National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: August 29, 2002

In reply refer to: A-02-24 and -25

Mr. Monte R. Belger
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

The Safety Board has had longstanding concerns about the availability of cockpit voice recorder (CVR) information following reportable accidents or incidents. The CVR can be one of the most valuable tools used for accident investigation. Unfortunately, an increasing number of the Board's safety investigations are being hampered because of a lack of CVR data. Our audio laboratory regularly receives CVRs with missing or irrelevant data.

Two primary issues cause these recordings to be deficient: (1) the tape or memory has been overwritten by events subsequent to the incident, or (2) the recording system was malfunctioning or inoperative at the time of the incident. These issues are discussed below and solutions are recommended to address them.

Overwritten Cockpit Voice Recordings

The most frequently recurring problem with CVRs is that the relevant recorded information is overwritten by events subsequent to the incident or accident. For most CVR installations, the CVR system is designed to operate whenever the airplane's electrical system is on, and it continually overwrites the oldest data stored on the tape or memory module. The recording can be preserved only if the CVR is deactivated before the relevant portion becomes overwritten.

In the event of a severe or catastrophic accident, the CVR is typically deactivated due to a loss of electrical power, and the relevant audio that was recorded prior to the accident is preserved. However, many of the CVRs examined in the Safety Board's laboratory are from incidents or accidents in which the airplane's electrical system remains functional after an event occurs. For example, this can occur after events such as

- loss-of-control incidents in which the airplane is recovered and lands safely;
- tail strikes;
- taxiway or runway incursions;
- rejected takeoffs;
- precautionary or emergency landings; and
- runway overruns.

For events such as these, nearly every CVR recording examined by the Safety Board has been overwritten. These recordings often contained only background sounds in an unoccupied cockpit while the airplane sits stationary at the gate because the CVR was not deactivated soon enough after the event took place.

A CVR needs to be deactivated promptly because of its relatively short recording duration. Most CVRs currently in service have a recording duration of about 30 minutes.[1] This means that once the CVR is turned off, only the most recent 30 minutes of recorded audio is retained.

In some cases it may take longer than 30 minutes to safely land and secure the airplane following an in-flight incident, and overwriting some or all the pertinent audio is unavoidable. In these situations, a newer CVR with a 2-hour duration would provide more time to return to the airport, land, and taxi to the gate before the relevant audio would be erased. However, as illustrated by the following two incidents, an increased recording duration alone will not prevent the recording from being overwritten.

American Eagle EMB-120 Loss of Pitch Control. On December 27, 2000, at 9:10 p.m. central standard time, an Embraer EMB-135LR, N721HS, operating as American Eagle flight 230, encountered pitch control problems during the initial climb after takeoff from runway 9R at O'Hare International Airport, Chicago, Illinois (NTSB incident CHI01IA055). The flight crew made two attempts to land the airplane before landing it on the third attempt, on runway 4R at O'Hare.

The airplane was equipped with an Allied Signal solid-state 2-hour CVR; however, the CVR was not deactivated after the incident flight was completed. As a result, it continued to record, overwriting the relevant audio while the airplane remained parked at the gate with the electrical power on. The lack of CVR information has hampered the Safety Board's ongoing investigation into this serious incident.

The entire incident flight lasted about 30 minutes. Had the CVR been stopped shortly after the airplane was secured at the gate, the 2-hour recording would have been sufficient to capture not only the entire flight, but both the pre- and post-flight operations as well.

United Airlines Boeing 767-300 Dual Engine Shutdown. On March 4, 2001, at about 00:52 Greenwich mean time (G.m.t.), a Boeing 767-300 operated by United Airlines experienced a dual engine shutdown during climbout from Kona, Hawaii (NTSB incident DCA01SA025). The engines were restarted and the airplane returned to Kona and landed safely. The 30-minute solid-state CVR was overwritten and did not contain any audio relevant to the incident investigation.

The entire flight from gate to gate lasted 71 minutes, nearly half of which could have been captured by the CVR had it been deactivated promptly after the airplane was safely secured on the ground. The timing information recorded in the CVR's memory module indicated that the

[1] Title 14 *Code of Federal Regulations* (14 CFR) Part 121.359(f) requires that CVRs record the most recent 30 minutes of operation. Similar regulations also exist for certain operations of CVR-equipped aircraft subject to Parts 135, 125, and 91.

recorder was not powered off until 05:55:35 G.m.t., more than 4 hours after the airplane arrived at the gate following the incident.[2] Had this airplane been equipped with a 2-hour duration CVR, the relevant information still would have been entirely overwritten.

