GROUND TEST INSTRUCTIONS

SECTION 8

ENGINE STARTING SYSTEM

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SECTION 8

ENGINE STARTING SYSTEM

PART 1

TRIPLE BREECH TURBO STARTER

The following tests apply to triple breech turbo starters with circuits modified to include:—

Fourth lead (continuous earth) from selector to starter.

Limiting resistance (10 ohm) in supply line between time switch and selector switch.

Separate resistance (10 ohm) mounted in breeches.

1. HIGH ENERGY IGNITERS – WARNING

High energy igniter units (employed on engine starting systems) are, under certain circumstances, capable of discharging a lethal electrical shock. The H.T. connections and plugs must NOT, (under any conditions), be touched when units are operating, and when removing units, allow ONE minute for the unit to discharge (after disconnecting at the L.T. supply).

2. CHECKS BEFORE TESTING

Before commencing tests, make the following checks on circuit components and wiring:—

(i) Selector switch is either Type FJB/A/3 Model 2 or Type FJB/A/5.

(ii) 10 ohm limiting resistance (Type DJ1030/A/1) is in line between pin 6 in time switch 'Breeze' plug and terminal 5 on selector switch.

(iii) Fourth lead (continuous earth) is connected from terminal 9 on selector to pin 'D' on starter 'Breeze' plug.

(iv) Turbo starter (Type T.B.S.720) has 10 ohm resistances mounted in breech connectors.

(v) Circuit conforms basically to R.R. Drawing No.P.P.75814.

3. STARTER CIRCUIT TESTS

Circuit wiring is to be checked to ensure there is no high resistance to earth.

This is important as high resistance may cause the firing of TWO cartridges simultaneously.

Test starter circuits by the following operations which must be made in the sequence given:—

(i) Check (using Wheatstone bridge) that terminal 9 on selector switch is connected to earth; check resistance to earth does not exceed 1.0 ohms.

(ii) Check starter body is earthed to airframe (using bonding tester 5G/2126); check resistance does not exceed 0.025 ohms.

3. CIRCUIT STARTER TESTS (Contd.).

(iii) Disconnect cable assembly 'C3' from plug on engine; disconnect cable assembly 'F31' from time switch; check the following:—

(a) Two out of three pins (A, B and J) of cable assembly 'C3' socket are connected to pin 1.

(b) Remaining pin is not connected to earth (test with 250 volt megger).

(iv) Press starter selector switch ONCE : repeat operation (iii) (a) and (b).

(v) Repeat (iv) FOUR times.

(vi) Test (using Wheatstone bridge) between pins A, B, J and 1 at cable assembly 'C3' socket that resistance of cartridge leads is less than 1.0 ohms.

(vii) Reconnect cable assembly 'F31' to time switch.

(viii) Connect THREE lamps (24 volt) between pins A, B and J of cable assembly 'C3' plug, and earth (negative).

(ix) Energise complete circuit

(x) Press starter selector switch button ONCE : note which lamp lights (only ONE lamp must light during any ONE cycle).

(xi) Wait 30 secs. (selector switch button will return to normal position in this time).

(xii) Repeat (x) and (xi) at least SIX times : check lamps light in correct sequence.

(xiii) Upon completion of tests, disconnect all THREE lamps : reconnect cable assembly 'C3' to plug on engine.

SECTION 8

ENGINE STARTING SYSTEM

PART 2

PLESSEY (LTSA/150) LIQUID

FUEL STARTER

I.D. INSTRUCTION H01/1 (Issue 4)

1. APPLICABILITY

This instruction covers Mks.6, 56, 58 and 66 aircraft, incorporating Mods.146 (or 2379), or 2382, or 2383) 382, 639, and 752.

2. EQUIPMENT REQUIRED

Starter test rig as shown in ID.Sk.613, Iss.C.

24 volt electrical supply.

An ignition indicator unit and an overspeed-simulating switch as shown in ID.Sk.2050, Iss.A.

