

GROUND TEST INSTRUCTIONS

SECTION 6

ELECTRICAL

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SECTION 6  
ELECTRICAL  
PART 1  
GENERAL

The following Instructions and Tests (together with permissible limits), are given as for the complete electrical installation of the aircraft. They may apply equally to several electrical systems, therefore, the instructions (where applicable), must be observed when testing individual systems.

1. 'ELECTRICALLY SAFE' – WARNING

Before commencing any tests or servicing the aircraft must, in the interests of Personnel safety, be rendered 'Electrically Safe' by the following operations:—

- (i) Remove leads from batteries and stow on to adjacent dummy terminals.
- (ii) Ensure NO external supply connected.  
(When electrical power is required, an external supply must be used, and disconnected immediately requirement is completed).

2. 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).

3. BONDING

The aircraft bonding must be tested by measuring the electrical resistance of the complete metal structure of the aircraft, as follows:—

- (i) Connect 'Low Reading' ohmmeter to ONE of the main earthing points on the aircraft.
- (ii) Take resistance reading at several well dispersed points on aircraft structure and equipment. Resistance must not exceed 0.025 ohms.
- (iii) Repeat (i) and (ii) for several other main earthing points on aircraft (select earthing points that are well dispersed).
- (iv) Record readings and locations for future reference.

#### 4. EARTHING AIRCRAFT

To ensure that no electrical charge remains static within the aircraft (danger of sparking in vicinity of fuel tanks, etc.), the main earthing system is brought into immediate contact with the ground on landing through the electrically conductive nose-wheel tyre.

Check the resistance between main earthing system and ground using 500 Volt megger (Av.P.970) with nose wheel standing on a WET contact surface.

Resistance must not exceed 10 Megohms

#### 5. EARTH RETURN SYSTEM

The aircraft earth return system must be checked with a 250 Volt megger in accordance with R.A.E. Technical Memo. E.L.1027 – Aircraft Wiring (Av.P.970 refers).

The following component sections must be checked as individual assemblies:—

- Front fuselage.
- Centre fuselage.
- Rear fuselage.
- Tail unit.
- Main planes.

When these component sections have been checked the complete aircraft requires only a functioning test of equipment.

#### 6. INSULATION TESTS PREPARATIONS

Before commencing insulation resistance tests of aircraft wiring the following operations must be carried out:—

- (i) Remove all lamps.
- (ii) Disconnect inverters.
- (iii) Disconnect main earth points (1 to 19).
- (iv) Remove WHITE compass plug from A.C. junction box.
- (v) Remove RED and GREEN Radar plugs from A.C. junction box.
- (vi) Remove plugs from Fire Extinguisher cylinder(s).
- (vii) Remove supply plug to both Fuel Contents Gauge Amplifiers.
- (viii) Disconnect Gun Sight Suppressor (F5).
- (ix) Remove Voltmeter (if fitted).
- (x) Remove lamps from Type 'A' cut-outs.
- (xi) Disconnect all other suppressors.
- (xii) Remove Engine Plugs.
- (xiii) Disconnect Rebecca Mk.7 (if fitted).
- (xiv) Set all switches 'ON'.
- (xv) Connect 250 Volt Insulation Resister Tester to Positive Terminal and to an earth point of aircraft.

## 7. CIRCUIT TESTING

The following Circuits must be tested to within limits as detailed:—

- (i) Power Circuit.  
Power Circuit must be tested with Generators and Suppressors disconnected.  
Insulation resistance (under these conditions) must not be less than 2 megohms.
- (ii) Distribution Circuits.  
Any number of circuits may be tested in parallel or individually as desired.  
Insulation resistance for any circuit or group of circuits must not be less than 2 megohms.
- (iii) Bomb Release Circuits.  
These must be tested separately with control switches 'CLOSED' and Pre-selector set in Numerical Sequence.  
Insulation resistance for EACH individual Circuit must not be less than 2 megohms.  
Insulation resistance for ALL fusing Circuits in parallel must not be less than 500,000 ohms.
- (vi) Engines.  
If it is required to test Engine Units alone, a higher insulation value is required as only part of the circuit is being measured (R.A.E. Technical Memo E.L.1027).  
Insulation resistance for any circuit or group of circuits must not be less than 4 megohms.
- (v) Radio Circuits.  
Radio Wiring must be tested as follows:—
  - (a) Supply and Control Wiring.  
Insulation resistance must be tested with a 250 Volt megger (in accordance with R.A.E. Technical Memo E.L.1027).
  - (b) Inter-Equipment Wiring.  
Insulation resistance must be tested with a 500 Volt megger.  
An infinity reading must be obtained.
- (vi) Gyro Compass Circuits.  
Gyro Compass Wiring must be tested to limits specified for (v) Radio Circuits above.

## 8. CIRCUIT FUNCTIONING TESTS

Each Circuit must be completely tested for functioning on a shop rig.

After each Test the circuit fuse must be removed to ensure there are no crossed wires and to check **that** circuit is broken by removal of fuse.

9. GENERATOR 'PARALLELLING'

The Generating Circuit must be 'paralleled' under any ONE of the following conditions:—

After fitment of replacement Generator.

After fitment of replacement Voltage Regulator.

After fitment of replacement Cut-out.

After any Servicing which may have disturbed the alignment of the Circuit.

When check indicates adjustment is necessary.

For sequence of operations (using Testmeter Type 'D', Ref.10S/10610), see Vol.1, Sect.5, Chap.1.

10. TAB ACTUATORS

Rudder Tab and Aileron Tab Actuators must be tested as detailed in Vol.1, Sect.5, Chap.1.

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PART 2

TAILPLANE ACTUATOR TEST

(ROTAX A 1603)

I.D. INSTRUCTION H09/5 (Issue 3)

1. INSTRUMENTATION AND EQUIPMENT REQUIRED

- (i) Ammeter range 0 to 50 amp. in Cables T.1 (2 off) and T.3 in the earth return at the rear fuselage earthing point. (Starboard aft face of frame 45.)
- (ii) Voltmeter range 0 to 40 Volts between terminal 2 of the main contactor and the earth return at the rear fuselage earthing point.
- (iii) Voltmeter range 0 to 40 Volts between terminal 2 of the standby contactor and the earth return at the rear fuselage earthing point.
- (iv) Seconds stop-watch.
- (v) Clinometer.
- (vi) Tailplane incidence board.
- (vii) A variable voltage supply 20–30 Volts.

2. CONDITIONS OF TESTS

- (i) Tailplane assembled.
- (ii) Actuator and contactor access doors removed.
- (iii) The aircraft should be set up in the rigging position.
- (iv) The Desynn indicator marked for extremities of tailplane travel and zero incidence.

3. FUNCTIONAL CHECKS

- (i) At 28 Volts applied, set the actuator at approximately mid-stroke. Using the control column switch, inch three times, then reverse the direction of movement and inch three times in the opposite direction. Note peak current for inching and reversal. Repeat using standby circuit. (Figures to be recorded).
- (ii) Function actuator three times over full range using control column switch. Note volts, peak and steady amps., operating times and tailplane incidences at extreme positions. The current and operating time must not exceed 10 amps. and 13 secs. respectively.

## 2. FUNCTIONAL CHECKS (Contd.)

- (iii) Repeat (i) and (ii) above at 20 Volts applied. Function Actuator once over full range, using standby circuit.

