EMDAIR Ltd. -

- CF SERIES ENGINE

INSTRUCTION MANUAL.

This manual contains information required for the correct installation, operation and maintainance of the Emdair CF series engines.

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(Note! ND - Not Drawn).

3.(i). ENGINE DESCRIPTION - Overview and Layout.

The descriptions and drawings given in this manual are typical of the subject matter they portray, in no instance are they to be interpreted as examples of any specific engine, equipment or part thereof.

The Emdair CF series engines are twin cylinder horizontally opposed, dry sumped, air cooled aircraft engines.
In referring to the location of the various engine parts, the components are described in their relationship to the engine installed in a typical tractor configuration airframe
The main power take off is considered to be the front.
References to the left and right side of the engine are made with the observer facing the rear of the engine.
The cylinder designated number one is that closest to the main power take off, that is, on the right side with the observer facing the rear of the engine.

3.(ii). ENGINE DESCRIPTION - Cylinder Heads and Barrels.

The cylinders are of conventional air cooled construction, comprising of two major parts, the cylinder head and barrel. The heads are made from aluminium alloy castings with a fully machined combustion chamber. There are four valves, two inlet and two exhaust, and two spark plugs per cylinder head. The valves are operated by means of pushrods and rockers, the rocker shaft bearings are mounted on studs in the cylinder heads. The valve springs bear against steel seats. Proper valve clearance is maintained by means of adjusting the studs which support the rocker shaft bearings.

The valves and ports are cooled by extensive deep fins that are cast into the heads. Valve guides and seats are shrunk into machined recesses in the cylinder heads. The barrels are machined from aluminium castings with deep integral cooling fins, then fitted with cast iron liners which are bored and honed to a specified finish.

3.(ill).ENGINE DESCRIPTION - Crankcase and Internal Parts.

The crankcase is a one piece aluminium casting, with a detachable main bearing housing at the rear. The main bearings are bronze bushes pressed into the crankcase and bearing housing respectively. The main bearings are finish machined after they have been pressed into place. The crankshaft is manufactured from EN40B forging, with all bearing surfaces nitrided. It is installed in the crankcase before the rear main bearing housing is fitted. The connecting rods are made from alloy steel forgings and are machined all over. They have replaceable bearing shells at the big end and bronze bushes at the little end. The bearing caps are retained by two bolts per cap. The pistons are machined from aluminium alloy forgings. Two compression rings and an oil control ring are employed on each piston. The piston pin is of the fully floating type with a wire circlip at each end to prevent the pin from touching the cylinder walls.

3.(iv). ENGINE DESCRIPTION - Timing Cover, Cams and Oil pump.

The timing cover is an aluminium casting and is fastened to the rear of the crankcase. It forms a housing for the oil pumps and valve train. The crankshaft protrudes from this housing to provide an accessory drive.
The valve operating mechanism is located inside the timing cover. The two gear operated camshafts, the inlet camshaft being directly above and the exhaust directly below the crankshaft, are mounted in ball bearings. The camshafts actuate the valves by means of pushrods and rockers. Chilled cast iron cam followers transmit the cam motion to the pushrods. All gears are of the straight cut type. The dry sump lubrication system is powered by a double chamber gear pump mounted in the timing cover. Oil is sucked from an external tank by the pressure feed pump which pumps the oil through the filter into the engine. Oil drains into the base of the engine where it is collected by the scavenge pump which pumps it and blowby gases back to the oil tank. Oil cooling may be provided by a cooler plumbed in using a thermostatic sandwich plate under the oil filter.

3.(v). ENGINE DESCRIPTION - Miscellaneous and Ancillaries.

The air supply to the engine is by means of a common intake plenum with a single throttle body and air filter. It is intended that the air filter draw in cool air and shall be connected to the throttle body by trunking of 12" - 18" in length. The air temperature sensor should be installed in the trunking.

The CF series engines are all equipped with Weber electronic engine management systems which are calibrated by Emdair. The only adjustment available is to idle fueling. The engine management system automatically adjusts the amount of fuel supplied and the ignition advance according to the engine speed and throttle angle. Additional fuel is added during the starting and warm up phases, there are also fuel and ignition modifications for air temperature and pressure. The exhaust system should be constructed to the dimensions given in Drn.No. 549-012-A1.

If this is not possible, then any changes should be as small as possible, as the engine is calibrated using this standard exhaust system.

This engine is intended to be cooled by air pressure, created by the forward motion of the aircraft. If the cylinder heads and barrels are shrouded from the airstream, ducting should be installed to cool these items. Most heat is rejected through the cylinder heads, barrels and exhaust system. The alternator, if fitted, is installed on a bracket under cylinder No.l. It is driven via a single vee belt from the auxiliary drive pulley on the rear of the engine. The extension housing, as fitted to suffix "E" engines, is an aluminium casting which bolts to the front of the crankcase and extends the propeller hub further from the crankcase. The propeller hub forms part of the extension shaft which is fitted to the end of the crankshaft and runs in a needle roller bearing at the outer end.

There is currently no specified make or type of propeller for this engine, however it is important that the propeller chosen is a good match to the rating of the engine. This means ensuring that with the aircraft stationary and the . throttle fully open, the engine runs within 100 rpm of rated speed.

EMDAIR AIR COOLD ENGINE SPECIFICATION - CF RANGE

	CF 092	CF 122
No of Cylinders	2	2
Bore	104mm	115mm
Stroke	88.9mm	96.5mm
Displacement	1510cc 9.5:1	2005cc 9.0:1
Compression Ratio	52KW (70Bhp)	60KW (SOBhp)
Rated Power	3600 RPM 39KW (	3000 RPM 45KW (
Rev/min @ rated Power	52Bhp) 3100 RPM	60Bhp) 2600 RPM
Cruise Power (75% Maxium)	260 g/KWh Weber	270 g/KWh Weber
Rev/min @ Cruise Power	Alpha valve Twin	Alpha 4 Valve Twin
Cruise Fuel Consumption	Spark 100 LL SAE	Spark 100 LL SAE
Ignition & Fuel Injection System	10W/40	10W/40
Combustion Chamber		
Fuel Requirement Specification	12v Neg. Earth 4	12v Neg. Earth
Lubricating Oil Specification	5 Amp.	45 Amp.
(Under normal Operating Conditions)		
Electrical Supply	711mm (28.0 ins.)	740mm ;29.1 ins,
Alternator	430mm (17.0 ins.)	430mm 17.0 ins.
	399mm (15.7 ins.)	415mm ;i6.3 ins,
-dth	518mm (20.4 ins.)	534mm 21.0 ins,
Height	178mm (7.0 ins.)	185mm ; 7.3 ins,
Length (Engine Type "A") Length	285mm (11.2 ins.)	292mm 11.5 ins,
(Engine Type "E") C of G From Prop	47Kg. (104 Ibs.)	53Kg. '117 Ibs.'
Flange (Type "A") C of G from Prop	51Kg. (112 Ibs.)	57Kg. '125 Ibs.'
Flange (Type "E") Dry Weight (Type	63Kg. (139 Ibs.)	69Kg. '152 Ibs.
"A") Dry Weight (Tvpe "E") Total	67Kg. (147 Ibs.)	73Kg. '160 Ibs.
Weight "(Type "A") * Total Weight		
(Type "E") *		

*NB. Total installation weight includes Alternator, Electric Starter, Muf f ler Engine Management System, Oil Tank, and connector pipes, but dose not include Propeller.

