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SUPERSEDING
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MILITARY SPECIFICATION

MODEM, DIGITAL DATA, MD-1065/G

This specification is approved for use by the Communications-Electronics Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the design, fabrication and testing necessary for the manufacture of the Modem, Digital Data, MD-1065/G . This unit is also known as the Radio Modem (RM) and is one of the electronic units that comprise the Digital Group Multiplex (DGM) family of cable system equipment developed by the Joint Tactical Command, Control and Communications Agency (JTC^3A, formerly TRI-TAC). See 6.1 for intended use and functional description of the unit.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commander, US Army Communications-Electronics Command, ATTN: AMSEL-ED-TO, Fort Monmouth, New Jersey 07703-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC No. N/A FSC 5820

SPECIFICATIONS

Military

MIL-P-116	Preservation, Methods of
MIL-P-11268	Parts, Materials, and Processes Used in Electronic Equipment
MIL-M-13231	Marking of Electronic Items
MIL-F-14072	Finishes for Ground Electronic Equipment
MIL-E-55585	Electronics Equipment and Parts, Packaging of

STANDARDS

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-252	Classification of Visual and Mechanical Defects for Equipment, Electronic, Wired, and Other Devices
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-461A Notice 4	Electromagnetic Interference Characteristics, Requirements for Equipment
MIL-STD-462 Notice 3	Electromagnetic Interference Characteristics , Measurements of
MIL-STD-781C	Reliability Tests, Exponential Distribution
MIL-STD-810D	Environmental Test Methods and Engineering Guidelines
MIL-STD-1332	Definitions of Tactical, Prime, Precise, and Utility Terminologies for Classification of the DOD Mobile Electric Power Engine Generator Set Family
MIL-STD-2073-2	Packaging Requirements Code
MIL-STD-45662	Calibration System Requirements

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

SPECIFICATIONS

Communications-Electronics Command

CR-CX-0173-001	Nuclear Survivability/Vulnerability Provisions for the Family of Digital Group Multiplexer Equipments

DRAWINGS

Communications-Electronics Command

SM-D-875948	Circuit Card Assembly (CCA), BITE 1
SM-D-876000	CCA, Multiplexer
SM-D-876111	CCA, Demux
DL-SM-B-876240	Modem, Digital Data, MD-1065/G
SM-D-884454	CCA, Regenerator
SM-D-884567	CCA, Multi VDC
SM-D-884579	CCA, AC Input
SM-D-884593	CCA, 5 VDC

(Copies of specifications, standards, drawings, publications and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article units. When specified in the contract or purchase order, the contractor shall furnish first article units in accordance with 4.3.

3.2 Construction.

3.2.1 Fabrication. The equipment shall be constructed in accordance with DL-SM-B-876240, and the requirements specified herein.

3.2.2 Printed wiring. The printed wiring shall meet the requirements of MIL-STD-454, Requirement 17.

3.2.3 Semiconductor devices and integrated circuits. The semiconductor devices and integrated circuits shall meet the requirements of MIL-STD-454, Requirements 30 and 64.

3.3 Parts, materials, and processes - general. (See 4.4) In addition to the requirements of this specification, the requirements of MIL-P-11268 including the selection requirements therein shall apply.

3.4 Finish. The equipment shall be finished in accordance with MIL-F-14072 and DL-SM-B-876240.

3.5 Marking. The marking shall conform to MIL-M-13231, with approvals in accordance with requirements specified in the contract or purchase order.

3.5.1 Serial numbers. A unique serial number is required on each nomenclatured item and CCA. The numbers shall be consecutively assigned.

3.6 Electrical preconditioning (burn-in). (See 4.6) Prior to submission to the specified quality conformance inspections, each assembled MD-1065/G unit shall be electrically preconditioned for a minimum of 48 hours operating time. The last 24 hours of electrical preconditioning shall be failure free. Each unit fabricated shall be subjected to this process. Failure free is defined as (1) no bulit-in test equipment (BITE) alarms during burn-in and (2) the successful completion of the operational test of 4.7.11 after burn-in.

3.7 Electrical. (See 4.7)

3.7.1 Balanced equipment-side signal characteristics. (See 4.7.1)

3.7.1.1 Line-to-line voltage levels. (See 4.7.1.1) The line-to-line voltage shall be between +0.1 and +4.0 volts for a digital 1 and between -0.1 and -4.0 for a digital 0, measured into a 100-ohm dummy load. For the 2 kb/s data and timing outputs, the minimum voltage measured into a 100-ohm dummy load shall be +0.5 volts for a digital 1 and -0.5 volts for a digital 0.

3.7.1.2 Line-to-ground voltage. (See 4.7.1.2) The magnitude of the line-to-ground voltage shall not exceed 3 volts.

3.7.1.3 Clock/data phasing. (See 4.7.1.3) For those data signals having a related clock signal, the time difference between the upward transition of the clock signal and either the upward or downward transition of the data signal shall be no greater than $\pm$29 ns for group rate signals, or $\pm$1500 ns for 2 and 16 kb/s signals. Times shall be measured at the zero voltage point of signals.

3.7.1.4 Offset. (See 4.7.1.4) The magnitude of the offset voltage measured between the center tap of a 100-ohm dummy load and ground shall not be greater than 3 volts.

3.7.1.5 Signal balance. (See 4.7.1.5) The magnitude of the difference between the magntiudes of the digital 1 level and the digital 0 level shall not be greater than 10% of the larger of the two.

3.7.1.6 Slew rate. (See 4.7.1.6) When 100 feet of RG-108 A/U cable terminated in a 78-ohm dummy load is connected to the driver output, the transition between $\pm$40 mV (either direction) shall take no more than 10 ns for group rate signals and 100 ns for the 2 and 16 kb/s signals.

3.7.1.7 Receiver dynamic range. (See 4.7.1.7) The receiver shall deliver the proper digital output when a line-to-line voltage of +50 mV to +4 volts for a digital 1 or -50 mV to -4 volts for a digital 0 is applied to the receiver input terminals.

3.7.1.8 Input load impedance. (See 4.7.1.8) The input impedance shall be 100 ohms ±10%.

3.7.1.9 Clock asymmetry. (See 4.7.1.9) The positive half of the clock waveform shall be equal to half the period ±15 ns for group rate timing signals and ±1500 ns for 2 and 16 kb/s timing signals.

3.7.1.10 Unloaded output. (See 4.7.1.10) For the 2 kb/s data and timing outputs, the maximum voltage into an open circuit shall be +3.0 volts for a digital 1 and -3.0 volts for a digital 0.

3.7.2 Radio side interface. (See 4.7.2) The radio side interface, which shall interface with a full-duplex digital group plus digital orderwires, connects to a Radio Set AN/GRC-103(V). Provision shall be made to connect the radio side input-output to an AN/GRC-103 via 91 ohm coaxial cable connectors on the back of the unit.

3.7.2.1 Transmit video signal. (See 4.7.2.1) The transmit video signal characteristics shall be as follows:

a. Waveform: NRZ.

b. Transmit level measured into 91-ohm load: 2 V p-p ±10%.

c. Rise and fall times: 160 to 280 ns.

d. Polarity: A digital 1 shall be more positive than a digital 0.

3.7.2.2 Receive video signal. (See 4.7.2.2) The receive video signal characteristics shall be as follows:

a. Waveform: Binary at 640 kb/s; biternary at 1280 kb/s.

b. Receive level: 0.5 to 2 V p-p.

c. Input impedance: 91 ohms ±10%.

3.7.2.3 Analog orderwire signal (See part of 4.7.7). The analog signal shall be nominal 16% and shall not be greater than 20% of the digital signal, both signals being measured on a peak-to-peak basis. The analog orderwire appears with the receive video signal only.

3.7.3 Analog orderwire interface. (See 4.7.3) Each modem module shall provide to the AN/GRC-103 an analog orderwire signal recovered from the receive radio side interface. The characteristics of the signal shall be as specified in the balance of this paragraph.

3.7.3.1 Output impedance. (See 4.7.3.1) The output impedance shall be 600 ohms ±10% balanced.

3.7.3.2 Output level. (See 4.7.3.2) The output level shall be -4 dBm ±2 dB for an input level of 53 mV.

3.7.3.3 Signal-to-noise ratio (SNR) (See 4.7.3.3) The signal-to-noise ratio shall be 25 dB C-message weighted.

3.7.3.4 Orderwire control interface. (See 4.7.3.4) Each modem module shall provide an orderwire control connection, one for each module installed. It shall be a contact closure with the normal state being closed. When the modem cannot detect timing in the input signal from the radio or loses unit power, the orderwire control contacts shall open. The orderwire control shall operate in conjunction with the RS alarm. The control allows the AN/GRC-103 to use its analog orderwire in the absence of digital traffic.

3.7.4 Frame search inhibit interface. (See 4.7.4) This interface shall consist of a signal from each module. It shall be connected to a load which consists of a pull up resistor connected to a pull up voltage. Proper operation shall be achieved with a pull up resistance between 1000 and 51,000 ohms and a pull up voltage between +4.5 and +5.5 volts. Proper operation shall be defined as the voltage being between 0 and +0.8 volts when the search is to be inhibited and not less than +2.0 volts when the search is to be permitted.

3.7.5 Alarm interface. (See 4.7.5) The modem case shall generate and provide external connections for S, SA, and RS alarms as defined in 3.7.5.1. The alarm connections shall be contact closures with the closed state indicating alarm.