Maximum limits for these tests are as tabulated below:—

Motor	Peak amps.	Steady amps.	Time (secs.)
Main	25	9	20
Standby	16	6	50

- (iv) Check that, with cover of standby switch lifted, operation of the control column switch does not cause movement of the tailplane. Remove all instruments, reconnect earthing points and function tailplane on normal and standby circuits, using aircraft electric supply.

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PART 3

RUDDER OR AILERON TRIM ACTUATOR TESTS

(ROTAX C 5021/2)

I.D. INSTRUCTION H09/6 (Issue 1)

PROCEDURE

- (i) The actuator should be fitted to the test rig (Drawing No.SE.483 for rudder trimmer or SE.484 for aileron trimmer), with ammeter, voltmeter and electrical supply from a battery.
- (ii) Function the actuator at no load and note the following:—
  - (a) Correct direction of rotation.
  - (b) 24 volts supply.
  - (c) Steady current not more than 0.43 amps.
  - (d) Operating time over 90<sup>0</sup> angular movement not more than 22½ seconds in either direction.

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PART 4

DATUM TRIM ACTUATOR  
(WESTERN TE Mk.1C, 1D and 1F)  
I.D. INSTRUCTION H09/8 (Issue 2)

The following tests are to be carried out on each Actuator before assembly on the aircraft:—

1. INSTRUMENTATION REQUIRED

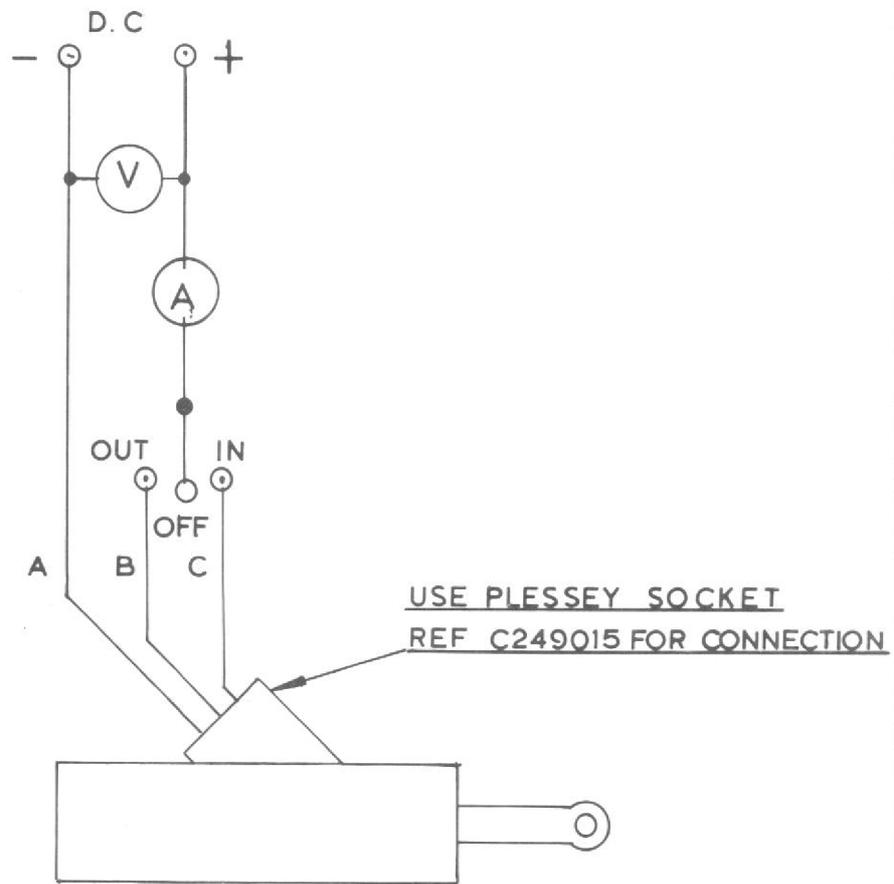
This is shown on I.D. Sk. 1054.

2. EQUIPMENT REQUIRED

- (i) Stop-watch, 1/5th second beat.
- (ii) Jig for backlash check.

3. TESTS

- (i) Operate the Actuator and check that with Pin B energized the ram moves outwards, and with Pin C energized that ram moves inwards.
- (ii) With 28 volts applied, inch the Actuator three times in one direction and then three times in the reverse direction. Record the average reading of peak current for both directions.
- (iii) Operate the Actuator three times over the full range and record steady current and operating time. The current must not exceed 0.90 amp. and the operating time must be within the limits of 2.2 and 3.4 seconds. Check travel in both directions. This must be within the limits 0.96 in. and 1.04 in.
- (iv) Repeat (ii) and (iii) above with 22 volts applied. The steady current must not exceed 0.80 amp. and the operating time must not exceed 4.6 seconds.
- (v) Remove test supply.
- (vi) Check the backlash between the eye ends of the actuator by applying a load of approx. 20 lb., in tension and compression successively. The backlash must not exceed 0.010 in.



D.C. SUPPLY

TO GIVE 22 & 28 VOLTS

AMMETER

RANGE 0-2 AMP

VOLTMETER

RANGE 0-40 VOLTS

SWITCH

3-POSITION CENTRE OFF

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PART 5

TIME DELAY SWITCH

(TEDDINGTON CONTROLS TYPE FHM/A/24)

I.D. INSTRUCTION H09/9 (Issue 2)

The following tests are to be carried out on each time switch before fitting it to the aircraft;

1. EQUIPMENT REQUIRED

- (i) Ammeter, range 0 to 2 amp. D.C.
- (ii) Push-button switch and indicator lamp.
- (iii) 500 volt megger.
- (iv) Stop-watch.

2. NORMAL FUNCTION

- (i) To test the normal function of the switch, first check that there is continuity between pins 1 and 2 of the unit. Then connect up the unit to the test circuit (ID. SK. 1142) and proceed as follows:—
- (ii) Start the stop-watch and simultaneously depress the push-button for approximately one second. (This period is necessary to allow the 'hold-in' contacts to close.) Check that the lamp lights after an interval of one to one and a half seconds and goes out after an interval of  $28 \begin{smallmatrix} +3 \\ -0 \end{smallmatrix}$  seconds, both periods being measured from the instant of first pressing the push-button.
- (iii) The current indicated on the ammeter must not exceed 1.1 amp. when carrying out this test at an applied voltage of 28 volts D.C.

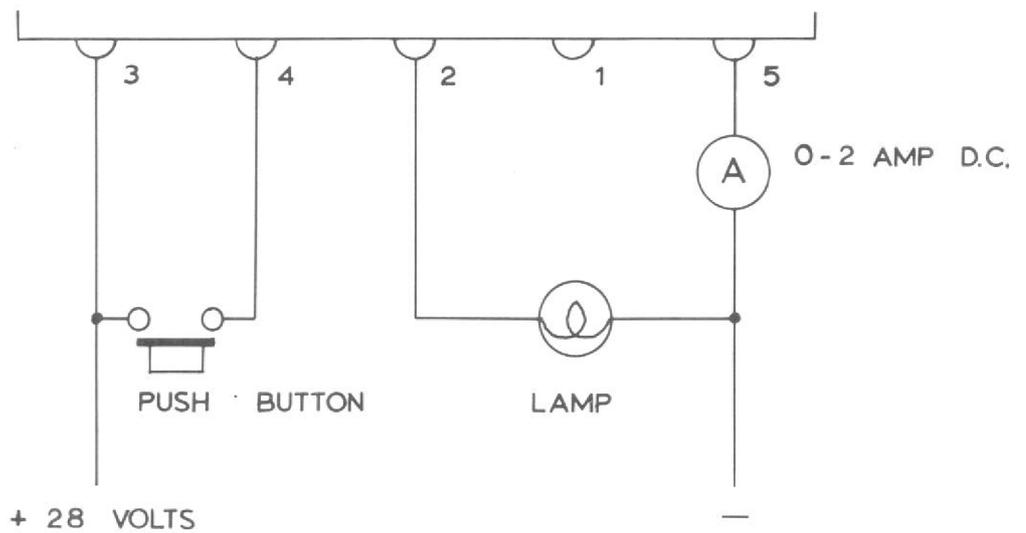
3. OVER-RUN CHECK

- (i) To check the over-run operation of the switch proceed as follows, the unit being connected as before.
- (ii) Maintain the push-button depressed. Check that at the end of the time cycle, the motor ceases to run (indicated by a drop in ammeter reading) but the lamp still remains alight until the push-button is released.

