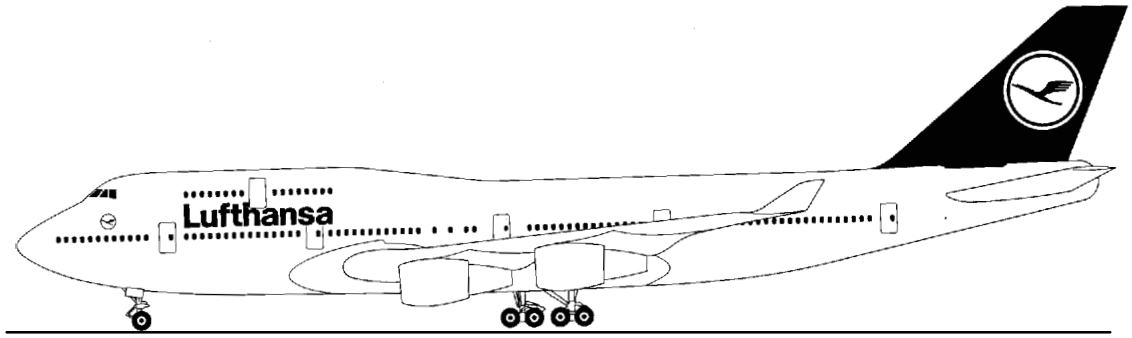
Lufthansa Technical Training

Training Manual
B 747-400



ATA 23-12
VHF System
ATA Spec 104 Level III

Book No:

Lufthansa
Technical Training GmbH
Lufthansa Base

Issue: NOV 2001
For Training Purposes Only

Lufthansa Technical Training

Lufthansa Technical Training GmbH

Lufthansa Base Frankfurt

D-60546 Frankfurt/Main

Tel. +49 69 / 696 41 78

Fax +49 69 / 696 63 84

Lufthansa Base Hamburg

Weg beim Jäger 193

D-22335 Hamburg

Tel. +49 40 / 5070 24 13

Fax +49 40 / 5070 47 46

ATA 23-12 VHF

VHF COMMUNICATION SYSTEM - INTRODUCTION

The VHF system is a short-range, line-of sight, two-way voice and data communication system.

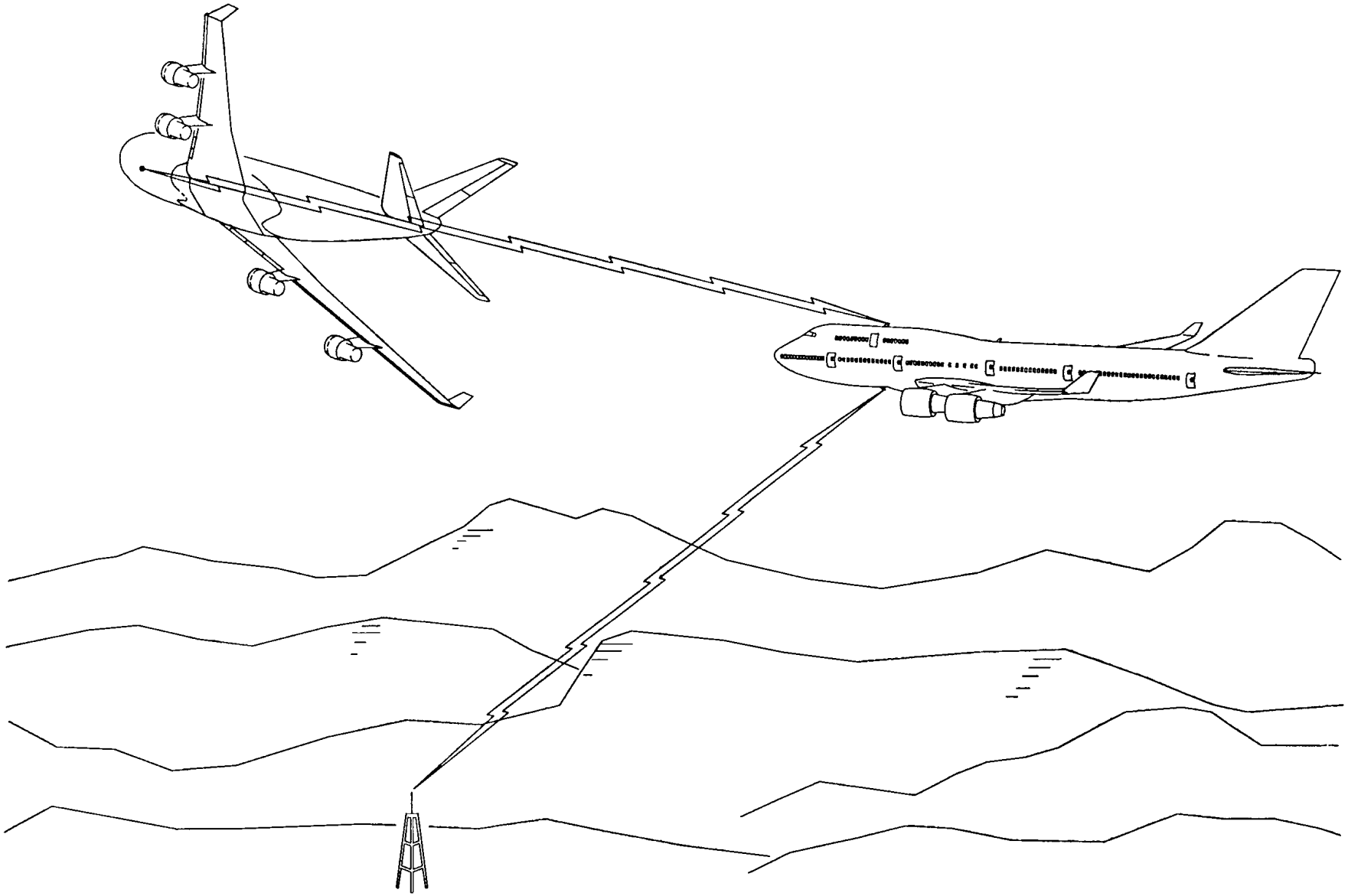


Figure 1 VHF COMMUNICATION SYSTEM - INTRODUCTION

VHF SYSTEM

General

The VHF communication system uses three VHF systems. Each VHF system has:

- A VHF antenna
- A VHF communication transceiver
- Three radio communication panels (RCPS).

General Description

The VHF communication system connects with:

- The audio management unit (AMU). microphone audio and mic switch discretes go to the VHF transceiver through the AMU. Receiver audio goes from the VHF headsets through the AMU.
- The SELCAL decoder. The SELCAL decoder starts an alert when a call comes in for that airplane.
- The ACARS system. ACARS receives data from the VHF system and sends data to the VHF system.

The digital flight data acquisition card (DFDAC). The DFDAC sends the PTT to the flight recorder.

The ACMS system. ACMS records the PTT.

The central maintenance computer (CMC) system. The CMC gets fault reports from the VHF system and records this information in a fault history. This shows the maintenance crew the faulty component or function.

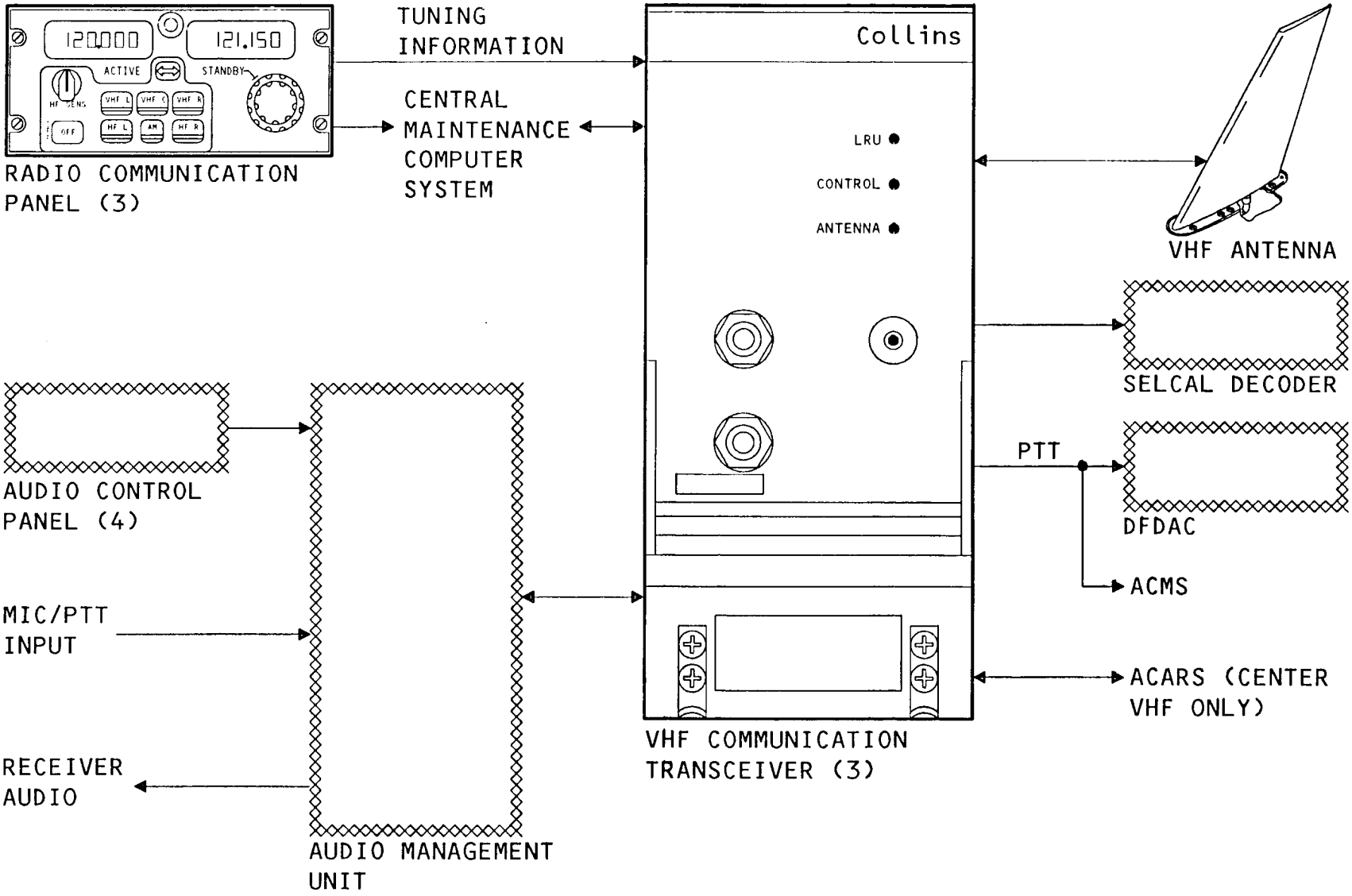


Figure 2 VHF SYSTEM

VHF SYSTEM

General

The VHF communication system uses three VHF systems. Each VHF system has:

- A VHF antenna
- A VHF communication transceiver
- Three radio communication panels (RCPs).

General Description

The VHF communication system connects with:

- The audio management unit (AMU). microphone audio and mic switch discretes go to the VHF transceiver through the AMU. Receiver audio goes from the VHF headsets through the AMU.
- The SELCAL decoder. The SELCAL decoder starts an alert when a call comes in for that airplane.
- The ACARS system. ACARS receives data from the VHF system and sends data to the VHF system.

The digital flight data aquisition card (DFDAC). The DFDAC sends the PTT to the flight recorder.

The ACMS system. ACMS records the PTT.

The central maintenance computer (CMC) system. The CMC gets fault reports from the VHF system and records this information in a fault history. This shows the maintenance crew the faulty component or function.

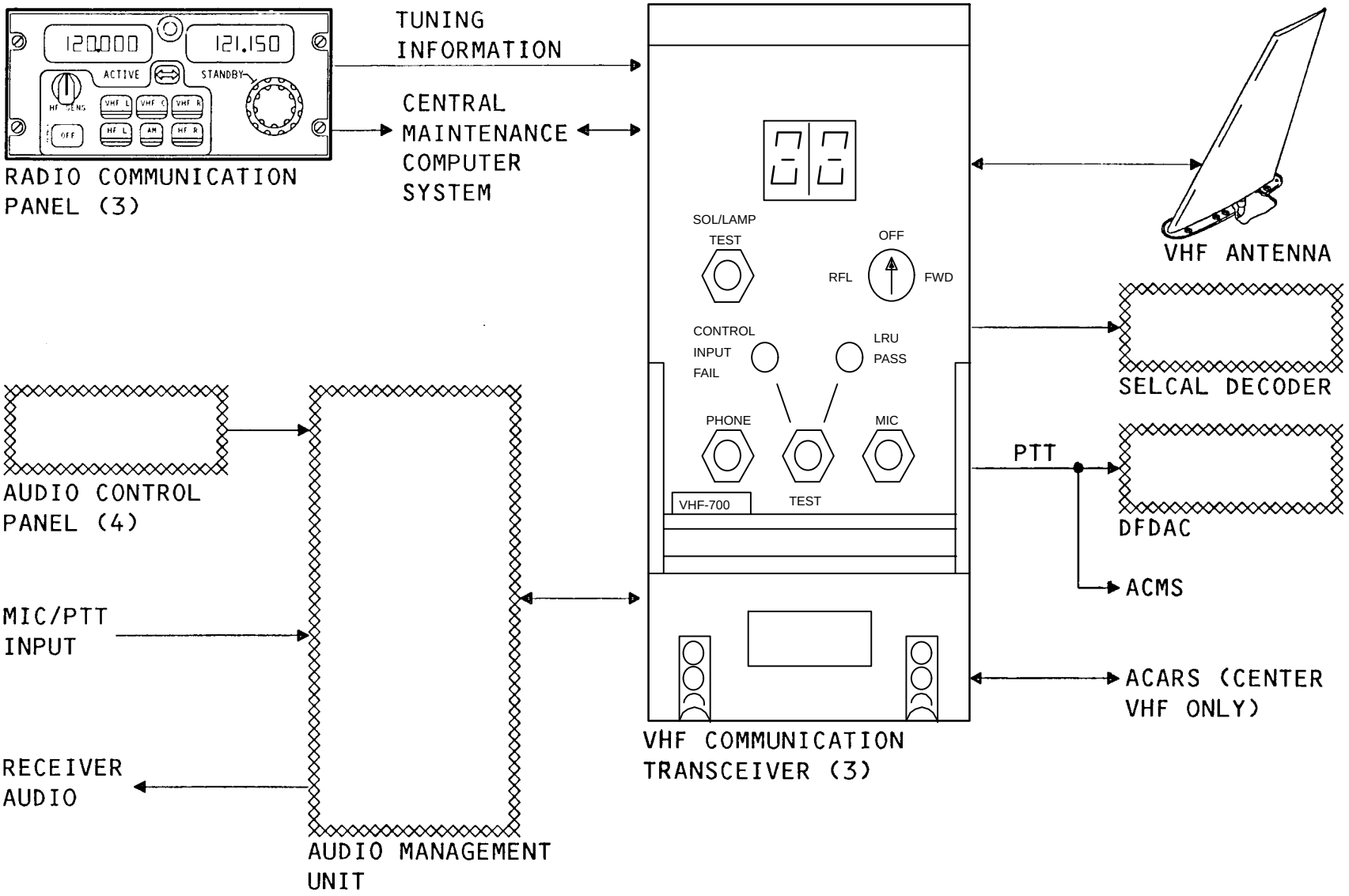


Figure 3 VHF SYSTEM

FLIGHT DECK COMPONENT LOCATIONS

VHF System Component Locations

The radio communication panels (RCP) are in the aft aisle stand panel.

The VHF circuit breakers are on the overhead circuit breaker panel P7.

Other System Component Locations

The audio control panels (ACP) are part of the flight interphone system. They have an interface with the VHF communication system.