Engine Type "A" is a standard direct drive design.
Engine Type "E" is fitted with a short propeller extension shaft

EMDAIR reserve the right to alter this specification,

5.(i). ENGINE INSTALLATION - Engine Mounts.

When installing the engine, refer to the engine installation drawing (Drn.No.549-017-A1) supplied with this manual, for engine mounting detail.
All CF series engines have four engine mounting points, two are part of the crankcase at the bottom and rear of the engine. The position other two depend on the configuration of the engine. Suffix "A" engines have a cover bolted to the front of the crankcase which has the two front mounting points cast in place. Suffix "E" engines have the two front mounting points cast into the propshaft extension housing. All the mounting points are designed to use LORD J3608-1 mounting rubbers which are designed to fit onto a 9.5mm (0.375in) diameter shaft. Two rubbers are required for each mounting point.

5.(ii). ENGINE INSTALLATION - Dry Sump Lubrication System.

When installing the engine, refer to engine installation drawing (Drn.No.549-017-A1) supplied with this manual, for oil connection details.
All CF series aero engines are equipped with a dry sumped lubrication system. The oil reservoir is an external oil tank from which oil is drawn by the oil pressure pump. This pumps the oil through the crankcase mounted filter and around the engine. The oil then drains to the base of the engine, where the scavenge pumps draws from, and pumps the oil back to the external reservoir.
The oil capacity of the tank should be a minimum of 5 Litres, however because the scavenged oil is a frothy mixture of oil, air and blowby gas, the tank should be a minimum of twice the oil capacity. For the CF series engines the following dimensions are suitable, for a cylindrical tank. The height should be 32cm (12.6in) and the diameter 20cm (7.9in). If it is not possible to make the tank this shape, then generally the height should be as great as possible with a small oil surface area. The tank should be constructed with a closed lid, but a breather must be fitted as the scavenge circuit also functions as the engine breather. The oil feed to the engine should exit from the base of the tank via a gauze filter, the scavenge return should enter at the top and in with a cylindrical tank, be directed tangentially at the side wall of the container. A drain plug or valve should be fitted into the base of the tank to allow for oil drainage. All oil piping should be as short as possible, with pipe sizes of no smaller than 13mm (0.5in) internal diameter. This applies to both feed and return piping.
The CF series engines are not fitted as standard with oil coolers, if it is necessary to install one, then fit a thermostatic sandwhich plate under the oil filter cartridge. The oil cooler may be connected to this using 13mm (0.5in) internal diameter pipes.
If required for aircraft instrumentation, an oil temperature sensor is best fitted in the side of the tank, near the base. The temperature read at this point can be considered to be equivalent to the sump temperature on a conventional engine.

5.(iii).ENGINE INSTALLATION - Fuel Supply.

When installing the engine, refer to schematic layout drawing (Drn.No. 549-012-A4) supplied with this manual, for supply connection detail.
Ensure that the supplied pre-pump filter is installed at the lowest point inside the tank. This is the only suitable type of filter that may be installed before the pump. The PTFE tube supplied is a press fit onto this filter for use inside the fuel tank.
It is important that the pump is below the tank and has a positive gravity feed. Running the pump dry will seize it.
It is not recommended to install a fuel cock, though if one has to be installed, then it must be fitted between the fuel pump and filter, and be rated at 7 bar.
All fuel hose used should be 8mm internal diameter and of high nitrile construction suitable for recirculating fuel systems.
The main replaceable filter should be installed at an accessible point in the supply line, after the fuel pump but before the pressure regulator. The pressure regulator itself will need to be installed close to the injectors and the small port should be connected to the inlet manifold by a 15cm - 30cm length of vacuum tube.
The pressure regulator requires a fuel return back to the tank as the fuel pump will pump 100 Litres per hour, irrespective of engine consumption and the unused fuel is returned to the tank. Nominal fuel pressure will be 2.5 bar at full throttle, but will drop on part load.
Fuel pump current consumption is about 4 amperes.

5.(iv). ENGINE INSTALLATION - Electrical Supplies.

When installing the engine, refer to schematic layout drawing (Drn.No. 549-028-A3) supplied with this manual, for supply connection detail.
The engine should be strapped to the battery ground by a conductor of at least 15 mm sq, to carry starter current and provide a spark return path. The starter should be switched via an automotive type starter relay and momentary push to make switch.
The alpha wiring harness has external connections:

1. A main ground which should be connected to ground via 3.0 mm sq wire.
2. Two ignition coil feeds, for side and centre which should be connected via 1.5 mm sq wire to separate SPST ignition switches.
3. Two ECU power feeds which are connected via a 1.0 mm sq wire to a spare pole on the ignition switch.
4. Ignition coil grounds. Each ignition module loom has two ring connectors. One should be connected to the coil, the other to the drive module.
5. Tacho Output. Produces two 12v pulses for every revolution of the crankshaft.

In addition:

1. Each coil module should be bonded to the engine or earth via 2.5 mm sq wire, if not already bolted to the chassis.
2. The fuel pump will need to be separately switched via 1.5 mm sq wire.
3. The alternator will require connection to the aircraft electrical supply and instumentation as per Section 5(vi) of this manual.

These wiring instructions, with the loom are as supplied, no fuses are fitted to the system, although the ECU may be supplied via a 15 amp fuse and the fuel pump via a 10 'amp fuse. The ignition coils are not fused.

Please Note:

Routing of the ignition coil supply and ground wiring should be chosen with care. These wires will radiate Electromagnetic Interference across a wide spectrum and should be routed well away from the sensors and associated wiring of the engine management system, together with any other sensitive equipment on the aircraft.

5.(v). ENGINE INSTALLATION - Alpha System Wiring Loom.

When installing the engine, refer to schematic layout drawing (Drn.No. 549-028-A3) supplied with this manual, for supply connection detail.
The engine wiring loom solely serves the Weber alpha engine management system. The connections to this loom are shown below:

1). Power Supply:	
Red Wire "Unmarked" Black	To spare pole on the ign switch
Wire "Unmarked" Blue\White	To Battery ground. Tacho Signal
Wire "Unmarked"	Output.