4. INSULATION TEST

Remove the unit from the test circuit and check that the insulation resistance from pin 2 and from pin 3 to the switch case is not less than 20 megohms. Check also that the insulation resistance from pin 4 to the switch case is not less than 2 megohms.

SOCKET CZ 27907



TEST CIRCUIT FOR DELAY SWITCH

IDSK 1142  
ISSUE B

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PART 6

TAILPLANE ACTUATOR

ROTAX TYPE A.1607, A.1607/1 or A.1612

I.D. INSTRUCTION H09/10 (Issue 2)  
(Incorporating Mod.No.A.S.H.650/73)

1. APPLICABILITY

This instruction applies to aircraft embodying Mod.605, 922 or 1145.

2. INSTRUMENTATION AND EQUIPMENT REQUIRED

- (i) Ammeter, range 0 to 50 amp. \* to indicate main motor current, connected into cables T.1 (2 off) at the rear fuselage earthing point.
- (ii) Ammeter, range 0 to 20 amp. \* to indicate standby motor current, connected into cable T.3 at the rear fuselage earthing point.
  - \* Alternatively, a single ammeter, range 0 to 30 amp. to indicate main and standby motor current, connected so that it is common to cables T.1 and T.2.
- (iii) Voltmeter, range 0 to 40 volts to indicate main motor voltage, connected between terminal 3 of the main contactor and the rear fuselage earthing point.
- (iv) Voltmeter, range 0 to 40 volts to indicate standby motor voltage, connected between terminal 3 of the standby contactor and the rear fuselage earthing point.
- (v) 1/5th second stop-watch.
- (vi) Clinometer.
- (vii) Tailplane incidence board.
- (viii) Ground supply, variable to give 20 or 28 volts.

3. CONDITIONS OF TEST

- (i) Tailplane assembled.
- (ii) Actuator and contactor access doors removed.
- (iii) Aircraft set up in the rigging position.
- (iv) Desynn indicator checked for neutral and extremities of tailplane incidence.

4. FUNCTIONAL CHECKS

- (i) Put the Tailplane Main-Control switch to Off. With 28 volts applied and the tailplane approximately at neutral, use the control column switch, (Port column on two-seater), to inch three times in one direction and then three times in the reverse direction. Record the peak current in both directions.
- (ii) Operate the actuator three times over full range using the control column switch (Port column on two-seater). Record for both directions the reading of current at the end of the stroke, the corresponding voltage, the operating time and the tailplane incidence at the extreme positions. The final current and operating time must not exceed 11.0 amp. and 8.6 sec. respectively.
- (iii) Repeat (i) above using the standby motor.
- (iv) Repeat the whole of the above procedure with 20 volts applied, and in addition operate the standby motor once over the full range at this voltage. Maximum limits for these tests are tabulated below.

Motor	Peak amps.	Final amps.	Time (secs.)
Main	25	9.5	10.8
Standby	15	4.5	23.0

- (v) Remove all instruments and test apparatus, re-connect earthing points and operate tailplane on normal and standby circuits using the aircraft electric supply.
- (vi) Check that with the cover of the standby switch lifted, operation of the control column switch does not cause movement of the tailplane.
- (vii) On Two-seater only, check that instructor's control switch (starboard column) over-rides the pupil's control column switch (port column). The instructor's switch must have complete control in all three positions of the pupil's switch.

Note . . .

The reading of peak current obtained will depend in part on the particular meter used, but an unusual reading will indicate a faulty actuator, i.e. it is a comparative check only.

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PART 7

TIME DELAY SWITCH

(TEDDINGTON CONTROLS TYPE FHM/A/68)

I.D. INSTRUCTION H09/11 (Issue 1)

1. APPLICABILITY

This time switch is introduced by Mod.625 (see Mod. Ref. Sheet).

The following tests are to be carried out on each time switch before fitting it to the aircraft.

2. EQUIPMENT REQUIRED

- (i) Ammeter, range 0 to 2 amp. D.C.
- (ii) Push-button switch and indicator lamp.
- (iii) 500 volt megger.
- (iv) Stop-watch.

3. NORMAL FUNCTION

- (i) To test the normal function of the switch, first check that there is continuity between pins 1 and 2 of the unit. Then connect up the unit to the test circuit (ID. SK.1142 Issue B) and proceed as follows:—
- (ii) Start the stop-watch and at the same time momentarily depress the push-button. Check that the lamp lights after an interval of 1 to 1.7 seconds and goes out after an interval of  $18 \begin{smallmatrix} +0 \\ -1 \end{smallmatrix}$  seconds, both periods being measured from the instant of first pressing the push-button.
- (iii) The current indicated on the ammeter must not exceed 1.1 amp. when carrying out this test at an applied voltage of 28 volts D.C.

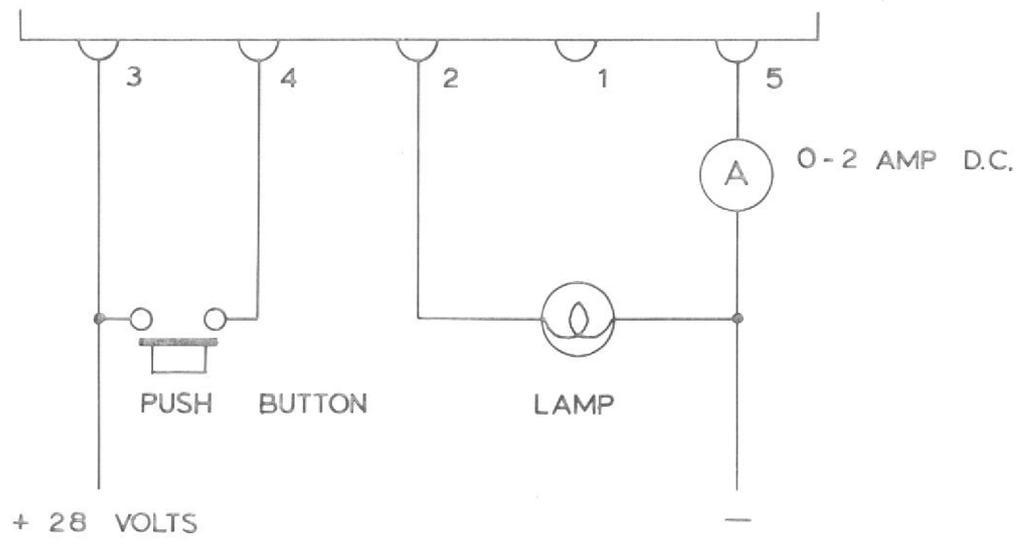
4. OVER-RUN CHECK

- (i) To check the over-run operation of the switch proceed as follows, the unit being connected as before.
- (ii) Maintain the push-button depressed. Check that after 29 to 32 seconds, the motor ceases to run (indicated by a drop in ammeter reading) but the lamp still remains alight until the push-button is released.