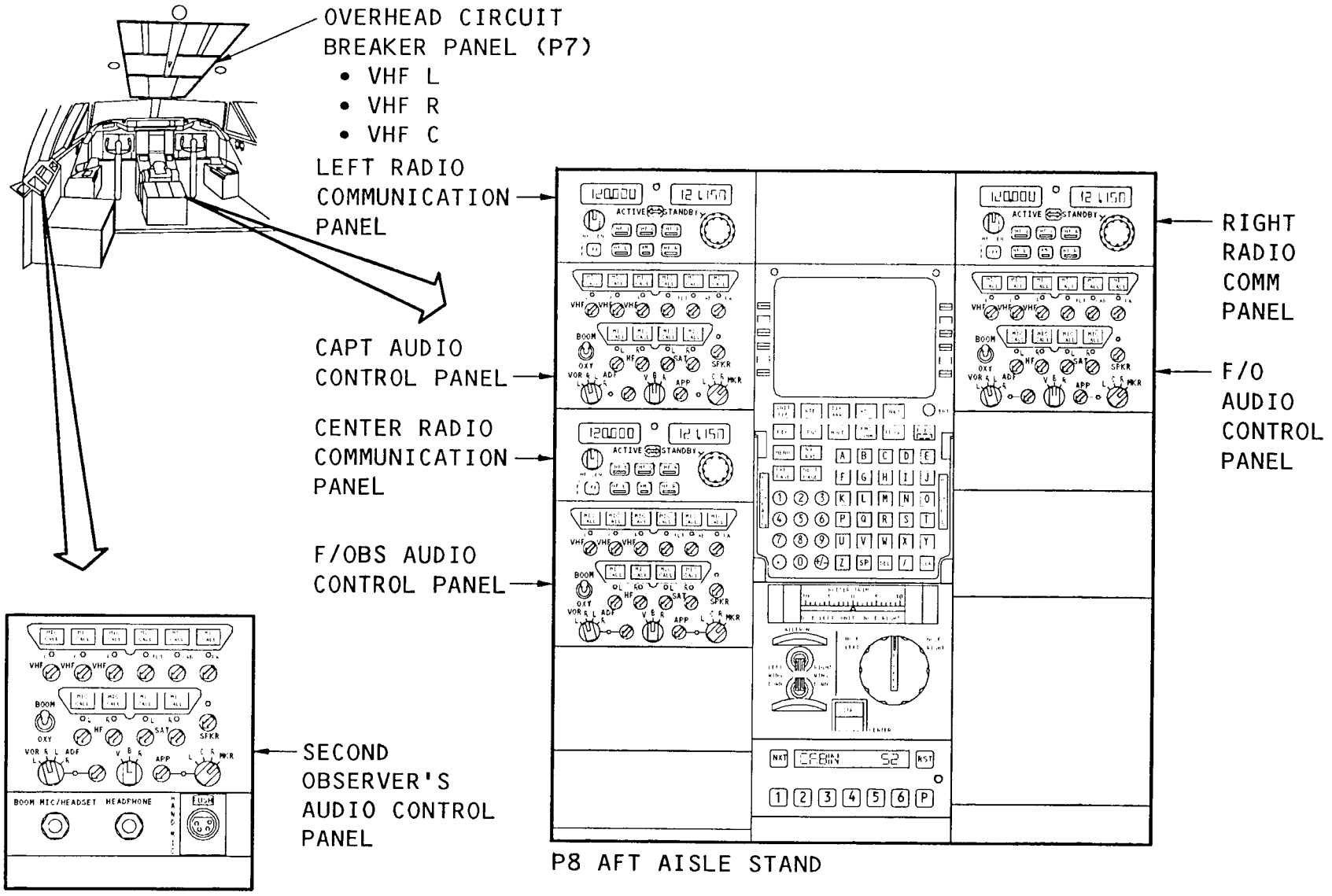


Figure 4 FLIGHT DECK COMPONENT LOCATIONS

MEC COMPONENT LOCATIONS

The VHF communication transceivers are in the main equipment center.

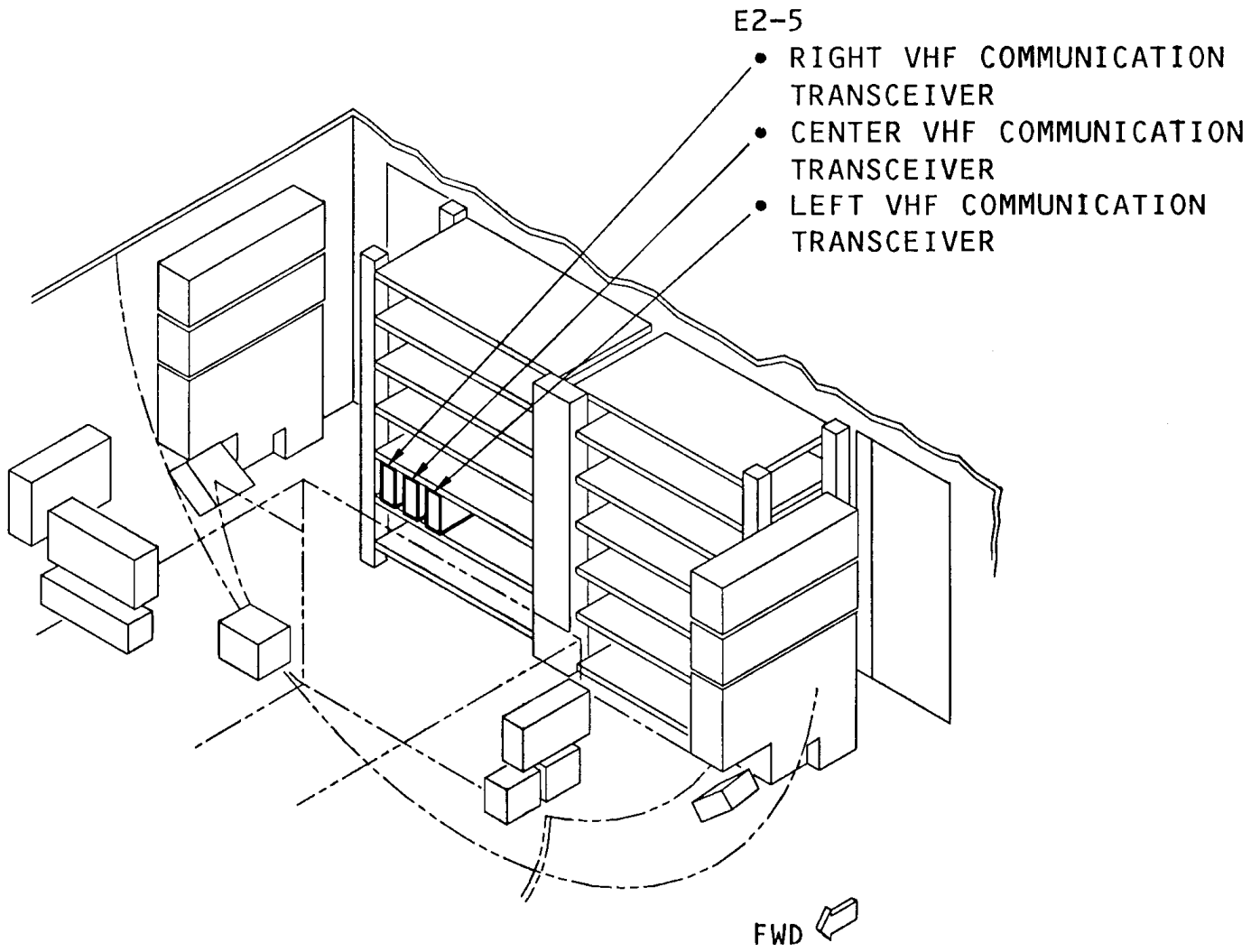


Figure 5 MEC COMPONENT LOCATIONS

EXTERNAL COMPONENT LOCATIONS

The three VHF antennas are on the upper and lower fuselage. The left antenna is on the upper fuselage. The center and right antennas are on the lower fuselage.

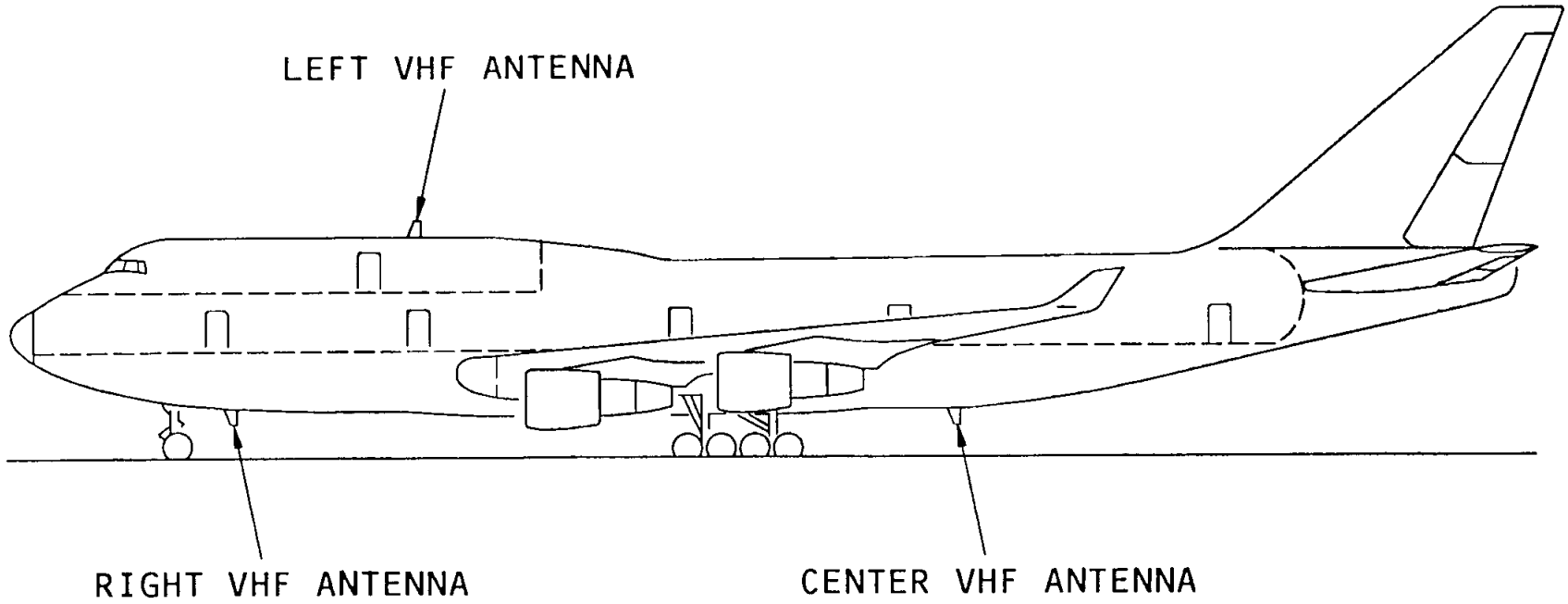


Figure 6 EXTERNAL COMPONENT LOCATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

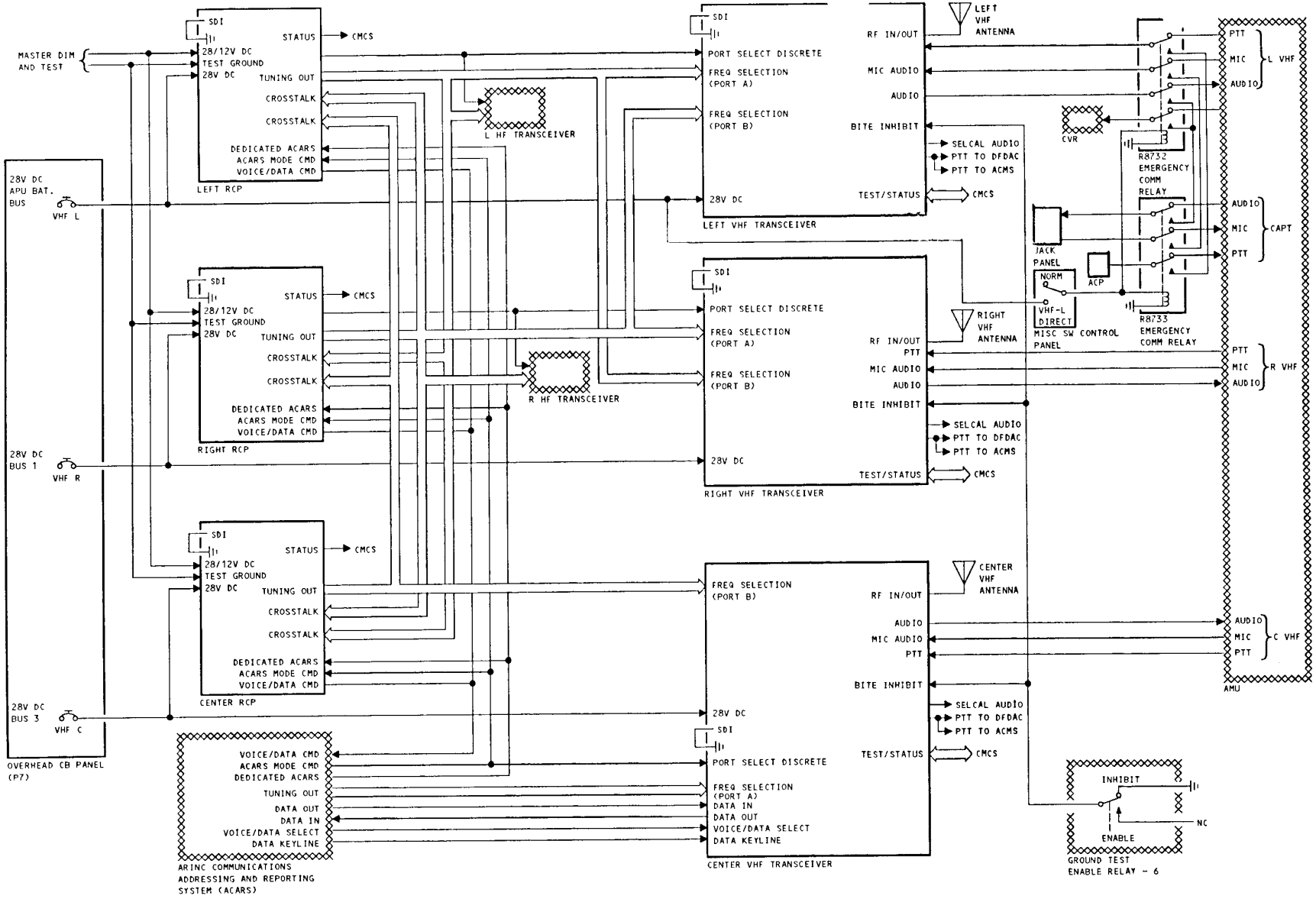


Figure 7 VHF – INTERFACE DIAGRAM

POWER INTERFACE

The APU battery bus sends 28v dc to the:

- Left VHF communication transceiver
- Left radio communication panel (RCP)
- Emergency communication relays, through the miscellaneous switch control panel.

DC bus 1 sends 28v dc to the:

- Right VHF communication transceiver
- Right RCP.

DC bus 3 sends 28v dc to the:

- Center VHF communication transceiver -Center RCP.

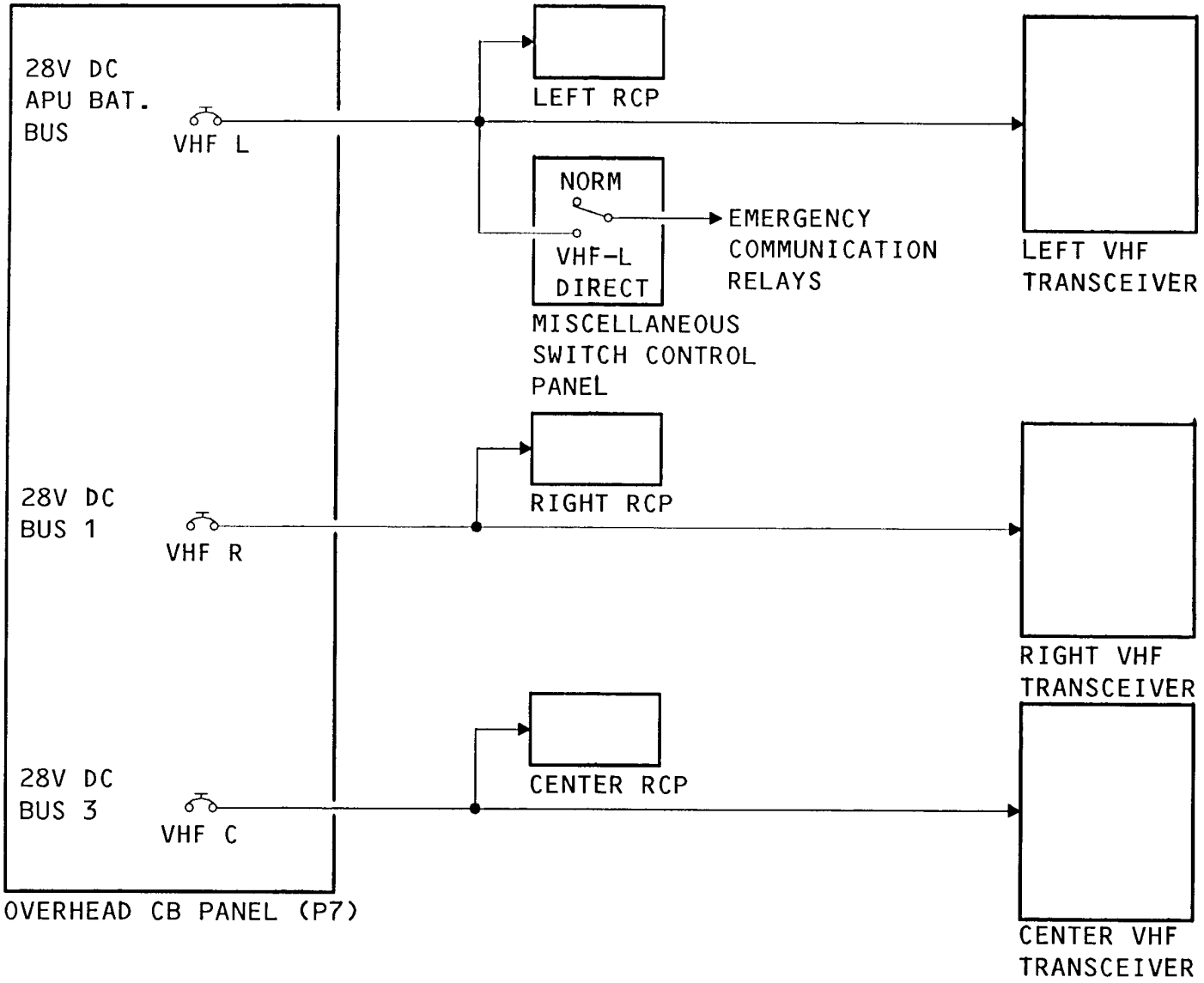


Figure 8 POWER INTERFACE

TUNING

General Description

The VHF transceivers get tuning data from three identical radio communication panels (RCPs). Any RCP can tune any communication radio.

