1139581 A/C.2 JEFFREY HUT H3

Rough Notes

Lochhead

5TH LEICESTERS
/ TIGERS.

[illegible]

3.

Senior Airman of H. 3. J.
Judge Jeffrey

E. Jeffrey
[illegible], King Street
Oadby
Nr Leicester
England

1359581. A.C.2. JEFFREY. S.E.
HUT. H.6. No.3 (T) WING
R.A.F. St. ATHAN
GLAMORGAN
S. Wales

THEN AND, NOW

G Checklin
UPPER [illegible]
Leicester

"U" ENTRY

TIGERS
5th LEICESTERS
239th BATTERY

Automatic Boost Control.

June 28th. Saturday Morning

Is a device fitted to an aircraft engine to automatically control boost pressure and so relieve the pilot of this responsibility. The device itself consists of an air tight chamber which is connected to the pressure side of the super charger. Anchored to the top of the chamber by means of a screwed spindle is a stack of ~~evacuated~~ evacuated capsules. These capsules are connected to a piston valve which moves in one direction or the other depending upon whether the aneroid expands or contracts under the influence of changes of pressure in the induction system. If the aneroid extends due to a reduction of pressure the piston valve is lowered and H.P. oil is permitted to enter the Servo Cylinder to the Lower side of the Servo Piston which in turn is forced up in the cylinder. The Servo Piston is connected to toggle link work which is interposed between the throttle operating lever and the throttle and is arranged in such a way that when the piston rises the throttle is opened. Should the induction pressure rise to high the

aneroid contracts and oil pressure forces the servo piston down and so closes the throttle.

Boost Over ridering Device

From the foregoing it will be obvious that while the boost pressure is being maintained at normal by the automatic control, the power out-put of the engine will also be normal. In certain circumstances such as when taking off the pilot may wish to use the maximum power of which the engine is capable. To obtain this extra power the boost control must be reset to give a slightly larger throttle opening. This is accomplished by a movement of a lever in the pilots cock-pit which brings into operation a device known as boost override.

Mixture enriching device

In view of the increasing compression and expansion pressures, due to the larger throttle opening it is imperative that from 10% to 15% increase in mixture strength to suppress detonation The extra petrol required for this is supplied

by a mixture enriching device which comes into ~~use~~ operation a few degrees before the boost override with which it is connected. The extra petrol reaches the induction system before the boost pressure increases thereby depressing detonation.

Monday June 30th 1941

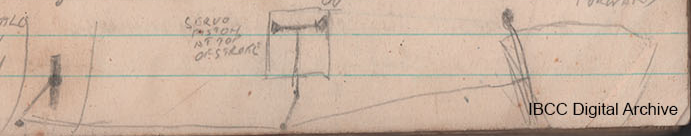
DASH-POT TO ELLIMINATE OSCILLATIONS

AIR LEAK HOLE TO PREVENT OIL FROM QUENCHING DE

ADJUSTING OVERRIDING & ENRICHMENT DEVICES ON A

2 STAGE A.B.C.

Connecting control rods and toggles &c.



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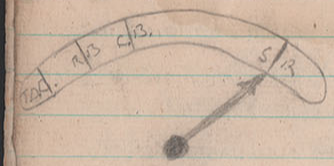
Meaning Servo piston connection

This connecting rod should be rather on short side than too long otherwise servo piston will reach top of stroke before throttle is fully open. This will affect power output at altitude and will not be apparent when engine is running on the ground

Connecting throttle control rods A.V.T 85 11.13.



POSSIBLE DEFECTS OR FAILURE IF BOOST PRESS IS TOO HIGH

1/ AIR LEAK

2/ ANEROID PUNCTURED

3/ STICKING PISTON VALVE (DOWN)

4/ LOCKING NUT SLACK, ANEROID SPINDLE SCREWED DOWN

5

BOOST PRESSURE TOO LOW

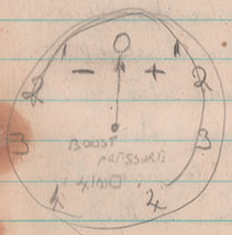
1/ FAILURE OF OIL SUPPLY

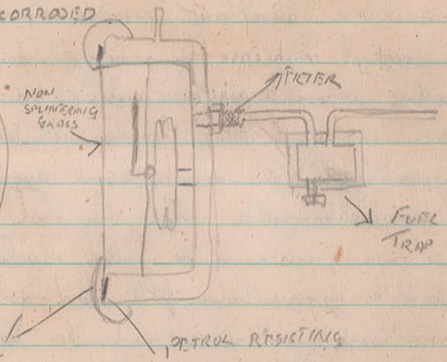
2/ STICKING PISTON VALVE (UP)

3/ LOCKING NUT SLACK ANEROID SPINDLE SCREWED UP

ERRATIC BOOST PRESSURE POSSIBLE FAILURE

1/ UNIT WORK CORRODED





DTD Air Compressor When Maximum

On line 2 stroke cycle operation.

DTD 109 or DTD 72

Everywhere

OIL TO PREVENT MAKE BALL VALVE EFFECTIVE

JULY 1ST TUESDAY

OIL USED DTD 72 EVERFLO RUNNING HAS IN THE SUMP OF THE
CASTOR OIL OIL COMPRESSOR

DTH AIR COMPRESSOR OPERATION:-

ON 2 stroke principle piston ascends causing depression in crank-case atmospheric pressure forces inlet-valve from seating crank-case is charged piston descends compresses air in crank-case and at bottom of stroke uncovers transverse ports through wich air enters cylinder rising piston then forces air through by-pass valve by a ball non-return valve and oil seal to air bottle. When the pressure in the bottle reaches its maximum permissable by-pass valve lifts and air is then by-passed to crank-case and the load on the compressor is reduced. An oil seal is fitted in the pipe line so that a quantity of oil is carried back to the ball non-return valve thus effectively sealing it when the compressor is by-passing.

POSSIBLE FAILURES.

1/ Leaking Pipe lines
2/ Inlet Valve
3/ By-Pass-BALL-Non Return Valves
4 Crank-case Joints

EXHAUST CONTROL

A type of hydraulic control consisting of a transmitter unit having a hand operating lever, and a receiver unit having a lever which follows the first. Each unit consists of Rocker Assembly, Spring Assembly, Piston & Cylinder. Connecting units together is a length of pipe line and the cistern is filled with a free flowing liquid which is kept under pressure by the action of the springs which oppose each other. Fluid tightness is maintained by packing glands each gland containing a cup leather.

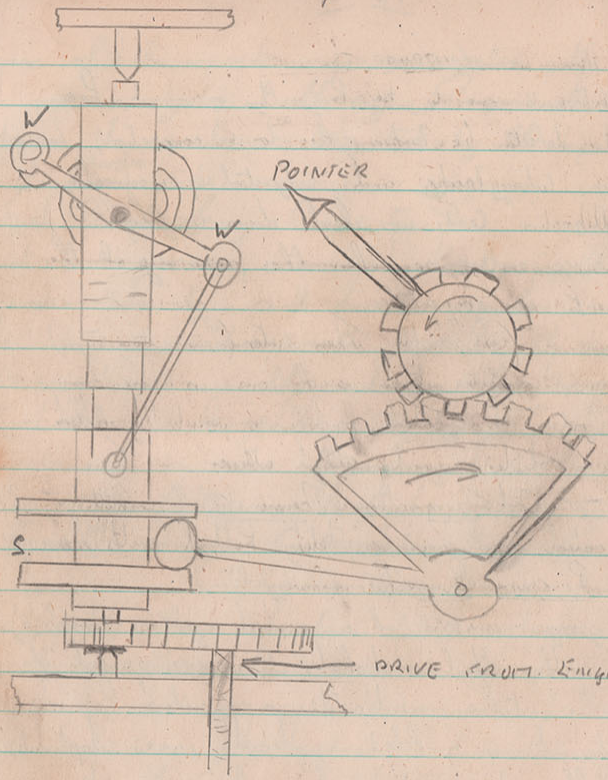
A reservoir is fitted to the transmitter unit so that the system may be compensated for any variation in volume caused by changing temperatures, or slight leaks. A compensating valve is fitted between the reservoir and the cylinder and is brought into operation when the operating lever is moved to the aft end of its travel, piston being on the upward st...

