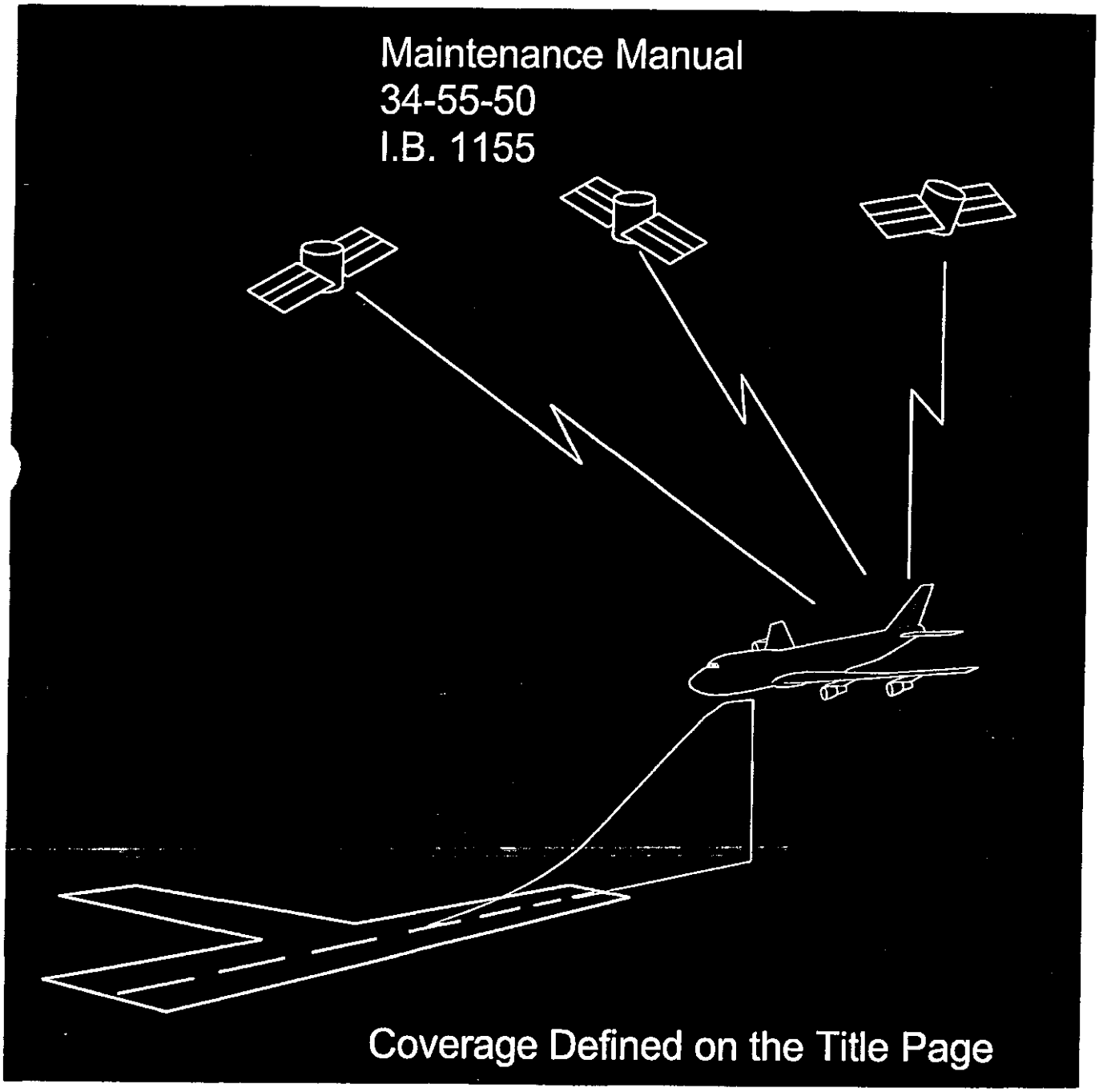
RMA-55B
Multi-Mode Receiver System

Maintenance Manual
34-55-50
I.B. 1155



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Electronic & Avionics Systems

Maintenance Manual

RMA-55B
Multi-Mode Receiver System

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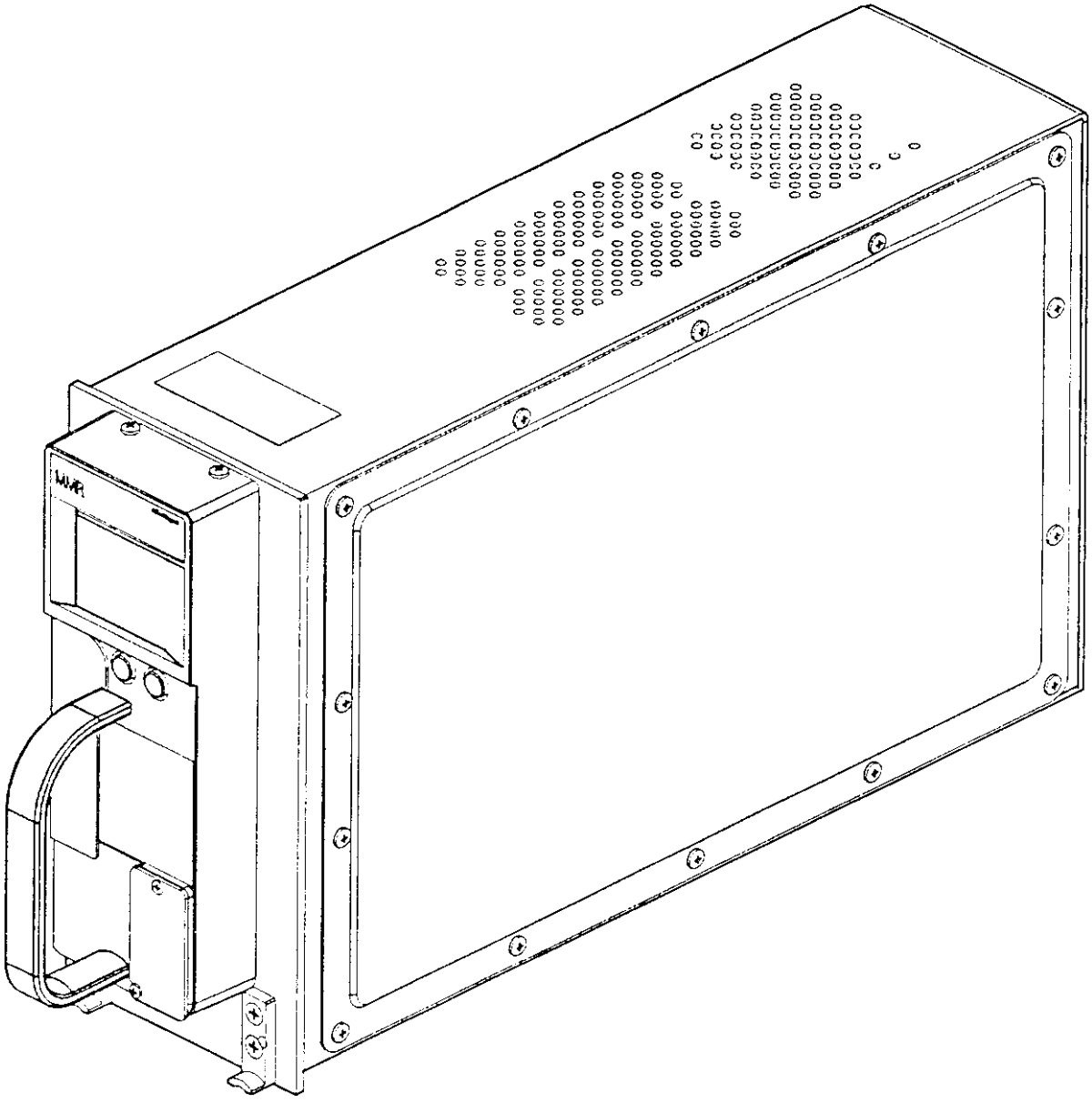
MAINTENANCE MANUAL
RMA-55B MULTI-MODE RECEIVER SYSTEM

INTRODUCTION

This manual, I.B. 1155 (34-55-50), contains information covering description and operation, installation, and checkout procedures for the AlliedSignal Electronic and Avionics Systems RMA-55B Multi-Mode Receiver System.



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RMA-55B Multi-Mode Receiver
Figure 1

DESCRIPTION AND OPERATION

1. General

This section contains descriptive information covering the RMA-55B Multi-Mode Receiver System, and lists other components required for system operation. The RMA-55B Multi-Mode Receiver (MMR) is illustrated in figure 1.

A. Purpose of Equipment

The RMA-55B Multi-Mode Receiver (MMR) meets industry defined sensor requirements for Category III Instrument Landing Systems (ILS), including requirements for ICAO Annex 10 FM Immunity, and Global Navigation Satellite Sensor (GNSS) enroute navigation and non-precision approaches.

The instrument landing system (ILS) function of the MMR consists of a VHF localizer receiver and a UHF glide-slope receiver, and the global navigation satellite sensor (GNSS) function consists of the GNSS receiver. These receivers are used in conjunction with three antennas (localizer, glide slope, and L-band GNSS), a control head, and the cockpit displays [course deviation indicator (CDI) and horizontal situation indicator (HSI)].

The primary purpose of the ILS circuitry is to provide lateral (localizer) and vertical (glide slope) guidance information. This information is provided via ARINC 429 interfaces to the aircraft Automatic Flight Control System (AFCS) and instrument systems during manual and automatically controlled approaches and landings. The MMR also provides an aural output for the ILS ground station identification.

The primary purpose of the GNSS receiver is to provide GNSS enroute navigation and non-precision approach information: latitude and longitude.

The RMA-55B Multi-Mode Receiver (MMR) design conforms to industry standards Aeronautical Radio Incorporated (ARINC) 755 *Multi-Mode Receiver Characteristics* and ARINC 743A-2 *Global Positioning System Receiver Characteristics*, Radio Technical Commission for Aeronautics (RTCA) document numbers DO-192 *Minimum Operational Performance Standards (MOPS) for Airborne ILS Glide Slope Receiving Equipment Operating Within the Radio Frequency Range of 328.60 - 335.40 MHz*, DO-195 *MOPS for Airborne ILS Localizer Receiving Equipment Operating Within the Radio Frequency Range of 108 - 112 MHz*, and DO-208 *MOPS for Airborne GPS Receiving Equipment used for Supplemental Means of Navigation*, European *Organisation* for Civil Aviation Equipment (EUROCAE) ED-72A *Minimum Operational Performance Specification for Airborne GPS Receiving Equipment used for Supplemental Means of*

Navigation, and digital guidance data conforms to ARINC 429-14 *Mark 33 Digital Information Transfer System (DITS)* format.

In addition, the MMR provides digital Morse Code decoding, fault memory, and built-in test equipment (BITE) interfaces for use in a Central Fault Display System (CFDS) per ARINC 604 and Airbus Industrie ABD-0048.

B. Equipment Part Numbers

Components of the RMA-55B Multi-Mode Receiver System supplied by AlliedSignal Electronic and Avionics Systems (EAS) are listed in figure 2. The figure lists the currently available components of the system, along with part numbers and equipment type numbers.

EQUIPMENT TYPE NUMBER	EQUIPMENT DESCRIPTION	PART NUMBER
RMA-55B Multi-Mode Receiver	A microprocessor-based instrument landing system receiver that receives ground-based localizer signals from 108.10 MHz to 111.95 MHz and ground-based glide-slope signals from 329.15 MHz to 335.00 MHz frequency band and processes these signals to provide digital aircraft guidance data to the AFCS and instrument system during manual and automatically controlled approaches and landings. Receiver design conforms to ARINC 755 and EUROCAE ED-72A; digital guidance data conforms to ARINC 429 format. In addition to the automatic self-test feature, the unit contains an operator-initiated self-test feature, located on the ILS receiver front panel, that provides a comprehensive test of all sections of the unit and operation of its outputs. Complies with DO-178B software requirements and enhanced BITE requirements of Airbus, Boeing, and McDonnell Douglas.	066-50029-0101

RMA-55B Multi-Mode Receiver System Components
(AlliedSignal Supplied)
Figure 2 (Sheet 1 of 2)

EQUIPMENT TYPE NUMBER	EQUIPMENT DESCRIPTION	PART NUMBER
RMA-55B Multi-Mode Receiver (Cont)	Capable of interfacing CMC per ARINC 604. Capable of data recording and loading through the front of the unit. Meets DO-160C lightning protection and 200 ms power interrupt transparency requirements. Meets HIRF requirements and ICAO Annex 10 requirements.	066-50029-0101 (Cont)
	Same as '-0101, except capable of GNSS enroute navigation and non-precision approaches per ARINC 743A-2 and EUROCAE ED-72A.	066-50029-1101
	Same as '-0101, except capable of interfacing CFDS per ARINC 604 and McDonnell Douglas MDC-96K9054.	066-50029-0151
	Same as '-0151, except capable of GNSS enroute navigation and non-precision approaches per ARINC 743-2 and EUROCAE ED-72A.	066-50029-1151

RMA-55B Multi-Mode Receiver System Components
(AlliedSignal Supplied)
Figure 2 (Sheet 2)

C. Equipment Required but Not Supplied

Figure 3 lists equipment required for the RMA-55B Multi-Mode Receiver System, but not supplied by AlliedSignal Electronic and Avionics Systems (EAS).

EQUIPMENT	DESCRIPTION
Control Panel	Must provide remote control of frequency selection, power on-off, and self-test data using two-wire serial digital command format defined in ARINC 429.
Power Source	AC power supply of 115 volts, 400 Hz as defined in ARINC 413A.
Electronic Horizontal Situation Indicator (Digital HSI)	Must accept ILS digital data in ARINC 429 format and display aircraft position data.
ILS Localizer Antenna	Must be capable of receiving localizer signals over a frequency range from 108 MHz to 112 MHz, VSWR of 5:1 maximum, and an impedance of 50 ohms.
ILS Glide Slope Antenna	Must be capable of receiving glide-slope signals over a frequency range from 329 MHz to 335 MHz, VSWR of 5:1 maximum, and an impedance of 50 ohms.
GNSS L-Band Antenna	Must be capable of receiving GNSS signals over a frequency range from 1565.42 MHz to 1585.42 MHz, VSWR of 2.0:1 maximum, and an impedance of 50 ohms.
3 MCU Unit Mount	Must provide a means of mounting RMA-55B Multi-Mode Receiver in the aircraft. Designed per ARINC 600. Mount connector must allow mating of MMR low-insertion force, size 2 shell, ARINC 600 connector with three inserts. The connector must accommodate four coaxial interconnections in its upper insert (TP), 118 service interconnections and two coaxial interconnections in its center insert (MP), and two coaxial and power interconnections in its lower insert (BP). Keying pins must be indexed to pin code "03".

Equipment Required but Not Supplied
Figure 3 (Sheet 1 of 2)

EQUIPMENT	DESCRIPTION
Cooling Source	Aircraft supplied ARINC 600 forced-air cooling is required for the MMR.
Cables and Connectors	Necessary connectors, rf cables, and aircraft interwiring are shown in RMA-55B Multi-Mode Receiver System Interwiring Diagram, figure 211.

Equipment Required but Not Supplied
Figure 3 (Sheet 2)

D. Related Publications

Figure 4 lists the publications covering the MMR system and test procedure supporting the system.

PUBLICATION	EAS IDENTIFICATION NUMBER	ATA IDENTIFICATION NUMBER
RMA-55B Multi-Mode Receiver, Component Maintenance Manual	I.B. 1155A	34-55-51

Related Publications
Figure 4

2. Configurations Available

Figure 5 lists the available configurations of the RMA-55B Multi-Mode Receiver and the features contained in each configuration. Figure 6 contains a brief description of each feature.

PART NUMBER 066-50029	FEATURES				
	BASIC UNIT WITH ILS	ENROUTE GNSS	INTERFACE		
			BOEING CMC	MCDONNELL DOUGLAS CFDS	AIRBUS CFDS
-0101	X		X		
-1101	X	X	X		
-0151	X			X	
-1151	X	X		X	

RMA-55B Multi-Mode Receiver, Configurations Available
Figure 5

FEATURE	DESCRIPTION
Basic Unit with ILS	Airborne solid-state microprocessor-based instrument-landing system receiver which provides localizer and glide-slope deviation data to cockpit displays and automatic flight control system in ARINC 429 digital data format. Microprocessor circuits control signal processing, tracking, integrity monitoring, failure warning, and self-test. A nonvolatile, single-chip fault memory allows the recording of faults associated with a particular flight leg. Sixty-four flight legs are available with each flight leg made up of a flight-leg information header containing a fault record section for recording ten airborne faults and three ground faults. When all flight legs have been used, the oldest flight leg is reused. Digital Morse Code Decoder provides capability of receiving ground-facility digital Morse Code Ident signals and decoding them to ARINC 429 data word format for use on the ILS system ARINC 429 data output bus.
Enroute GNSS	GNSS receiver provides GNSS enroute navigation and non-precision approach information: latitude and longitude.
CMC Interface	The MMR interfaces fault memory and BITE data between MMR and line maintenance Centralized Maintenance Computer (CMC) for the purpose of extracting maintenance information and initiating tests. Designed to conform with ARINC 429 interfaces, ARINC 604.
CFDS Interface	The MMR interfaces fault memory and BITE data between MMR and line maintenance Centralized Fault Display Interface Unit (CFDIU) for the purpose of extracting maintenance information and initiating tests. Designed to conform with ARINC 429 interfaces, ARINC 604, and McDonnell Douglas MDC-96K9054.

RMA-55B Multi-Mode Receiver Features
Figure 6

3. System Leading Particulars

A. Unit Specifications

Figure 7 lists the leading particulars for the RMA-55B Multi-Mode Receiver System.

CHARACTERISTICS	DESCRIPTION
General	
Power Requirements	115 Vac, 380 to 420 Hz, 30 to 35 Watts
Weight	Refer to outline drawing, figure 210
Dimensions	Refer to outline drawing, figure 210
Form Factor	ARINC 600, 3 MCU
Cooling	ARINC 600 Forced air; refer to outline drawing figure 210 for air flow rate.
Temperature Operating Storage	 -15°C to +70°C (+5°F to +158°F) -55°C to +85°C (-67°F to +185°F)
Warm-up Period	Stable operation within one minute after application of power
Frequency Selection	Serial digital in accordance with ARINC 429
Certification	TSO C34e (G/S), C36e Class B (LOC), and C129a-B2/C2, B3/C3 (GNSS); DO-160C/EUROCAE ED-14 Environmental Category /A2/ZBA/B/XXXXXXZEAEZWZ/XXE2/XX ICAO Annex 10 FM Immunity
ILS Localizer Receiver	
Frequency Range	108.10 MHz to 111.95 MHz, 50 kHz channel spacing (excluding VOR Stations)
Selectivity	Attenuation / Bandwidth Less than 6 dB / ±15 kHz More than 60 dB / ±31.5 kHz
Undesired Response Rejection	80 dB minimum

Leading Particulars
Figure 7 (Sheet 1 of 3)

CHARACTERISTICS	DESCRIPTION
ILS Localizer Receiver (continued)	
Cross Modulation Rejection	60 dB minimum
Receiver Sensitivity: Aural Reception	3 hard microvolts of less for 6 dB signal-plus-noise-to-noise, measured at the audio output
Localizer Reception	3 hard microvolts for valid data indication
Audio Frequency Response	Audio output will not vary more than 6 dB from 350 Hz to 2500 Hz. More than 20 dB attenuation at 150 Hz and 5 kHz.
AGC	Less than 3 dB audio output variation from 5 microvolts to 100,000 microvolts
Audio Output	Capable of 40 milliwatts minimum into a 200-ohm to 600-ohm resistive load with 10-microvolt signal modulated 30 percent at 1000 Hz. Factory adjusted for 10 milliwatts minimum into a 600-ohm resistive load
Audio Output Regulation	Less than 6 dB voltage change from a 40 milliwatt reference level into 200 ohms for resistive load variations of 200 ohms to 10,000 ohms
Harmonic Distortion	Less than 7.5% with 1000 microvolts modulated 30% at 1000 Hz and less than 20% with 90% modulation for rated audio output into a 200-ohm to 600-ohm resistive load
Centering Accuracy	±0.003 DDM under standard laboratory conditions
Warning Signals	Per ARINC 424 and ARINC 755
ILS Glide Slope Receiver	
Frequency Range	329.15 MHz to 335.00 MHz, 150 kHz channel spacing
Selectivity	Attenuation / Bandwidth Less than 6 dB / ±22 kHz More than 60 dB / ±78 kHz
Undesired Response Rejection	80 dB minimum

Leading Particulars
Figure 7 (Sheet 2)

CHARACTERISTICS	DESCRIPTION
ILS Glide Slope Receiver (continued)	
Cross Modulation Rejection	60 dB minimum
Receiver Sensitivity	10 microvolts or less for valid data indication
Centering Accuracy	±0.003 DDM under standard laboratory conditions
Warning Signals	Per ARINC 424 and ARINC 755
GNSS Receiver	(Meets performance requirements defined in following under conditions of aircraft operating speeds of up to 800 knots, acceleration of up to ±2.5G, jerk of up to 2 m/s^3.)
Sensor Unit Autonomous Position Accuracy:	Assumptions: HDOP = 1.5 VDOP = 2.0 TDOP = 0.8 C/N_o = 37.7 dB Hz SA = Inactive
Horzontal Position	30 meters per axis
Ground Speed	1.25 knots
Track Angle True	0.5 degree
Vertical Velocity	200 feet/minute (1.01 meter/second)
Altitude	130 feet (39.6 meters)
N-S & E-W Velocities	1.0 knot (1851 m/s) for straight/level flight during zero acceleration
Time-to-First-Fix	less than 75 seconds (95% confidence level)
Reacquisition	200 milliseconds (5 seconds maximum) (Velocity ≤200 kts - 5 sec reacquisition time) (Velocity)200 kts - 90 sec reacquisition time)
Acquisition Sensitivity	-134.5 dBm at input of antenna preamplifier Assumption: NF preamp = 2 dB maximum G preamp = 33.0 ±3 dB Cable Loss = 6 to 16 dB
Tracking Sensitivity	-137.5 dBm at input of antenna preamplifier Assumption: NF preamp = 2 dB maximum G preamp = 33.0 ±3 dB Cable Loss = 6 to 16 dB

Leading Particulars
Figure 7 (Sheet 3)

B. Environmental Certification

The RMA-55B Multi-Mode Receiver meets the environmental conditions of the Radio Technical Commission for Aeronautics (RTCA) document number DO-160C, "Environmental Conditions and Test Procedures for Airline Electronic/Electrical Equipment and Instruments." The environmental certification categories of the MMR are /A2/ZBA/B/XXXXXXZEAEZWZ/XXE2/XX (see figure 8).