Each RCP monitors tuning frequency information from the other RCPs. All three RCPs keep the same tuning frequency information for each of the communication radios. New tuning information from any RCP updates the tuning information in all the RCPs.

The tuning information is sent to the VHF transceivers and RCPs through an ARINC 429 bus.

Port Select Discrete

Each of the VHF transceivers has two tuning frequency input ports (port A and port B). The transceiver uses the port select discrete to determine which tuning input port is active. The normal active port is port A. Port A is used when the port select discrete input is grounded. Port B is used when the port select discrete is open.

The port select discrete for the left transceiver connects to the left RCP.

The port select discrete for the right transceiver connects to the right RCP.

The port select discrete for the center transceiver connects to ACARS.

When ACARS is in use, it outputs a ground port select discrete and tunes the center VHF transceiver. The RCPs use the ACARS port select output to know when ACARS is in control of the center VHF transceiver.

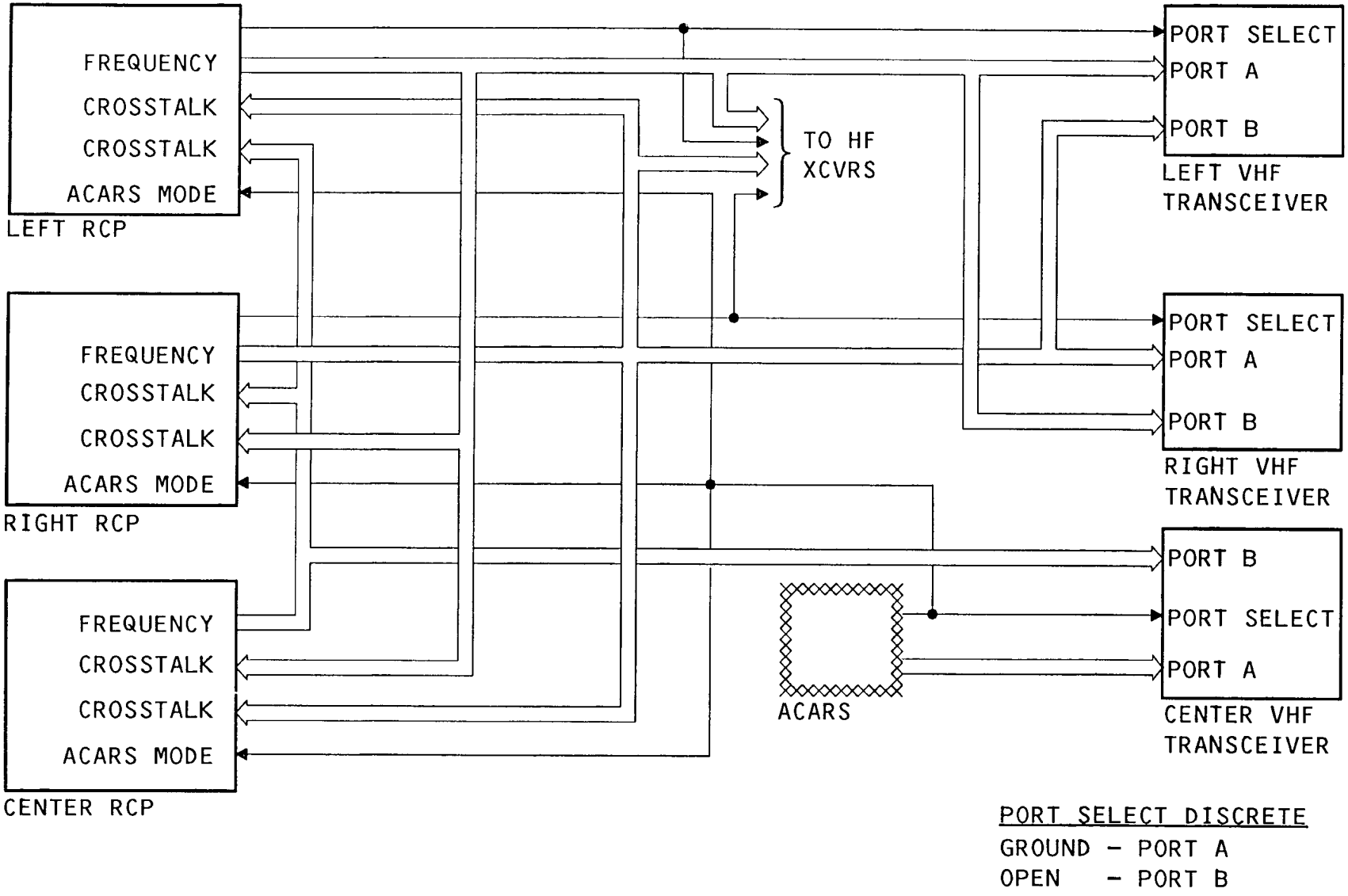


Figure 9 TUNING

RECEIVE/TRANSMIT

General Description

The radio communication panels (RCPs) control the frequency selection of the transceivers.

The audio control panels (ACPs) control:

- Transmit selection
- Receive selection
- Volume.

Signal Flow

During transmission, mic audio and PTT signals go through the AMU to the transceivers. The transceiver changes the mic audio to a rf signal and sends it to the antenna. The antenna radiates the rf signal. Audio sidetone is sent to the AMU from the transceiver as receiver audio. The sidetone is used to monitor transmission.

During reception, the antenna receives rf signals and sends them to the transceiver. The rf signal is changed in the transceiver to an audio signal and sent to the AMU. The AMU sends the audio to the crew stations.

System Interfaces

The SELCAL decoder monitors all the VHF transceivers. It alerts the flight crew when the correct SELCAL code is received.

ACARS uses the center VHF transceiver for voice and data two-way communication.

A transceiver PTT is sent to the:

- Digital flight data acquisition card (DFDAC) so the flight recorder can record the PTT
- Airplane condition monitoring system (ACMS).

Emergency Communications Relays

The emergency communication relays connect the captains audio and PTT to the left VHF transceiver, when the CPT audio system switch is in the VHF-L DIRECT position.

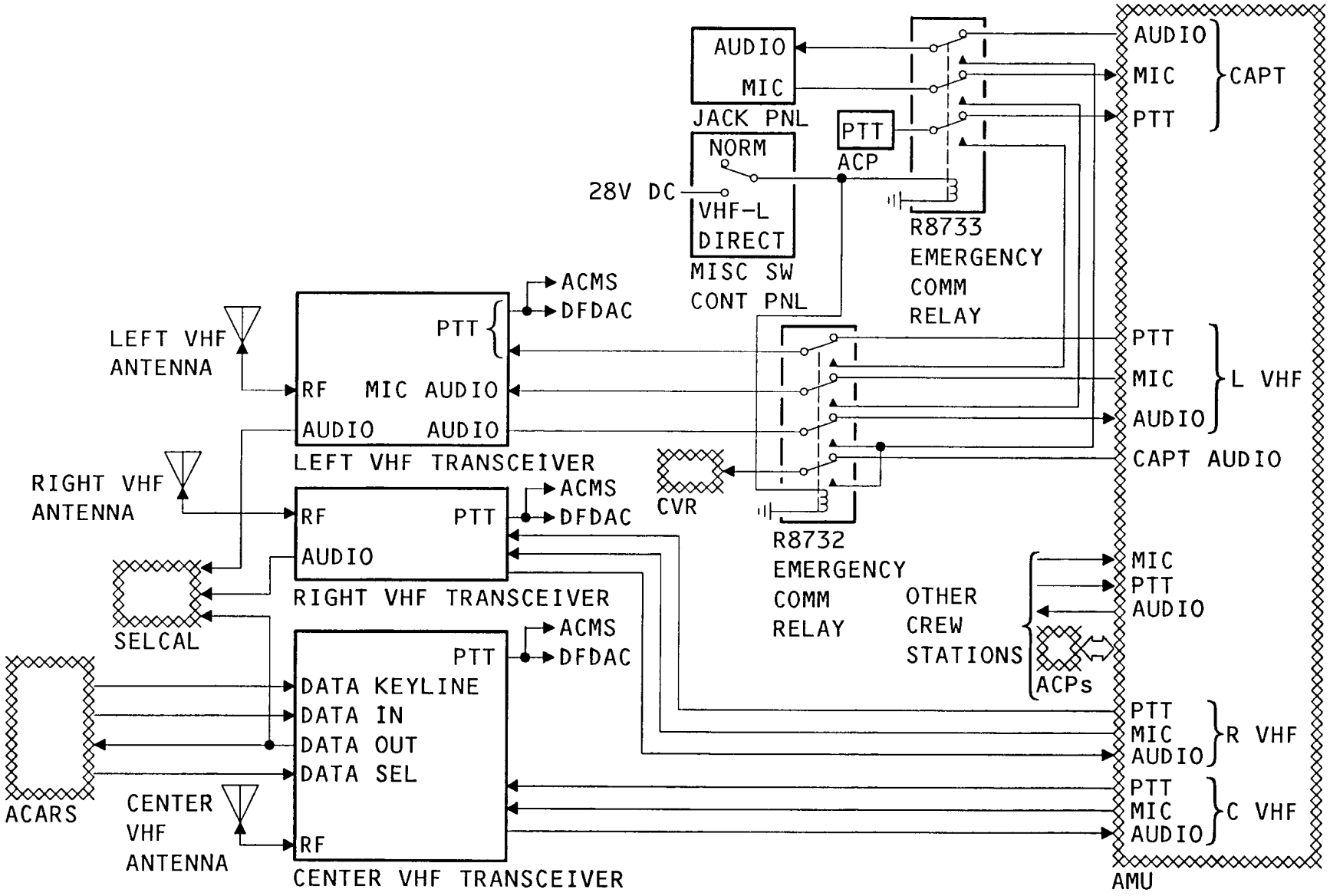


Figure 10 RECEIVE/TRANSMIT

CMC INTERFACES

The radio communication panels (RCP) send a discrete to the central maintenance computers (CMC). The CMCs monitor the discrete to determine if an internal failure exists.

The VHF transceivers send continuous maintenance data to the CMCs.

The left CMC sends test commands to the VHF transceivers through ARINC 429 buses. If the left CMC fails, the right CMC sends test commands to the VHF transceivers through internal switching in the left CMC. The left, right and center VHF transceivers send ground test data to both CMCs over an ARINC 429 bus.

Three control display units (CDUs) are used for control of the CMCs.

The ground test enable relay number 6 inhibits a ground test.

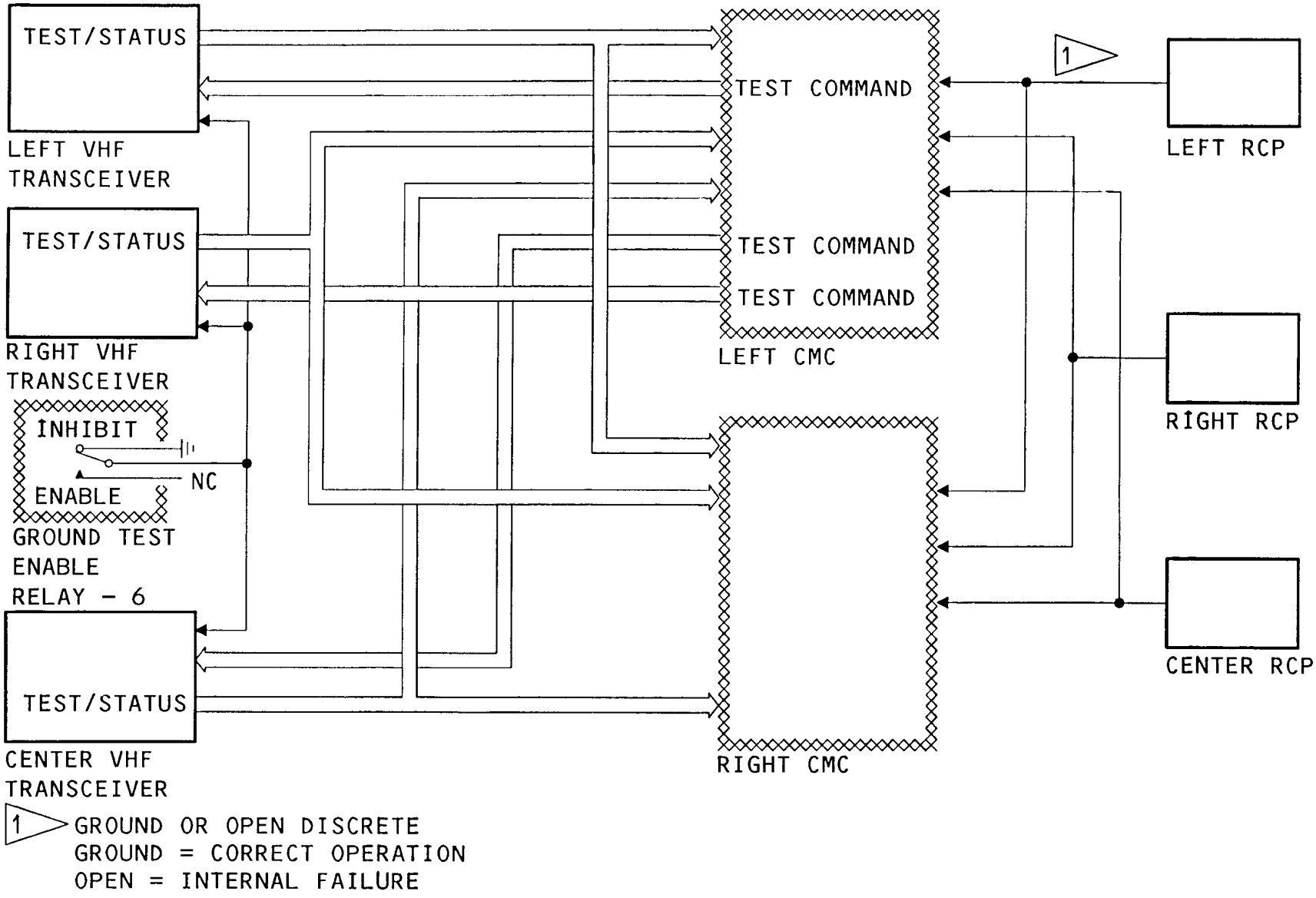


Figure 11 CMC INTERFACES

VHF COMMUNICATION TRANSCEIVER

Purpose

The VHF communication transceiver changes RF signals to audio signals during receive and changes audio signals to RF signals during transmit.

General Description

The transceiver has:

- 8.33 KHz frequency spacing
- 118 MHz to 136.975 MHz frequency range
- 25 watts minimum output power.

Controls and Indications,

The LED indicators show the status of the VHF system after you do a self-test from the front panel. The front panel LED indicators are:

- LRU, shows a failure of the transceiver
- CONTROL, shows a failure of the ARINC 429 input
- ANTENNA, shows a failure of the antenna.

The TEST switch starts a system self test.