3. TEST ON COMPLETE AIRCRAFT

(i) Disconnect the liquid fuel line to the starter motor from the ignition switch unit and connect the Kerosene rig line; connect up ground supply, cables to rig overspeed-simulating switch at E.S.4 and ignition test wiring.

(ii) Pour ¾ gallon of clean Kerosene into aircraft starter header tank. This is just enough for one false and one full start.

(iii) Open the rig on-off cock. Check that the vent is open and the drain closed.

(iv) With battery and engine master switches and O/S simulating switch 'ON' and engine ignition isolating switch 'OFF', press the starter button and release it.
Check that the following sequence takes place:—

(a) The pump-unit motor starts up.

(b) Air flows from the starter air feed pipe.

(c) 2½ to 3 seconds after starting, Kerosene flows into the rig tank, pressure rises to approximately 150 p.s.i. and the ignition indicators "spark" once.

(d) The system shuts down.

(v) Check that the starter control box motor stops approximately 18 seconds after button was pressed.

(vi) Examine the fuel line joints for leakage.

(vii) Close the rig cock.

(viii) Press starter button and release it. Check that the following sequence takes place.

(a) Pump unit motor starts up.

(b) 2½ to 3 seconds after starting Kerosene flows into the rig tank and the ignition indicators 'spark' once.

(c) Pressure rises to approximately 600 p.s.i.

3. TEST ON COMPLETE AIRCRAFT (Contd.).

(ix) After fuel has flowed for approximately 6 seconds, move rig O/S simulating switch to OFF and check that:—

(a) The system shuts down.

(b) The control motor stops running approximately 18 seconds after the button was pressed.

(x) Examine fuel lines for leakage.

(xi) Open rig cock, move rig O/S simulating switch to 'ON' and battery master switch to 'OFF'.

(xii) Remove drain plug from pump inlet line and drain tank. Replace drain plug.

(xiii) Disconnect Kerosene rig and connect waste tank.

(xiv) Pour ½ gallon of I.P.N. fuel into aircraft starter header tank.

(xv) Move battery master switch to 'ON', press starter button and release it. Check that I.P.N. flows into waste tank.

(xvi) After 30 seconds, repeat (xv).

(xvii) Remove drain plug from pump inlet line and drain tank.