TEST	CATEGORY
Temperature and Altitude	A2
In-Flight Loss of Cooling	Z
Temperature Variation	B
Humidity	A
Operational Shocks and Crash Safety	Meets Specification
Vibration	B
Explosion Proofness	X
Waterproofness	X
Fluids Susceptibility	X
Sand and Dust	X
Fungus Resistance	X
Salt Spray	X
Magnetic Effect	Z
Power Input	E
Voltage Spike	A
Audio Frequency Conducted Susceptibility - Power Inputs	E
Induced Signal Susceptibility	Z
Radio Frequency Susceptibility (Radiated and Conducted)	W
Emission of Radio Frequency Energy	Z
Lightning Induced Transient Susceptibility	XXE2
Lightning Direct Effects	X
Icing	X

Environmental Certification Categories of MMR
Figure 8

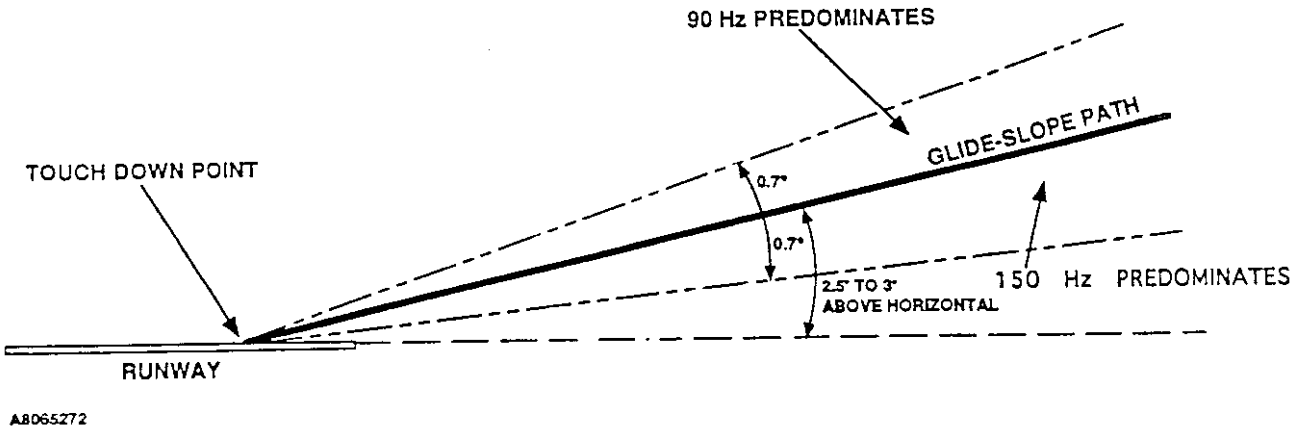
4. System Description

The basic RMA-55B Multi-Mode Receiver (MMR) System is an ILS receiver. Other versions of the MMR merges a Global Navigation Satellite Sensor (GNSS) into the MMR. The function of the ILS receiver and GNSS receiver are independent of each other.

A. Instrument Landing System (All LRU's)

An Instrument Landing System (ILS) consists of ground-based transmitting equipment and one or more sets of airborne receiving equipment. The ground-based equipment consists of two separate transmitters to radiate the guidance signals required for ILS approaches and landings. The glide-slope transmitter generates frequencies ranging from 329.15 MHz to 335.00 MHz to provide the vertical guidance (elevation) data. The localizer transmitter generates frequencies ranging from 108.10 MHz to 111.95 MHz to provide the lateral guidance (azimuth) data. Both transmitter antenna arrays are located near the airport's ILS runway and produce the patterns as shown in figures 9, 10, and 11.

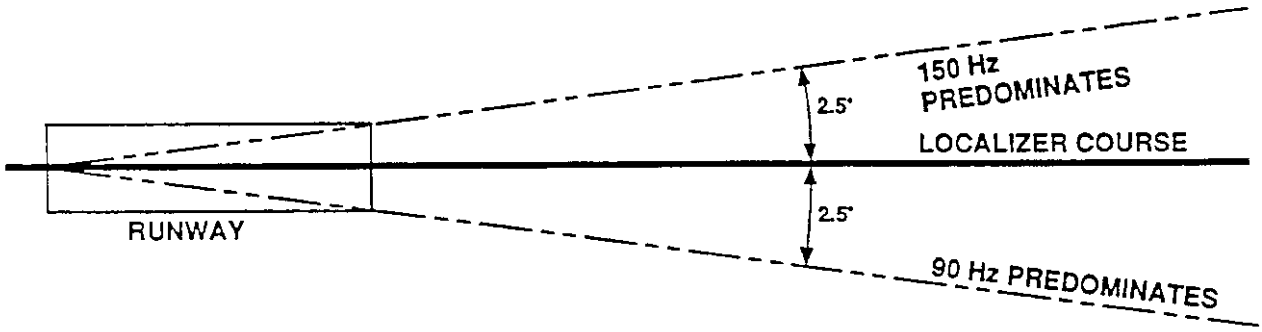
The glide-slope path is the angle of descent for an instrument landing (figure 9). This angle is nominally three degrees above the ground but depends upon the local terrain. The glide-slope transmitter antenna array radiates two intersecting lobes. The lobe above the glide-slope path is modulated with 90 Hz. The lobe below the glide-slope path is modulated with 150 Hz. When the aircraft is exactly on the glide-slope path, the modulation signals are equal, indicating that the aircraft is flying at the proper angle of descent.



Glide-Slope Antenna Pattern
Figure 9

Above the glide-slope path, the 90-Hz modulated signal is stronger, indicating that the aircraft is above the glide-slope path. Below the glide-slope path, the 150-Hz modulated signal is stronger, indicating that the aircraft is below the glide-slope path. The MMR detects the differences in the two modulated signals, and provides the resultant glide-slope deviation signal to the glide-slope deviation indicator on the electronic horizontal situation indicator (EHSI) or digital HSI and to the Automatic Flight Control System (AFCS).

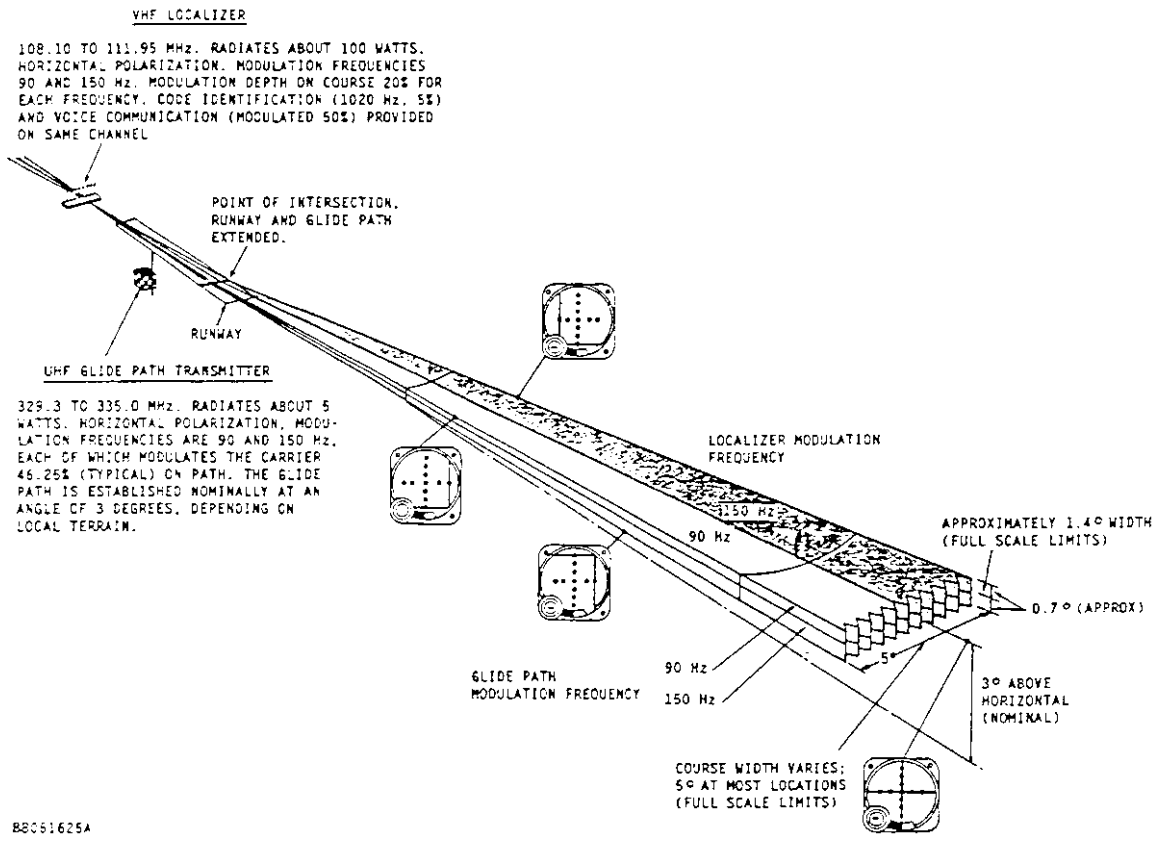
The localizer course is the centerline of the runway for an instrument landing (figure 10). Operation of the localizer beam is similar to the glide-slope beam except the localizer provides azimuth guidance instead of elevation guidance data. The localizer transmitter antenna array radiates two intersecting lobes. The lobe to the left of the runway centerline is modulated with 90 Hz. The lobe to the right of the runway centerline is modulated with 150 Hz. When the aircraft is exactly aligned with the runway centerline (localizer course), the modulation signals are equal, indicating the aircraft is flying the proper azimuth heading (course).



Localizer Antenna Pattern
Figure 10

To the right of the localizer course, the 150-MHz modulated signal is stronger, indicating that the aircraft is to the right of the runway centerline. To the left of the localizer course, the 90-MHz modulated signal is stronger, indicating that the aircraft is to the left of the runway centerline. The MMR detects the differences in the two modulated signals, and provides the resultant localizer course deviation signal to the course deviation indicator on the electronic horizontal situation indicator or digital HSI and to the AFCS.

Figure 11 illustrates the combination of both the ground-based glide-slope and localizer guidance signals for a typical instrument landing system.



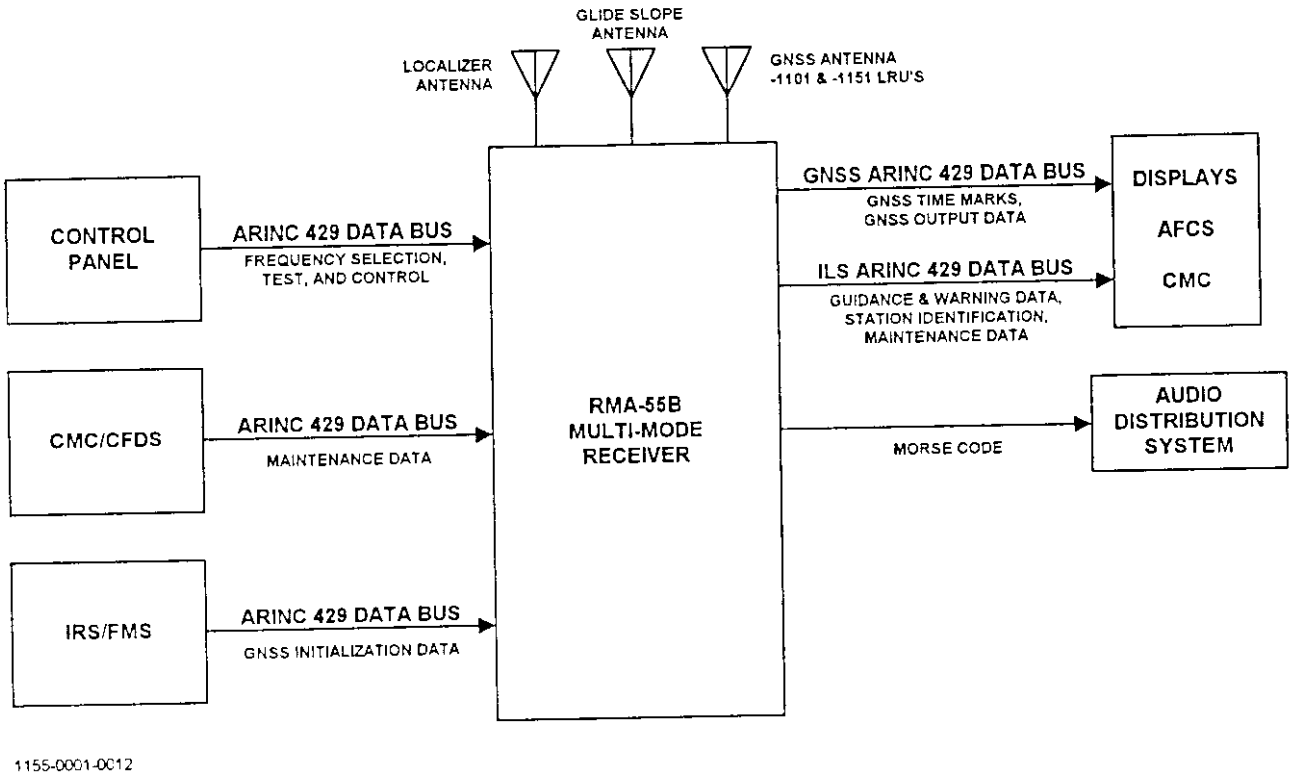
Typical Instrument Landing System
Figure 11

The localizer transmitter also sends out a station identification code and voice communication, modulated at 1020 Hz.

The airborne equipment typically consists of an ILS Receiver, such as the one found in the MMR, a localizer antenna, a glide-slope antenna, and a control panel. For most air transport applications and to satisfy all Category II & III landing applications, two or three ILS receiver systems are installed.

The glide-slope and localizer signals from the ground-based transmitters are picked up by the aircraft antennas connected to glide-slope and localizer receivers in the MMR. The glide-slope receiver requires a horizontally polarized antenna capable of receiving glide-slope signals in the range of 329.15 MHz to 335.00 MHz. The localizer receiver also requires a horizontally polarized antenna, but the frequency range is 108.10 MHz to 111.95 MHz.

Figure 12 shows a simplified block diagram of the RMA-55B Multi-Mode Receiver System. Separate aircraft antennas are required for glide-slope and localizer operation. The MMR receivers process the rf signals and calculate deviation of the aircraft from the glide-slope path and localizer path. The amount of deviation, based upon the difference in depth of modulation (DDM) of the signal, from both receivers is provided as ARINC 429 output words to the primary displays, the navigation displays, and the automatic flight control system (AFCS). In manual mode, the pilot is presented with a visual indication of the amount of deviation from the central axis, both in the lateral and the vertical directions. The pilot maneuvers the aircraft to zero out the left/right and up/down deviations. In automatic mode, the aircraft is maneuvered by the AFCS.



RMA-55B Multi-Mode Receiver System Block Diagram
Figure 12

The station identification and voice communication signals are recovered from the localizer receiver and are fed to the aircraft speaker system or the cockpit headsets. The ground station digital Morse Code identification signal is also provided on the ARINC 429 data output bus.

The localizer and glide-slope frequencies of the MMR are selected by ARINC 429 words output by a control panel. The pilot tunes the MMR to match the frequency specified for a particular airport's runway. Only the localizer frequency is specified by the control panel. The glide-slope frequency in the MMR is set depending upon the localizer frequency. Refer to figure 13 for a list of operating localizer and glide-slope frequency pairings.

LOCALIZER FREQUENCY (MHz)	GLIDE-SLOPE FREQUENCY (MHz)	LOCALIZER FREQUENCY (MHz)	GLIDE-SLOPE FREQUENCY (MHz)
108.10	334.70	110.10	334.40
108.15	334.55	110.15	334.25
108.30	334.10	110.30	335.00
108.35	333.95	110.35	334.85
108.50	329.90	110.50	329.60
108.55	329.75	110.55	329.45
108.70	330.50	110.70	330.20
108.75	330.35	110.75	330.05
108.90	329.30	110.90	330.80
108.95	329.15	110.95	330.65
109.10	331.40	111.10	331.70
109.15	331.25	111.15	331.55
109.30	332.00	111.30	332.30
109.35	331.85	111.35	332.15
109.50	332.60	111.50	332.90
109.55	332.45	111.55	332.75
109.70	333.20	111.70	333.50
109.75	333.05	111.75	333.35
109.90	333.80	111.90	331.10
109.95	333.65	111.95	330.95

Localizer and Glide-Slope Frequency Pairings
Figure 13

The MMR also interfaces with the CFDS to allow line maintenance to initiate the BITE and extract maintenance information pertaining to faults. The BITE provides information such as the date, time in Greenwich Mean Time (GMT), flight number, city pairs, aircraft identification, BITE command, flight phase and the "health" of the LRU. If a fault had occurred during a flight phase or segment, the BITE would also indicate which module in the MMR had failed along with the other information.

B. Global Navigation Satellite Sensor (-1101, -1151 LRU's)

A global navigation satellite sensor (GNSS) is a satellite navigation sensor which uses the C/A code of the NAVSTAR Global Positioning System (GPS) satellite constellation. The GNSS module interfaces with the aircraft systems to provide three dimensional aircraft position and velocities, as well as satellite position, pseudo range, and delta range information for use in remote hybrid computations.

The GNSS module is designed to track the RF signal received from the antenna, determine the signal code phase and carrier phase, compute the antenna position and output the raw and navigational data.

5. System Component Description

A. RMA-55B Multi-Mode Receiver (MMR)

The MMR is a solid-state, airborne multi-mode receiver consisting of an instrument landing system (ILS) receiver and in some MMR models a global navigation satellite system (GNSS) receiver. These receivers are used in conjunction with two ILS antennas (localizer and glide slope), a GNSS antenna (if used), a control head, and the cockpit displays. The primary purpose of the RMA-55B Multi-Mode Receiver is to provide lateral (localizer) and vertical (glide slope) guidance ILS information. In MMR models that include a GNSS receiver, the unit provides additional enroute navigation and non-precision approach information. This information is provided via ARINC 429 interfaces to the aircraft Automatic Flight Control System (AFCS) and instrument systems during manual and automatically controlled approaches and landings. The MMR also provides an aural output for the ILS ground station identification.

The MMR is completely solid state and is housed in an ARINC 3-MCU case per ARINC specification 600. A handle is located on the front panel of the MMR to facilitate installation, removal, and transport of the MMR receiver.

The MMR uses a low insertion force, size two shell ARINC 600 rear panel connector with three inserts. The top insert is used for antenna connections for GNSS upper antenna and future antenna connections. The middle insert is used for aircraft interconnections and future antenna connections. The bottom insert is used for input power, control panel output power, and coaxial antenna connectors for the glide slope antenna and localizer antenna. The keying pins are set to index pin code "03".

Forced air cooling, in accordance with ARINC specification 600, is required for cooling the MMR.