3.7.5.1 BITE and alarms. The BITE shall monitor signals in and out of the unit and internal circuits and power supply voltages. The BITE shall operate without interrupting traffic or interfering with normal system operation. Alarm conditions are removed automatically when proper operation is restored. Failures detected by the BITE circuitry cause relay contact closures accessible externally at a connector on the rear panel. Means shall be provided in the unit to check the operation of the alarms without interrupting the equipment operation. The following outputs are available:

a. S alarm. The S alarm shall indicate any failure detected including loss of input power. This alarm shall also provide a visible indication on the front panel, except for input power failure.

b. SA alarm. The SA alarm shall indicate that the malfunction is within the unit. Loss of input radio signal shall inhibit the SA alarm. A loss of signal on one radio input shall suppress only the SA alarm originating in the equipment associated with that radio input. SA alarms associated with a nonfailed radio input shall not be suppressed. If the power switch is set to OFF, there shall be no SA alarm.

c. RS alarm. The RS alarm shall indicate loss of signal coming in from the radio. If the unit loses power, the RS alarm shall assume its normal state. This alarm shall inhibit the SA alarm on the failed group.

3.7.6 Prime power interface. (See 4.7.6) The ac primary power source shall be 115 V ±10% at frequencies of 50 Hz, 60 Hz, and 400 Hz ±5%, single phase. The power input to the unit shall not exceed 90 watts. The ac primary power shall conform to MIL-STD-1332 for Type I, Class 1 and 2, Mode I, II, and III generator sets.

3.7.7 Signal detection. (See 4.7.7)

a. Pulse shaping in the radio. The filtering encountered in the radio shall conform to the following:

Frequency, kHz	Attenuation, dB Min.	Max.
10	Reference	
180	1.3	2.2
240	2.5	4
360	5.7	8
480	10.2	13.5
720	23.1	30.5
960	41.2	52.5

b. Error rate. The receive portions of the modem shall be capable of detecting band-limited Gaussian-shaped pulses of a binary or biternary input video signal which have been shaped by the filter. The error rate versus signal-to-noise ratio measured at the AN/GRC-103 modem radio side input with the radio level set so that no clipping is visible, shall be as follows:

Probability of Error	Peak-signal-to-rms-noise ratio dB Binary	Biternary
10^{-3}	16	23.5
10^{-6}	20.5	28.5
10^{-7}	-25	-34

The noise band shall also be shaped by the filter. The error rate shall be met with a 1 kHz orderwire signal present at 16% of the digital signal level, peak-to-peak basis.

3.7.8 Timing. (See 4.7.8) In normal operation, each modem shall use related timing at the group rate for transmit timing. When the selected timing fails, the modem shall automatically transfer to an internal master timing source to keep the digital voice orderwire (DVOW) and the data orderwire (DOW) operating. The accuracy of the internal timing shall be within ±15 ppm of the nominal radio rate. In normal operation, the modem's receive timing shall be derived from the radio side input. When the radio side input is missing, the modem shall provide group and DVOW

timing within ±15 ppm of the nominal rates. If the input video signal is missing due to a radio fade, bit count integrity (BCI) shall be maintained for fades up to 30 ms.

3.7.9 TD-1237 jitter. (See 4.7.9) The modem shall be able to derive its transmit timing from a group signal that has passed through up to three tandem TD-1237(P)/G Multiplexer links (connected back-to-back) without bit error or loss of BCI for 1 minute or 10^8 information bits, whichever is longer. One TD-1237 link shall have a maximum frequency deviation of ±1.25 ppm or less for long term group frequency offsets within ±1 ppm of nominal, and ±2 ppm or less for long term offsets within ±30 ppm of nominal.

3.7.10 Framing. (See 4.7.10)

3.7.10.1 Bit and frame acquisition time. (See 4.7.10.1) The modem shall acquire bit and frame synchronization within 33 ms in 90% of the tests after application of the signal in a randomly distrubuted bit error rate (BER) of 10^3.

3.7.10.2 Frame maintenance. (See 4.7.10.2) The modem shall have a mean time to false declaration of loss-of-frame of at least 240 hours in a randomly distributed BER of 10^{-3}.

3.7.10.3 Detection of loss-of-frame and reacquisition. (See 4.7.10.3) When bit count integrity (BCI) is lost, the modem shall detect loss-of-frame synchronization and reacquire frame synchronization within 39 ms in 90% of the tests with a bit count integrity (BER) of 10^{-3}.

3.7.10.4 Data squelch. (See 4.7.10.4) When the demultiplexer is out-of-frame, the group, digital voice orderwire, and data orderwire outputs shall be set to digital 1.

3.7.11 Operational check and signal detection. (See 4.7.11)

3.7.11.1 Group data error rate check at 1152 kb/s and 576 kb/s. (See 4.7.11.1) There shall be no errors in 10 seconds at 1152 kb/s and no errors in 10 seconds at 576 kb/s.

3.7.11.2 DVOW error check at 16 kb/s. (See 4.7.11.2) There shall be no errors in 30 seconds.

3.7.11.3 DOW error check at 2 kb/s. (See 4.7.11.3) There shall be no errors in 30 seconds.

3.7.11.4 Alarm monitor check. (See 4.7.11.4) There shall be no alarms indicated.

3.7.11.5 Analog orderwire check. (See 4.7.11.5) The receive level shall be between -6 dBm and -2 dBm.

3.7.12 Environmental signal detection check (full duplex). (See 4.7.12)

3.7.12.1 Group data error rate check at 1152 kb/s and 576 kb/s. (See 4.7.12.1) There shall be no errors in 10 seconds at 1152 kb/s and no errors in 10 seconds at 576 kb/s.

3.7.12.2 DVOW error check at 16 kb/s. (See 4.7.12.2) There shall be no errors in 30 seconds.

3.7.12.3 DOW error check at 2 kb/s. (See 4.7.12.3) There shall be no errors in 30 seconds.

3.7.12.4 Alarm monitor check. (See 4.7.12.4)

a. With all cables connected, there shall be no alarms generated, that is, there is an open circuit at each alarm output.

b. With the group input disconnected, the S and SA alarms shall be generated, that is, a short exists at each alarm output. No RS alarm shall be generated, that is, there is an open circuit at the alarm output.

c. With the video input disconnected, the S, SA and RS alarms shall be generated, that is, a short exists at each alarm output.

3.7.12.5 Analog orderwire check. (See 4.7.12.5) The receive level shall be between -6 dBm and -2 dBm.

3.8 Service conditions. (See 4.8) The operational test of 3.7.12 shall be performed before, during, and after each service condition test unless otherwise specified in the appropriate test paragraph.

3.8.1 Temperature. (See 4.8.1)

3.8.1.1 High temperature. (See 4.8.1.1) The equipment shall be operable without degradation in specified performance at ambient air temperatures as high as +63°C (+145°F), and shall withstand exposure (non-operating) to ambient air temperatures as high as +71°C (+160°F).

3.8.1.2 Low temperature. (See 4.8.1.2) The equipment shall be operable without degradation in specified performance at ambient air temperatures as low as -31.7°C (-25°F), and shall withstand exposure (non-operating) to ambient air temperatures as low as -57°C (-70°F).

3.8.2 Humidity. (See 4.8.2) The equipment shall be operable without degradation in specified performance, and shall sustain no physical damage during and after prolonged exposure to extreme high humidity levels as encountered in tropical areas.

3.8.3 Low pressure (altitude). (See 4.8.3) The equipment shall be operable without degradation in specified performance at altitudes up to 10,000 feet above sea level, and shall withstand air transportation at altitudes up to 40,000 feet above sea level.

3.8.4 Dust. (See 4.8.4) The equipment shall withstand, in both operating and non-operating conditions, the effects of dust particles that may accumulate within the shelter assembly or vehicle.

3.8.5 Salt fog. (See 4.8.5) The equipment shall be resistant to the corrosive effects of a salt fog atmosphere.

3.8.6 Fungus. (See 4.8.6) The equipment, in the assembled-and-ready-for-delivery condition, shall provide no nutrients in material, coating or contaminant form or support fungal growth when tested in accordance with 4.8.6. Only inherently fungus resistant grades of materials per requirement 4, MIL-STD-454, shall be used.

3.8.7 Vibration and shock. (See 4.8.7). The equipment shall withstand vibration and shock induced during vehicular transport as part of a mobile assemblage, over all types of roads and cross-country terrain, and shocks encountered during servicing.

3.9 Electromagnetic interference (EMI). (See 4.9) The unit shall meet the following emission and susceptibility requirements of MIL-STD-461A, Notice 4.

CE02	CS02	RE02	RS02
CE03	CS06	RE02.1	RS03
CE04			
CE05			

NOTES:

a. RE02.1 is applicable over the frequency range of 14 kHz to 1000 MHz.

b. RS03 is applicable over the frequency range of 10 kHz to 1000 MHz.

c. Conducted emission and susceptibility requirements are applicable to 60 Hz and 400 Hz power lines.

3.9.1 Bonds and grounds. (See 4.9.1) Bonding and grounding impedance shall not exceed 2.5 milliohms.

3.10 Reliability. (See 4.10) The unit shall have a specified Mean-Time-Between-Failure (MTBF), 0_o, of 4000 hours when in the normal modes of operation.

3.11 Interchangeability. (See 4.11) Like units assemblies, subassemblies, and replaceable parts shall meet Requirement 7 of MIL-STD-454.