5. INSULATION TEST

Remove the unit from the test circuit and check that the insulation resistance from pin 2 and from pin 3 to the switch case is not less than 20 megohms. Check also that the insulation resistance from pin 4 to the switch case is not less than 2 megohms.

SOCKET CZ 27907



SECTION 6

ELECTRICAL

PART 8

INVERTER CHANGEOVER CIRCUIT

I.D. INSTRUCTION H09/12 (Issue 1)  
(Incorporating Mod.No.375)

1. APPLICABILITY

This instruction applies to aircraft embodying Mod.375. (See Mod. Ref. Sheet.) The following checks must be carried out on each aircraft to ensure that the revised inverter circuit is functioning correctly and that the additional torque switch protects the top-temperature control system.

2. TEST PROCEDURE (Battery Master Switch ON).

Note . . .

In the following instructions the 'MAIN' inverter, which is the forward mounted one, is referred to as No.1 and the 'STANDBY' as No.2.

- (i) Switch ON Engine-Master switch and check that No.2 inverter runs up and supplies the compass, the artificial horizon, and the oil pressure gauge. Check that this applies,
  - (a) with the Inverter Selector switch in both NORMAL and STANDBY positions.
  - (b) with the Radar switch in both ON and OFF positions.

Then return Inverter Selector switch to NORMAL and Radar switch to OFF.

- (ii) Operate and hold on the Test Switch on generator control panel (thus simulating "engine-running" conditions). Check that No.2 inverter ceases operation and No.1 commences, the instruments originally supplied by No.2 now being supplied by No.1. The changeover indicator should now show black (i.e. normal operation). Then check that,
  - (a) Selecting STANDBY with the Inverter Selector switch causes No.2 inverter to take over from No.1.
  - (b) Returning the Inverter Selector switch to NORMAL brings No.1 inverter into operation again and shuts down No.2.
- (iii) With the Inverter Selector switch at NORMAL, switch radar ON. Check that No.2 inverter runs up and that the radar indicator shows white, i.e. radar operating. Then, leaving the radar on check that,
  - (a) Selecting STANDBY with the Inverter Selector switch causes No.1 inverter to shut down so that the instruments are supplied by No.2 and the radar becomes inoperative. The changeover indicator will show white and the radar indicator black.
  - (b) Returning the Inverter Selector switch to NORMAL brings in No.1 inverter again and No.2 reverts to radar.

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PART 8

INVERTER CHANGEOVER CIRCUIT

I.D. INSTRUCTION H09/12 (Issue 1)  
(Incorporating Mod.No.375)

1. APPLICABILITY

This instruction applies to aircraft embodying Mod.375. (See Mod. Ref. Sheet.) The following checks must be carried out on each aircraft to ensure that the revised inverter circuit is functioning correctly and that the additional torque switch protects the top-temperature control system.

2. TEST PROCEDURE (Battery Master Switch ON).

Note . . .

In the following instructions the 'MAIN' inverter, which is the forward mounted one, is referred to as No.1 and the 'STANDBY' as No.2.

- (i) Switch ON Engine-Master switch and check that No.2 inverter runs up and supplies the compass, the artificial horizon, and the oil pressure gauge. Check that this applies,
  - (a) with the Inverter Selector switch in both NORMAL and STANDBY positions.
  - (b) with the Radar switch in both ON and OFF positions.

Then return Inverter Selector switch to NORMAL and Radar switch to OFF.

- (ii) Operate and hold on the Test Switch on generator control panel (thus simulating "engine-running" conditions). Check that No.2 inverter ceases operation and No.1 commences, the instruments originally supplied by No.2 now being supplied by No.1. The changeover indicator should now show black (i.e. normal operation). Then check that,
  - (a) Selecting STANDBY with the Inverter Selector switch causes No.2 inverter to take over from No.1.
  - (b) Returning the Inverter Selector switch to NORMAL brings No.1 inverter into operation again and shuts down No.2.
- (iii) With the Inverter Selector switch at NORMAL, switch radar ON. Check that No.2 inverter runs up and that the radar indicator shows white, i.e. radar operating. Then, leaving the radar on check that,
  - (a) Selecting STANDBY with the Inverter Selector switch causes No.1 inverter to shut down so that the instruments are supplied by No.2 and the radar becomes inoperative. The changeover indicator will show white and the radar indicator black.
  - (b) Returning the Inverter Selector switch to NORMAL brings in No.1 inverter again and No.2 reverts to radar.

## 2. TEST PROCEDURE (Contd.)

- (iv) Leaving the radar switch ON, trip the circuit breaker for No.1 inverter (this simulates a failure) and observe that this inverter ceases operation, also that the radar ceases to function. Check that the instruments continue to operate however, as these are supplied by No.2 inverter, the radar having been off-loaded. The changeover indicator will now show white and the radar indicator black.
- (v) Re-set No.1 inverter circuit-breaker and note that there is no resulting change in the operation of the inverters, i.e. No.2 still supplying the instruments and No.1 not functioning. Momentarily switch Inverter Selector switch to STANDBY and back to NORMAL again. Check that No.1 inverter recommences operation and supplies the instruments while No.2 reverts to supplying the radar.
- (vi) Trip No.2 inverter circuit-breaker and observe that No.2 inverter and hence the radar stop functioning. Remake circuit-breaker and check that they recommence operation.
- (vii) Release Test switch at generator control panel and allow it to return to NORMAL (this simulates engine or generator failure). Check that No.1 inverter and the radar cease operating and that the instruments are supplied from No.2 inverter. This completes the tests on the inverter changeover circuit.
- (viii) In conjunction with the revised circuit, a top-temperature A.C. control box has been fitted. Remove the A.C. supply plug to the top-temperature amplifier and connect three "delta" connected 115 volt. neon lamps to the supply cable. With either inverter running, the neon lamps will light. (Suitable neon lamps, complete with holder, are manufactured by Arcoelectric Ltd., West Molesey, Surrey.)
- (xi) Disconnect, in turn, No.10 and No.14 fuses situated in the main A.C. junction box, and check that in both instances all three lamps are extinguished. Then replace fuses and reconnect supply to the top-temperature amplifier.
- (x) Return all switches to OFF or NORMAL.

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PART 9

AUTOSTABILIZER Mk.2

I.D. INSTRUCTION H09/13 (Issue 2)

1. APPLICABILITY

This instruction applies to Hunter Mk.4, 5, 6, 50, 51 and T.7 aircraft embodying Mod.H.91 and H.417. The following test procedure must be carried out on each aircraft to ensure that the autostabilizer Mk.2 installation is functioning correctly.

2. REFERENCES

The autostabilizer Mk.2, as fitted to Hunter aircraft, is fully described in A.P.1469S, Vol.1, Sect.3.

3. EQUIPMENT REQUIRED

(i) Electrical Link Panel to ID.Sk.1552

This link-panel provides a means of introducing a 'disturbance' into the system, thus simulating flight conditions. The magnitude and direction of this disturbance is indicated by the 5 – 0 – 5 millimeter.

Adjustment of the control resistance RV1 about its centre position produces corresponding deflection of the trim tab about the neutral or trim position. Normally the trim tab, when so deflected, will automatically return to its original position but with switch S1 in the ON position the trim tab remains locked where it is set by RV1. The 15 – 0 – 15 voltmeter indicates the trim tab deflection introduced by the autostabilizer.