A front panel display provides an interface to an operator via a liquid crystal display (LCD) that is visible from the front of the MMR receiver to display messages in simple language in one of four modes: normal operation, BITE display, maintenance, and software loading.

Two pushbutton switches allow operator interface with the MMR receiver LCD.

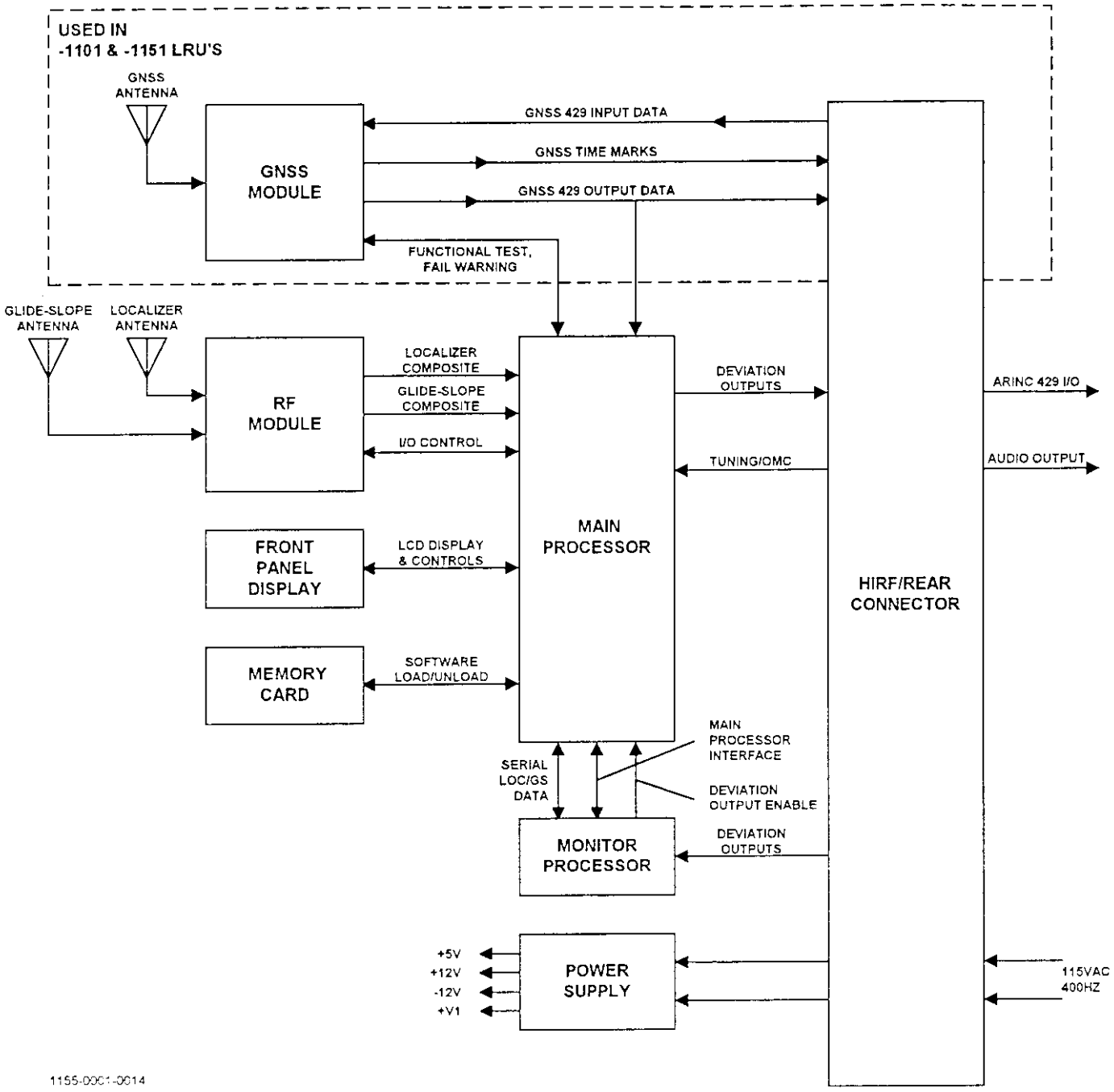
In normal operation, the front panel LCD displays the unit's characteristics: unit identification, part number, and serial number. The BITE display mode is activated after manual self-test has been exercised either from the front panel test pushbutton or remotely. In the BITE mode, BITE status is reported and in the event of a detected failure, additional help screens are provided to locate the detected failure to a module. BITE help pages are provided. In the maintenance mode, a set of maintenance words are displayed and decoded showing the names of data fields and the value of the data. Maintenance help pages are provided.

For loading software, a series of screens direct the operator during the data loading process. Software version and loading status are provided during the update process.

The MMR is partitioned into seven subassemblies: ILS rf module, main processor module, monitor processor module, HIRF/rear interconnect module, power supply assembly, display assembly, and memory card module (refer to figure 14). In -1101 and -1151 LRU's, a GNSS receiver is added to the MMR.

B. Other Components in the System

Other RMA-55B Multi-Mode Receiver System components are not supplied by AlliedSignal Electronic and Avionics Systems. Information on these units must be obtained from their respective manufacturers.



RMA-55B Multi-Mode Receiver, Simplified Block Diagram
Figure 14

6. Operation

A. General

The RMA-55B Multi-Mode Receiver provides localizer and glide-slope digital guidance data to the aircraft cockpit display and automatic flight control systems during approaches and landings. The ILS receiver performs this function as part of an ILS system that includes other units not supplied by AlliedSignal Electronic and Avionics Systems. Also, in -1101 and -1151 LRU's, the MMR provides enroute navigation and non-precision approach information: latitude and longitude.

B. Basic Theory

(1) ILS Receiver (All LRU's)

The ILS receiver consists of seven subassemblies: ILS rf module, main processor module, monitor processor module, HIRF/rear interconnect module, power supply assembly, display assembly, and memory card module (refer to figure 14).

(a) ILS RF Module

When receiving, the ILS receiver rf module converts the rf signals received by the localizer and glide-slope antennas into analog signals for processing by the digital-signal processor (DSP) section of the main processor module. The rf module consists of two rf sections: one for the VHF localizer signals and one for the UHF glide-slope signals. The primary difference between the two sections is in the front end circuitry due to the frequencies involved. BITE circuitry is included to both test and continuously monitor various stages of each receiver.

(b) Main Processor Module

Operation of the ILS receiver is controlled by the main processor module to process the analog signals from the rf module to generate the audio and deviation outputs, and control the aircraft interfaces and the data displayed on the front panel. The main processor module is divided into three major sections: digital-signal processor (DSP), central processing unit (CPU), and input/output (I/O).

1 DSP Section

The DSP section is used to process the analog outputs from the rf module and to generate automatic gain control (AGC) and test signals to the rf module.

The localizer and glide-slope signals from the rf module are digitized using an A/D converter. The A/D converter is also used to monitor signals from the BITE test points on the rf module and the power supply voltages. The digitized data from the A/D converter is stored in a FIFO which is accessed by the DSP.

Programmable logic devices (PLD's) are used by the DSP to generate the control signals for the localizer and glide-slope frequency synthesizers. A D/A converter feeds the AGC and test control signals to the rf module. A second D/A converter provides the audio outputs which are amplified to provide up to 50 milliwatts into a load ranging from 200 ohms to 600 ohms.

Data is exchanged with the CPU section through a dual-port RAM (random access memory) providing maximum throughput of both processors.

2 CPU Section

The CPU section is used to process the data from the DSP section to provide information to the front panel display and to provide the data and control signals to the I/O section.

The microprocessor in the CPU section controls all major functions to the ILS receiver. Application specific integrated circuit (ASIC's) and programmable logic devices (PLD's) serve as the microprocessor controller and provide the interfaces to the memory devices (boot routine, program, fault, and data), the data recorder/data loader flash card, and the front panel display driver.

Data is exchanged with the DSP section through a dual-port RAM. Data is also exchanged with the monitor processor module through a second dual-port RAM.

3 I/O Section

The I/O section provides the interfaces with other aircraft systems including the Central Maintenance Computer (CMC), Data Loader, control panels and displays, and the automatic flight control system (AFCS).

ARINC 429 inputs from data loader, CMC, and the tuning control panel(s) are processed by the ARINC 429 I/O ASIC. This ASIC also provides the ARINC 429 data loader, CMC, and deviation outputs. External buffers are used to satisfy the ARINC 429 characteristics for the transmitters.

All discrete inputs external to the ILS receiver are processed by the ARINC 429 I/O ASIC. This ASIC also generates the external discrete outputs which are buffered to prevent damage to the ASIC.

The I/O section also contains an RS-232C test interface and an IEEE 1149.1 Test Access Port (TAP) for the boundary scan interface.

(c) Monitor Processor Module

The monitor processor module provides a redundant dissimilar signal processing path for the localizer and glide-slope signals from the rf module. In order to determine if the main CPU section is functioning properly, the monitor processor calculates the deviation outputs and compares the results against those being transmitted over the ARINC 429 ILS receiver ports. If the calculations from the two microprocessors are excessively different, the monitor processor will ask the DSP processor in the main CPU section to set the deviation words to indicate "Failure." The monitor processor will shut down the output busses if the SSM of the output words does not indicate failure when required.

The localizer and glide-slope signals from the rf module are digitized using an A/D converter. The digitized data from the A/D converter is stored in a FIFO which is accessed by the DSP. The DSP does not generate any control signals for the rf module, but only serves as a monitor to verify data integrity. The DSP stores the processed data in a dual-port RAM. The DSP uses the same memory devices for both program and data storage. A PLD is used to generate the control signals for the DSP, the A/D converter, and the FIFO. Data is exchanged with the CPU section of the main processor module through a dual-port RAM, providing maximum throughput of both processors.

ARINC 429 receivers are used to monitor the deviation data transmitted by the main processor module. The receivers are controlled by a microprocessor which compares the calculated deviation outputs with the actual deviation outputs. A discrete output is used to disable the

transmitter on the main processor module in order to prevent erroneous data from being output by the ILS receiver. Separate program and data memory is used for the microprocessor. A PLD is used to generate the control signals for the microprocessor and ARINC 429 receivers.

(d) Power Supply Module

The 115 volts ac, 400 Hz aircraft power is converted by the power supply module into the dc operating voltages required by the various modules within the ILS receiver. A self-contained, high efficiency switching power supply is used to minimize power dissipation.

(e) HIRF/Rear Interconnect

To prevent High Intensity Radiation Fields (HIRF) or lightning from affecting operation by entering via rear connector cables, a HIRF compartment is formed in the rear of the ILS receiver. The signal and power cables are filtered by using discrete and distributed filter elements and limiting devices on the rear interconnect module located inside this HIRF compartment. The filtered lines are then fed to the appropriate points in the ILS receiver.

The ILS receiver is packaged in an aluminum casting. This seamless main frame ensures HIRF cannot enter the unit through structural seams. The slots formed by the removable side covers are sealed against HIRF with protective gaskets and metal covers.

(f) Front Panel Display Assembly

The front panel display module is mounted behind the front panel and provides an interface to an operator via a low-power liquid crystal display (LCD) that is visible from the front of the ILS receiver. In addition to the LCD, the module contains "Light Pipe" back lighting, temperature compensation circuitry, and a PC board containing an associated LCD driver, two pushbutton switches, and a D-sub, nine-pin, RS-232 serial type connector.

The LCD is a bit-mapped display capable of displaying alphanumeric and graphical symbols. Simple messages written in plain language minimize the potential for misunderstanding or incorrect interpretation. The LCD displays the following:

- Part Number/Software Identification,
- Status,
- Results of Level 1 BITE Tests,
- Maintenance Help Pages,
- Shop Maintenance Data,
- Flight Fault Memory Contents,
- Software Loading Status, and
- Capable of Customizing for Airline Unique Maintenance Messages.

(g) Memory Card Interface Module

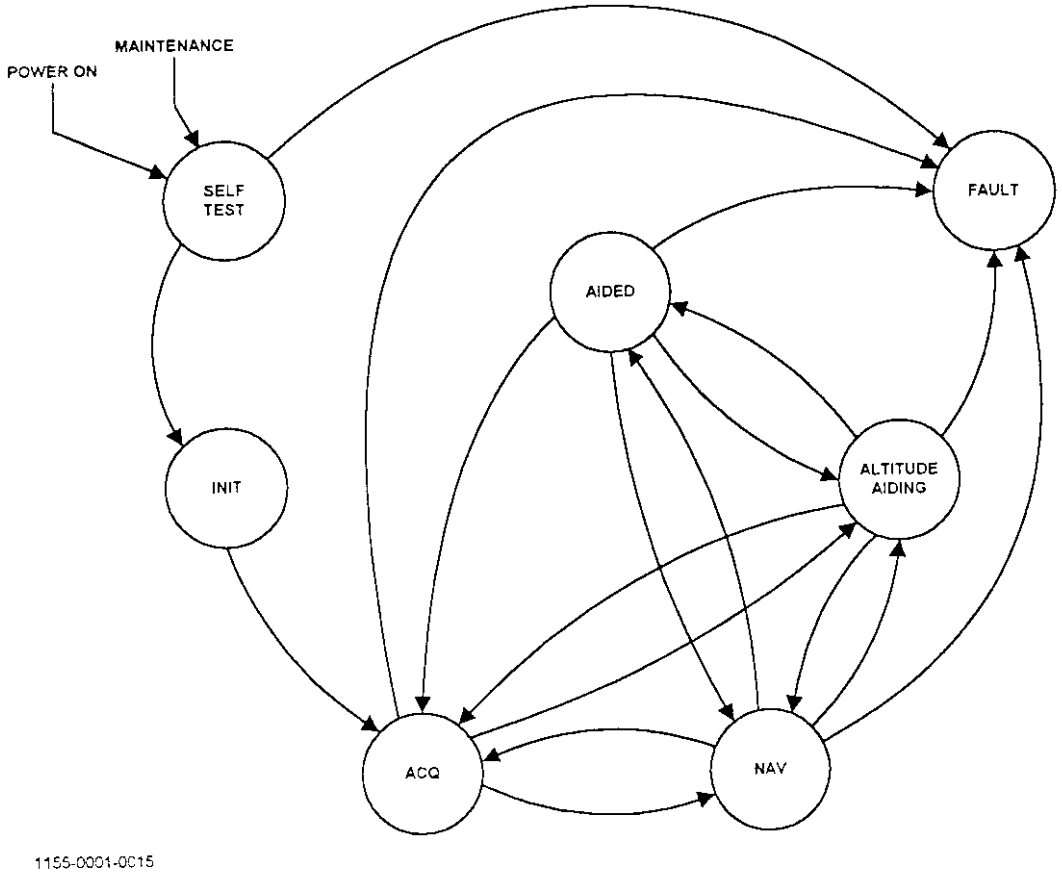
The memory card interface module is used to load data into the CPU or record data from the CPU. The memory card interface module supports FLASH cards via the front panel Personal Computing Memory Card Interface Adapter (PCMCIA) slot. Intel® Series 2 cards with capabilities ranging from 4, 10, and 20 megabytes (up to 64 megabytes, when available) are all supported. The FLASH card is inserted through the front panel. In one mode, data stored on the flash card memory module is used to update program or data memory in the ILS receiver. In another mode, the flash card memory module functions as a data recorder.

(2) GNSS Receiver (-1101 and -1151 LRU's)

The GNSS receiver consists of an antenna and the GNSS module (refer to figure 14). The GNSS module has seven operating modes: self-test, initialization, acquisition, navigation, altitude/clock aiding, aided and fault. Figure 15 illustrates the automatic transition path between modes of operation.

(a) Self-Test Mode

Upon application of power, the GNSS module is in self test mode until completion of all internal power-up built-in-tests (BIT) of the MMR. The self-test mode is initiated by ARINC 429 tuning input, function test discrete input, or through the front panel pushbuttons of the MMR. After self test is completed, the GNSS module exits to either the initialization mode or if a fault was detected, the fault mode.



GNSS Module Mode Transition Diagram
Figure 15

(b) Initialization Mode

After completion of the GNSS module self-test mode, the GNSS module enters the initialization mode and remains in this mode until the device has initialized the hardware to enable it to enter the acquisition mode.

(c) Acquisition Mode

The GNSS module operates in the acquisition mode when insufficient satellite and/or aiding data are available to produce an initial navigation solution or be in the navigation, altitude/clock aiding, or aided modes. The acquisition mode is entered from the initialization, altitude/clock aided, aided, or navigation modes and exits to the navigation, altitude/clock aided, or fault modes.

To acquire signals from the NAVSTAR Global Position Satellite (GPS) system, the GNSS module uses:

- almanac data - which describes the satellite orbits and is stored in nonvolatile memory,
- time - which in conjunction with almanac data is used to estimate the present position of satellites in their orbits, and
- approximate location of the GNSS module so a prediction can be made as to which satellites are visible (satellites 2.0 degrees or more above the horizon with respect to current position is considered visible).

When power is applied to the GNSS module, an ARINC 429 bus provides date, time, and position data. The GNSS module predicts which satellites are visible and acquire the satellite signals which meet minimum requirements for acquisition and sensitivity. The GNSS module then collects ephemeris data by decoding the satellite down-link data message. (Ephemeris data is a tabulation of the assigned place for each satellite in the NAVSTAR GPS system.) After each satellite in view is acquired, the satellite measurement data is transmitted continuously. When a sufficient number of satellites are being tracked, position and velocity can be computed, and the navigation mode can be entered.

If the GNSS module cannot perform acquisition due to an absence of almanac data or GNSS module initialization data from the ARINC 429 bus, the GNSS module then initiates a "Search the Skies" acquisition. The GNSS module attempts to acquire all satellites in the GPS constellation. Once a satellite has been acquired, ephemeris data is decoded from the satellite down-link message. After sufficient satellites have been acquired, the GNSS module set the sign status matrix (SSM) to the appropriate status mode and enters the navigation mode.

(d) Navigation Mode

When the number of GPS satellites being tracked provide a sufficient set of measurements for the GNSS module to compute position, velocity, and time, the GNSS module enters to navigation mode where the ephemeris data is decoded to provide a navigation solution. In this mode, the satellite measurement data continues to be transmitted without interruption.

(e) Altitude/Clock Aiding Mode

If satellite measurements are not sufficient for the GNSS module to perform the navigation mode, yet are sufficient when altitude and clock information is available, the GNSS module enters into the altitude/clock aiding mode. In the altitude/clock aiding mode, the GNSS module uses inertial or pressure altitude and clock drift information to aid the navigation solution during extended periods of insufficient satellite coverage and geometry. The GNSS module enters altitude/clock aiding mode only after the pressure altitude has been calibrated with a geometric altitude solution. If both inertial altitude and air data altitude are available, the GNSS module uses the inertial altitude.

(f) Aided Mode

(Not available.)

(g) Fault Mode

The GNSS module enters the fault mode during the period of time in which the GNSS module outputs are affected by one or more critical system faults. This mode supersedes all others and will remain active until the next power-down/power-up cycle.

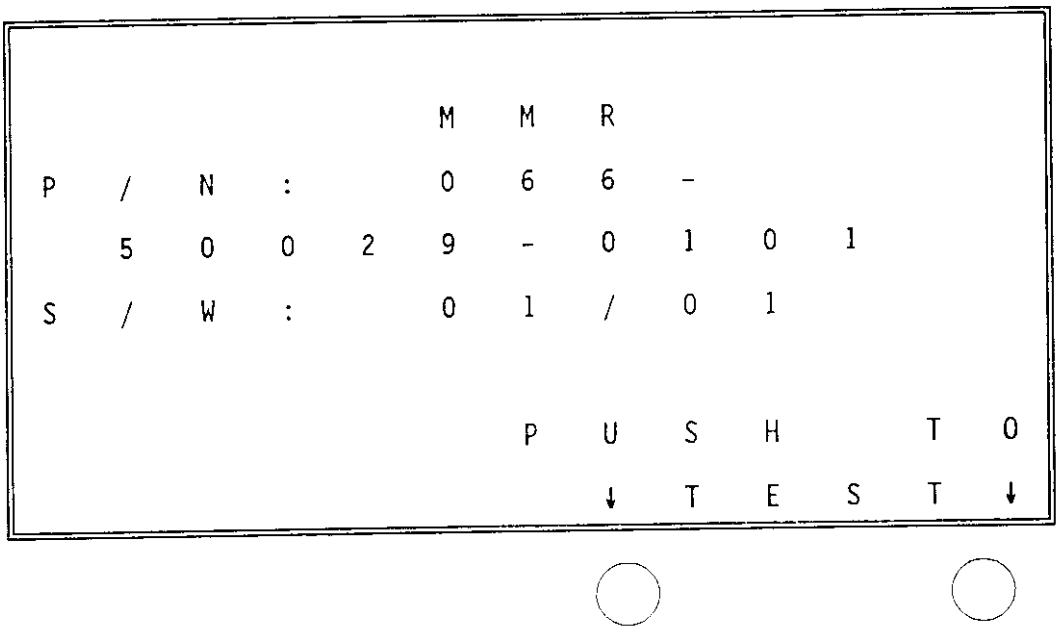
FAULT ISOLATION

1. General

Fault isolation is the process of isolating the source of a system failure to an LRU (line replaceable unit) or to the aircraft wiring.