Hydraulic Pumps. Fitting to Engine

Vickers	Examine splines
Bristol	Lubricate where necessary
Dowty	Examine sealing rings or gland
Lockheed	Use correct joint between mounting flanges

Mechanical Revolution Indicator Wednesday 2nd July

The weighted arm is driven round at speed proportional to that of the engine. The weights fly outwards, as in the case of the ordinary steam engine governor, and like the sleeves which take up a definite position for any given speed. The pointer of the instrument is operated by the sleeve through a toothed quadrant and pinion.



INSTRUMENTS.

All instruments are to be frequently examined for external defects i.e broken glass loose connections, loose clips on tubing, leaks, and subjected periodically to calibration tests as laid down in flight maintainance orders or when the accuracy of the instruments is suspected.

Radiator Thermometer (Transmitting type)

The vapour pressure type is the one in common use. The whole system is sealed and is partially filled with a volatile liquid ethyl ether.

— Oil Temperature Thermometer (Transmitting type)

The sealed system is completely filled with mercury.

Oil Pressure Gauge (Transmitting type)

The gauge consists of a sealed system completely filled with ethyl alcohol, it is comprised of a bourdon tube, capillaries & capsules. Capsule is contained in a flat cyndrical case adapted for fitting the engine by means of a special hollow bolt and washers mounted that the

exterior of the capsule is in communication with the oil pressure system of the engine. Pressure of the oil on the capsule is transmitted by the liquid to the bourdon tube.

Fuel Pressure Gauge. (Direct type)

The fuel under pressure is conveyed direct to the bourdon tube by a small diameter pipe line. This pressure tends to straighten out the bourdon tube and so move the pointer on the dial.

Fuel Pressure Gauge (Transmitting type) —

Constructed on same line as oil pressure gauge adopted for fitting in the fuel pressure system

Flexible drives for Revolution Indicators (Tachometer Drive)

To enable Rev indicators to be driven in remote positions, the connection to the engine is by a flexible shaft running at ½ engine speed. The shaft is encased in a flexible brass sheath packed with grease for the purpose of lubrication.

Precautions. when fitting flexible drive make

that it is adequately supported throughout its length. Have as few bends as possible and no bend less than 9" radius.

Fitting instruments.

1/ Always use brass screws 2/ Always fit washers or serve pads between instrument and panel. 3/ Capillary tube must be coiled up to a diameter not less than 6" and clipped to the bulkhead in three places. 4/ Diameter of anti vibrating coil 1½". 5/ Secure capillary and tubing etc to adjacent parts using rubber packing at distances not exceeding 18" apart.

Bezel Colour Colours

Orange or yellow indicate oil.

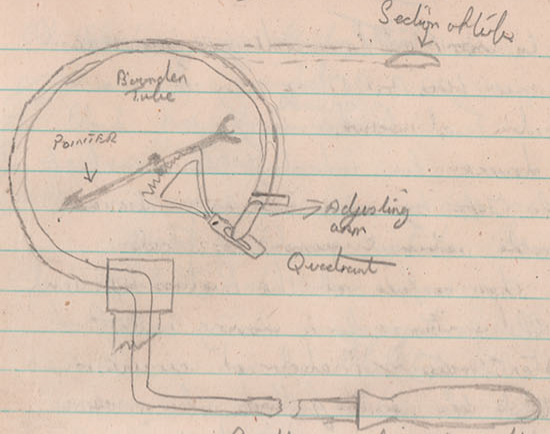
Blue indicate coolant temperatures

Red indicates air Fuel.

Electrical Instruments.

Engine Cylinder Thermometer.

This is fitted to air cooled engines to provide the pilot with temperature of engine



cylinder. The thermo couple is suitable mounted to register an accurate temperature of the cylinder. The indicator itself is mounted on the instrument panel, and the two are connected electrically by means of a suitable compensating lead. In action the apparatus depends on the fact that when two dissimilar metals are joined together at both ends and heat is applied at one end

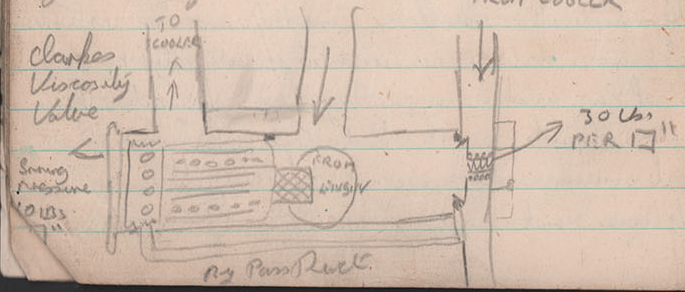
17.24 15

generator to 24 V. The voltage generated is 1 volt per 100 R.P.M.

Electrical Fuel Condense Gauge

is a device for indicating the amount of fuel in the tanks by means of a pointer and dial on the instrument panel. A float resting on the surface of the fuel in the tank determines the position of a moving contact on a potentiometer, an electrical circuit is so arranged that the pointer follows the movement of the potentiometer arm and indicates on a scale the volume of fuel in the tank.

The instrument has gives the tail down, and level flight reading



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Oil temperature gauge Stainless Steel

1/ Use clips provided

2/ Check for zero error

3/ Contacts LEADS clean

4/ No account must lead be shortened to effect repair Engine cylinder thermometer Electrical Fuel Contents Gauge

Good Point Make sure gauge has full range

F.E. Gilroy.

Oil Tanks Aluminium Welded Seams Dural Riveted

called a thermo couple or hot junction a small e.m.f is generated.

The amount generated depends on the metals used (in this case copper & constantin.) and the difference in temperature between hot and cold junction. The E.M.F generated does not exceed .02 volts. The instrument itself is graduated direct in degrees of centigrade.

Electrical Engine Speed Indicator (Vert.)

Is fitted to indicate the speed of the engine crank-shaft on multi-engine aircraft where the engines are situated at a distance from the instrument panel rendering the mechanical types inconvenient, it also enables several indicator movements to be used side by side in one instrument case. The instrument consists of two units generator & the indicator the generator is a dynamo and the indicator a volt meter The generator is driven by a flexible shaft at ½ E.S. and the ratio stepped up in the

Clarkes Viscosity Control Valve

Visoty control valve is incorporated in the lubrication system of the engine and is fitted between scavenger pumps and oil tank. It controls through the changing viscosity of the oil, the flow of the oil from engine direct to tank or from the engine via the cooler to the tank. It is essentially a viscosity valve, not a thermo control valve.

Thermostat for liquid cooled Engines.

A thermostat is fitted to liquid cooled aero engines, to keep the engine warm under all conditions, to avoid severe internal stresses through sudden changes of temperature. This is done by by passing the radiator so long as the coolant temperature is below a predetermined value and by gradually bringing the radiator into operation as the temperature rises. After a predetermined rise in temperature the full cooling capacity of the radiator is used.

Tests

1/ On starting engine when from cold the coolant

temperature should rise rapidly 85° centigrade and should remain steady.

2/ During flight temp should not fall more than 10°C below the opening temperature stamped on the Thermostat

Examination on Receipt

Exam should be made to see that the radiator valve is fully closed and by-pass is fully opened. Should the bypass be observed to be closed instrument is damaged and unserviceable

Symptoms of Failure

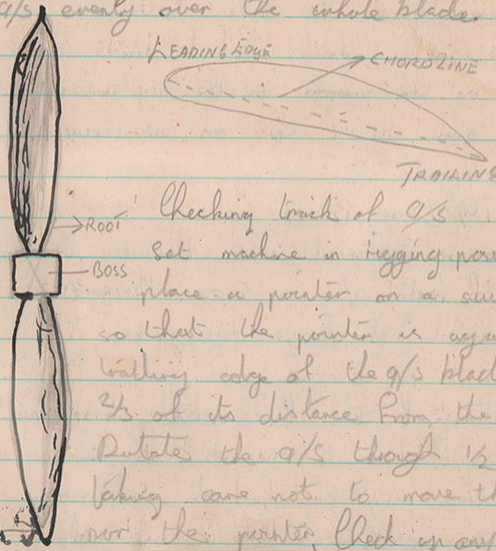
1/ Engine warms up too slowly. 2/ Thermostat controlling temperatures at very low value

3. Big fluctuations of coolant temperatures during flight.

Air Screw

Air screws fitted to the machine in order to convert the rotary motion of the engine in to traction force. Pitch of an a/s is the distance the a/s will travel forward

in one Rev assuming that there is no slip (measured in feet & inches) Blade Angle B.A varies from Root to Tip because the tip of the a/s travels faster than a point near the root of the Blade. The angle of the blade is greater near the root theoretically this distributes the thrust of the a/s evenly over the whole blade.