The following table lists several other recent incidents/accidents in which the CVR was not shut down after the incident flight, and the relevant data were overwritten.

NTSB accident number	Operator	CVR duration (minutes)	Aircraft	Location	Date	Description
MIA01IA047	British West Indies Airways	30	MD-83	Miami, Florida	01/01/02	Runway overrun.
DCA01MA031	Comair	30	EMB-120	West Palm Beach, Florida	03/19/01	Icing encounter, loss of control; substantial damage to horizontal stabilizer and elevators.
DEN01IA036	Delta Air Lines	120	MD-90	Salt Lake City, Utah	12/30/00	Struck approach lights on landing.
NYC01LA054	Atlantic Southeast Airlines	30	EMB-120	Charleston, West Virginia	12/06/00	Struck deer on landing.
NYC01IA024	Comair	30	CRJ	Near Falmouth, Kentucky	10/26/00	Uncommanded roll.
NYC01LA023A	American Trans Air	30	Boeing 727	LaGuardia, New York	10/22/00	Ground collision.
NYC00IA231	USAirways	30	F100	Norfolk, Virginia	08/17/00	Thrust reverser deployment in flight.
LAX00SA272	Mesa Airlines	30	CRJ	Monterey, California	07/18/00	Loss of pitch trim control.

Previous Safety Recommendations to Address Overwritten CVR Recordings

In 1972, the Safety Board recommended that the Federal Aviation Administration (FAA) ". . . delineate the responsibility of the pilot-in-command for ensuring the preservation of recorded information on a cockpit voice recorder following an occurrence . . . ."[3] At that time, the FAA elected to monitor the situation in order to determine how serious the problem actually was. In December 1974, the FAA issued Air Carrier Operations Bulletin 74-8 in response to the Board's recommendation. This bulletin (enclosed) advised FAA Principal Operations Inspectors (POIs) that they "should make every effort" to have carriers include instructions for CVR deactivation in their flight manuals. It also stated that the CVR should be deactivated, preferably as a part of the "After Landing Checklist" following a reportable occurrence. The information, instructions, and guidance in that bulletin were not only appropriate in 1974, but they continue to

[2] According to the operator, the airplane departed the gate at 00:18 G.m.t. and returned to the gate at 01:29 G.m.t., as reported by the Aircraft Communications Addressing and Reporting System (ACARS). This newer solid-state type CVR was configured to capture G.m.t. time. Currently, most CVRs do not record any timing information.

[3] National Transportation Safety Board Safety Recommendation A-72-118 was issued in August 1972 and classified "Closed—Acceptable Alternate Action" in December 1975.

be particularly applicable to this day. However, because the bulletin provided only guidance instead of actual requirements, it has proven to be ineffective in the prevention of overwritten recordings. The need for additional action by the FAA and by operators still exists.

Despite the FAA's issuance of a bulletin, the Safety Board's experience has shown that a large majority of recordings examined by the Board have been overwritten after noncatastrophic incidents occur. Although in some of these cases an overwritten recording may have been unavoidable (because of the short CVR duration of either 30 minutes or 2 hours), many recordings have been overwritten simply because the operator did not deactivate the CVR immediately upon completion of the flight. In other cases, the CVR was initially deactivated but then turned on again at a later time by maintenance personnel. As a result, the critical data captured by the CVR was lost.

In January 1996, the Safety Board investigated a hard landing accident involving a ValuJet DC-9 in Nashville, Tennessee (NTSB accident MIA96FA059). After discovering that the CVR had been overwritten, the Board again recommended that the FAA take action to prevent the loss of CVR data. This recommendation asked the FAA to "require all airlines to revise their procedures to stipulate that flightcrews turn off power to the cockpit voice recorder as part of the engine shutdown procedure . . . ."[4] In response, the FAA issued a temporary Flight Standards Information Bulletin for Air Transportation (FSAT 97-09,[5] enclosed) in August 1997, which partially met the safety recommendation but fell short in several key areas. For example, the "ACTION" statement in the bulletin begins with the qualifying phrase "Until such time that new technology CVRs with extended recording capability become available, principal operations inspectors (POI) shall review the procedures established by the airlines for which they have responsibility, in order to ensure that those carriers have established procedures to safeguard CVR data."