Fault isolation in the RMA-55B Multi-Mode Receiver System includes a continuity check of the interwiring, and the assurance that proper installation techniques and procedures have been followed.

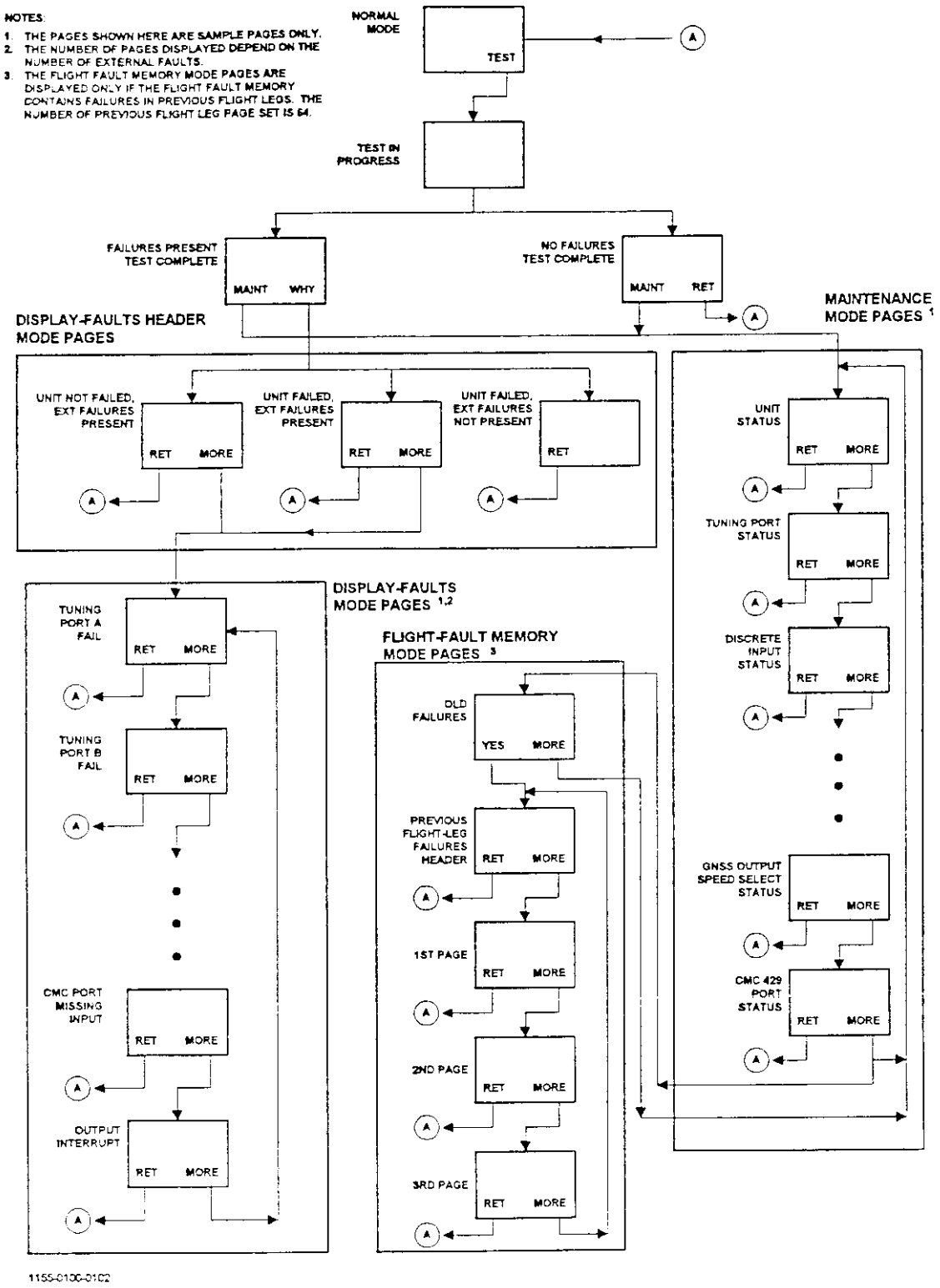
A functional self test of the LRU may be initiated by pressing the "test" key pushbutton switch as designated on the front panel LCD (figure 101). Although the normal-mode screen indicates that this is actuated from the right key, the left key has the same function if pressed while the RMA-55B Multi-Mode Receiver (MMR) LCD is in its normal mode.



Typical "Normal-Mode" Screen
Figure 101

Figure 102 illustrates the control flow of the LCD screens (except for the data loading and data recording screens).

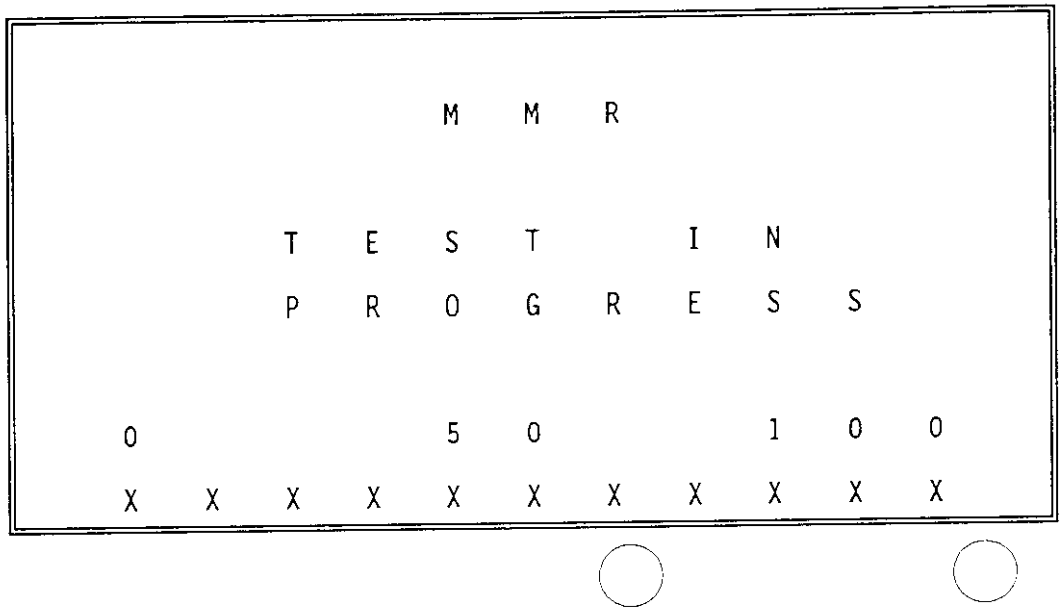
A complete functional test of the system can be performed as described in paragraph 7.B. in "Maintenance Practices" section 200 of this manual.



LCD Control Flow
Figure 102

2. Self-Test Mode

The self-test mode starts by displaying the "Test in Progress" screen (figure 103) one second after pressing the "test" key. This is displayed for four seconds with a moving thermometer along the bottom of the LCD indicating the progress of the test from one to five seconds.



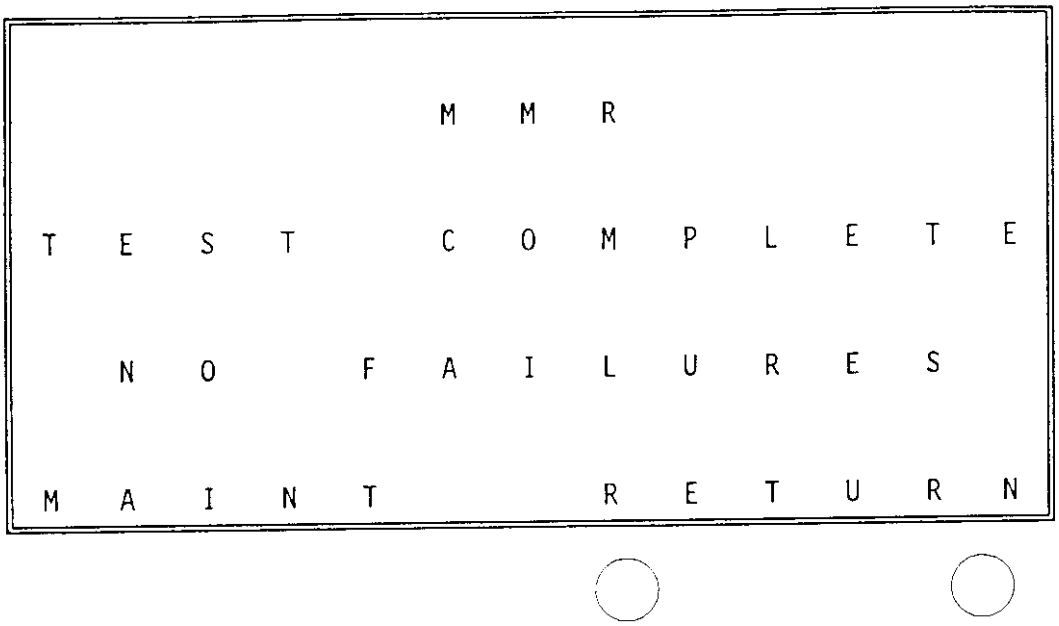
"Test in Progress" Screen
Figure 103

The "Normal-Mode" screen (figure 101) is displayed for the first second of the test sequence.

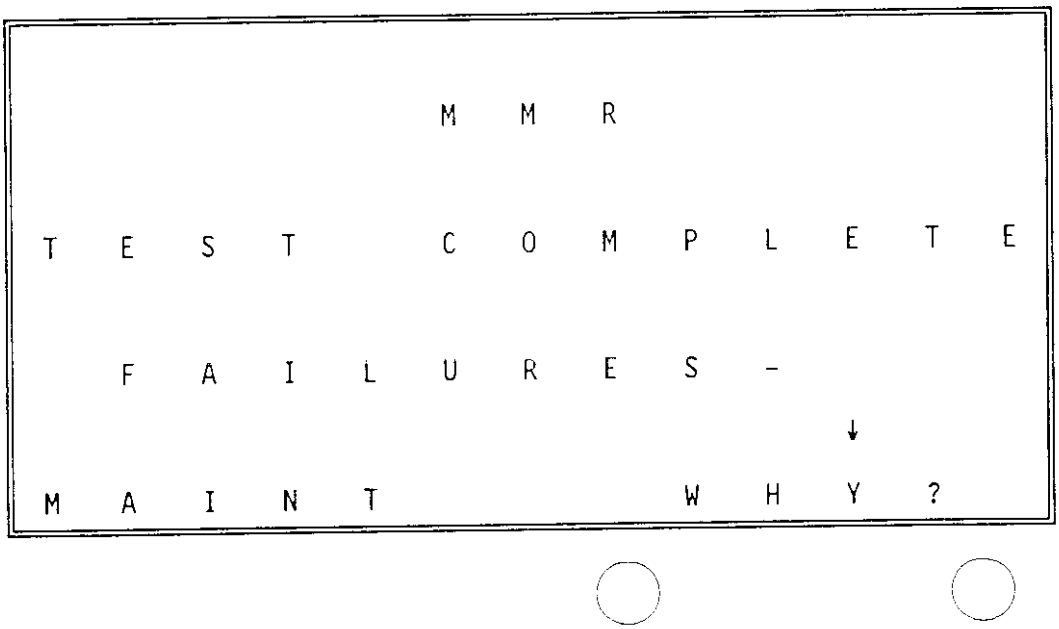
Once complete, the "Test Complete, No Failures" screen is displayed (figure 104), or the "Test Complete, Failures" screen is displayed (figure 105). Both screens contain two key selections each: "MAINT" and "RETURN" or "MAINT" and "WHY?", respectively.

- "MAINT" - For both screens, "MAINT" is located on the left key. This allows the initiation of the extended maintenance pages of the system for troubleshooting. Refer to paragraph 4.
- "RETURN" - In the "Test Complete, No Failures" screen, the "RETURN" key to the right returns the system to its "Normal-Mode" screen (figure 101).
- "WHY?" - In the "Test Complete, Failures" screen, the "WHY?" key to the right puts the system into the display-failures mode where individual system failures are displayed one per page. Refer to paragraph 3.

While in the self-test mode, not pressing either key for five minutes causes the system to return to the "Normal-Mode" screen (figure 101).



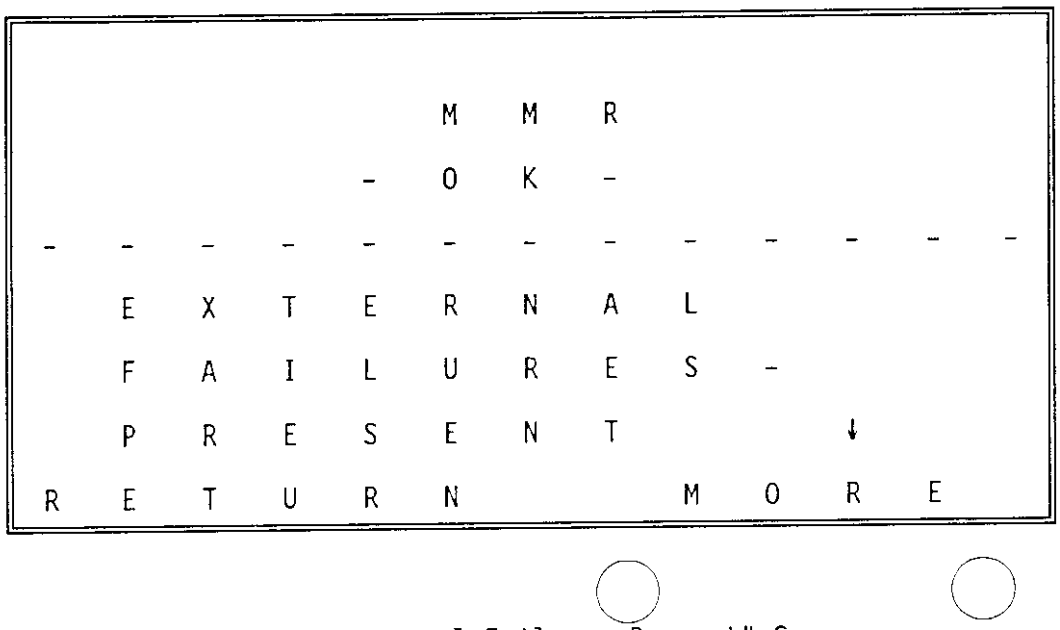
"Test Complete, No Failures" Screen
Figure 104



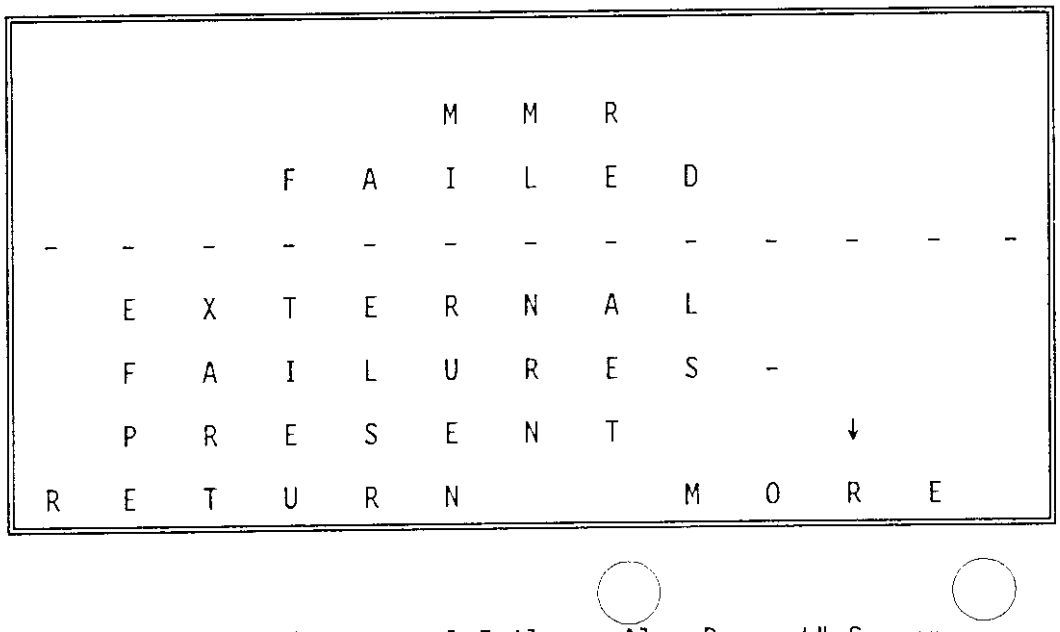
"Test Complete, Failures" Screen
Figure 105

3. Display-Failures Mode

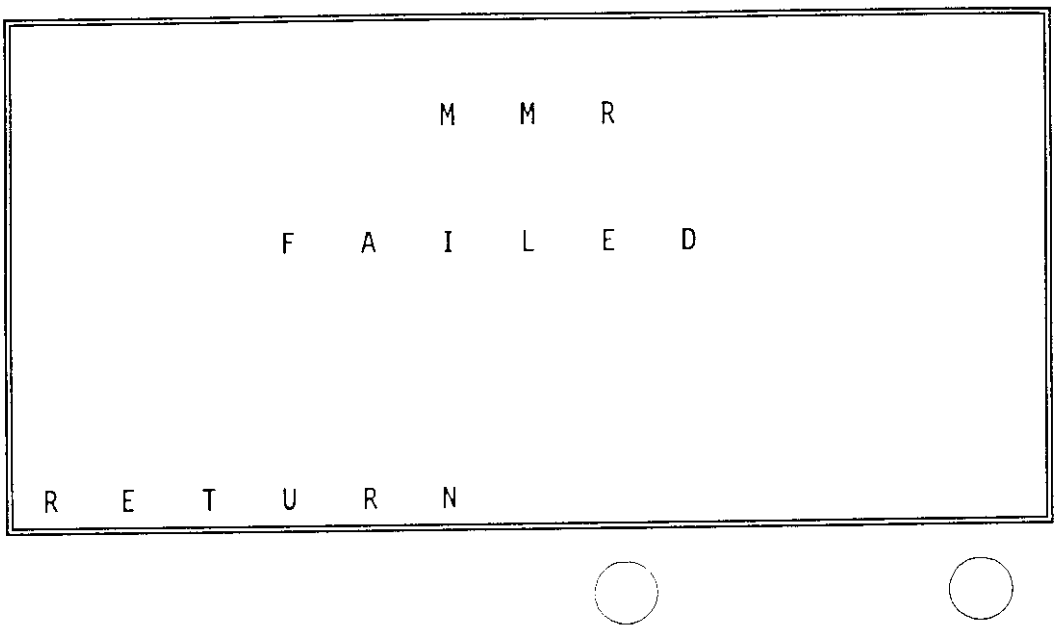
One of three failure possibilities exist: the MMR is okay, but there are external failures (figure 106), the MMR failed and there are external failures (figure 107), and the MMR failed, but there are no external failures (figure 108).



"MMR OK, External Failures Present" Screen
Figure 106



"MMR Failed, External Failures Also Present" Screen
Figure 107



"MMR Failed, External Failures Not Present" Screen
Figure 108

All "Display-Failures Mode" screens have the "MORE" selection on the right key. The only exception is when there is only one failure page. This only happens when the MMR itself has failed and no other external failure exists (figure 108).

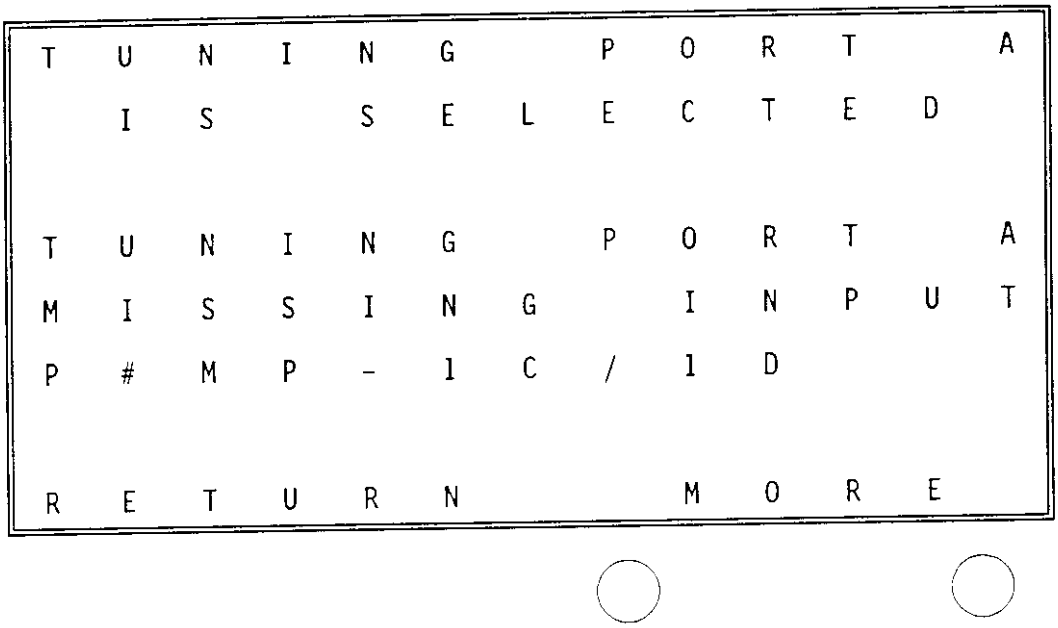
- "MORE" - Pressing this key cycles through all of the failures present. When on the last page, the "MORE" key causes a return to the first displayed failure page (figure 106 or 107).

