Appendix 1

Detailed Summary of Surveys.

Capstone Management

Name: Gary Childers  Position: National Free Flight Field Coordinator

Explain your duties and responsibilities:

I work in conjunction with all FAA straight-line organizations, other governmental agencies, and external users while coordinating the development of scope, concepts and requirements that are used to initiate the operational demonstration, validation, and implementation of various Free Flight and Capstone program components. During this process I work to identify the appropriate operational/technical regulations, policies, and procedures, and ensure system integration, human factors implications, schedules, and funding are considered for each element. I also coordinate the acceleration of cost effective avionics certification and approval processes; equipage, and operation of new technology, to assure that space based navigation and automatic dependent surveillance UAT data link transfer of flight information become available to users at the earliest possible date. I continuously evaluate the newest 21st Century technology, in an effort to assure Capstone bundles the current capabilities into each end-to-end demonstration. I coordinate the validation of Navigation, Communications, and Surveillance system performance under real-time operational conditions in Alaska in preparation for National Airspace System wide modernization and full implementation of free flight elements. I help assure that every organization involved has the opportunity to contribute to the accomplishments of Capstone goals and objectives. I also provide assistance, guidance, and information, as required, to various AVR offices, Flight Standard Divisions, other straight-line organizations and governmental agencies as well as industry and users groups.

Note: In order to fully appreciate overall effort undertaken by the Capstone program office and to enable a through analyze of Capstone Phase One to the extent indicated by the enclosed questions, a review of the entire contents of the Capstone website should be conducted. Answers to the high level question presented can be found in documents previously given to flight standards and located on the web site. For your convenience I will provide some lead-in information under each question, these answer should not, however, be taken as a complete summary of Capstone Phase One element involved.

1. Elements 8.2.4 Cooperative Relations with Assigned PIs

A. What did congress mandate for the implementation of Capstone?

The primary congressional desires flow out from a series of reports generated around the globe that point out the need to improve aviation safety and capacity through the injection of new technology. One of the primary studies used was forwarded to FAA in 1997 by the NTSB This study, Aviation in Alaska, NTSB/SS-95/03 states in pertinent part,

Implement, by December 31, 1997, a model program in the Arctic and southeast regions of Alaska to demonstrate a low altitude instrument flight rules (IFR) system that better fulfills the needs of Alaska’s air transportation system. The model should include the following components:

1. The use of the global positioning system (GPS) as a sole source of navigational information for en route navigation and for non-precision instrument approaches at a representative number of airports where instrument approaches do not currently exist. (Operators participating in the program will have to be allowed to conduct these operations without the integrity monitoring functions of the wide area augmentation system (WAAS) until WAAS is fully implemented in the demonstration region.)

2. The use of satellite-based voice communications and satellite-based, Mode S, or VHF data link (for aircraft position and altitude) between aircraft in flight and air traffic controllers.

3. The operation of commercial, passenger-carrying flight under IFR in turbine-powered single-engine airplanes equipped with redundant sources of electrical power and gyroscopic instrument vacuum/pressure.

4. The use of currently uncontrolled airspace for IFR departures, en route flight, and instrument approaches in the demonstration program region. (Class II, Priority Action) (A-95-121)

This safety study is supported by a plethora of other scientific studies dating back to 1882. From these many reports, the Vice President of the United States, with guidance from senior FAA executives, mandated an out growth of Aviation infrastructure within Alaska and across the rest of the NAS. From the resulting presidential decree came the Flight 2000 program, which later became Capstone, which was funded by direct specific language found in the 1999 Congressional omnibus. Each year since 1999 similarly worded language has directed new elements and provided more fenced monies from Congress to the Capstone program.

B. Explain the guidance you were given for this program?

No additional Flight Standards guidance material was provided beyond an assignment letter by AAL-200 to my present position in support of the congressional and executive decree to initiate the work.

C. What was program supposed to accomplish?

These specific Phase I objectives of Capstone are (these are taken directly from a Flight Standards coordinated version the Capstone plan:

1.5.1 Safety.

1.5.1.1 Reduce the fatal accident rate (on a per-flight-hour basis) due to en route and approach navigational errors in reduced visibility by 25 percent in the equipped aircraft within one year after installation of equipment and new low altitude airspace design and procedures are in place.

1.5.1.2 Reduce the fatal accident rate from mid-air collisions en route between the airports involved in Capstone and in the vicinity of Bethel by 25%.

1.5.1.3 Reduce the fatality rate due to search and rescue failures for equipped aircraft in the Bethel area.

1.5.2 Capacity and Efficiency.

1.5.2.1 Reduce the number of flights canceled due to inadequate destination weather reporting at airports equipped with new automated weather sources by 10% within one year.

1.5.2.2 Reduce flight delays due to weather by 5% within one year for flights into Capstone airports.

1.5.2.3 Reduce operators costs for fuel wasted due to adverse weather situations on equipped aircraft in the Bethel area within one year.
1.5.3 Information for Decision Makers

1.5.3.1 Provide a report to the Associate Administrator for Regulations and Certification containing the relevant technical data on ADS-B system performance of all three candidate ADS-B systems (Mode S, VDL4, UAT) in mountainous terrain including at lower altitudes, in extremely low temperature operations, and on a variety of small airframes.

1.5.3.2 Provide a report to cargo operators on the fuel savings achieved due to better in flight information on the location and severity of icing conditions, winds aloft, and below minimums landing conditions.

1.6 Benefits

Under Capstone, the Alaskan Region will serve as a real-world test bed for tools, procedures and certification techniques. During the project selected commercially operated aircraft are equipped to interface with ground sites installed within Alaska.

Immediate impact items include:

- Improved situational awareness for pilots,
- More weather reporting sites,
- Improved area navigation and instrument approach capabilities,
- Stimulation of the avionics manufacturing industry,
- Improved capability for dispatchers and controllers to flight follow aircraft,
- Improved search and rescue,
- Adapted MEARTS for Anchorage ARTCC,
- Fuel savings for equipped carriers,
- Immediate potential for reducing near mid air collisions.
- Radar like coverage at altitudes below 10,000 feet

1.6.1 Capstone long term benefits:

- Procurement of avionics to attract manufacturers who can, individually or jointly, deliver avionics and ground equipment which meet performance specifications in a timely manner.
- Provides answers to questions regarding GPS performance during periods of natural interference.
- Launches efforts to accommodate 180,000 small aircraft nation wide with affordable avionics.
- Facilitates search and rescue missions by recorded aircraft flight tracks

D. What was the FAA’s purpose for deploying Capstone equipment?

Capstone provides the avionics and ground system infrastructure that will lead to improved aviation safety in Alaska. It also provides the launching platform for validation of many essential elements needed to move toward a “proof of concept” demonstration of the Free Flight concept. Introduction of the future communication, navigation and surveillance components of the NAS 4.0 Architecture allows an assessment of operational capabilities and mitigation of monetary and safety risk exposure. The technology fielded under Capstone may be modified during national implementation and need to be replaced.

Capstone provides for field evaluation of alternative ADS-B technologies. The technology fielded under Capstone may be modified during national implementation and need to be replaced. For a full and complete understanding reading every document on the Capstone web site is recommended.

E. Do you have a written policy concerning program implementation (End users, AFS, etc.) Explain your response.

The following document was developed and disseminated in concert with FS personnel at the the Regional Headquarters, and the Anchorage and Fairbanks FSDO’s. The HBAT for ADS-B, now a portion of the inspectors handbook was developed in conjunction with local, Regional and National Flight Standards personnel.

CAPSTONE INFORMATION

FAA ALASKAN REGION

Capstone

Investment in Safety

IFR AND VFR USE OF CAPSTONE AVIONICS EQUIPMENT BY AIR CARRIERS AND OPERATORS
IN THE STATE OF ALASKA

Version 2 February 12, 2001
Appendix 1. Detailed Summary of Surveys.  

1. PURPOSE: The information within this document is intended as interim guidance for Alaskan Region Aviation Safety Inspectors providing certificate management oversight of certificate holders participating in the FAA Alaskan Region Capstone Program. It is not intended to preempt or replace any other regional or national guidance. This pamphlet replaces the Capstone Information pamphlet dated 02-17-00.

2. BACKGROUND: Capstone is an Alaskan Industry/FAA safety initiative. Industries role includes establishing requirements and helping field technology. FAA’s role includes processing Alaska aviation industry requirement into viable answers to safety initiatives. Industry selected the Yukon Kuskokwin Delta to begin Phase I of the Capstone program. The area, with a blend of approximately 125 VFR aircraft and 25 IFR commercial aircraft, serving 50 communities from a centralized hub airport located at Bethel, Alaska, had a very high accident rate. Technology was selected that could address causes of, primarily, fatal accidents. Since most fatal accidents result from collisions with terrain and other aircraft, these two factors were placed as the highest priority for improvements. It was felt that offering pilots new enhanced situational awareness tools, such as terrain and mid air collision warnings in the cockpit, could have the greatest impact. Passed studies aimed at identifying the cause of accidents show that the large number of VFR destinations served by scheduled carriers around Bethel influenced the number of accidents. As possible counter measures new weather stations and IFR approaches are ready for use by carriers and ADS-B ground stations were certified to enable Air Traffic Controllers to use ADS-B as a radar-like separation tool.

