NEWSLETTER

Carb Heat

Hot Air and Flying Rumours

Vol 29 No. 6

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June 1999

Inside:

Next Meeting:
Saturday June 19, 1999 10:00 AM
Chapter Club House at Carp Airport

Oshkosh Arrival Procedures Video

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The weather gods have been exceptionally good to us recently, and the first two fly-ins of the year are behind us. Both the Embrun and Smiths Falls events were well attended as usual.

While talking about fly-ins, **Stan Acres** has graciously accepted the position of coordinator for our own breakfast on Sunday August 8th. I am sure Stan can count on your support for our cornerstone event of the year. Thanks very much Stan for stepping forward.

Canada Day July 1st

Our annual display at the National Aviation museum in support of their Canada Day celebrations continues this year. **Curtis Hillier** will be heading up the inside display table. Those interested in displaying their flying aircraft statically, and /or participating in the fly by are asked to contact yours truly.

Clubhouse Cleanup May 29th

Our annual spring cleaning of the clubhouse and hanger saw a dedicated band of members making things shipshape. It was encouraging to see many of our newest members pitching in, and just a little disappointing to see less than a full turnout of members with aircraft on the field.

Anyone who has attended Oshkosh, cannot help but be impressed by the cleanliness of the EAA site. The ubiquitous "**EAAers don't litter**" signs play a key part in that. But equally important is the **pride** of the individual EAA members, **and the willingness of many to pick up after the few**; usually offering a **gentle reminder** of how we do things at EAA.

Most of our members share that same sense of pride for our own chapter hanger and clubhouse. Unfortunately, there are **a few that are too lazy, self centred, and plain inconsiderate** to clean up after themselves. One the more noticeable transgressions were the large number of old oil jugs left lying around. Is it really too much effort to stick these in your trunk and drop them off at Canadian Tire or any gas station after you change the oil?

Leaving oil lying around also constitutes a **fire hazard**, and I should not have to remind folks that we are self insured, and need to be extra vigilant where fire hazards are concerned. If you notice anyone failing to clean up after their annual, a gentle reminder is perfectly justified, and hopefully all that will be required.

A special **thank you to Laurent Ruel** who is fabricating a new, larger door for our storage shed.

You may also notice our experiment with biological sanitary facilities has been deemed a noble failure. One major cleanup was all Frank Hendriksen and I had in us, and no new volunteers stepped forward. You'll have to use the trees or make other arrangements.

Young Eagles June 5th

We held our event this year a week early, under the very capable leadership of **Russ Robinson**. While turnout was down from past years, all the freshly minted Eagles thoroughly enjoyed themselves, as did the pilots and ground support staff. A special thank you to all who made this a memorable day for all.

The downturn in attendance seems to reflect a growing concern amongst youth organization leaders about the risk of flying. While the recent local fatality earlier this year may have also played a role, it seems harder and harder to get young people involved.

The bottom line is that your Executive are considering redirecting our efforts from Young Eagles to the **Flying Start** program which is aimed at introducing adults to the rewards of flying. Expect to hear more about this in the fall.

I would still encourage members to individually take youngsters up for rides as the opportunity presents itself under the Young Eagles auspices. You'll enjoy it as much as your passengers!

Russ and I would welcome your thoughts on this change in emphasis.

Thursday May. 20th Meeting

Our featured speaker at our May meeting was our own **Technical Advisor, Robert Erdos** who gave a thorough discussion of flight test considerations. I was impressed by Robert's presentation, handouts, and his impeccable credentials.

Saturday June. 19th Meeting

Our next meeting starts our Summer Saturday series at our chapter clubhouse at Carp Airport. The topic will be **Oshkosh** arrival procedures, featuring the official FAA video tape. Unfortunately I will miss that meeting, but **Dick Moore** will be hosting the meeting.

Gary

MODE-C ON THE TRANSPONDER
by Olav Peterson

The era of transponders arrived many years ago and unless your flying takes you only over the Canadian Shield, it's very likely that you have already acquired the "little black box".

Operating in Mode-A enhances the return to the ground-based radar and also allows positive identification of targets by assigning them unique "squawk" codes. The internal 12-bit code provides 2^{12}= 4096 combinations that could be assigned by air traffic control, which you are expected to dial in by means of the four, rotary, selector-switches on the face-plate of your unit. This aircraft identification code is shifted out together with the altitude interrogation segment, however, in Mode-A, the input from the altitude digitizer is disabled and hence, will contain no information.

