DCA98MA015
December 28, 1997
Over Pacific Ocean

ATTACHMENT 5

Chime Amplifier Tear-Down Report

(17 Pages)

National Transportation Safety Board

Memorandum

Date: April 8, 1998

To: Bob Benzon, AS-10
Investigator-in-Charge

Thru: Gary Mucho, SWRA
Regional Director

From: Wayne Pollack, SWRA
Air Safety Investigator

Subject: DCA98MA015

EXAM OF THE "AIRCRAFT PASSENGER ADDRESS AMPLIFIER" COMPONENT, IN FOLLOW-UP TO THE 12/28/97 ACCIDENT INVOLVING N4723U.

In accordance with your instructions, on April 1, 1998, the referenced part was examined in an "as received" condition under my supervision and observation at the United Airlines maintenance facilities, San Francisco International Airport, California. The testing was accomplished in accordance with United's Component Maintenance Manual #RC-85-23-31-04-JD. The initial purpose of the examination was to determine whether the amplifier was functional.

At least one representative from each of the following parties was present during the entire test procedure: Federal Aviation Administration, United Airlines, Boeing, Rockwell-Collins, and the Association of Flight Attendants. Except for the FAA, during the examination one individual from each of the parties took field notes.

Pursuant to your verbal instructions, upon ascertaining that the alert chime feature within the amplifier did not function in accordance with United's test protocol, additional tests were undertaken to analyze the reason for the inoperative chime signal and to identify the related defective component. This aspect of the amplifier examination required component part replacement to confirm the parties' observations. At the conclusion of the tests, all of the parties' field notes were agreed upon and combined into a joint Teardown Report which was signed off by the participants. The amplifier was reboxed and returned to United's secure storage room pending your disposition instructions.

The following summarizes pertinent observations and findings:

1. Collins manufactured the amplifier approximately 30 years ago;

2. A low volume level was noted upon energizing the circuit related to any transmissions from the 1st Flight Attendant position;

3. The amplifier utilizes over one-half dozen electronic components known as photoswitches. (The Collins parts list refers to this component as a "photoelectric cell," and the Collins Overhaul Manual refers to this component as a "Photoswitch RP11 (Lamp));

3. The photoswitches incorporate filaments, similar to light bulb filaments, which have a finite life span;

4. One of these photoswitch components, identified as part "RP11," was found to have failed. Essentially, its filament was burned out;

5. The RP11 photoswitch is located in a portion of the circuit such that upon its failure the airplane's chime system is rendered inoperative; and

6. There is no alternate route (or bypass procedure) for current to travel around this RP11 which fails in the "open" circuit mode.

In summary, the single point failure of the RP11 photoswitch within the amplifier's circuitry was observed to render the airplane's "Fasten Seat Belt/No Smoking annunciation chime system inoperative.

The following three areas for additional investigation were identified during this work assignment:

1. Upon your request, Rockwell-Collins can extract from its records repair action data for the RP11 photoswitch and the component's mean time between failures (MTBF);

2. Rockwell-Collins reported that it has issued 23 service bulletins on the subject amplifier. United indicated that it had modified the amplifier 4 times. Upon your request, United will research whether the modifications incorporated the requirements of the applicable service bulletins; and

3. Upon your request, United will provide historical records covering the installation of this amplifier into the accident airplane. Also, United can review its cabin discrepancy and airplane logs for additional evidence of chime system failures.

Attachments:

1. Equipment Evaluation (Teardown) Report (3 pages), and related United test procedure document (5 pages);

2. Collins Overhaul Manual Parts List extract showing failed component and manufacturer (2 pages);

3. Collins Overhaul Manual circuit diagram showing location of failed component (1 foldout page);

4. Memo from Collins regarding availability of amplifier manufacturing records (1 page);

5. Statement from United's technician regarding identification of the single failed component related to the inoperative status of the chime (1 page); and

6. List of persons observing the teardown (1 page).

EQUIPMENT EVALUATION (TEARDOWN) REPORT

Participants:

Wayne Pollack	-	NTSB
*Jeff Plantz	-	United Airlines-Flight Safety
*Cathy Harris	-	United Airlines-Quality Assurance
Jerry Knott	-	United Airlines-Shop #147 Team Leader/Supervisor for Lewis Ward
Lewis Ward	-	United Airlines-Shop #147 Technician
*Sang Hee Han	-	Boeing
*Fidel Gonzales	-	Association of Flight Attendants
*Robert Patterson	-	Rockwell Collins Inc.
Paul Kratzer	-	Rockwell Collins Inc.
Gregory Moore	-	FAA

* Assigned Note Taker

Aircraft N4723U, NTSB Docket #DCA98MA015

Follow-up to accident Flight #826 on December 28, 1997. The below listed part was removed from the quarantine area, and it was examined. We observed a small depression/dent in the right side of the cover. The parties subsequently determined that this dent did not affect any internal components.

Part Examined:

Aircraft Passenger Address Amplifier (PA#1)
MR 23314-336
PCN 5309030
UAL Change Status 1,2,3,4
Collins Type # 346D-1B
Collins Part # 522-4538-002
S/N 2458

Part Test:

The part was tested in accordance with United Airlines Component Maintenance Manual procedure RC-85-23-31-04-JD. Section 5. [Note 1 & 2] Prior to initiating the test, the part was warmed up for ten (10) minutes at 28V. Then, the test was performed following the specified procedure. (See arrow on test page for procedure followed during the test)

Test Data

Step (2) Unit Under Test

(1)	OK
(2)	72V
(3)	S17 9.5V S19 OK (38V)
(4)	OK (3.7V)
(5)	OK
(6)	Range 14.17V to 14.41V, stabilized at 14.23V
(7)	S18 15V S19 OK (40V)
(8)	10V
(9)	0.5 db
(10)	OK (70V)
(11)	OK
(12)	OK
(13)	OK
(14)	OK
(15)	OK

Test Data -- continued

TABLE 1

1. OK (3.0V)
2. Not applicable
3. 0.74V
4. OK (39V)
   OK (1.5V)

4a. OK (10V)
4b. OK (10V)

5. 26.V [Note 3]
6. OK (70V)
7. OK (70V)
8. 68V
9. Consensus the unit did not meet criteria for "older."
10. OK (28mV)
11. OK (200mV)
12. 68V
13. OK (0.0V)
14. OK (70V)
15. OK (0.0V)
16. OK (70V)
17. 19.8V
18. OK (0.0V)
19. OK (70V)
20. OK (0.0V)

TABLE 2 - [Note 4]
LO = No Smoking/Fasten Seat Belt
HI = Passenger Call
HI/LO = Flight Attendant/Pilot to Flight Attendant

Main Output [Note 2]

1. 28V
2. HI Chime 2.4V
   LO Chime 0.0V
3. 0.0V
4. OK (0.0V)
5. HI Chime 2.4V
   LO Chime 0.0V
6. 0.0V
7. OK (0.0V)
8. OK (0.0V)
9. 0.0V

Aux. Output

1. 6.2V
2. 0.0V

NOTES:

[1] None of the required adjustments were made so that unit would be tested in "as received" condition.

[2] Unless otherwise noted, "OK" means the test resulted in values compliant with the test procedures. Actual results are shown in parentheses, or when needed for clarification.

[3] Table 1, Step 5 failure would result in a weaker signal (weak announcement volume) from 1st Flight Attendant position to whatever area the Flight Attendant chose to transmit to in the cabin. This would not have an affect on the chime function.

[4] Table 2 had the following failures noted:
   a. Main Output - Steps 2, 3, 5, 6, 9 were failures
   b. Aux. Output - Steps 1 and 2 were failures

SUMMARY NOTES

Boeing

This PA AMP (S/N 2458) unit was installed in PA AMP position number one which is the source for the NO SMOKING and FASTEN SEAT BELT low chime signal to the entire cabin, as shown in WDM 23-30-01 page 101.