3. ENVIRONMENT

It is important for each Alaskan safety inspector to share a common understand of the environment involved.

Capstone Phase I

The Lower Yukon Kuskokwin Delta, not unlike several other coastal regions of Alaska, is an area of flat tundra intermingled with low gently rising sparsely vegetated hills. A large range of mountains borders the area to the east. Snow conditions, present up to nine months a year, create low or flat light conditions that affect a VFR pilot’s ability to judge terrain clearance. This large flat area is known for rapidly changing weather conditions. When instrument flight conditions move rapidly into the area VFR aircraft are caught outside the class D airspace surrounding the hub airport. When IFR traffic is approaching the Bethel airport, Special VFR aircraft are held outside Class D airspace until IFR traffic complete their approaches. This results in multiple VFR aircraft flying in a “daisy chain” holding pattern, in reduced visibility, and adds to and already preexisting risk of midair collisions.

Capstone Phase II

Southeast Alaska will become the site of Capstone Phase II. Due to the terrain constrained environment there are many challenges to be met in order to reduce the number of fatal accidents in this region of the State. With over 1000 islands the Alexander Archipelago is made up of the exposed tops of the submerged coastal mountains that rise steeply from the Pacific Ocean. Deep, fjord-like channels separate the islands and cut them off from the mainland; the northern part of the inside passage threads its way among the islands. The largest islands are Chichagof, Admiralty, Baranof, Wrangel, Revillagigedo, Kupreanof, Mitkoff, and Prince of Wales. All the islands are rugged and densely forested, with few forced landing areas. Some of the islands communities have hard surfaced runways, with the remainder served by seaplane landing areas. Only a few of the airports are served by instrument approach aids. Minimum enroute altitudes, ranging from 6000 to 10000 feet MSL, are due to: mountainous island terrain; communication and navigation limitations The weather is somewhat typical of coastal regions, however, numerous glaciers cascading toward warm ocean water intensifies the affect. The channeled affect created by the islands tend to funnel aircraft into narrowing airspace, while low ceilings increase traffic concentrations at lower altitudes. The transitional areas leading to the airports become congested, intensifying the risk of collisions. Both of these regions are faced with unique environmental conditions which include: minimal aviation support services, large numbers of VFR destinations, and customer pressure, factors that have resulted in the Alaskan industry selecting them for improvements.

4. DISCUSSION: The Capstone program includes:

A. Phase I and Phase II, Purchasing up to 200 sets of modern avionics during Phase I, and 200 during Phase II (sets include all cables, antennas, mounting hardware, and manuals).

Phase I, 1. Approve the avionics sets for installation under Supplemental Type Certificate (STC) Number SA02149AK, as amended future STC’s or the field approval process.

B. Install the avionics sets in commercial aircraft in Alaska.

1. Phase I, These avionics suites consists of:

- Multi-function displays (MFD)
- TSO-129 or equivalent GPS
- Universal Access Transceiver (UAT) or an equivalent ADS-B data link
- TSO-129 or equivalent GPS
- Universal Access Transceiver (UAT) or an equivalent ADS-B data link


D. Phase I and Phase II, Purchase and install ADS-B ground stations capable of transcieving flight information data and sending data to Anchorage ARTCC.

E. Phase I, Initiate operational use of ADS-B for radar-like services to participating aircraft.

F. Phase I and Phase II, Enable the use of ADS-B as a flight following tool for airline operations centers

G. Phase I and Phase II, Verify the accuracy of the ADS-B data collected

H. Phase I and Phase II, Analyze information and program impacts before, during and after implementation.

I. Phase I and Phase II, Provide generic training material and initial cadre carrier crew training.

4. ACTION: FAA Flight Standards role is:

A. Training Program approvals: Each participating Air Carrier/Operator received a complete FAA order 8400.10 compliant sample training module developed and provided by the University of Alaska Anchorage (UAA). This program was developed in conjunction with carriers and ASI’s from the Alaskan Region FSDO’s. The modules cover the operation of the GX-60 and MX-20 avionics units. Amendments and new modules will be provided as new features are added to Capstone. The most recent addition was forwarded to participants on 12-09-00. Carriers can adapt and adopt Capstones generic program or develop their own version. Regardless, each carrier is responsible to present their adaptation to assigned Principal inspectors for initial approval. Sample train the trainer and initial approval letters for each company are included in Appendix A of this document for convenience. Capstone funded a minimum on one train the trainer slot (larger companies
Appendix 1

4. INQUIRIES. All Regional inquiries should be directed to James Call 907-271-3771 or Gary Childers, 907-271-6304

Appendix A

XYZ Airlines
Director of Operations
Main Street
Anywhere, AK 99XXX

DATE
Flight Standards District Office
Airport
XYZ Airlines request approval to incorporate the Capstone training module for initial, recurrent, requalification, ground and flight, instructor/check airman and dispatcher training program per page XXX, XXX, dated February 15th 2000. This request for training curriculum approval is in accordance with the provisions of FAR 135.325(a) of the Federal Aviation Regulations.

XYZ Airlines also requests that Mr. Leonard Kirk be added to our list of instructors. Mr. Kirk will be the ground instructor for the Capstone training module of our training program.

Director of Operations

Appendix B

October 11, 2000

SUBJECT: Policy Regarding Automatic Dependent Surveillance-Broadcast System Relief

MMEL CODE: 34 (NAVIGATION)

REFERENCE: Original

FROM: Manager, Air Transportation Division, AFS-200

TO: All Regional Flight Standards Division Managers
All Aircraft Evaluation Group Managers

REPLY TO ATTN OF: Manager, Program Management Branch, AFS-260

PURPOSE:
The purpose of this policy letter is to provide updated guidance for Flight Operations Evaluation Board (FOEB) Chairmen and principal operations inspectors (POI) in assigning relief for Automatic Dependent Surveillance-Broadcast System (ADS-B) in Master Minimum Equipment Lists (MMEL) and operators Minimum Equipment Lists (MEL).

DISCUSSION:
The ADS-B is an onboard aircraft system that is designed to assist the flightcrew in avoiding conflicting traffic. ADS-B like Traffic Alert Collision Avoidance System (TCAS) is considered a backup to "see and avoid" concept and the air traffic control (ATC) radar environment. This system is certified as an aid to visual acquisition of conflicting traffic and may not be used to maneuver the aircraft based upon traffic information displayed.

The ADS-B communicates with other ADS-B equipped aircraft and transmits/receives data; such as, Global Positioning System latitude/longitude
position, ground speed, altitude, a flight identifier, and velocity vector.

Other traffic information may be uplinked from the ground radar station. This information is derived from the Traffic Information Service (TIS). This service uplinks the traffic radar data from ATC and will generate both TIS traffic targets and TIS traffic alerts.

The ADS-B system is in a developmental process and has not been authorized for fleet-wide installation. Installation is limited to a small number of aircraft under a certificate of eligibility. Relief has been requested for the entire system and for subsystems to allow use of those functions which operate normally, e.g. transmit or receive information if the other function is inoperative.

POLICY:

The Flight Operations Policy Board (FOPB) finds sufficient cause to grant relief for the ADS-B system. It also recognizes that as a developmental system the capabilities will be enhanced and the system will be certified to perform tasks currently being accomplished by Title 14 Code of Federal Regulations (14 CFR) required equipment, e.g. TCAS. Therefore, the POI will ensure, that if ADS-B is installed in lieu of or as a replacement for 14 CFR required equipment, that the repair category in the operator's MEL will be the same as that of the 14 CFR required equipment.

34 NAVIGATION

XX. Automatic Dependent Surveillance- Broadcast (ADS-B) System

NOTE: If ADS-B is installed in lieu of or as a replacement for 14 CFR required equipment, the repair category in the operator's MEL will be the same as that of the 14 CFR required equipment.

1) Link and Display Processor Unit (LDPU)

NOTE: Cockpit Display Traffic Information (CDTI) display of data from other aircraft systems may be used.

2) Cockpit Display and Traffic Information (CDTI)

NOTE: ADS-B data transmissions may continue.

3) CDTI Control

May be inoperative provided: Panel a) Flight ID can be set, and, b) Screen display is acceptable to the flight crew.

4) Data Link transmitter(s)

5) Data Link Receivers

Gary E. Davis for Gregory L. Michael

2. Elements 9.1.1 Tests and Demonstrations

A. What procedures did you use to deploy Capstone equipment to the industry?

Deployment was done as dictated by the Capstone Avionics Installation Program developed under Contract with Aviation Systems Engineering Inc.

B. What procedures did you use to disseminate training, proper use, and installation information, etc., to industry managers, crewmembers, dispatchers, flight followers?

Capstone followed the procedures found in the the Federal Aviation Regulations and Flight Standards Aviation Inspector handbook. All materials disseminated were processed through the CHDO for each participating carrier.