3.12 Unit subassembly electrical performance. (See 4.12) The unit subassemblies listed below shall meet the requirements specified on their respective test requirement specification (TRS) drawings, as referenced in the following subassembly drawings:

CCA	DRAWING
BITE 1	*SM-D-875948
Multiplexer	*SM-D-876000
Demux	*SM-D-876111
Regenerator	SM-D-884454
Multi VDC	SM-D-884567
AC Input	SM-D-884579
5 VDC	SM-D-884593

*This drawing contains automatic test equipment (ATE) acceptance procedures and programs.

3.13 Operational test. (See 4.7.11) Each fabricated and tested unit shall be subjected to a final operational test in accordance with 4.7.11 after all other inspections and tests are completed to determine that the unit is operating prior to packaging.

3.14 Systems safety engineering. (See 4.13)

3.14.1 Personnel hazards. Personnel hazards shall be kept to a minimum. The criteria of MIL-STD-454, Requirements 1 and 8, shall be applicable for tasks and efforts such as the selection of parts, the complete manufacturing and assembly processes, and any product baseline configuration changes that may be implemented during the course of the contract. Verification that compliance with the requirement has been achieved shall be through a visual examination and inspection.

3.14.2 Rounding exposed edges. Exposed edges and corners shall be rounded sufficiently to preclude puncture or laceration hazards.

3.14.3 Radioactive materials. Radioactive materials shall not be used (e.g., luminous dials/markings, electron tubes/spark gaps, lenses).

3.15 Workmanship. (See 4.13) The equipment shall be manufactured and assembled in accordance with Requirement 9 of MIL-STD-454 and with the applicable portions of MIL-P-11268 as follows:

a. Adhesives

b. Cables, cords and wires, electrical

c. Wire (harnessing)

d. Plastic material and parts

e. Rubber

f. Wiring and cabling

g. Connectors (electrical)

h. Printed wiring assemblies

i. Processes.

3.16 Nuclear survivability. The equipment shall satisfy the nuclear survivability requirements stated in Section 3 of CR-CX-0173-001 with the exception of paragraph 3.3.1.1 (BLAST) and 3.3.1.2 (THERMAL).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection. (See 4.3) Does not include packaging.

b. Inspections covered by subsidiary documents. (See 4.4)

c. Quality conformance inspection.

(1) Quality conformance inspection before packaging. (See 4.5)

(2) Packaging inspection. (See 4.14)

4.3 First article. Unless otherwise specified in the contract or purchase order, the first article inspection shall be performed by the contractor.

4.3.1 First article units. The contractor shall furnish a minimum of 20 first article units of the complete Modem, Digital Data MD-1065/G. The first article quantity shall be as specified in the contract or purchase order.

4.3.2 First article inspection. The first article inspection shall consist of inspections specified in table I and shall be performed in the order specified therein except that all hardwired assemblies shall undergo inprocess Group A inspection prior to burn-in.

4.3.3 First article inspection data. The first article test plan and test report(s) shall be as required in the contract or purchase order.

TABLE I. First article inspection

Inspection	Reqt Para	Test Para	UNIT 1	2	3	4	5	6	7	8	9	10	11-18	19+
1. Inspections by Subsidiary Documents	N/A	4.4	Inspections to be performed on all units											
2. Burn-In	3.6	4.6	Inspections to be performed on all units											
3. Group A Inspection	(See table II)		Inspections to be performed on all units											
4. Group B Inspection	(See table III)		Inspections to be performed on all units											
5. Group C Inspection														
Subgroup 1														
High Temperature	3.8.1	4.8.1.1	1	*										
Low Temperature	3.8.1	4.8.1.2	2	*										
Subgroup 2														
EMI	3.9	4.9			1									
Vibration/Shock	3.8.7	4.8.7				1	*							
Subgroup 3														
Humidity (Note c)	3.8.2	4.8.2						1			*			
Subgroup 4														
Altitude	3.8.3	4.8.3							1					
Dust (Note c)	3.8.4	4.8.4							2					
Salt Fog (Note c)	3.8.5	4.8.5							3					
Fungus (Note c)	3.8.6	4.8.6								1				

TABLE I First article inspection (continued)

Inspection	Reqt Para	Test Para	Unit 1 2 3 4 5 6 7 8 9	10	11-18	19+
Subgroup 5						
Line-to-Ground Voltage	3.7.1.2	4.7.1.2**		1		
Clock/Data Phasing	3.7.1.3	4.7.1.3		2		
Offset	3.7.1.4	4.7.1.4**		3		
Signal Balance	3.7.1.5	4.7.1.5		4		
Slew Rate	3.7.1.6	4.7.1.6		5		
Input Load Impedance	3.7.1.8	4.7.1.8		6		
Clock Asymmetry	3.7.1.9	4.7.1.9		7		
Transmit Video Signal	3.7.2.1	4.7.2.1		8		
Receive Video Signal	3.7.2.2	4.7.2.2		9		
Analog Orderwire Interface	3.7.3	4.7.3		10		
Frame Search Inhibit	3.7.4	4.7.4		11		
Signal Detection	3.7.7	4.7.7		12		
Timing	3.7.8	4.7.8		13		
TD-1237 Jitter	3.7.9	4.7.9**		14		
Frame Acquisition	3.7.10.1	4.7.10.1		15		
Frame Maintenance	3.7.10.2	4.7.10.2**		16		
Detection of Loss of Frame & Reacquisition	3.7.10.3	4.7.10.3		17		
Unloaded Output	3.7.1.10	4.7.1.10		18		
Prime Power	3.7.6	4.7.6		19		
Dimensional Interchangeability	3.11	4.11		20		
Data Squelch	3.7.10.4	4.7.10.4**		21		
6. Group D Inspection						
Reliability	3.10	4.10			8 units	

**One time engineering test covered by separate engineering test report. Not part of the first article test report.

NOTES to table I:

a. The inspections 1 through 3, in the order shown, shall be performed on all first article units before subjecting these units to any other inspection requirements specified in the table.

b. The numbers in the unit columns in the table covered by inspections 5 and 6 specify the order of inspections for the indicated unit. An asterisk (*) indicates the use of an auxiliary MD-1065/G unit.

c. The equipment shall be thoroughly washed, cleaned, dried, and refurbished after this inspection before proceeding with subsequent inspection.

d. The quantity of units shall be specified in the contract or purchase order. All first article units shall be subjected to Group A and Group B inspections.

4.4. Inspections covered by subsidiary documents. The following shall be inspected under the applicable subsidiary documents as part of the inspection required by this specification, and the inspection requirement specified in the contract or purchase order.

	Where Required
Printed wiring	3.2.2
Semiconductor devices integrated circuits	3.2.3
Parts, materials, and processes	3.3
Finish	3.4
Marking	3.5

4.5 Quality conformance inspection of equipment before packaging. The contractor shall perform the inspections specified in 4.4, and 4.5.1 through 4.5.5. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements.

4.5.1 Group A inspection. Each unit on contract or purchase order and each subassembly and assembly identified in table II shall be inspected for conformance to the inspections specified in table II.

4.5.1.1 Order of inspection within Group A. Group A inspection shall be performed in the order listed in table II. The order of inspection of the subassemblies, assemblies, and units (end equipment) shall be as follows:

a. Prior to their assembly into the end equipment, the assemblies and subassemblies identified in table II shall be subjected to a 100% visual/mechanical and electrical inspection by the contractor for conformance with the inspection requirements provided in table II.

b. Only for spares which are not installed into complete units, do the following: After completion of the above 100% inspection by the contractor, discrete lots shall be formed from the subassemblies and assemblies which passed the 100% inspection and these shall be subjected to sampling inspection utilizing the procedures of MIL-STD-105 using general inspection levels and acceptable quality levels (AQLs) indicated in table II (Quality Assurance Verification). Factors of lot composition not defined herein, or in the contract or purchase order, shall be in accordance with MIL-STD-105.

c. Assemblies and subassemblies which have passed the above 100% visual/mechanical and electrical inspections shall be assembled into the end equipments, which shall then be subjected by the contractor to the burn-in test requirements of 4.6 and a 100% end equipment visual/mechanical and electrical inspection in accordance with table II, in that order.

d. After completion of the above 100% inspection by the contractor, discrete lots shall be formed from units which passed the 100% inspection and these shall be subjected to sampling inspection by the contractor utilizing the procedures of MIL-STD-105 using the general inspection levels and AQLs indicated in table II. Group A electrical inspection shall be performed in the order shown in table II.

4.5.2 Group B inspection. Group B inspection shall be performed on inspection lots that have passed Group A inspection and on samples selected from units that have been subjected to and met the Group A inspection. This inspection shall conform to table III and to the special inspection levels of table I of MIL-STD-105.

TABLE II. Group A inspection.

Inspection	Reqt Para	Insp Para	AQL Major	AQL Minor
VISUAL-MECHANICAL (Including Spare Assemblies)				
Multi VDC	3.15	4.13	2.5%	4.0%
Multiplexer	3.15	4.13	2.5%	4.0%
Demux	3.15	4.13	2.5%	4.0%
Regenerator	3.15	4.13	2.5%	4.0%
BITE 1	3.15	4.13	2.5%	4.0%
5 VDC	3.15	4.13	2.5%	4.0%
AC Input	3.15	4.13	2.5%	4.0%
Case and Cover	3.15	4.13	2.5%	10.0%
ELECTRICAL PERFORMANCE (Including Spare Assemblies)				
Multi VDC	3.12	4.12	1.0%	*
Multiplexer	3.12	4.12	1.0%	*
Demux	3.12	4.12	1.0%	*
Regenerator	3.12	4.12	1.0%	*
BITE 1	3.12	4.12	1.0%	*
5 VDC	3.12	4.12	1.0%	*
AC Input	3.12	4.12	1.0%	*
ELECTRICAL				
Alarm Interface	3.7.5	4.7.5	1.0%	*
Operational Tests	3.7.11	4.7.11	1.0%	*

*All Electrical defects are Major.