Checking track of a/s

Set machine in rigging position and place a pointer on a suitable stand so that the pointer is against the trailing edge of the a/s blade about ⅔ of its distance from the centre. Rotate the a/s through ½ a Rev taking care not to move the machine nor the pointer, check up any clearance

between the pewter and the trailing edge if the clearance exceeds 3/16 the a/s should be removed.

Static Balance 5 ozs 4 Dwts.

Owing to the fact that an airscrew is purely a rotating body care must be taken to ensure that the weight on one side of the axis is exactly the same within subscribed limits as the weight on ~~the weight~~ on the opposite side. To check and adjust this an air-screw is statically balanced.

Metal a/s (Fixed Pitch)

The maximum balanced error allowed in the manufacture of metal a/s is 5" oz. Balance of a metal a/s should not change during use.

Fitting a/s to HVB.

The position of the hub in the boss must be carefully checked to ensure that it is concentric, this may be checked by inserting Feeler gauge inserted between hub and the

boss. When tightening the hub bolts ensure that they are tightened gradually and evenly otherwise damage to the boss faces may result.

Fitting Gypsy a/s to Engine.

Turn engine a/s in D.O.R slowly ~~clockwise~~ until the impulse starter is heard to "click". Fit hub to shaft in such a position that lower half of blade is between 4 and 5 o'clock.

De Havilland Variable Pitch a/s.

Mounting.

1/ Remove the screw plug from the inside of the a/s shaft and clean out the oilway.

2/ Locate the rear cone (if any) on the a/s shaft against the thrust nut.

3/ Clean the air screw shaft & a/s splines and smear with Whitmores Compound.

4/ With the cylinder head lock ring and cylinder head removed slide the a/s hub over the shaft to engage the splines or serations correctly and screw on the piston. Care should be taken to ensure that the threads engage correctly and that NO

Force is used to start the thread.

5/ Tighten the piston with the spanner, tommy bar and extension tools provided. With the bar under the load (800 lbs torque) the tommy bar should be given a smart blow as near as possible to the box spanner with the Rammer.

6/ Secure the piston with its lock-ring using the steel split-pins provided.

7/ Fit the cylinder head with its gasket making certain that the gasket rests squarely and is retained on the cylinder head. Secure the head with its lock-wire.

8 After an initial greasing with the pressure grease gun the engine for 2/3 revs with the blades in fine pitch, the a/s regreased & rerun up. This should be repeated until no more grease can be inserted. Change the pitch several times during running check for function.

Test

After the first test flight and also at

the specified inspection periods the tightness of the a/s Rub and piston on the shafts must be checked.

TANKS

Sheet steel welded by the ringing when struck. Majority have filler heads fitted so that it is in a position to have adequate air space. Aluminium & Paint corrosion Grey White.

ANTI VOLTEX DEVICE FITTED IN HEADER TANK TO PREVENT AIR LOCKS. Examinations should be carried out according to F/Maintenance Orders.

6/8 PER □" 1½ TO 2 lbs
COOLANT TOOL

INSTALLATION

EXTRACTION OF ENGINE FROM A/F
AFTER USING
230 FUEL ENGINE HAS TO BE THROUGHOLY
CLEAN. AND RUN UP FOR 20 MINS WITH 224
Chocks in front of wheels & behind. Jack,
balance the tail. Cowlings or A/S first
Use dust cap provided after taking off A/S
1, Oil, 2, Fuel, or do one system at a time
3, Throttle and other controls, 4 Gauge Connections.
Two ~~wire~~ drives out of way. Slacken Bearer Bolts
1 turn at a time undo them diametrically opposite

Preparing engine for Packing
Remove Sparking Plugs Fit Blanking Plugs
Spray with Anti Corrosive Lhanolised oil
When spraying have B.D.C on piston
Blank off all unions with Blanking plugs.
Clean engine down Give Anticorrosive "SOZOL"
Keep away from Magneto, Leads & covered.
All bright metal parts covered with Yellow Grease
On airscrew shaft use oiled paper or oiled rag if
no dust cap is available.

If engine is storage for any length of time
turn engine over once a week
Get the appropriate packing case and store in
cool, dry, place marking box ~~with~~ indicating the
position of engine

Removing engine from Packing Case
Checking list, Packing Note, Check Mags
Prepair Engine for Installation, contact breaker
Remove Lhanolised oil from cylinder. points in stand & gap.
Remove Blanking Plugs & Fit Correct Plugs
Check HT LEADS. Check for Continuity - Lamp & Battery.
Ignition and all covers TEST H.T. LEADS WITH A MEGGER
Check TAPPET Clearances. Rocker Gear Check everything
Prepare A/F to receive engine.
Chocks in front of wheels & behind Ballast ~~into~~
tail Check Bearer Plate. Check controls coming
through bulkhead Check for continuity Port switch
Leads N.B. magneto gap. Renew rubber joint washers
if defecting. Check joints for security and also
locking devices. Get engine in correct sling

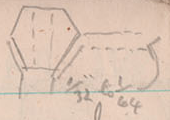
and correct position and tighter Boosser Bolts diametically opposite
Pit instruments dont damage capillary tube
tachometer drive Check Let Galed throttle
after Guard test Check up Plug leads
Put nose into wind Pull control column
towards rear of plane take out Fire
equipment If engine has been in storage
for long time prime it with warm oil
Start up engine and look at
1st Oil Pressure Guage.
2 Stop engine and look at Joints etc after
the number of Revs have died down
Magnetos when I is turned off the drop in
Revs should not be more than Approx 3%
Let Galed throttle
Procedure adopted to Stopping Engine
1 Turn off main Fuel supply
Close throttle down switch off and
operate Cut-offs
If fitted with CUT-OFF servic

1 Turn off Fuel
2 Close throttle when engine is running irregular
Switch off Mags
In Case of Fire
Do NOT switch off ~~Mags~~ magnetos
Turn off Fuel and open throttle

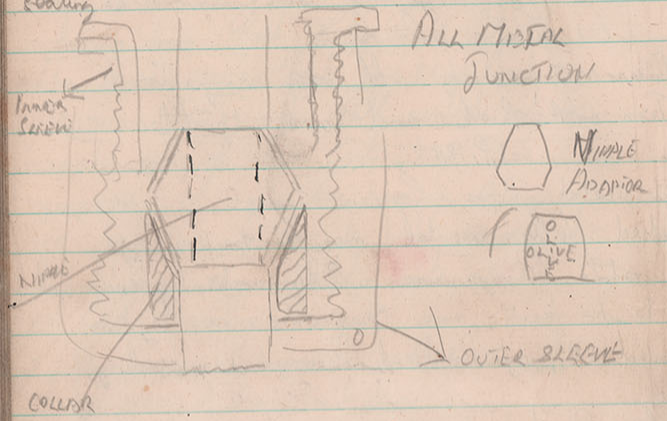
PIPES

Rigid metal Pipes Copper Pipes
Supplied fully annealed must be bent in its
cold state Always use a filler and plug ends up
Not to be bent more than once as they are
subjected to age hardened Always use bending
machine
Stainless Steel
Always bent to shape, ready for fitting.
Light Alloy
Chief purpose where lightness is main consideration
Can be used for conduit air vents
Tungsten Varnish Use bending machine must not be bent
more than once Used on Coolant System where
Ethylene Glycol is used

Fit nipple in end of pipe
Collar chamfered and provides a good



sealing



ALL METAL JUNCTION

ALL METAL ~~NN~~

Measure from the bellied out portion of the pipe to the ~~cutter~~ edge of the collar 1/32 - 1/64 Standard Union
Advantage attaching pipe to fixed member

Before making joints test with fuel
Blow one end of the pipe fit a Non Return Valve and apply pressure of approx. 20 lbs □"

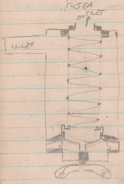
Rubber Joints

Petrol resisting Rubber Dipped in tin
Prevents rubber from sticking to pipe also corroding.
(Stainless Steel paint with Air Drying Varnish)
Beading prevents sharp edge from digging into rubber. Also prevents Rubber from slipping about
Bonding is a means whereby all metal parts or components are bonded together to cause 1 common earth

Rubber Joint.