C. What procedures did you use to disseminate installation, training, and proper use information info to FAA PIs?

Each piece of information was disseminated directly to the PI both by Email and during meetings at the CHDO.

D. Are these procedures documented, and have the procedures and changes been tracked?

Yes.
For the Certificate Management Team and Operator Management sections, this document shows the number (in parenthesis) of interviewees who gave that answer to each question. For the Crewmember section, all actual answers are given due to the variety.

We have applied the ATOS program elements to each series of questions and identified them with four reasons for human error: Management Function failures, Lack of Standards, Lack of Training, and Poor Individual Performance. These four reasons for human error encompass the various attributes, which should be incorporated into operator programs under the concept of System Safety.

**Certificate Management Team (CMT) principal inspectors**

Seventeen inspectors assigned to operator Certificate Management Teams were interviewed, including four Principal Operations Inspectors (POI), five Principal Avionics Inspectors (PAI), and six Principal Maintenance Inspectors (PMI). Some of these inspectors are assigned to more than one of the operators surveyed.

### Standards

FAA must have a policy and a procedure to achieve a standard.

1. **Elements:**
   - 3.1.4 Operational Control
   - 8.2.4 Cooperative Relations with Assigned PIs

A. **What do you think the Capstone program is supposed to accomplish?**
   - 2 responded “Situational awareness”, 5 responded as “CFIT”, 4 responded “safety”, 3 responded “traffic avoidance”, 1 responded “radar-like coverage and air traffic control”, 4 responded “test program”, 3 responded “navigation”, 2 responded “flight following”.

B. **Describe the FAA’s purpose for deploying Capstone equipment, as you understand it?**
   - These answers were the same as A above since the question was so similar to that one.

C. **Were you provided with policy information regarding training, proper use, and installation? If yes, explain your understanding of the policy.**
   - 9 responded “no policy information”, 4 responded “some policy information”, 1 said “policy changed in midstream”.

D. **If you received policy information, who distributed that information (Capstone, FAA Region, FSFO management, UAA, etc.)?**
   - 8 responded “Capstone”, 3 responded “UAA”, and 4 responded “None”. (Note – responses here are inconsistent with C above, likely due to misunderstanding of policy information versus instructions as distinguished in the questions)

E. **What procedures were used for:**
   1. Approval of training program?
      - 4 of 4 POI said HB 8400.10. All PAI/PMI indicated no involvement.
   2. Operations specifications changes as applicable
      - 1 of 4 POI said HB 8400.10 for OPSS approval, other 3 POI said no OPSS issued. All PAI/PMI indicated not involved.
   3. Company manuals (maintenance and operations)?
      - 2 of 4 POI said HB 8400.10; other 2 said no procedures in manuals. 4 of 5 PMIs said not in manuals, other PMI said data cards change procedures only. All PAI said not in manuals, except 1 said manual is under development now.
   4. Are these procedures documented?
      - Answers are reflected in block “E.3”, above.

### Training

FAA must make the employee aware that the standard or policy exists and teach how to achieve the standard.

1. **Element**
   - 8.2.4 Cooperative Relations with Assigned PIs
   - 9.1.1 Tests and Demonstrations

A. **Did you receive an overview briefing on Capstone background and development from the Capstone office?**
   - 11 said yes, 4 said No.

B. **What training did you receive on the Capstone program, the process, and its operation?**
   - 9 said none, 4 said some from observing training or from briefings above, 2 said 2-day UAA class (1POI, 1 PAI)

C. **What training did you receive on the use of the equipment?**
   - Same as B

D. **Have you used the Capstone equipment and operational simulator? How often?**
   - 4 POI said yes, only 1 POI in training. 5 of 5 PMI said no, but a couple have watched bench testing. 3 of 5 PAI said some from watching, 2 PAI said yes from UAA training.

E. **Have you used the Capstone equipment in the King Air or any other aircraft?**
   - 4 of 4 POI said yes, but varied – 2 in King Air, 1 in both, 1 during en routes. PMI/PAI – all said no except for during en routes or while in shop.

F. **Other than what you provided, if any, do you know if your operator was given any other guidance to incorporate Capstone into the operations manual and training program?**
   - Sporadic answers: 6 said unknown, 7 said some knowledge but could not expand.

G. **If so, who provided the guidance and were you included in the distribution of that guidance, either as a participant or for information? Explain. Same as F above except 10 of the total could not specify who actual distributed the info, UAA or Capstone. Only one said they participated in the distribution.**

H. **What materials were provided with this guidance – VHS, CD, examples, etc?**
   - 2 of 4 POI tapes, manuals, handouts; 2 did not know. 2 PAI said manufacturer manuals. All other PAI/PMI did not know.

I. **Did the operator use this guidance when developing their training program?**
   - 2 POI said yes, 1 PMI said yes. All others said unknown.

J. **Was this guidance available to you when evaluating the manual and approving the training program?**
   - 3 of 4 POI said yes. All others said no.
Management

Must provide the tools to achieve a standard; must enforce the standard.

3. Elements

3.1.4 Operational Control

A. When and how did you become aware that your operator was participating in Capstone?

(Answers were extremely varied, non-specific, or not clear enough to fully analyze, mostly due to passage of time (3-4 years ago). See question B.

B. Was this before or after the installation of the actual equipment in the first company aircraft?

Before – 8; During – 5, After – 1, Other – 2

C. At what stage of implementation did you become actively involved with this operator on the Capstone program: equipment installation, ops specs, during an enroute, training program additions, training of crewmembers, Manual changes, etc? (Record the answer as given)

See question B above.

D. Did you need support from either FAA management or the Capstone office? What support did you receive?

1. PMI – Some questions were raised to Capstone office but little resolve was obtained. I was left with the feeling that questions were rocking the boat. POI – primarily ops spec authorization, guidance is weak. PAI – Some questions were raise but we felt that questions were rocking the boat.

2. PAI – did not need any but felt that Capstone office would not have responded if I asked. PMI – No; POI – Talked to a couple of folks from Capstone and DC, but don’t remember exactly what.

3. PMI/PAI – yes but never received any; POI – No.

4. PMI did not need information other than what Childers passed; PAI – no very active, checked 337 and performed in flight checks after installation;

POI – No, pretty straight forward stuff.

5. POI – see nr.4; PMI – see nr.1

6. PMI – don’t remember if I asked for help but I did pass information to Capstone. What they did with it I do not know. POI – See nr. 1. PAI – no one in Capstone has an airworthiness background.

7. PAI – see nr.2; POI – see nr.4; PMI – see nr.6

8. PAI – see nr.2; POI – what I really needed was a proper introduction to the program and familiarization with the product; PMI – see nr.6

9. POI – See nr.4; PAI – no one interested in the program.

E. What does your operator management use the capstone equipment for? (Note - answers are only opinion, not actual proof)

2 said company uses for operating in less than VFR, 1 said enhanced GPS, 4 said flight following, 1 said situational awareness, 1 said CFT and collision avoidance, 1 said terrain avoidance and navigation, 2 said don’t know, 1 said it is used at outlined in the equipment manual.

F. Do you have any concerns regarding your operator's use of this equipment? Explain.

1. PMI – My concern is that pilots will use this equipment to a higher level of navigational assistance than the FAA intended (i.e., VFR situational awareness R&D project.) With equipment that has the ability to mislead a pilot, training and recurrent training would see to be a valuable tool to use during this R&D project. PAI – concern that they (PAIs) are not aware of changes in Capstone data bases. Feel totally left out of process and program.

POI – Yes, utilized equipment for weather in less than FAR allowance. PAI – pilots will tend to use the equipment to a higher level of navigational assistance than FAA intended.

2. PMI – none to speak of. PMI – Absolutely no formal training given to maintenance inspectors at any point in the project. We would ask questions and not get support. A major concern is the STC. The STC gives the installer cart blance to move radio racks and other equipment around in order to install the Capstone boxes and heads. During installation on company aircraft, the Capstone contracted mechanics just moved stuff around and did not interface with the principals. I was also not given a copy of the STC until I asked for one from one of the contracted mechanics. Supervisor Fred Handy expressed some concern to the Capstone folks about the STC and they just “blew him off”. POI – carrier seems to be doing good with what they have.

3. PMI/PAI – no trace ability to national standard; no support for install of initial equipment; POI – no.

4. PMI concerned that other operators may be turning it off when needed most because of distrust; PAI – only concern is possible pilot distraction but benefits outweigh this; POI – No, very happy with it.

5. POI – see nr.4; PMI – see nr.1

6. All three seem to be OK with it. Concerned with new aircraft added to certificate that are not equipped. Specifically with relation to operating special VFR with aircraft that have mixed installations. He said that this is a very common complaint among several operators because they were told that SVFR operation and ATC handling would improve but it has not. POI – see nr.1; PAI – see below this box for concerns.

7. PAI – see nr.2; POI – see nr.4; PMI – see nr.6

8. PAI – see nr.2; POI – Not if it keeps them in the air and out of accident reports; PMI – nr.6

9. POI – See nr.1; PAI – see nr.4

Additional Concerns from PAI, operator number 6.