When you finally scrape up enough cash to purchase and install a blind altitude encoder box, you will also be able to advance the mode-selector switch one notch farther to ALT. This position enables the 9-bit parallel info from the digitizer and adds it to the transponder signal down-path at 1090MHz. And this brings me to the primary purpose of this article: to shed some illumination on the Mode-C, Blind Altitude Encoder.

The name obviously implies to the method by which the aircraft altitude is conveyed to the ground station without the pilot's intervention ! Not an altogether satisfactory way and to overcome this glitch you are always expected to include the reading of your panel altimeter as part of your initial transmission to the tower.

The encoder contains an absolute pressure transducer. It's more than likely to be a solid-state device, as opposed to a mechanical contraption with bellows, gears and levers and it would contain a vacuum reference such that it measures the absolute pressure of the local ambient.

It is known as a Silicon Diaphragm Diffused Strain Gauge sensor. The car- industry makes extensive use of this device in monitoring manifold pressure for optimizing mixture.

Basically it's a tiny slab of silicon, where one side is etched to form a 'diaphragm'. A backing plate seals the edges and since the process is performed in vacuum, the sealed cavity becomes the vacuum reference chamber. Four, diffused sensing resistors around the edges are used in a Wheatstone configuration to produce an essentially linear relationship between pressure, conveyed by the Piezo-electric resistance, versus altitude and it also compensates for thermal expansion errors.

The pressure sensor output is followed by an analog-to-digital converter, digital linearization and encoding. The pressure sensor chip is temperature stabilized by means of a heater in a control loop.

It is calibrated at a barometric setting of 29.92 inches of mercury; at this setting it indicates directly, i.e., at sea level the code output would be equivalent to zero feet.

Atmospheric pressure decreases with increasing altitude at approximately 0.1 inches of mercury per 100 feet of altitude. Hence, if at ground level it shows 29.9"Hg, then at 100' it will show 29.8"Hg. Conversely, if the barometric setting decreases at ground level to 29.8"Hg, it will put out a code for +100' and to correct for the baro fluctuations, 100' would have to be subtracted in order to get an indication of 0' or ground level.

Thus, when the ATC receives the transponder signal with the imbedded altitude information, it has to translate the indication to true altitude.

The digitized altitude information, in ABCD code, defined by International Standard Code For Pressure Altitude Transmission, consists of an 11-bit binary sequence with a pattern of:

D2, D4, A1, A2, A4, B1, B2, B4, C1, C2, C4

where C4 is the least significant bit (LSB) of the sequence.

The eight most significant bits(MSB), the A B D bits, follow true Gray code and define altitude in 500-foot increments from -1K to 127K feet.

The three least-significant bits, the C bits, define altitude in 100-foot increments but they are not in Gray code; their cyclical pattern repeats every 1000 feet.

If we were to build a cockpit display for a typical general aviation airplane with a service ceiling of no more than 15K feet, we certainly could save on processing all the altitude info bits available by ignoring some of the MSB's.

. In order to establish the number of bits required we can do the following calculation.

Since the MSB's in Gray code are incremented every 500 feet and the code starts at -1000 feet, there will be (15000/500) +2 = 32 segments of 500 foot increments. The equivalent Gray code can be found by changing this decimal number to binary and then applying exclusive-OR algorithm to the binary bit-pairs.

Decimal 32 is represented in binary 0010 0000 which will then translate to 0011 0000 in Gray code. Obviously, instead of using all the available 9 bits, only 6-bit Gray code is sufficient, saving in complexity and cost.

The owners' manual for my Cess172, Skyhawk caps the altitude at 13,100 feet which would allow me to get by even with a 5-bit Gray code.

I will print out below the code for a few thousand feet to illustrate and give you a better feel for what comes out of the digital altitude encoder; also the cyclical pattern of the C-bits is shown.