4.5.2.1 Group B sampling plans. The Group B AQL shall be as shown in table III and the inspection level shall be S-4.

4.5.2.2 Order of inspection within Group B. Group B inspection shall be performed in the order listed in table III.

TABLE III. Group B inspections.

Inspections	Reqt Para	Insp Para	AQL
Line-to-Line Voltage Levels	3.7.1.1	4.7.1.1	4.0%
Receiver Dynamic Range	3.7.1.7	4.7.1.7	4.0%
Transmit Video Signal (Voltage)	3.7.2.1	4.7.2.1.1	4.0%
Receive Video Signal (Voltage)	3.7.2.2	4.7.2.2.1	4.0%

4.5.3 Group C inspection. Group C inspection shall be performed on units from lots that have passed Group A and Group B inspection. The inspection shall consist of the inspections specified in table IV. Samples shall be selected in accordance with 4.5.3.1.

4.5.3.1 Sampling for Group C inspections.

4.5.3.1.1 Subgroup 1. For this subgroup, one unit shall be selected from the first production lot. For subsequent Group C inspection, one unit shall be selected every third month. The unit shall be subjected to high and low temperature testing in that order.

4.5.3.1.2 Subgroup 2. For this subgroup, two units shall be selected from the first production lot. For subsequent Group C inspection, one unit shall be selected every fourth month, and one unit shall be selected every eighth month. The unit selected every fourth month shall be subjected to vibration and shock testing in that order. The unit selected every eighth month shall be subjected to EMI testing.

4.5.3.1.3 Subgroup 3. For this subgroup, one unit shall be selected from the first production lot. For subsequent Group C inspection, one unit shall be selected every fifth month. The unit shall be subjected to humidity testing.

4.5.3.1.4 Subgroup 4. For this subgroup, two units shall be selected from the first production lot. For subsequent Group C inspection, two units shall be selected every twelfth month. One unit shall be subjected to altitude, dust and salt fog testing, and one unit shall be subjected to fungus testing.

4.5.3.1.5 Subgroup 5. For this subgroup, one unit shall be selected from the first production lot. For subsequent Group C inspection, one unit shall be selected every fourth month. The unit shall be subjected to the electrical tests in the order shown in table IV.

TABLE IV. Group C inspection.

Inspection	Reqt Para	Insp Para
Subgroup 1		
High temperature	3.8.1.1	4.8.1.1
Low temperature	3.8.1.2	4.8.1.2
Subgroup 2		
Vibration	3.8.7.1	4.8.7.1
Shock	3.8.7.2	4.8.7.2
EMI	3.9	4.9
Subgroup 3		
Humidity	3.8.2	4.8.2 (Note 1)
Subgroup 4		
Altitude	3.8.3	4.8.3
Dust	3.8.4	4.8.4 (Note 1)
Salt fog	3.8.5	4.8.5 (Note 1)
Fungus	3.8.6	4.8.6 (Note 1)

TABLE IV. Group C inspections (continued).

Inspection	Reqt Para	Insp Para
Subgroup 5		
Clock/Data Phasing	3.7.1.3	4.7.1.3
Signal Balance	3.7.1.5	4.7.1.5
Slew Rate	3.7.1.6	4.7.1.6
Input Load Impedance	3.7.1.8	4.7.1.8
Clock Asymmetry	3.7.1.9	4.7.1.9
Transmit Video Signal	3.7.2.1	4.7.2.1
Receive Video Signal	3.7.2.2	4.7.2.2
Analog Orderwire Interface	3.7.3	4.7.3
Frame Search Inhibit	3.7.4	4.7.4
Signal Detection	3.7.7	4.7.7
Timing	3.7.8	4.7.8
Frame Acquisition Time	3.7.10.1	4.7.10.1
Detection of Loss-of-Frame Reacquisition	3.7.10.3	4.7.10.3
Unloaded Output	3.7.1.10	4.7.1.10
Prime Power	3.7.6	4.7.6
Dimensional Interchangeability	3.11	4.11

NOTE 1: The equipment shall be thoroughly washed, cleaned, dried, and refurbished, if necessary, before proceeding with subsequent tests.

4.5.3.2 Order of inspection within Group C. Group C inspection shall be performed for each subgroup in the order specified in 4.5.3.1.

4.5.3.3 Group C failures. Actions required relative to Group C failures shall be as specified in the contract or purchase order.

4.5.4 Reinspection of conforming Group C sample units. Unless otherwise specified, sample units which have been subjected to and passed Group C inspection may be accepted on the contract provided all damage is reworked to specifications and the sample units are resubjected to and pass Group A inspection only.

4.5.5 Group D inspection. This inspection shall consist of the tests specified in table V and shall be performed on units from lots which have been subjected to and have met Group A and Group B inspection. Test conditions, methods, and procedures shall be in accordance with 4.10.

TABLE V. Group D inspection.

Inspection	Reqt Para	Insp Para
Reliability	3.10	4.10

4.5.5.1 Sampling for Group D inspection. Eight units shall be selected at random from the first month's production and subjected to the test of 4.10. For subsequent Group D inspections, eight units shall be selected at random from every fourth month's production.

4.5.5.2 Group D failures. Actions required relative to Group D falures shall be as specified in the contract or purchase order.

4.5.5.3 Reinspection of conforming Group D sample units. Unless otherwise specified, sample units which have been subjected to and have passed Group D inspection may be accepted on the contract provided all damage is reworked to specification and the sample units are resubjected to and pass Group A inspection only.

4.6 Electrical preconditioning (burn-in). (See 3.6) During electrical preconditioning, the equipment shall be connected as shown in figure 1. A radio simulator is shown in figures 2 and 3, the passive part of which (figure 2) is used in the conduct of the burn-in test. Test conditions of 4.10.3 shall apply except that the duty cycle shall be 100%. If a failure occurs during this preconditioning, the failure shall be recorded, the failed component(s) replaced, and the preconditioning cycle reinstituted. Failure data obtained shall be submitted with the lot containing the unit in which the failure occurred. The procedure shall be as follows:

a. Set rate switch on UUT to 9 (1152 kb/s)

b. Operate the UUT for 48 hours, using BITE to indicate failure. If a failure is detected, it is to be repaired and recorded. The last 24 hours of burn-in must be failure free. Provisions shall be made to latch all S, SA and RS alarms.

c. After completion of burn-in, perform the operational test procedure outlined in 4.7.11.

4.7. Electrical. (See 3.7) Unless otherwise specified, all tests shall be performed at 115 V ±5% from a single-phase source operating between 57.0 and 63.0 Hz. Tests shall be conducted at room ambient temperature, pressure, and humidity per MIL-STD-810 unless otherwise specified. The electrical test equipments listed in table VI or their equivalents shall be utilized during testing and shall be calibrated in accordance with MIL-STD-45662. The standard test equipment shall be provided by the contractor. Government technical representative approval is required prior to use of proposed substitute items. Unless otherwise specified, special test equipment (see table VII and figure 4) shall be provided by the contractor subject to approval by the Government. The Government shall be responsible for supplying the Government Furnished Equipment (GFE) required for test listed in table VIII. Table IX identifies the external interface connections as shown in the test figures. Unless otherwise noted all resistors in test figures shall be .5 watts.

TABLE VI. Standard test equipment.

Description	Mfg./Model No. (or equivalent)
Electronic Counter	H.P. 5345A
Volt-Ohmmeter	Simpson 260
DC Voltmeter	H.P. 412A
Transmission Measuring Set	H.P. 3555B
RMS Voltmeter	H.P. 3403A
Audio Oscillator	H.P. 200CD
Wattmeter	Weston 432
AC Voltmeter	H.P. 403B
Attenuator	Kay 3-30
Oscilloscope	Tektronix 7904
DC Milliammeter	Fluke
Digital Voltmeter	Dynasciences 330
AC Power Source	Invertron 1501
Noise Generator	Elgenco 624A-12224
Pulse Generator	H.P. 8011A

TABLE VII. Special test equipment.

Equipment Name	Drawing No.	Functional Description
Group Simulator	A3051667	The Group Simulator simulates the group data, and subchannel orderwire and telemetry signals. It generates either a long or short pseudo-random sequence. The three signals can be generated simultaneously or in any combination.
Timing Source	A3051666	The Timing Source provides four independent group outputs, switch-selectable to positions between 72 and 4608 kb/s. Also provided are four independent Station Clock/ Telemetry Clock outputs, switch-selectable to 2, 16, or 32 kHz.
Timing Source (Alternate)		An alternate Timing Source is shown in figure 4 that may be used in lieu of the above.
DVOW/DOW Simulator	A3051669	The DVOW/DOW Simulator provides a pseudo-random data generator and correlator at 2, 16, and 32 kb/s with a balanced signal interface. A TTL error output signal is provided for counting errors externally.
Error Inserter	A3051665	The error inserter consists of an error generator for inserting a fixed number of errors into the data stream, stuff-delete circuitry to add or delete a data bit, a burst generator to simulate burst error rates and filters and analog circuitry to simulate the GRC-103 radio.