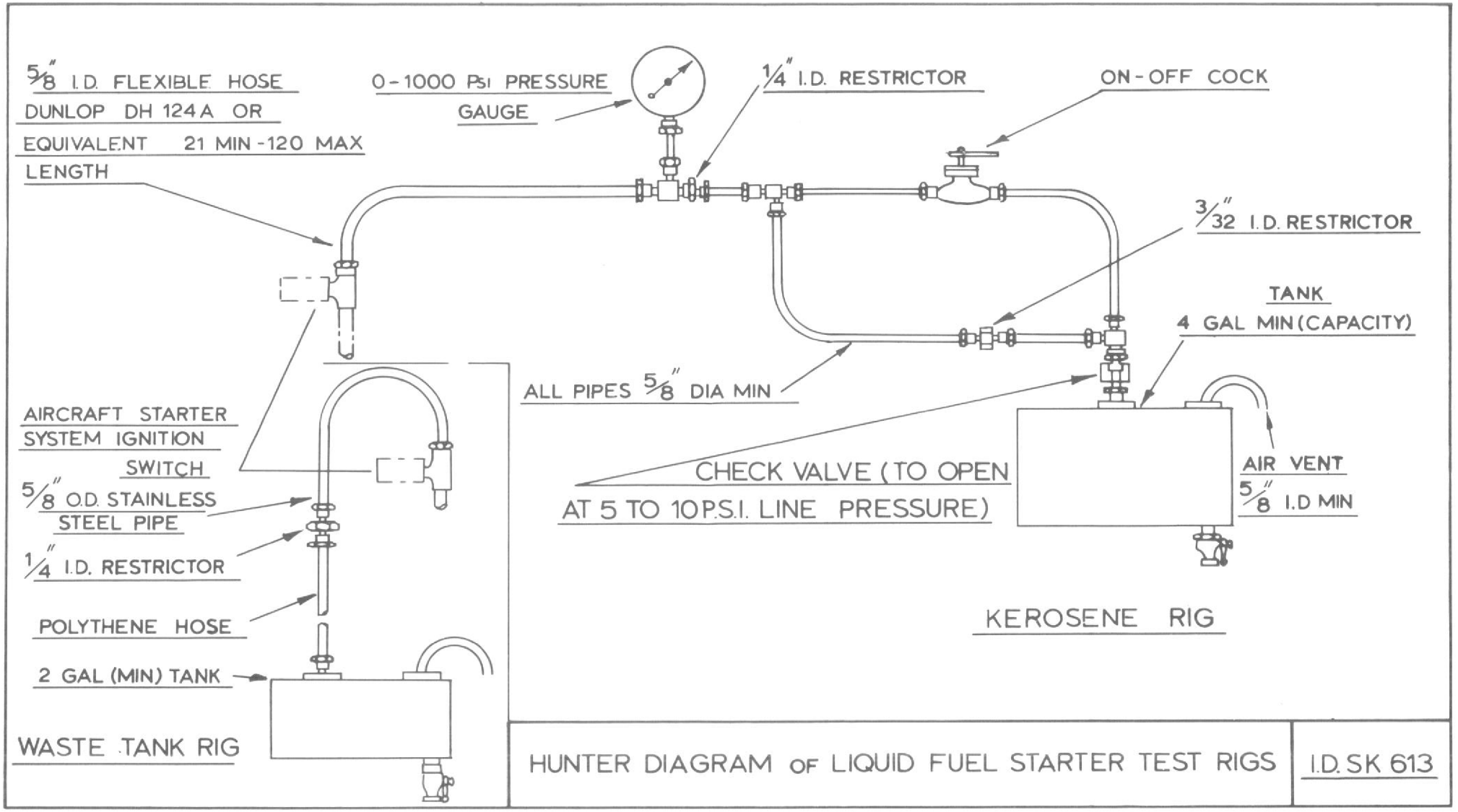
(xviii) Replace drain plug and disconnect rig and electrics.

NOTE: (i) The fuel pump must not be allowed to run dry.