Fault Isolation Procedure

The following procedure was used to isolate the specific component responsible for the failures observed in Table 2, Main Output steps 3, 6 and 9 and Aux Output step 2.

1) Transistors Q84 and Q 85 were removed to isolate circuit of interest.
2) Transistor Q 69 was removed to allow the HI Chime tone to reach the unit output.
3) The HI Chime tone was observed at the unit output.
4) Transistor Q 69 was reinstalled.
5) Transistor Q68 was removed to allow the LO Chime tone to reach the unit output.
6) No output was observed at the unit output.
7) A jumper was connected across photo resister RP 11.
8) A LO Chime tone was observed at the output of the unit.

The sequence above is conclusive evidence that RP 11 failed to an open state. RP 11 was removed from the unit and replaced with a new part from United stock. Manufacturer's markings on the accident RP 11 component are "RAY CK2102 3219 9416," there is a green paint dot on the top, and #230 is hand written on the side.

Component Maintenance Manual test procedure Table 2 was repeated in an attempt to confirm proper operation after replacement of RP 11. Main Output, Step 3 and Aux Output step 2 passed indicating restoration of the LO Chime capability necessary for the seat belt alert. Additional faults within the unit were not isolated as they are not related to the LO Chime function.

Factual Observation

Failure of this component, RP 11 photo switch (lamp), precludes the LO Chime feature of the Fasten Seat Belt / No Smoking annunciation from operating.

Wayne Pollack [redacted] Date 4/1/98

Jeff Plantz [redacted] Date 4-1-98

Cathy Harris [redacted] Date 4/1/98

Sang Hee Han [redacted] Date 4-1-98

Fidel Gonzales [redacted] Date 4-1-98

Robert Patterson [redacted] Date 4/1/98

D. Approved Repairs (Only Approved Repairs for other EIN's are listed here.)

(1) None.

E. Assembly

(1) Re-assemble the unit using serviceable parts.

5. Testing and Completion

A. Basic Test Conditions

NOTE

All frequency values given are intended ±5%.

(1) Test Panel

(a) DC power S14 on.

(b) Audio frequency and voltage as noted.

(c) All other switches OFF (down or counterclockwise) until otherwise noted.

(d) Main amplifier output loading.

1) Switches S21 and S24 must be set to 83 ohm position, during normal tests.

NOTE

To prevent overheating during troubleshooting, 1K ohm load can be used by setting S24 to 1K position. S24 switch in center position sets a NO LOAD condition.

(2) Unit Under Test: Preliminary Adjustments - Collins 346D-1B Only.

(a) 346D-1B Only

1) Standby power drain test - with no signal, S16 to X1, read not more than 600 mA.

2) Apply 1 KHZ to input #1 J10 - OSC, Set R22 to 120 mV at J3 VTVM input (S1 to "Pilot"., S6 to 83 Ohm 100V and S2 control ON). Check output for 70V (Adjust R71 master level). Reduce R-22 to provide 41.0 Volts output with S17 shorted. R100 full CW.

3) With S17 at 2000 Ohms, output shall be 13.0 Volts. Adjust R80 as required. Operate S19 to recheck output NLT 35.0 volts.

4) With S17 at 4000 Ohms, output shall be 4.1 Volts ± 4 db.

5) With S17 shorted recheck for 41.0 Volts output (adj. signal input).

6) Ensure 15 volt power supply measures 15.0 ± 0.5 Vdc.*

continued

NOTE

***For Resistor selection (R92)refer to par. 4. F (2) of Vendors Manual.**

7) With S18 on 1000 Ohms, set R60 for 13.0 Volts output. Operate S19 to recheck output NLT 35.0 Volts.

8) With S18 on 2000 Ohms, the output shall be 8.0 Volts ± 1.5 db.**

9) S-18 to short, reduce signal with R22 to obtain 13.0 Volts output. Note input voltage at J3-VTVM input. Change frequency of signal generator to 100 Hz. Readjust the input voltage using R-22 to the previously noted value. Maintain previous input level while adjusting R48 (Bass Boost and cut control) or 1 db drop below output at 1 KHZ, as read on output meter. Restore input to 120 MV at 1KHZ.