TABLE VIII. Government Furnished Equipment (GFE).

Equipment	Description
Multiplexer, TD-1237(P)/G	A unit in the DGM family of equipments known also as the Master Group Multiplexer (MGM).

Table IX. MD-1065 interface connections.

Connector	Function	Pin LO	Pin HI	Pin GND	Signal Type
Group 1	Group DATA In	A	B	M	NRZ
	Group TIM In	C	D	N	SQ WAVE
	Group DATA Out	E	F	P	NRZ
	Group TIM Out	G	H	R	SQ WAVE
	BSC Out	J	K	S	
Group 2	Group DATA In	A	B	M	NRZ
	Group TIM In	C	D	N	SQ WAVE
	Group DATA Out	E	F	P	NRZ
	Group TIM Out	G	H	R	SQ WAVE
	BSC Out	J	K	S	
Group 3	Group DATA In	A	B	M	NRZ
	Group TIM In	C	D	N	SQ WAVE
	Group DATA Out	E	F	P	NRZ
	Group TIM Out	G	H	R	SQ WAVE
	BSC Out	J	K	S	
Digital Voice Orderwire	Group 1 XMT DATA In	A	B	R	NRZ
	XMT TIM Out	C	D		SQ WAVE
	RCV DATA Out	E	F		NRZ
	RCV TIM Out	G	H		SQ WAVE
	Group 2 XMT DATA In	J	K	R	NRZ
	XMT TIM Out	L	M		SQ WAVE
	RCV DATA Out	N	P		NRZ
	RCV TIM Out	S	T		SQ WAVE
	Group 3 XMT DATA In	U	V	R	NRZ
	XMT TIM Out	W	X		SQ WAVE
	RCV DATA Out	Y	Z		NRZ
	RCV TIM Out	a	b		SQ WAVE
Data Orderwire	Group 1 XMT DATA In	A	B	R	NRZ
	XMT TIM Out	C	D		SQ WAVE
	RCV DATA Out	E	F		NRZ
	RCV TIM Out	G	H		SQ WAVE
	Group 2 XMT DATA In	J	K	R	NRZ
	XMT TIM Out	L	M		SQ WAVE
	RCV DATA Out	N	P		NRZ
	RCV TIM Out	S	T		SQ WAVE
	Group 3 XMT DATA In	U	V	R	NRZ
	XMT TIM Out	W	X		SQ WAVE
	RCV DATA Out	Y	Z		NRZ
	RCV TIM Out	a	b		SQ WAVE

Table IX MD-1065 interface connections. (Cont)

Connector	Function	Pin LO	Pin HI	Pin GND	Signal Type
Analog Voice Orderwire	Group 1 AVOW	A	B	T	BAL 600 ohms
	OW Cont	C	D		RELAY
	Group 2 AVOW	E	F		BAL 600 ohms
	OW Cont	G	H		RELAY
	Group 3 AVOW	J	K		BAL 600 ohms
	OW Cont	L	M		RELAY
ALARM	S Alarm	A	B	T	RELAY
	SA Alarm	C	D		RELAY
	RS Alarm	E	F		RELAY
	Group 1 Frame Squelch Signal		G		UNBAL TTL
	Return		H		
	Group 2 Frame Squelch Signal		J		UNBAL TTL
	Return		K		
	Group 3 Frame Squelch Signal		L		UNBAL TTL
	Return		M		
To Radio 1	Group 1 to Radio				UNBAL NRZ
To Radio 2	Group 2 to Radio				UNBAL NRZ
To Radio 3	Group 3 to Radio				UNBAL NRZ
From Radio 1	Group 1 from Radio				UNBAL VIDEO
From Radio 2	Group 2 from Radio				UNBAL VIDEO
From Radio 3	Group 3 from Radio				UNBAL VIDEO
Power		C	A	B	

4.7.1 Balanced equipment-side signal characteristics. (See 3.7.1)

4.7.1.1 Line-to-line voltage levels. (See 3.7.1.1)

a. Connect the equipment as shown in figure 5.

b. Set the rate switches on the UUT to 9.

c. For each of the following signals measure the positive and negative voltage levels line-to-line (i.e., between high and low pins) using the oscilloscope circuit of figure 6(A):

RCV Group 1 Data
RCV Group 2 Data
RCV Group 3 Data
RCV Group 1 Timing
RCV Group 2 Timing
RCV Group 3 Timing
RCV Group 1 BSC
RCV Group 2 BSC
RCV Group 3 BSC
XMT DVOW 1 Timing
XMT DVOW 2 Timing
XMT DVOW 3 Timing
RCV DVOW 1 Data
RCV DVOW 2 Data
RCV DVOW 3 Data
RCV DVOW 1 Timing
RCV DVOW 2 Timing
RCV DVOW 3 Timing
XMT DOW 1 Timing
XMT DOW 2 Timing
XMT DOW 3 Timing
RCV DOW 1 Data
RCV DOW 2 Data
RCV DOW 3 Data
RCV DOW 1 Timing
RCV DOW 2 Timing
RCV DOW 3 Timing

d. Verify that the requirements of 3.7.1.1 are met.

4.7.1.2 Line-to-ground voltage. (See 3.7.1.2)

a. The equipment setup is the same as in 4.7.1.1 except that the oscilloscope input must be unbalanced (see figure 6(B)).

b. For each of the signals given in 4.7.1.1, measure the voltage peaks on the high and low pins to ground.

c. Verify that the requirements of 3.7.1.2 are met.

4.7.1.3 Clock/data phasing. (See 3.7.1.3)

a. The equipment setup is the same as in 4.7.1.1, except connect the oscilloscope as shown in figure 7.

b. For each of the signals given below, measure the delay between the zero voltage points on both the data rise and fall time slopes to the zero voltage points of the timing rise slopes as indicated in figure 8.

RCV Group 1 Data/Timing
RCV Group 2 Data/Timing
RCV Group 3 Data/Timing

RCV DVOW 1 Data/Timing
RCV DVOW 2 Data/Timing
RCV DVOW 3 Data/Timing

RCV DOW 1 Data/Timing
RCV DOW 2 Data/Timing
RCV DOW 3 Data/Timing

c. Verify that the requirements of 3.7.1.3 are met.

4.7.1.4 Offset. (See 3.7.1.4)

a. The equipment setup is the same as in 4.7.1.1 with the oscilloscope connected as shown in figure 9(A).

b. For each of the signals given in 4.7.1.1, measure the dc offset voltage.

c. Verify that the requirements of 3.7.1.4 are met.

4.7.1.5 Signal balance. (See 3.7.1.5)

a. The equipment setup is the same as in 4.7.1.1.

b. For each of the output signals given in 4.7.1.1, measure the positive and negative voltage levels line-to-line (i.e., between high and low pins) as in 4.7.1.1.

c. Compare the positive and negative values. Determine the larger of the two values.

d. Compare the difference between the positive and negative values to 10% of the larger value.

e. Verify that the requirements of 3.7.1.5 are met.

4.7.1.6 Slew rate. (See 3.7.1.6)

a. The equipment setup is the same as in 4.7.1.1 with the oscilloscope connected as shown in figure 9(B).

NOTE: All measurements shall be made through 100 feet of RG-108 cable.

b. For each of the signals listed in 4.7.1.1, measure the time between +40 mV and -40 mV points around the zero voltage level of the rise and fall slopes as shown in figure 10.

c. Verify that the requirements of 3.7.1.6 are met.

4.7.1.7 Receiver dynamic range. (See 3.7.1.7)

a. Connect the equipment as shown in figure 11. A variable attenuator will be connected in the normal signal path during the conduct of test.

b. Connect the attenuators in each signal path. Using the oscilloscope, adjust each attenuator to give a ±50 mV peak signal into the UUT.

c. Observe the errors at each signal path. Verify that there are no DVOW or DOW errors over a 30-second period and no group errors over a 10-second period.

4.7.1.8 Input load impedance. (See 3.7.1.8)

a. Connect the equipment as shown in figure 12.

b. At each signal input adjust the audio oscillator to a frequency of 1.0 kHz for a V1 output voltage of 1.0 V. Then measure the V2 voltage.

c. Calculate the input impedance of each input using the formula:

$$R = 100 \frac{V2}{V1} \text{ ohms}$$

d. Verify that the requirements of 3.7.1.8 are met.

4.7.1.9 Clock asymmetry. (See 3.7.1.9)

a. The equipment test setup is the same as in 4.7.1.1.

b. For each of the signals given in table X, measure the time (A) between the rise and fall slopes at the zero voltage points; then measure the time (B) between two successive rise slopes at the zero voltage points as indicated in figure 13.

TABLE X. Clock asymmetry tolerances.

Signal	Tolerance
Group 1 Timing Group 2 Timing Group 3 Timing RCV Group 1 BSC RCV Group 2 BSC RCV Group 3 BSC	± 15 ns
XMT DVOW 1 Timing XMT DVOW 2 Timing XMT DVOW 3 Timing RCV DVOW 1 Timing RCV DVOW 2 Timing RCV DVOW 3 Timing XMT DOW 1 Timing XMT DOW 2 Timing XMT DOW 3 Timing RCV DOW 1 Timing RCV DOW 2 Timing RCV DOW 3 Timing	± 1500 ns

c. Verify that A = 1/2 B within the above tolerence requirements of table X, in accordance with the requirements of 3.7.1.9.