CAUTION: STATIC SENSITIVE. DO NOT HANDLE BEFORE READING PROCEDURE FOR HANDLING ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (REF 20-41-01/201). CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

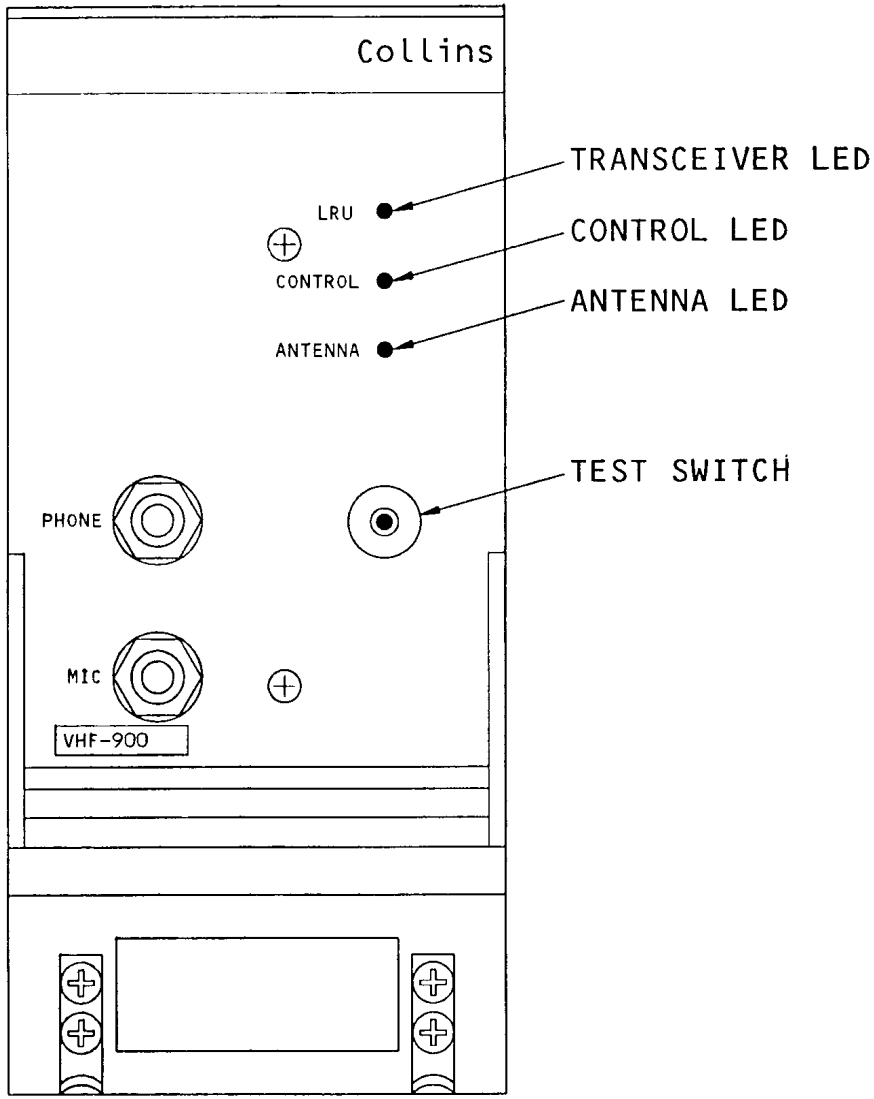


Figure 12 VHF COMMUNICATION TRANSCEIVER

VHF COMMUNICATION TRANSCEIVER

General Description

The VHF transceiver detects audio or data from the rf input during transmission. It modulates the carrier with voice audio or data during transmission.

Characteristics

Some of the characteristics of the transceiver are:

- Microprocessor controlled
- 8.33 KHz frequency spacing
- 118 MHz to 136.975 MHz frequency range
- 25 watts minimum output power.

Controls and Indications

Push and hold the SQL/LAMP TEST switch to:

- Disable the squelch
- Turn on the CONTROL INPUT FAIL LED
- Turn on the LRU PASS LED

The RFL/OFF/FWD selector is a spring-loaded, return-to-center rotary switch. It selects forward or reflected power. The power is shown in watts on the POWER/VSWR indicator.

The POWER/VWSR indicator is a two-digit LED display.

Push and release the TEST switch to start the:

- Microprocessor LRU self-test
- Input serial word test
- Antenna VWSR test

During the test the transceiver:

- Turns on the res CONTROL INPUT FAIL LED for three seconds, if the tuning data is not valid.
- Turns on the green LRU PASS LED for three seconds, if the transceiver completes the test with no failures.
- shows VWSR the POWER/VWSR indicator.

PHONE and MIC jacks give connection points for headphone and handmic respectively.

CAUTION: STATIC SENSITIVE. DO NOT HANDLE BEFORE READING PROCEDURE FOR HANDLING ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (REF 20-41-01/201). CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

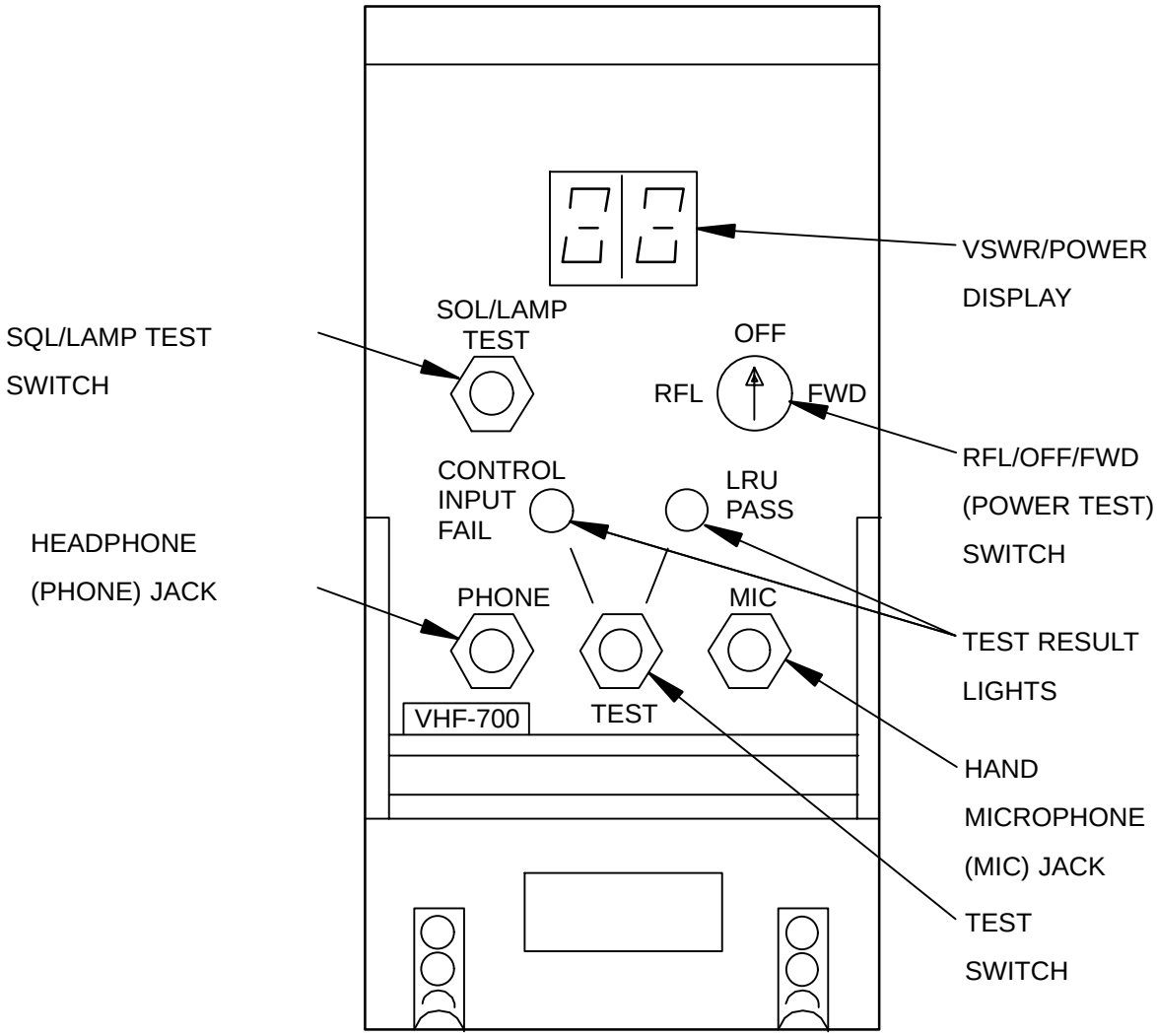


Figure 13 VHF COM TRANSCEIVER (Collins VHF-700)

ANTENNA

General Description

The VHF antenna radiates and receives rf signals in the VHF frequency range.

The antenna attaches with 10 screws. There is an aerodynamic smoother around the antenna base. An O-ring provides sealing for the coaxial connector.

Maintenance Practice

For a bottom antenna installation, apply two strips of one inch wide plastic visibility tape.

CAUTION: DO NOT USE METALLIC TAPE. A HIGH VSWR WILL RESULT CAUSING TRANSCEIVER DAMAGE.

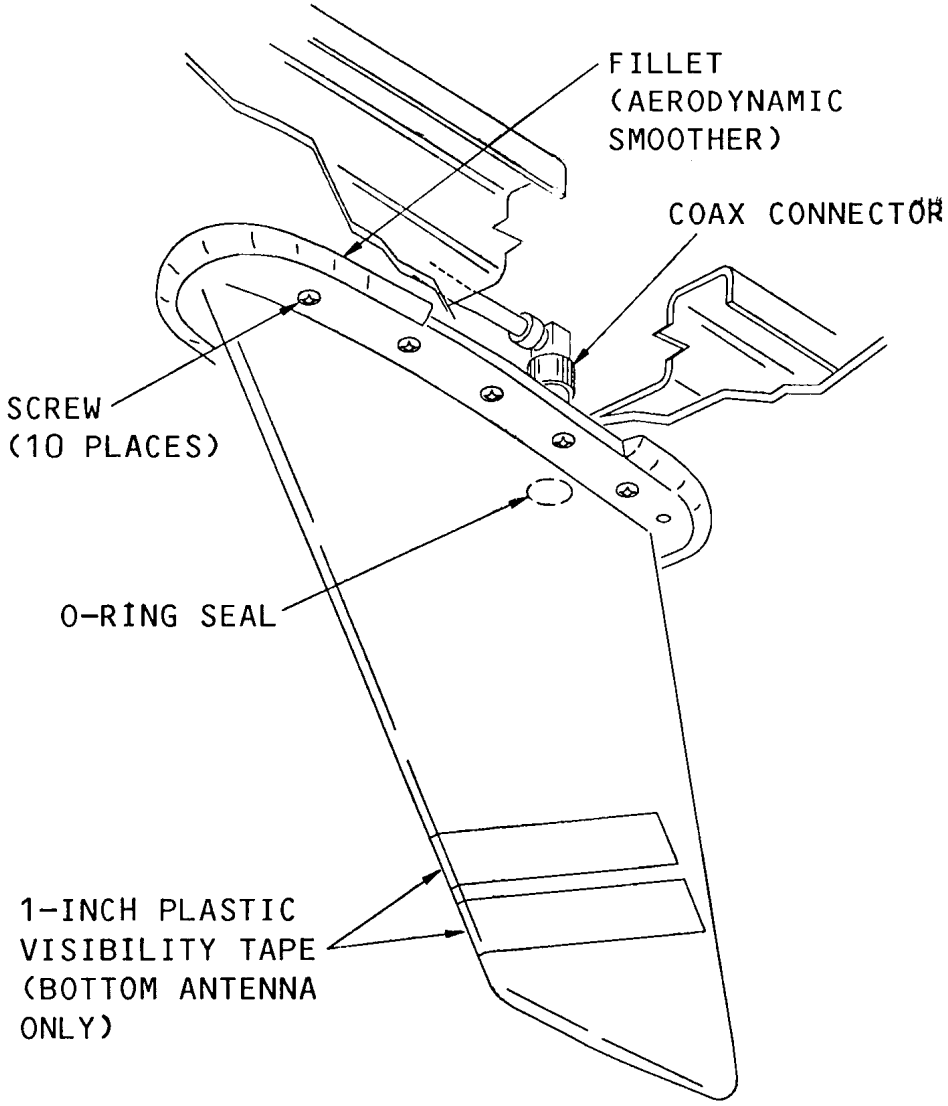


Figure 14 VHF ANTENNA

RADIO COMMUNICATION PANEL

Purpose

The radio communication panel (RCP) selects the modes of operation, and selects the active and standby frequencies for each communication radio. Each RCP sends tuning and mode information to the:

- Communication radios
- Other two RCPs

Each RCP sends a status discrete to the central maintenance computer system (CMCS).

Description

Each RCP has these features:

- Active and standby frequency windows
- Frequency transfer switch
- Offside control light
- Frequency selectors
- Radio switches
- AM switch
- RCP off (OFF) switch
- HF sensitivity (HF SENS) control.

Program pins define the RCP position.

Operation

When the RCP is off, the white OFF light comes on. Push the RCP OFF switch to turn the RCP on. When RCP is on, the white OFF light goes off.

The RCP at power up initializes in the VHF mode and:

- The on-side VHF selector switch comes on
- Sends the last stored on-side active and standby frequencies to the other two RCPs
- Monitors the active and standby frequency information from the other RCPs. This information is used to update the off-side memory of the RCPs microprocessor. The last selection of standby and active frequencies for the off-side radios are stored previous to shutdown. If no off-side frequency update information is received upon power-up, the stored off-side active and standby frequencies are used.

The active frequency window shows the current frequency of the selected radio. The standby frequency window shows the frequency that the flight crew selects with the frequency selectors.

The flight crew sets the standby frequency with the frequency selectors. The first digit is always 1. The outer knob adjusts the second two digits (10 MHz and 1 MHz) in 1 MHz steps. The inner knob adjusts the fourth, fifth and sixth digits (100 KHz, and 10 KHz, and 1 KHz) in 25 KHz steps.

The frequency transfer switch causes the active and standby frequencies to change windows. The active frequency goes to the standby window and the standby frequency goes to the active frequency window.

You use the radio switches to select a radio. You select only one radio at a time. The white light in the selected radio switch comes on.

When the flight crew selects an off-side radio, two offside control

lights come on. One light is on the RCP that the flight crew uses to make the selection. The other light is on the onside RCP of the selected radio.

For the center VHF when ACARS is used:

- The active frequency display shows the word ACARS.
- The standby frequency display shows the last active frequency.

For the center VHF when ACARS is not used:

- The active frequency display shows the active frequency.
- The standby frequency display shows the word ACARS.
- The RCP returns to voice operation.

Program pins in the RCP connector define the RCP position.

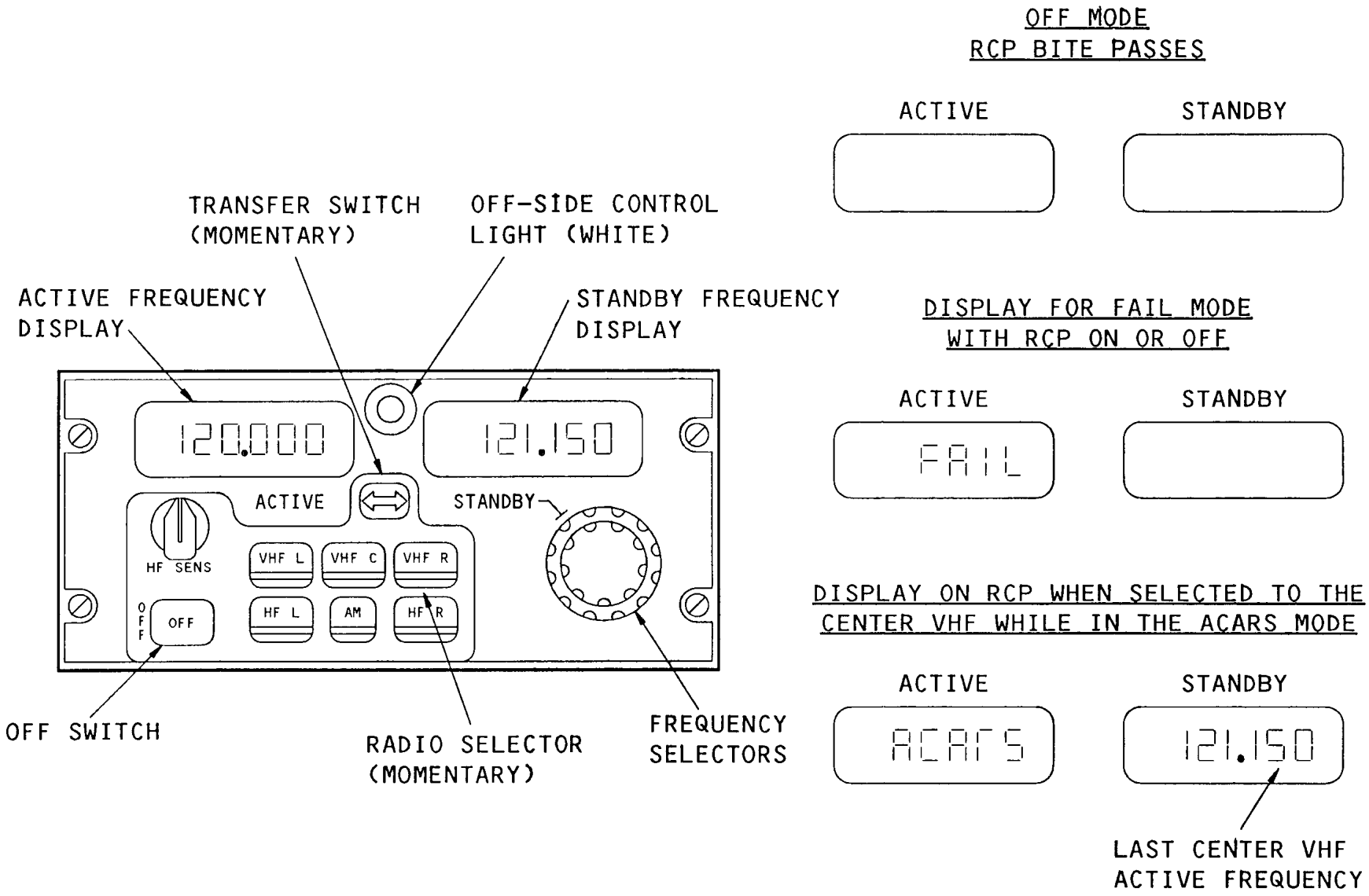


Figure 15 RADIO COMMUNICATION PANEL (Boeing panel)

RADIO COMMUNICATION PANEL

Purpose

The radio communication panel (RCP) selects the modes of operation, and selects the active and standby frequencies for each communication radio. Each RCP sends tuning and mode information to the:

- Communication radios
- Other two RCPs

Each RCP sends a status discrete to the central maintenance computer system (CMCS).

