EAA 245 NEWSLETTER

OTTAWA, ONTARIO

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CARB HEAT - Hot Air and Flying Rumours

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Meetings - 3rd Friday at the National Research Council Building Auditorium, 100 Sussex Drive, Ottawa, 8 pm

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EAA Chapter 245 Meeting

18 May 84

- Place: Bradley Air Services Ltd., Carp.
- Meeting was opened at 8.09 pm by President Eric Taada.
- Attendance: 28, including three guests: Linda Murray (Dave's wife), Avery Frail from Nova Scotia, and Tom Muir. Tom has been retired for 12 years, having previously served for many years as an AME at Laurentian Air Services Ltd. and Bradley Air Services Ltd.
- The hangar floor is in process and concrete will probably have been poured by the time you read this.
- Dick Moore is designing a hangar door. Ken Cavers has located some material for same.
- Eric was able to enlist the services of a DOT backhoe, complete with operator, to dig a new hole for the annex. A 200-gal. oil tank will be installed in said hole to provide adequate space for the biological services division. Eric has decided to name the improved annex Carp Tower (with an AR, that is, not RA).
- The Oshawa Symposium will be held in the Fall. It is headed up by Dave Drain.
- The Aerosport Technical Committee may be getting a word processor. They have also received a generous donation to cover necessary repairs to their recently acquired printing press. They hope to soon publish an updated edition of the Canadian Homebuilt Register, among other things.
- Coffee and donuts were provided by Bradley Air Services Ltd.
- Our guest speaker was Richard P. Rho, Chief Inspector, Engine Shop, Bradley Air Services Ltd. Richard served his apprenticeship at Laurentian Air Services Ltd. and Alliance Aviation, and - he proudly pointed out - was trained by Tom Muir's former students.
- We enjoyed a conducted tour of Bradley's engine overhaul facility. Richard supplied a very informative commentary and answered many many questions.