10) With 1000 cycle input signal at 120mV at J-3, adjust output to 70.0 volts with R71 (Master Level).

11) Reduce input signal to less than 50 mV.

12) Slowly increase signal level to confirm the knee of the AGC curve at 120 mV ± 10 MV. (If necessary, repeat to accurately adjust R2).

13) S2 to off, remove signal and check "calibrate" position on amplifier for "O" db. Select resistor R123 as required. *

14) Proceed with the following tests per Table 1 & 2. ***

NOTE

DSI may be replaced by a 270 ohm 1/2W resistor. (RC20GFZ71K)

NOTE

*** Some adjustment of meter calibration resistor R96 may be required in lieu of adjusting R123 and R124 to obtain "O" VU. (70.0 volts output).**

NOTE

**** Amplifiers, with R36 replaced by a 5v 80 MA lamp, that cannot meet specifications, select and add a 1/8 watt resistor across pins No. 1 and No. 2 of RP6 to bring into specifications.**

NOTE

***** It may be necessary to reverse the test lead of the oscilloscope when making measurements due to differences in test panel grounding methods.**

15) Set S-11 to smoking and trigger S-15 (Ext noise) and monitor meter from chime output. The meter should read "0" (zero).

continued

Table 1:

OUTPUT SELECTOR S6									
STEP	S1 INPUT	INPUT SIGNAL	CONTR. SW. ON	UNIT TEST/ OFF/ CAL	100V 83 OHM	10V 6 OHM	10V 500 OHM	ADJUST	GENERAL
1	Pilot	1 KHZ 120MV	S2	OFF	----	3.0 Volt	----	R304	Aux. Amp. Output
2 ***	Pilot	350 HZ 120 MV	S2	OFF	Less than 3% HM Distortion	Less than 3% HM Distortion	----	----	----
3	Pilot	1 KHZ 120MV	S2	OFF	----	----	0.7 volt	R91	Sidetone
4	Pilot	1 KHZ 120MV	S2 & S5	OFF	31 to 40 Volts	1.3 to 1.7 Volts	----	None	Engines "Off" Output
4A	Pilot	1 KHZ	S2	OFF	35.0 Volts				Read 10.0 ± 1v on position 8 of S6
4B	Pos. 7 (Mult.)	1 KHZ	S2	OFF	ADJ. OUTPUT TO 35.0 VOLTS			R131 (Select)	Input shall be 10.0 ± 1v
5	Stew	1 KHZ 120 MV	S3	OFF	70.0 Volts	----	----	R4	----
6	Stew Bal	1 KHZ 480 MV	S3	OFF	70.0 Volts	----	----	R6	----
7	#3	1 KHZ 480 VM	S7	OFF	70.0 Volts	----	----	R8	----
8	Music	100 HZ 480 MV	S4	OFF	63.0 Volts	----	----	R10	----
9	Pilot	None R22 FULL C.W. ****	None	TEST	32 to 35 Volts (14-20 V. on old units)	----	----	----	Select Resistors for R124 **
10	Pilot	None	S2	OFF	Less than *150 MV	----	----	----	Ampl. Noise Test
11	Pilot	S12 & S15 ON	S2	OFF	*Less than 350 VM	----	----	----	Pwr. Line Noise Test

* USE 10V 83 OHM POSITION ON S6.

** SOME ADJUSTMENT OF METER CALIBRATION RESISTOR R96 MAY BE REQUIRED IN LIEU OF ADJSUTING R123 AND R124 TO OBTAIN "O"VU. (70.0 VOLTS OUTPUT).