Description

Each RCP has these features:

- Active and standby frequency windows
- Frequency transfer switch
- Offside control light
- Frequency selectors
- Radio switches
- AM switch
- RCP off (OFF) switch
- HF sensitivity (HF SENS) control.

Program pins define the RCP position.

Operation

When the RCP is off, the white OFF light comes on. Push the RCP OFF switch to turn the RCP on. When RCP is on, the white OFF light goes off.

The RCP at power up initializes in the VHF mode and:

- The on-side VHF selector switch comes on
- Sends the last stored on-side active and standby frequencies to the other two RCPs
- Monitors the active and standby frequency information from the other RCPs. This information is used to update the off-side memory of the RCPs microprocessor. The last selection of standby and active frequencies for the off-side radios are stored previous to shutdown. If no off-side frequency update information is received upon power-up, the stored off-side active and standby frequencies are used.

The active frequency window shows the current frequency of the selected radio. The standby frequency window shows the frequency that the flight crew selects with the frequency selectors.

The flight crew sets the standby frequency with the frequency selectors. The first digit is always 1. The outer knob adjusts the second two digits (10 MHz and 1 MHz) in 1 MHz steps. The inner knob adjusts the fourth, fifth and sixth digits (100 KHz, and 10 KHz, and 1 KHz) in 25 KHz steps.

The frequency transfer switch causes the active and standby frequencies to change windows. The active frequency goes to the standby window and the standby frequency goes to the active frequency window.

You use the radio switches to select a radio. You select only one radio at a time. The white light in the selected radio switch comes on.

When the flight crew selects an off-side radio, two offside control

lights come on. One light is on the RCP that the flight crew uses to make the selection. The other light is on the onside RCP of the selected radio.

For the center VHF when ACARS is used:

- The active frequency display shows the word ACARS.
- The standby frequency display shows the last active frequency.

For the center VHF when ACARS is not used:

- The active frequency display shows the active frequency.
- The standby frequency display shows the word ACARS.
- The RCP returns to voice operation.

Program pins in the RCP connector define the RCP position.

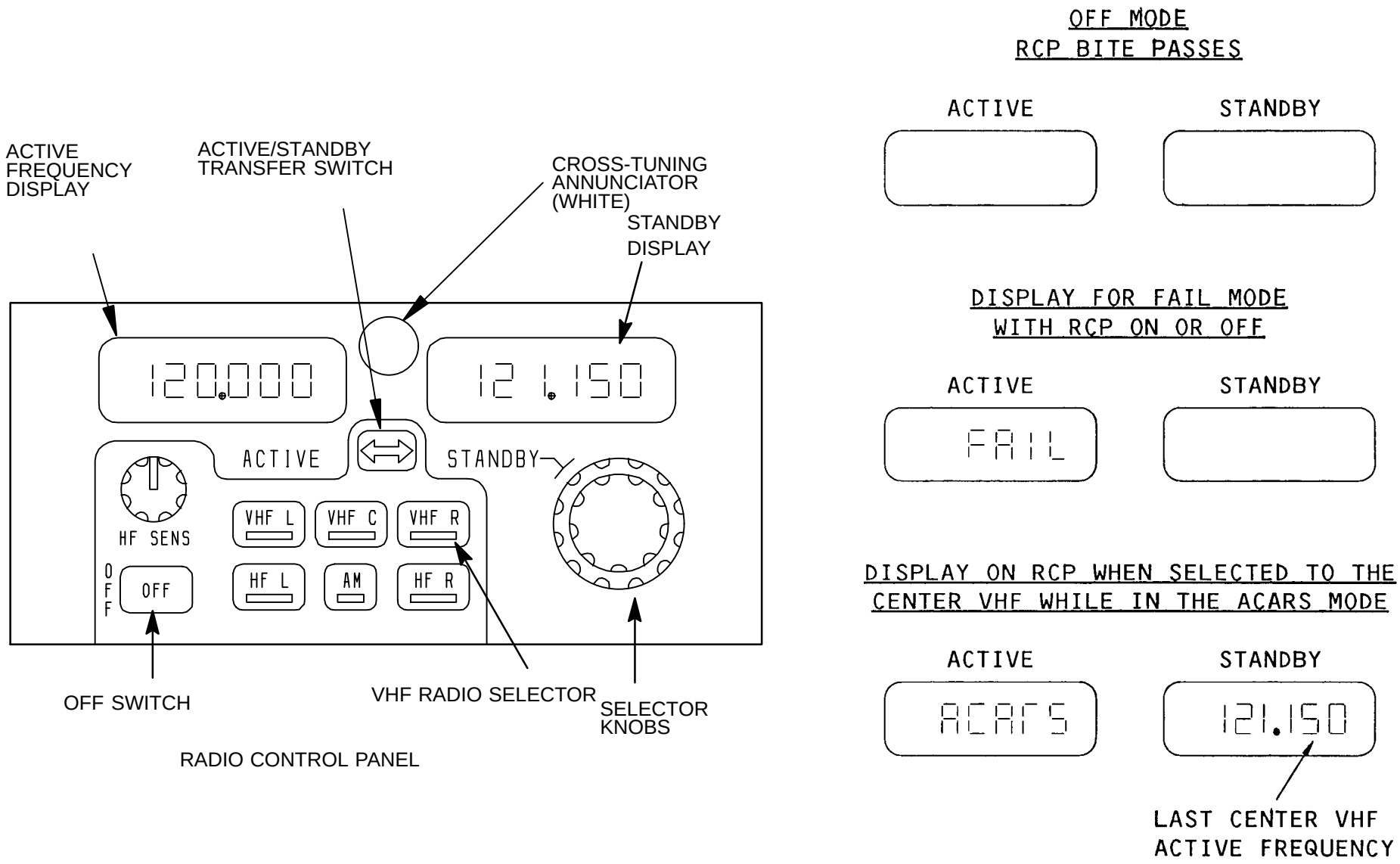


Figure 16 RADIO COMMUNICATION PANEL (Gabels panel)

SYSTEM - AUDIO CONTROL PANEL

General Description

The audio control panel (ACP) supplies transmitter selection, receiver selection, and volume control for the left, center, or right VHF communication transceiver. The VHF controls are on the upper half of the ACP.

Control and Indications

Push a VHF receiver volume control to listen to a VHF receiver. Rotate the receiver volume control for volume control. The receiver light above the control shows green with the receiver control on.

Push a transmitter select switch to select a transceiver for transmission. The mic light shows white for the selected system. Push the mic/interphone switch to connect the microphone to the transceiver and key the transceiver.

The cockpit speaker control adjusts the volume of the speaker.

The BOOM/OXY switch is a two position switch used to select the boom mic or the oxygen mask mic. When selected to BOOM, the boom mic is connected to the selected transceiver. When the BOOM/OXY switch is selected to OXY, the oxygen mask mic is connected to the selected transceiver.

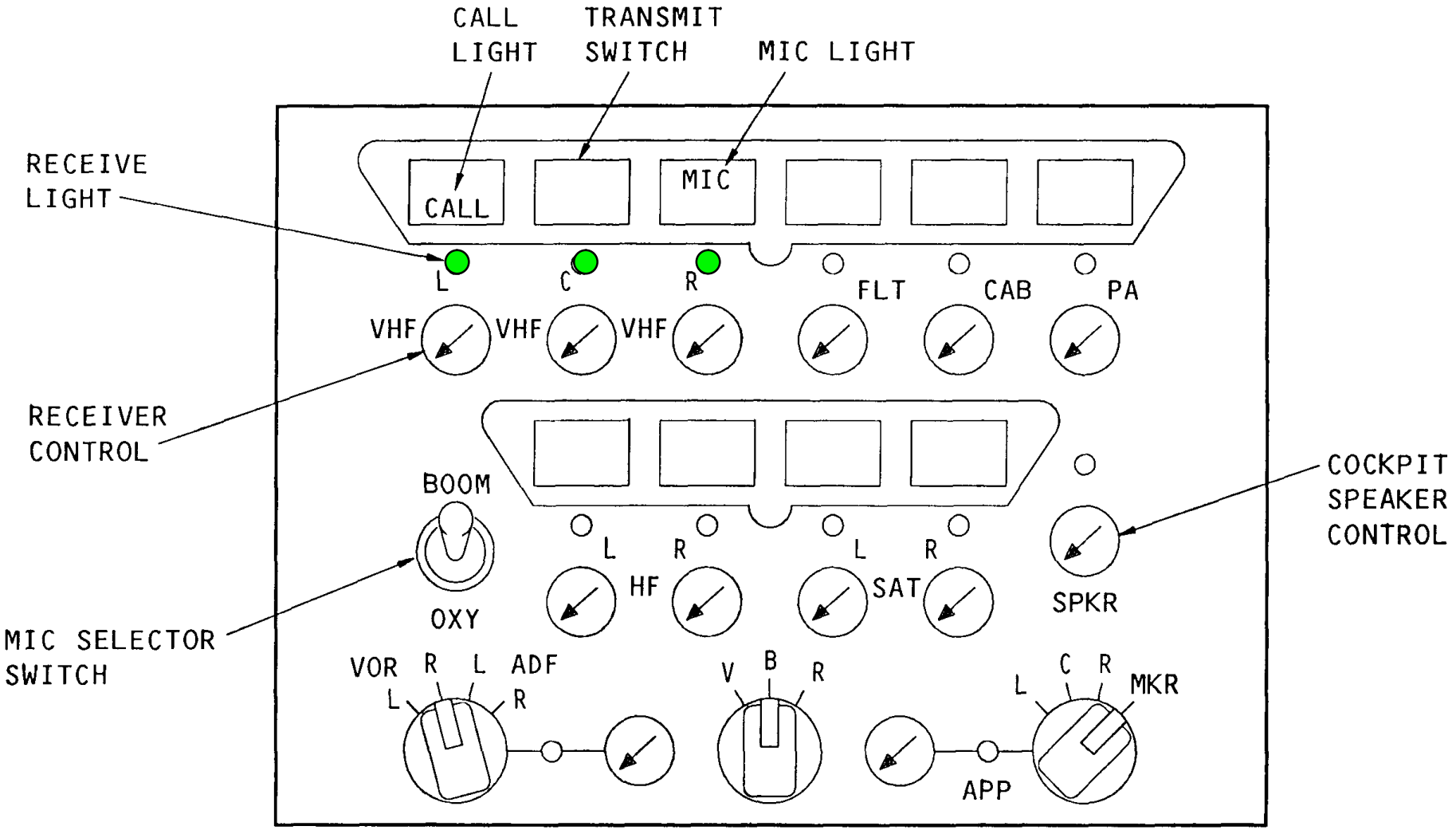


Figure 17 AUDIO CONTROL PANEL

THIS PAGE INTENTIONALLY LEFT BLANK

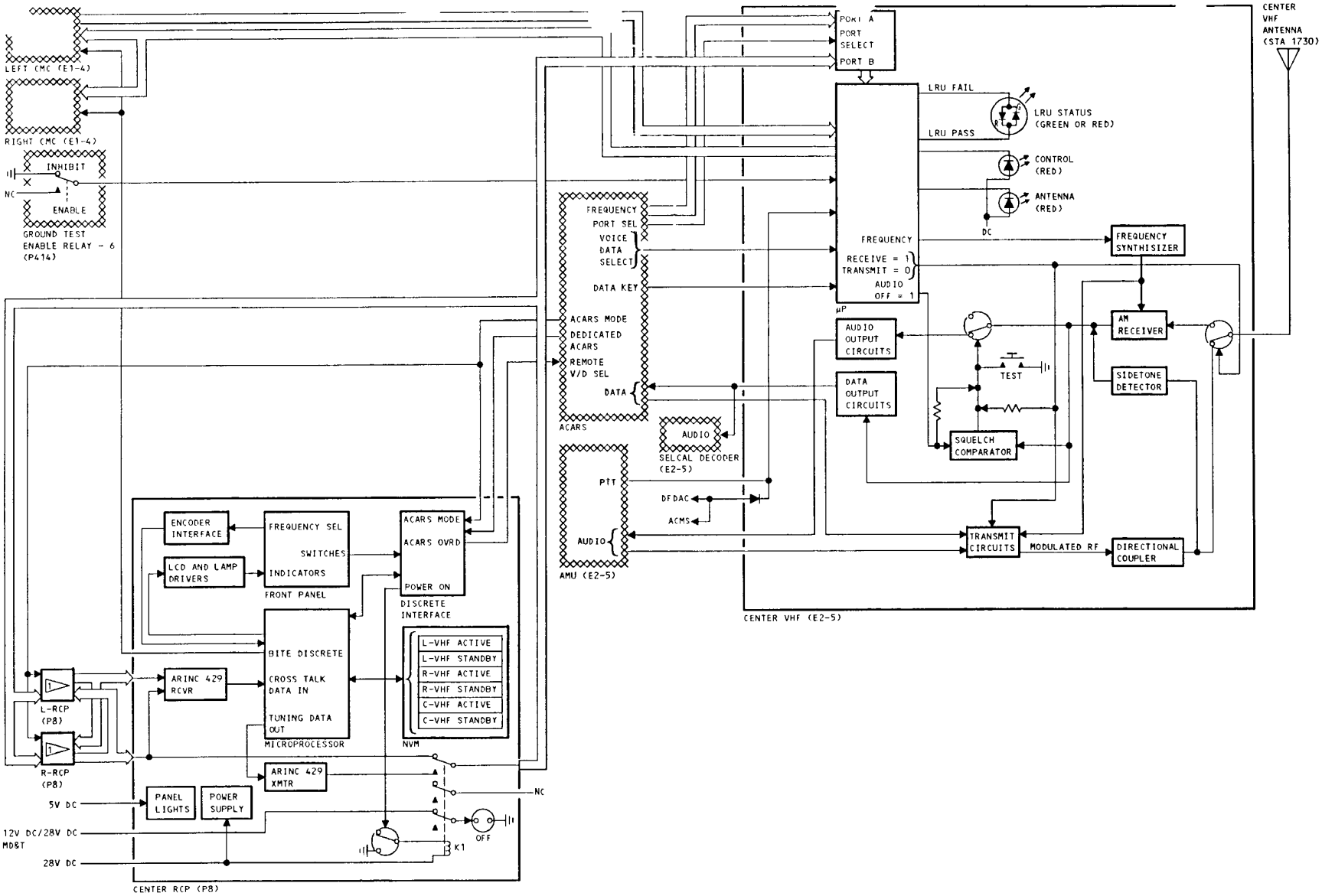


Figure 18 VHF - SCHEMATIC DIAGRAM

TUNING FUNCTIONAL DESCRIPTION

General Description

The radio communication panel (RCP) gets 5v ac and 28/12v dc from the master dim and test circuitry (MD&T) for panel lighting. The RCP front panel indications come on when the master dim and test circuitry sends a grounded test discrete to the RCP.

Radio Communication Panel

The RCP power supply uses 28v dc. It has a microprocessor which controls its operation.

The discrete interface changes the inputs from the front panel switches to digital data and sends the data to the microprocessor.

The port select discrete from ACARS is monitored by all three RCPs through the discrete interface.

The encoder interface changes the inputs from the frequency selector switches to digital data and sends the data to the microprocessor.

The microprocessor sends display data to the LCD and lamp drivers. They control the LCD frequency indicators and the indicator lights.

The nonvolatile memory (NVM) stores all tuning data when the RCP is off.

The ARINC 429 receivers get ARINC 429 data from the other RCPs and send it to the microprocessor. The microprocessor monitors for any changes made to the tuning data from the other RCPs. If any changes are detected, the microprocessor updates its output to match the new data.

When the center RCP is on, relay K1 energizes. This causes:

- The OFF light to go off
- The center RCP ARINC 429 transmitter to supply the tuning data to the center VHF transceiver when ACARS is not used
- A ground on the port select discrete. The port select discrete from the center RCP is not connected.

The tuning data from the left RCP also goes to the right and center RCPs.

If the center RCP is switched off, relay K1 is de-energized. This causes:

- The port select discrete to open
- The OFF light to show white
- The input from the right RCP to go through K1 to the center VHF transceiver.

The switching capability allows any one RCP to provide tuning data to any VHF transceiver if one or two RCPs are switched off.

Two discrete outputs from the RCP are:

- Emergency frequency discrete to AMU -BITE discrete to CMC.

When a VHF transceiver is tuned to the emergency frequency of 121.5 MHz, the onside RCP sends a ground to the AMU. This causes the AMU to make the audio come on for that transceiver at all the crew stations.

The RCP sends a BITE discrete output to the central maintenance computers (CMCs). An open discrete causes a RCP fault message in the CMC. This discrete opens if:

- The internal BITE circuit finds a failure.
- The RCP is in the off mode.

VHF Transceiver

If the port select discrete is open, the microprocessor in the transceiver uses data from port B. It then tunes the frequency synthesizer to the correct transmit or receive frequency.