ALTITUDE (in feet)	<----------Gray code.....>								<-cyclic->		
	D2	D4	A1	A2	A4	B1	B2	B4	C1	C2	C4
-1000	0	0	0	0	0	0	0	0	0	1	0
-900	0	0	0	0	0	0	0	0	1	1	0
-800	0	0	0	0	0	0	0	0	1	0	0
-700	0	0	0	0	0	0	0	1	1	0	0
-600	0	0	0	0	0	0	0	1	1	1	0
-500	0	0	0	0	0	0	0	1	0	1	0
-400	0	0	0	0	0	0	0	1	0	1	1
-300	0	0	0	0	0	0	0	1	0	0	1
-200	0	0	0	0	0	0	1	1	0	0	1
-100	0	0	0	0	0	0	1	1	0	1	1
0	0	0	0	0	0	0	1	1	0	1	0
100	0	0	0	0	0	0	1	1	1	1	0
200	0	0	0	0	0	0	1	1	1	0	0
300	0	0	0	0	0	0	1	0	1	0	0
400	0	0	0	0	0	0	1	0	1	1	0
500	0	0	0	0	0	0	1	0	0	1	0
600	0	0	0	0	0	0	1	0	0	1	1
700	0	0	0	0	0	0	1	0	0	0	1
800	0	0	0	0	0	1	1	0	0	0	1
900	0	0	0	0	0	1	1	0	0	1	1
1000	0	0	0	0	0	1	1	0	0	1	0
1100	0	0	0	0	0	1	1	0	1	1	0
1200	0	0	0	0	0	1	1	0	1	0	0
etc.	----------e t c ----------										

Now that you know the code, why not design and build a cockpit display of your altitude that is being relayed to the ground station and use it to double-check the integrity of the blind encoder and your altimeter, before entering a control zone !

I have already generated a circuit schematic, a printed circuit layout for surface-mount components and packaging which would fit into a standard , 3 1/8"instrument cut-out, and a file in C for the EPROM.

Classifieds

Place your ads by phone with Charles Gregoire @ 828-7493 or e-mail to cbg@nortelnetworks.com
Deadline is first of the month.
Ads will run for three months with a renewal option of two more months.

Irving Slone is looking for someone to accompany him in a Pietenpol to assist in flying it to Oshkosh this coming summer. Oshkosh 99 is featuring the 70th anniversary of the Pietenpol. A large turnout of Pietenpols is expected, (20 so far) and will be parked together in the showplane area. A multi-media presentation on the legendary designer and his aircraft will be presented at the theatre of the woods. If interested call Irving Slone at
722-0359 (res) or 230-2100 (office) 03/99

A limited number of WearCheck engine oil analysis (SOAP) kits at $28 each. Price includes analysis for 17 wear elements, additives and contaminents, percent fuel dilution, water concentration and diagnostic recommendation, plus debris examination (if present). SOAP has been used for at least 30 years and is the most widely accepted method of internal engine health monitoring and can often pinpoint impending engine failure.
Garry Fancy 836-2829 02/99

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Large HF radio (ex Otter), good ham project $25.00, Large Radar Screen (possible coffee table???) $25.00, Beech 18 oil cooler, new (possible rad??) $50.00, 6 Gal. J-3 wing Tanks (2) $200.00, Box of VW engine Parts (possible 1/2 vw project) $50.00, New autopilot , 12 volt trim servos and stuff $25.00, Air Path and Pioneer 3 1/8 compass cores $75.00/ea, Shark Fin pitot tube 24volt, new in box $25.00, Beaver U/L Lotus float rigging (spreader bars, etc.) $25.00, Continental prop. spacer (O.E.M. alum) $50.00
Tim Robinson 613-824-5044 03/98
75714.2136@compuserve.com

McCauley Metal Prop, 70-38 for a continental A65 or C85.
Jim Robinson 613-830-4317 01/98

Garry's Parts Bin

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Valve, Parking brake
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Lycoming, Accesory case, dual take-off adapter for hydraulic and vacuum pumps.
Piston rings for Continental E-185 or O-470.
Light weight starter & bracket for Lycoming O320 or O360.
two Lycoming engine-driven fuel pumps $50.00 each

Control wheel yoke assembly from Piper Tomahawk

Engine, VW 1600cc completely rebuilt
Garry Fancy (613)-836-2829 01/98

Articles Wanted

I am always interested in receiving submissions for this, your Newsletter. You may bring articles to the monthly meetings or mail information to the post office box or send me an e-mail attachment at:
cbg@nortelnetworks.com 01/98

EAA Chapter 245 Membership Application

NEW:___ RENEWAL:___ DATE:__/__/__
EAA NUMBER:.....
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Annual Dues: January 1st to December 31st. (porated after March31st for new members/subscribers).
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Full Member: ____: $55.00 Newsletter, hangar, workshop, tiedowns
Newsletter subscriber ____: $30.00 Newsletter
Note Associate and full members must also be members of EAA's parent body in Oshkosh WI, USA

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