Jim Butler
Acting Secretary

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DON'T FORGET

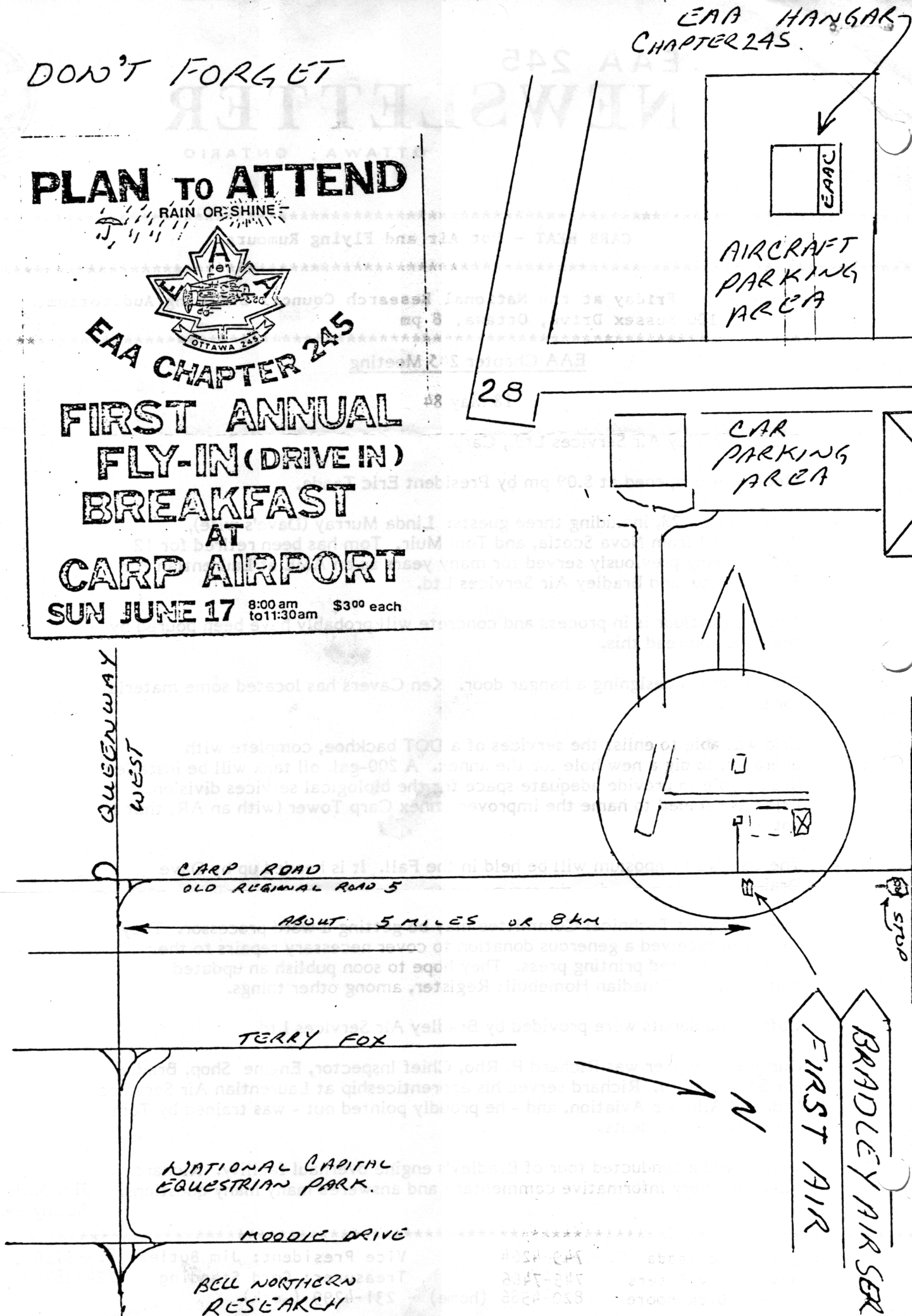
PLAN TO ATTEND

RAIN OR SHINE

EAA CHAPTER 245

FIRST ANNUAL FLY-IN (DRIVE IN) BREAKFAST AT CARP AIRPORT

SUN JUNE 17 8:00 am to 11:30 am $3.00 each



Notes on Talk by Richard Rho

by Jim Butler

Bradley is equipped and licenced to overhaul piston aircraft engines ranging from 50 to 2000 hp.

- During major overhaul, the engine is stripped down; parts are cleaned by solution and/or vapour degreasing (glass bead blasting) and examined to specification; ferrous metal parts such as crankshafts and cylinder barrels are subjected to Magnaflux inspection and non-ferrous metal parts are tested by Zyglo dye-penetrant inspection. Both techniques render microscopic cracks and defects visible to the naked eye.

  Cracked parts are normally discarded. However, cracked cylinder heads can be welded by Standard Aero or Western Aero.

- After an engine has been overhauled, the oil should be changed after 20 to 25 hrs. and the oil screen inspected (essential.) for metal filings. Cylinder and crankcase bolts should be retorgued after 50 hrs. This is very important, but often - if not usually. - neglected. Loose crankcase bolts will result in bearing damage and oil leaks.

- After top overhaul, some pilots tend to "nurse" an engine by operating at reduced throttle settings. They think that by doing climbout at 3/4-throttle they are helping breakin. However, a freshly overhauled engine at part throttle doesn't develop enough pressure in the crankcase to force sufficient oil up cylinder walls. Consequently, the cylinders will likely become glazed. Result: an oil burner.

  Do first ground test run into wind on a cool day. Run as briefly as possible to avoid glazing of cylinders; shutdown and check for leaks, etc. Do not run with cowlings off. (results in uneven, inadequate cooling). If cylinder head temperature gets close to 500°, shutdown and allow engine to cool.

  For first 20 to 30 hours of operation, do all climbs at shallow angle and higher speed than best angle of climb speed in order to promote adequate cooling.

- New or overhauled engines should use only mineral base oil for first 20 to 25 hours of operation. Detergent multiviscosity oil may be used thereafter. Richard likes 15/50, particularly for operation at low temperatures; has found it to be excellent for Continental, Lycoming, and Pratt and Whitney engines. However, it is very expensive. He recommends W80 and W100 detergent oil for normal temperature operation.

- Avgas 100 fuel should not be used in engines designed for 80/87. Engines designed for avgas 100 have larger valves, often sodium cooled. If you can't get 80/87 at a given airport, you would be advised to use 100/130, which has about twice as much lead content, rather than low-lead 100. Always go to higher octane, never lower. Substitute fuel should not be used more than 20% of total time.

- When a licenced overhaul facility receives an engine which has endured a known prop strike, the cylinders must be removed and the crankcase inspected. It is highly desirable - although not mandatory - to Magnaflux the crankshaft.

  A major overhaul on a Lycoming IO-360 can cost over $11,000. Lycoming parts have been undergoing astronomical price increases (15 to 20% per year), largely due to labour difficulties, strikes, etc. An exhaust valve for an IO-360 costs $300.

- Major overhaul on 0-200 series engines normally costs from $5,500 to $12,000; 6-cylinder models about $8,000 to $15,000.