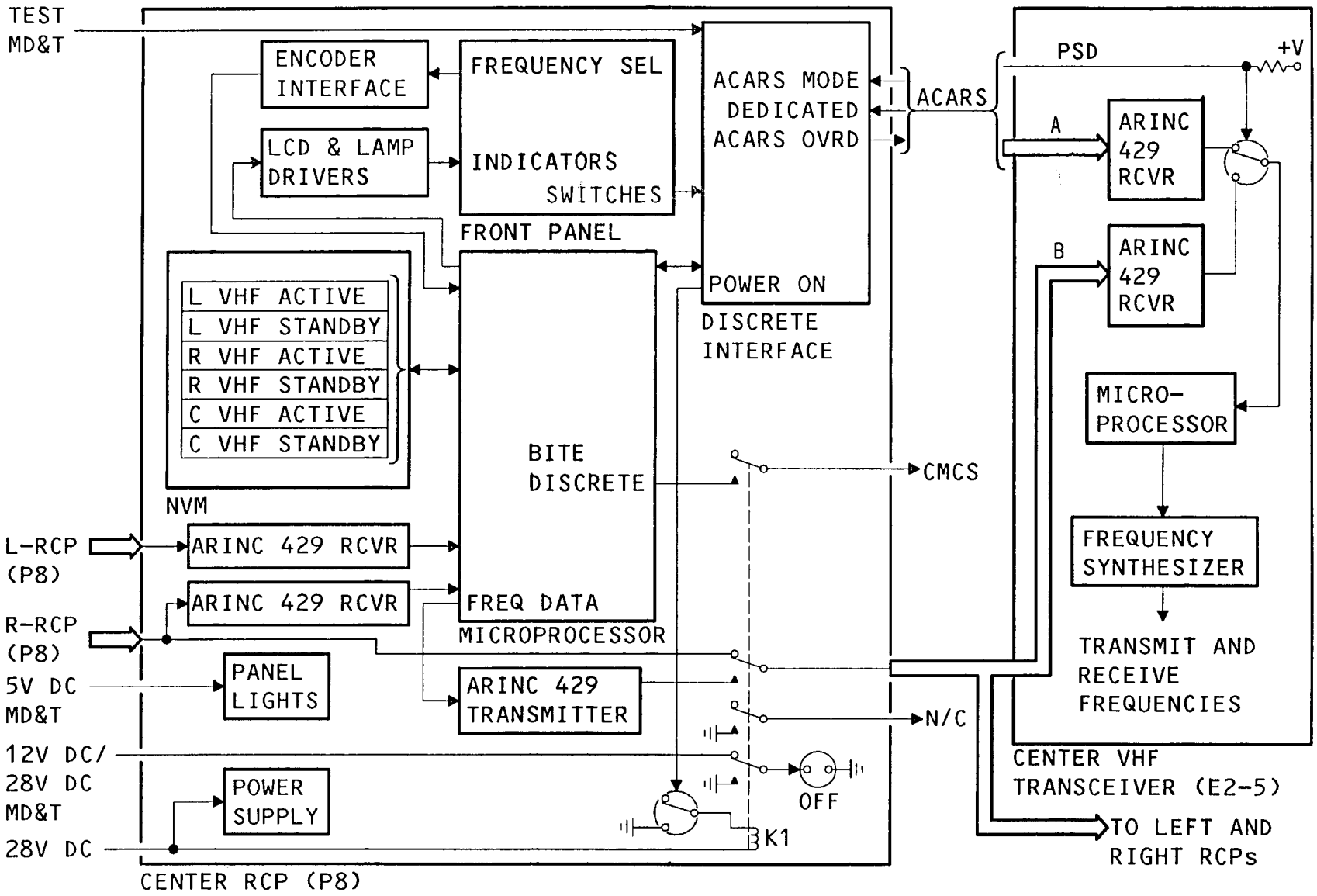


Figure 19 TUNING FUNCTIONAL DESCRIPTION

TUNING - NORMAL

Normal Tuning

Normal tuning conditions are when all radio communication panels (RCPs) are on and operational.

With normal tuning conditions:

- The left RCP sends a grounded port select discrete and tuning data to the left VHF communication transceiver.
- The right RCP sends a grounded port select discrete and tuning data to the right VHF communication transceiver.
- ACARS sends a grounded port select discrete and tuning data to the center VHF communication transceiver.
- All RCPs to send tuning data on the cross-talk busses to the other RCPs.

The cross-talk inputs from the RCPs go through the ARINC 429 receivers to the microprocessor in each RCP. The microprocessor monitors for any changes made to the tuning data. If a change is received, the microprocessor updates its memory and output to match the new data.

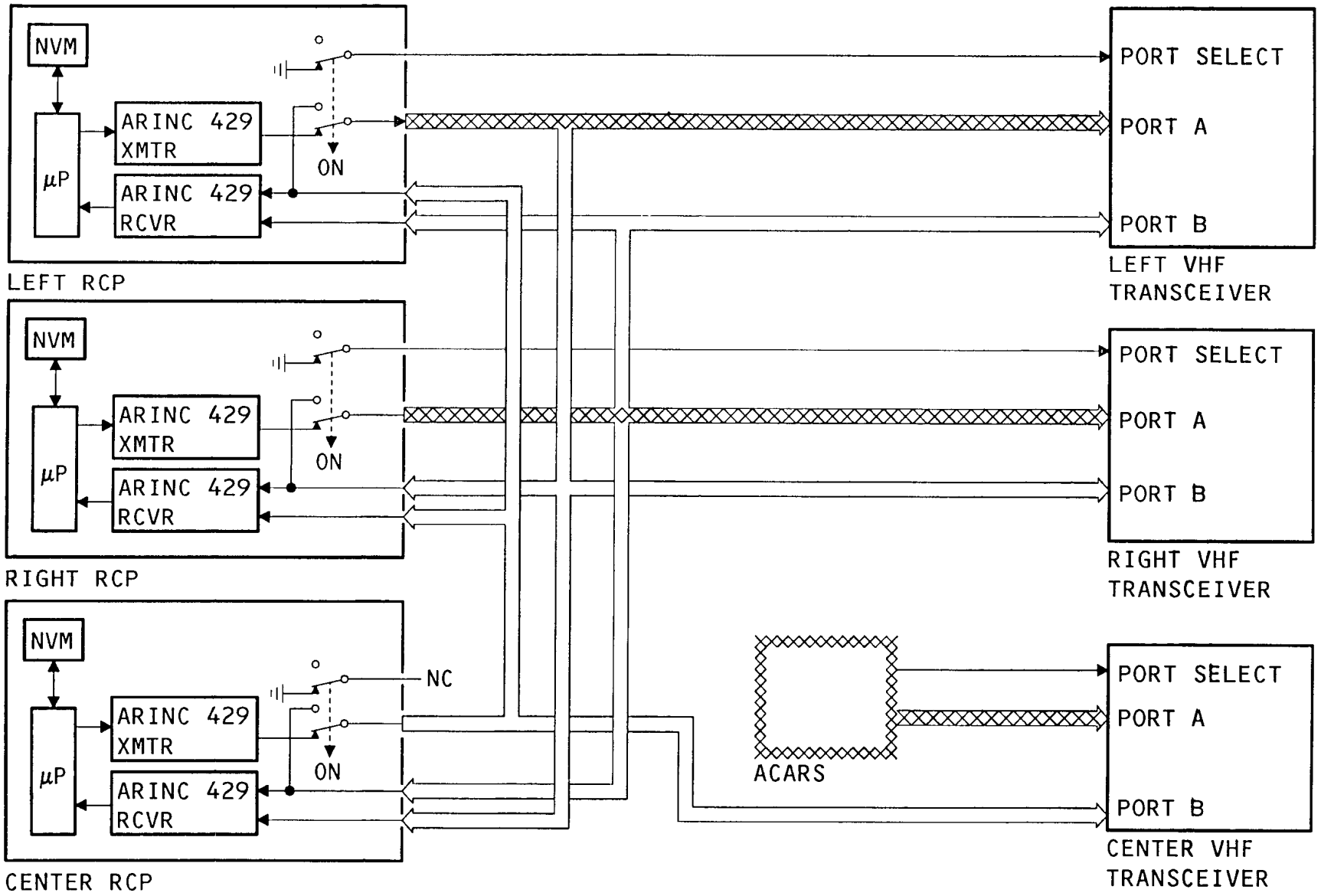


Figure 20 TUNING - NORMAL

TUNING - LEFT RCP OFF

A radio communication panel (RCP) is turned off with the OFF switch because its internal BITE circuit has found a failure. A defective RCP shows FAIL on the active frequency indicator even after it is turned off, if the display circuits work. The circuit breaker that supplies power to the RCP also supplies power to its onside VHF transceiver. Thus, a failed RCP should be turned off with the OFF switch.

When the left RCP indicator shows FAIL, push the switch off. When the left RCP is off:

- The left RCP OFF switch shows white.
- The left RCP active frequency indicator continues to show FAIL.
- The port select discrete to the left VHF transceiver goes to an open condition.
- The right RCP sends tuning data to the left and right transceiver.
- The left transceiver uses the tuning data received through Port B.

A relay in the left RCP connects its input from the center RCP to its output.

The microprocessors in the right and center RCPs monitor for any changes made to the tuning data. Thus, either RCP can tune any of the transceivers.

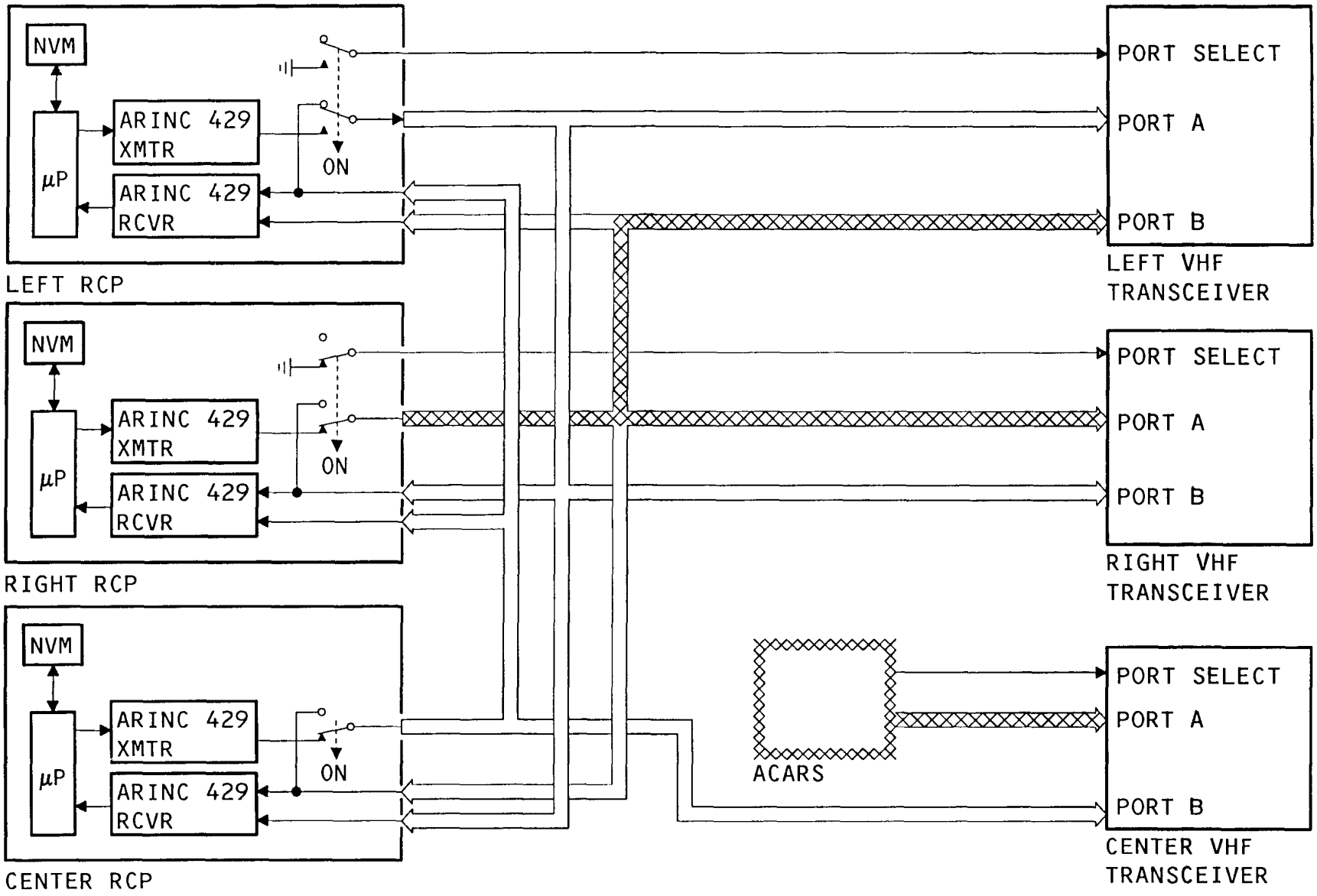


Figure 21 TUNING - LEFT RCP OFF

TUNING - LEFT AND CENTER RCPS OFF

If the internal BITE circuits of both the left and center radio communication panels (RCPs) find a failure, the active frequency indicators show FAIL, When the indicators show FAIL, press the left and center RCP OFF switches. When the left and center RCPs are off:

- The left and center RCP OFF switches show white.
- The left and center RCP active frequency indicators continue to show FAIL.
- The port select discrete for the left VHF transceiver goes to an open condition.
- The left transceiver uses the tuning data on Port B.

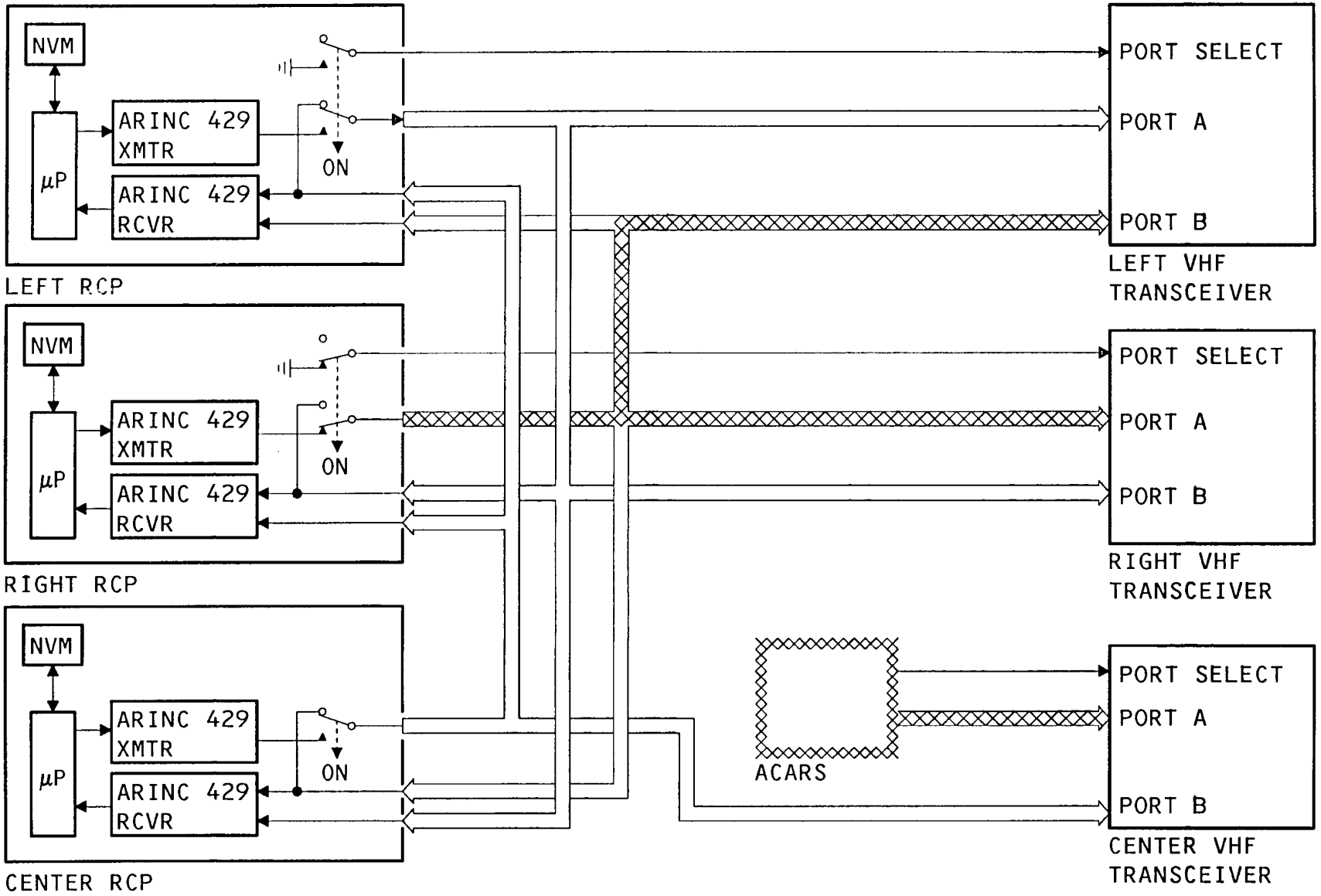


Figure 22 TUNING - LEFT AND CENTER RCPs OFF

TUNING - RIGHT RCP OFF

If the right radio communication panel (RCP) internal BITE circuit finds a failure, the active frequency indicator shows FAIL. When the indicator shows FAIL, press the right RCP OFF switch. When the right RCP is off:

- The right RCP OFF switch shows white.
- The right RCP active frequency indicator continues to show FAIL.
- The port select discrete for the right VHF transceiver goes to an open condition.
- The right transceiver uses the tuning data received through Port 13.