**WARNING** Always move RV1 slowly and always check that this control is at its centre position before switching the cockpit switch or the link panel switch to ON. Failure to do this will cause overload and consequent damage to the system.

(ii) Pitot-static Test Rig to ID.Sk.1553 Issue B

This rig is necessary to check the monitor unit and provides a means of applying static suction and differential pressure to simulate the required altitude and airspeed respectively.

With valves A and C open and valve B closed, suction is applied to both pitot and static lines to obtain the necessary equivalent altitude; then by carefully opening valve B to atmosphere with valves A and C closed, the necessary equivalent airspeed is obtained. To release the suction, first open valve C to equalize pitot and static lines, then open valve B to atmosphere.

## 3. EQUIPMENT REQUIRED (Contd.).

## (iii) Test Set No.1 Stores Ref.6C/1207

This test set is only necessary for isolating defective units, should the system be found faulty. Instructions for the use of the test set are contained inside the lid of the transit case.

## 4. TEST PROCEDURE

Note . . . All rigging checks must be carried out with the rudder at neutral.

## 5. PRELIMINARY

- (i) Connect the electrical link-panel into the autostabilizer system, set the control RV1 to the centre position and the switch S1 to OFF.
- (ii) Set the battery master switch, the engine master switch and the autostabilizer cockpit switch to ON.
- (iii) Set the rudder trim tab approximately to neutral by means of the manual control on the port shelf.

## 6. GENERAL SERVICEABILITY

- (i) Rotate RV1 slowly backwards and forwards. Check that the trim tab moves smoothly from side to side and returns approximately to neutral if RV1 is left in any one position for a few seconds.
- (ii) Set S1 to ON and check that the tab always remains in the position as selected by the setting of RV1 (the angle of tab movement obtainable is approximately  $6^{\circ}$  either side of neutral).

## 7. NEUTRAL TRIM SETTING

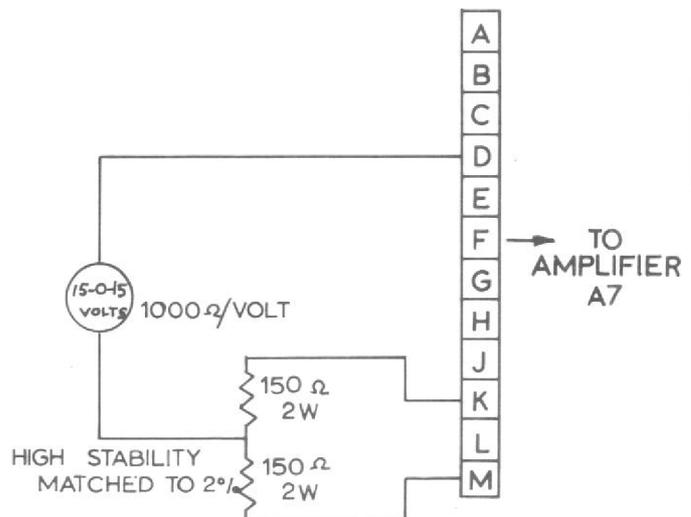
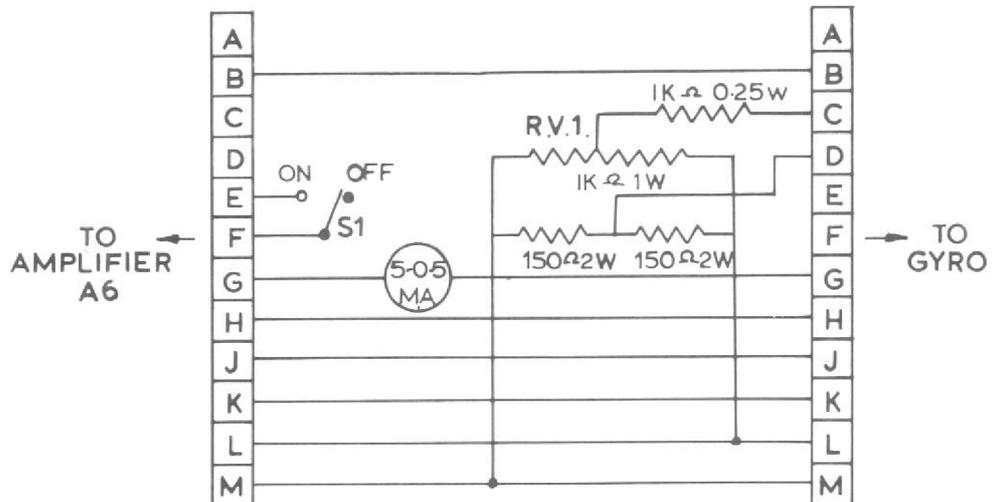
- (i) With S1 at OFF, rotate RV1 in one direction and note the deflection on the 15 – 0 – 15 voltmeter when conditions have become steady; then repeat in the other direction. In both instances the voltmeter pointer will come to rest somewhat short of zero and a number of checks should be made to ensure that the average deviation is equal about the zero point. If the deviation is not equal, it may be impossible to meet the requirements of 9(i) below, in which case fitting a different amplifier unit may bring an improvement.
- (ii) With S1 at OFF, rotate RV1 in one direction and note the position to which the tab returns; then likewise for the other direction. In both instances the trim tab will normally come to rest slightly short of neutral and the manual trim control should now be adjusted so that the deviation is equal in both directions, this being the true neutral setting. Check that the deviation, taken as an average of several tests, is not greater than  $0.030^{\circ}$  either side.
- (iii) Check that the desynn indicator shows neutral, and if necessary readjust in accordance with Drawing C.203729.

8. COCKPIT CONTROL SWITCH
- (i) Set S1 to ON and by means of RV1 set the trim tab to its full travel position in the port direction. Put the autostabilizer cockpit switch to STANDBY and check that the tab returns to within 0.030" of neutral. Then return RV1 to the centre position and the cockpit switch to ON.
  - (ii) Repeat test (i) above in the starboard direction.
9. TRIM TAB – LIMITS OF TRAVEL
- (i) Set S1 to ON and by means of RV1 set the trim tab to its full travel in first one and then the other direction. Check that the movements obtained are in accordance with the limits given on Drawing E.202984, latest issue. No adjustment is possible in respect of these limits.
  - (ii) Set S1 to OFF and check that the tab movement obtained using the manual trim control is in accordance with Drawing E.202984, latest issue. Details of the adjustment to obtain equal travel either way are given on Drawing C.203729.
  - (iii) Set S1 to ON and check that the combined tab movement obtained using the manual trim control in conjunction with RV1 is in accordance with Drawing E.202984, latest issue.
  - (iv) Set S1 to OFF and re-adjust the trim tab to neutral by means of the manual trim control.
10. MONITOR UNIT
- (i) Disconnect the aircraft pitot-static system from the monitor unit (installed under the hood fairing) and connect the pitot-static rig ID.Sk.1553 direct to the monitor unit. For the following tests the 15 – 0 – 15 voltmeter can be used as a direct indication of the tab position and movement.
  - (ii) With S1 set to ON, adjust RV1 to give approximately half-tab deflection. Then apply altitude conditions and check that from 30,000 ft. up to 44,000 ft. there is a steady increase in tab deflection, the airspeed being kept at zero for this test.
  - (iii) Reduce altitude to 20,000 ft. exactly. With S1 set to ON, rotate RV1 just sufficiently to obtain full travel of the trim tab. Gradually apply conditions of equivalent airspeed and check that from 240 knots upwards there is a steady decrease in tab deflection until at  $423 \frac{+10}{-0}$  knots the tab deflection increases suddenly, thus indicating that the Mach switch has operated.
  - (iv) Reduce altitude to 13,000 ft. and then reset the airspeed to approximately 440 knots. Set S1 to ON and by means of RV1 set the trim tab to its full travel. Then switch S1 to OFF and observe the rate at which the tab returns to neutral. Return RV1 to the central position, put S1 to ON, and by means of RV1, again set the trim tab to its full travel. Increase the speed to above 450 knots and check that when S1 is set to OFF the trim tab returns to neutral with an increase in speed. This proves that the airspeed contact has operated.
  - (v) Release the suction (by opening valve C, then valve B), then carefully reconnect the monitor unit to the aircraft pitot-static system.