All "Display-Failures Mode" screens have the "RETURN" selection on the left key.

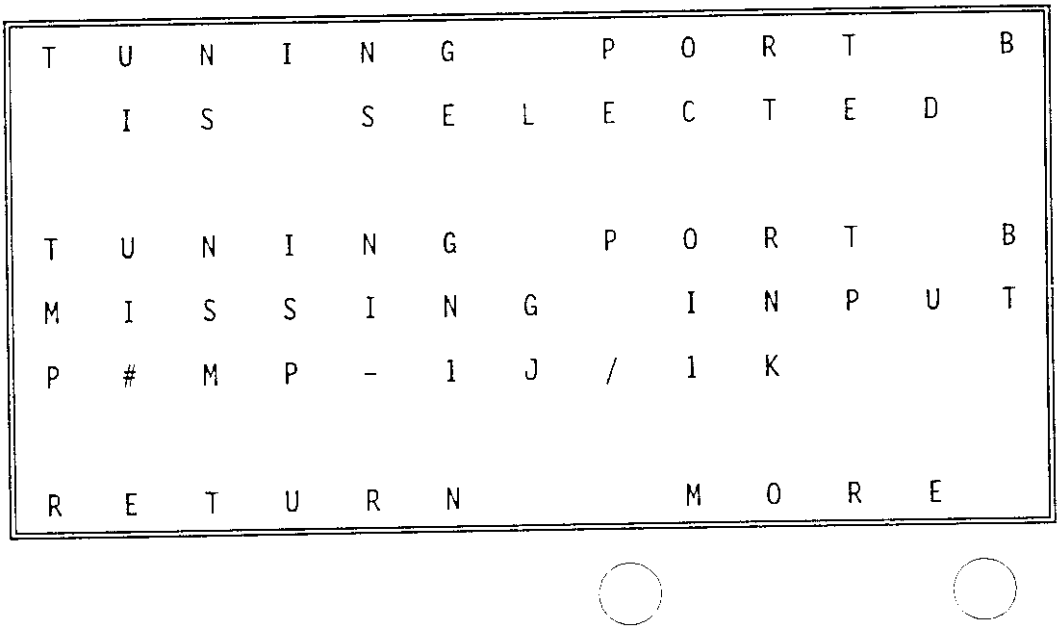
- "RETURN" - Pressing this key causes the system to return to the "Normal-Mode" screen (figure 101).

While in the display-failures mode, not pressing either key for five minutes causes the system to return to the "Normal-Mode" screen (figure 101).

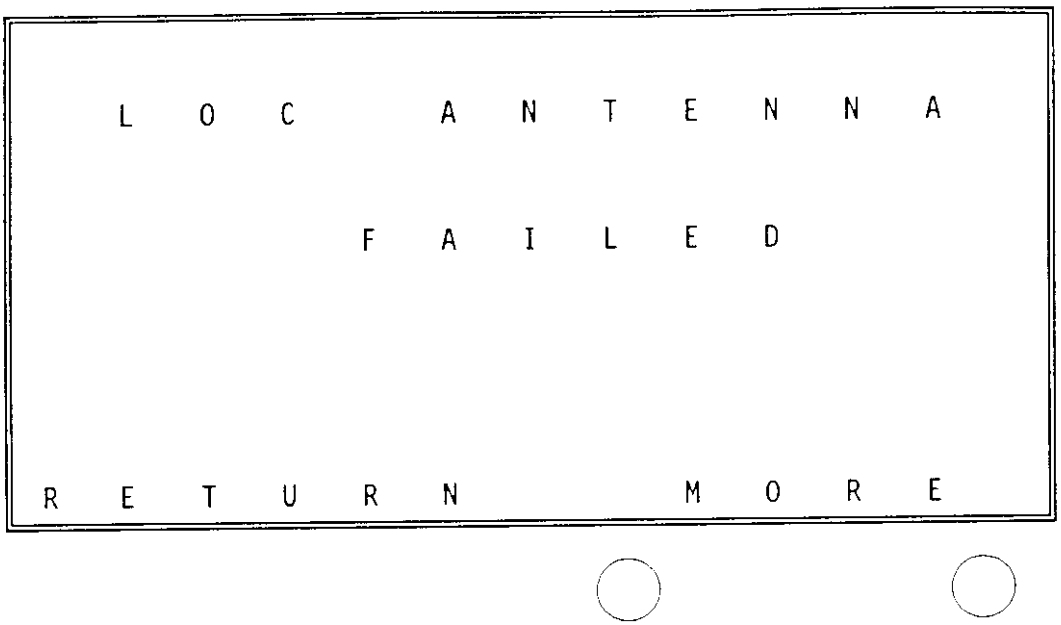
Figures 109 through 114 show typical display-failure modes that may be encountered.



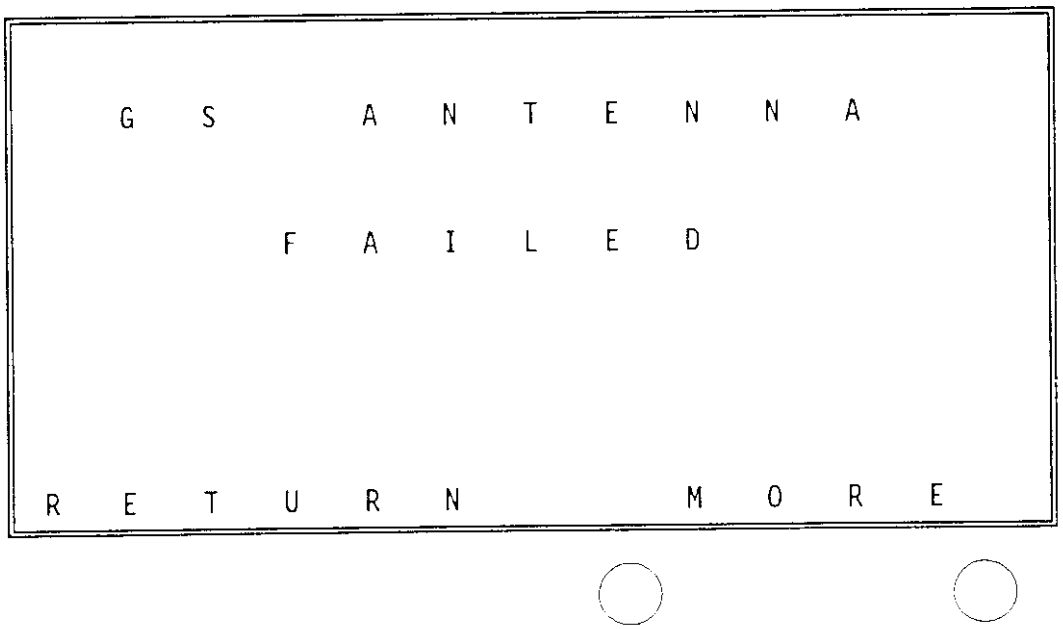
"Tuning Port A Failure" Screen
Figure 109



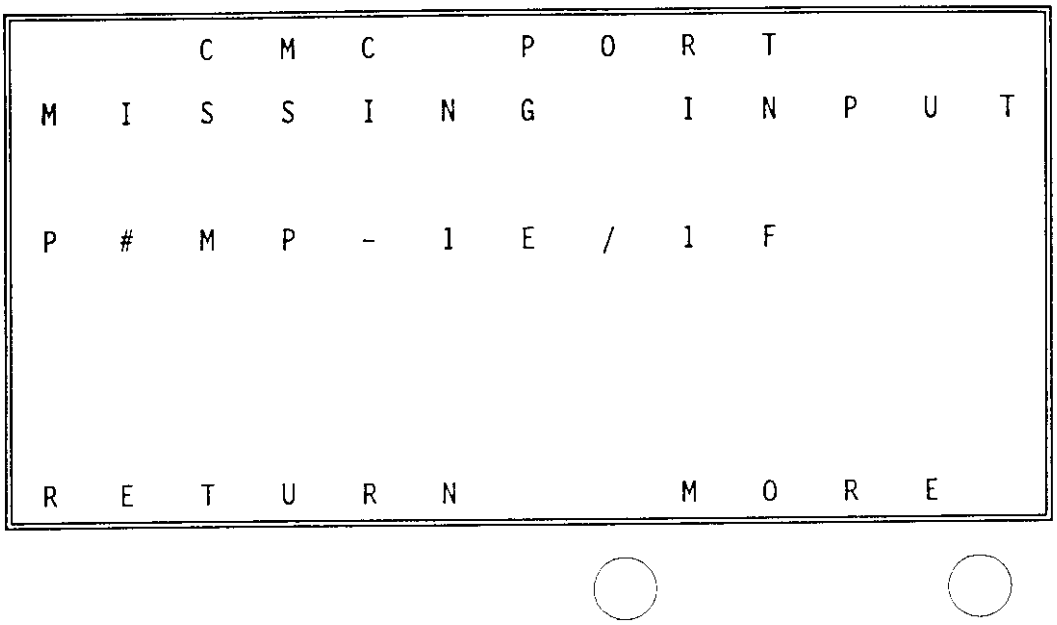
"Tuning Port B Failure" Screen
Figure 110



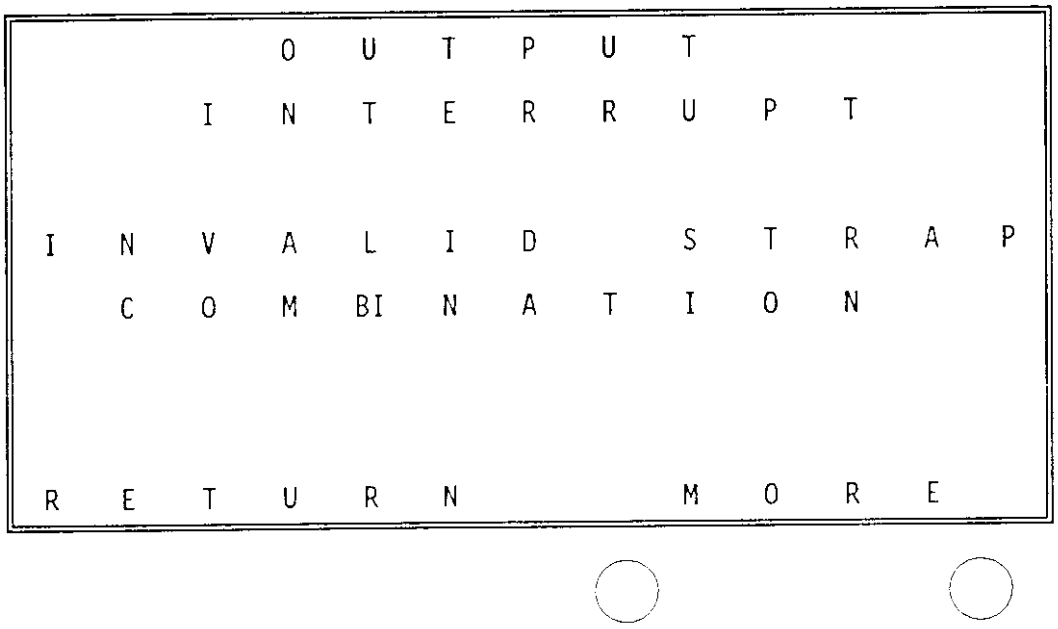
"LOC Antenna Failure" Screen
Figure 111



"GS Antenna Failure" Screen
Figure 112



"CMC Port Failure" Screen
Figure 113



"Output Interrupt Program Pin Invalid Strapping" Screen
Figure 114

4. Maintenance Mode

The maintenance mode is entered from either one of the two "Test Complete" screens (figure 104 or 105). The maintenance mode allows troubleshooting of all components of the MMR system, both internal and external.

All pages have the "MORE" selection on the right key.

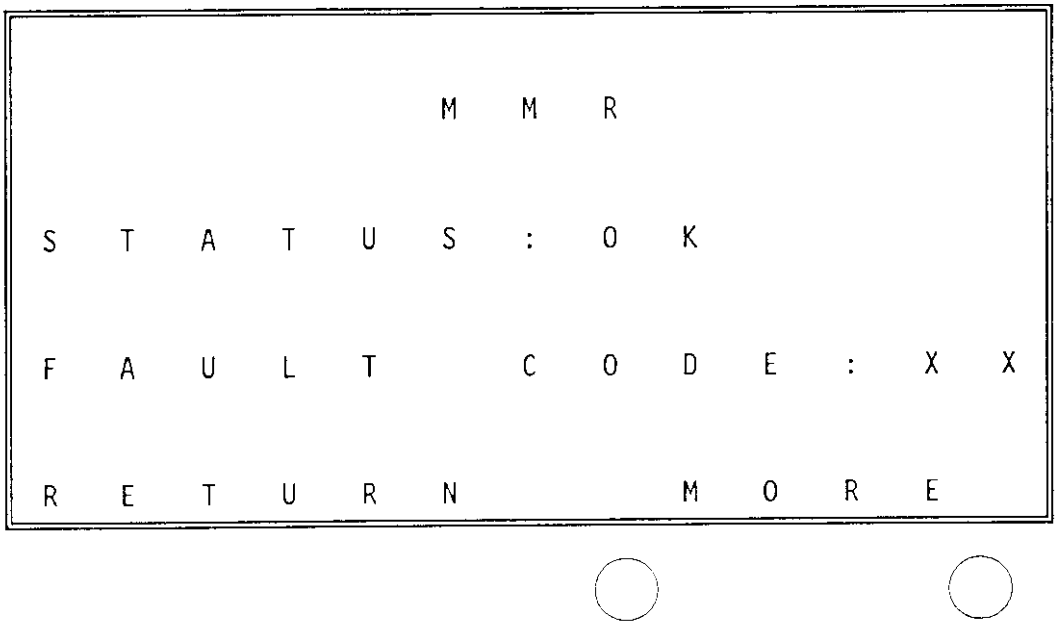
- "MORE" - Pressing this key cycles through all of the maintenance pages. When on the last page, the "MORE" key causes a return to the first displayed maintenance screen.

All pages have the "RETURN" selection on the left key.

- "RETURN" - Pressing this key causes the system to return to the "Normal-Mode" screen (figure 101).

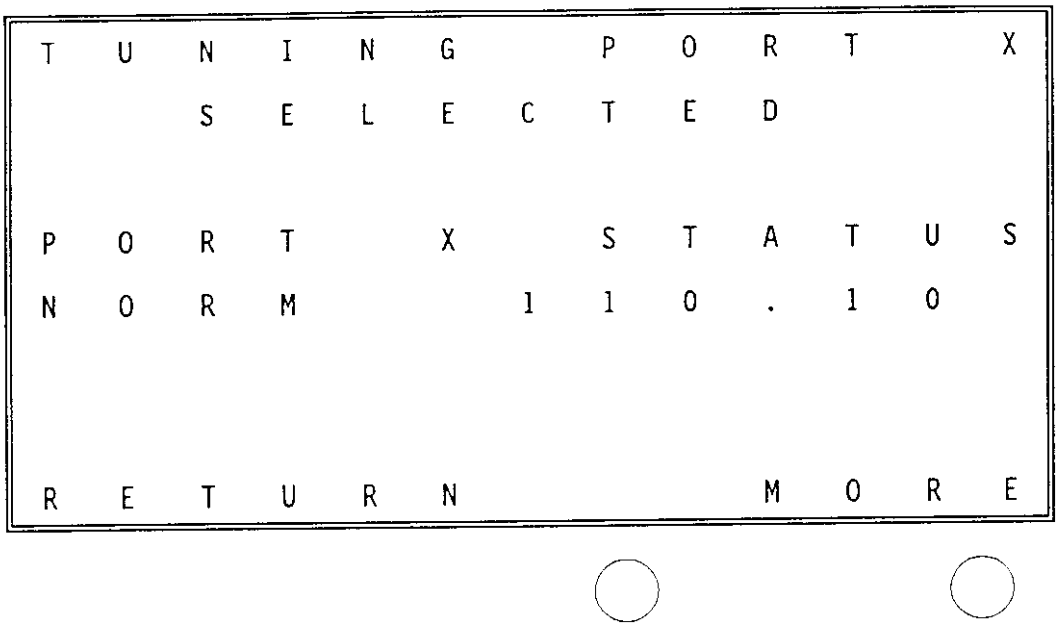
There is no timeout in the maintenance mode when the aircraft is on the ground. But, while in the air, not pressing a key for five minutes causes the system to return to the "Normal-Mode" screen (figure 101).

Figures 115 through 122 show typical maintenance-mode pages that may be encountered.

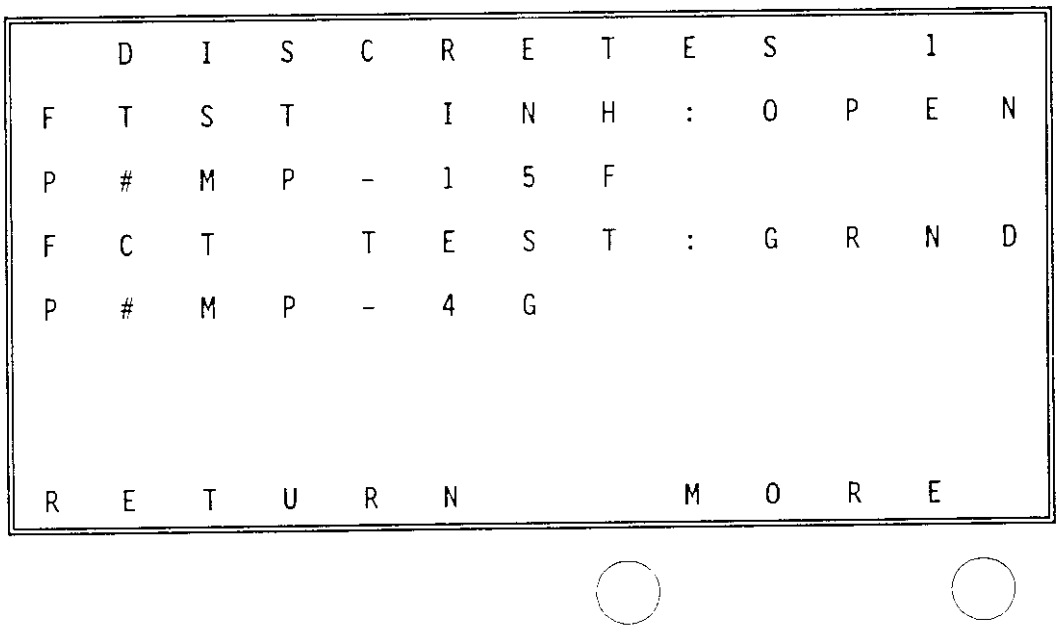


NOTE: The "Status" field displays "FAILED" if either an external or an internal failure is detected.