4.7.1.10 Unloaded output. (See 3.7.1.10)

a. The equipment setup is the same as in 4.7.1.5 except that the 50-ohm termination resistors are removed.

b. For each of the following signals, measure the positive and negative voltage levels, line-to-line (i.e. between high and low pins):

DOW XMT Tim 1 Out
DOW XMT Tim 2 Out
DOW XMT Tim 3 Out
DOW RCV Data 1 Out
DOW RCV Data 2 Out
DOW RCV Data 3 Out
DOW RCV Tim 1 Out
DOW RCV Tim 2 Out
DOW RCV Tim 3 Out

c. Verify that the requirements of 3.7.1.10 are met.

4.7.2 Radio-side interface. (See 3.7.2)

4.7.2.1 Transmit video signal. (See 3.7.2.1)

4.7.2.1.1 Transmit video signal voltage.

a. Connect the equipment as shown in figure 14.

b. With the Group Simulator connected to Group 1 on the UUT and rate switch set to 1152 kb/s, measure the output voltage level at the To Radio 1 output on the UUT.

c. Repeat step b for Groups 2 and 3, with output measured at the To Radio 2 and 3, respectively.

d. Verify that the requirements of 3.7.2.1 are met.

4.7.2.1.2 Transmit video signal rise and fall times and polarity.

a. The equipment test setup is the same as in 4.7.2.1.1, figure 14.

b. With the Group Simulator connected to Group 1 on the UUT, measure the rise and fall times of the output at the To Radio 1 connector on the UUT.

c. Repeat step b for Groups 2 and 3.

d. Verify that the requirements of 3.7.2.1 are met.

e. Connect the Group Simulator to Group 1 on the UUT and monitor the output video signal at the To Radio 1 connector on the UUT.

f. Observe the data bit after the three "ones" frame bits on the oscilloscope. Set the Group Simulator to the all ones position, then to the all zeros position. Verify that the digital ones position is more positive than the digital zeros position.

g. Verify that the requirements of 3.7.2.1 are met.

h. Repeat step e through g for Groups 2 and 3.

4.7.2.2 Receive video signal. (See 3.7.2.2)

4.7.2.2.1 Receive video signal voltage.

a. Connect the equipment as shown in figure 15.

b. Set the UUT rate switch for Group 1 to 1152 kb/s.

c. Set the Radio Simulator Video Level to 0.5 V p-p by adjusting R while observing the Radio Out signal.

d. Monitor the Group Errors over a 10-second period. Verify that no errors are generated.

e. Set the Radio Simulator Video Level to 2.0 V p-p by adjusting R while observing the level at the Radio Out signal.

f. Repeat step d.

g. Repeat steps b through f for Groups 2 and 3.

4.7.2.2.2 Receive video signal impedance.

a. Connect the test equipment as shown in figure 16.

b. Connect the test setup to From Radio on the UUT. Adjust the oscillator at a frequency of 1 kHz to produce a V1 voltage of 1.0 V. Then measure the V2 voltage.

c. Repeat step b with the setup connected to From Radio 2 and 3.

d. Calculate the impedance using the formula:

$$Z = 91 \frac{V2}{V1} \text{ ohms}$$

e. Verify that the requirements of 3.7.2.2 are met.

4.7.3 Analog orderwire interface. (See 3.7.3)

4.7.3.1 Impedance. (See 3.7.3.1)

a. Connect the equipment as shown in figure 17.

b. Connect the setup to the Group 1 AVOW output and FROM RADIO 1 output on the UUT.

c. Adjust the Radio Simulator with the Video OFF for 53 mV rms Audio Level at a frequency of 1 kHz. This will produce a voltage of -4 dBm into the unit. Then measure the AVOW V(L) loaded voltage and the open circuit output voltage, V(OC).

d. Calculate the output impedance using the formula:

$$Z = 600 \frac{V(OC) - V(L)}{V(L)} \text{ ohms}$$

e. Repeat steps b through d for Groups 2 and 3.

f. Verify that the requirements of 3.7.3.1 are met.

4.7.3.2 AVOW output level. (See 3.7.3.2) Test of 4.7.3.1 (V(L) measurement) will satisfy testing for this requirement.

4.7.3.3 Signal-to-noise ratio (SNR). (See 3.7.3.3)

a. Connect the equipment as shown in figure 18.

b. Set the Group Simulator and Group 1 Rate switch of the UUT to a 128 kb/s rate.

c. Adjust the audio oscillator (at 1 kHz) and the Radio Simulator to give 0.6 volt peak-to-peak video output signal and a 53 mV peak-to-peak audio signal at the Radio output of the active Radio Simulator.

d. Measure the audio output level with the Transmission Measuring Set 600-ohm termination (in C-message weighted mode). Record the level in dBm.

e. Disconnect the audio signal and note the noise level on the Transmission Measuring Set. Record the level in dBm.

f. Calculate the SNR as follows:

SNR = (Audio Level) dBm - (Noise Level) dBm.

g. Repeat steps b through f for 256, 288, 512, 576, 1024 and 1152 kb/s data rates.

h. Verify that the requirements of 3.7.3.3 are met.

4.7.3.4 Orderwire control interface. (See 3.7.3.4)

a. Connect the equipment as shown in figure 19.

b. Set the UUT rate for Group 1 to 1152 kb/s. Monitor the AVOW 1 Control output. It shall indicate a short circuit.

c. Disconnect the signal at To Radio 1 on the UUT. Monitor the AVOW 1 Control output. It shall indicate an open circuit.

d. Connect the signal at To Radio 1 on the UUT. Monitor the AVOW 1 Control output. It shall indicate a short circuit.

e. Repeat steps b through d for Groups 2 and 3.

4.7.4 Frame search inhibit interface. (See 3.7.4)

a. Connect equipment as shown in figure 20.

b.Set the UUT rate switch of Group 1 to 1152 kb/s. Measure the Frame Squelch 1 output on the UUT, using the worst case load for non-squelched condition.

c. Disconnect the video at the To Radio 1 connector on the UUT. Then measure the Frame Squelch output at the UUT, using the worst case load for squelched condition.

d. Repeat steps b and c for Group 2 and 3.

e. Verify that the requirements of 3.7.4 are met.

4.7.5. Alarm interface. (See 3.7.5)

4.7.5.1 BITE and alarm. (See 3.7.5.1)

a. Connect the equipment as shown in figure 21.

b. Set the Group Simulator and all UUT Groups to a 1152 kb/s rate.

c. Set the DVOW and DOW for normal operation at 16 kb/s and 2 kb/s, using Station Clock mode. (DVOW and DOW XMT Tim 1 Out).

4.7.5.1.1 No-fault operation. Verify using an ohmmeter that the following BITE requirements are met: (Open circuit is NORMAL, a short indicates alarm).

S OPEN
SA OPEN
RS OPEN
SUMMARY FAULT lamp must be OFF.
Power Out of Tolerance (POT) lamp must be OFF.
All CCA LEDs must be OFF.
Verify that no Group, DOW or DVOW errors are generated.

4.7.5.1.2 Summary fault test. Press the LAMP TEST switch on the UUT. Verify that the following BITE requirements are met:

S CLOSED
SA CLOSED
RS CLOSED
SUMMARY FAULT lamp must light.
Loss of Input (LOI) and POT lamps must light.
Verify that no Group, DOW or DVOW errors are generated.

4.7.5.1.3 BITE CCA removal. Remove the BITE CCA. Verify that there are no Group, DOW or DVOW errors generated. Re-install the BITE CCA.

4.7.5.1.4 Power alarm test. Turn OFF power to the UUT at the source. Verify that the following BITE requirements are met:

S CLOSED
SA CLOSED
RS OPEN

Turn OFF unit power switch. Verify that the following BITE requirements are met for the idle unit.

S CLOSED
SA OPEN
RS OPEN

4.7.5.1.5 Loss-of-video. Turn power ON and disconnect the FROM RADIO 1 connector on the UUT. Verify that the following BITE requirements are met:

S CLOSED
SA OPEN
RS CLOSED

4.7.6 Prime power interface . (See 3.7.6)

a. Connect the equipment as shown in figure 22.

b. Set the Group Simulator and UUT Groups for normal operation at 1152 kb/s, the DVOW for normal operation at 16 kb/s and the DOW for normal operation at 2 kb/s.

c. Set the Radio Simulator to provide a video level of 1 V p-p with an audio level of 0.16 V p-p, no noise.

d. Obtain the following combinations of voltages and frequencies in sequence:

115 Vac	60 Hz
103.5 Vac	47.5 Hz
	420 Hz
126.5 Vac	47.5 Hz
	420 Hz

e. For each of the combinations of voltages and frequencies above, perform the following measurements.

(1) Measure the input power and verify that it is 90 watts max.

(2) Measure the Group BER at 1152 kb/s over a 10-second period. Measure the DVOW BER at 16 kb/s, and the DOW BER at 2 kb/s, over a 30-second period. Verify that no errors are generated.

4.7.7 Signal detection. (See 3.7.7)

a. Connect the equipment as shown in figure 23.

b. Set the Group Simulator and UUT Group 1 for a 576 kb/s rate.

c. Set the Audio Oscillator for a signal level of 0.08 volts peak-to-peak at 1000 Hz.

d. Adjust the Radio Simulator until the video signal level is 0.5 volts peak-to-peak.

e. Disconnect the To Radio 1 connector on the UUT from the Radio Simulator and the audio oscillator (OW In to the Radio Simulator).

f. Adjust the Simulator to obtain a noise level of 0.0396 volts as measured on the RMS voltmeter.

g. Connect the To Radio 1 connector on the UUT to the Radio Simulator and the audio oscillator (OW In to the Radio Simulator).

h. Measure and record the errors for 10 seconds and verify that the error rate is within the limits specified.

i. Repeat steps b through h using the group input rates, video levels and noise levels shown in table XI.

