NEOMETRIX

Testing and Charging Test Rig for Main and Nose Landing Gears

TEST RIG NO.0006T4A10

Product Catalog

www.neometrixgroup.com

About us:

Neometrix Defence Celebrating 20 Years of Excellence!
For the past two decades, Neometrix Defence has maintained its position as a premier provider of advanced test benches and rigs.

Our accreditation by the Directorate General of Aeronautical Quality Assurance, India (DGAQA) and Defence Research & Development Organization, India (DRDO) underscores our commitment to upholding the highest international defence industry standards.

Counting the Indian Air Force/Army/Navy, Ministry of Defence, Hindustan Aeronautical Limited, and DRDO among our esteemed clientele, we are recognized for delivering state-of-the-art solutions and unwavering performance reliability.

Strengths & Capabilities:

Neometrix Defence is a powerhouse of engineering brilliance, proudly serving every Indian Air Force station and partnering with the Indian Army, Navy, Railways, BARC, NPCIL, and ISRO. With a team of over 100 elite engineers and visionary founders from IIT Kanpur and IIT Delhi, we harness cutting-edge technology to set the gold standard in mechanical engineering.

We Don't Just Meet Industry Demands – We Define Them!

- We have established our presence in all Air Force stations across India. With the Indian Air Force as our leading customer, we are dedicated to upholding the highest standards of excellence in the aerospace industry.
- Our extensive clientele extends beyond the defence industry, including projects with the Indian Army, Navy, Railways, BARC, NPCIL, ISRO, and more. In essence, we excel in all aspects of mechanical engineering!
- Our team comprises over 100 graduate engineers, supported by a cutting-edge manufacturing site equipped with state-of the-art machinery, enabling us to meet the highest Engineering standards.
- The founders of our company are distinguished graduates from IIT Kanpur and IIT Delhi, bringing extensive expertise and a wealth of engineering knowledge to Neometrix Defence.

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Introduction:

PURPOSE:

The Test Rig is designed for testing of Main Landing Gear assembly-

06R4A100000010B/20B

06T4A100000010C/20C

And Nose Landing Gear assembly-

06R4B100000000B

06T4B100000000D

The following operations are to be performed on above unit as per

Test Schedule of the above units given in details in SOP of this Manual

1. Shock Absorber filling and leveling
2. Charging
3. Shock Absorber testing
4. Electrical
5. Bleeding
5. Self-centering and Steering test

CANOPY:

Test Rig is a closed enclosure movable skid that has 4 wheels with lock option. The canopy houses the following components:

i. Air Drive Liquid Booster Pump: is kept inside of skid on a Base frame of Canopy. Having boosting capacity of 9800 Psig (676 bar). Pump requires no Electrical Current for running and only clean and dry air from 60 to 80 psig. For better result it requires more than 2.83 NM3/Minute air flow.

ii. User Panel: User Panel Have one Pressure Gauge (Dial Sie-100mm), Three Digital Read Out (DRO of Size 96 X48 mm) for Pressure Indication, one ON/Off Valve, One Pressure Regulator, 4 Control Valve (needle Valve), three isolation valve, 4 Outlet Bulk Head Port and 4 sampling Port.

iii. High Pressure Hoses: There are 5 Nos. hoses with this rig. 4 of ½" ID Hose for Hydraulic Line of working Pressure 6000 PSI and one of ¼" ID Hose for N2 Line of working Pressure 7030 PSI.

iv. Port Connection:
   a. N2 Inlet Port & Drive Air Port: These Ports are provided at skid. The user will connect the N2 cylinder to the designated Port and the Air Hose to the Air Port. These Ports are on the Back side of Panel given together. N2 Inlet Port is ¼" tube OD and Drive Air Port is ½" BSPP (male)
   b. Outlet Connection Ports: Total five Ports are given as outlet Ports at Front side of Panel. For hydraulic lines of ½" BSPP(Male) and one for N2 Line of ¼" BSPP(Female)

v. Filters: two Hydraulic filters of 2 micron are given in Hydraulic line, one at Outlet of Booster Pump and one at outlet of Hand pump of working Pressure 6000 Psig. One filter of 5 micron is given at Air drive Line. Total three filters are used in system.

vi. Interlock and safety Components: one Solenoid valve is given for this purpose. If any case pressure will go beyond 6000 Psig this valve will cut the Drive Air supply and hence booster will stop to protect the system.