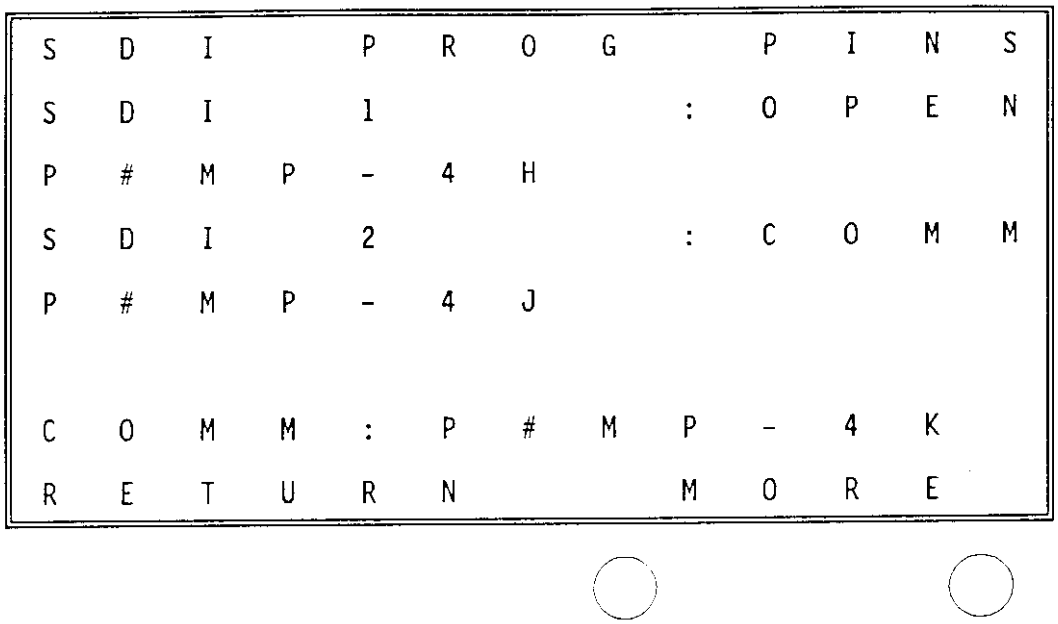
"MMR Status (OK, FAILED)" Screen
Figure 115



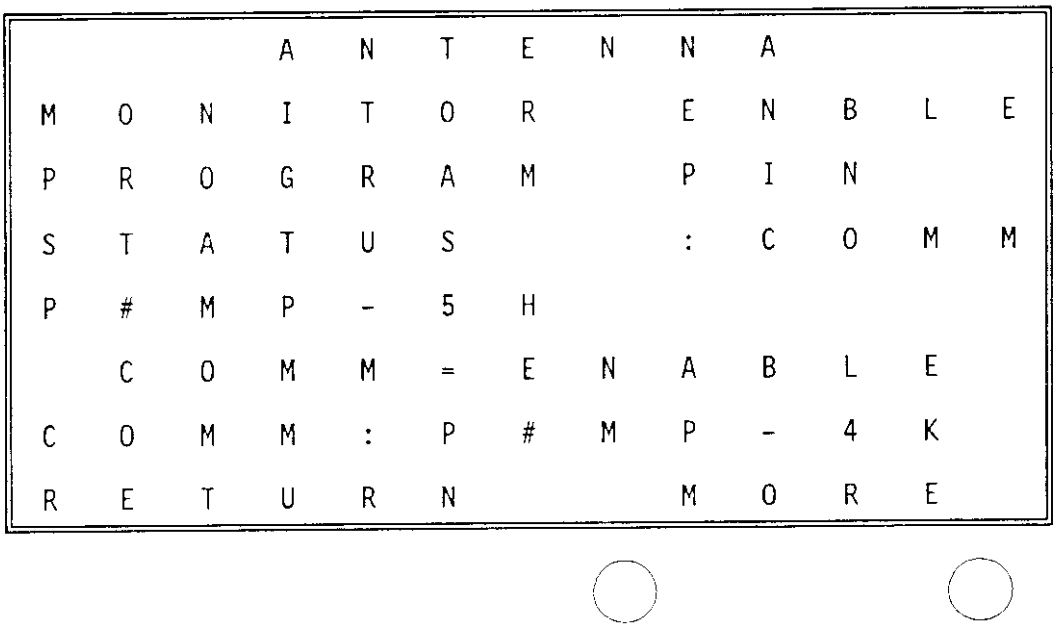
"Tuning Port Status (NORM, TEST, NCD, NODAT)" Screen
Figure 116



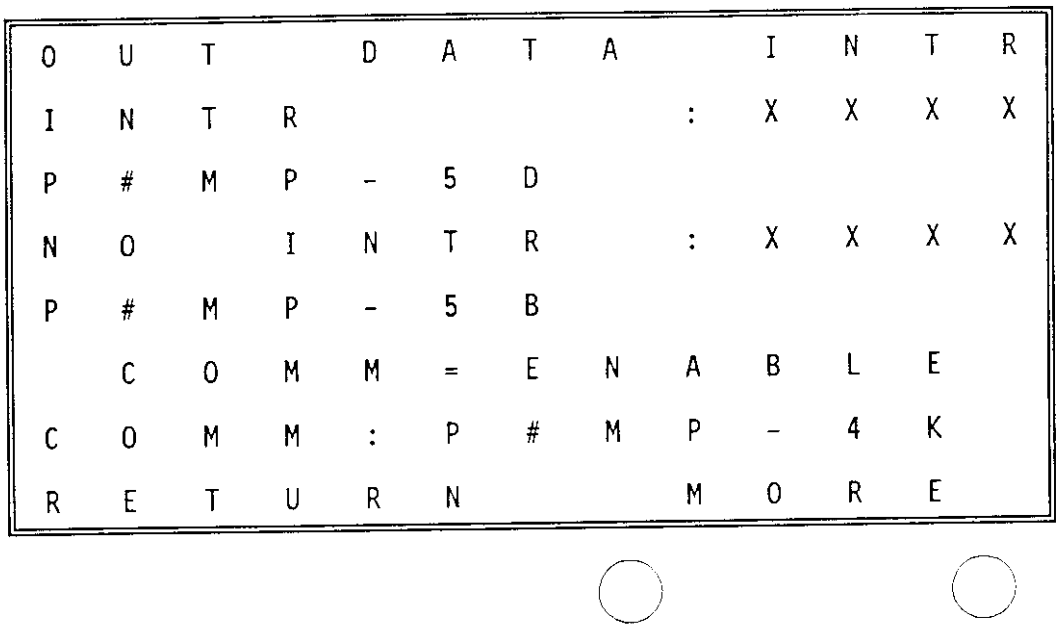
"Discrete Input Status Page 1 (OPEN, GRND)" Screen
Figure 117



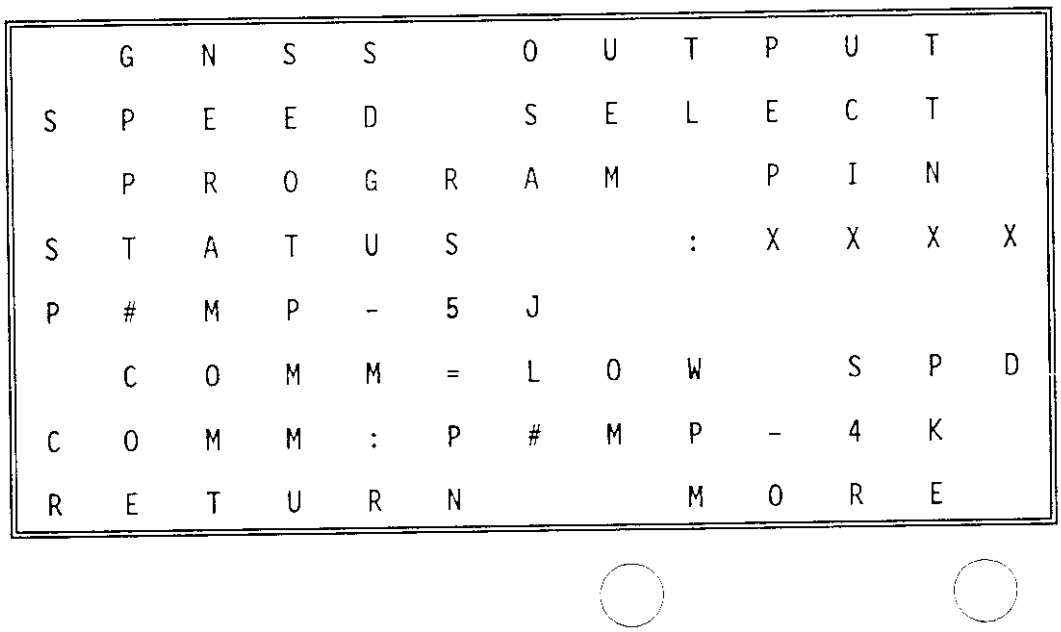
"SDI Program Pin Status Page (OPEN, COMM)" Screen
Figure 118



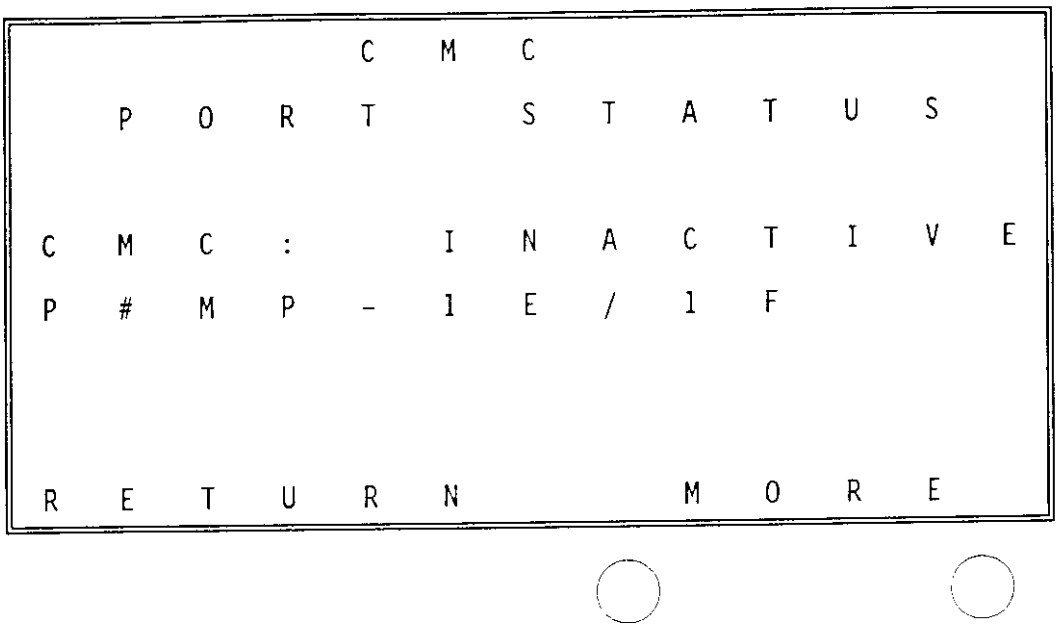
"Antenna Monitor Program Pin Status Page (OPEN, COMM)" Screen
Figure 119



"Output Data Interrupt Enable Program Pin Status Page (OPEN, COMM)" Screen
Figure 120



"GNSS Output Speed Select Program Pin Status Page (OPEN, COMM)" Screen
Figure 121



"CMC Port Status (ACTIVE, INACTIVE)" Screen
Figure 122

5. Flight Fault Memory Mode

When the flight-fault memory contains failures from previous flight legs, an "Old Failures" screen (figure 123) is presented as the last page of the maintenance mode screens. This page allows the viewing of previous flight leg failures, one flight leg at a time by pressing the "YES" key. Pressing the "MORE" key from this page bypasses this function and returns the system back to the first page of the maintenance data.

Once in the flight fault memory mode, flight legs are displayed from the most recent, backwards. Four pages are required for each flight leg. The first page of each flight leg contains the date, flight number, aircraft number, and departure/destination stations (figure 124). Three pages follow for each flight leg to contain the 13 possible failures (figure 125).

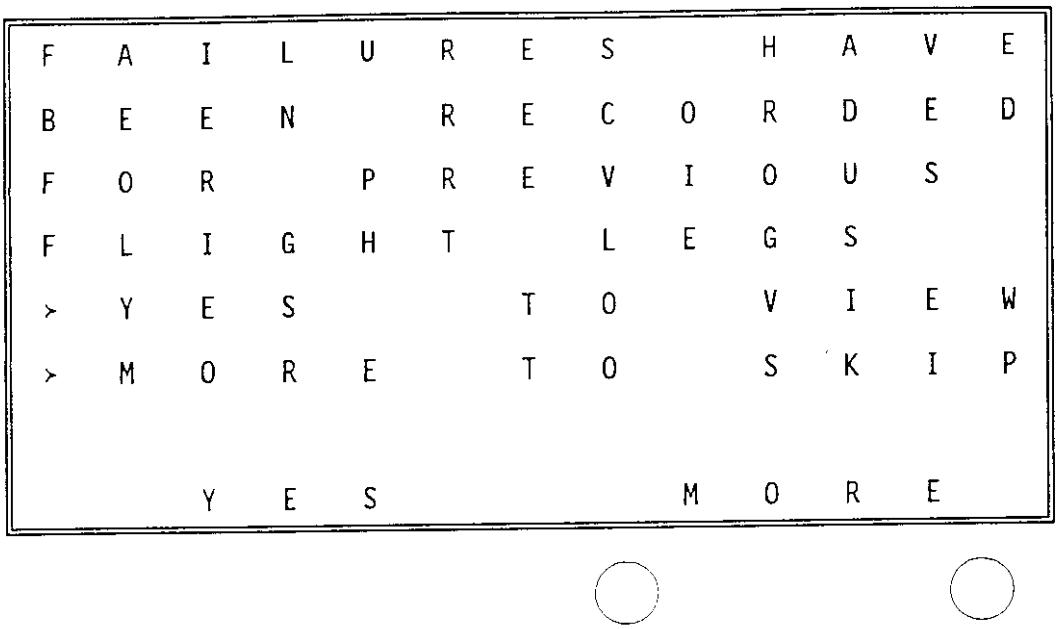
All flight fault memory pages have the "MORE" selection on the right key.

- "MORE" - Pressing the key cycles through all of the flight fault memory pages. When on the last page, the "MORE" key causes a return to the first page.

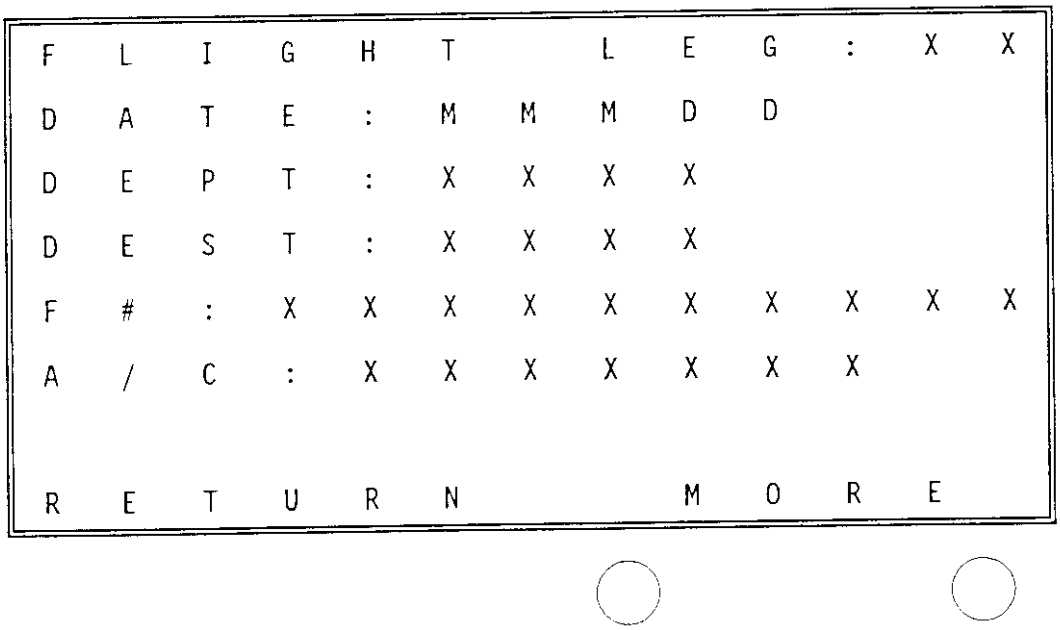
All flight fault memory pages have the "RETURN" selection on the left key.

- "RETURN" - Pressing this key causes the system to return to normal mode (figure 101).

There is no timeout in this mode when the aircraft is on the ground. But, while in the air, not pressing a key for five minutes causes the system to return to the "Normal-Mode" screen (figure 101).



"Old Failures Page" Screen
Figure 123



"Previous Flight Legs Failures First Page" Screen
Figure 124

F	L	I	G	H	T		L	E	G	:	X	X
F	C		U	T	C			R	P	O		
0	0		0	0	0	0		0	0	0	0	
0	0		0	0	0	0		0	0	0	0	
0	0		0	0	0	0		0	0	0	0	
0	0		0	0	0	0		0	0	0	0	
0	0		0	0	0	0		0	0	0	0	
R	E	T	U	R	N			M	O	R	E	

NOTE: "FC" is fault code, "UTC" is time, "R" is repetition count, "P" is phase, "O" is origin.

"Previous Flight Legs Failures Data Page" Screen
(Three Screens per Flight Leg)
Figure 125

MAINTENANCE PRACTICES

1. General

This section of the manual provides service personnel with installation and maintenance information for the RMA-55B Multi-Mode Receiver (MMR). Installation instructions are supported by mechanical outline drawings and an electrical interconnection diagram. These drawings, located at the back of this section, should be reviewed by the installer, and requirements peculiar to the airframe should be established before starting the installation.

2. Inspection After Unpacking

CAUTION: THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. EQUIPMENT, MODULES, AND ESDS DEVICES MUST BE HANDLED WITH APPROPRIATE PRECAUTIONS.

Visually inspect the RMA-55B Multi-Mode Receiver (MMR) and all associated equipments for possible damage which may have occurred during shipment. Inspect for dents, deep abrasions, chipped paint, etc. If any equipment is damaged, notify the transportation carrier immediately.

An AlliedSignal Electronic and Avionics Systems (EAS) test and inspection record and quality report tag is included with each shipped unit. This ensures the customer that the necessary production tests and inspection operations have been performed on that particular unit.

One copy of the quality report tag is affixed to each unit by the first assembly inspector. As the unit proceeds through production and stock to the shipping area, the appropriate blocks on the test and inspection record of the tag are stamped. This tag accompanies the unit when it is shipped to the customer. Customers are requested to complete the quality report portion of the tag and return it to the AlliedSignal Electronic and Avionics Systems, Quality Assurance Department, Redmond, Washington. This portion of the tag provides CAS with the necessary information required to evaluate shipping methods as well as test and inspection effectiveness.

Completed cards are accumulated to provide information for a periodic analysis.

3. Preinstallation Testing

The components in the MMR have been adjusted and tested prior to shipment. Therefore, preinstallation testing is not required. However, if preinstallation testing of the units is desired, refer to the customer acceptance criteria given in the Component Maintenance Manual for the appropriate unit in the system. Refer to figure 4 in the "Description and Operation" section of this manual for a list of related Component Maintenance Manuals.

4. Equipment Changes and Marking

AlliedSignal Electronic and Avionics Systems use a standardized marking system to identify equipment and their subassemblies which have had changes incorporated. Refer to the front of the appropriate Component Maintenance Manual for a list of Service Bulletins affecting the unit.

5. Interchangeability

The MMR will operate in any installation that complies with ARINC Characteristics 743 and 755 and EUROCAE ED-72A. Refer to aircraft system interwiring diagram figure 211 for particulars.

6. Installation

A. General

The MMR should be installed in the aircraft in a manner consistent with acceptable workmanship and engineering practices, and in accordance with the instructions set forth in this publication. To ensure that the system has been properly and safely installed in the aircraft, the installer should make a thorough visual inspection and conduct an overall operational and functional check of the system on the ground prior to flight.

CAUTION: AFTER INSTALLATION OF THE CABLING AND BEFORE INSTALLATION OF THE EQUIPMENT, A CHECK SHOULD BE MADE WITH AIRCRAFT PRIMARY POWER BEING SUPPLIED TO THE MOUNT CONNECTORS TO ENSURE THAT POWER IS APPLIED ONLY TO THE PINS SPECIFIED IN AIRCRAFT SYSTEM INTERWIRING DIAGRAM FIGURE 211.

B. Location of Equipment

Location of the MMR in the aircraft is not critical, as long as the environment is compatible with the equipment design and is not near equipment operating with high pulse current of high power outputs such as radar. Refer to the Leading Particulars, figure 7, in the "Description and Operation" section of this manual. Forced air cooling is required for cooling the MMR in accordance with ARINC Characteristic 600. The associated cooling equipment must be mounted in accordance with the manufacturer's instructions. Refer

to outline diagram figure 210 for specific "air flow rate" for the MMR Part Number being installed.

Antenna and mounting should be in accordance with the manufacturer's instructions for the antenna being used. The coaxial cable connecting the antenna to the mount should be as short and direct as possible and any required bends should be gradual. When two or more MMR's are installed in an aircraft, it is necessary to provide adequate space isolation between antennas of each system to ensure that the use of one system does not interfere with the reception from another system. A minimum of 35 dB of space isolation should be provided, and any steps which can be taken to provide further isolation should be considered.

Control unit location and mounting can be determined by mutual agreement between the user and airframe manufacturer.

C. Interwiring and Cable Fabrication

(1) General

Figure 211 is a complete aircraft system interwiring diagram for a single RMA-55B Multi-Mode Receiver System and associated components. This diagram requires thorough study before the installer begins installation of the aircraft wiring.

When two or more systems are being installed in the aircraft, the interconnecting wiring shown in figure 211, as well as all other installation instructions must be duplicated.