TABLE XI. Signal detection levels.

Data Rate, kb/s	Video Level, volts	Audio Level, volts	RMS Noise Level, volts	Peak Signal to RMS Noise Ratio, dB	Errors in 10 s
576	0.5	0.08	0.0396	16.0	5760
576	0.5	0.08	0.0236	20.5	6
1152	0.5	0.08	0.0167	23.5	11520
1152	0.5	0.08	0.0094	28.5	12
576	2.0	0.32	0.158	16.0	5760
576	2.0	0.32	0.094	20.5	6
1152	2.0	0.32	0.067	23.5	11520
1152	2.0	0.32	0.038	28.5	12
576	0.5	0.08	0.140	25.0	10
1152	0.5	0.08	0.005	34.0	10

4.7.8 Timing. (See 3.7.8)

4.7.8.1 Normal operation, related timing and transition to master timing (on XMT side).

a. Connect the equipment as shown in figure 24. Set the Group Rate switches to 1152 kb/s. Set DVOW/DOW Simulators to Station Clock mode.

b. Measure the DVOW 1 and DOW 1 XMT Timing output frequencies; then measure the DVOW 1 and the DOW 1 Error Rate over a 30-second period. Verify that no errors are generated. Verify that the frequencies are as follows:

DVOW Frequency: 16 kHz ±15 ppm

DOW Frequency: 2 kHz ±15 ppm

c. Repeat step b for DVOW and DOW XMT Timing outputs 2 and 3.

4.7.8.2 Normal operation, recovered timing and transition to master clock (on RCV side).

a. The equipment setup is the same as in figure 24.

b. Disconnect the TO RADIO 1, 2 and 3 connections on the UUT.

c. Measure the frequency of the Group 1, 2 and 3 Timing Out signals and the DVOW Group 1, 2 and 3 RCV Timing Out signals.

NOTE: No RCV Timing test required for the DOW signal.

d. Verify that the following requirements are met:

Group RCV Timing frequency: 1152 kHz ±17.3 Hz
DVOW RCV Timing frequency: 16 kHz ±0.24 Hz

4.7.8.3 Video interrupt test.

a. Connect the equipment as shown in figure 25.

b. Set the following Error Inserter controls:

(1) UNBALANCED Interface

(2) RANDOM Errors

(3) BER to 0%

(4) Burst Errors OFF

c. Verify that no errors are observed on the Group, the 16 kb/s DVOW/DOW, and the 2 kb/s DVOW/DOW simulators.

d. Set the pulse generator for a 30 ms pulse width and a 1 second repetition rate. This will switch the video output signal off for 30 ms and replace it with a 37 kHz square wave to simulate noise from the radio.

e. Verify that the Group Simulator, the 16 kb/s and the 2 kb/s DVOW/DOW simulators do not permanently lose BCI.

f. Repeat steps c through e, substituting Group 2 and Group 3 signals and Radio 2 and Radio 3 outputs for Radio 1 outputs.

4.7.9 TD-1237 jitter. (See 3.7.9)

a. Connect the equipment as shown in figure 26.

b. Set the Group Simulator to 1152 kb/s and adjust the audio oscillator frequency to 1 kHz and its output level such that the transmission measuring test set measures -4 dB at AVOW Out.

c. Set both TD-1237 units and the DVOW/DOW Simulator to the Station Clock mode.

d. Set the frequency synthesizer to +15 ppm.

e. Measure the Group and DVOW BER for 15 minutes. Verify that no errors are generated.

f. Repeat steps d and e for -15 ppm.

g. Repeat steps b through f for 128 kb/s Group Rate.

4.7.10 Framing. (See 3.7.10)

4.7.10.1 Frame acquisition time. (See 3.7.10.1)

a. Connect the equipment as shown in figure 27.

b. Set the Error Inserter BER to 10^{-3} errors, RANDOM, UNBALANCED Interface and Burst Errors OFF.

c. Squelch the Video Out data on the Error Inserter.

NOTE: The frame squelch signal will go low, indicating loss-of-frame.

d. Restore the Video Out data and note the time it takes for the frame squelch signal to go high which indicates that frame has been acquired.

e. Perform steps c and d fifty times. Verify that the total time to acquire frame does not exceed 33 ms in more than 5 of the 50 tests.

4.7.10.2 Frame maintenance. (See 3.7.10.2)

a. Connect the equipment as shown in figure 28.

b. Set the Bit Error Inserter the same as 4.7.10.1.

c. Allow the setup to operate for at least 12 hours and verify that no loss-of-frame occurs during the 12-hour period.

NOTE: In the event of failure, the UUT will be subjected to a 240-hour test with random errors at a 10^{-3} rate as defined in the specification or retested as described above.

4.7.10.3 Detection of loss-of-frame and reacquisition. (See 3.7.10.3)

a. Connect the equipment as shown in figure 29.

b. Set the Bit Error Inserter to stuff/delete (stuff mode), BER to 10^{-3} and Unbalanced Interface.

c. Insert a bit into the bit stream to induce loss of BCI and set up the counter to measure the time it takes the UUT to lose and recover frame.

NOTE: The frame squelch signal will go low when frame is lost and return to high when frame is reacquired.

d. Perform step c fifty (50) times and verify that the total time for loss and reframe does not exceed 39 ms in more than 5 of the 50 tests.

e. Repeat steps a through d, except in step c delete a bit to induce loss of BCI, instead of inserting one.

4.7.10.4 Data squelch. (See 3.7.10.4)

a. Connect the equipment as shown in figure 30.

b. Set the Group 1 Simulator for normal operation at 1152 kb/s and the DVOW/DOW Simulators to Station Clock mode.

c. Monitor the Group Simulator error output while pressing the Lamp Test switch on the UUT. Verify that no errors are generated.

d. With the oscilloscope, monitor the Group 1 Data output, the DVOW Group 1 Data output, and the DOW Group 1 Data output on the UUT.

e. Disconnect the video signal at the From Radio connector on the UUT. Verify that the DVOW and DOW output signals indicate all ones.

f. Repeat steps b through d substituting Group 2 and Group 3 signals for Group 1 signals.

g. Verify that the requirements of 3.7.10.4 are met.

4.7.11 Operational check and signal detection. (See 3.7.11)

a. Connect the equipment as shown in figure 31.

b. Adjust R1 for a radio output level of 1.0 to 2.0 V p-p at the Radio Out connector of the simulator.

4.7.11.1 Group data error check at 1152 and 576 kb/s. (See 3.7.11.1)

a. Set the UUT and Group Simulator to 1152 kb/s.

b. Monitor the Group Simulator error output over a 10-second period.

c. Repeat step b with the Group Rate set to 576 kb/s.

d. Verify that no errors occur.

4.7.11.2 DVOW error check at 16 kb/s. (See 3.7.11.2) With the DVOW/DOW Simulator set to 16 kb/s, monitor the DVOW error output for a 30-second period. Verify that no errors are generated.

4.7.11.3 DOW error check at 2 kb/s. (See 3.7.11.3) With the DVOW/DOW Simulator set to 2 kb/s, monitor the DOW error output over a 30-second period. Verify that no errors are generated.

4.7.11.4 Alarm monitor check. (See 3.7.11.4) Test of 4.7.5.1 satisfies testing for this requirement.

4.7.11.5 Analog voice orderwire check. (See 3.7.11.5) With the audio oscillator set to 53 mV rms, measure the AVOW 1, 2 and 3 outputs. Verify that the output level is between -6 and -2 dBm.

4.7.12 Environmental signal detection test (full duplex).

a. Connect the equipment as shown in figure 32.

b. Adjust R1 for a radio output level of 1.0 to 2.0 V p-p and adjust the audio oscillator for a 53 mV rms level at each simulator radio output.

c. Set the UUT, Auxiliary Unit and Group Simulator for 1152 kb/s operation.

d. Set the DVOW and DOW at 16 kb/s and 2 kb/s using Station Clock mode. (DVOW and DOW XMT Tim 1 Out.)

4.7.12.1 Group Data Error Rate Check at 1152 kb/s and 576 kb/s.

a. Monitor the Group Simulator error output for 10 seconds (at 1152 kb/s). Verify that no errors are generated.

b. Set the Group Simulator, UUT and Auxiliary Unit for proper operation at 576 kb/s and repeat step a.

4.7.12.2 DVOW Error Check at 16 kb/s. With the DVOW/DOW Simulator operating at 16 kb/s, monitor the DVOW for a 30-second period. Verify that no errors are generated.

4.7.12.3 DOW Error Check at 2 kb/s. With the DVOW/DOW Simulator operationg 2 kb/s, monitor the DOW for a 30-second period. Verify that no errors are generated.

4.7.13.4 Alarm monitor check. (See 3.7.13.4)

a. Monitor the S, SA and RS alarm outputs. Verify that there are no alarms generated; that is, there is an open ciruit indicated for each. (A short indicates alarm).

b. Disconnect the Group cable on the Auxiliary Unit and verify that the S and SA alarms are shorted.

c. Reconnect the Group cable on the Auxiliary Unit.

d. Disconnect the Video Out connector on Radio Simulator No. 4. Verify that the S, SA, and RS alarms are shorted.

e. Reconnect the Radio Out connector on Radio Simulator No. 4. Verify that no alarms are generated.

f. Repeat steps d and e for Radio Simulators 5 and 6.