Charging Rig.: Do's & Do Not's:

Charging Rig List Of Do's

1. High Pressure Systems may cause serious HAZARDS if mishandling. These systems require HANDLING by TRAINED PERSONNEL only. Please STUDY the Operation & Maintenance manual carefully before operating the Charging Rig.
2. Do acquire proper training before attempting to operate the Booster (Air Hydro Pump/Intensifier).
3. Please ensure that Cylinder Valves, Air Supply Valves are always closed.
4. Do ensure that DAILY CHECK on Booster is successfully carried out before operating it.
5. Do open the cylinders valves as well as panel mounted valve slowly. There should be NO HURRY in doing any operation on Booster.
6. Do check the condition of hose before every use for any damage.
7. Ensure that open your HOSE ENDS do not touch the GROUND as they may GET DIRTY. Keep the ENDS always capped.
8. Keep the doors closed while moving the Charging Rig.
9. Do the system un pressured after every testing
10. Do off the Drive Air Valve just some lesser pressure you want to use, and you can get your required pressure after some increase in pressure due already made stroke by booster. If not reaching then only ON the booster for a mili second and off it if you are using it in any closed condition. if testing system is open no problem.
11. Do keep open supply valve (11) at suction of Booster pump otherwise pump may fail
12. Do open Dump Valve (6) before start of Booster Pump
13. Do open Isolation Valve 15.3 before start of booster otherwise you can see the Generated Pressure and system may reach 10000 PSI (Pump Max. Pressure Generating Capacity) without your any observation and system may fail.

Charging Rig Do Not's

1. Do not operate Charging Rig. if you are not trained on the system.
2. Do not attempt to repair without proper authorization & proper procedure.
3. Do not use Welding/ Grinding or any other electrical tools in pressurized System.
4. Do not hurry while operating Booster (Air Hydro Pump/Intensifier).
5. Do not open Isolation valve 15.1 while using rig more than 500 PSIG Pressure otherwise Pressure Transmitter (16) may damage.
6. Do not disturb Drive Air Pressure Regulator (2) while system is running
7. Do not over tight the Control valves 6, 13, 21.1 and 21.2 un-necessary.
8. Do not put Isolation valve 15.3 in closed condition. Due to this system will not sense the Generated Pressure (you can also not see) and will not stop at its max. Set pressure of 6000 PSIG. And can damage the system.
9. Do not keep the system pressurized after testing and release the pressure.

General Specification Of Charging Rig:

Working Pressure	3500 Psig (Max.) for N2 Line and 6000 PSIG(Max.) for Hydraulic Line
Shop Air Supply for Drive the Booster Pump	60 to 80 Psig for Higher Pressure Testing: 105 PSIG at Rig Inlet
Drive Air Input Port	01 No., ½" BSPP(Male) on Back side of Panel
N2 Input Port	01 No., ¼" tube OD on Back side of Panel
Hydraulics Output Ports	04 Nos., ½" BSPP(Male) on Front side of Panel
N2 Line Output Port	01 No., 1/4" BSPP(Female) on Front side of Panel
Dimension	800 (width) X 600 (Depth) X 1535 mm (Height) without wheel and without Cylinder Mounting Fixture 800 (width) X 600 (Depth) X 1642 mm (Height) with wheel without Cylinder Mounting Fixture 800 (width) X 900 (Depth-Max) X 1642 mm (Height) with wheel with Cylinder Mounting Fixture and N2 cylinder

USER PANEL:

The Charging Rig has the following components on USER PANELS for operation:

1. Pressure Gauges:
   - Air Pressure Gauge

2. Digital Pressure Indication:
   - Charging Pressure hand Pump Line 19.1
   - Charging Pressure Main Line 19.2
   - Charging Pressure main Line19.3

Above three Digital read Out is given for panel for reading pressure of corresponding line.