Cabling must be fabricated by the installer in accordance with figure 211. Wires connected to parallel pins should be approximately the same length, so that the best distribution of current can be effected. AlliedSignal Electronic and Avionics Systems recommends that all wires, including spares, shown on aircraft system interwiring diagram figure 211 be included in the fabricated harness. However, if full ARINC wiring is not desired, the installer should ensure that the minimum wiring requirements for the features and functions to be used are incorporated.

NOTE: To allow for inspection or repair of the connector, or the wiring to the connector, sufficient lead length should be left so that the rear connector assembly can be pulled forward several inches when the mounting hardware for the rear connector assembly is removed. A bend should be made in the harness near the connector to allow water droplets, that might form on the harness from condensation, to drip off at the bend and not collect at the connector.

When the cables are installed in the aircraft, they must be supported firmly enough to prevent movement and should be carefully protected against chafing. Additional protection should also be provided in all locations where the cables may be subject to abuse. In wire bundles, the cabling should not be tied tightly together as this tends to increase the possibility of noise pick-up and similar interference. When routing cables through the airframe, try to avoid running cables or wire close to power sources (400-Hz generator, etc). If unavoidable, the cables should cross high-level lines at a right angle, or high-quality shielded conductors should be used.

If a cable must pass through a bulkhead between pressurized and unpressurized zones, this passage must conform to the aircraft manufacturer's specifications.

The assembler must be knowledgeable of any system variations peculiar to the installation, and must thoroughly understand the complexities associated with handling related problems of line lengths, capacitance, and of susceptibility to interference.

The following determinants are the responsibility of the installation agency for fabrication of the wiring harness, see figures 201 and 211.

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
TP-1	-	Reserved	
TP-2	Input	GNSS Upper Antenna	Required for GNSS receiver input signal.
TP-3	-	Reserved	
TP-4	-	Reserved	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 1 of 11)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-A1	Output	ILS Look-Alike Output Port #1 (A) (AFCS)	One of two low speed ARINC 429 data output ports to provide localizer and glide-slope deviation outputs to the AFCS. Used to transmit the frequency word, the ILS ground station identification, and to repeat the runway heading and ISO Alphabet No. 5-encoded ILS facility identifier if received over the frequency tuning interfaces. Maintenance data information is also transmitted on these ports. Connect to automatic flight control system (AFCS).
MP-B1	Output	ILS Look-Alike Output Port #1 (B) (AFCS)	
MP-C1	Input	Tune/Funct Select Data Input Port A (A)	One of two low speed 429 data input ports to receive tuning information, runway heading, and ILS ISO Alphabet No. 5 identifier ARINC 429 labels.
MP-D1	Input	Tune/Funct Select Data Input Port A (B)	
MP-E1	Input	OMS/CFDS RX A	Low speed ARINC 429 data input port receives maintenance data and flight leg information from an onboard maintenance system (OMS).
MP-F1	Input	OMS/CFDS RX B	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 2)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-G1	Output	ILS Look-Alike Output Port #2 (A) (INST)	One of two low speed ARINC 429 data output ports to provide localizer and glide-slope deviation outputs to other data utilization devices. Used to transmit the frequency word, the ILS ground station identification, and to repeat the runway heading and ISO Alphabet No. 5-encoded ILS facility identifier if received over the frequency tuning interfaces. Maintenance data information is also transmitted on these ports. Connect to other utilization devices (INST).
MP-H1	Output	ILS Look-Alike Output Port #2 (B) (INST)	
MP-J1	Input	Tune/Funct Select Data Input Port B (A)	One of two low speed 429 data input ports to receive tuning information, runway heading, and ILS ISO Alphabet No. 5 identifier ARINC 429 labels.
MP-K1	Input	Tune/Funct Select Data Input Port B (B)	
MP-A2	Output	GNSS Time Mark #1 Out A	One of three identical but mutually isolated ports that provide GNSS time-marked output for use by other aircraft systems to synchronize the GPS data.
MP-B2	Output	GNSS Time Mark #1 Out B	
MP-C2	Output	GNSS Data #1 TX A	One of three identical but mutually isolated ports that provide the high or low bit rate data output labels for each satellite in track in the space vehicle (SV) raw data measurement block. The GNSS data rate is determined by the GNSS Output Bus High/Low Program discrete on MP-J5.
MP-D2	Output	GNSS Data #1 TX B	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 3)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-E2	-	Reserved	
MP-F2	-	Reserved	
MP-G2	Output	GNSS Time Mark #2 Out A	One of three identical but mutually isolated ports that provide GNSS time-marked output for use by other aircraft systems to synchronize the GPS data.
MP-H2	Output	GNSS Time Mark #2 Out B	
MP-J2	Output	GNSS Data #2 TX A	One of three identical but mutually isolated ports that provide the high or low bit rate data output labels for each satellite in track in the SV raw data measurement block. The GNSS data rate is determined by the GNSS Output Bus High/Low Program discrete on MP-J5.
MP-K2	Output	GNSS Data #2 TX B	
MP-A3	-	Reserved	
MP-B3	-	Reserved	
MP-C3	-	Reserved	
MP-D3	-	Reserved	
MP-E3	-	Reserved	
MP-F3	-	Reserved	
MP-G3	-	Reserved	
MP-H3	-	Reserved	
MP-J3	-	Reserved	
MP-K3	-	Reserved	
MP-A4	Input	Air/Ground Discrete	Discrete input that presents a standard "open" circuit while the aircraft is on the ground and a standard "ground" when the aircraft is airborne.
MP-B4	-	Reserved	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 4)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-C4	Input	Freq/Funct Data Source Select Discrete	Discrete input determines which input tuning port will be selected. Port "A" (MP9B & MP9C) are used when the discrete is in the "ground" state. Port "B" (MP13B & MP13C) are used when the discrete is in the "open" state. When the RIA-35B is installed in an aircraft in which a dedicated control panel supplies the tuning information, Port "B" should be used. When the RIA-35B is installed in an aircraft in which a Centralized Radio Management system supplies the tuning information, Port "A" should be used as the primary control source, and Port "B" as the secondary or backup control source.
MP-D4	-	Spare	
MP-E4	-	Reserved	
MP-F4	-	Reserved	
MP-G4	Input	Functional Test Discrete	Discrete input that activates LRU functional test function. Gnd/Low = activate functional test.
MP-H4	Input	SDI Input #1	Used for encoding the location (system number) of the MMR in the aircraft; used with pin MP-K4 (program common).
MP-J4	Input	SDI Input #2	
MP-K4	Input	Program Common	Ground for the SDI code inputs from pins MP-H4 and/or MP-J4, for the Output Data Interrupt/Not Interrupt Program inputs from pins MP-B5 and MP-D5, and for the Antenna Monitor Program pin MP-H5.

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 5)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-A5	-	Reserved	
MP-B5	Input	Output Data Not Interrupt Program	For any failures which compromise the integrity of the setting of the sign/status matrix (SSM) bits, the MMR will not interrupt data transmission on ILS Look-Alike Output Port #1 (AFCS) and ILS Look-Alike Output Port #2 (INST); used with pin MP-K4 (program common).
MP-C5	-	Reserved	
MP-D5	Input	Output Data Interrupt Program	For any failures which compromise the integrity of the setting of the sign/status matrix (SSM) bits, the MMR interrupts data transmission on ILS Look-Alike Output Port #1 (AFCS) and ILS Look-Alike Output Port #2 (INST); used with pin MP-K4 (program common).
MP-E5	-	Spare	
MP-F5	-	Spare	
MP-G5	-	Spare	
MP-H5	Output	Antenna Monitor Program	Discrete output supplies the ground for the antenna monitor enable when connected to Program Common, pin MP-K4. Antenna monitoring function is disabled when MP-H5 is open.
MP-J5	Output	GNSS Bus Hi/Lo Program	Discrete output determines the output rate for the GNSS output buses. Gnd/Low = Low Speed ARINC 429; Open/High = High Speed ARINC 429.
MP-K5	-	Spare	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 6)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-A6	-	Spare	
MP-B6	-	Spare	
MP-C6	-	Spare	
MP-D6	-	Spare	
MP-E6	-	Spare	
MP-F6	-	Spare	
MP-G6	-	Spare	
MP-H6	-	Spare	
MP-J6	-	Spare	
MP-K6	-	Spare	
MP-A7	-	Spare	
MP-B7	-	Spare	
MP-C7	-	Spare	
MP-D7	-	Spare	
MP-E7	Output	GNSS Time Mark #3 Out A	One of three identical but mutually isolated ports that provide GNSS time-marked output for use by other aircraft systems to synchronize the GPS data.
MP-F7	Output	GNSS Time Mark #3 Out B	
MP-G7	-	Spare	
MP-H7	-	Spare	
MP-J7	-	Spare	
MP-K7	-	Spare	
MP-A8	Input	IRS #1 RX A	One of two ARINC 429 high speed inputs for inertial system to initialize time and position data.
MP-B8	Input	IRS #1 RX B	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 7)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-C8	Input	DADS #1 RX A	One of two ARINC 429 low speed inputs from digital air data computer system to initialize altitude.
MP-D8	Input	DADS #1 RX B	
MP-E8	-	Reserved	
MP-F8	-	Reserved	
MP-G8	Input	IRS #2 RX A	One of two ARINC 429 high speed inputs for inertial system to initialize time and position data.
MP-H8	Input	IRS #2 RX B	
MP-J8	Input	DADS #2 RX A	One of two ARINC 429 low speed inputs from digital air data computer system to initialize altitude.
MP-K8	Input	DADS #2 RX B	
MP-A9	-	Spare	
MP-B9	-	Spare	
MP-C9	-	Spare	
MP-D9	-	Spare	
MP-E9	Output	GNSS Data #3 TX A	One of three identical but mutually isolated ports that provide the high or low bit rate data output labels for each satellite in track in the SV raw data measurement block. The GNSS data rate is determined by the GNSS Output Bus High/Low Program discrete on MP-J5.
MP-F9	Output	GNSS Data #3 TX B	
MP-G9	-	Spare	
MP-H9	-	Spare	
MP-J9	-	Spare	
MP-K9	-	Spare	
MP-A10	-	Spare	
MP-B10	-	Spare	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 8)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-C10	-	Spare	
MP-D10	-	Spare	
MP-E10	-	Spare	
MP-F10	-	Spare	
MP-G10	-	Spare	
MP-H10	-	Spare	
MP-J10	Output	Audio Output (HI)	Localizer audio output to audio distribution system.
MP-K10	Output	Audio Output (LO)	
MP-A11	-	Spare	
MP-B11	-	Spare	
MP-C11	-	Spare	
MP-D11	-	Spare	
MP-E11	-	Spare	
MP-F11	-	Spare	
MP-G11	-	Spare	
MP-H11	-	Spare	
MP-J11	-	Spare	
MP-K11	-	Spare	
MP-E12	-	Spare	
MP-F12	-	Spare	
MP-E13	-	Spare	
MP-F13	-	Spare	
MP-E14	-	Reserved	
MP-F14	-	Reserved	
MP-E15	-	Reserved	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 9)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
MP-F15	Input	Tune/Functional Test Inhibit Discrete	Inhibits re-tuning the ILS receiver from the channel selected for an automatically coupled approach or place in the self-test condition once an approach has been started.
BP-1	-	Spare	
BP-2	-	Spare	
BP-3	-	Spare	
BP-4	Output	Control Panel 115VAC Power Output (HOT)	115VAC, 400Hz is available on pins BP-4 and BP-6 for routing to a control panel in those installations which use an individual control panel rather than an integrated Frequency/Function Selection system supplied with aircraft power directly.
BP-5	-	Spare	
BP-6	Output	Control Panel 115VAC Power Output (COLD)	115VAC, 400HZ is available on pins BP-4 and BP-6 for routing to a control panel in those installations which use an individual control panel rather than integrated Frequency/Function Selection system supplied with aircraft power directly.
BP-7	Input	115VAC (COLD)	Primary power return
BP-8	Input	Chassis Ground	Chassis ground
BP-9	Input	115VAC (HOT) (2A Circuit Breaker)	Primary input power to MMR
BP-10	-	Spare	
BP-11	-	Spare	

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 10)

PIN NO.	TYPE	SIGNAL NAME	FUNCTION
BP-12	Input	Localizer Antenna	Required for localizer input signal.
BP-13	Input	Glide-Slope Antenna	Required for glide-slope input signal.

RMA-55B Multi-Mode Receiver Connector Determinants
Figure 201 (Sheet 11)

(2) Reserved and Spare Wires

If the installer does not wish to connect all wires, he/she may select wires reserved for optional functions which his/her system does not contain and delete these wires. He/she should also decide which future spare wires to include in the installation. Reserved and spare wires are identified in figure 201 and in interwiring diagram figure 209.

(3) Source/Destination Identifier (SDI) Program Encoding

A connection is required from the "program common" pin MP-K4 to the appropriate source/destination identifier (SDI) pin to identify each MMR in multiple system installations (refer to figure 202). Installations having only one MMR should include a connection identifying it as the No. 1 system. These connections should not be omitted from any installation.

MMR NUMBER	CONNECTOR PIN	
	SDI 2, MP-J4	SDI 1, MP-H4
Not Applicable	Open	Open
1	Open	To MP-K4
2	To MP-K4	Open
3	To MP-K4	To MP-K4

SDI Encoding Pin Configuration
Figure 202

(4) Output Data Interrupt Program

For any failures which compromise the integrity of the setting of the sign/status matrix bits, the MMR stops all data transmissions on ILS Look Alike (AFCS) Bus #1 and ILS Look Alike (INST) Bus #2 when the Output Data Interrupt Program pin and the Output Data Not Interrupt Program pin are set as shown in figure 203.

STATUS	CONNECTOR PIN	
	OUTPUT DATA NOT INTERRUPT, MP-B5	OUTPUT DATA INTERRUPT, MP-D5
Not Valid	Open	Open
Interrupt	Open	To MP-K4
Not Interrupt	To MP-K4	Open
Not Valid	To MP-K4	To MP-K4

Output Data Interrupt Encoding Pin Configuration
Figure 203

D. Installation of System

(1) Mounting Base

The selected mounting base for the RMA-55B Multi-Mode Receiver should be wired according to the system interwiring diagram, figure 211, and installed according to the manufacturer's instructions. The mounts are designed to be removed without rewiring the connectors. Follow the equipment manufacturer's installation instructions to install the mount into the airframe.

To wire the mounts into the system, first remove the mount connector cover and connector plate assembly. Then crimp or solder (as applicable) the interconnecting wiring to the appropriate connector pins. Finally, return the connector plate assembly and cover to their original positions.

NOTE: To allow for inspection or repair of the connector, or the wiring to the connector, sufficient lead length should be left so that the rear connector assembly can be pulled forward several inches when the mounting hardware for the rear connector assembly is removed. A bend should be made in the harness near the connector to allow water droplets, that might form on the harness from condensation, to drip off at the bend and not collect at the connector.

(2) RMA-55B Multi-Mode Receiver (MMR)

The MMR is installed in the mount as follows:

(a) Slide the MMR into the mount until the guide pins are aligned and the electrical connectors are firmly engaged.

(b) Secure the front of the MMR to the mount by tightening the two knurled screw clamps (located on the front of the mount) until they are firmly seated over hold-down hooks located on the front of the unit.

(c) Safety-wire the two screw clamps.

(3) MMR Control Panel

The selected MMR control panel should be wired according to the system interwiring diagram, figure 211, and the manufacturer's instructions. For installation procedure and mounting dimensions, refer to the applicable manufacturer's instructions.

(4) Electronic Horizontal Situation Indicator

The electronic horizontal situation indicator (EHSI) should be mounted in the aircraft instrument panel to provide easy visibility and to conform to customer requirements and the installation instructions of the manufacturer. Interwiring should be in accordance with figure 211, system interwiring diagram.

(5) Localizer Antenna

Install the localizer antenna in accordance with the manufacturer's instructions. An important consideration is the placement of the localizer antenna with respect to other antennas, especially the antenna used with vhf transmitters. Localizer operation can be seriously affected by the output (at least 25 watts) from the transmitter antenna. It is therefore recommended that at least 35 dB (preferably 45 dB) of space attenuation (isolation) be supplied between the localizer antenna and vhf transmitter antenna.

The system installation requires a coaxial cable between the mount and the antenna. This cable should be as short and direct as possible to limit attenuation. Any required bends should be gradual. Any signal loss attributed to the cable will be detrimental to localizer reception and must be held to a minimum. The interconnecting coaxial cable must have an impedance of 50 ohms. Additionally, the antenna system should present less than a 5:1 VSWR under all conditions including precipitation and icing.

(6) Glide-Slope Antenna

Install the glide-slope antenna in accordance with the manufacturer's instructions. The system installation requires a coaxial cable (type RG-58/U) between the antenna and the mount. This cable should be as short and direct as possible to limit attenuation. Any required bends should be gradual. Any signal loss attributed to the cable will be detrimental to glide-slope operation and must be held to a minimum. The interconnecting coaxial cable must have an impedance of 50 ohms. Additionally, the antenna system should present less than a 5:1 VSWR under all conditions including precipitation and icing.

(7) GNSS Antenna (if required)

Install the GNSS antenna in accordance with the manufacturer's instructions. The system installation requires a coaxial cable between the antenna and the mount. This cable should be as short and direct as possible to limit attenuation. Any required bends should be gradual. Any signal loss attributed to the cable will be detrimental to GNSS receiver operation and must be held to a minimum. The interconnecting coaxial cable must have an impedance of 50 ohms. Additionally, the antenna system should present less than a 2.0:1 VSWR under all conditions including precipitation and icing.

7. Inspection and System Check Procedures

NOTE: Inspection and check procedures for the RMA-55B Multi-Mode Receiver (MMR) includes checkout of all interfacing units that may affect performance of the MMR.

A. Inspection

Figure 204 is a visual inspection check procedure and should be performed after system installation, prior to system checkout. In addition, the procedure should be used as a periodic inspection check.

EQUIPMENT	INSPECTION/CHECK PROCEDURE
3 MCU Unit Mount	As defined by manufacturer's instructions.
RMA-55B Multi-Mode Receiver	(1) Check that unit is fully inserted in mount and that the knurled screw clamps which secure the unit in the mount are tight and safety wired. (2) Inspect the case for deformation, dents, corrosion, and damage to finish; ensure that ventilation holes in the unit are not clogged. (3) Check that ARINC 600 cooling source is securely in place.
Control Panel	As defined by manufacturer's instructions.
Electronic Horizontal Situation Indicator	As defined by manufacturer's instructions.
Localizer Antenna	As defined by manufacturer's instructions.
Glide-Slope Antenna	As defined by manufacturer's instructions.
GNSS Antenna	As defined by manufacturer's instructions.

Inspection/Check Procedures
Figure 204

B. System Checkout

(1) General

After installation of the RMA-55B Multi-Mode Receiver System, and inspection of the equipment per previous figure 204, perform a continuity and visual check of the system interwiring per paragraph 7.B.(2). A post-installation test per paragraph 7.B.(3) should then be performed.

(2) System Interwiring Check

Visually check the system interwiring for abnormalities, such as cables rubbing unprotected metal edges or tightly stretched cables. Check continuity of all interwiring. In particular, check the following:

(a) Check that the MMR is properly installed and the hold-down screw clamps are tight.

(b) Check wiring harness connectors for security and connection to the MMR.

(c) Check that antenna transmission line connectors are securely fastened.

(d) Check that control panel connectors are securely fastened.

(e) Check that EHSI connectors are securely fastened.

(f) Check that cables do not interfere with aircraft controls or other equipment.

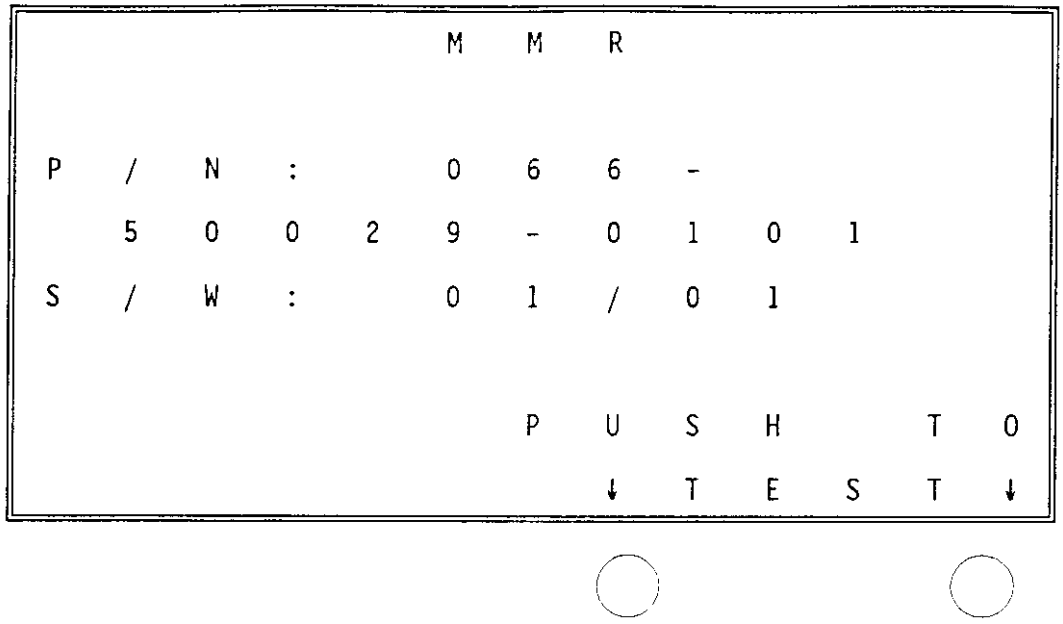
(3) Post-Installation Check

(a) Test Equipment Required

None Required.