The Board remains concerned that the language used in the FSAT 97-09 implies that once 2-hour duration recorders are installed, POIs will no longer be required to ensure that the carriers have established procedures to safeguard CVR data. As highlighted by the two incidents described earlier (Chicago, Illinois, and Kona, Hawaii), increasing the recording duration alone cannot fully address the problem. In these two incidents, a 2-hour CVR would have been sufficient to capture the incidents and allow for the time required to land and secure the airplane, yet neither CVR was turned off after the incident flight was completed. As a result, all the relevant data were lost in both cases.

The Safety Board and the FAA agree that the required duration of CVR recordings needs to be increased, and the FAA has indicated an intent to issue a notice of proposed rulemaking on this issue since March 1999.[6] Currently, 2-hour duration recorders are available and are being installed on some airplanes even though they are not yet required. Contrary to the language in

[4] Safety Recommendation A-96-170 was issued on December 20, 1996, and classified "Closed—Unacceptable Action" on April 6, 1999.

[5] This temporary bulletin originally had an expiration date of August 31, 1998, but it has been extended until further notice and currently remains in effect.

[6] Safety Recommendation A-99-16, issued to the FAA on March 3, 1999, addresses the need for a 2-hour CVR duration. The recommendation is currently classified "Open—Unacceptable Response" because the FAA has repeatedly delayed the issuance of an NPRM and final rule regarding this issue.

FSAT 97-09, deactivation of the CVR must occur as soon as safely practical upon completion of the flight,[7] regardless of the recorder's duration, to retain the relevant portions of the recording.

The FSAT 97-09 bulletin also states "these procedures . . . shall only be accomplished when the flight crew believes that the CVR data, which may be of use in subsequent investigations conducted by the NTSB, is contained within the tape's 30-minute duration." The Safety Board continues to believe that this guidance is inappropriate. Relevant data may exist within the tape's duration (which could be longer than 30 minutes), despite the opinion of the flight crew. Further, it is not the responsibility of the flight crew to decide whether or not CVR data may be useful in an investigation conducted by the Safety Board. An erroneous decision could result in unnecessarily recording over potentially valuable CVR data, as it did in the following case.

United Airlines Boeing 777/Lufthansa Airlines Boeing 747 Taxiway Incursion. On June 3, 2001, a United Airlines Boeing 777 struck a Lufthansa Airlines Boeing 747 while taxiing at Washington Dulles International Airport, Sterling, Virginia, causing substantial damage to the auxiliary power unit cowling area and minor damage to the horizontal stabilizer of the 747 (NTSB incident DCA01SA047A). The United 777 crew subsequently taxied the airplane to the gate and shut down the airplane but did not deactivate the CVR. Later, after having discussions with the flight crew, a United Airlines safety officer decided that the CVR may have captured some useful information concerning the ramp control operations and instructed maintenance personnel to pull the CVR circuit breaker. According to the safety officer, on the following day, he assumed that the 30-minute duration of the CVR was not long enough to capture information relative to the incident, and he instructed the maintenance personnel to push the CVR circuit breaker back in. By the time the CVR was removed from the airplane, the recorded data had been entirely overwritten.

In this case, the decisions made by the operator, although consistent with the guidance provided by FSAT 97-09, resulted in the CVR data being needlessly overwritten. It took a significant amount of time for the operator to assess the situation, conclude that the incident was reportable to the Safety Board, then determine whether or not the event occurred within the 30-minute time period captured by the CVR, and subsequently arrange for the CVR to be deactivated by pulling the circuit breaker. The CVR data may well have been overwritten during this time.

The Safety Board believes that the proper procedure should be to deactivate the CVR first (immediately after the airplane is safely secured, such as when the engines are shut down), and then evaluate the situation. It is difficult for the flight crew to remember every occurrence that is reportable to the Safety Board, and it may be difficult to evaluate in a timely manner when the event occurred.

Another case highlighting the problem of overwritten CVR data is the Safety Board's current investigation into a recent incident involving a Boeing 737 rudder event.

[7] The Safety Board does not advocate the deactivation of the CVR during flight.

United Airlines Boeing 737-322 Rudder Malfunction. On December 13, 2001, at about 12:00 p.m. central standard time, United Airlines flight 578 declared an emergency because of a reported "rudder malfunction" during descent into O'Hare International Airport, Chicago, Illinois (NTSB incident CHI02IA050). The 30-minute solid-state CVR was overwritten and did not contain any audio relevant to the incident investigation.