3. On/Off Valve: only one Valve is given on user Panel for Shop Air/N2 Supply on/off for which we can restrict the Air supply to Booster. Off means Booster (Air Hydro Pump/Intensifier) will off.

4. Air Pressure Regulator: only one Pressure Regulator is given on user Panel by which you can set/Adjust required Air Pressure for Booster (Air Hydro Pump/Intensifier).

5. Isolation Cock: total three Isolation cock is given:
    - Isolation cock hand Pump Line 24.1 for Isolating Pressure Indication 19.1
    - Isolation Cock Main Line 24.2 for Isolating Pressure Indication 19.2
    - Isolation Cock Main Line 24.3 for Isolating Pressure Indication 19.3

Items on User Panel	Circuit Diagram Code
1. Air Pressure Gauge	3.0
2. Digital Pressure Indication	19.1, 19.2 and 19.3
3. Isolation Valve	24.1, 24.2 and 24.3
4. Control Valve	6, 13, 21.2, 21.2
5. Air Line Valve	1.0
6. Air Pressure Regulator	2.0

Standard Operating Procedure (S.O.P):

1. Main Booster Line: Charging at any Pressure
2. Main Booster Line: Pressure Proof or Leak Testing
3. Hand Pump Line: Charging at any Pressure
4. Hand Pump Line: Pressure Proof or Leak Testing
5. N2 Line Charging at any Pressure or Leak Testing

USER PANEL:

1. Main Booster (Air Hydro Pump/Intensifier) Line: Charging at any Pressure:

1. Keep the Circuit Diagram in front. Ensure all valve in whole circuit is in closed condition.
2. Connect the UUT at both port of Main Line Port of rig.
3. Connect the shop air of 7 bar to Airport back side of Panel.
4. Open the all valve of Booster line by seeing the circuit these are Supply valve (11), Bypass or Dump Valve (6), Main Valve (13), and Isolation Valve (15.3) of High Pressure Transmitter (17.1). Ensure Isolation valve (15.1) should be in closed condition otherwise low range pressure sensor 16 may fail.
5. Open the Air Drive Valve in ON position. Now main pump (booster) will start and outlet oil will be dump to Tank via dump valve (6) as it is in open condition.
6. Now closed the Dump Valve (6) and observe the pressure on High pressure Indicator of High range Pressure Transmitter (17.1)

Now you can get you're your required pressure by seeing pressure on Digital Pressure Indicator 19.2 or 19.3. if pressure requirement is more than 500 use 19.2 otherwise use 19.3. Charged the UUT as per specified pressure and closed the Drive Air Pressure.

2. Main Booster (Air Hydro Pump/Intensifier) Line: Pressure Proof or Leak testing:

1. Keep the Circuit Diagram in front. Ensure all valve in whole circuit is in closed condition.
2. Connect the UUT at both port of Main Line Port of rig.
3. Connect the shop air of 7 bar to Airport back side of Panel.
4. Open the all valve of Booster line by seeing the circuit these are Supply valve (11), Bypass or Dump Valve (6), Main Valve (13), and Isolation Valve (15.3) of High Pressure Transmitter (17.1) . Ensure Isolation valve (15.1) should be in closed condition otherwise low range pressure sensor 16 may fail.
5. Open the Air Drive Valve in ON position. Now main pump (booster) will start and outlet oil will be dump to Tank via dump valve (6) as it is in open condition.
6. Now closed the Dump Valve (6) and observe the pressure on High pressure Indicator of High range Pressure Transmitter (17.1)

Now you can get you're your required pressure by seeing pressure on Digital Pressure Indicator 19.2 or 19.3. if pressure requirement is more than 500 use 19.2 otherwise use 19.3. And observe any pressure drop or leak.

