic Electro-Hydraulic Control Circuits with PLC-220

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	EX.16	EX.17	Q'ty
UH-001-01	Working Board	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-001-02	Working Table	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-101	Hydraulic Power Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-111	Pressure Gauge	1	1			1	1	1	1	1		1	1			1	2	1	2
UH-116	Accumulator															1			1
UH-201	Double-Acting Hydraulic Cylinder	1	1	1	1	1		1	1	1		1		1		1		1	1
UH-203	Differential Hydraulic Cylinder	1	1		1	1		1					1						1
UH-205	Double-Acting Hydraulic Cylinder						1		1	1	1			1	1				1
UH-211	Hydraulic Motor																1		1
UH-401	2/2-Way Single-Solenoid Valve			1								1							1
UH-403	3/2-Way Single-Solenoid Valve												1		1				1
UH-405	4/2-Way Single-Solenoid Valve					1								1	1	1		1	1
UH-411	4/3-Way Double-Solenoid Valve	1	1	1			1		1	1	1	1					1	1	1
UH-419	4/3-Way Double-Solenoid Valve	1	1		1	1		1											1
UH-601	Check Valve				1	1		1					1				4		4
UH-603	Pilot-Operated Check Valve	1													1				1
UH-611	Flow Control Valve								2	2		1		2			2		2
UH-613	2-Way Throttle Valve										1		1						1
UH-701	Pressure Relief Valve	1	1	1		1													1
UH-703	Pilot-Operated Pressure-Relief Valve																2		2
UH-711	3-Way Pressure Reducing Valve							1											1
UH-723	Sequence Valve				1	1													1
UH-733	Counterbalance Valve						1		1										1
UH-805	3-Way Distributor	3	2	1	4	3	1	2	1		1	2	1	2	1	1	3	1	4
UH-807	4-Way Distributor																3	1	3
UH-809	Shut-Off Valve	1	1		1			1								1			1
UH-814	Hose, 1M	10	10	8	10	10	7	10	9	6	6	9	7	10	10	7	10	7	10
UH-815	Hose, 1.5M	3	3	2	3	5	2	2	2	2	2	2	2	2	2	2	5	2	5
UH-821	Pressure Switch																	1	1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch	2	4	2	4	3		4	2	2		3	2	1		2		1	4
PLC-220	PLC Trainer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



PART IV Electro-Hydraulic Sequence Control Circuits with PLC-220																				
Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	EX.16	EX.17	EX.18	Q'ty
UH-001-01	Working Board	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-001-02	Working Table	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-101	Hydraulic Power Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-201	Double-Acting Hydraulic Cylinder	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UH-203	Differential Hydraulic Cylinder													1	1	1	1	1	1	1
UH-405	4/2-Way Single-Solenoid Valve	1	1	1	1	1	1							2	2	2				2
UH-411	4/3-Way Double-Solenoid Valve							1	1	1	1	1	1				2	2	2	2
UH-805	3-Way Distributor													1	1	1	1	1	1	1
UH-814	Hose, 1M	4	4	4	4	4	4	4	4	4	4	4	4	9	9	9	9	9	9	9
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch			1	2	1	2		1	2	1	2	2	4	3	2	4	4	4	4
PLC-220	PLC Trainer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1