There have been many concerns since the start of the project but no one seems to want to listen to the field inspector, or provide guidance as to how to deal with the equipment. Inspector Tom Hodenfield was to be the point of contact in the FSDO for this project and states that he has been completely left out of the project and has no idea as to what is going on with it, or how it is working. The equipment has inherent problems that have been identified and not fixed, or addressed in any form other than training. Many of the aircraft that the equipment was installed in already had a GPS receiver, of a different manufacture and adding the GSX50/60 only added confusion to an already very busy cockpit, such as a DC-6. This aircraft has four engines, prop controls, navigation and program. POI – see nr.4; PMI – see nr.1

POI – primarily ops spec authorization, guidance is weak. PAI – Some questions were raise but we felt that questions were rocking the boat.

PMI – No; POI – Talked to a couple of folks from Capstone and DC, but don’t remember exactly what.

PMI/PAI – yes but never received any; POI – No.

PMI did not need information other than what Childers passed; PAI – no very active, checked 337 and performed in flight checks after installation;

POI – No, pretty straight forward stuff.

PMI/PAI – see nr.4; POI – see nr.1

PMI – don’t remember if I asked for help but I did pass information to Capstone. What they did with it I do not know. POI – See nr. 1. PAI – no one in Capstone has an airworthiness background.

PAI – see nr.2; POI – see nr.4; PMI – see nr.6

PAI – see nr.2; POI – what I really needed was a proper introduction to the program and familiarization with the product; PMI – see nr.6

POI – See nr.4; PAI – no one interested in the program.

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Do you have any concerns regarding your operator's use of this equipment? Explain.

PMI – My concern is that pilots will use this equipment to a higher level of navigational assistance than the FAA intended (i.e., VFR situational awareness R&D project.) With equipment that has the ability to mislead a pilot, training and recurrent training would see to be a valuable tool to use during this R&D project. PAI – concern that they (PAIs) are not aware of changes in Capstone data bases. Feel totally left out of process and program.

POI – Yes, utilized equipment for weather in less than FAR allowance. PAI – pilots will tend to use the equipment to a higher level of navigational assistance than FAA intended.

PMI – none to speak of. PMI – Absolutely no formal training given to maintenance inspectors at any point in the project. We would ask questions and not get support. A major concern is the STC. The STC gives the installer cart blance to move radio racks and other equipment around in order to install the Capstone boxes and heads. During installation on company aircraft, the Capstone contracted mechanics just moved stuff around and did not interface with the principals. I was also not given a copy of the STC until I asked for one from one of the contracted mechanics. Supervisor Fred Handy expressed some concern to the Capstone folks about the STC and they just “blew him off”. POI – carrier seems to be doing good with what they have.

PMI/PAI – no trace ability to national standard; no support for install of initial equipment; POI – no.

PMI concerned that other operators may be turning it off when needed most because of distrust; PAI – only concern is possible pilot distraction but benefits outweigh this; POI – No, very happy with it.

PAI – see nr.4; PMI – see nr.1

All three seem to be OK with it. Concerned with new aircraft added to certificate that are not equipped. Specifically with relation to operating special VFR with aircraft that have mixed installations. He said that this is a very common complaint among several operators because they were told that SVFR operation and ATC handling would improve but it has not. POI – see nr.1; PAI – see below this box for concerns.

PAI – see nr.2; POI – see nr.4; PMI – see nr.1

PMI – see nr.2; POI – Not if it keeps them in the air and out of accident reports; PMI – nr.6

POI – See nr.1; PAI – see nr.4

Failure to reset or update the baro setting on the Capstone equipment was a contributing factor of an accident by Grant aviation. Failure to reset the auto CDI scaling function of the equipment inhibits the auto sensitizing of the CDI in the approach mode. STC’s were issued to pressurized aircraft and the installation to be done IAW AC43.13 instead of the SRM. The capstone equipment added a second Altitude Encoder to most of the aircraft. If the original Altitude Encoder is calibrated to the correct altitude, the pilots encoder can legally be 125 feet below that. Utilizing that altimeter to test the capstone encoder, (per. The ICA instructions) another 125 ft error would be within tolerance. Thus we now have a 250ft error in a DC-6 accepting ADS-B vectors on approach into Bethel, possibly in an IFR environment with other aircraft that have the opposite error, and also accepting vectors from ATC who believes that the information presented to them places the aircraft within 125ft of there assigned altitude. The FAA just put two aircraft at the same flight level believing they were maintaining a 1000ft separation. The possibility for a catastrophic accident exists. Bethel is a very busy place. Based on this analysis I personally saw to it that the second encoder was deleted from the aircraft and both the ADS-B and ATC transponder now receive altitude information from the same encoder. This encoder is calibrated and tested regularly. There are many of these types of anomalies associated with this program. The Capstone personal state that the equipment is used for “IFR situational awareness.”

By the time the Bethel pilot mentality hear this it means IFR, good to go.
Appendix 1. Detailed Summary of Surveys.

Operator Management

**Standards**

<table>
<thead>
<tr>
<th>Standards</th>
<th>Company must have a policy and a procedure to achieve a standard.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elements</td>
<td>2.0 Manuals</td>
</tr>
<tr>
<td></td>
<td>3.1.4 Operational Control</td>
</tr>
<tr>
<td></td>
<td>8.1.4 Internal Evaluation Program</td>
</tr>
</tbody>
</table>

**Note from AAL-240:** It is not clear if management understands the difference between policy and procedure. 1 of the 9 is a single pilot.

A. Does your company have a policy for use of Capstone equipment? 7 of 9 said yes, they have a policy; the other two said no. Of the 7 with a policy, only one has policy in the manual, 2 have policy in training program. 4 have policy passed in training but it is not in clear writing.

B. Explain the company’s policy on the use of this equipment. 7 gave answers as follows: use to support ops, use to equipment capabilities, 3 say just turn it on with no other direction, 1 said not a tool for IFR, 1 has instructions for IFR/VFR operations. (Note - most statements did not seem like clear policy but just general guidance.)

C. Can you show me a copy of the company policy? 1 was in company manual, 3 were in training program, others not written as policy. (See Note added to question B above)

D. Does your company have an audit process to ensure that the company policy is being followed? None had a written audit process. 4 of 8 said they conduct periodic en routes. 1 left is single pilot.

E. Do you have a company procedure for the use of Capstone equipment? Same as A

F. Explain the company’s procedure for the use of this equipment? Same as B

G. Can you show me a copy of the company procedure? Same as C

H. Is there an audit process to ensure that company procedures are being followed? Same as D.

2. Elements | 2.0 Manuals |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>3.1.4 Operational Control</td>
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<td></td>
<td>5.1.2 Weather Reporting/SAWRS</td>
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<tr>
<td></td>
<td>5.1.6 Use of Approved Routes, Areas, and Airports.</td>
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<td></td>
<td>8.1.5</td>
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</tbody>
</table>

A. Are Capstone equipped aircraft used for specific trips or specific purposes? Clear answer from all was not for specific trips, but since almost all aircraft are equipped, this was not an issue.

B. Are there any special requirements for the assigning a Capstone aircraft for specific trips or purposes? NA

C. What conditions initiate the use of special requirements for assignment of Capstone? NA

D. Who makes these determinations? NA

E. Are these procedures in the company manual? NA

F. The Capstone program is readily used for in flight avoidance of terrain and other aircraft. What other ways are you aware of that pilots and other personnel in your company, may be using the equipment and Capstone system, such as for preflight planning, or post flight analysis of a particular flight or series of events? One uses it as an item for operational risk assessment, others to ID aircraft, locate concentrations of aircraft at an airport, concentrations of aircraft in areas of questionable weather, terrain, some weather. See expanded answer of full report.

G. This is a new program to employ advanced technology to 135 operations and there may be advantages and uses not yet discovered or documents. Have your employees found innovative or new ways to employ the advantages and applications of the Capstone equipment and program? If so, explain.

<table>
<thead>
<tr>
<th>H. If yes to either of these two areas, have you been able to provide feedback to the Capstone office?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Company uses another program called “Flight Explorer” that shows area, terrain, weather, etc. and the DO has suggested to Capstone that they consider better interface rather than the “blank” screen available at home on a computer. DO would rather see what the situation really is rather than just where the aircraft is. He passed this to Capstone but their response was that “this is our focus”. In other words, they blew him off.</td>
</tr>
<tr>
<td>b. We provide feedback to Capstone on many issues and in many formats, including phone calls and direct contact. We rarely get follow up information unless it is a critical issue such as recent database error giving incorrect altitudes.</td>
</tr>
<tr>
<td>c. They said they have several issues they have pushed forward to the Capstone office but do not seem to get feedback or action from them. In many cases, these items are brought up at the monthly Capstone meetings in Bethel but at the following meeting the item is not resolved. One concept put forward is to see if ATC can have the positions of non-Capstone equipped aircraft in the areas of radar coverage transmitted to the Capstone equipment and displayed in the aircraft. They were told they would look into it but nothing was further said.</td>
</tr>
<tr>
<td>d. NA</td>
</tr>
<tr>
<td>e. NA</td>
</tr>
<tr>
<td>f. NA</td>
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<tr>
<td>g. NA</td>
</tr>
<tr>
<td>h. Mr. Nelson is a member of the Capstone committee and has direct access.</td>
</tr>
<tr>
<td>i. None, only contact is for following inoperative equipment</td>
</tr>
</tbody>
</table>
3. Elements

1.1.2 Appropriate Operational Equipment
3.1.3 Airman Duties/Flight Deck Procedures
3.1.4 Operational Control
3.2.1 Dispatch or Flight Release
8.1.4 Internal Evaluation Program

One operator is a single pilot.