Two Pipes Bellied out (olive) According to the diameter of the pipe so that depth of entry varies

ROYAL AERONAUTICAL ESTABLISHMENT



Lever in fully forward position
Insert ·002" feeler between Throttle butterfly & stop
Leave a clearance between the full movement of throttle.
Rods Forks ends have a safety hole if it is prevented from going through it is considered safe

Setting of Gated Throttle

Barometer reads in inches of mercury
Standard pressure 29·9 = 14·7.
Between −2 lbs□" reading on the gauge +2 lbs
degree of error is 1% or 1/8 of 1lb per □"
−2−4 and +2+4 degree of error is 2% or 1/4lb per □"

$\frac{14.2}{14.7} \times 29.9$

Checking lubber line of the day and
Obtain Barometric Pressure 29·9. convert
to lbs □" ÷ 2·04 Check reading of gauge by
this Take a/c out and run up everything
in best running condi
1 Loosen Gate & slide fully forward
Boost Pressure at gate + 1lb pressure for
the day ~~—~~ 1/2.

Open throttle until boost gauge reads +½. Mark throttle quadrant and slide back throttle.
To check
Open throttle to mark made and check gauge if correct lock Gate
Check position of rubber line
Work up hook for Maximum Permissable Boost.
1/ Fuel Red 2/ Oil Black 3/ Coolant Blue 4/ Compressed Air Yellow.
5/ Hydraulic White 6/ Automatic Controls Brown. 7/ Engine Starting Green.
Flexible Pipe Petroflex - Fuel Only
Lateral Bonding wire Layer of Hose Gat oil will attack Hose gat and it will expand Double wrapping of unproofed cotton fabric varnished, outer spiral, primary supports
Outer bonding wire. Identified by Brass Tag. Maximum life of 3 years also Bonding wire 22 Hexagon Nuts

Syper. Flexit. Fuel & Oil
Consists of lateral wire bonding. Then a lair of unproofed cotton fabric double lair of cellulose film 2 layers of unproofed cotton fabric. A rubber sheath over that. lair of unproofed cotton fabric which is then varnished. outer spiral wire. on metal braided. Marked round thimble at

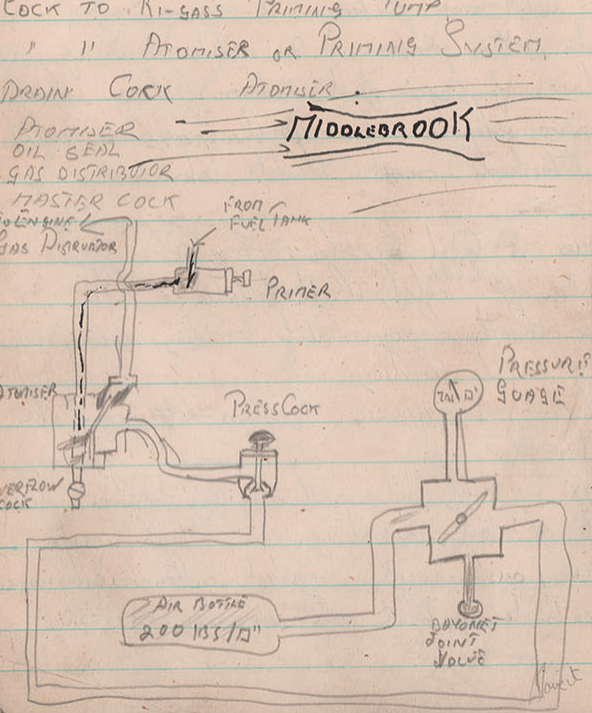
Aeroflexus - Oil System. Fairly heavy pressure consists of flexible metal sheath cellulose film rubber sheath heavy metal braiding incorporated in that is the bonding.
Aeroflex - Hydraulic System Heavier build than Aeroflex.
Silvoflex Fuel oil, and also Hydraulic System. Consist of oil resisting tube, High tensile steel wire reinforcement, braided cotton reinforcement on the outside of that oil & weather resisting tube.

MIDDLEBROOK

Tubular Clips
Double Band

Gas Starter System.

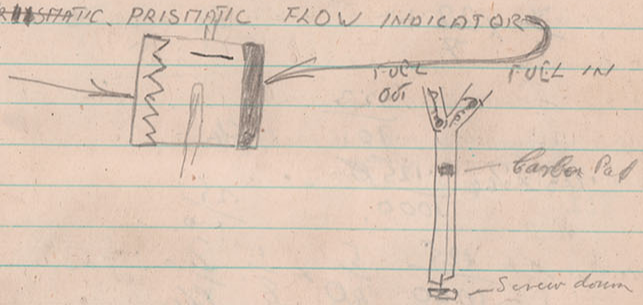
Cock to Ki-gass Priming Pump
" " Atomiser or Priming System.
Drain Cock Atomiser.



See you've got sufficient Compressed Air.
Master Cock Open.
Turn on Fuel
Turn on C Directs Fuel to.

Note Boost Pressure. +1 lb.

Prismatic Prismatic Flow Indicator



BORE 2" LENGTH OF STROKE 7"

$\frac{2 \times 7}{2} \times 2 \times 7 \times \frac{22}{7}$ $3\frac{1}{7}$ $\frac{22}{7}$

△ △ 55 70 55

△ 150.

$\frac{7}{1} \times \frac{22}{7}$ 22

$\frac{7}{1} \times \frac{22}{7}$ 22

$\frac{323}{16}$ 64

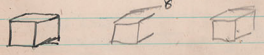
$\cdot 125 \times 1/64$ $\frac{\cdot 125}{1000}$. $\frac{\cdot 25}{100}$.

$\frac{125}{1000}$. $\frac{5}{40} \times \frac{1}{8}$. $\frac{8}{64}$

$\cdot 125$

$\frac{110}{20}$ $\cdot 55$. $\frac{\cdot 5\ 125}{1000}$. $\frac{1}{64}$ $\frac{1}{51.2}$

8



100 CENT - 212 FAR
0 - 32

INSTALLATION (LIQUID COOLED)

Farhenite to Centigrade Minus - 32 $\times$ 5/9

$-32 \times 5/9$

Centigrade to Farhenite 9/5 + 32.   FAHRENHEIT.

$\frac{212}{1} - \frac{32}{1} \times \frac{5}{9}$ $\frac{212}{180}$ $\frac{20}{180} \times \frac{5}{9}$. $\frac{100}{1}$

$\frac{\overset{20.}{100}}{1} \times \frac{9}{5} + \frac{32}{1}$

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150   $\frac{188}{1} \times \frac{9}{5}$. $\frac{1692}{5}$

338.

FLAMELESS HEATER

Description The Flameless Heater is a small portable device designed to provide by means of slow combustion of liquid fuel a certain amount of heat without the existance of a naked flame. In cold, cold weather this heat is utilised to keep warm various aeroplane components, such as pipe lines, oil tanks, and also portable oil tanks. It may also be used to prevent condensation of moisture on the instrument on the cockpit and cabin.

Operation.