After testing open the dump valve (6) and disconnect the UUT from system.

3. Hand Pump Line: Charging the UUT at any pressure:

1. Keep the Circuit Diagram in front. Ensure all valve in whole circuit is in closed condition.
2. Connect the UUT at both port of Main Line Port of rig.
3. Tight the relief valve on Hand Pump
4. Open the all valve of Hand pump line by seeing the circuit these are control valve (21.1), Isolation Valve (15.2)
5. Pump the Hand Pump by Hand. And observe the pressure on Digital pressure Indicator (19.1) of Pressure Transmitter (17.2), now UUT is under charging and Pressure will be increases. When pressure on indicator reached as per test schedule of UUT stop pumping.

4. Hand Pump Line: Pressure Proof or Leak testing:

1. 1. Keep the Circuit Diagram in front. Ensure all valve in whole circuit is in closed condition.
2. 2. Connect the UUT at both port of Main Line Port of rig.
3. 3. Tight the relief valve on Hand Pump
4. 4. Open the all valve of Hand pump line by seeing the circuit these are control valve (21.1), Isolation Valve (15.2)
5. 5. Pump the Hand Pump by Hand. And observe the pressure on Digital pressure Indicator (19.1) of Pressure Transmitter (17.2), Pressure will be increases. When pressure on indicator reached as per test schedule of UUT stop pumping. And leave it for observation of any leak or pressure drop as per UUT Test Schedule

5. N2 Line Charging at any Pressure or Leak Testing:

1. Keep the Circuit Diagram in front. Insure all valve in whole circuit is in closed condition.
2. Keep the N2 Cylinder of working Pressure 3500 Psig at back side of Rig and clamp it property in cylinder fixture of rig
3. Connect it with Rig regulator. And ensure that regulator is well connected with Inlet Port of rig.
4. Connect the UUT with N2 line Output Port of rig by N2 hose
5. Open the control valve (21.2) of N2 Line and increase the pressure slowly up to test/charging pressure of UUT by N2 Cylinder Regulator by seeing Pressure on N2 regulator outlet Gauge.
   Leave it for some minutes and observe the pressure drop in system as per UUT test schedule.

Safety Measures & Safety Interlocking:

⚠ Air Line Solenoid Valve	24 VDC operated A solenoid Valve is given that will off stop and cut the air supply and protect the system for any pressure beyond 6000 Psi as without pressure Booster Pump will not run	Condition: Isolation valve 15.3 should be open for taking this benfit.

Service And Maintanence Instructions:

FREQUENCY		(SERVICE & MAINTANENCE ACTION)
Before /After each use		Perform the visual check of the complete system.
		During Operation observe leakage, if any.
		Release Pressure from All Pressure Gauges/Pressure Transmitters on the Panel. Each gauge/Digital Indicator on the Panel should READ ZERO Pressure after completion of operation.
Every Month		Check for the Leakage of the tubing and fittings, if any. Clean the complete system to ensure Dust & Dirt-Free system.
Every 3 months		Check booster (Air Hydro Pump/Intensifier) for Oil leaking from vents, external leakage, & overall performance.
		Clean the Filter and Filter Elements.
		Check for loosening of Nuts and bolts or pipe adaptors. Re-torque if needed.
Every 6-12 months		Inspect piping at full system pressure for leakage using pressure drop.
		Test & calibrate all pressure gauges/Sensors/Transmitters.
		Replace Hydraulic & air filter ELEMENTS.
		Test Drive Air Pressure regulator reset as needed.
		Change the Hydraulic Booster Pump SEALS.
		Get Valve, Pressure Regulator in the checked for performance (In-SITU).
Every 5 Years		Get the N2 Gas Cylinders HYDRO TESTED & certified if any you are using for this rig.