*** STEP 2 REQUIED ONLY WHEN TROUBLESHOOTING CHRONIC AMPLIFIERS. USE OSCILLOSCOPE PATTERN FOR ROUTINE DISTORTION CHECK.

**** IF UNIT IS AFFECTED BY R22 (OLDER UNITS) LEAVE R22 FULL CLOCKWISE WITH SIGNAL GENERATOR DISCONNECTED.

continued

STEP	S1 INPUT	INPUT SIG	CONTR. SW. ON	UNIT TEST OFF/CAL	OUTPUT SELECTOR S6		
					100V 83 ohm	10V 6 ohm	10V 500 ohm
12	Music	100 HZ 480 MV	S4	OFF	63V		
13	Music	100 HZ 480HZ	S7	OFF	00.0V		
14	No. 3	1KHZ 480 MV	S7	OFF	70V		
15	No. 3	1KHZ 480 MV	S3	OFF	00.0		
16	Stew Bal.	1KHZ 480 MV	S3	OFF	70V		
17	Stew	1KHZ 120 MV	S3	OFF	70.V		
18	Stew	1KHZ 120 MV	S2	OFF	00.0V		
19	Pilot	1KHZ 120 MV	S2	OFF	70.0V		
20	Pilot Bal.	1KHZ 120 MV	S2	OFF	00.0V		

continued

Table 2:

STEP	S6	S8	ACTUATE	MAIN OUTUPT 100V 83OHM	ADJUST	
1	Pos 5	ON	S9 - HI	*25 volts	R194	
2	Pos 5	ON	S10 - HI/LO	*25 volts	R250	Balance R225
3	Pos 5	ON	S11 - NS/FSB	*25 volts	R239	
4	Pos 5	HI - Deactivate	S9 - HI	NMT 0.5 volts	-	
5	Pos 5	HI - Deactivate	S10 - HI/LO	*25 volts	-	
6	Pos 5	HI - Deactivate	S11 - NS/FSB	*25 volts	-	
7	Pos 5	HI-LO Deactivate	S9 - HI	NMT 0.5 volts	-	
8	Post 5	HI-LO Deactivate	S10 - HI/LO	NMT 0.5 volts	-	
9	Pos 5	HI-LO Deactivate	S11 - NS/FSB	*25 volts	-	
STEP	S6	S8	ACTUATE	AUX OUTPUT 10V 6OHM	ADJUST	
1	Pos 7	ON	S9 - HI	*5 volts	R300	
2	Pos 7	ON	S11 - NS/FSB	*5 volts	R301	

* Read as highest momentary reading on RMS meter.