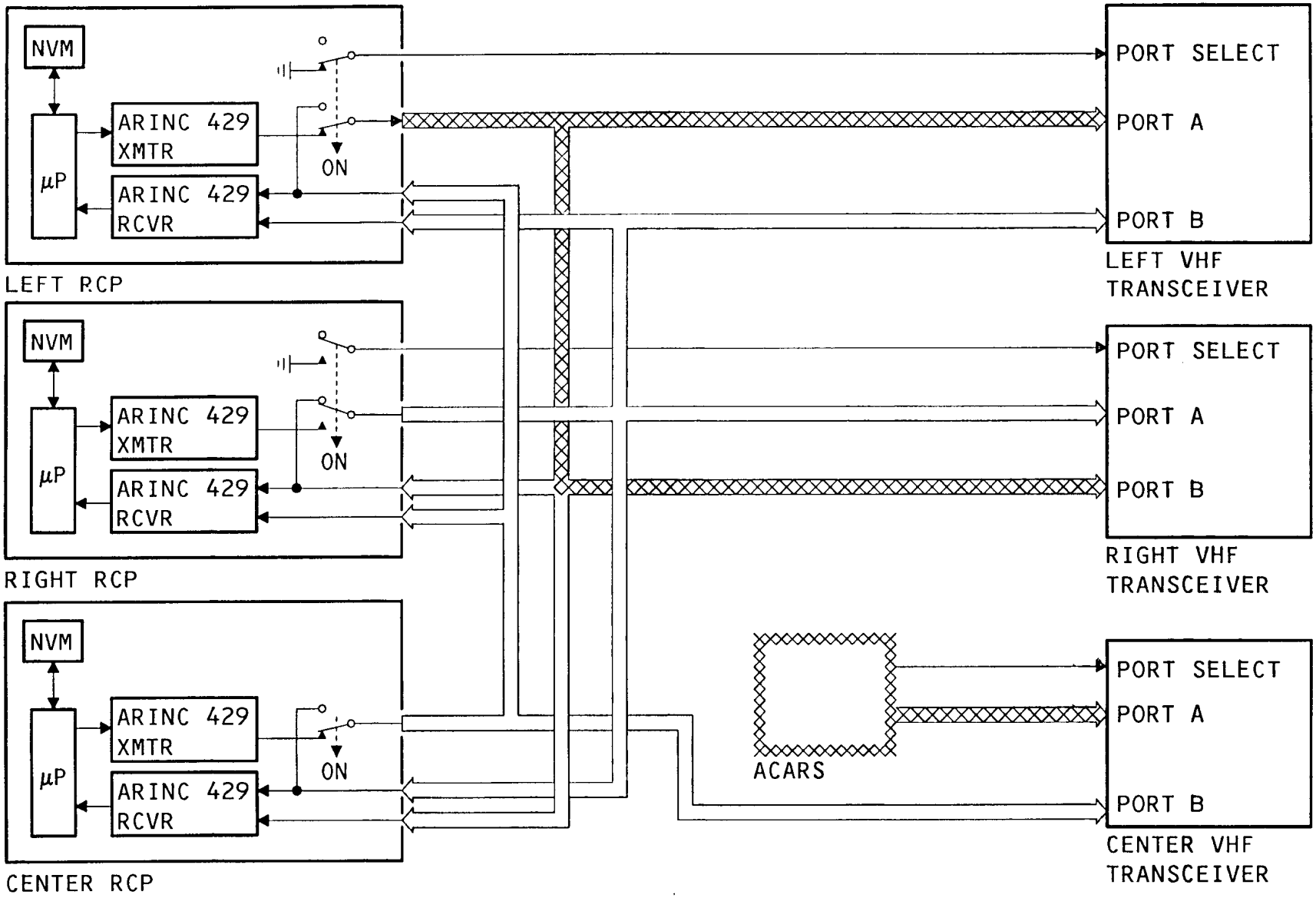


Figure 23 TUNING - RIGHT RCP OFF

TUNING - RIGHT AND CENTER RCPS OFF

If the internal BITE circuits of both the right and center radio communication panels (RCPs) find a failure, the active frequency indicators show FAIL. When the indicators show FAIL, press the right and center RCP OFF switches. When the right and center RCPs are off:

- The right and center RCP OFF switches show white.
- The right and center RCP active frequency indicators continue to show FAIL.
- The port select discrete for the right VHF transceiver goes to an open condition.
- The right transceiver uses the tuning data received through Port B.

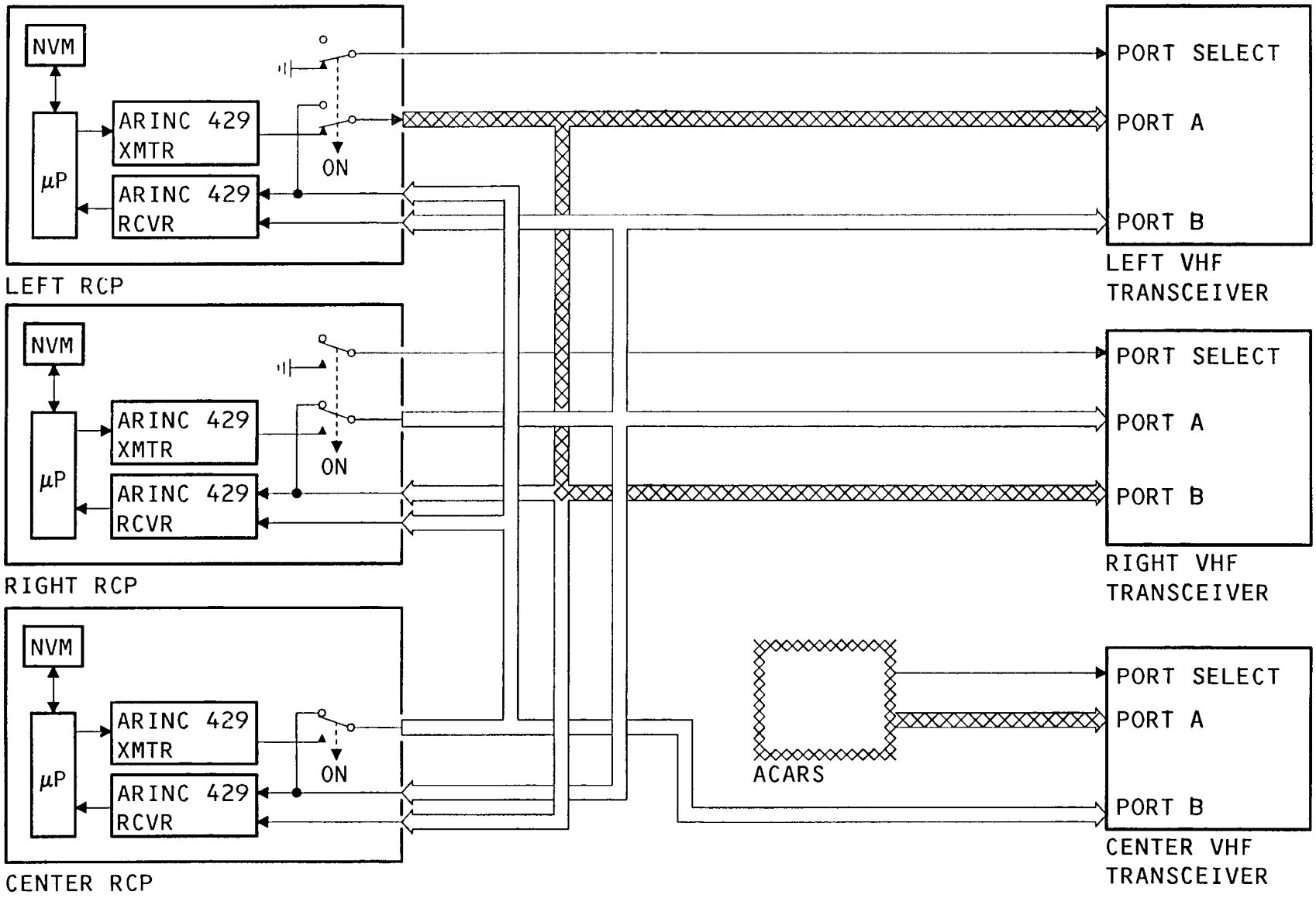


Figure 24 TUNING - RIGHT AND CENTER RCPS OFF

TUNING - LEFT AND RIGHT RCPS OFF

If the internal BITE circuits of both the right and left radio communication panels (RCPs) find a failure, the active frequency indicators show FAIL. When the indicators show FAIL, press the right and left RCP OFF switches. When the right and left RCPs are off:

- The right and left RCP OFF switches show white.
- The right and left RCP active frequency indicators continue to show FAIL.
- The port select discretes for the right and left VHF transceivers go to an open condition.
- The right and left transceivers uses the tuning data received through Port B.
- A relay in the left RCP connects its input from the center RCP to its output.
- A relay in the right RCP connects its input from the left RCP to its output.

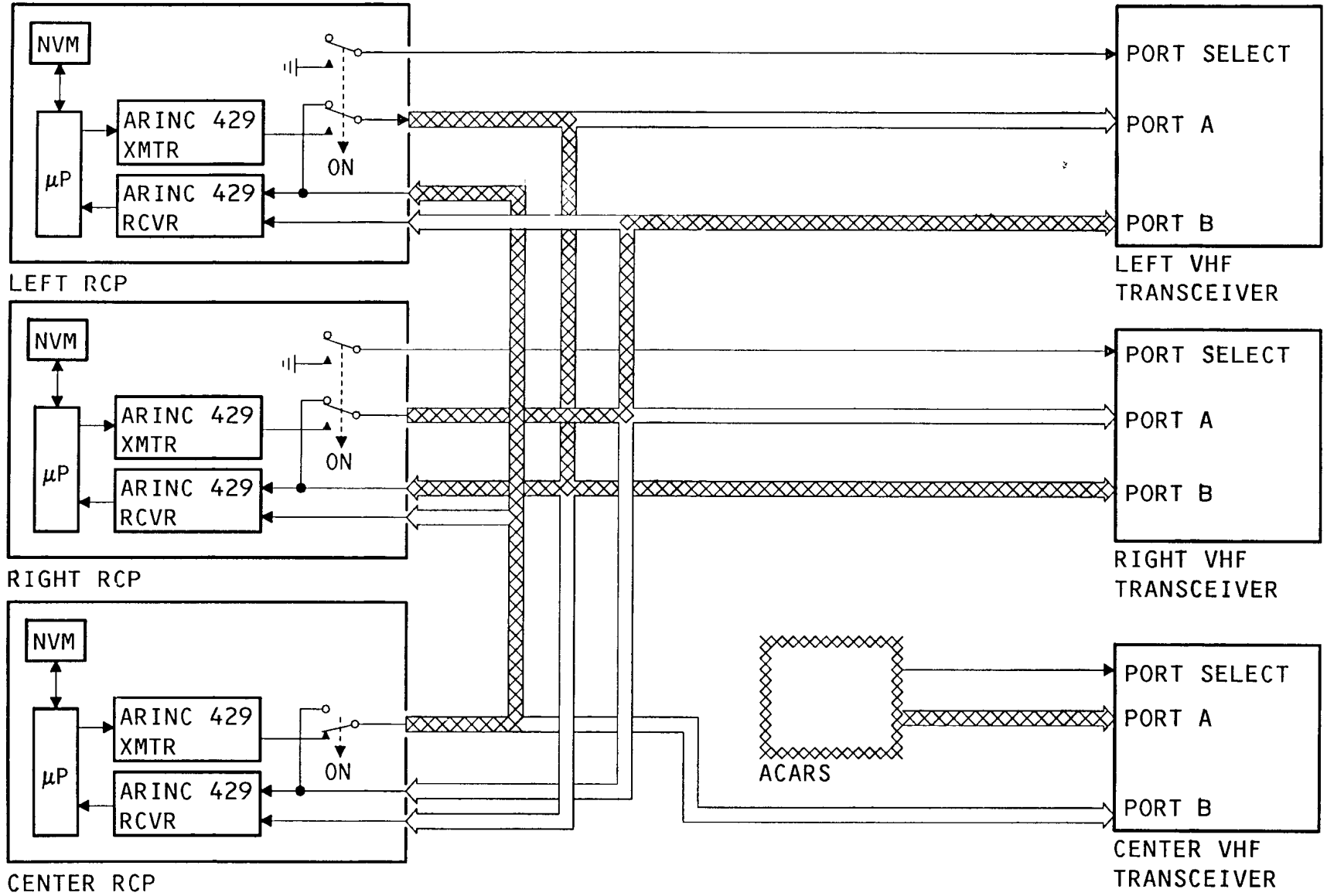


Figure 25 TUNING - LEFT AND RIGHT RCPs OFF

RECEIVE SCHEMATIC

General Description

The VHF antenna receives rf signals and routes them to the VHF transceiver through a coaxial cable. The VHF transceiver processes the rf signal.

Operation

The microprocessor sends the receive frequency to the frequency synthesizer. The frequency synthesizer sets the frequency of the AM receiver.

The microprocessor in the VHF transceiver outputs a logic high to the transfer switch when the transceiver is not in the transmit mode. This closes the transfer switch and sends the received rf input from the VHF antenna to the AM receiver.

The AM receiver de-modulates the rf input and detects the audio signal.

The audio output from the AM receiver is sent to:

- The data output circuit
- The squelch comparator
- Switch S1

The data output circuits send unsquelched audio to SELCAL and ACARS.

The squelch comparator circuit compares the detected audio with a threshold value. If the level of the detected audio is greater than the threshold, the squelch circuit sends a ground to switch S1. Switch S1 closes and passes the audio signal to the audio output circuits.

The audio output circuits send the audio signal to the audio management unit (AMU) and to the headphone jack. The TEST switch also causes switch S1 to close and send receiver audio to the audio output circuits.

The microprocessor sends a logic low signal to S1 during voice transmission. Sidetone then passes through S1 to the audio output circuit.

When ACARS is in data mode, the audio off signal goes to a logic high. This disables the audio by opening S1 and disables the squelch comparator.

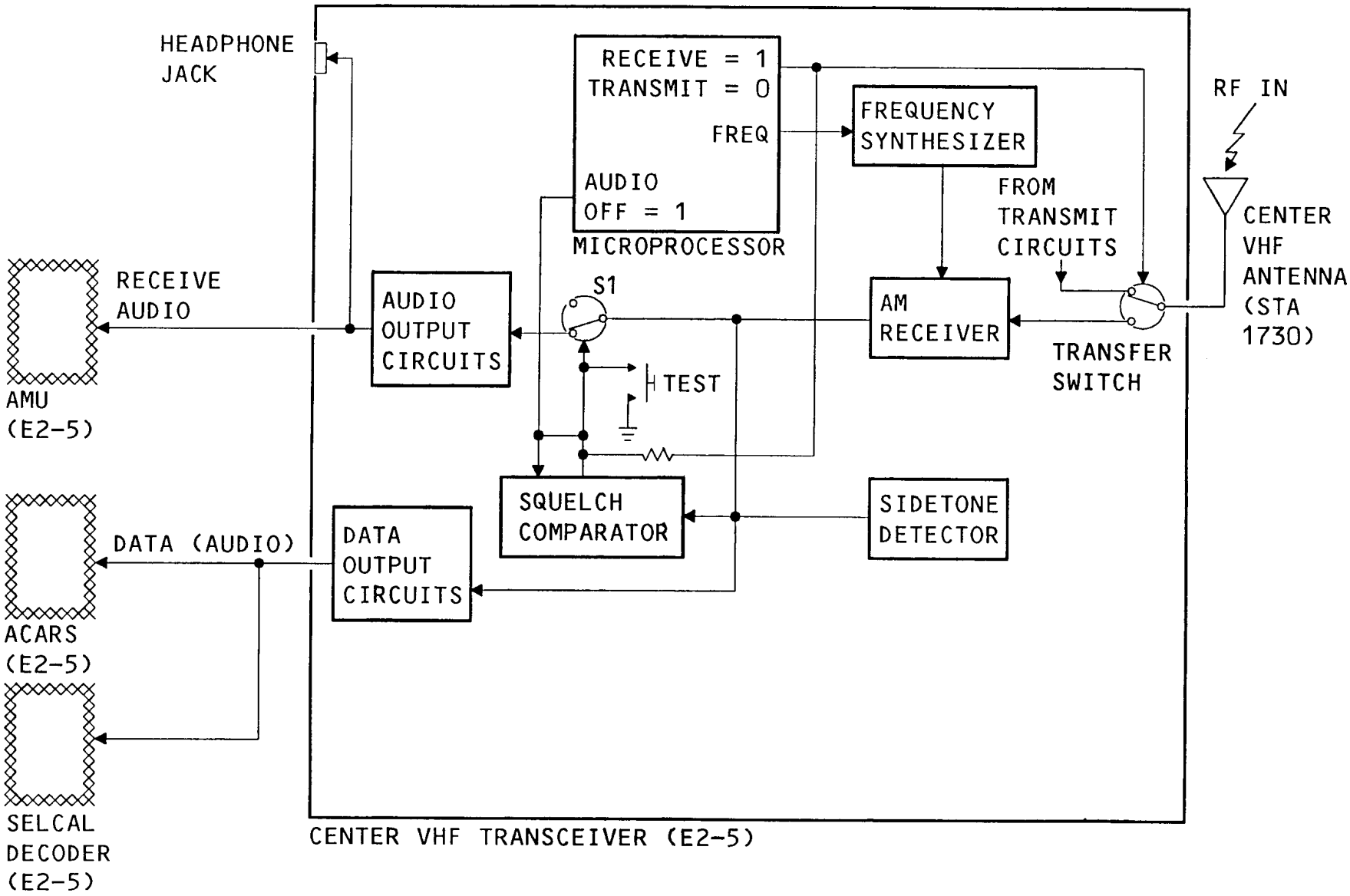


Figure 26 RECEIVE SCHEMATIC

TRANSMIT SCHEMATIC

During transmission, the microprocessor receives a PTT from the audio management unit (AMU) or a data key from ACARS. This causes the microcomputer to send a logic low to the transfer switch. This connects the output of the directional coupler to the VHF antenna.