2). Ignition *I:* Side Spark Plug,

White Wire "1"	To SPST switch, supplies Side Ignition Coil.
7 Way Connector	To Ignition Drive Module 1.
3 Way Connector	To Ignition Coil *I.*
Spade Receptacles (2 Off)	To Ballast Resistor 1.
Ring Terminals (2 Off)	To Coil Mounting and Module Mounting Bolts.

3). Ignition 2: Centre Spark Plug.

White Wire "2"	To SPST switch, supplies Centre Ignition Coil.
7 Way Connector	To Ignition Drive Module 2.
3 Way Connector	To Ignition Coil 2.
Spade Receptacles (2 Off)	To Ballast Resistor 2.
Ring Terminals (2 Off)	To Coil Mounting and Module Mounting Bolts.

4). Engine:

2 Way Connector (Blue) 2	Oil Temperature Sensor,
Way Connector (Brown)	Air Temperature Sensor.
2 Way Connector (White)	RPM Sensor.
3 Way Connector (Red)	Throttle Angle Sensor.
2 Way Connectors (Green)	Injector Drivers, use either tagged pair or untagged pair.

5). Control Unit:	
3 Way Connector	Air Pressure Sensor.
7 Way Connector	AMC Line. NOT IN USE.
35 Way Connector	Engine Control Unit.

5.(vi). ENGINE INSTALLATION - Alternator.

When installing the engine, refer to alternator connection diagram 549018A4 supplied with this manual. The standard alternator supplied is rated at 45 amperes at an engine speed of 2400 RPM. The unit contains a rectifier and regulator pack, therefore no external electronics is required.
The alternator is mounted under cylinder No.1. on a fabricated steel bracket. The bracket allows adjustment of the single vee belt tension and should be tightened to give 13mm (0.5in) of belt deflection under hand pressure.
Electrical connection is via the three blade style connectors on the rear of the unit and the grounded casing. The unit terminations follow:

1). Main Power Output: Two off 3/8" Lucas blade connectors. It is important that both of these terminals are used to connect the alternator to the battery positive or battery isolator positive.

2). IND Output: A single 1/2" Lucas blade connector. This should be connected via a 12 volt indicator to a switched 12 volt supply. When the indicator is on, the alternator is NOT charging.

3). Main Ground: The alternator is grounded via the case and mounting bracket, to the engine. It is not usual to fit an earth strap, but one may be fitted if required.

6.(i). ENGINE OPERATION - Initial Starting.

Whilst new engines have been carefully run in by Emdair, careful initial use will enhance the future operation of the engine. The following procedures must be followed in their entirety on initial start, after any engine maintenance or if the engine is started after standing for a period of time.
Before any attempt is made to start the engine, oil pressure must be raised. Check that the oil level in the external tank is correct and that it contains a minimum of 5 litres. Top up if required.
Remove the spark plugs, fully open the throttle and ensure that the engine management system is switched off. Operate the electric starter motor and crank the engine until an oil pressure of 50 psi is indicated on the pressure gauge. On initial cranking, pressure may be slow in appearing. Do not crank for more than 30 seconds without allowing the starter motor to cool for at least 2 minutes.
When oil pressure has been raised, stop cranking and note the oil level in the external tank. The level will have fallen as the oil filter, delivery lines and any oil coolers fitted are filled. Add oil if required.
Open any fuel cocks fitted, check that there is fuel at the pump and turn it on. If fitted, check that the fuel pressure gauge reads 37 to 40 psi. Allow the fuel pump to run until no air can be heard running through the system.
Replace spark plugs, switch on the engine management system, switch on the fuel pump and open the throttle to approximately 15% of WOT.
Crank the engine until it starts, adjust the throttle to give an engine speed of 1500 to 2000 RPM. The engine should not require more than five seconds cranking to start.
Check the oil pressure, if none is indicated within five seconds, stop the engine and determine the cause.
Should the engine stall immediately after starting, switch off the engine management system, wait 15 seconds and repeat the starting procedure.

6.(ii). ENGINE OPERATION - Routine Starting.

No other item of engine operation contributes quite so much to satisfactory performance and long life as the constant use of the correct grades of fuel and oil.
The initial starting procedure should be followed if the engine has never before been run, after any maintainance or if the engine has stood for a period of time. Only if this is not the case should the routine starting procedure below be used.
Check that the oil level in the external tank is correct. Top up if necessary.
Open the fuel cock, if fitted, switch on the fuel pump then switch on the engine management system. Open throttle to 15% of WOT position and crank the engine until it starts. If is does not start after five seconds cranking, or starts then immediately stalls, switch off the engine management system, wait 15 seconds, then repeat the above procedure.
Check the oil pressure, if none is indicated within five seconds, stop the engine and determine the cause.
Having started the engine, adjust the throttle to give an engine speed of 1500 to 2000 RPM.

6.(ill). ENGINE OPERATION - Ground Running.

Once the engine has been started, it should be warmed up prior to take off.
The engine may be considered warm when:

1). Cylinder heads are 80 deg Centigrade or greater.
2). Tank oil temperature is 50 deg Centigrade or greater.
3). Oil pressure is 60 to 70 Psi.

These engines are air pressure cooled and depend upon the forward motion of the aircraft to maintain proper cooling. Care is therefore necessary when operating on the ground to ensure that the engine does not overheat. The limits on ground running temperatures are:

1). Cylinder heads - 200 deg Centigrade.
2). Tank oil - 120 deg Centigrade.

Once the engine has reach running temperatures, it is ready to be used. However,prior to take off the following tests should be carried out:

1). Smoothly advance throttle to WOT position. Engine should accelerate and run smoothly and cleanly. If not abort test and investigate.
2). Note the engine RPM. Switch off centre spark plug and allow engine to stabilise. Note the drop in engine RPM. Switch on centre spark plug. Ensure that engine returns to the original RPM.
3). Note the engine RPM. Switch off side spark plug and allow engine to stabilise. Note the drop in engine RPM. Switch on side spark plug. Ensure that engine returns to the original RPM.
4). The speed drop on either spark plug cut should be less than 150 rpm.

7.(i). ENGINE MAINTAINANCE - General Specification.

1). General Specification.

Electrical system	12 Volt, Negative Earth
Cylinder head	4 Valve, Pentaprism Chamber
Propeller rotation	Clockwise, Viewed from Rear

2). Consumable Items.

Fuel grade	100LL AVGAS
Fuel filter	Weber FI02/1
Oil quality	API SF-CC
Oil grade	20W50 MOF
Oil filter	26X K&N
Air filter	RU1760 NGK
Spark plugs	B7ES

3). Torque Settings.