Trouble Shooting Chart:

S.NO	PROBLEMS	POSSIBLE CAUSE
1	Booster is running but pressure is not coming on Digital Pressure Indicator 19.2	• Check and open the Isolation cock 15.3 • Check and closed the Dump Valve (6)
2	BOOSTER IS not running but still pressure is increasing	Feed flow is lesser.
3	Booster initially ran but stop running but Drive air pressure is showing full pressure	Be careful, booster generates its max. Possible pressure of 10000 PSI as possibly you missed out to open the control valve (13) and/or isolation valve (15.3). For confirming dump open the dump valve, booster will start.
4	Booster initially ran, but not running	Check pressure on Drive Air Pressure Gauge, Pressure may be not sufficient, for confirming open the Dump line valve, booster pump will start pumping.

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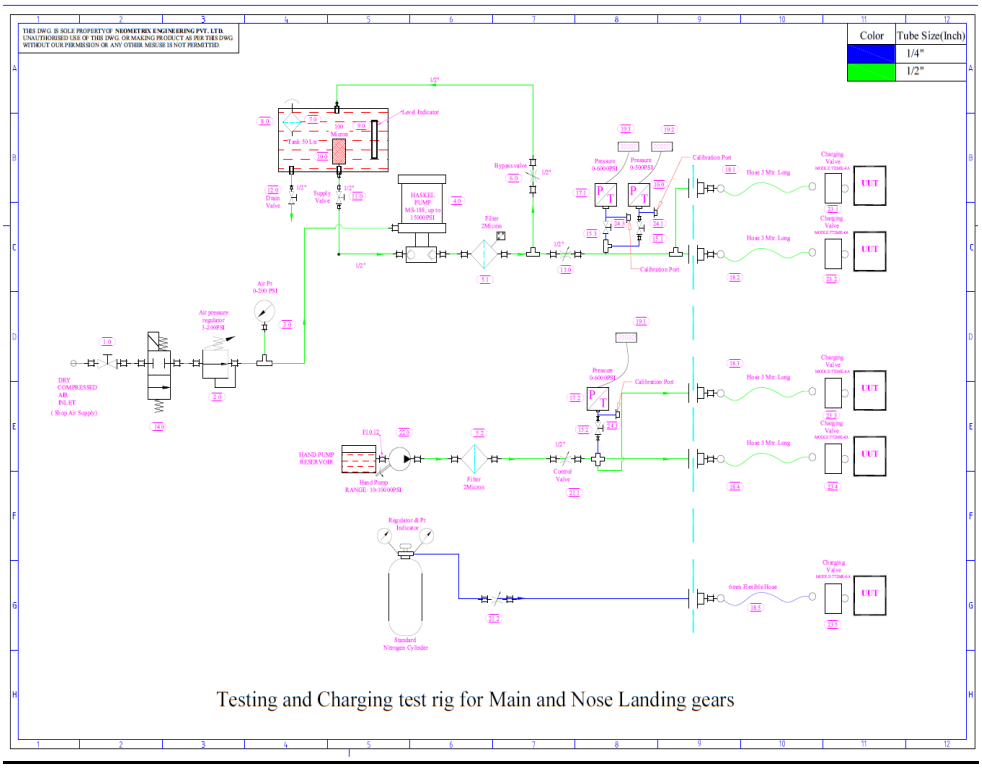
List Of Major Equipments:

S No.	CKT Code	Item	Description	Qty.
1	1.0	Ball Valve	size:- 1/2"	1
2	2.0	Air Pressure Regulator for Air Hydro Pump	Range : 3 to 200 psi , End connection:- 3/8" NPT(F)	1
3	3.0	Pressure Gauge (For air Supply)	Range: 0to 200psi, Accuracy: 1.0%, Least count: 5 psi, Dial Size: 4"	1
4	4.0	Air Hydro Pump	Maximum Pressure : 0 to 15000 psi, stroke : 11CC/stroke	1
5	5.0	Hydraulic Filter with elecrical clogging indicator	2 micron , beta ratio : 1000 or better, working pressure :6000psig, 3/4" SAE(F)	2
6	6.0, 13.0, 21.1 and 21.2	Needle valves	Size: 1/2" BSP, working Pressure :6000 Psig(Min)	4
8	8.0	Hydraulic Reservoir	Material of Construction: SS Sheet of 2 to 3mm Thickness , Tank Capacity : 50 Ltrs	1
	9.0	Level Indicator	10"-length	1
9	10.0	Suction strainer	stainless steel Construction, Rating : 125 micron or better	1
10	11.0	Ball valve (Suction Valve)	Size:1/2", Low Pressure Valve	1
11	12.0	Drain valve	Size:- 1/2"	1
12	14.0	Solenoid valve	Solenoid ON/OFF valve(Normally closed), 1/2" BSPP(F) both side	1
	N/A	Coil for above fest valve	to suit above	1
13	15.1, 15.2, 15.3	Isolation valve	Size:-1/4" working pressure 6000 psi	3
14	16.0	(a). Pressure transducer	Range: 0 to 500 psi, Accuracy: .25%, Least count: 0.5 psi, input: 4 to 20 mAmp.	1
15	17.1, 17.2	(B). Pressure transducer	Range: 0to 6000 psi, Accuracy: .25%, Least count: 10psi, input: 4 to 20 mAmp.	2

16	18.1, 18.2, 18.3, 18.4, 18.5	Flexible Hose Pipe	Size: 1/2" ID, Nominal Pressure : 6000psi, Length : 3mtr	A/R
17	N/A	Fixture with Hose Pipe	Material of Construction:- MS	A/R
18	19.2,	(C.) Digital Indicator for above Pressure Transducer	3.5digit, input: 4 to 20 mAmp.	1
	19.1, 19.3	(D.) Digital Indicator for above Pressure Transducer	4 digit, input: 4 to 20 mAmp.	2
19	22.0	Hand Pump	Max : Pressure capacity: 0 to 700 bar(10150psi), Now pump is having 49 CC in first stroke for up to 30 bar and 2.8CC more than 30 bar and up to 700 bar(10150psi), and with tank of 6 liter	1
20	N/A	Pressure Gauge for Charging Valve	Pressure range:- 0- 600 psi, 0-3500psi, Dial Size: 3"	10
21	23.1, 23.2, 23.3, 23.4, 23.5	Charging valve (inflation Adaptor kit)		5
22	N/A	Variable DC Power Supply With Digital Indicator For Voltage And Current	Range:- 0-30 VDC , 2AMP	1
23	N/A	Bottle jack/ Screw Jack	Capacity: 12 Ton, Approximate closed Height : 16", Approximate stroke : 10", Approximate handle Effort per ton: 16(lbs) or less , Approximate base dia. 7" , Steel lever bar length: 24" or more	1
24	N/A	SS Pipe Fittings	SS pipe fitting as per BS 4368, Part IV Standard of required Size, Working Pressure : 6000 Psig or as per requirement, Size : as per requirement	A/R
25	24	Calibration Port for Pressure Transmitter	Diagnostic Coupling, panel mount, M16X2 and G1/4, Working Pressure: 6000 PSIG, 1/4" Minimess adaptors	4

	N/A	Cap for Minimess Bulkhead	Test Point cap(Stainless Steel)1620 to suit above	4
26	N/A	Control Panel	as per Drawing	1
26	N/A	SS Pipe	SS Grade TP 316L as per ASTM standard, Working Pressure : 6000 Psig or as per requirement, Size : as per requirement	A/R
27	N/A	Regulator for HAL N2 Cylinder	Working Pressure: 6000 PSIG with Input and output Gages	1
28	N/A	Frame for Cylinder	as per Drawing	1
29	N/A	Frame for Hand Pump	as per Drawing	1

Hydraulic Circuit Diagram:



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