NOTE

1 Operate switches S9, S10 and S11 at 5 seconds intervals.

2 NS/FSB (S11) switch must be checked on all four positions with a 5 seconds interval between steps.

3 Hi frequency 587 Hz adjust R-172 Q69 and 85 out. Lo frequency 494 Hz adjust R-213 Q68 and 84 out.

4 S-23 should be in the OFF position when accomplishing chime tests.

5 Test select R189 and R230 as required. Range of values shall be between 2.0K to 15.0K.

continued

DETAILED PARTS LIST

T	UNITS PER ASSY	FIG-ITEM	PART NUMBER	AIRLINE PART NO	INCDT	NOMENCLATURE	EFFECT CODE	UNITS PER ASSY
	1	1111 203	RCR07G472KS		2	RESISTOR,FIXED CMPSN, 4.7K, 10%, 1/4W (V81349) 745-0773-000 R211		1
	1	204	PL5B1		2	PHOTOELECTRIC CELL 714-3219-010 (V33173) RP11 (EFF TO SIL 1-75)		1
R	1	-204A	CK2102		2	PHOTOELECTRIC CELL (V94144) 714-3219-010 RP11 (EFF SIL 1-75)(SUPSD BY 204B)		1
R		-204B	H11F1		2	MICROCIRCUIT (ESDS) (V34371) 351-0606-010 (SUPSDS 204A)		1
R	1	-205	5100-50C		2	RING,RETAINING (V79136) 340-0048-000 (AP) (USED WITH 204 & 204A)		1
R		205A	600-2007-141		2	CIRCUIT BOARD (AP) (USED WITH 204B)		1
	1	206	RCR07G273KS		2	RESISTOR,FIXED CMPSN, 27K, 10%, 1/4W (V81349) 745-0800-000 R228		1
R	1	207	150D105X0035A2		2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 35V (V56289) 184-7398-000 C85		1
	1	208	RN55D1501F		2	RESISTOR,FIXED FILM, 1.5K, 1%, 1/8W (V81349) 705-3605-080 R176 (EFF THRU MCN 1299)		1
R	1	-208A	RN55D1961F		2	RESISTOR,FIXED FILM, 1.96K, 1%, 1/8W (V81349) 705-1010-000 R176 (SUPSD BY 208B)		1
R	1	-208B	RN55D1471F		2	RESISTOR,FIXED FILM, 1.47K, 1%, 1/8W (V81349) 705-1004-000 R176 (SUPSDS 208A)		1
	1	209	RCR07G820KS		2	RESISTOR,FIXED CMPSN, 82 OHMS, 10%, 1/4W (V81349) 745-0710-000 R263 (EFF THRU MCN 1007)		1
R	1	-209A	RCR07G391KS		2	RESISTOR,FIXED CMPSN, 390 OHMS, 10%, 1/4W (V81349) 745-0734-000 R263 (EFF MCN 1008)		1
R	1	210	PL5B1		2	PHOTOELECTRIC CELL 714-3219-010 (V33173) 714-3219-010 RP10 (EFF TO SIL 1-75)		1
R	1	-210A	CK2102		2	PHOTOELECTRIC CELL (V94144) 714-3219-010 RP10 (EFF SIL 1-75)(SUPSD BY 210B)		1
R	1	-210B	H11F1		2	MICROCIRCUIT (ESDS) (V34371) 351-0606-010 RP10 (SUPSDS 210A)		1
R	1	-211	5100-50C		2	RING,RETAINING (V79136) 340-0048-000 (AP) (USED WITH 210 & 210A)		1
R	1	211A	600-2007-141		2	CIRCUIT CARD (USED WITH 210B)		1
R	1	212	150D105X0035A2		2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 35V (V56289) 184-7398-000 C84		1
	1	213	RCR07G102KS		2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (V81349) 745-0749-000 R197		1
	1	214	RCR07G223KS		2	RESISTOR,FIXED CMPSN, 22K, 10%, 1/4W (V81349) 745-0797-000 R196		1
	1	215	RCR07G273KS		2	RESISTOR,FIXED CMPSN, 27K, 10%, 1/4W (V81349) 745-0800-000 R187		1
	1	216	RCR07G183KS		2	RESISTOR,FIXED CMPSN, 18K, 10%, 1/4W (V81349) 745-0794-000 R183		1
	1	217	RCR07G471KS		2	RESISTOR,FIXED CMPSN, 470 OHMS, 10%, 1/4W (V81349) 745-0737-000 R198		1
R	1	218	150D156X0020B2		2	CAPACITOR,FIXED ELCTLT, 15UF, 20%, 20V (V56289) 184-7371-000 C69		1
	1	219	0550H5-065		2	RESISTOR,THERMAL 1K, 5%, 1W (V10646) 714-1732-000 RT10		1
R	1	220	1N457		2	SEMICOND DEVICE (V03508) 353-0204-000 CR76		1
R		221	1N457		2	SEMICOND DEVICE (V03508) 353-0204-000 CR77		1