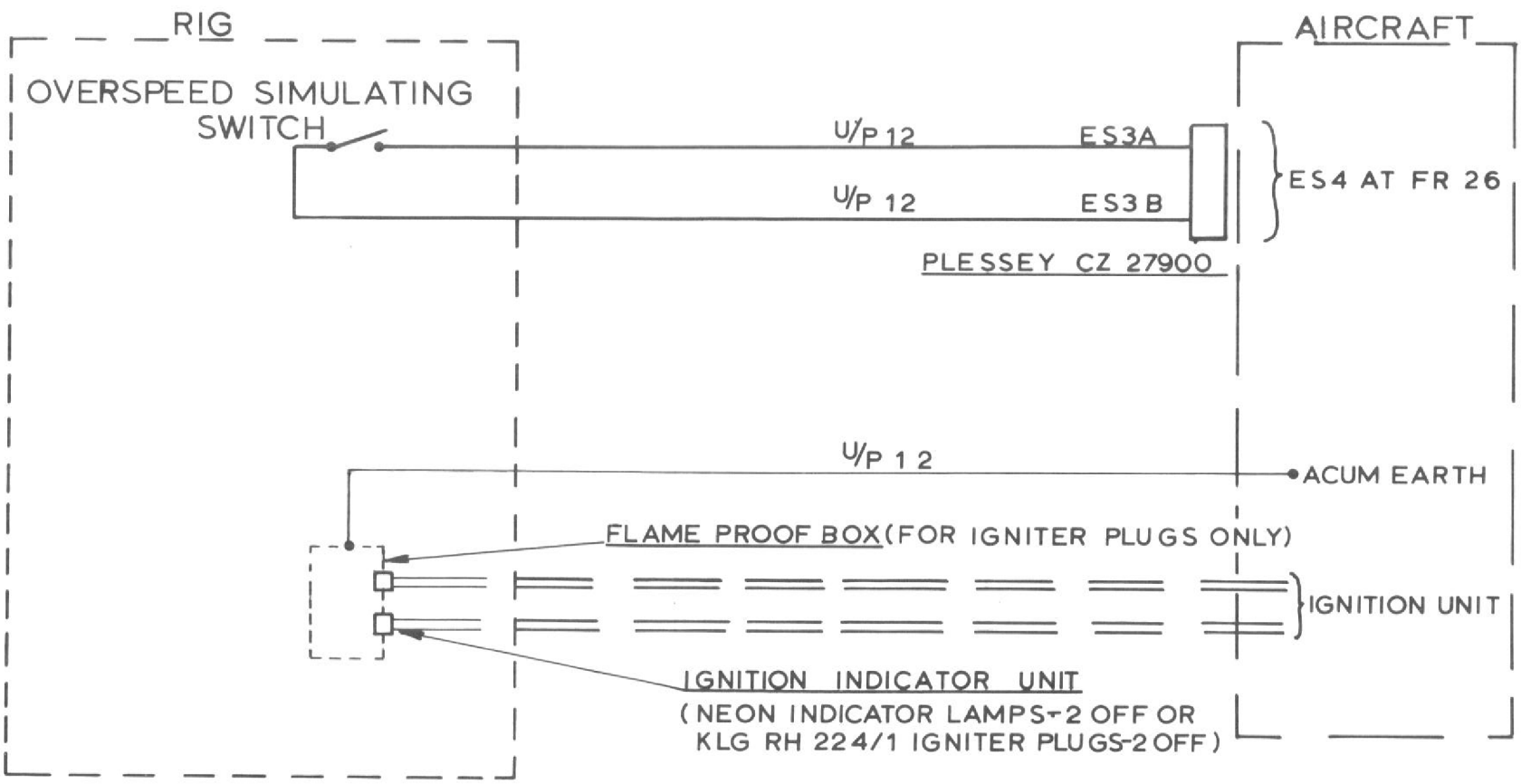
(ii) At least 20 seconds must be allowed between successive pressings of the starter button.

(iii) The electrical supply must not at any time exceed 26 volts.

(iv) Spilt I.P.N. must be removed from the aircraft at once.



HUNTER DIAGRAM OF LIQUID FUEL STARTER TEST RIGS | I.D. SK 613



HUNTER DIAGRAM OF LIQUID FUEL STARTER TEST WIRING

I.D.S.K.2050

SECTION 8

ENGINE STARTING SYSTEM

PART 3

PLESSEY (LTSA/70) LIQUID

FUEL STARTER

I.D. INSTRUCTION H01/2 (Issue 2)

The equipment required consists of the test rig shown diagrammatically in I.D. Sk.1114 and a 24 volt electrical supply. I.D. Sk.1115 shows the ignition test wiring and also the electrical equipment needed to test the system components in the centre fuselage only.

1. TEST ON CENTRE FUSELAGE ONLY

(i) Connect the Kerosene rig line to the low pressure switch unit, connect up electrics.

(ii) Pour ½ gallon of clean Kerosene into the aircraft starter header tank. This is just enough for one false and one full start.

(iii) Open the rig on-off cock. Check that the vent is open and the drain closed.

(iv) Move rig switches A and B to 'ON', press the starter button and release it; Check that the following sequence takes place:—

(a) The pump unit motor starts up and rig indicator lamp lights.

(b) Air flows from the starter air feed pipe.

(c) 2 to 3 seconds after starting, Kerosene flows into the rig tank, pressure rises to approx. 150 p.s.i. and the ignitor plugs spark once.

(d) The system shuts down.

(v) Check that the starter control box motor stops approx. 18 secs. after button was pressed.

(vi) Examine the fuel line joints for leakage.

(vii) Close the rig cock.

(viii) Press the starter button and release it. Check that the following sequence takes place:—

(a) Pump unit motor starts up and the rig indicator lamp lights.