Propeller hub nut Rear	340 Nm	(250	Ibft)	L
crankshaft nut Alternator	122 Nm	(90	Ibft)	L
pulley nut Alternator	68 Nm	(50	Ibft)	L
mounting bolts Rear engine	14 Nm	(10	Ibft)	L
mount stud nut Exhaust	14 Nm	(10	Ibft)	L
manifold stud nut	10 Nm	(7	Ibft)	S

Suffix "L" - Apply LOCTITE 270 to bolt/stud.
Suffix "S" - Fit spring washer under nuts.

7.(ii). ENGINE MAINTAINANCE - Filter Replacement.

1). Oil Filter Change.

Remove the old oil filter, using a strap wrench if tight. Have a suitable container ready to catch any spilt oil. Screw the new filter onto the fitting until the rubber seal just touches the seat, then tighten, by hand, one third of a turn only. Restart the engine using the initial start procedure, checking the new filter for oil leaks. When replacing the oil filter it is usual to replace the oil at the same time.

2). Oil Change.

Run the engine and allow the oil to warm, so that the viscosity drops. It is sufficient to drain the oil only from the external oil tank. Replace with sufficient oil to fill the tank to the required level. When restarting the engine use the initial start procedure.

3). Fuel Filter Change.

Clamp the flexible fuel pipe on either side of the of the filter, to minimise fuel spillage. Have a suitable container ready to catch any spilt fuel. Detach the old filter from the pipework, transfer the fittings to the new filter and fit the new filter. Unclamp the pipes and run the fuel pump until the system has purged all the trapped air.

4). Air Filter Clean.

The air filter is of wire - oiled cotton construction and does not require replacement, like a paper filter. It does however require cleaning and re-oiling. The filter requires cleaning when the external dirt deposits are in excess of 2mm (O.O5Oin) thick. This will depend on local operating conditions.

Fill a shallow tray with K&N cleaner and roll the filter in the fluid. Do not let the fluid run over to the inside of the filter. Wait for two minutes. Rinse the filter, from the inside, using clean water. Do not use high pressure water. Dry the filter naturally, as cotton.

When dry, weigh the filter. Lay strips of oil along the top of each pleat. When each pleat has been oiled, weigh the filter again. The filter is correctly oiled when 14 grams of oil has been applied. Allow 20 minutes to elapse before using.

7.(ill).ENGINE MAINTAINANCE - Routine Service Items.

1). Spark Plug Gap Check.

Remove the spark plugs, ensure no debris is dropped into the engine. Clean if necessary using a brass wire brush. Check the gap using feeler gauges and adjust if necessary. The specified clearance is:

0.75mm - 1.00mm (0.030in - 0.040in).

Replace spark plugs and HT leads.

2). Tappet Clearance Check.

The tappets should be checked with the engine cold. Remove the rocker cover taking care not to damage the gasket, which will need replacing if damaged. Have a suitable container ready to catch any spilt oil. Rotate the engine until the valve being checked is at full lift, then rotate the engine a further 360 degrees. Check the clearance between the rocker arm end and the top of the valve stem. The specified clearances are:

Inlet Clearance : 0.100 mm (0.004 in).
Exhaust Clearance : 0.150 mm (0.006 in).

If the clearance measured is incorrect then adjust it, using the rocker support stud nuts. Recheck the clearances and lock in position using the locknuts provided. Refit the rocker cover and gasket. Repeat the procedure for the other cylinder head.

3). Idle Speed and Idle Mixture Setting.

Both idle speed and mixture are set by Emdair during manufacture and should not require adjustment. If, however, it is necessary, the idle speed setting screw acts as the throttle butterfly stop on the throttle body. The idle mixture screw is to be found under the tamperproof bung on the engine control unit.

7.(iv). ENGINE MAINTAINANCE - Major Service Items.

For information required to undertake major servicing or overhaul of the CF series engines, please contact Emdair direct at the address below:

EMDAIR Ltd.
HARBOUR ROAD,
RYE,
EAST SUSSEX.
TN31 7TH
ENGLAND

TELEPHONE: (+44) 0797 223460
FACSIMILE: (+44) 0797 224615

7.(v). ENGINE MAINTAINANCE - Inspection and Service Intervals,

Engine servicing and maintainance should be undertaken at the intervals specified:

2 Hours:

1). Visual check of entire engine. Check
2), security of engine mountings. Check
3) security of exhaust system.
4). Check alternator drive belt tension.

25 Hours:

1). Visual check of entire engine. Check
2). security of engine mountings. Check
3) security of exhaust system. Check
4) alternator drive belt tension,
5). Replace oil and oil filter.

125 Hours:

1). Visual check of entire engine. Check
2). security of engine mountings. Check
3). security of exhaust system. Check
4). alternator drive belt tension. Check
5) spark plug gap and condition.
6). Replace oil and oil filter.

250 Hours:

1). Visual check of entire engine. Check
2). security of engine mountings. Check
3). security of exhaust system. Check
4). alternator drive belt tension. Check
5). tappet clearance.
6). Replace spark plugs.
7). Replace oil and oil filter.
8) Replace fuel filter.