A. Does your company have a policy for operating in marginal weather conditions?
All say they have a policy.
B. Can you explain that policy?
5 say they do not operate in less than 500/2 but not much else than that. 1 says they will transition to IFR when encounter those conditions (FAR 121 operator). Others did not expand except to avoid violating FAR.
C. Can you show me the policy?
5 of 8 were in either manual or training program. 3 were not written.
D. Does your company have a process to ensure that employees are adhering to company policy?
Only 1 of 8 had a formal process, which is a dispatch process. 4 perform periodic checks. 3 no.
E. Does your company have a procedure for operating into marginal weather conditions?
Same as A thru D above.
F. Can you explain that procedure?
Same
G. Can you show me the procedure?
Same
H. Does your company have a process to ensure that employees are adhering to company procedures
Same.

Training

Company must make the employee aware that the standard exists and teach how to achieve the standard.

4. Elements

2.1.2 Interfaces
3.1.3 Airman Duties/Flight Deck Procedures
3.1.4 Operational Control
3.2.1 Dispatch or Flight Release
4.3.1 Pilot Operating Limitations/Recent Experience
4.3.2 Airman/Crewmember Checks and Qualifications
5.1.2 Weather Reporting/SAWRS
8.3.6 Outsourcing, Maintenance, Training, Ground Handling

A. Is your company authorized and qualified to perform maintenance on Capstone equipment, and what training have you received to support this?
Operators do not perform maintenance on equipment. Only replace data cards and remove/replace boxes. Some limited troubleshooting when talk to manufacturer to validate that box needs to be removed.
B. If your company is not authorized to perform maintenance on Capstone equipment and you are using an avionics repair station, what training have their employees received on handling, maintaining, and installing the equipment, if you are aware of any?
Some received R&R training but most was OJT IAW equipment manuals. None have clear maintenance training.
C. Were you provided with materials to put Capstone into your training program?
Yes to all – 1 was single pilot but have materials
D. Where, how, and from whom did you receive these materials?
UAA for all.
E. Were these materials adequate for use in your training program, and if not, why?
All said yes. Some operators made changes to meet company standards
F. What materials did you develop as part of the training program other than those provided?
3 said they reformatted materials to meet company standards and 2 added presentation processes. Others used as given, with two saying they share training with another operator in Bethel.
G. What approximate percentage of company pilots are trained and qualified to use Capstone equipment? Total?___ IFR?___ VFR?___
Essentially 100% for all operating in Bethel. One small operator half are equipped.
H. Do you plan to train and qualify all pilots in the use of Capstone?
Yes.
I. If you have decided not to have all pilots trained in Capstone, what was the basis for that choice?
Only one operator uses a non-qualified pilot and does not assign to a Capstone aircraft. Does plan to train him and any other untrained pilot if/when hired.
J. What procedure do you use to keep unqualified pilots from using Capstone when operating an aircraft with equipment installed?
DO/CP say just don’t assign him.

5. Element

8.1.4 Safety Program/Internal Evaluation

A. In the normal course of training and qualification, VFR pilots only receive training and checking once a year and IFR pilots twice a year. What controls do you have in your internal evaluation/audit system to validate that your policies and procedures are being followed throughout the year?
Half use periodic line checks. Two are IFR. Rest use only competency check annually.
B. How often do you perform line checks or other on-the-spot knowledge checks on your pilots using Capstone?
Most don’t but the ones that do say they try for twice a year on VFR pilots.
C. Does this system of audits/internal evaluations include other employees involved in the Capstone program?
Only one includes dispatch/flight following.
### 6. Element 4.2.3 Training of Flight Crewmembers
- 5.1.2 Weather Reporting/SAWRS
- 8.1.5 Resource Management Training

**A.** Does the company provide training on recognition of loss of visual references due to flat light, white out, or deteriorating visibility conditions?
*All say yes but non-specific. One is single pilot.*

**B.** Does the company teach pilots how to estimate in flight visibility?
*All say yes, but is non specific, not clearly written in training program*

**Management:** Must provide the tools to achieve a standard; must enforce the standard.

### 7. Elements 2.1.1 Manual Currency
- 2.1.2 Content Consistency Across Manuals

**A.** How did you find out about Capstone?
5 said from Capstone briefings in Bethel and contact from UAA, 1 was already in process when company purchased, 1 small operator for a prior POI, 1 small operator from when he was a pilot for Village Aviation already involved.

**B.** What background information were you given on Capstone and deployment in the Yukon-Kuskokwim Delta?
*Essentially all do not clearly remember – some test bed for new technology, improve SVFR, Safety, radar-like ATC, reduce mid-airs, reduce accidents.*

**C.** Why did your company want to participate in the capstone project?
Answers included: Safety, free equipment, CFIT, Mid air avoidance, track aircraft, new program, ADS-B, increase value of airframes with equipment, enhances operations in Bethel, increase awareness, many other benefits non specified.

**D.** What was the key factor that made your company want to participate?
*Equipment free, increased safety, CFIT. One stated that it helped standardize their cockpits.*

**E.** What were your expectations of the program at the onset of implementation? Examples may be operational control, safety, accidents, marginal weather capabilities, etc.
*All items above listed above in C. Track aircraft, situational awareness*

**F.** Did it meet with your expectations?
Yes. All want to keep it and like to have it.

**G.** If either enthusiastic or disappointed about a specific area, explain further.
1. Disappointed in response from Capstone in expansion of equipment involving other technologies such as “Flight Explorer” interface. Recent crash: DO says Capstone did not show actual position of aircraft (but this may be a wrong interpretation of actual situation). DO says that Grant is the only dual installation in the area, allowing better use of GPS for navigation and IFR. DO says Capstone response is poor but did not give any other clear issues.
2. Flight crew morale significantly improved during training and after training because of the capabilities of Capstone. There were installation problems – primarily, there were few technicians available and installations did not run as smooth as we could. Until this past July, there was no process of notifying users when problems arose. There is now a process in place.
3. There were developmental problems that have been eliminated. Also, they were originally assured that they would not be subject to enforcement if the equipment were misused. This was not true and two pilots were violated at the onset of the program – status in unknown. Training and deployment were not coordinated. Equipment was installed and they were told to use it before they were trained. ERA would like to install the equipment in all aircraft and in a planned Level 5 FTD. But Capstone tells them equipment in not available. There are also ergonomic issues such as a large number of key strokes for certain tasks. Another key issue is the time it takes to initialize the set up when shut down on short legs.
4. CP – Concerned with RAM warnings, more than other GPSs. Happens in all airplanes 2-3 times a week, more often than other units in same aircraft.
5. **Installation cost the owner $1387.29 – was supposed to be free!!! (see Bill Missal for more)**

**6.** NA

**7.** Air Traffic in Bethel is not better. This was big selling point in the beginning. Thought IFR/SVFR would move faster.

**8.** Biggest problem is that Flight Standard inspectors are generally left out of the entire process. Mr. Nelson's experience and information from several sources reveals that many inspectors are not trained in the products, process, or capabilities. Assigned inspectors seem to be left out. He expects that inspectors will be a extension of his structure to ensure that FAA policies are followed in addition to manuals and training programs

**9.** altitude software glitch

### 8. Elements 3.1.4 Operational Control
- 8.1.4 Safety Program/Internal Evaluation Program

**Note:** One operator is a Single Pilot Operator.

**A.** Does your company have an internal audit procedure ensure that pilots are using Capstone equipment as intended or IAW with company policy? If yes, explain the procedure.
4 of 8 have a process that consists mostly of line checks. Policy not written.

**B.** Explain what action management takes when Capstone procedures are not followed, e.g., how does the company enforce the standards: e.g., disciplinary action, remedial training, manual revisions, etc.
2 say has not been an issue. 1 said just fire if caught. 5 said retrain. 4 said will fire if repeated.

**C.** Do you have a method to determine if procedures are not effective: direct feedback from pilots, flight log entries, safety reports, trip records, passenger complaints/comments, etc?
Only one has a formal system but it is not written.

**D.** Explain what action management takes when procedures appear ineffective: e.g., manual revisions, training program revision?
4 say they issue Revisions. 4 will use revisions but have not needed to do so. 1 gives to safety committee to work.
**Crewmembers.**

**Individual**  The individual must know the standard and must follow the standard—may have to explain.

Note: The verbiage in each question is a consolidation of all comments from pilots interviewed at each company, which are indicated by a number rather than name or designator to maintain impartiality.