(b) 2 to 3 seconds after starting Kerosene flows into the rig tank and the ignitor plugs spark once.

(c) Pressure rises to approx. 600 p.s.i.

(ix) After fuel has flowed for approx. 6 seconds, move rig switch B to OFF and check that:—

(a) The system shuts down.

(b) The control motor stops running approx. 18 seconds after the button was pressed.

(x) Examine fuel lines for leakage.

(xi) Open rig cock, move switch B to 'ON' and switch A to 'OFF'.

(xii) Remove drain plug from pump inlet line and drain tank. Replace drain plug.

1. TEST ON CENTRE FUSELAGE ONLY (Contd.).

(xiii) Disconnect Kerosene rig and connect waste tank.

(xiv) Fill aircraft tank with ½ gallon of I.P.N. fuel.

(xv) Move switch A to 'ON', press starter button and release it. Check that I.P.N. flows into waste tank.

(xvi) After 30 seconds, repeat (15).

(xvii) Remove drain plug from pump inlet line and drain tank.

(xviii) Replace drain plug and disconnect rig and electrics.

(xix) Blank low pressure switch unit fuel outlet.

2. TEST ON COMPLETE AIRCRAFT

When it is necessary to test the system with the aircraft complete the sequence to be followed is the same in principle to that in Part 1:—

(i) Disconnect the liquid fuel line to the starter motor from the low-pressure switch unit and connect the Kerosene rig line; connect up electrical supply, cables to rig switch 'B' at ES4 and ignition test wiring.

(ii) Pour ½ gallon of clean Kerosene into the aircraft starter header tank. This is just enough for one false and one full start.

(iii) Open the rig on-off cock. Check that the vent is open and the drain closed.

(iv) With battery master switch and switch B 'ON' and engine ignition switch 'OFF', press the starter button and release it. Check that the following sequence takes place:—

(a) The pump unit motor starts up and the rig indicator lamp lights.

(b) Air flows from the starter air feed pipe.

(c) 2 to 3 seconds after starting, Kerosene flows into the rig tank, pressure rises to approx. 150 p.s.i. and the ignitor plugs spark once.

(d) The system shuts down.

(v) Check that the starter control box motor stops approx. 18 secs. after button was pressed.

(vi) Examine the fuel line joints for leakage.

(vii) Close the rig cock.

(viii) Press the starter button and release it. Check that the following sequence takes place:—

(a) Pump unit motor starts up and the rig indicator lamp lights.

(b) 2 to 3 seconds after starting Kerosene flows into the rig tank and the ignitor plugs spark once.

(c) Pressure rises to approx. 600 p.s.i.

2. TEST ON COMPLETE AIRCRAFT (Contd.).

(ix) After fuel has flowed for approx. 6 seconds, move rig switch B to OFF and check that:—

(a) The system shuts down.

(b) The control motor stops running approx. 18 seconds after the button was pressed.

(x) Examine fuel lines for leakage.

(xi) Open rig cock, move switch B to 'ON' and master switch to 'OFF'.

(xii) Remove drain plug from pump inlet line and drain tank. Replace drain plug and disconnect Kerosene rig.

(xiii) Connect waste tank and fill the aircraft tank with ½ gallon of I.P.N. fuel.

(xiv) Move the master switch to 'ON', press starter button and release it. Check that I.P.N. flows into waste tank.