350 Hours: As per 100 Hour Maintainance.

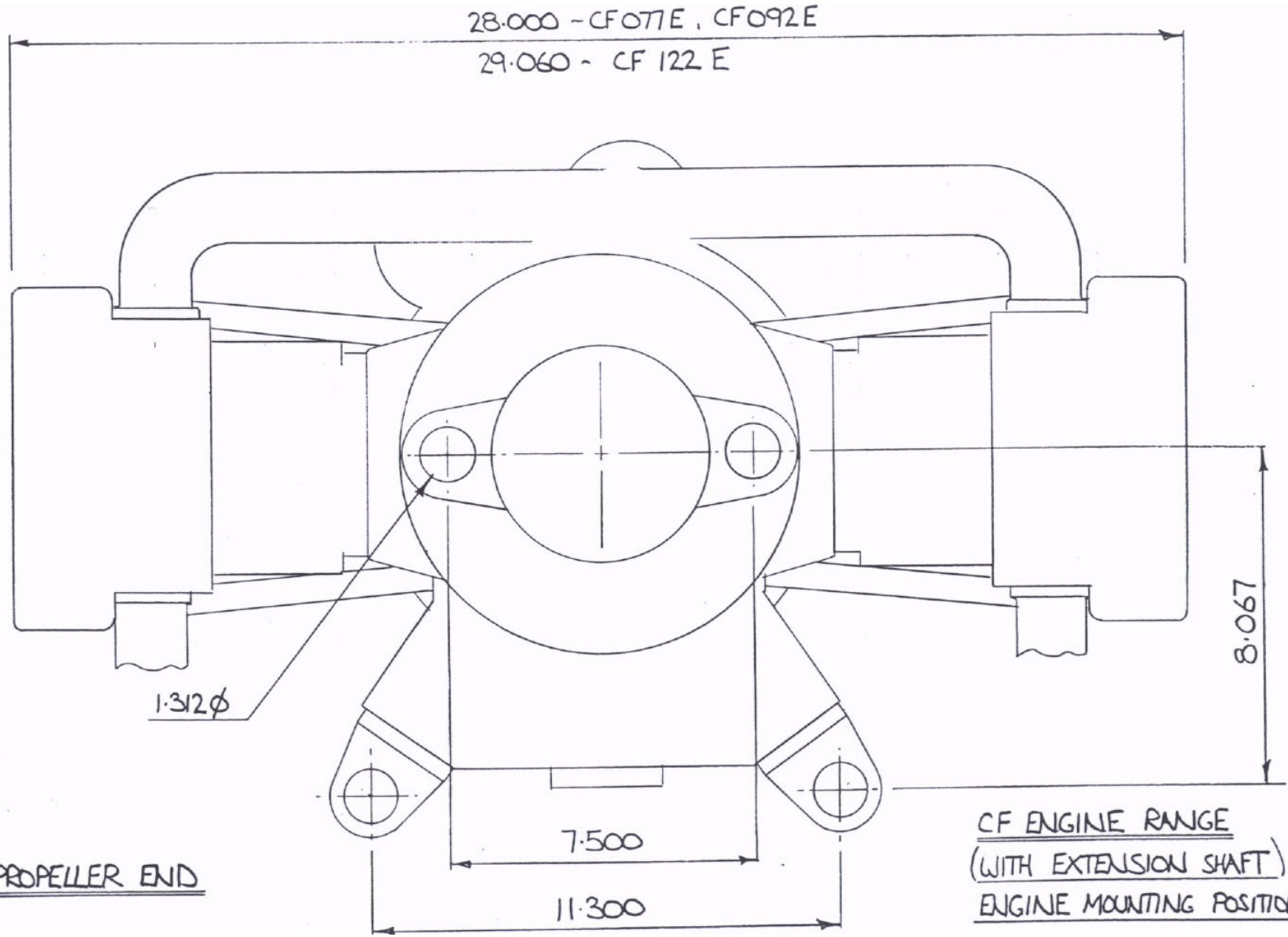
500 Hours: As per 250 Hour Maintainance.

600 Hours: As per 100 Hour Maintainance.

750 Hours: As per 250 Hour Maintainance.

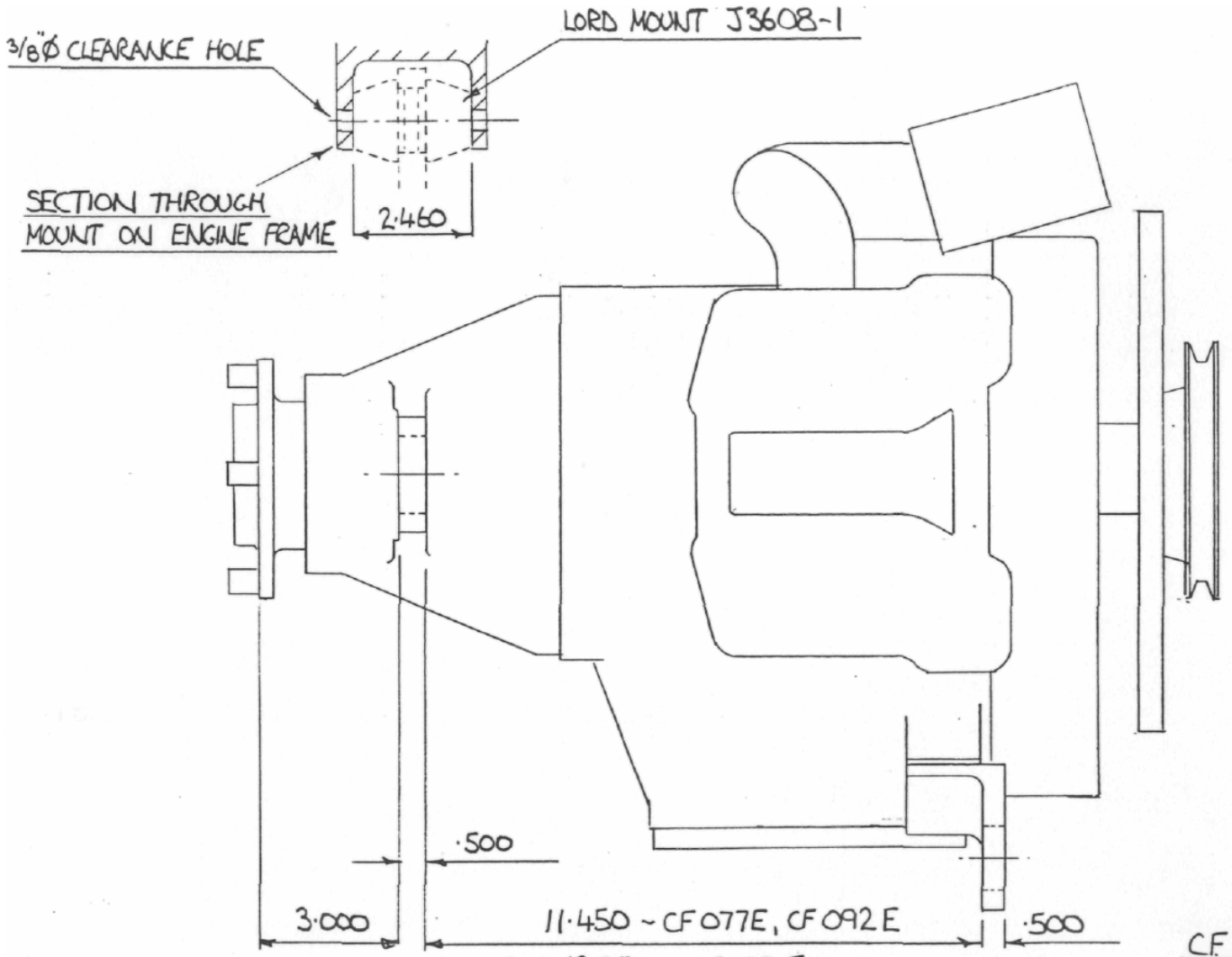
850 Hours: As per 100 Hour Maintainance.