According to data gathered from the digital flight data recorder (DFDR), the airplane landed and came to rest on the runway about 13 minutes after the initial event began. About 7 minutes later, the engines were shut down. The airplane was subsequently towed from the runway to the gate. Review of the CVR in the Safety Board's laboratory revealed that the recording captured only the operation of the airplane being moved from the gate to a maintenance hangar.

In this case, the CVR's 30-minute duration was more than adequate to capture the audio from the initial event through descent, landing, and engine shutdown. The recording was overwritten because the operator did not deactivate the CVR promptly.

The operator's procedures for deactivating the CVR are outlined in the United Airlines *Flight Operations Manual.* The section "Policies and Procedures—Pre-departure Procedures," in reference to flight recorders, states, in part:

> The use of the cockpit voice recorder is limited to accident investigation. The tape must not be erased.
>
> If an incident that requires immediate notification of the NTSB occurs within the last 30 minutes before landing, contact the Flight Operation Duty Manager as soon as possible by ACARS, voice or phone for instructions on how to remove power from the cockpit voice recorder. Reportable incidents include the following:
>
> - Flight control system malfunction or failure
> - Fire
> - Substantial damage to airplane (engine failures, tires, dents are not considered substantial)
> - Fatal or serious injury to any person.

These procedures are well within the guidelines specified by the FAA in FSAT 97-09. The Board recognizes that the intent of these procedures is to preserve CVR data after a reportable event occurs. In practice, however, they may be ineffective and allow too much time to elapse before the CVR is deactivated. First, the procedures are listed in the pre-departure section of the flight manual, yet they address actions that are to be performed after a flight has been completed. The current placement in the manual could result in their being overlooked when the crew performs its post-flight duties. Second, they advise the flight crew to contact an Operations Duty Manager and then wait for instructions on how to remove power from the CVR. That procedure could cause another unnecessary delay.

The problem of overwritten CVR data is not unique to scheduled air carrier operations. The Safety Board receives overwritten CVRs from smaller, on-demand carriers as well as private and business airplane operators. The CVR procedures proposed herein are applicable to all operators who have CVR-equipped aircraft. The Safety Board believes that the Federal Aviation

Administration should require that all operators of airplanes equipped with a CVR revise their procedures to stipulate that the CVR be deactivated (either manually or by automatic means) immediately upon completion of the flight, as part of an approved aircraft checklist procedure, after a reportable incident/accident has occurred. These procedures must also ensure that the recording remains preserved regardless of any subsequent operation of the aircraft or its systems. Any doubt as to whether or not the occurrence requires notification of the Safety Board must be resolved after these steps have been taken to preserve the recording.

Malfunctioning or Inoperative Cockpit Voice Recorder Systems

In addition to the problem of overwritten recordings, the Safety Board has conducted a number of accident and incident investigations involving CVRs that were either malfunctioning or completely inoperative at the time of the event. Examples of malfunctioning or inoperative CVR systems are summarized below.

Amway FalconJet Loss of Pitch Control. On October 9, 1999, a Dassault Aviation FalconJet DA-900B, N523AC, operated by the Amway Corporation experienced a series of pitch oscillations while leveling off at 11,000 feet mean sea level during a descent into Grand Rapids, Michigan (NTSB accident CHI00FA006). The aircraft load factor followed the aircraft pitch attitude and reached magnitudes between +3.3g and -1.2g. The CVR installed on this airplane was a Fairchild tape-based 30-minute model. The tape did not contain any audio information. Subsequent testing of the CVR at the recorder manufacturer's facility revealed an open transformer on one channel whereas the other channels were found to be fully operational. The cause of the failure was not determined; a possible explanation is that the CVR was not fully inserted into its mounting rack, causing incomplete electrical connections.

Executive Airlines Jetstream 3101. On May 21, 2000, an East Coast Aviation Services (doing business as Executive Airlines) British Aerospace Jetstream 3101 crashed at Bear Creek Township, Pennsylvania, about 11 miles south of Wilkes-Barre/Scranton International Airport (NTSB accident DCA00MA052). The airplane was destroyed by impact forces and post-impact fire, and the 17 passengers and 2 flightcrew members were fatally injured. This airplane was equipped with a Fairchild tape-based 30-minute CVR. The tape contained no recorded information for the accident flight or any other flight. Except for a 1.8 second, 400Hz, 20db tone, the only other signal present on the tape was an artifact of the bulk erase function. An inspection and subsequent tests of the recorder indicate that it likely had not functioned since the time it was installed, nearly 3 months before the accident occurred. The airplane reportedly flew an average of nine scheduled flights per week.