<table>
<thead>
<tr>
<th>1. Elements</th>
<th>3.1.3 Airman Duties/Flight Deck Procedures</th>
<th>3.1.4 Operational Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. How does the company expect you to use this equipment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. No pilots for this company interviewed.</td>
<td></td>
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<tr>
<td>2. CE207 - Situational awareness and traffic separation. CE208 – not positive</td>
<td></td>
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<tr>
<td>3. Pilots are trained to use full capabilities at all times, IFR and VFR</td>
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<tr>
<td>4. Traffic avoidance, secondary navigation, situational awareness, VFR safety equipment</td>
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<tr>
<td>5. SINGLE PILOT OPERATOR (SPO), GPS tracking, terrain mode, traffic information</td>
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<td>6. Back up when needed, terrain avoidance increased situational awareness, dispatch tool, increased safety</td>
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<tr>
<td>7. Always on, primary navigation, situational awareness,</td>
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<td>8. Unsure, always on</td>
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<td>9. Use if installed if trained</td>
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<tr>
<td>10. use it to keep out of trouble if needed, keep it turned on all the time.</td>
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<tr>
<td>B. Do you know the company policy for using Capstone equipment?</td>
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<tr>
<td>1. Not interviewed</td>
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<tr>
<td>2. CE207 – None. CE208 – not sure</td>
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<tr>
<td>3. Yes</td>
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<tr>
<td>4. None</td>
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<tr>
<td>5. NA</td>
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<td>6. Not sure, always have system on when flying</td>
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<tr>
<td>7. None. Similar to VOR or autopilot, no specific policies, just another piece of equipment</td>
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<td>8. Not sure</td>
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<td>9. Use map mode near mountains</td>
<td></td>
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<tr>
<td>10. No response</td>
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<tr>
<td>C. Where can you find the written company policy?</td>
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<tr>
<td>1. Not interviewed</td>
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<tr>
<td>2. CE207 – None. CE208 – not sure.</td>
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<tr>
<td>3. Policy is part of the training program</td>
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<td>4. NA</td>
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<td>5. Not written</td>
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<tr>
<td>6. Not sure</td>
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<tr>
<td>7. None</td>
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<td>8. Not sure</td>
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<tr>
<td>9. NA</td>
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<tr>
<td>10. not sure</td>
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<tr>
<td>D. Explain the company procedures for use of Capstone equipment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Not interviewed</td>
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<tr>
<td>2. CE207 – none. CE208 - located aboard the aircraft and a video is available.</td>
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<tr>
<td>3. Procedures are contained in the training program.</td>
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<tr>
<td>4. None, just use it.</td>
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<tr>
<td>5. No procedures</td>
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<tr>
<td>6. No answer</td>
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<tr>
<td>7. NA</td>
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<tr>
<td>8. No answer</td>
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<tr>
<td>9. No</td>
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<tr>
<td>10. No response</td>
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<tr>
<td>E. Can you show me the procedures?</td>
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<tr>
<td>1. Not interviewed</td>
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<tr>
<td>2. CE207 – No system, self explanatory. CE208 – Not aware of any.</td>
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<tr>
<td>3. None that are specific but they are developing more effective uses all the time.</td>
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<td>4. NA</td>
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<td></td>
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<td>5. NA</td>
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<tr>
<td>6. Located on company aircraft</td>
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<tr>
<td>7. None</td>
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<tr>
<td>8. Believe there are procedures located at the stations in Dillingham and Bethel, but not sure. Have my own procedures manual he carries</td>
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<td>9. No</td>
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<td></td>
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<td>10. probably could use more detailed instructions</td>
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<tr>
<td>F. Are there procedures that are missing, or need improvement?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Not interviewed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CE – 207 no. CE208 – no to company, yes to other crews.</td>
<td></td>
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<tr>
<td>3. Several items were passed to Capstone office with little or no response; Yes through Chief pilot both positive and negative items.</td>
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<tr>
<td>4. No, other than no procedures written</td>
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<tr>
<td>5. NA</td>
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<tr>
<td>6. Not aware of any, be vigilant in maintaining correct baro pressure dialed into system</td>
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<td>7. NA</td>
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<tr>
<td>8. don’t know</td>
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<tr>
<td>9. No</td>
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<tr>
<td>10. No</td>
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</tbody>
</table>
Appendix 1  Detailed Summary of Surveys.

G. Have you given feedback on procedures to company management, either positive or negative?
   1. Not interviewed
   2. CE207 – No. CE208 – use the internet plus a Capstone observer was on one flight.
   3. Phone calls, oral during meetings. Items are passed to Capstone in a variety of ways.
   4. No
   5. NA
   6. Yes, and no
   7. No
   8. Yes
   9. No
   10. No

H. What method did you use to provide this feedback?
   1. Not interviewed
   2. Various
   3. Above in G
   4. NA
   5. NA
   6. Oral discuss with CP
   7. NA
   8. directly talk to CP
   9. NA
   10. NA

I. Would you rather operate a Capstone equipped aircraft than one not equipped?
   1. Not interviewed
   2. Yes
   3. Yes and definitely. Would like to see all aircraft in fleet equipped- 5 of 9 now. Policy is that equipped aircraft are assigned to Bethel.
   4. Yes
   5. Capstone equipped
   6. Yes and No
   7. Yes
   8. Yes
   9. Capstone equipped
   10. Yes

J. Do you anticipate that Capstone equipped aircraft will be given priority handling for special VFR operations?
   1. Not interviewed
   2. No but should
   3. We operator mostly IFR in marginal conditions and do not routinely use SVFR procedures.
   4. No
   5. No
   6. Not sure, probably not.
   7. No but desirable. Bethel air traffic over congested and slow. Should use Capstone to its capabilities but the Bethel tower does not. No-BIG PROBLEM, Have technology but no using it, big safety problem.
   8. No comment, yes
   9. No
   10. No

2. Elements  4.2.3 Training of Flight Crewmembers  4.2.8 Simulators/Training Devices

A. What initial training did you receive for Capstone? Expand.
   1. Not interviewed
   2. CE 207 – UAA; CE208 – UAA plus ground school at Hageland
   3. First exposure was through UAA and Capstone. One pilot interviewed is a Capstone instructor at ERA.
   4. Initial indoc aircraft and ground, flight training and handouts, philosophy and problems with incorrect programming. Do route programming on ground prior to flight.
   5. Village Aviation 3 years ago
   6. Ground school in Anch provided by company, received 8 hours as an instructor for another company
   7. Manuals, videos, simulator, flight training
   8. Ground school in Anchorage provided by company.
   9. Company ground school
   10. Company training in Fairbanks

B. When did you receive initial on this equipment?
   1. Not interviewed
   3. At initial program implementation a couple of years ago
   4. a year to two years ago.
   5. No answer
   7. 2 years ago, 18 months ago.
   8. July 2002 both
   9. a few months ago
   10. August and September 2002
### Appendix 1. Detailed Summary of Surveys.

#### C. Who provided this training?
1. Not interviewed
2. UAA
3. Capstone and UAA
4. UAA
5. UAA
6. Chief pilot, UAA
7. In house. UAA also provided training after Grant crash
8. Company
9. Company instructor
10. Company CP and DO

#### D. What materials and equipment were available during training?
1. Not interviewed
2. Simulator use plus handouts
3. Simulators, handouts, videos, manuals. Modified to meet ERA standards
4. Lectures, handouts, no video, no simulator
5. Sims, videos, written material
6. Simulator, worksheets
7. No simulator: manuals, videos, flight training
8. Handouts and simulator
9. Simulator, handouts
10. No simulator available, but use actual installation in aircrafts

#### E. Did the initial training prepare you for everyday use of the equipment during operations?
1. Not interviewed
2. Good start but learn more as you go, had to use the equipment for a while to really learn it, no
3. Yes
4. Good start but need to use equipment to really learn.
5. Yes
6. Yes under right conditions, and on the job training in required
7. Yes but learned more as you go, use more to get used to it.
8. Probably. Almost, but the real teacher was experience gained from actually flying the aircraft with the equipment.
9. Yes
10. Yes but some experience in the actual aircraft was still required for rounding things out.