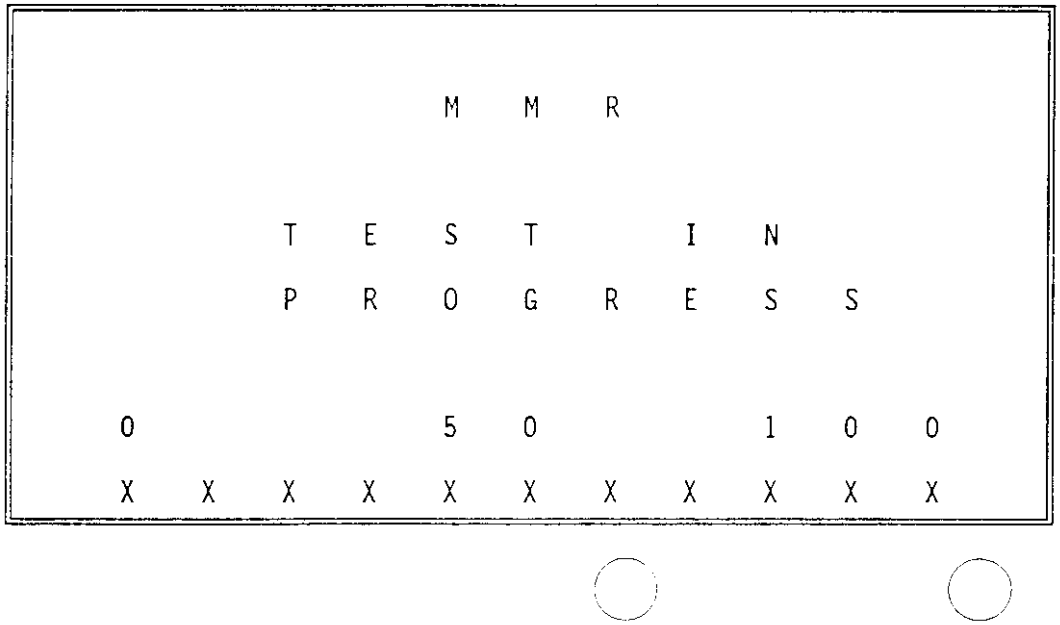
(b) System Test

A functional self test of the LRU may be initiated by pressing the "test" key pushbutton switch as designated on the front panel LCD (figure 205). Although the normal-mode screen indicates that this is actuated from the right key, the left key has the same function if pressed while the MMR LCD is in its normal mode.



Typical "Normal-Mode" Screen
Figure 205

The self-test mode starts by displaying the "Test in Progress" screen (figure 206) one second after pressing the "test" key. This is displayed for four seconds with a moving thermometer along the bottom of the LCD indicating the progress of the test from one to five seconds.



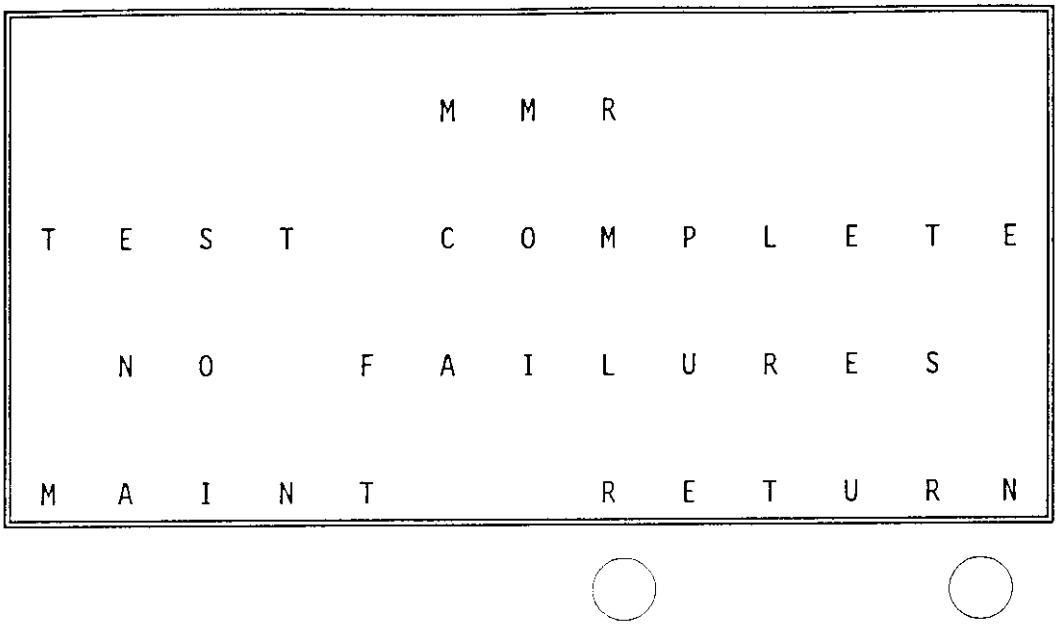
"Test in Progress" Screen
Figure 206

The "Normal-Mode" screen (figure 205) is displayed for the first second of the test sequence.

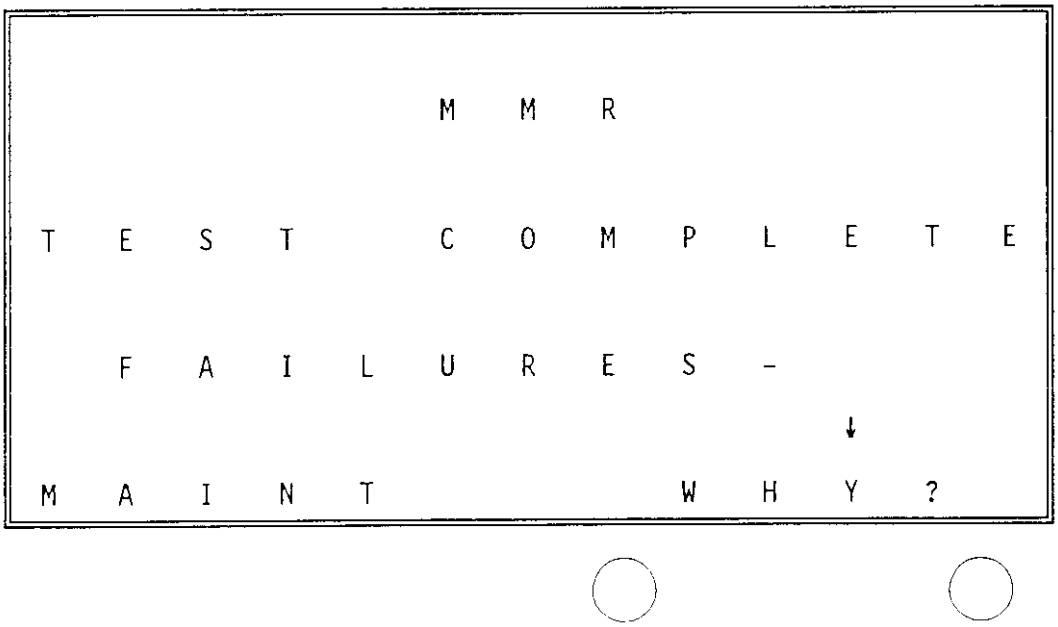
Once complete, the "Test Complete, No Failures" screen is displayed (figure 207), or the "Test Complete, Failures" screen is displayed (figure 208). Both screens contain two key selections each: "MAINT" and "RETURN" or "MAINT" and "WHY?", respectively.

- "MAINT" - For both screens, "MAINT" is located on the left key. This allows the initiation of the extended maintenance pages of the system for troubleshooting. Refer to paragraph 4 of "Fault Isolation" section 100 of this manual.
- "RETURN" - In the "Test Complete, No Failures" screen, the "RETURN" key to the right returns the system to its normal mode screen (figure 205).
- "WHY?" - In the "Test Complete, Failures" screen, the "WHY?" key to the right puts the system into the display-failures mode where individual system failures are displayed one per page. Refer to paragraph 3 of "Fault Isolation" section 100 of the manual.

While in the self-test mode, not pressing either key for five minutes causes the system to return to the "Normal-Mode" screen (figure 205).



"Test Complete, No Failures" Screen
Figure 207



"Test Complete, Failures" Screen
Figure 208

C. Ramp Test

(1) Figure 209 describes one test set that can be used for ramp testing to verify the operational readiness of the RMA-55B Multi-Mode Receiver. Test sets other than that listed in figure 209 can be used if their characteristics meet the requirements listed under "Characteristics Required" in figure 209.

DESCRIPTION	CHARACTERISTICS REQUIRED	REPRESENTATIVE TYPE
Nav Test Set (Must include LOC/GS functions)	Must have at least one LOC and one GS frequency (±.0001% accuracy); internally stepped or adjustable LOC and GS modulation; and rf signal must be radiated from an antenna. LOC/GS centering accuracy = ±.002 DDM.	Instrument Flight Research Corp. (IFR) Model NAV-401L

Table of Test Equipment
Figure 209

(2) Locate ramp test set near localizer and glide-slope antennas. Set up ramp test set according to manufacturer's instructions to radiate a 0 DDM localizer and glide-slope signal.

NOTE: For MMR's equipped with GNSS Receiver (-1101, -1151), locate aircraft at the compass rose of the air field or some known surveyed spot on the air field for making latitude and longitude measurements.

(3) Set aircraft ILS control panel frequency selector to correspond to the ILS frequency of the test set. Set ILS control panel on-off switch to ON.

(4) Observe cockpit display localizer indications. Localizer course deviation indicator should be centered. Localizer status indication should be normal.

(5) Observe cockpit display glide-slope indications. Glide-slope indicator should be centered. Glide-slope status indication should be normal.

(6) Set test set controls to generate a localizer test signal of +0.155 DDM (90 Hz tone predominant). Cockpit display course deviation indicator should deflect right. Localizer status indication should be normal.

(7) Set test set controls to generate a localizer test signal of -0.155 DDM (150 Hz tone predominant). Cockpit display deviation indicator should deflect left. Localizer status indication should be normal.

(8) Set test set localizer controls for an output signal with the 90 Hz signal equal to the 150 Hz signal (0 DDM). Cockpit display course deviation indicator should be normal.

(9) Set test set localizer controls to individually remove the 90 Hz and 150 Hz signals. Localizer status indication should be no computed data (NCD) when either signal is removed.

(10) Set test set controls to generate a glide-slope test signal of +0.175 DDM (90 Hz tone predominant). Cockpit display glide-slope indicator should deflect down. Glide-slope status indication should be normal.

(11) Set test set glide-slope controls to generate a glide-slope test signal of -0.175 DDM (150 Hz tone predominant). Cockpit display glide-slope indicator should deflect up. Glide-slope status indication should be normal.

(12) Set test set glide-slope controls for an output signal with the 90 Hz signal equal to the 150 Hz signal (0 DDM). Cockpit display course deviation indicator should be centered. Localizer status indication should be normal.

(13) Set test set glide-slope controls to individually remove the 90 Hz and 150 Hz signals. Cockpit display glide-slope status indication should be NCD when either signal is removed.

(14) Check aircraft audio system for ILS station identification tone during ILS operation of MMR. Tone should identify station generated by the test set.

(15) For -1101 and -1151 MMR's, verify that the cockpit displays the correct latitude and longitude of the aircraft as shown for the compass rose of the air-field chart or the known surveyed spot in the air field.

D. Flight Tests

(1) Set aircraft MMR control panel to select the frequency of a nearby ILS station.

(2) Apply power to MMR system.

(3) Fly toward ILS runway and perform ILS approach using both the localizer and glide-slope functions. Observe EHIS for proper localizer and glide-slope indications during approach.

8. Removal and Replacement

A. Removal

(1) Loosen the two knurled screw clamps (located on the front of mount) that secure the MMR to the mount.

(2) Gently pull the MMR forward until it is disconnected from the rear connector and guide pins.

B. Replacement

(1) Slide the MMR onto the tray of the mount and then gently push the MMR until the guide pins are aligned and the connectors make a firm connection.

(2) Tighten the two knurled screw clamps located on the front of the mount until they are firmly seated over the hold-down hooks located on the front of the radio altimeter.

(3) Safety wire the two knurled screw clamps.

9. Maintenance Procedures

A. Adjustments and Alignments

There are no adjustments or alignments required for the MMR. All alignment and adjustment procedures are accomplished during bench maintenance. The technician should remove the unit from the aircraft and reference should be made to the related maintenance manual when unit performance indicates an adjustment or an alignment is required.

B. System Protection

The system should be protected by a 2-ampere circuit breaker located at the circuit breaker panel in the aircraft.

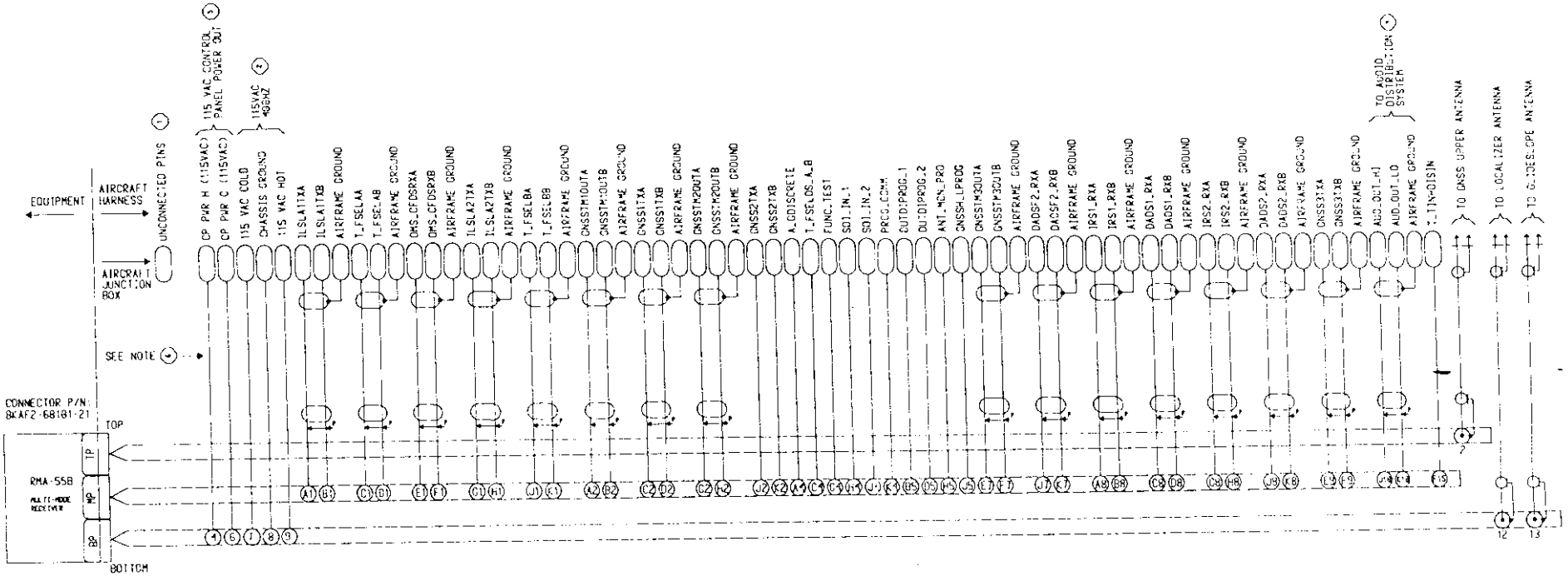
C. Lubrication Practices

There are no requirements for periodic lubrication of any RMA-55B Multi-Mode Receiver System component.

D. Cleaning

When deemed necessary, depending upon the environment to which the equipment is exposed and the intensity of use, periodic cleaning should be performed. Any dust on the RMA-55B Multi-Mode Receiver System LRU's should be wiped off with a lint-free cloth.

NOTE: Any cleaning of equipment interiors should be limited to that required when performing overhaul (bench-type) work.



NOTES:

(1) UNCONNECTED PINS ON MMR RECEIVER REAR CONNECTOR ARE:
TP PINS 1,3,4
MP PINS F2,F2,A3,B3,C3,D3,E3,F3,G3,H3, J3,K3,D4,D4,E4,F4,A5,C5,F5,F6, G5,K5,A6,B6,C6,D6,E6,F6,D6,H5, J6,K6,A7,B7,C7,D7,G7,H7,E8,F8, A9,B9,C9,D9,G9,H9,J9,K9,A10,B10, C10,D10,E10,F10,G10,H10,A11,B11, C11,D11,E11,F11,G11,H11,J11,K11, E12,F12,E13,F13,E14,F14,F15.
BP PINS BP_1,BP_2,BP_3,BP_5,BP_10,BP_11.

(2) USE 2 AMP CIRCUIT BREAKER ON HOT SIDE.

3. DIGITAL DATA BUS SHIELDS SHOULD BE GROUNDED TO AIRCRAFT STRUCTURE AT BOTH ENDS AND ON BOTH SIDES OF ALL BREAKS.

(4) AUDIO CABLE SHIELD SHOULD BE GROUNDED AT AUDIO SYSTEM END ONLY. IT SHOULD NOT BE GROUNDED AT THE MMR RECEIVER END.

(5) 115 VAC 400HZ AVAILABLE ON THESE PINS FOR ROUTING TO CONTROL PANEL FOR THOSE INSTALLATIONS WHICH USE INDIVIDUAL PANEL RATHER THAN INTEGRATED FREQUENCY/FUNCTION SELECTION SYSTEM SUPPLIED WITH AIRCRAFT POWER DIRECTLY.

(6) WIRE SIZE IS DETERMINED BY THE LENGTH OF CABLE RUN AND "I-R" VALUES (MAXIMUM CURRENT-EFFECTIVE RESISTANCE) INDICATED IN ATTACHMENT 3-1, STANDARD INTERWIRING OF ARINC CHARACTERISTIC 755.

15550002

RMA-55B Multi-Mode Receiver System Interwiring Diagram
Figure 211

AlliedSignal IDENTIFYING NUMBER	DESCRIPTION	CUSTOMER	UNIT CONNECTOR AlliedSignal PN	UNIT CONNECTOR CANNON PN	MATING CONNECTOR AlliedSignal PN	MATING CONNECTOR CANNON PN	UNIT WEIGHT MAXIMUM	AIR FLOW RATE	POWER REQUIREMENTS	CG X AXIS TOL ±.25 / 6.4MM	CG Y AXIS TOL ±.25 / 6.4MM	CG Z AXIS TOL ± 25 / 6.4MM
066-50029-0101	ILS ONLY	BOEING	030-24518-0003	BKAF2-68101-121-9732	24342-0022	BKAD2-A137-32203	8.9 LBS / 4.1KG	3.5 CFM	30 WATTS AVERAGE	1.70 / 43.2MM	4.00 / 101.6MM	6.00 / 152.4MM
066-50029-1101	ILS/ENRTE GPS	BOEING	030 24518 0003	BKAF2-68101-121-9732	24342 0022	BKAD2-A137-32203	10 LBS / 4.5KG	4.1 CFM	35 WATTS AVERAGE	2.10 / 53.3MM	3.80 / 96.5MM	6.40 /162.6MM
066 50029-0151	ILS ONLY	AIRBUS/DOUGLAS	030-24518 0003	BKAF2-68101-121-9732	24342 0022	BKAD2 A137-32203	8.9 LBS / 4.1KG	3.5 CFM	30 WATTS AVERAGE	1.70 / 43.2MM	4.00 / 101.6MM	6.00 / 152.4MM
066-50029-1151	ILS/ENRTE-GPS	AIRBUS/DOUGLAS	030-24518-0003	BKAF2-68101-121-9732	24342-0022	BKAD2-A137-32203	10 LBS / 4.5KG	4.1 CFM	35 WATTS AVERAGE	2.10 / 53.3MM	3.80 / 96.5MM	6.40 /162.6MM

SHEET 2 OF 2

0200-001

066-50029

RMA-55B Multi-Mode Receiver, Dimensional Outline Drawing
Figure 210 (Sheet 2)