Captain Michael Gitt Papers - The Airline Pilot (ALPA Newsletter), 1949-1964

[[picture in the upper left corner]]
CAPTAIN JAMES A. FURR, author of this paper, is shown representing ALPA during a flight recorder tape readout at the National Bureau of Standards. Seated in the picture are John Pahl and Edward Patton of the CAB. Captain Furr has represented ALPA at several of the tape readout sessions following accidents and is the Association's most experienced representative in the analysis of flight recorder data. The special equipment required fro this work is evident in the photo.

[[three columns of text]]

other, they are displaced from each other so as not to be in vertical alignment. This arrangement presents a problem when trying to look at two different traces and determine what was happening on one, and simultaneously what was happening on the other.
The next problem is to try to find the exact distance these styli are displaced from each other. The manufacturers' standard is known, but when tapes are installed and removed, apparently the styli are shifted and do vary in relation to each other. This is important as a change of 25 ten thousandths of an inch is the equivalent of one second in time. Since most accidents require the time to be accurate to the second, it becomes obvious this displacement should be known and accounted for. Sometimes we can findfrom the accident tape, a point on some previous flight where the recorder was turned off, then re-energized. At this point, usually all styli will make a mark. The space between these marks can be measured thus giving the distance they are displaced from each other. After the tape has been checked for stylus displacement the actual reading of the various parameters can begin.
Altitude is usually picked as a beginnig trace to read. This is because it is the easiest to follow back from impact. The altitude trace is usually followed back to some altitude where teh flight was operating normally to start the readout. If too much of the flight is read out it is not only time consuming but by having an extended plot there is a comparable loss of detail in the final moments. Likely this is the area in which you have the most interest.
In reading a trace, it is followed under the microscope and any significant change is taken as a data point. Each data point taken is actually two values. The "X" which is how far the foil has advanced and is later converted to time; and the "Y" being the vertical measurement from the reference line. These data points are taken at each significant change right up to and maybe a few points beyond impact.
After the raw data points have been taken for each parameter, they are ready to convert them to useable values. These are altitude in feet, indicated aispeed in knots--vertical acceleration in "G"s and heading in magnetic degrees. One of the corrections which must be applied to the raw data in one tape recorder is arc correction. The altitude and airspeed styli are mounted on a pivot so as to scribe an arc when traveling their full range. As values of altitude and arispeed vary, corrections must be applied to compensate for arcs, effectively making the travelof the styli a straight vertical line. Next, the aforementioned stylus displacement correction must be applied to all styli to mathematically reposition them as if they had been recording in a straight vertical line.
On recorders which have the scirbing styli on a straight line and have no arc or stylus displacement corrections, a readout can be accomplished in less time. Finding a point in time to commence is the next process. Since you have previously determined the amount of time in seconds which is represented by a given movement of the foil in thousands of an inch, you next take the "X" data points and find how many seconds (or minutes) each data point has advanced from the starting point. You now

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Altitude is usually picked as a beginning trace to read. This is because it is the easiest to follow back from impact. The altitude trace is usually followed back to some altitude where the flight was operating normally to start the readout. If too much of the flight is read out it is not only time consuming but by having an extended plot there is a comparable loss of detail in the final moments. Likely this is the area in which you have the most interest.

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After the raw data points have been taken for each parameter, they are ready for the correction factors necessary to convert them to useable values. These are altitude in feet, indicated airspeed in knots—vertical acceleration in "G"s and heading in magnetic degrees. One of the corrections which must be applied to the raw data in one tape recorder is arc correction. The altitude and airspeed styli are mounted on a pivot so as to scribe an arc when traveling their full range. As values of altitude and airspeed vary, corrections must be applied to compensate for arcs, effectively making the travel of the styli a straight vertical line. Next, the aforementioned stylus displacement correction must be applied to all styli to mathematically reposition them as if they had been recording in a straight vertical line.

On recorders which have the scribing styli on a straight line and have no arc or stylus displacement corrections, a readout can be accomplished in less time. Finding a point in time to commence is the next process. Since you have previously determined the amount of time in seconds which is represented by a given movement of the foil in thousands of an inch, you next take the "X" data points and find how many seconds (or minutes) each data point has advanced from the starting point. You now have to make up a calibration chart from which the "Y" values or the distance that is measured from the reference line up to the trace you are reading in thousands of an inch, can be transposed into actual values of altitude, airspeed, "G" forces and heading.

About The Author

Captain James A. Furr, Eastern Air Lines, has participated in many accident investigations as a representative of ALPA. Captain Furr is presently ALPA's Region III Safety Chairman and is Central Safety Chairman for Eastern. He is a member of EAL Council 214 and lives in Falls Church, Virginia.

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Captain Jamse A. Furr, Eastern Air Lines, has partecipated in many accident investigations as a representative of ALPA. Captain Furr is presently ALPA's Region III Safety Chairman and is Central Safety Chairman for Eastern. He is a member of EAL Council #142 and lives in Falls Church, Virginia.
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