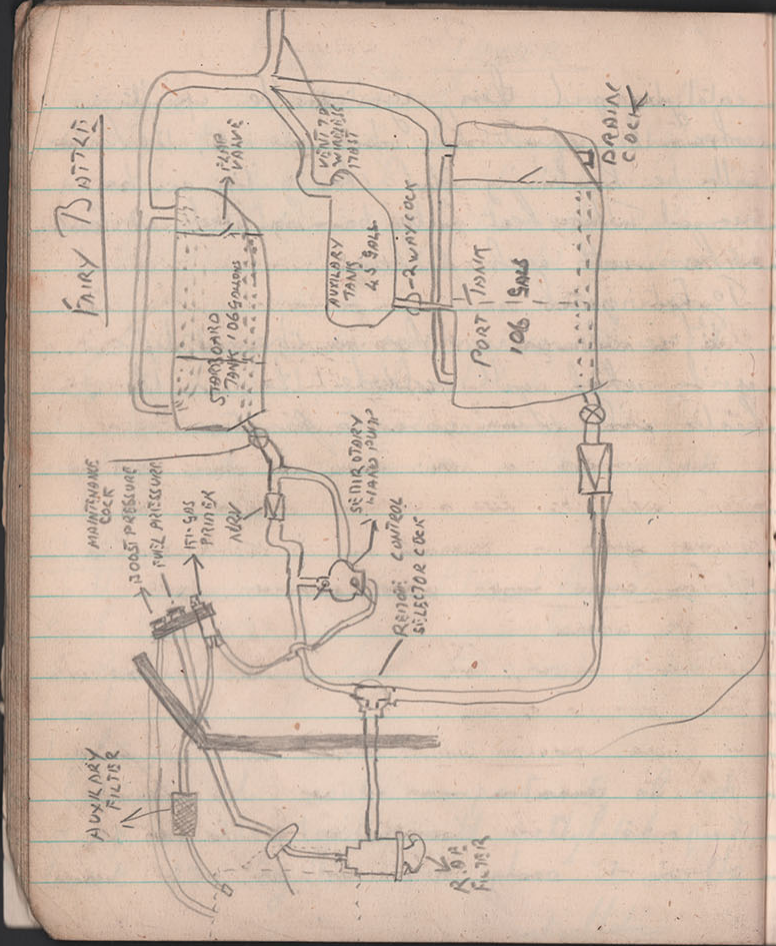
Fill reservoir with Filtered Aviation fuel D.T.D. 224 in no circumstances is a fuel containing lead D.T.D. 230 is to be used

Lighting.

Saturate the centre compartments of each group on the ignitor with methylated spirits, invert the ignitor and place it on the catalytic grid then ignite the spirit when the spirit has burned out, the Heater will be functioning and the ignitor can be removed. This heat will be maintained at least 45 hours with each filling.

To Extinguish

Place the extinguisher on the catalytic grid which will exclude the air, the Heater will then cease to function



GRAVINER FIRE EXTINGUISHER

Its purpose is to put out fires in the engine compartments if a crash occurs and to enable fires to be extinguished in flight or if the a/c overturns if making a forced landing. The extinguishing medium used is pure methyl bromide contained in copper bottles under an high pressure. When this fluid is discharged it immediately evaporates with an intense cooling effect. The engine is sprayed with the fluid so that the hot metal parts become instantly reduced in heat below the ignition point of petrol and the fire is instantly smothered. The Graviner system is operated by 3 simple switches

1/ The crash switch which operates immediately the a/c crashes

2/ Gravity switch operates when an aircraft inadvertently turns over in landing

3/ Flame operated switch which comes into action when the temperature around it reaches 150° centigrade.

The push button control enables the pilot to flood his engine compartments with methyl bromide before an expected crash.

Advantages.

1/ A heavier load can be taken off with the same power.

2/ Operation height reached more quickly

3/ Small aerodromes may be used with safety/Work

4/ Extra power used for its most directly useful for

5/ Aircraft is equally efficient at ground level and altitudes.

Disadvantage. 1/ Extra Weight.

Concise description of V.P. To adapt the power available to the variable conditions of load.

Note: When pilots lands pitch should be fine as a safety precaution but before switching off pitch should be ~~fine~~ altered to coarse (for remove)

Oil Coolers.

1/ Function of an oil cooler.

Modern aero engines develop high powers and are extensively cowled to reduce head resistance to the aeroplane. This tends to cause the lubricating oil to become overheated and so necessitates the introduction of an cooling device in the oil line.

POSITION IN SYSTEM Between engine scavenger oil pump and oil tank. Oil coolers employed on aeroplanes are air cooled and are generally mounted in the slipstream of the airscrew.

A/Cy TYPE. P. 325 COOLER

Description The main members of the cooler are a number of fins assembled on 2 parallel connecting tubes the fins being separated from one another by means of intermediate spacing rings. An odd number of fins are employed because oil flows through the fins in series and must emerge at the outlet connection which is situated on the side opposite to that of the inlet

Inhibiting

Anti corrosive treatment D.T.D 230

Engines which have been run on leaded fuel Before storage the engine cylinders should be sprayed internally with an inhibiting fluid known as E.S 174. The amount of fluid used varies with the size of the cylinders, not between 5 -25 cc. per cylinder. The spraying is carried out through the plug holes with the pistons at B.D.C. thereafter the engine should not be turned during storage if it should be it must be reinhibited. Inhibiting must be carried out every 6 months. The sump should be partially filled with Mandrised oil the quantity varying as laid down in the makers hand book. In the case of an inline engine with an O.C.S remove cam shaft cover and coat with Mandrised oil engine

Engines which have been run on D.T.D 226 into each cylinder Mandrised oil is injected with a syringe

A/C SPECIFICATION	OCTANE VALUE	COLOUR	A/C IDENTIFICATION	A/C USED IN
R.D.E/F/70 D.T.D 224	70 77	None Faint Blue or Red Tint	70/70 224/77	Motor Transport Normally Aspirated Normally Aspirated Highly Supercharged Must not be used with compression above 5.5-1
D.T.D 230	87	Blue or Red	230/87	Highly Supercharged Moderately Supercharged Engines
—	90	No Special	90/90	American A/C (is blend of 230-100)
R.D.E/F/100	100	Green	100/100	High Compression & Highly Supercharged Engines

Proffessor Leedham

Cleaning Oil Filter
Clean fuel filter with Lead free petrol
120°FAR 40°C 1st

MAINTENANCE SCHEDULE - SECTION II SUB SECTION B/

AIRSCREW	30 A	60 AB	90 AB	120 AB	150 AB	180 AB	210 AB	240 AB
AS.1 EXAMINE BLADES FOR DAMAGE SEE THAT PROTECTIVE COATING IS MAINTAINED AS NECESSARY								
AS.2* REMOVE SPINNER & EXAMINE HUB FOR DAMAGE & LEAKS								
POWER PLANT. P.P.1* INSPECT ENGINE MOUNTING RING FOR DAMAGE & CORROSION								
P.P.2 INSPECT PUSH RODS FOR WEAR & CORROSION								

EXPLANATION
UNSTARRED ITEMS INSPECTED EVERY 30 HOURS (MINOR INSPECTION
1 " " " " 60
2 " " " " 90
3 " " " " 120
BLOCK LETTERED ITEMS WITH CODE REFERENCE UNDERLINED 240. (MAJOR INSPECTION

SECTION OF MAINTENANCE SCHEDULE

SEC	TYPE OF INSPECTION	WHEN CARRIED OUT
I	BETWEEN FLIGHTS	BETWEEN EVERY FLIGHT
	DAILY	EVERY 24 HOURS UNLESS I MINOR INSPECTIONS DUE II MACHINE IS U/S. III MACHINE DOES NOT FLY IN WHICH CASE DI MAY BE UP TO 7 DAYS BUT MUST HAVE DI NOT MORE THAN 24 HOUR BEFORE FLYING - AT LEAST EVERY 7 DAYS WHETHER IT FLYS OR NOT.

SUB SECTION B.
FLT. MECH (E)

SEC II
SUB SECT B.
FLT MECH (E)
MINOR - EVERY 30 or 40 HRS
MAJOR AFTER EVERY 8th PERIOD OF 30 OR 40 HOURS, I.E. EVERY 240 OR 320 HRS.

PERIOD OF FLYING HOURS.		ITEMS TO BE INSPECTED
30	40	ALL UNSTARRED ITEMS.
60	80	" + *
90	120	" + **
120	160	" + * + ***
150	200	"
180	240	" + * + **
210	280	"
240	320	" + * + ** + *** +

Minor Insp.

ALL ITEMS IN BLOCK LETTERS WITH CODE INDEX UNDERLINED

VARIATIONS OF THE PERIODICITY OF OPERATIONS IN MINOR INSPECTIONS ARE TO BE INDICATED BY STARS (*) AS FOLLOWS.