Comair Canadair Regional Jet Control Problem. On June 6, 2000, a Canadair Regional Jet operated by Comair experienced a "frozen yoke and no aileron control capability" while in the cruise phase of flight near Harrisburg, Pennsylvania (NTSB accident NYC00SA153). The airplane was equipped with a Fairchild tape-based 30-minute CVR. The CVR was found to have an inoperative magnetic erase head and consequently could not erase any of the previous recordings. The resultant audio on all four channels was indiscernible.

American Trans Air Lockheed L-1011 Engine Failure. On March 5, 2001, a Lockheed L-1011 operated by American Trans Air, Inc., experienced an uncontained engine failure during

climbout from Honolulu, Hawaii (NTSB accident DCA01IA027). The airplane was equipped with a Fairchild tape-based 30-minute CVR. Although the CVR was deactivated promptly after the airplane landed, the recorded audio on all four channels was unintelligible. The cause of the CVR malfunction is currently under investigation.

Emery Boeing/McDonnell Douglas DC-8 Gear-Up Landing. On April 26, 2001, a Boeing/McDonnell Douglas DC-8 operated by Emery Worldwide Airlines sustained a left main gear-up landing in Nashville, Tennessee (NTSB accident MIA01IA129). The Sundstrand tape-based 30-minute CVR recovered from this airplane did not exhibit any external damage and appeared to be in good condition. However, the magnetic tape transport mechanism inside the CVR was found to be mechanically jammed. The condition of the components indicated that the transport had been jammed for an extended period of time. None of the audio recorded on the tape was discernible.

In the cases described above, the CVR recordings were entirely unusable. However, in other cases, some channels on the recording were usable whereas others were not. Broken wires were found in the cockpit area microphones in two separate cases: an American Eagle Saab 340 that overran the runway in Killeen, Texas, in March 2000 (NTSB accident FTW00FA101); and a Comair CRJ that experienced an uncommanded roll while flying near Falmouth, Kentucky, in October 2000 (NTSB incident NYC01IA024). The Comair CVR is also listed in the earlier table of overwritten recordings.

Some of these malfunctions would be difficult or impossible to determine using the built-in test feature found on the CVR control unit in the cockpit. Others, such as the one found with the Executive Airlines Jetstream 3101 mentioned earlier, should be readily detectable. However, most or all of the malfunctions found by the Safety Board could have been detected by the operator with a more robust test procedure, such as listening to the output of the headphone jack in the control unit.

Previous Safety Recommendations to Address Malfunctioning or Inoperative CVRs

The Safety Board has issued 10 separate safety recommendations to the FAA regarding poor CVR performance. Most of the recommendations have focused on specific CVR models; for example, one issued in 1997 addressed a fleet-wide problem with CVR installations in Beech 1900 aircraft.[8]

In its efforts to ensure that all CVR systems function properly and are adequately inspected and maintained, the Safety Board recommended in 1978 and 1990 that the FAA require proper testing of a CVR system before each flight.[9] The FAA responded favorably to the

[8] Safety Recommendation A-97-36 asked for the prompt inspection of the CVR system on all Beech 1900 aircraft to ensure that the recordings were intelligible. The airplane manufacturer has subsequently developed a hardware upgrade to remedy the problem. Based on the FAA's issuance of SD 2000-20-07 on September 26, 2000, which mandated the CVR modifications in accordance with Raytheon Service Bulletin 23-3094, this recommendation was classified "Closed—Acceptable Action" in January 2001.

[9] Safety Recommendation A-78-21, issued in April 1978, was classified "Closed—Acceptable Action" in August 1978; Safety Recommendation A-90-70, issued in May 1990, was classified "Closed—Acceptable Action" in April 1995.

recommendations by issuing a notice and bulletin, respectively. In the most recent Air Transportation Operations Inspector's Handbook Bulletin HBAT 91-27 (enclosed), the FAA advised POIs to ensure that their operators addressed CVR preflight checks and indicated that these checks ". . . should include a check using headphones for CVRs having recording monitoring provisions."