1000 Hours: Complete Engine Overhaul.



VIEW ON PROPELLER END

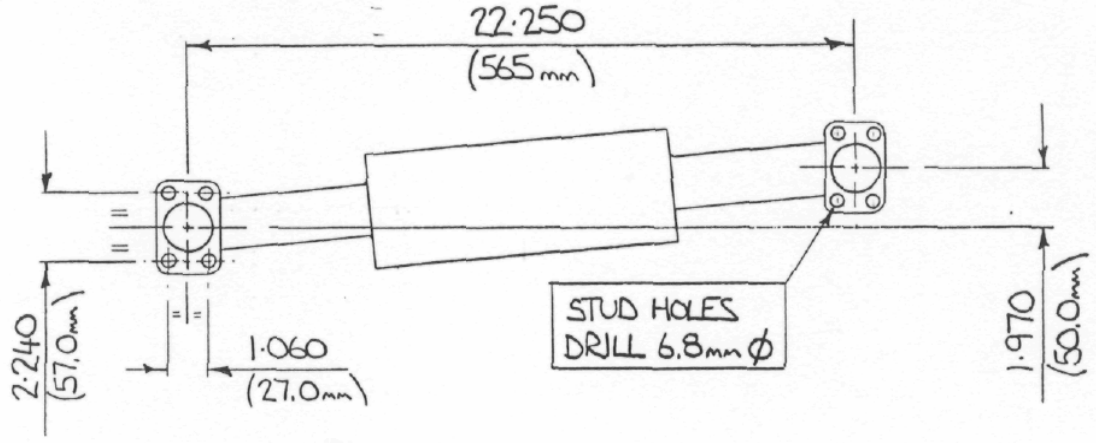
CF ENGINE RANGE
(WITH EXTENSION SHAFT)
ENGINE MOUNTING POSITIONS

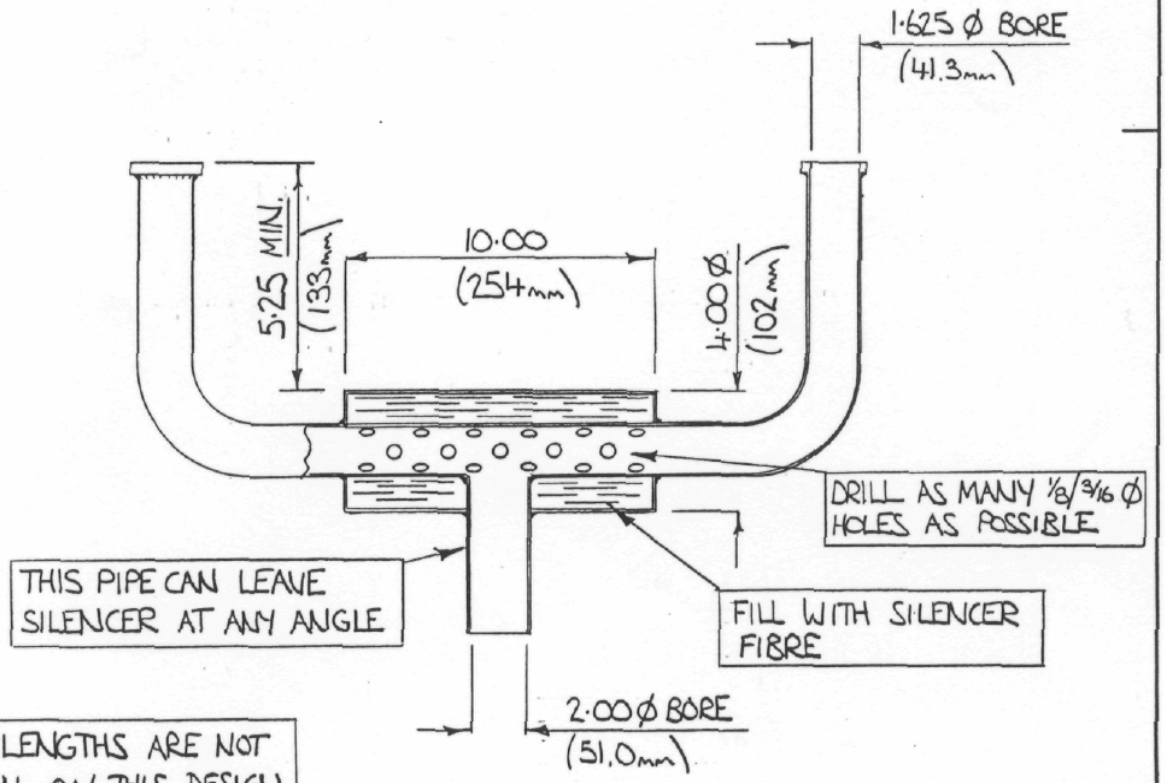


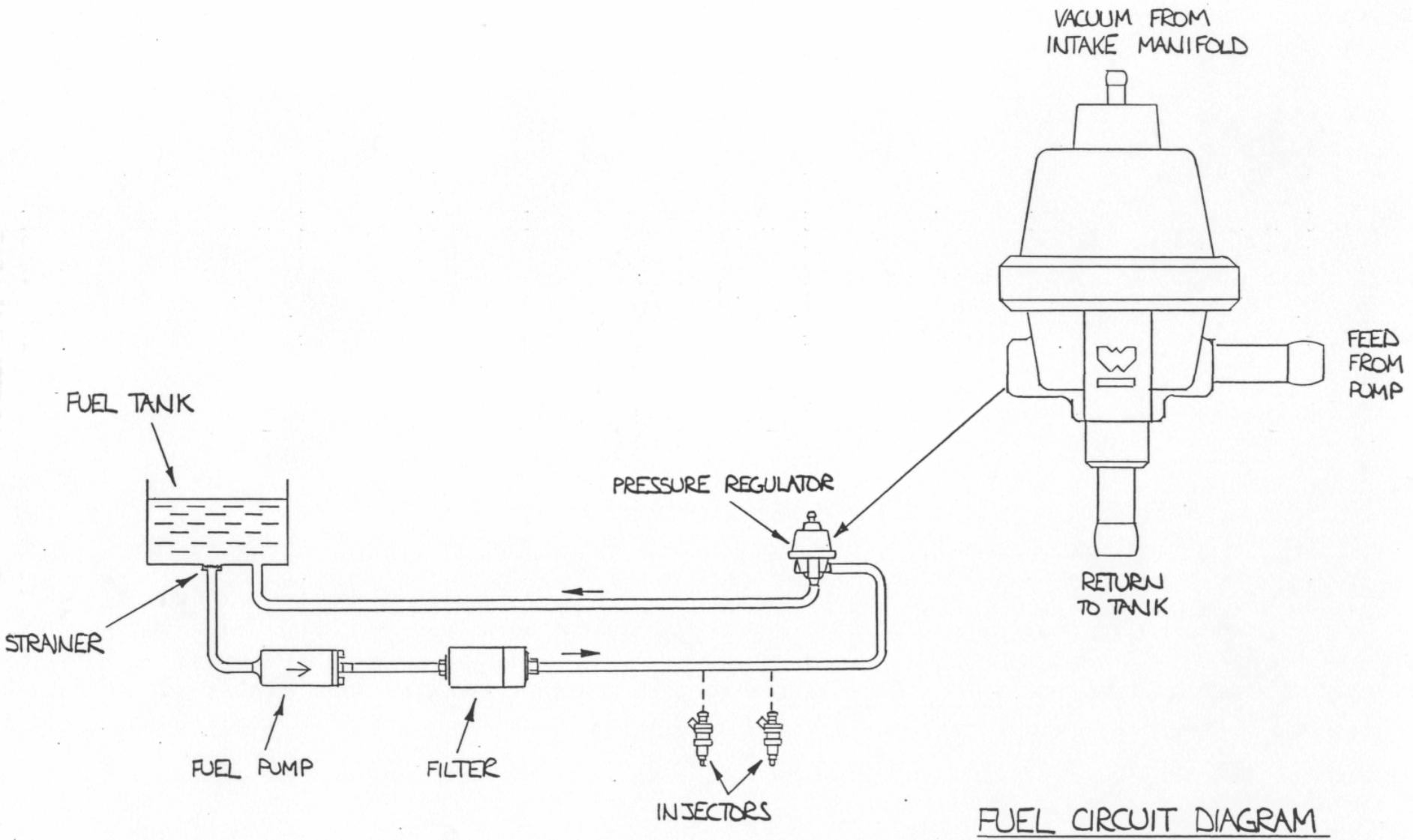
C.F. ENGINE RANGE
(WITH EXTENSION SHAFT)
ENGINE MOUNTING POSITIONS