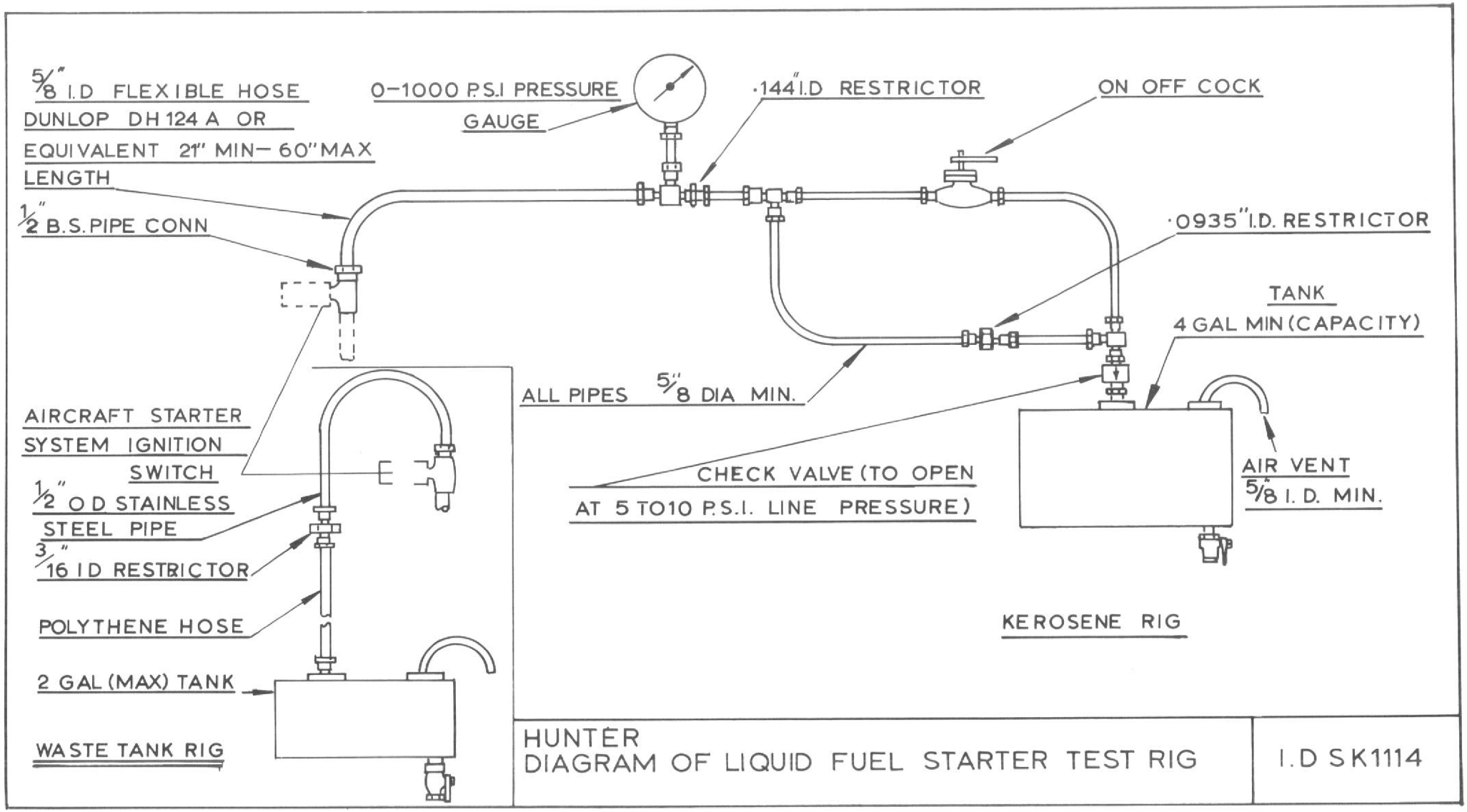
(xv) After 30 seconds, repeat (xiv).

(xvi) Remove drain plug from pump inlet line and drain tank.

(xvii) Replace drain plug, disconnect rig and electrics, and reconnect motor liquid fuel line to low-pressure switch unit.