Mic audio from the AMU and the data tones from ACARS are sent to the transmit circuits in the VHF transceiver.

The transmit circuits modulate the transmit frequency with the mic audio or the data tones. This makes an amplitude modulated rf signal. The directional coupler sends the rf signal to the antenna through a coaxial cable. The antenna radiates the rf signal into the air.

The rf output also goes to the sidetone detector. The sidetone detector detects the audio from the amplitude modulated RF signal.

The voice/data select input from ACARS determines the operation mode of the transceiver. A grounded input sets the transceiver to the data mode while an open input sets it to the voice mode.

In the data mode, the audio off signal goes to a logic high to disable the sidetone.

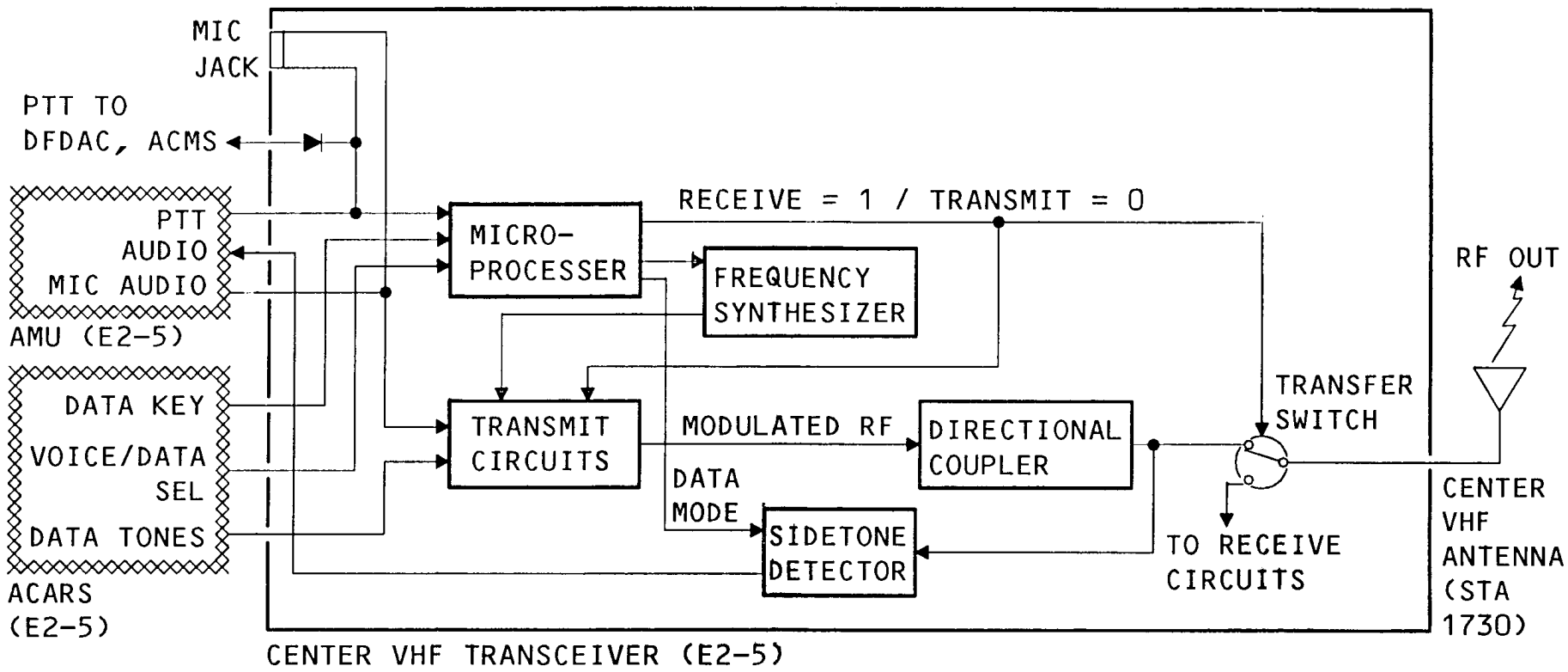


Figure 27 TRANSMIT SCHEMATIC

SELF-TEST

General

A test can be started from the front panel TEST switch.

When performing a test, no audio should be applied to the mic or data inputs. This may result in incorrect results.

TEST

Push the momentary TEST switch to start a self test.

The self test checks the:

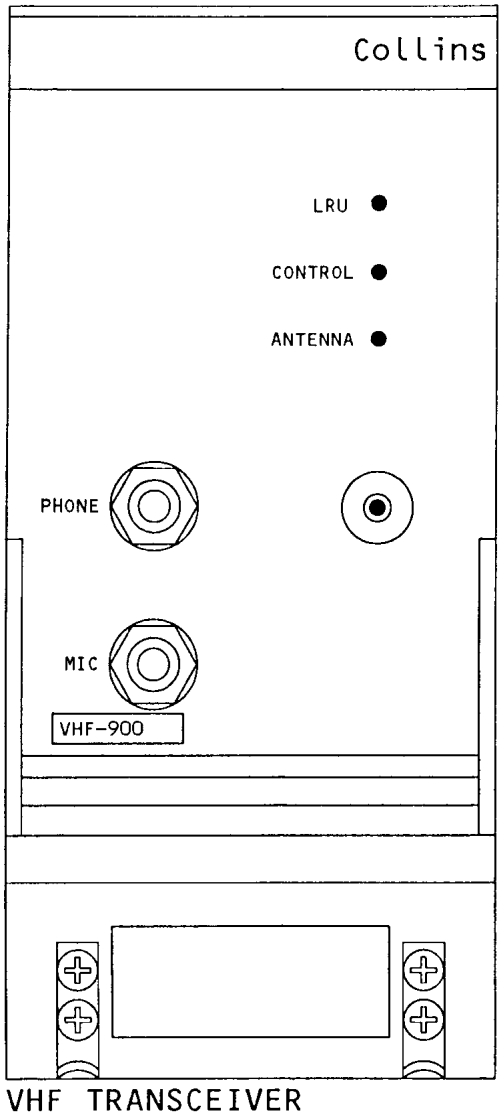
- Transceiver operation
- Input serial tuning word
- Antenna VSWR.

During test the front panel LEDs come on in this order:

- All LEDs come on red for two seconds.
- The LRU STATUS LED comes on green for two seconds, the other LEDs remain red.
- All LEDs go off for two seconds.
- The LRU STATUS LED comes on green for 30 seconds and the other LEDs remain off.

All LEDs off after approximately 36 seconds shows a passed test.

The applicable LED will turn on red after the test to show a failure.



VHF TRANSCEIVER

TEST SWITCH PUSHED	TEST INDICATIONS			TEST RESULT
	LRU STATUS LED	CONTROL FAIL LED	ANTENNA FAIL LED	
0-2 SECONDS	ON-RED	ON-RED	ON-RED	PASS
2-4 SECONDS	ON-GREEN	ON-RED	ON-RED	PASS
4-6 SECONDS	OFF	OFF	OFF	PASS
6-36 SECONDS	ON-GREEN	OFF	OFF	PASS
36+ SECONDS	OFF	OFF	OFF	PASS
	ON-RED	OFF	OFF	XCVR FAULT
	OFF	ON	OFF	FAIL: CONTROL INPUT FAULT
	ANY OTHER COMBINATION			FAIL *

* IF TWO FAILURE INDICATIONS ARE ON, THEN MORE TROUBLESHOOTING WILL BE REQUIRED IN ORDER TO ISOLATE THE FAULT.

Figure 28 SELF-TEST (Collins VHF-900)

SELF-TEST

General Description

Three tests can be started from the VHF transceiver front panel. They are the:

- SQL/LAMP TEST
- LRU TEST
- FWD/RFL power test

SQL/Lamp Test

Push and hold the SQL/LAMP TEST switch. This:

- Causes the LRU pass and control input fail LED to turn on.
- Allows the operator to hear the receiver noise as a receiver confidence test.

The operator can use the headphone jack an the transceiver front panel to connect the headphone.

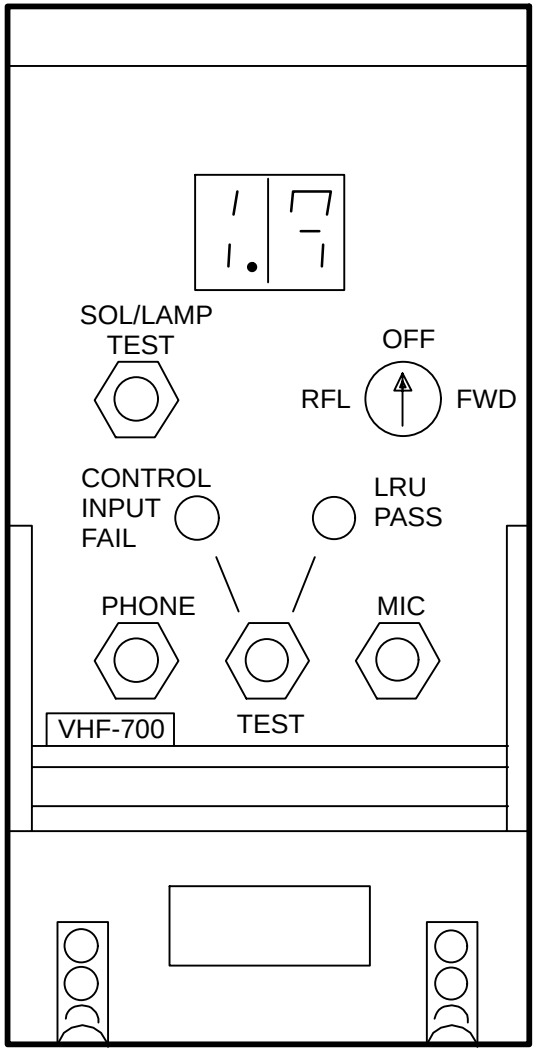
LRU Test

Push the mementary test switch to:

- Check the ARINC 429 tuning bus data for correct word rate, parity, and frequency. If the tuning data is not correct, the control input fil shows fail for about three seconds.
- Check the tranceiver for proper operation of the frequency synthesizer, receiver and transmitter. If the transceiver passes the test, the LRU PASS LED shows green for about three seconds.
- Causes the LED display on the transceivedr to show the VSWR measured during the test. A VSWR greater than 2:1 means that there is an antenna or transmission line problem.

FWD/RFL Power Test

When the POWER/VSWR indicator is switched to the FWD position, it must show a minimum of 25 watts. In the RFL position, it must show a power level of no greather than 11% of the FWD power.



TEST RESULTS

INDICATOR	PASS
CONTROL INPUT FAIL LED	STAYS OFF
LRU PASS LED	SHOWS GREEN FOR APPROXIMATELY 3 SECONDS
POWER/VSWR INDICATOR	LESS THAN OR EQUAL TO 2.0

INDICATOR	PASS
SQUELCH	NOISE AUDIO HEARD AT PHONE JACK
CONTROL INPUT FAIL LED	BOTH LED'S GO ON

INDICATOR	PASS
POWER/VSWR INDICATOR	MORE THAN OR EQUAL TO 25W IN FWD
	LESS THAN 11 PERCENT OF FWD IN RFL

Figure 29 SELF-TEST (Collins VHF-700)

GROUND TEST

Use the central maintenance computer (CMC) through the control display unit (CDU) to test each VHF system.

The VHF ground test is inhibited when the ground test enable switch is in the NORMAL position. INHIBITED shows above each VHF test selection on the CDU.

The ENABLE PAGE shows when a VHF test is selected. Do the instructions on the ENABLE PAGE and return to GROUND TESTS page.

With the ground test enable switch in the ENABLE position use the CDU to start a VHF ground test.

Push the line select key next to the system to be tested. A test precondition screen shows on the CDU screen. Push the START TEST key to start the ground test.

PASS will show if the test passes and FAIL will show if the test fails.

The ground test message page shows the faults related to a failed VHF system.

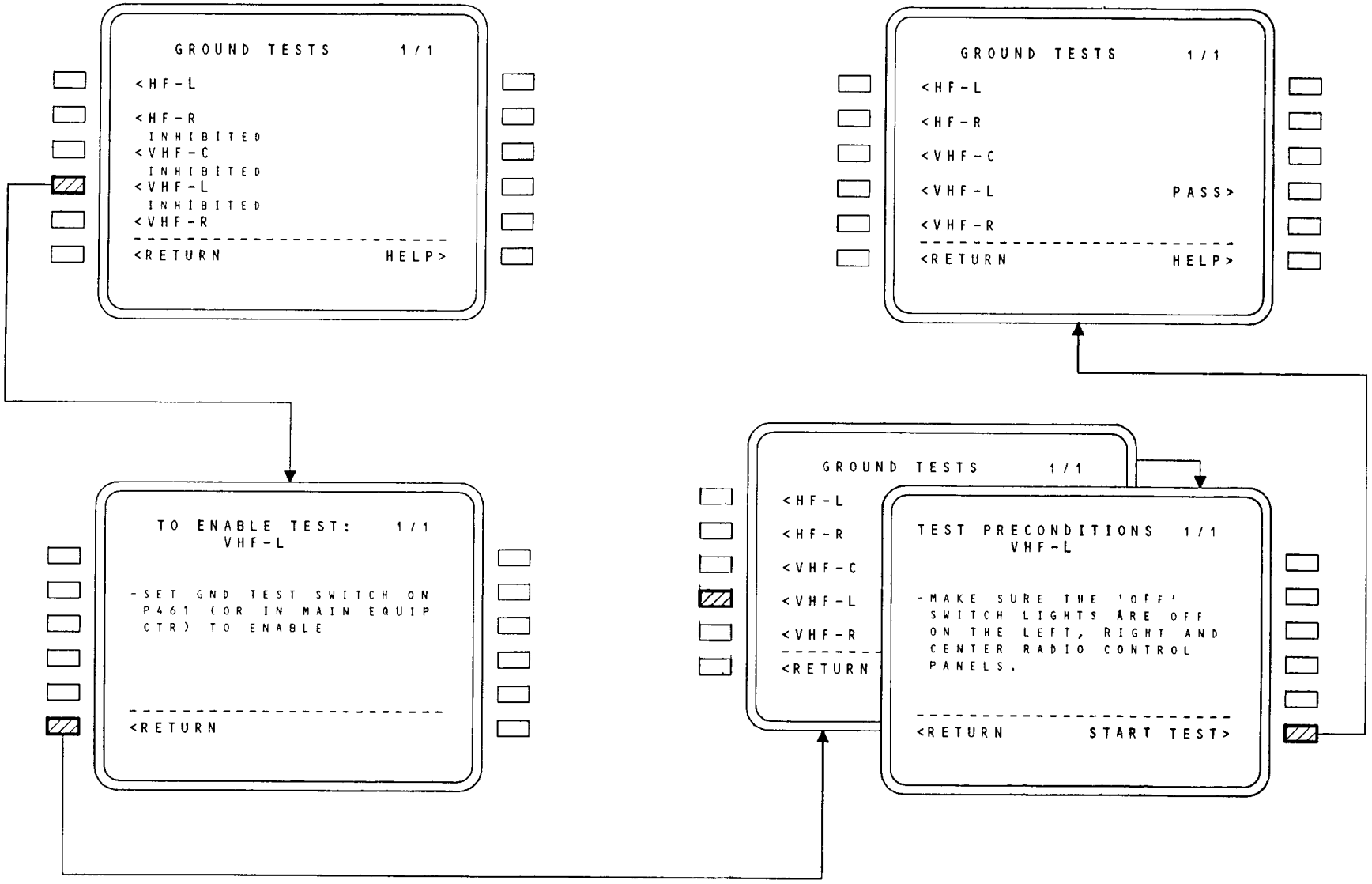


Figure 30 VHF - GROUND TEST

TABLE OF CONTENTS

TABLE OF FIGURES