Unfortunately, as highlighted by the examples above, CVR systems continue to malfunction. In some cases, such as private operations, the operators may not have a POI to review their specific CVR testing and maintenance procedures. In other cases, some operators apparently are not testing CVRs regularly, or perhaps are not using headphones to verify that the recording is intelligible. Further, flight crews may be relying solely on the CVR self-test indicator, which cannot detect many of the deficiencies the Safety Board is finding. The self-test feature provided with most recorders is limited and can test only certain functions internal to the CVR itself. The self-test feature does not test the system components that provide signals to the CVR or the associated wiring that connects them. As a result, one or all of the CVR channels may record erroneous or poor quality audio, even when the self-test feature indicates that the CVR is functioning normally. Additionally, an internal failure of a single channel in the CVR may be difficult to determine from the self-test indicating meter in the cockpit. This is because the meter shows the status of each channel sequentially,[10] and a "pass" indication for any single channel may be misinterpreted by the flight crew as an indication that all channels are functioning normally.

As with overwritten recordings, the problem of malfunctioning or inoperative CVRs is not unique to scheduled air carrier operations. These types of problems are found with recorders from smaller, on-demand carriers as well as private and business airplane operators. Therefore, the Safety Board believes that the FAA should require that all operators of airplanes equipped with a CVR test the functionality of the CVR system prior to the first flight of each day, as part of an approved aircraft checklist. This test must be conducted according to procedures provided by the CVR manufacturer and shall include, at a minimum, listening to the recorded audio on each channel to verify that the audio is being recorded properly, is intelligible, and is free from electrical noise or other interference.

Summary

The examples noted above demonstrate what the Safety Board believes is a systemic problem with the availability of CVR data after an accident or incident occurs. The Board continues to believe that reliable procedures are needed to safeguard CVR data. Despite current FAA regulations,[11] valuable CVR recordings continue to be overwritten far too frequently. The FAA has attempted to address this problem by issuing bulletins to its POIs; however, issuance of the bulletins has not resulted in appropriate action being taken by the operators after incidents occur. The current bulletin (FSAT 97-09) advises that the CVR should be deactivated only when the flight crew believes it is appropriate to do so.

[10] For most tape-based CVR installations.

[11] 14 CFR 121.359(h) requires that CVR recordings be retained by the certificate holder after a reportable accident or occurrence. Similar regulations also exist for operations subject to Parts 135, 125, and 91.

Additionally, many operators of CVR-equipped airplanes are not overseen by POIs. The Safety Board believes that the FAA should take action to ensure that these operators preserve CVR data after an occurrence as well.

Although the reliability of CVRs generally continues to improve, many variables affect CVR performance. The system components, wiring, and installation can all have an effect on the resulting recording. Self-test features are not designed to evaluate the performance of the entire system and cannot verify that the incoming audio signals are valid and audible.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Require that all operators of airplanes equipped with a cockpit voice recorder (CVR) revise their procedures to stipulate that the CVR be deactivated (either manually or by automatic means) immediately upon completion of the flight, as part of an approved aircraft checklist procedure, after a reportable incident/accident has occurred. These procedures must also ensure that the recording remains preserved regardless of any subsequent operation of the aircraft or its systems. Any doubt as to whether or not the occurrence requires notification of the National Transportation Safety Board must be resolved after the steps have been taken to preserve the recording. (A-02-24)

> Require that all operators of airplanes equipped with a cockpit voice recorder (CVR) test the functionality of the CVR system prior to the first flight of each day, as part of an approved aircraft checklist. This test must be conducted according to procedures provided by the CVR manufacturer and shall include, at a minimum, listening to the recorded signals on each channel to verify that the audio is being recorded properly, is intelligible, and is free from electrical noise or other interference. (A-02-25)

Chairman BLAKEY, Vice Chairman CARMODY, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

Original Signed

By: Marion C. Blakey
Chairman

Enclosures (3)

1. Air Carrier Operations Bulletin No. 74-8
2. Flight Standards Information Bulletin for Air Transportation (FSAT) 97-09
3. Air Transportation Operations Inspector's Handbook Bulletin (HBAT) 91-27

Enclosure 1

CHANGE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

8430.6A CHG 88

12/3/74

Cancellation Date: after filing

SUBJ: AIR CARRIER OPERATIONS INSPECTOR'S HANDBOOK

PURPOSE: This change transmits Air Carrier Operations Bulletin No. 74-8 which sets forth a requirement for periodic review, with the air carrier's crews, the mandatory reportable occurrences as listed in NTSB Part 430.

PAGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
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C. A. McKAY, Acting Chief
Flight Operations Division
Flight Standards Service

Distribution: FFS-2, 4, 5, 7 & 8 (wide); ZFS-843
FFS-1 & 3 (minimum); FIA-0 (minimum)
AAC-951A (50 copies); AAC-955 (80 copies)

Initiated By: AFS-424

AIR CARRIER OPERATIONS BULLETIN NO. 74-8

SUBJECT: Preservation of Cockpit Voice Recorder (CVR) Data Following NTSB Reportable Occurrences

There have been a significant number of instances over the past several years, subsequent to a landing after experiencing an incident or occurrence reportable to the NTSB under Part 430, where the flight crew has failed to halt the operation of the CVR. This has caused the erasure of all the recording pertinent to the occurrence and potentially valuable accident prevention material has been lost.

Federal Aviation Regulations (FAR) are explicit in requiring the certificate holder to retain the CVR recorded information relative to a flight which had an occurrence that requires immediate notification to the NTSB and which occurrence results in the termination of the flight. The inadvertent erasures usually result from neglect of the flight crew to cause the deactivation of the recorder and subsequent erasure when power is again applied to the aircraft.

Principal inspectors will review the provision of CAB Regulation Part 430.5 and FAR 121.359 or 127.127 with their assigned carrier. Since it is difficult for an aircrew to remember every occurrence that is to be reported in accordance with CAB Regulation 430.5, this item should be periodically reviewed during the pilot's recurrent training program. Principal operations inspectors should make every effort to have their assigned carrier include specific instructions and rationale for the deactivation of the CVR in the carrier's appropriate operations flight manuals.

Care must be taken to ensure that no flight crewmember construes the above directions as a requirement to deactivate the CVR immediately after an in-flight NTSB reportable occurrence. The CVR must not be deactivated until after landing and then, preferably, as a final checklist item, on the "After Landing Checklist." The amplified portion should expand on this item as being applicable only when a reportable occurrence has been experienced.

Because there is a possibility of inadvertent erasure of the desired recording due to the subsequent power application to an aircraft, coordination should be effected with the principal avionics inspector to assure the proper instructions are also included in a company maintenance manual.

Principal inspectors who are unable to obtain satisfactory carrier compliance will advise AFS-400, through normal channels, of the present company procedures and any particular areas that may cause difficulty.

Enclosure 2

FSAT 97-09 - Action to Conserve Data Contained within Cockpit Voice Recorders (CVR) Following an Incident or Accident

Flight Standards Information Bulletin for Air Transportation (FSAT)
{New-97-9}
EFFECTIVE DATE: 08-05-97
TRACKING: NTSB Safety Recommendations A-96-170, A-96-171

NOTE: THIS BULLETIN REQUIRES PTRS INPUT. SEE ITEM 5.

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1. PURPOSE. This bulletin contains information on procedures for ensuring that data contained within aircraft Cockpit Voice Recorders (CVR) is preserved following a reportable incident or accident aboard an air carrier aircraft equipped with a CVR.

2. DEFINITIONS. (Taken from NTSB 830, Accident and Incident Notification, Subpart A - General, paragraph 830.2)

A. Reportable Incident. An incident means an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations.

B. Accident. An accident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

3. BACKGROUND.

A. Investigation by the National Transportation Safety Board (NTSB) regarding a recent accident involving a scheduled domestic air carrier, resulted in a safety recommendation. This recommendation requires all airlines to revise their procedures to stipulate that flight crews turn off power to the CVR as part of the engine shutdown procedure in the event of a reportable incident or accident (A-96-170).

B. The NTSB stated that the investigation of this accident was complicated by the fact that the 30-minute closed loop CVR tape did not include documentation of pertinent information necessary to the investigation because of the 30-minute tape duration. The NTSB concluded that had the flight crew turned off power to the CVR after the airplane was safely stopped on the

ground, investigators would have had access to valuable documentation of the events surrounding the subject accident. Therefore, the NTSB believes that the Federal Aviation Administration (FAA) should require all airlines to revise their procedures to stipulate that flight crews turn off power to the CVR as part of the engine shutdown procedure in the event of a reportable incident/accident.

4. DISCUSSION. A review of the time sequence of events surrounding the subject accident resulting in NTSB recommendation A-96-170, confirms that had the flight crew taken action to preclude the continuous recording of the CVR shortly after they completed their final landing, additional information would have been made available to their investigators.

A. Although the FAA supports the intent of the NTSB's recommendation, it does not believe that crew initiated action will, in all cases, provide NTSB investigators with additional information that A-96-170 seeks to achieve.