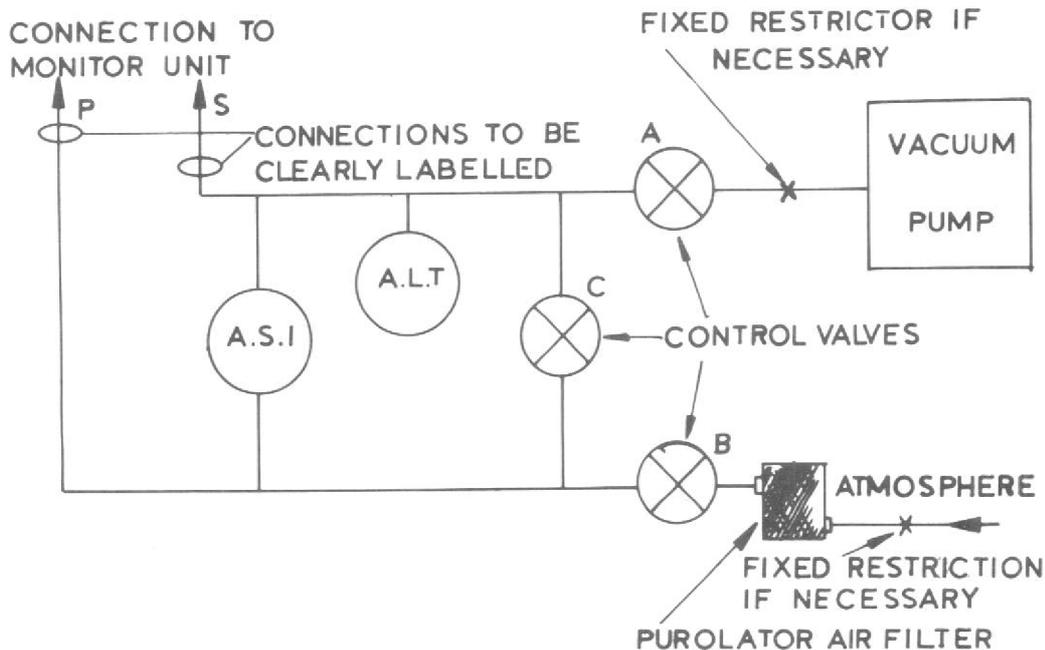
11. FINAL CHECKS

- (i) Set autostabilizer cockpit switch to OFF, remove the electrical link-panel and reconnect the cable (AS.3). Reset cockpit switch to ON.
- (ii) Push the tail of the aircraft to port. Check that the trim tab moves to starboard and then returns smoothly to the neutral position. Push the tail of the aircraft to starboard and check that the reverse movement occurs.
- (iii) Return all switches to OFF.

REF TEST INSTRUCTION HO9/13



- NOTE
- 1 THE HIGH STABILITY  $150\Omega$  RESISTORS MUST BE PERIODICALLY CHECKED TO ENSURE THAT THEY ARE MATCHED TO 2%.
  - 2 THE FOLLOWING WARNING TO BE MARKED ON PANEL: RAPID MOVEMENT OF RV1 WILL CAUSE OVERRUN AND CONSEQUENT DAMAGE OF SERVO-MOTOR



- NOTE.
1. VACUUM PUMP. LOW CAPACITY MOTORISED PUMP TO PROVIDE 2 LB/SQIN. ABSOLUTE.
  2. A.S.I. SENSITIVE A.S.I. TO READ UP TO 500 KNOTS WITH DISCRIMINATION OF 2 KNOTS
  3. ALTIMETER SENSITIVE ALTIMETER TO READ UP TO 45,000 FT
  - 4 CONTROL VALVES NEEDLE TYPE VALVES HAVING FINE ADJUSTMENT

PITOT-STATIC TEST RIG

AUTOSTABILIZER MK2 INSTALLATIONS

SECTION 6  
ELECTRICAL

PART 10

INVERTER CHANGEOVER CIRCUIT

I.D. INSTRUCTION H09/14 (Issue 1)

1. APPLICABILITY

This instruction applies to all Hunter Mk. T.7 aircraft. The following checks must be carried out on each aircraft to ensure that the inverter changeover circuit is functioning correctly.

2. TEST PROCEDURE (Battery-master switch ON)

- (i) Switch ON engine-master switch and check that the inverter changeover indicators show that both the STANDBY inverters are operating and thus supplying the compasses, the artificial horizons and the oil pressure gauge. Check that this condition applies with the inverter selector switches in both NORMAL and STANDBY positions; then return the selector switches to NORMAL.
- (ii) Operate and hold on the two test switches on the generator control panel (thus simulating engine-running conditions). Check that the changeover indicators show that the MAIN inverters are operating and thus supplying the instruments originally supplied by the standby inverters. The artificial horizon indicator will now show BLACK. Check the operation of both the inverter selector switches i.e. selecting STANDBY causes the appropriate indicator to show STANDBY.
- (iii) With the inverter selector switches at NORMAL, switch radar ON and check that the radar supply indicator shows WHITE, i.e. radar operating from the compass group standby inverter. Then with the radar ON, check that selecting STANDBY with the compass group selector switch causes the radar indicator to show BLACK and returning the selector switch to NORMAL causes the indicator to revert to WHITE.
- (iv) Leaving the radar switch ON, trip No.1 (in the fwd. to aft direction) circuit-breaker, thus simulating a failure of the compass group main inverter. Check that the compasses continue to function, however, as these are supplied by the corresponding standby inverter, the radar having been off loaded. The compass group indicator will now show STANDBY and the radar indicator BLACK.
- (v) Re-set No.1 circuit-breaker and note that there is no resulting change in the operating of the inverters. Momentarily switch the compass-group selector switch to STANDBY and back to NORMAL again. Check that the changeover indicator then shows MAIN and the radar indicator WHITE.

## 2. TEST PROCEDURE (Contd.).

- (vi) Trip No.2 circuit-breaker and check that the radar indicator shows BLACK although the changeover indicators are unaffected. Re-set the circuit-breaker and check that the radar indicator reverts to WHITE.
- (vii) Trip No.3 circuit-breaker, thus simulating a failure of the Art. Hor. group main inverter. Check that the artificial horizons continue operation, being supplied from the corresponding standby inverter. The Art. Hor. group indicator will show STANDBY and the artificial horizon indicator WHITE.
- (viii) Trip No.4 circuit-breaker. Check that the artificial horizons cease to function, and that the Art. Hor. group indicator shows OFF. Re-set this circuit-breaker and note that there is a reversion to the conditions of (i) above.
- (ix) Re-set No.3 circuit-breaker and note that there is no change in the operation of the inverters. Momentarily switch the Art. Hor. group selector switch to STANDBY and back to NORMAL again. Check that the changeover indicator then shows MAIN and the artificial horizon indicator BLACK.
- (x) Release test switches at generator control panel and lock them to NORMAL. (This simulates failure of engine or generators). Check that both changeover indicators show STANDBY, the radar indicator BLACK and the artificial horizon indicator WHITE.
- (xi) Return all switches to OFF or NORMAL and, finally, check that the changeover indicators return to OFF.