#### F. If you have received recurrent training, has that been equally effective?
1. Not interviewed
2. Recurrent ground school conducted by UAA was effective
3. Six month recurrent for IFR is effective but use ERA program
4. Yes with simulator exercise, one pilot is a new hire.
5. SPO.
6. No and yes.
7. No and yes
8. Haven't been to recurrent as yet.
9. NA
10. Not yet

### 3. Elements

<table>
<thead>
<tr>
<th>4.2.3</th>
<th>Training of Flight Crewmembers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.1</td>
<td>Dispatch or Flight Release</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Weather Reporting/SAWRS</td>
</tr>
<tr>
<td>5.1.6</td>
<td>Use of Approved Routes, Areas, and Airports</td>
</tr>
</tbody>
</table>

### A. Do you personally have a method to determine in flight visibility?
1. Not interviewed
2. Yes from all
3. Yes but seldom use it because company policy is to go IFR in marginal weather.
4. Yes by all
5. Experience
6. Yes assisted by GPS and Capstone
7. Yes
8. No, yes
9. Estimate
10. Yes

### B. Can you explain the method you use?
1. Not interviewed
2. Ref with point ahead, experience judging distances, can’t explain
3. Back up visuals with GPS and experience.
4. Experience, timing, moving map and visual, GPS
5. Can’t explain, just experience
6. Not really able to explain it; local geographical knowledge is the best way to put it.
7. Capstone assists, visual reference points on ground, experience
8. NA, pick out a spot on the windshield and use it to reference outside distances.
9. Runway length comparison, flight training, reference points on aircraft
10. Timing, use watch and ground speed to determine distance between objects
C. Where did you learn this method (company training, flight school, recurrent training, other company, other pilots, etc.)?
1. Not interviewed
2. experience, common knowledge, no response
3. Experience and other pilots
4. experience, common knowledge, self taught
5. years of flying
6. experience using equipment, experience and other pilots.
7. self taught
8. NA, fellow company pilot
9. primary flight training
10. self taught. Use for years successfully in all types of AC

D. Does the company have a procedure for determining in flight visibility? Explain it.
1. Not interviewed
2. No and not sure
3. Use all equipment available, including Capstone. If visibility is decreasing significantly, enter IFR.
4. No
5. no
6. No
7. No
8. Not aware of any
9. No
10. No

E. Where is the company procedure outlined?
1. Not interviewed
2. NA
3. Outlined in training program
4. NA
5. No
6. NA
7. NA
8. NA
9. NA
10. NA

4. Elements

A. In what aircraft are you qualified for this company?
1. Not interviewed
2. CE208 and 207
3. Multiengine Captain and First Officer/Instructor.
4. CE172, CE207
5. Cherokee
6. CE 207
7. CE172/207/208
8. CE206/207
9. CE207
10. PA32 and 32A

B. Which of these aircraft have capstone equipment?
1. Not interviewed
2. All are equipped
3. 5 of 9 are equipped
4. All are equipped
5. NA, one aircraft
6. All
7. All
8. approximately 50%
9. 50%, 2 of 4
10. all assigned to Bethel

C. Are Capstone equipped aircraft used for specific trips? Explain.
1. Not interviewed
2. All are equipped
3. Not for trips but equipped aircraft are assigned to Bethel
4. NA
5. No
6. NA
7. NA
8. No
9. No
10. NA
Appendix 1  Detailed Summary of Surveys.  

<table>
<thead>
<tr>
<th>Q</th>
<th>Response</th>
</tr>
</thead>
</table>
| D. Are there any special requirements for the assignment of Capstone aircraft to the specific trip? | 1. Not interviewed  
2. NA  
3. NA  
4. NA  
5. NA  
6. NA  
7. NA  
8. NA  
9. No  
10. NA |
| E. Who determines what these special requirements are, when they are applied, and who makes the final decision on the assignment of a Capstone aircraft? | 1. Not interviewed  
2. through 10. NA |
| F. Show me where these special requirements and procedures are located? | 1. Not interviewed  
2. NA  
3. NA. There is no written company policy about Bethel aircraft, it is just that way.  
4. through 10. NA |
| G. How are you assigned to a flight with a Capstone equipped aircraft? | 1. Not interviewed  
2. NA  
3. NA  
4. NA  
5. NA  
6. NA  
7. NA  
8. NA  
9. Training qualifies you to be assigned  
10. NA |
| H. In relation to this flight above, when and how are made aware of that assignment? | 1. Not interviewed  
2. NA  
3. NA, except that it is common knowledge among pilots if a specific aircraft in Bethel does not have Capstone, and pilots complain.  
4. NA  
5. NA  
6. NA  
7. NA  
8. NA  
9. PIC assignment to flight  
10. NA |
| I. If you as a pilot are involved in the choice to use a Capstone aircraft for a specific flight or any flight in general, what process do you use to make that choice? | 1. Not interviewed  
2. NA  
3. Complain if not available.  
4. NA  
5. NA  
6. NA  
7. NA  
8. NA  
9. Capstone makes flights safer  
10. NA |
| J. Is that process in writing as a company policy and procedure? Show me the process? | 1. Not interviewed  
2. NA  
3. No  
4. through 10. NA |

A. What do you think controlled flight into terrain (CFIT) means?  
1. Not interviewed  
2. Wrecking due to loss of situational awareness due to low visibility, crashing in bad weather and low visibility, flying into terrain in low visibility, not sure  
3. Crashing in low visibility and lighting, especially during VFR, Unwanted collision with ground regardless of circumstances.  
4. flying into ground or hillside by accident, accident in poor weather, pilot error, crashing due to weather  
5. Related to terrain avoidance  
6. Both felt they know what it is but were unable to effectively explain it.  
7. Flying a good airplane into a hillside, low ceiling, poor visibility  
8. Unable to put into words, did not understand the question initially.  
9. other than landing crashes  
10. familiar with term but did not explain
### Appendix 1: Detailed Summary of Surveys.

#### B. What are all the conditions that you think need to exist for there to be a risk of CFIT? Explain (record the specifics).
- **1. Not interviewed**
- **2. Positional awareness not known, poor visibility, bad weather and no knowing exactly where you are, low or no visibility**
- **3. Low visibility, flat light and whiteout, inattention to operating parameters, precipitation, night ops, many other conditions.**
- **4. Poor visibility, lack of weather reporting, low ceilings, lack of altimeter settings, hills, low visibility, flat land in low vis**
- **5. Altimeter settings**
- **6. Low altitude, poor weather, time of day, health of pilot, AC condition.**
- **7. Low visibility, poor situational awareness, poor visibility, low ceiling. Don’t trust terrain feature—not a radar altimeter. Uses baro setting which could be wrong. Not practical when needed at a low altitude due to necessity(???)**
- **8. Not sure. Low level flight, poor visibility, whiteout situation,**
- **9. Low visibility, mountainous terrain, night**
- **10. dark, low ceiling, low visibility**

#### C. Does the company provide information about these conditions?
- **1. Not interviewed**
- **2. Yes, in ground training, turn around it is gets too bad, in ground school and annual recurrent**
- **3. Yes during training and pilot discussions**
- **4. Not formally, verbal discussions during training,**
- **5. NO SPO**
- **6. Yes in ground school and annual recurrent**
- **7. No answers**
- **8. Yes**
- **9. Ground school video, CFIT accident review**
- **10. Yes**

#### D. Have you received training for operations in flat light conditions?
- **1. Not interviewed**
- **2. Yes, in ground school, hood work during instrument training, some**
- **3. Yes**
- **4. Above for CE single engine, Hood work in 212**
- **5. SPO**
- **6. Yes**
- **7. Yes, ground training, hood work, oral, discussion on ground**
- **8. Some mostly discussions with other pilots, no**
- **9. No**
- **10. Yes**

#### E. Have you received training for operations in white out conditions?
- **1. Not interviewed**
- **2. Yes, same as flat light,**
- **3. Yes**
- **4. same as D**
- **5. SPO**
- **6. Yes**
- **7. Same as above**
- **8. yes, Unsure**
- **9. No**
- **10. yes**

#### F. Does your company safety program address CFIT?
- **1. Not interviewed**
- **2. No,**
- **3. Yes during safety meetings**
- **4. No**
- **5. No, SPO**
- **6. Yes, and don’t know.**
- **7. Discussions only**
- **8. unsure**
- **9. Yes**
- **10. no response (don’t know?)**

#### G. Do you think that Capstone equipment will help you when you encounter these conditions? Have you experienced this?
- **1. Not interviewed**
- **2. Yes, good for reference.**
- **3. Yes very definitely**
- **4. Yes, some have experienced it.**
- **5. Yes, No**
- **6. No answer**
- **7. Map mostly, not terrain feature—don’t trust. Yes but low hills dangerous. At 500 feet, screen is red so a 300 foot hill will get you.**
- **8. Yes, Prefer more traditional indicating systems such as artificial horizon indicators.**
- **9. Yes but won’t help if not used correctly. Have not experienced situation as yet.**
- **10. Yes**
### Appendix 1. Detailed Summary of Surveys.