- ITEM NOT ILLUSTRATED

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
91662	ELCO CORP CONNECTOR DIV A GULF AND WESTERN MFG CO SUB OF GULF AND WESTERN INDUSTRIES HUNTINGDON INDUSTRIAL PK HUNTINGDON PA 16652
91663	ARMEL ELECTRONICS INC 1601 75TH STREET NORTH BERGEN NJ 07047
91886	MICRODOT MFG INC MALCO MFG DIV 12 PROGRESS DR MONTGOMERYVILLE PA 18936
94144	RAYTHEON CO MICROWAVE AND POWER TUBE DIV INDUSTRIAL COMPONENTS OPERATION 465 CENTRE ST QUINCY MA 02169
94145	RAYTHEON CO MICROWAVE & POWER TUBE INDUSTRIAL COMPONENTS OPN 465 CENTRE ST QUINCY MA 02169
94222	SOUTHCO INC 210 N BRINTON LAKE RD CONCORDVILLE PA 19331
94916	WACLINE DIV OF SIMMONDS PRECISION PRODUCTS INC DAYTON OH 45400
96906	MILITARY STANDARDS
97315	BALLASTRAN CORPORATION FORT WAYNE IN
98291	SEALECTRO CORP BLCC ELECTRONICS 40 LINDEMAN DR TRUMBULL CT 06611
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP 135 W MAGNOLIA BLVD P O BOX 7704 BURBANK CA 91510

F. Effect Codes

EFFECT CODE	UNIT PART NUMBER	FIG-ITEM
A	522-4353-001	1101-1A
B	522-4538-002	1101-1B
C	522-4538-003	1101-1C
D	522-4538-004	1101-1D
E	522-4538-005	1101-1E

s a positive or a negative p
he low chime switch when a
switch when a sign goes of
negative pulse does not trig

e high chime trigger circuit
Q85 and switch control amp
from either the low chime
put from Q62 is to low osci
Q67.

ators that produce square-
chimes. The input to first
w chime trigger circuit; the
and the deactivator circuits
is applied to the second hig
put from the second high/lo

vitches RP10 and RP11 off
om the high chime switch,
itch control amplifier Q67
witch RP11.

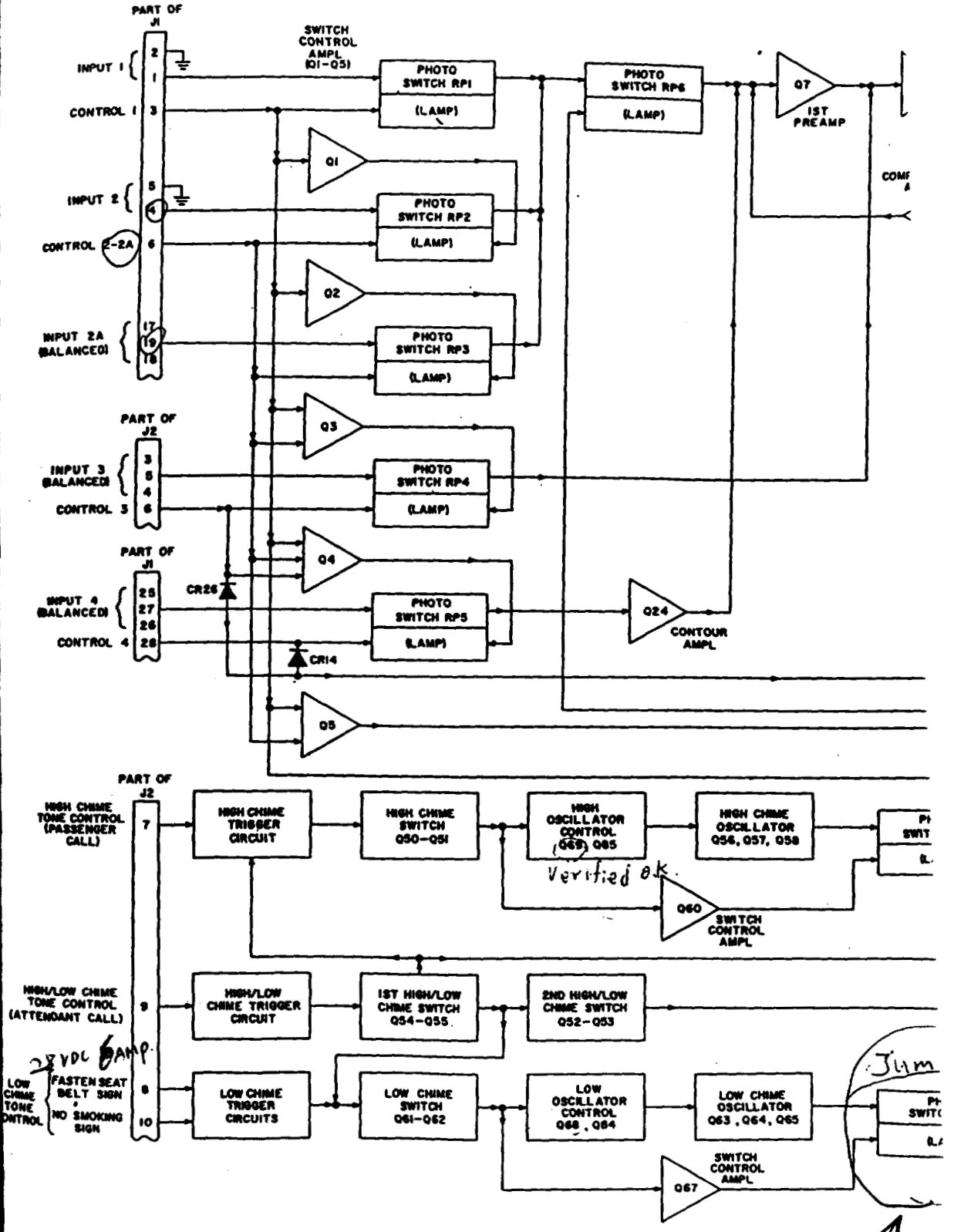
en the RC tank circuits in
control Q69 and Q85 is fro
e oscillator. The input to
itch, and its output is to th