DRG. No. 549 - 015A4		DO NOT SCALE IF IN DOUBT ASK			
Issue No. A Sig.		Third angle projection Dimensions in inches unless otherwise stated			
TITLE EXHAUST FABRICATION DETAILS		**EMDAIR LTD** Harbour Road, Rye, E. Sussex tel: 0797 223460 fax: 0797 224615			
Mtl. & spec.	Finish	THIS DRAWING IS THE PROPERTY OF **EMDAIR LTD.** AND IS SUBMITTED AS CONFIDENTIAL INFORMATION IN CONNECTION WITH OUR ORDER, ENQUIRY OR CONTRACT. IT IS NOT TO BE COPIED OR USED FOR MANUFACTURING PURPOSES WITHOUT OUR AUTHORITY IN WRITING.			
M/C Tolerance ±	date 7.12.93	scale 1/6			
Angular Tolerance ±	drawn CD	stress			
Cutters to have .025 R	ckd	appro.			

C.F. 122





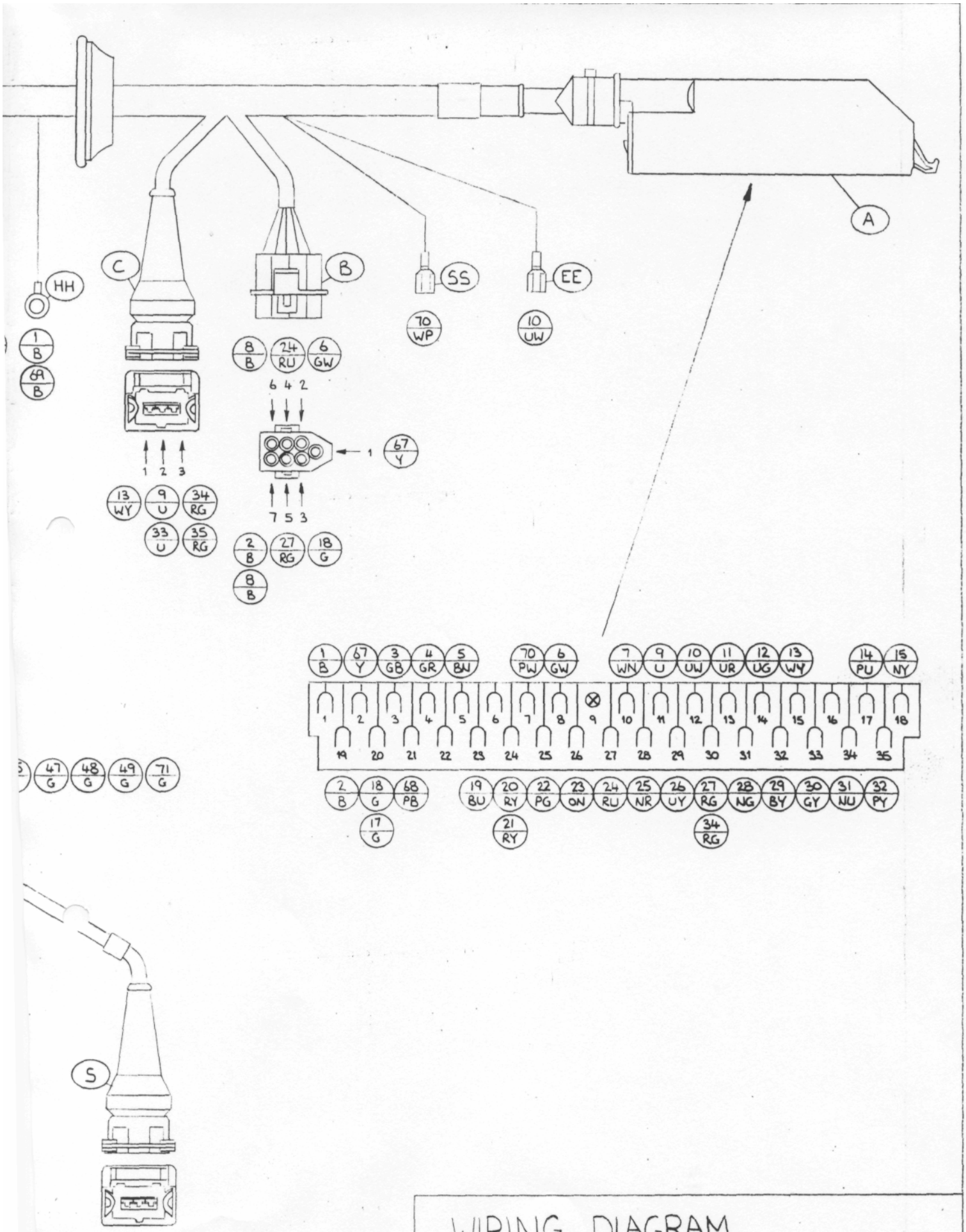


FUEL CIRCUIT DIAGRAM

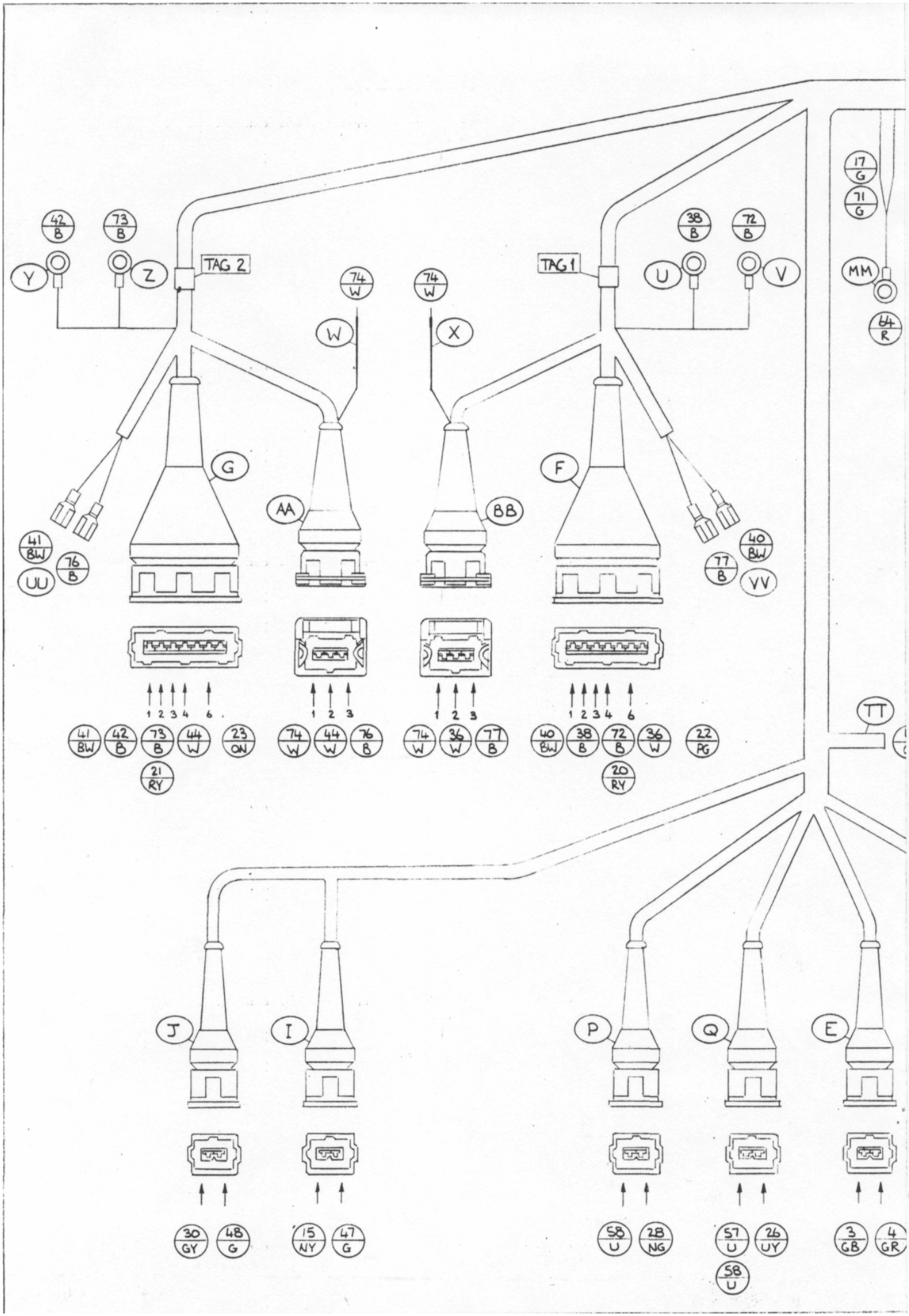
549-012 A4

CF122 WIRING CHART

Connector	Part Number	Colour	Number of pins	Description
A	AMP 825000-3	BLACK	35	ECU
B	LUCAS 51150004	WHITE	7	COMMUNICATIONS
C	AMP 827578-1	BLACK	3	PRESSURE SENSOR
D				
E	AMP 827216-1	WHITE	2	R.P.M. SENSOR
F	AMP 827216-1	BLACK	7	IGNITION UNIT (1)
G	AMP 825414-2	BLACK	7	IGNITION UNIT (2)
H				
I	AMP 825414-2	GREEN	2	INJECTOR 1
J	AMP 825414-2	GREEN	2	INJECTOR 2
K				
L				
M				
N				
O				