UNSTARRED - OPERATIONS TO BE DONE AT EACH MINOR INSPECTION

* " " " " " AT ALTERNATE MINOR "

** " " " " " AT EACH 3RD MINOR "

*** " " " " " AT EACH 4TH MINOR "

Includes Tappet Clearances

VOL I ~~Engine~~ DESCRIPTIVE HAND BOOK

PART I VOL II GEN MODIFICATIONS.

PART II VOL II FITS & CLEARANCES

PART III VOL II FOR REPAIRS

VOL III SPARE PARTS

AP 113.1

OSU/14/4/3/9

~~H.S.B.M. 9/32~~ 1.2 9/10

Engine Log Book

Yellow - Certificate Sqnd. C. H/SS 6.13A

Blue - Repair Log.

Pink - Modification Log.

White - Chronological "

Section 1.6

F. Mc. { Daily Inspection & Between Flights

Minor Repairs.

In a maintenance cycle of 240 hours with the minor inspections at 30 hrs intervals, the schedule will operate as follows.

1st Minor Inspection – Unstarred operations

2nd " " – " and 1* "

3rd " " – " and 2* " "

4th " " – " and 1* and 3* operations

5th " " – " operations

6th " " – and 1* and 2** operations

7th " " – operations

8th Major Inspections

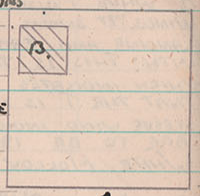
In a maintenance cycle of 320 hours with the minor inspections at 40 hour intervals the same system of starring will obtain. Additional operations noted in the supplementary inspection record are to be done at the appropriate period

Ground Signals

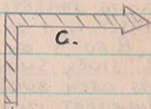
A variety of signs have been provided, which, when laid out in accordance with instructions form a guide in the air. These signs are interpreted in the following manner:-

(A.) Signal area. A 42ft., white hollow square situated out-side the watch office. Inside it are displayed the various signals to machines in the air.

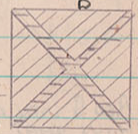
(B) Red square. (Of 3 sides). Displayed in the signal area. Indicates that the aerodrome is not open to private aircraft.



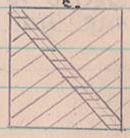
(C) A right-handed red arrow in the form of a right-angle. When placed on the top L.H corner of the signal area, it indicates that a R.H circuit is to be made before landing, or after taking off. No signal is displayed for normal L.H. circuits. At stations where the circuit is variable, the direction is indicated to the ground staff by green and red flags hoisted on the duty pilot's mast. Red for L.H. Green for R.H.



(D) A yellow diagonal cross. This signal, in the form of a yellow X is superimposed on the red square (B) to indicate that all landing is prohibited.

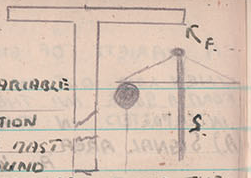


(E) A yellow diagonal, placed from the bottom L.H corner to the top R.H. corner of the red square (in place of the X above), shows that temporary obstructions exist and that special care must be taken when landing.



(F)

LANDING DIRECTION T.

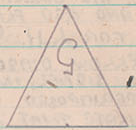


A WHITE T DISPLAYED DURING LIGHT OR VARIABLE WINDS. IT SHOWS THE PRECISE DIRECTION FOR LANDING AND TAKING OFF. USED IN CONJUNCTION WITH: THIS IS THE BLACK BALL (S) AT THE MAST WHICH INDICATES TO PILOTS ON THE GROUND THAT THE T IS IN USE. WHEN THESE SIGNALS ARE IN USE THE SLEEVE WIND INDICATOR AND ANY SMOKE-TYPE INDICATORS ARE TO BE IGNORED.

WHITE HOLLOW SQUARE (H)

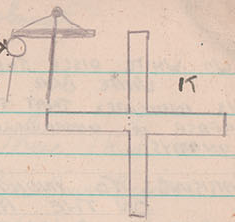
THIS IS FORMED FROM H. STRIPS 8'6" BY 1'4", TO INDICATE THAT BOMBING AND DIVING PRACTICE ON AERODROME TARGETS IS IN PROGRESS. THE ACTUAL TARGET IS A SOLID SQUARE 15 BY 15.

(1) RED G ON A WHITE TRIANGLE 12' SIDES, SHOWS THAT THE AERODROME HAS BEEN SUBJECTED TO A GAS ATTACK. AIR-CRAFT MAY LAND, BUT MUST TAXY TO WIND-WARD SIDE OF 'DROME TO AWAIT FURTHER INSTRUCTIONS.

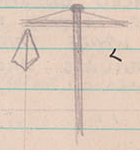


(2) RED G WITH BAR BENEATH, ON A WHITE TRIANGLE SHOWS THAT THE AERODROME HAS BEEN SUBJECTED TO A GAS ATTACK; AIR-CRAFT ARE NOT TO LAND.

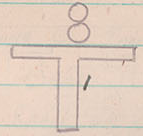
A WHITE CROSS, AS IN THE SKETCH (K) OR A RED BALL AT THE MAST INDICATES PARACHUTE-DROPPING IS IN PROGRESS.

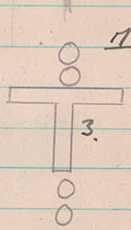


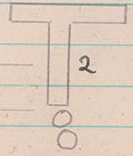
(4) YELLOW PYRAMID AT THE MAST:- WARNS PILOTS THAT THEY MUST AVOID TAXYING ACROSS THE LANDING BEACON. (LORENZ BEAM).



RECALL SIGNALS. THESE ARE WHITE T-PIECES WITH WHITE DISCS AS ARRANGED IN SKETCH

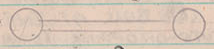






1. LOCAL RECALL. ALL AIRCRAFT OF THAT STATION TO RETURN HOME.
2. GENERAL RECALL. ALL AIRCRAFT TO RETURN TO THEIR OWN STATION.
3. GENERAL RECALL. ALL AIR-CRAFT TO LAND AT NEAREST AERODROME.

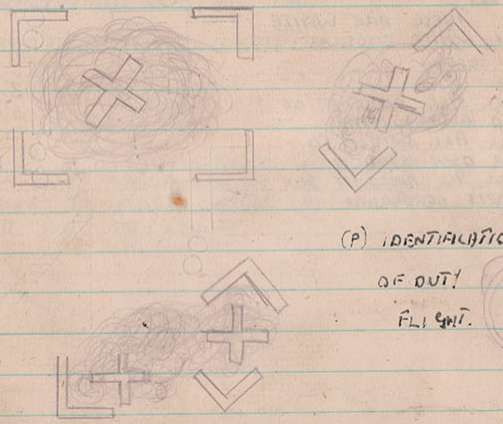
TWO WHITE DISCS JOINED BY A WHITE BAR.



THIS INDICATES THAT THE AERODROME SURFACE IS UNSERVICEABLE EXCEPT FOR THE PERMANENT RUNAWAYS.

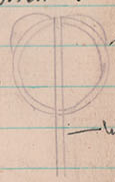
MARKINGS TO INDICATE BAD PATCHES OF GROUND ON THE AERODROME.

BAD PATCHES OF GROUND OR TEMPORARY OBSTRUCTIONS ARE ENCLOSED BY WHITE L-PIECES WITH A WHITE CROSS PLACED ON THE UNSERVICEABLE PART. TO ASSIST PILOTS WHO ARE TAXYING, THESE MARKS ARE SUPPLEMENTED BY STRIPS OF WHITE CANVAS ATTACHED TO SHORT STAKES SET AT INTERVALS AROUND THE AREA CONCERNED.



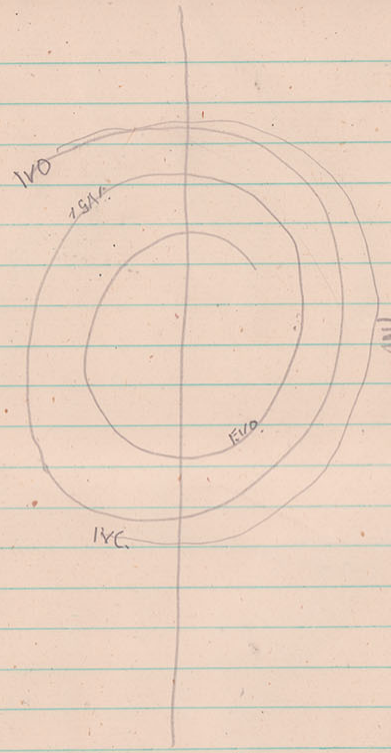
(P) IDENTIFICATION P.