SECTION 6

ELECTRICAL

PART 11

MONITOR UNIT

(TYPE B. STORES REF. 6S/40)

I.D. INSTRUCTION H09/15 (Issue 2)

1. APPLICABILITY

- (i) The monitor unit type B is part of the autostabiliser Mk.2 installation fitted to Hunter Mk.4, 5, 6, 7, 8, 50, 51, 53, 56 and 66 aircraft embodying Mod.H.91 and H.417.
- (ii) It is recommended that the following test procedure should be carried out on all monitor units when received into Stores and again prior to installation if more than 6 months has elapsed since the initial test.
- (iii) The tests may also be used to establish the reason for a monitor unit being rejected during final testing to instruction H.09/13. For actual servicing, however, test set No.2 Mk.2 is available and this should be used in accordance with AP.1469S Vol.4, Part.6.

2. EQUIPMENT REQUIRED

- (i) Pitot-static Test Rig to ID.Sk.1553, Issue B (SE.798).
- (ii) Switch unit to ID.Sk.2032 (SE.1483).
- (iii) Avometer model 7 or suitable ohmmeter.

3. TEST PROCEDURE

- (i) Connect the pitot-static rig to the monitor unit which must be tested in the normal position with the connections uppermost. Attach the switch unit to the Avometer set to 'ohms' and correctly zeroed for use on the 10,000 ranges as required; then connect to the monitor unit by means of the 12 way Plessey socket.
- (ii) Set the switch to position 1 and apply altitude conditions until at least 15,000 ft. is obtained and then close the control valve A on the pitot-static rig. Check that there is no continuous fall in altimeter reading due to leakages in the monitor unit.
- (iii) If there is no leakage, continue to apply altitude conditions and check that the resistance shown on the Avometer varies with altitude as follows:—

Height in feet	Resistance	± Limits
0 – 30,000	350 ohms	32 ohms
36,000	114 ohms	15 ohms
44,000	59 ohms	6 ohms

## 3. TEST PROCEDURE (Contd.).

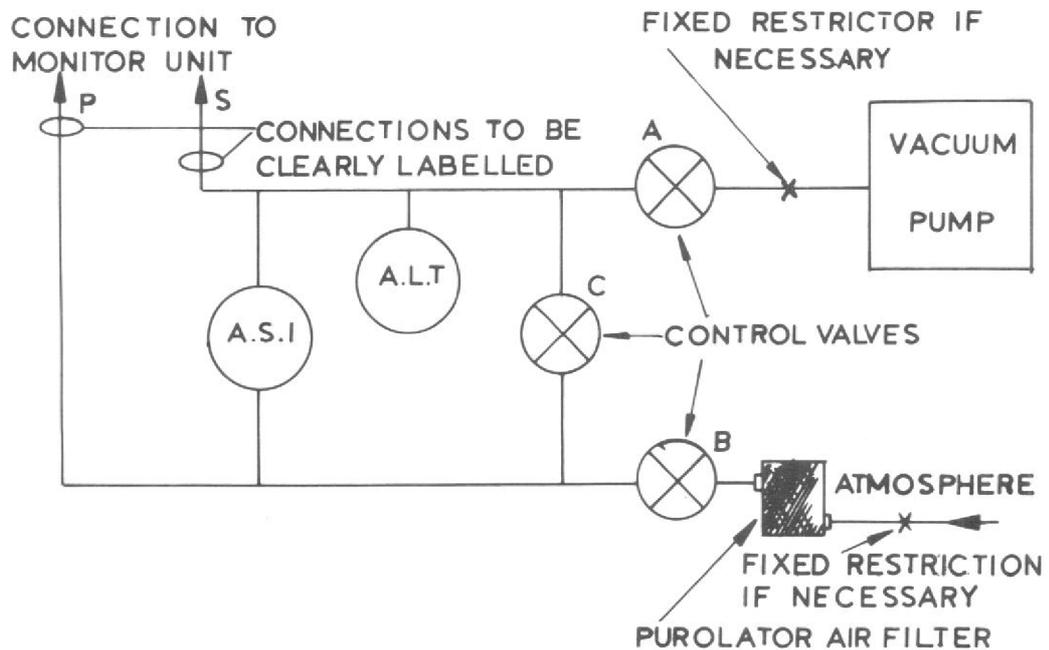
- (iv) Set the switch to position 2 and reduce the altitude to 20,000 ft. exactly. Gradually apply conditions of equivalent airspeed and check that at between 423 and 440 knots the mach switch operates, this being indicated by F.S.D. on the Avometer.
- (v) Set the switch to position 3 and reduce the airspeed to below 240 knots. The altitude must be greater than 13,000 ft. but otherwise for this and the following test, the actual value is not important. Gradually apply equivalent airspeed and check that the resistance shown on the Avometer varies with airspeed as follows:—

Airspeed in Knots	Resistance	± Limits
0 – 240	920 ohms	45 ohms
350	625 ohms	35 ohms
450	360 ohms	25 ohms

- (vi) Set the switch to position 4. Vary the airspeed and check that at  $450 \pm 6$  knots, the airspeed contacts close, this being indicated by F.S.D. on the Avometer.
- (vii) Release the suction (by opening valve C, then valve B) and disconnect the test equipment. Units which are satisfactory should be clearly stamped and any that do not conform to the test requirements rejected.

## Note . . .

When checking resistance values in tables, ensure that the ohmmeter indicates a closed circuit and comes to rest within the specified limits with respect to airspeed and height.

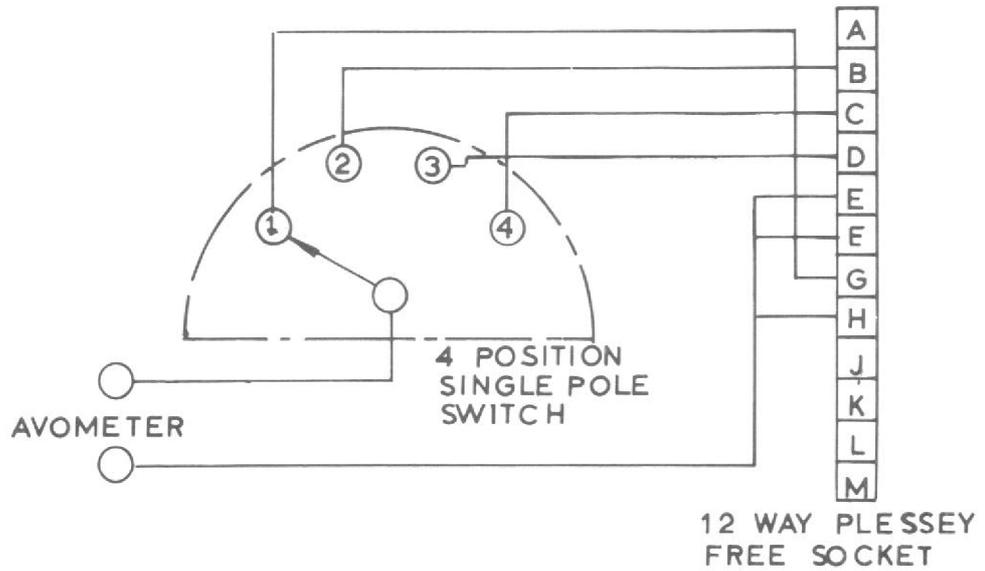


- NOTE. 1. VACUUM PUMP. LOW CAPACITY MOTORISED PUMP TO PROVIDE 2 LB/SQ IN. ABSOLUTE.
2. A.S.I. SENSITIVE A.S.I. TO READ UP TO 500 KNOTS WITH DISCRIMINATION OF 2 KNOTS
3. ALTIMETER SENSITIVE ALTIMETER TO READ UP TO 45,000 FT
4. CONTROL VALVES NEEDLE TYPE VALVES HAVING FINE ADJUSTMENT