P	AMP 825008-5	BROWN	2	AIR TEMP SENSOR
Q	AMP 825008-3	BLUE	2	OIL TEMP SENSOR
R				
S	AMP 827578-1	BLACK	3	THROTTLE POSITION
T	*v			
U	LUCAS CUB 225W25		RING	EARTH
V	LUCAS CUB 225W25	"N	RING	EARTH
W	WIRE 1		WHITE	COIL POSITIVE 1
X	WIRE 2		WHITE	COIL POSITIVE 2
Y	LUCAS CUB 225W25		RING	EARTH
Z	LUCAS CUB 225W25		RING	EARTH
AA	AMP 825414-3	BLACK	3	GNITION COIL 1
BB	AMP 825414-3	BLACK	3	GNITION COIL 2
EE	LUCAS CUB 225W25		SPADE	TACHO 4 CYL TYPE
HH	LUCAS CUB 225W25		RING	EARTH
MM	LUCAS CUB 225W25		RING	POSITIVE / IGN SWITCH
SS	LUCAS CUB 225W25		SPADE	TACHO 2 CYLTYPE
TT				MULTIPLE BOND
UU	LUCAS CUB 225W25		SPADES	BALAST RESISTOR 1
W	LUCAS CUB 225W25		SPADES	BALAST RESISTOR 2
	WIRING COLOUR CODE			
	B = BLACK N = BROWN			
	R = RED O = ORANGE			
	U = BLUE G = GREEN			
	W = WHITE P = PURPLE			
	Y = YELLOW			
	eg. UR = Blue wire with			
	With Red Tracer			



WIRING DIAGRAM


42 B
73 B
Y
Z
TAG 2
74 W
W
74 W
X
TAG 1
38 B
72 B
U
V
17 G
71 G
MM
64 R
G
AA
BB
F
41 BW
76 B
UU
77 B
40 BW
VV
1 2 3 4 6
1 2 3
1 2 3
1 2 3 4 6
41 BW
42 B
73 B
44 W
23 GN
21 RY
74 W
44 W
76 B
74 W
36 W
77 B
40 BW
38 B
72 B
36 W
22 PG
20 RY
TT
J
I
P
Q
E
30 GY
48 G
15 NY
47 G
58 U
28 NG
57 U
26 UY
58 U
3 GB
4 GR