OF DUTY FLIGHT.



Lubricants

Mayo	9p.	Gal 3/6p.	Types.	
Edwards	2/-	Livry 9p.		
Pontung	6½	Types.		Where Used
Phillips	6½	Grease	ANTI-FREEZE	HINGES, BALL-ROLLER-BEARINGS
Mullineaux	6½	HIGH MELTING POINT.		REAR C.B. Unit (PIVOT), RADIAL VALVES ASSEMBLY
Jones	1/-	ANTIFREEZE		KESTREL COOLANT PUMP
McFadyean	9p	SILKOLENE.		MERLIN " "
Welch	6½	VP. (Heavy)	MOBILGREASE	VP. A/SH NORMAL WEATHER CONDITIONS
Threadgold	6½	VP. (LIGHT)	" "2.	VP/A/SH COLD " "
Graham	1/-	OIL FLUSHING.		CLEANING OIL TANKS.
Rawlins	1/-	CASTOR	D.T.D. 72.	TEST BENCH RUNNING
Relph	1/-½	" TREATED		OIL SEALS, AIR COMPRESSOR
Chattington	1/-	MINERAL SUMMER	D.T.D. 109	ENGINE LUBRICATION
Cameron	1/-	" WINTER		
Leithes	6½	ANTI-FREEZE		CONTROL EXACTOR CONTROL
Reid	1/-	COMPOUNDS LANOLINE		METAL A/S BLADES
Hayes	9p.	WHITTMORES		A/S SPLINGS
Ormerod	2/½	GRAPHITE + GREASE		
Drummond	9p			
Williams	6½			



THE HUMBLE FLIGHT TECH

THE LORDS OF THE AIR THEY CALL US,
THEY SPEAK OF OUR GLORIOUS FAME
ON THE FRONT PAGE OF EVERY NEWSPAPER
TELLS US OF SOME PILOTS NAME
CONNECTED WITH DEEDS OF VALOUR
PERFORMED IN THE AZURE BLUE
THE USUALS THE HEINKELS OR DORNIER
CRASHING TO EARTH IN TWO
BUT ONE CHAP WHO GETS NO MEDALS
YOU NEVER HEARD HIS NAME
HE DOESN'T FLY IN THE PALE BLUE SKY
OR POSE FOR THE NEWS IN A PLANE

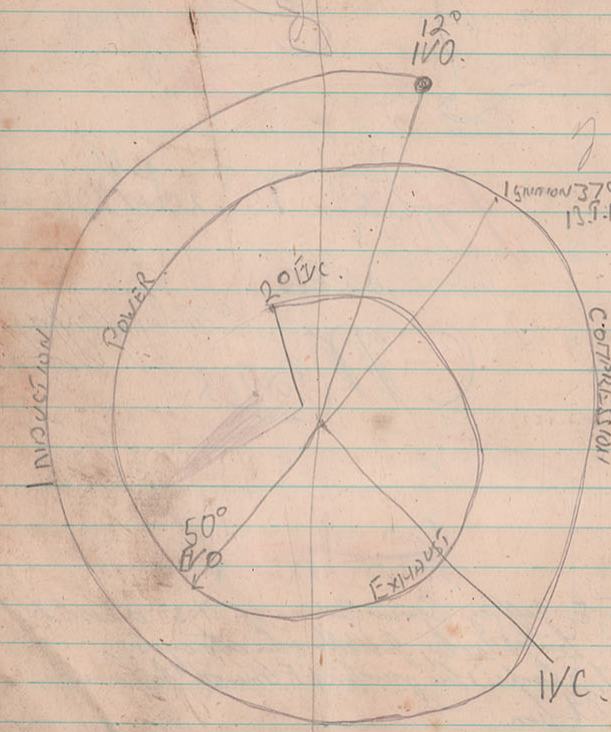
HIS JOB CANNOT BE CALLED ROMANTIC
SO HE'S NOT IN THE PUBLIC EYE
BUT YOUR HEROES CAN'T DO WITHOUT HIM
I WILL TELL YOU THE REASON WHY

HE'S UP AT THE BREAK OF DAWN
HE'S THERE WHEN THE TWILIGHT FALLS
ROLLING HIS WEIGHT TO KEEP HIS CRATE
READY FOR ALL THAT BEFALLS

SO THE NEXT TIME YOU SEE A PICTURE
OF A PLANE AND A FLYING CREW
REMEMBER THE GUY WHO KEEPS IT ALOFT
ALTHOUGH HE MAY BE AN A.C.2,

SO THE NEXT TIME YOU PRAISE A PILOT
AS THE ENEMY FALLS IN A WRECK
JUST THINK OF THE GUY YOU DO NOT SEE

YOURS TRULY A HUMBLE FLIGHT TECH.



I.V.O. 12° B.B.D.C
I.V.C. 40 A.B.D.C

E.V.O. 50 B.B.D.C
E.V.C. 2 A.T.D.C.

14·2 × 2·04

2240 × 4 = 8960 × 4 = 35840

142 × 204 = 204 × 284 × 578 × 142

26000 R.P.M. × 6 = 9,360,000

9 : 7 : 5 : 3 : 1

19. 23.

30 :

2240 × 4 = 8960 × 4 = 8960 × 4 = 35840

240000 × 4·5

240000 × 45 = 9600000 + 1200000 = 10800000 / 6 = 648.0000

24 × 60 × 60

1760 × 36 = 52800 + 10560 = 63360

240 × 6 = 1440 × 60 = 86400

MERCURY

1760 × 3 × 12 = 12 × 3480 × 10560 × 14040 × 3 × 42120

1760 × 2 = 3520 × 6 = 21120 × 3 = 63,360

Item inspected & found serviceable — A/B
Item inspected found defective & rectified — SJ
Item inspected found serviceable airman removed from inspection — SJ
Item inspected found defective airman removed from inspection — SJ
Item inspected found defective rectified no airman removed from inspection — SJ

8 Jeffrey

8 Jeffrey Middlebrook

LEEDHAM

Stanley Jeffrey

E Morys

Leedham

S. E. Jeffrey Senior Airman of H.S. assisted by Sims Woods, J. Wells & his auto cycle. T. Sharpe & his javelin & F. Comerod the human split pin.

Angle of centre punch ground to 60° because drill is

Pin punch is measured in diamameter of smallest end

Chisels Diamond Point Flat chisel, Round nose straight, Round nose Convex, Side Chisel ~~Straight~~ Flat General (Diamond Point used for getting into corners or oil groves) Round Nosed convex chisel used for cutting oilways on a convex surface Straight Round nose used for oilways

Cross pane ball pane Straight Pane Hide Face hamers

Hacksaw 2 kinds of blades Corse 14 & 18 Fine 20 - 26

Dividers loose accuracy after 90°

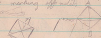
Marking off table Cast, seasoned, machined scraped to truth by comparison with a known surface

DRILLS, FLAT, SPEARHEAD COUNTER-BORING STRAIGHT-FLU[TED]
TWIST - DRILL BOTTOMING DRILL Countersinking

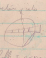
used with V blocks - Stirrup Clamp

SAM1. HILL
HEXAGON 1.15

Copper Sulphate for marking off metals



Divide the diameter into as many number of sides



types
Reamers 1 Solid 2 shell 3 expanding

High Carbon Steel

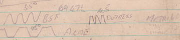
Twist drill 130° cutting angle of 7/12° clearance angle
& 90 cutting edge is not a precision instrument.

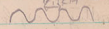
High Speed drill made of Tungsten

Drilling at angle or sheet metal use Straight fluted.