B. There are additional issues involving flight crew action in deactivating a CVR which the NTSB's recommendation has not fully addressed. These issues include:

(1) Due to the current 30-minute duration of the continuous tape found on current CVRs, inflight incidents or accidents which are resolved more than 30 minutes prior to the aircraft landing, would not provide the NTSB investigators with the information they are seeking to safeguard under A-96-170. For example, a flight between Hawaii and the Continental United States which experiences an incident after becoming airborne may require several more hours of flight before landing at its destination. Since the NTSB's recommendation would require the flight crewmembers to deactivate the CVR after completing the engine shutdown procedures, the CVR tape would be without any useable data concerning the incident/accident which occurred much earlier in the flight.

(2) The current generation of CVRs are not equipped with an on/off switch readily accessible to the flight crew, but rather require the pulling of a remotely located electrical control circuit breaker in order to interrupt the operation of the continuous tape. Since the location of the control circuit breaker for the CVR varies with each aircraft type (as well as variations within type), deactivation of the CVR may require crewmembers to leave their duty station in order to accomplish this task. The FAA believes that this type of activity is inconsistent with safe operating practices when conducted during flight. Such action in post flight operations is not normally considered a flight crew duty, and may distract or delay the flight crew from accomplishing safety related procedures (e.g. aircraft evacuation checklists).

C. The FAA believes that resolution of this issue lies in new technology CVRs with increased taping capability. The NTSB agrees with this approach, and has made an additional recommendation, A-96-171, which would require that all newly manufactured CVRs intended

for use on airplanes have a minimum recording duration of 2 hours. The FAA has indicated that it will revise the existing Technical Standard Order (TSO) C123a, Cockpit Voice Recorder System, to reference the standard for a 2-hour CVR as a requirement.

D. However, the FAA does agree with the NTSB that specific action directed at deactivating an aircraft's CVR after the flight crew has completed the engine shut down checklist, may produce additional pertinent data regarding an inflight incident/accident, although the appropriateness of such a procedure would be limited to an event similar to that which resulted in A-96-170.

5. ACTION. Until such time that new technology CVRs with extended recording capability become available, principal operations inspectors (POI) shall review the procedures established by the airlines for which they have responsibility, in order to ensure that those carriers have established procedures to safeguard CVR data. These procedures shall ensure that flight crew actions are not initiated prior to completing the engine shut down checklist, stopping the airplane safely, and shall only be accomplished when the flight crew believes that CVR data, which may be of use in subsequent investigations conducted by the NTSB, is contained within the tape's 30-minute duration. A procedure which informs the flight crew to notify/direct maintenance personnel to open the CVR circuit breaker would be considered an acceptable methodology.

6. PROGRAM TRACKING AND REPORTING SUBSYSTEM (PTRS) INPUT. POI's shall make a PTRS entry to record the actions directed by this bulletin with each of their operators as outlined in HBAT 94-08. The PTRS entry shall be listed as activity code number 1381 and the "national use" field entry should be "FSAT9709". POI's should use the comments section to record comments of interaction with the operators.

7. INQUIRIES. This bulletin was developed by AFS-220, Air Transportation Division. Any questions or comments concerning this guidance should be directed to AFS-220 at (202) 267-3755.

8. EXPIRATION. This bulletin is scheduled to expire on August 31, 1998. However, this FSAT may be extended as needed.

/s/
Katherine M. Hakala
Acting Manager, Air Transportation Division

Enclosure 3

HBAT 91-27 - Cockpit Voice Recorder (CVR) Preflight Procedures

A. BACKGROUND. Recently, numerous aircraft accident reports have revealed regular findings of poor CVR performance. This degradation of CVR performance can be greatly alleviated by better CVR maintenance and effective preflight check procedures.

B. ACTION. Principal operations inspectors (POI) shall bring the contents of this bulletin to the attention of their respective operators. POIs shall ensure that their operators' training programs and operations manuals adequately address the frequency of flightcrew CVR preflight checks and the preflight check procedures based upon the guidelines established by the manufacturer. The preflight procedures should include a check using headphones for CVRs having recording monitoring provisions.

As a minimum, these CVR checks should be accomplished on the first flight of the day and whenever a flightcrew change occurs during that day.

C. PTRS INPUT. POI's shall make a PTRS entry to record the actions directed by this handbook bulletin with each of their operators. The PTRS entry shall be listed as activity code number 1380 in section 1, and as code A831 in the "Primary/Key" column in section IV. POI's should use the comments section to record comments of interaction with the operators.

D. FURTHER GUIDANCE. Any questions or clarifications regarding this bulletin may be addressed to AFS-510.