#### 6. Elements 3.2.3 MEL/CDL Procedures

<table>
<thead>
<tr>
<th>A. Have you encountered Capstone equipment problems? Describe?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not interviewed</td>
</tr>
<tr>
<td>2. CE207 – Altitudes were off but has been fixed, slow startup in winter, Blue Screen of Death, screen has lines, route flags, weather gathering sometimes inop and often outdated; CE208 = Altitude reporting has been erroneous, baro pressure has to be entered manually every start due to constant changing in this area, wx data uplink problems, ELT function should be more obvious and easier. In an emergency, time is of the essence.</td>
</tr>
<tr>
<td>3. Not recently, several problems early on, all pilots are IFR and use all equipment available. Would like all aircrafts to be equipped.</td>
</tr>
<tr>
<td>4. Blue Screen of Death a lot at beginning but still happens occasionally, have to reboot to clear. Terrain feature not available in some areas near Nome, and not reliable at all times</td>
</tr>
<tr>
<td>5. Initial installation, costs, bad encoder, UAT failure.</td>
</tr>
<tr>
<td>6. Altitude problems, baro pressure needs to be entered manually at every start, MFD show lines when heated up in cold weather, system often shuts itself off in rainy conditions. When not actually in the “Terrain” mode, the only warning of a possible CFIT is a small flashing white light in the corner of the MFD. Should be brighter or some other way of getting attention.</td>
</tr>
<tr>
<td>7. Takes a while to come up to terrain feature in winter – 20-30 minutes. Some screens have lines in them—3 screens in 2 years. One screen looks black and white. Altitude encoders erroneous several times. Two ADS-B boxes failure. Screen very hot in summer.</td>
</tr>
<tr>
<td>8. False altitude reporting, system not painting other known Capstone equipped aircraft. Altitude related problems, displayed and broadcast, improper directional readouts for other aircraft-3 o’clock given when aircraft was actually at 9 o’clock</td>
</tr>
<tr>
<td>9. Obtaining weather, screen went blank.</td>
</tr>
<tr>
<td>10. Yes. Altitude reporting of other aircraft has been erroneous. Our AC are all good though. Suspect some installations may not be the best on other operators’ aircraft. MX-60 failures—total blank screen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. If these problems were not obvious equipment failures, did you stop using the equipment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not interviewed</td>
</tr>
<tr>
<td>2. CE207 – no; CE208 – yes.</td>
</tr>
<tr>
<td>3. We routinely use all capabilities of aircraft and equipment at all times, and are trained to use back up information at all times.</td>
</tr>
<tr>
<td>4. No. When Blue Screen happens, recycle box clears the problem.</td>
</tr>
<tr>
<td>5. Yes</td>
</tr>
<tr>
<td>6. No</td>
</tr>
<tr>
<td>7. No weather in Platinum, Kipnuk.</td>
</tr>
<tr>
<td>8. No, continued to use what part were functioning. Yes, but then found out that he could fool the system into giving what he knew to be his actual altitude by dialing up or down the barometric pressure on the box till system displayed his actual altitude.</td>
</tr>
<tr>
<td>9. Told company and equipment was repaired</td>
</tr>
<tr>
<td>10. Not sure</td>
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<table>
<thead>
<tr>
<th>C. Does your company MEL procedures include deferring Capstone equipment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not interviewed</td>
</tr>
<tr>
<td>2. CE 207 Don’t know, CE-208 has MEL</td>
</tr>
<tr>
<td>3. Yes, multi engine.</td>
</tr>
<tr>
<td>4. No, not even in CASA</td>
</tr>
<tr>
<td>5. No</td>
</tr>
<tr>
<td>6. Don’t know</td>
</tr>
<tr>
<td>7. None</td>
</tr>
<tr>
<td>8. Don’t know</td>
</tr>
<tr>
<td>9. NA</td>
</tr>
<tr>
<td>10. No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Show me the Capstone MEL procedure? (Record that the pilot can do this)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not interviewed</td>
</tr>
<tr>
<td>2. CE 207 Don’t know; don’t think so; NA; CE208 pilot was able to show procedure;</td>
</tr>
<tr>
<td>3. Yes</td>
</tr>
<tr>
<td>4. NA</td>
</tr>
<tr>
<td>5. NA</td>
</tr>
<tr>
<td>6. NA single engine</td>
</tr>
<tr>
<td>7. None</td>
</tr>
<tr>
<td>8. NA</td>
</tr>
<tr>
<td>9. NA</td>
</tr>
<tr>
<td>10. no</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. If Capstone equipment problems that you encountered were not listed in the MEL, have those problems affected the way you use the equipment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not interviewed</td>
</tr>
<tr>
<td>2. NA</td>
</tr>
<tr>
<td>3. NA – has not occurred</td>
</tr>
<tr>
<td>4. MMEL is approved but does not cover Capstone</td>
</tr>
<tr>
<td>5. NA</td>
</tr>
<tr>
<td>6. NA</td>
</tr>
<tr>
<td>7. NA</td>
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<tr>
<td>8. NA</td>
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<tr>
<td>9. NA</td>
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<tr>
<td>10. NA</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>F. To whom and how did you report these problems that are not MEL issues?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not interviewed</td>
</tr>
<tr>
<td>2. NA</td>
</tr>
<tr>
<td>3. NA</td>
</tr>
<tr>
<td>4. Some information issued from AAL-200 but not incorporated into MEL, sitting in front of binder.</td>
</tr>
</tbody>
</table>
Appendix 1. Detailed Summary of Surveys.

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<tbody>
<tr>
<td>5.</td>
<td>NA</td>
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<tr>
<td>6.</td>
<td>NA</td>
</tr>
<tr>
<td>7.</td>
<td>NA</td>
</tr>
<tr>
<td>8.</td>
<td>Dispatch and CP</td>
</tr>
<tr>
<td>9.</td>
<td>NA</td>
</tr>
<tr>
<td>10.</td>
<td>NA</td>
</tr>
</tbody>
</table>

G. If your opinion, is the Capstone equipment reliable?

1. Not interviewed
2. Give it 9 out of 10 overall; weather date 6 out of 10; very much like to have it; mostly except for the Altitude problems.
3. Works well most of the time and like to have it, very useful
4. Yes, very happen to have it, except for Blue Screen
5. Currently Yes
6. Yes, except for altitude related problems
7. Yes. Map especially, even in cold weather, but not too accurate, needs work.
8. Yes. Yes, but never place all your faith in it.
9. NA
10. Yes

Additional Comments:
1. None
2. Pilots commented that there is confusion about using N-numbers rather than unique designators. This makes it more difficult to identify conflicting traffic. Skammon Bay AWOS needs a repeater. No provision for cooling, the equipment gets hot. Some locations in wrong place on map — EEK, KWT, WNA, Mountain Village. Weather system is awful and not working much of the time. ADS-B not always accurate and other aircraft altitudes often wrong. Not sure how altimeter setting affects ADS-B. Flight plan feature a waste for VFR small hops.
3. through 9. No additional comments
10. Weather uplink status? It is needed. Magnetic variation—is it plugged into the database? Pilot suspects so, but is curious.

Report on Capstone Phase I Interviews by John S. Fisher, Interviewer (Juneau FSDO)

The following is a summary of what I was able to glean from the interviews with Capstone Phase I Operators in the Bethel area and other key people back in Anchorage, as well as my personal observations during my time in the area. There are some items here that may not be apparent from the raw interview reports, which were sent separate from this report.

Interviews:

Almost every one of the eight (8) pilots I interviewed was very happy to have Capstone in their aircraft. In fact, there was only one pilot who seemed a little unenthusiastic about the system. And even he admitted that it did have a lot of merits. I was only able to interview two (2) of the CMT Inspectors, but feel they did contribute honestly to the survey. It is noteworthy that both of the Inspectors I was able to interview were on the Airworthiness side of the house. I did get to speak with POI some, but did not actually capture his comments in a complete interview unfortunately. What surfaced from the Inspector’s interview was a desire on their part for more involvement with the program, but an apparent lack of such a request by Capstone. Whether this was intentional, or (more than likely) an oversight, is hard to determine. Both mentioned that there had been Capstone briefings at the FSDO, but there does not appear to have been much, if any, follow-through for those CMTs that were responsible for the selected Operators.

As far as Operator Management personnel, there was only one (1) successful interview, that being with (operator 8, who was interviewed twice). The individual was enthusiastic about the Capstone program. In fact he stated that he has been a vocal proponent of the program since its inception. It appears that even with a gung-ho management on board however, there is still room for much improvement in the Training and Auditing of the Capstone system. Many of the Responses to questions on these areas seemed vague at best.

Findings:

If there were common denominators for the end users in the Bethel area, they are as follows:

- No consistency in the Training Programs. Some appear almost non-existent.
- The Altitude Reporting part of the system was reported as most problematic.
- A fairly close second was the lack of sufficient weather data for many situations.
- There seems to be some variation on who is actually updating the databases on the aircraft. It appears to be a Maintenance responsibility, but it also appears that the pilots are often the ones who actually plug the new info into the unit. Perhaps it should be considered an Ops responsibility? Just thinking out loud here.

One item, which came up more than once, was the question on how they are to ID themselves within the system. There seems to be some variation on who is actually setting the unit back to its default values. This would be if the unit is known to be going bad. Consider having the Repair Station, or manufacturer, retain that data rather than automatically setting the unit back to it’s default values. This would be if the unit is known to be going bad.

Lastly, but certainly not least, was the question about what happens after the end of the three-year test. Has someone at Capstone or the manufacturer thought out the long-range plan as far as support? If we really do want the program to succeed, we must have a follow-through plan. The Operators are certainly considering it!

Recommendations:

- Look into a Better Standard for Training, which can be more easily made available to all Operators.
- Consider placing a Simulator out there in the local area (Bethel) for use by those Operators. This would, I believe, promote more practice by those crews with the systems capabilities.
- For better interaction between Capstone and CMT, consider additional instruction and equipment familiarization for those Inspectors directly responsible for the selected Operators.
- Be sure that we do have a program set up for continuing support from not only the manufacturer, but ourselves as well, to ensure survival of the system beyond the test phase!