Brass nothing or h
Aluminium Paraffin
Tool Steel "
Mild Steel None or Soapy Water
White Metal None

Reamer Straight fluted, Parallel
fixed blade expands blades in middle .004-.02
detachable blade 3/32" Taper Reamer
for Taper Pins

Threads 

Pitch is measured from adjacent


TAPER TAP 3 full threads 2nd First TAP
3 tapered Plug tap.
H.C steel H.S.
Die nut used for cleaning threads


Arbeiters (ausn got nobody)
Studs and the removal of of
use stud extractor space left for absorbing
vibration fits
Fits & Clearances.
A fit is drill only B fit is drilled & reamed
Pushfit, Running Force Shrink, Driving
Tolerance, Limits Allowance
Limits as High or Low as is limited
Allowance Margin allowed in workmanship
to obtain a desired fit. Newhall Standard table
Tempering PY/ SC DY/ LP LB DB
Normalizing Cool as slow as possible (Relieves stresses & strains.)
Annealing Cool in non-conducting medium (Internal Stress Hot Lime, Sand, Ashes or Wool) Annealed
Case Hardening Dull Red and dip it into
a case hardening mixture.
Dark Purple - Straw
Identification of Steels.
Tungsten Red Spark
HTS. Bright Yellow Spark
Coarse Grain Wrought, Cast, Mild steel
Fine Grain
Magnetic Test Steel Copper Sulphate

Engines:-

I.H.P Power developed in cylinder.

B.H.P. is Power devoloped at a/s shaft

Combustion - Rapid ~~B~~ Uniting of oxygen

Internal Combustion where combustion takes place inside the cylinder Inertia = Resistance to Motion

Early Realese of gasses prevents overheating

increases life

HP 33.000 lbs per ft per minute

PLANKN / 33.000

Mean Effective Pressure Length of stroke in ft

Area in of □" cylinder Number of Working Strokes

α Compression ~~Amount~~ Ratio of Radio of

BHP / IHP Bi between the total volume of the cylinder and the clearance chamber

$\frac{S.V + C.V}{C.V}$

Volumetric Efficiency Total Volume drawn in the cylinder at N.T.P.

Volumetric Efficiency Ratio of Volume of gas drawn in the cylinder at NTP against the ~~total~~ total volume of the cylinder at B.D.C →

Crankshaft N.C.S Point to note lightness Lubrication

Gypsy Slipper. Kestrel Pegasus

~~NCM~~ ANB sents can use 90.91

NCM 91° used ∧

Lubrication

Mineral oil is a stable

Pegasus, TANK, MAIN, INLET, FILTER TO P.P.

P.C., various ducts to T.S, R.C, ~~R.C~~

2 holes 45 Supercharger R B on F.B.g. R.V. C.P.

~~drawn T.V.~~ holes in CP feeds the B.E. of M.R

feeds the wrist pins. feeds. C.W By Splash

3 flats on

16/4.0 20

P.P. P.C. Components.

Vaporises the fuel, 2/ gives correct air/fuel mixture ratio over range of its ratio 3/ Slight reserve for acceleration

Claudel & Hobson

$\frac{6}{1} \times \frac{1}{4}$

1/8, 4 1/2

1/2 cyl

No of Sparks Per Rev

$\frac{9}{2} \times \frac{1}{4}$ $\frac{9}{8}$ $\frac{2}{1} \times \frac{1}{4}$ $1\frac{1}{2}$ 1/2 cylinder

$\frac{2}{1} \times \frac{1}{2}$ 1.

Condensor in between Primary & Contact Breaker to bring about a more rapid collapse of the Primary Circuit. T, minimise arcing at con points.

CB ~~situated~~ Terminal point to earth

The more

Magnetos Advantages

Cheddleton G V C

Sunday Morning Leave

1/4, 9/32, 5/16, 7/8, 7/16, 1/2

Magneto Disadvantages Dampness No

Timing Isolate P.V. Check C.B.P. F.D. Mag.

Turn Rotor Brush to cylinder which is going to fire.

Cylinder fire [illegible]

1 Remove Spinner if fitted.

2 Remove the spring draw bolt nut lock wire, nut and joint washer.

3 Remove cylinder head lockwire cylinder head & gasket

4 Remove the lock wire from the piston head locking screw. Unscrew the locking screw remove the lock screw washer.

5/ Unscrew piston head and withdraw the draw bolt, bracket & springs.

6 Remove the 3 splitpins which secure the piston lock ring. 7/ Unscrew the piston with special spanner & tommy Bar provided. This operation

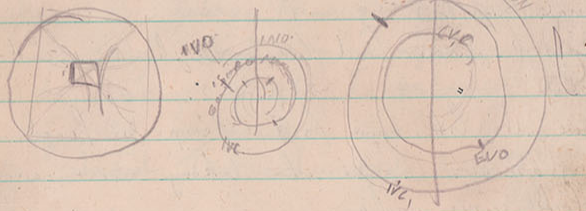
will pull the a/s from the rear cone, as soon as it is felt to be loose the weight should be taken by a rope sling already received round b/ of the blades.

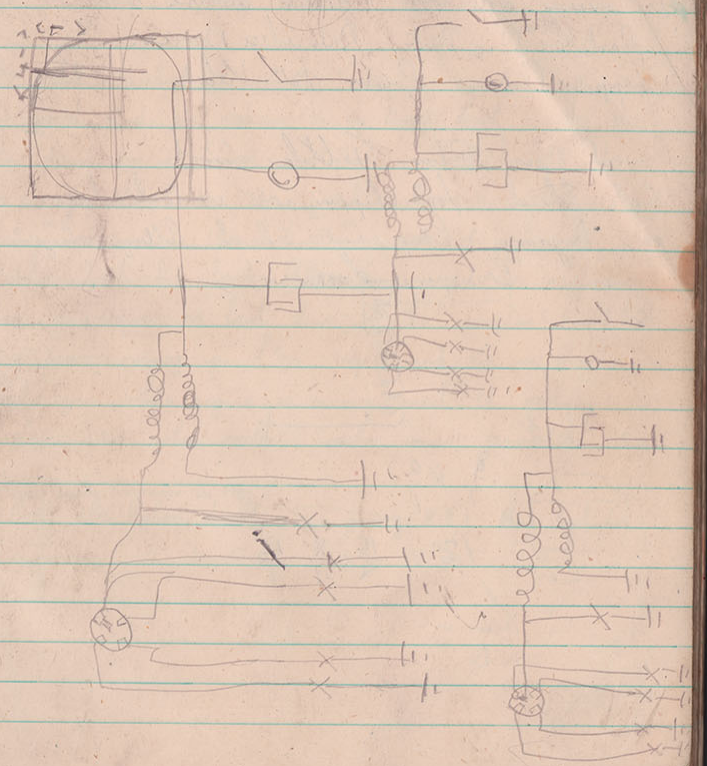
8/ Pull a/s clear of shaft.

9/ Using the 3rd blade as a lever to turn the a/s into a horizontal position lower the a/s onto a ground sheet.

10 Replace the dust plug into a/s shaft. e

B/ 42 635
A 8 35 142





RN P S.C. DIV

CC

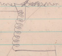
To advance ignition because of

Round Nose Pliers Die Nut Anti volter Device

Tappet Clearance · Power Jet Volute

Round Nosed Plies Tubular Work

Side Chisel for chipping out vertical drains on keyaways. Cross Cut Chisel Cutting Rectangular Groves Crossperne hammer



$3\frac{1}{2} \times 4$

$\frac{8}{7} \times \frac{2}{1}$

$1\frac{7}{8} \times \frac{15}{8} \times \frac{8}{1} \quad \frac{15}{1}$

1 How to check tappet clearances. Rotate crank/s to A.6.1.O just be able to nip a .005" feeler between the cam a rocker arm rotate crank/S 60° that would bring you to B.1.10 repeat same operation then run of the rest in firing order to .035"

How to fill a radiator with coolant. First see machines tail is on the ground. Wind the radiator to its lowest level ensuring that the drain plug is screwed up a locked open all vent cocks pour in the header tank until coolant runs out lowest cocks closing each in turn as the coolant runs out of each, fill up header tank fit back filler cap, wind up radiator run up engine as laid down in the aeroplane hand book for running up. Stop engine and top up. Run engine up again while engine is running wind the radiator to its highest point when coolant reaches correct temparature stop engine.

Check tappet clearances on Peg

Find the highest dwell by getting P.P.1 No1 cylinder compression set tappet