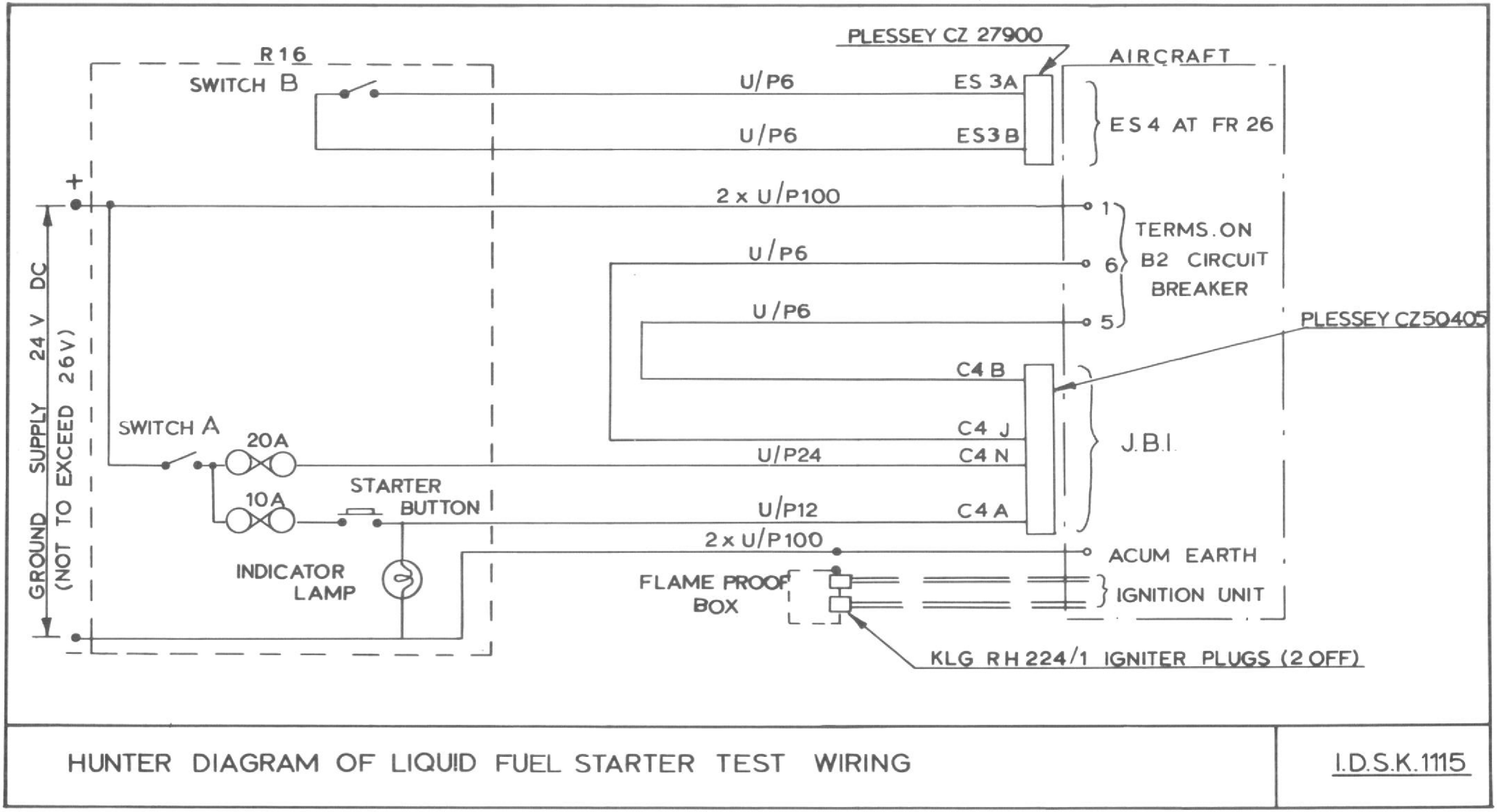
Notes:—

1. The fuel pump must not be allowed to run dry.
2. At least 20 seconds must be allowed between successive pressings of the starter button.
3. The electrical supply must not at any time exceed 26 volts.
4. Spilt I.P.N. must be removed from the aircraft at once.
5. Items 2 (xii) to (xvi) may be omitted if a true start is to be attempted within an hour of testing with Kerosene.



HUNTER
DIAGRAM OF LIQUID FUEL STARTER TEST RIG

I.D SK1114



HUNTER DIAGRAM OF LIQUID FUEL STARTER TEST WIRING

I.D.S.K.1115