- A major overhaul takes a minimum of 80 manhours (personhours?).

- When major overhauls are performed at the factory, parts are frequently placed in bins with parts from other engines. Consequently, you may not get the same parts back. Of course, that may not matter to you; then again, it might.

- Extreme caution should be exercised when buying a used engine. Abuse, negligence, or uninformed use may not leave obvious traces. For example, if a prop strike has occurred, there is a very good chance that the crankshaft is bent and/or cracked and/or bearings have been damaged.

- If you see a bead of silicone sealing/caulking compound around the crankcase joint - look out. This is a quick fix for an oil-leak and almost certainly means a loose case, with consequent crankshaft and bearing damage.

- Piston engines used in 'copters are governed to idle at 1500 rpm, so go to fast-idle immediately after start-up. Consequently, they do not get a gentle warm-up. They routinely operate at 3200 rpm and can overspeed when declutched. In a training operation, where engines are prone to abuse - often due to ignorance and/or lack of proper training/experience - such over-speeding tends to be a frequent occurrence. Therefore, Richard definitely does not recommend using 'copter engines in homebuilt airplanes.

- Because some horizontally-opposed engines have the camshaft near the top, it takes time for oil to reach it after start-up. Consequently, camshaft failures are not uncommon.

  Some models are also prone to crack at exhaust ports.

- It is a good idea to look for an engine with chrome-plated cylinders. However, chrome-plating is a very critical process and should be performed only by a licenced facility. Automotive chrome-plating shops are not normally conversant with the stringent requirements for chrome-plating of aircraft engine cylinders. Interestingly, a chromed cylinder barrel will not have the bright nickle appearance of automotive chrome, such as a car bumper, but will be relatively reflective and will have a uniform colour all the way up the barrel as compared to the blackened appearance of the upper portion of unplated or nitrided barrels. Nitrided cylinder barrels are case-hardened to a depth of about 0.009 to 0.011 inch. While this greatly increases wear life, nitrided cylinders are prone to corrode.

- Non-standard cylinders are identified by a colour code. If the base of the cylinder is painted red, it is a chrome-plated cylinder. Blue denotes nitriding and green denotes 0.010 inch oversize.

- Engines rated above 125 hp normally have choked cylinders, i.e., the bore is about 0.010 inch smaller at the top than at the bottom. This is to compensate for non-uniform expansion when hot. A straight bore would have a greater diameter at the top when running and would act somewhat as an oil pump, sucking oil up the cylinder walls.

  Clearance between piston and cylinder is greater on air-cooled than on liquid-cooled engines, being as much as about 0.020 inch on the former as compared to about 0.001 inch on the latter. Consequently, pistons of air-cooled engines appear to be a sloppy fit. Liquid-cooled engines, of course, operate at higher compression ratios and therefore higher cylinder temperatures.

- Crankshafts are nitrided and therefore must not be ground. Many home-builders have rebuilt their own engines and in the process some have taken their crankshafts to an automotive engine shop to have them "reground". As a result, the nitrided layer has been ground away. In service, the now soft journals become galled and seize in the bearings. Result: disaster. (A former member of the chapter experienced this very scenario some years ago. His crankshaft broke on takeoff; he was seriously injured and his airplane was wrecked).

- Richard is not keen on using auto engines for aircraft. He feels that auto engines are not designed for the rigorous use aircraft engines experience. For example, auto engines rarely run at full throttle and certainly do not cruise for long periods at 3/4-throttle as aircraft engines do. Nor are they designed to endure the torsional stresses imposed by a swinging propellor. (Some may recall that some auto engine crankshafts have broken because they were cast rather than forged). And, of course, their design, manufacture, overhaul, and maintenance are not governed by rigid specifications.

- A time-expired engine will cost about $2,000 to $3,000. Don't pay more. It is generally advisable to buy from a commercial operation, since their engines tend to be well-maintained.

- Richard does not consider the O-320H suitable for homebuilt aircraft.

- While Lycoming parts are becoming scarce and very expensive, Continental parts are still plentiful. No major parts are "lifed", i.e., have specified safe life, on either Lycoming or Continental engines.

- Richard doesn't see many Continental engines, since very few are used in commercial operations. However, his experience indicates that Continental engines are highly reliable and he doesn't hesitate to recommend them for use in homebuilt aircraft. There are still plenty of 100 to 200 hp models available.

- Richard laments what he sees as a downhill slide in quality standards of modern aircraft piston engines, particularly as compared to the superlative quality standards set by Continental and Pratt & Whitney engines manufactured in '30s, '40s and '50s.