PITOT-STATIC TEST RIG

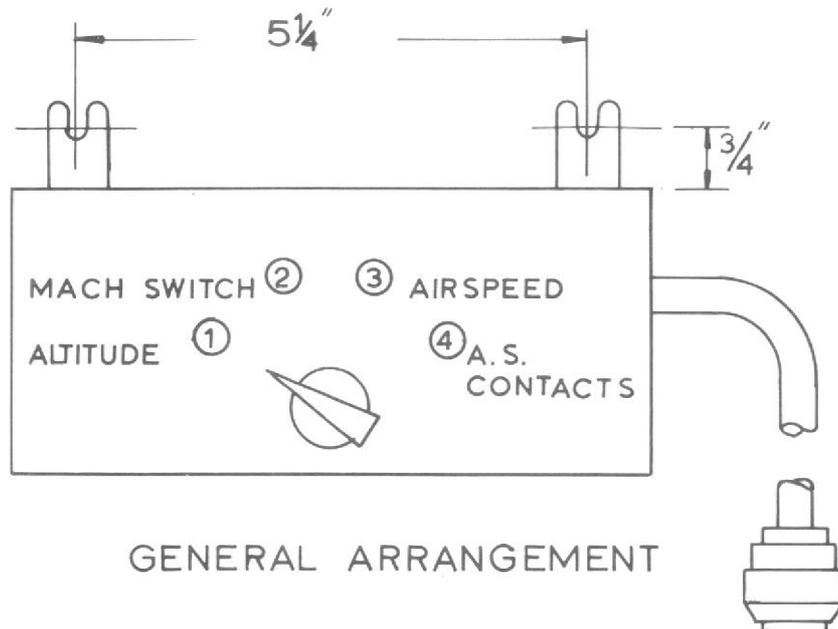
AUTOSTABILIZER MK2 INSTALLATIONS

REF TEST INSTRUCTION HO 9/15



THEORY DIAGRAM

SLOTS FOR  $\frac{3}{16}$ " TERMINALS

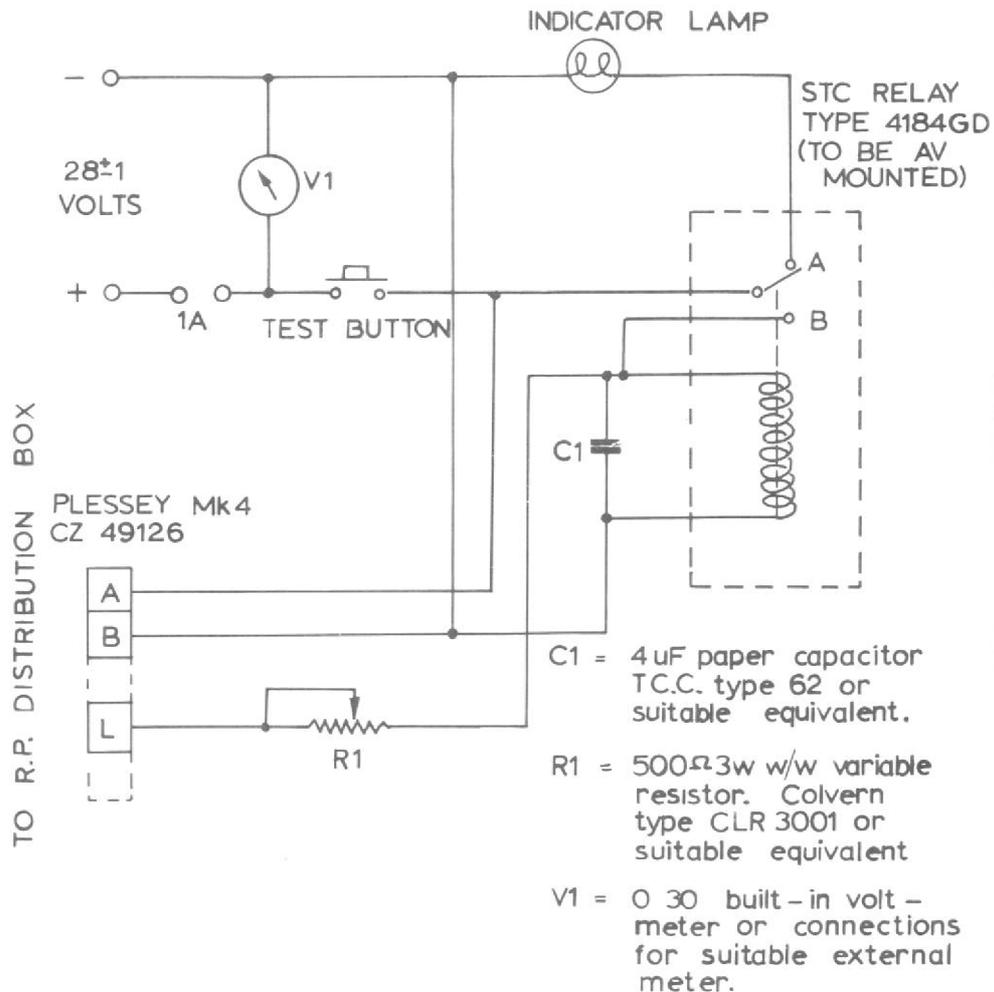


SWITCH UNIT FOR MONITOR UNIT  
TYPE B REF 65/40

I.D.S.K 2032



4.     RESETTING AND SEQUENCING (Contd.).
- (v)    Set the switch to position 4, operate the test button 6 times and check that the lamps light in a succession of fours.
  - (vi)    Set the ripple/normal switch to "ripple" and the R.P. selector switch to position 1. Depress the test button and check that the lamps light singly in continuous succession; then reset the mechanism.
  - (vii)   Set the selector switch to position 2. Depress the test button and check that the lamps light in a continuous succession of pairs then reset.
  - (viii)   Set the switch to position 4. Depress the test button and check that the lamps light in a continuous succession of threes; then reset.
  - (ix)    Set the switch to position 4. Depress the test button and check that the lamps light in a continuous succession of fours; then reset.
  - (x)     Repeat (i) to (ix) above with 22 volts supply. For R.P. distribution boxes which are to be fitted to aircraft under M.o.A. contract, clearance to 24 volts is acceptable.
  - (xi)    Disconnect the tester. Units which are satisfactory should be clearly stamped and any that do not conform to the test requirement rejected.



TIME ADJUSTMENT

Resistor R1 to be set so that the time between the test-button contacts being closed and full volts being applied to contact 'B' of the relay is  $10.5 \pm 0.2$  m8.. at 28.0 volts.

This control should then be sealed, although adjustment must be carried out if the time exceeds the limits or  $10.5 \pm 1.0$  m8.

For R.P. Distribution Box 5D/1761

RELAY TEST BOX

IDSK 2121

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