ically. The input to high
or control Q69 and Q85.
10. The input to low chim
rol Q68 and Q84. The outp

chime oscillator circuits,
when the photo switches a
gh chime oscillator, and i
to switch RP11 is from th
tage.

g the chime oscillator cir
ting frequency. The inpu
is to the first deactivato
auxiliary buffer circuits.
d the output is to the firs
e auxiliary buffer circuit.

ded in the main cabin. T
ols to the chime amplifie
rom the high and low buff
y, the sine-wave signal
h and low buffer stages,



346D-1B Block Diagram
Figure 10

From: Robert A Patterson on 02/22/98 07:21 PM

To: August N Canha/CedarRapids/Collins/Rockwell@Rockwell
cc: Roger E Southgate/CedarRapids/Collins/Rockwell@Rockwell
Subject: 346D-1B s/n 2458

Augie,

I appologize for the delay in responding.

Manufacturing records for this specific unit are no longer available. Our best estimate is that s/n 2458 was delivered in 1968 or 1969. This is based on available records and extrapolating back.

Your voice mail message indicated there is interest in a tear down of this unit. We definately want a Collins representative present. In fact, we prefer to conduct such equipment evaluation in our facilities.

Please provide name of NTSB investigator involved, and confirm desire for equipment evaluation.

Thanks.

Regards,
RAP

Augie [redacted] Cell Phone.

I certify that the original complaint of "~~No~~ NO fasten SEAT BELT CHIME" has been repaired. The defective part was identified as an inoperative "Photo Resistor" RP11. This was replaced with a new part which restored the "~~No~~ Fasten Seat Belt Chime"

[redacted]
LEWIS C. WARD
VAL TECHNICIAN

1 April 1998

4/1/98

☆ NOTE TAKER

PAUL KRATZER COLLINS [redacted]

Deported ~~BILL POWELL UAL ENGINEERING~~ [redacted]

☆ Sang H. Han Boeing Service Engineering [redacted]

JERRY KNOLL UA AVIONICS SHOP TEAM LEADER

☆ BOB PATTERSON COLLINS

☆ Cathryn Harris UA Quality Assurance

LEWIS WARD UAL TECHNICIAN

JEFF PLANTE UAL FLIGHT SAFETY

☆ Greg Moore ASI - FAA - CMO - SFO

☆ Fidel Gonzales AFA -

WAYNE POLLACK NTSB [redacted]

[redacted]