4.7.12.5 Analog voice orderwire check. (See 3.7.12.5) Measure the AVOW 1 and 2 output levels with the RMS voltmeter. Verify that the requirements of 3.7.12.5 are met.

NOTE: The measurements performed before, during, and after each environmental test shall not vary by more than ±1 dB.

4.8 Service conditions tests. (See 3.8)

4.8.1 Temperature. (See 3.8.1)

4.8.1.1 High temperature. (See 3.8.1.1) The equipment shall be subjected to the test of MIL-STD-810D, Method 501.2 Procedure II for cycling exposure. In step 12, raise the internal chamber temperature to +63°C (+145°F). Maintain internal chamber temperature for 6 hours at +63°C (+145°F). Raise the internal chamber temperature to +71.1°C (+160°F) within a time period of one hour and maintain at that temperature for four additional hours. Lower the internal chamber temperature to +63°C (+145°F) within a time period of one hour. Repeat the above steps two additional times for a total of three 12-hour cycles. Step 14 shall be performed as follows: adjust the internal chamber temperature to +63°C (+145°F) and maintain this temperature until temperature stabilization of the test item is reached. Operate the test item until the item is stabilized.

4.8.1.2 Low temperature. (See 3.8.1.2) The equipment shall be subjected to the test of MIL-STD-810D, Method 502.2, Procedure I. Lower the internal chamber temperature in step 2 to -57°C(-70°F) for a period of not less than two hours following stabilization of the equipment, or until 24 hours have elapsed, whichever occurs first. In step 5 of Procedure I, perform Procedure II - Operation. (Para. II- 3.2 of Method 502.2). The chamber temperature in step 1 of Procedure II shall be adjusted to -31.7°C(-25°F).

4.8.2 Humidity. (See 3.8.2) The equipment shall be subjected to the test of MIL-STD-810D, Method 507.2, Procedure III.

4.8.3 Low pressure (altitude). (See 3.8.3) The equipment shall be subjected to the test of MIL-STD-810D, Method 500.2, Procedure I. For step 2, adjust the chamber pressure to 141 mm of Hg (5.56 inches of Hg or 40,000 feet above sea level), at a rate not to exceed 2,000 fpm. The equipment shall also be subjected to the test of MIL-STD-810D, Method 500.2, Procedure II. The chamber pressure in step 2 shall be adjusted to 523 mm of Hg (20.6 inches of Hg or 10,000 feet above sea level) at a rate not to exceed 2,000 fpm.

4.8.4 Dust. (See 3.8.4) The equipment shall be subjected to the test of MIL-STD-810D, Method 510.2, Procedure I. In step 2 and step 5, the air velocity shall be 200 ±100 feet per minute. In step 5, the air temperature shall be adjusted to +63°(+145°F). The equipment shall be reoriented periodically to expose all its sides to the dust stream. The equipment shall be operated before step 1, during step 8 and during step 11.

4.8.5 Salt fog. (See 3.8.5) The equipment shall be subjected to the test of MIL-STD-810D, Method 509.2, Procedure I. In step 2, the 48-hour period shall be constant wetting. Delete step 3. Operation in step 4 shall take place after gentle wash in running water not warmer than +38°C(+100°F) and drying. There shall be no corrosion of finishes or metals. Such corrosion shall be defined as any visible degradation of the equipment surfaces that can be attributed to flaky, pitted, blistered or otherwise loosened finish on metal surfaces. There shall be no clogging or binding of moving mechanical parts.

4.8.6 Fungus. (See 3.8.6) The equipment in the assembled-and-ready-for-delivery condition, or representative samples subject to approval of the procuring agency, shall be subjected to the test of MIL-STD-810D, Method 508.3. After 28 days, based on visual examination, the equipment or samples shall show no more than sparse microbial growth with restricted tuberal growth development in an area 10% or less of the total area and no more than six unrelated minute colonies, with mycelial development in non-critical areas. Critical areas include: terminal spacing, CCAs, etc. The equipment shall fail if it shows more than the growth specified above.

4.8.7 Vibration and shock. (See 3.8.7)

4.8.7.1 Vibration. The equipment shall be subjected to the test of MIL-STD-810D, Method 514.3, Procedure I, Category 8 (Ground Mobile). The vibration level shall be in accordance with figures 514.3-7 through 514.3-9 of MIL-STD-810D. The axes designated on the schedules are the vehicle axes. The orientation of the equipment relative to the vehicle, therefore, must be considered for proper direction of vibration input. Test time shall be 4 hours in each of three mutually perpendicular directions for a total of 12 hours. Prior to and following these tests, the equipment shall be operated in accordance with MIL-STD-810D general test performance guidance paragraph 4.5. The equipment shall not have any degradation in performance and shall not suffer any mechanical damage.

4.8.7.2 Shock.

4.8.7.2.1 Functional. The equipment shall be subjected to the test of MIL-STD-810D, Method 516.3, Procedure I. The shock pulse shall be 20g peak for a nominal duration of 11 msec in accordance with figure 516.3-4.

4.8.7.2.2 Bench handling. The equipment shall be subjected to the test of MIL-STD-810D, Method 516.3, Procedure VI.

4.9 EMI tests. (See 3.9) The unit shall be tested for compliance with 3.9. Test methods and procedures shall be in accordance with MIL-STD-462, Notice 3, and a Government approved test plan. During susceptibility testing, the integral test facility plug-in subassembly shall be used to monitor operation of the unit.

4.9.1 Bonds and grounds. (See 3.9.1) Prior to performance of EMI testing, compliance with requirements of 3.9.1 shall be ascertained. Bonding resistance measurements shall be recorded and included in the EMI test report.

4.10 Reliability testing. (See 3.10)

4.10.1 First article reliability test. First article reliability testing shall be in accordance with Test Plan VIC of MIL-STD-781C.

4.10.2 Quality conformance (Group D) reliability test. The reliablity test for Group D inspection shall be in accordance with Test Plan VIC of MIL-STD-781C.

4.10.3 Reliability test conditions. Reliability testing shall be accomplished subject to the following conditions:

a. Two MD-1065/G units shall be operated back-to-back.

b. Duty cycle. Apply prime power to equipment under test for 4 hours. Turn power OFF for 2 hours. Turn power ON for 16 hours. Turn power OFF for 2 hours. Repeat this sequence for each 24-hour cycle.

c. Chamber temperature shall be $40 \pm 5^{\circ}C$ ($95^{\circ}F$ to $113^{\circ}F$).

d. Vibration shall be 2.2 g $\pm 10\%$ peak acceleration value at any nonresonant frequency between 20 and 60 cps measured at the mounting points on the equipment. The duration of vibration shall be at least 10 minutes during each hour of equipment operating time.

4.10.4 Reliability test method. The detailed test procedures and conditions for performing the test outlined in 4.10.1 and 4.10.2 shall be in accordance with a contractor prepared, Government approved test plan.

4.10.5 Failure definition. A failure is defined as any malfunction which causes or may cause inability to commence operation, cessation of operation, or degradation below limits specified in 3.7.11.

4.10.6 Failure reporting and analysis. A failure reporting and analysis system shall be implemented per MIL-STD-781. Final determination of the failure relevancy and multiple and pattern failure categorization shall be the responsibility of the procuring activity.

4.11 Interchangeability. (See 3.11) The dimensions listed below shall be gaged or measured to determine conformance to the physical interchangeability requirements of 3.11. When a listed dimension is not within specified or design limits, it shall be considered a major defect.

a. External and internal dimensions of case, cover, and insertable assemblies, when such dimensions affect mating of parts.

b. Dimensions of cavities, when such dimensions affect insertion of items.

c. Location of switches, sockets, and fasteners.

d. Location of panel-mounting screw holes on basic units for mating with case.

e. Location of connectors, locking pins, fasteners, slides, and mountings which receive mating parts or plug-in assemblies and major units; and location of the mating parts on the plug-in or major unit.

4.12 Electrical subassembly tests. (See 3.12) Plug-in subassemblies, including spares, shall meet the requirements of their respective TRS drawings listed in 3.12.

4.13 Visual and mechanical inspection. (See 3.14 and 3.15) The equipment shall be examined for the defects listed in MIL-STD-252 to determine compliance with 3.15. An inspection shall be performed to verify compliance with those portions of 3.14 (System safety engineering) which can be determined visually.

4.13.1 System Safety Design Verification Check List. An inspection shall be performed, on one unit only, during first article testing, utilizing SEL Form 1183, to verify compliance with 3.41 (System safety engineering.)

4.14 Packaging inspection. Packaging inspection requirements specified herein are classified as follows:

a. First article inspection of packaging.

b. Quality conformance inspection of packaging.

4.14.1 First article inspection of packaging. Unless otherwise specified in the contract, first article inspection of packaging shall be in accordance with the Unit Pack Design Validation Requirements of MIL-P-116.

4.14.2 Quality conformance inspection of packaging.

4.14.2.1 Materials inspection. All materials to be used in packaging shall be inspected in accordance with the applicable material specification.

4.14.2.2 Preservation inspection. Inspection of preservation and interior markings shall be in accordance with group A and B Quality Conformance Inspection Requirements of MIL-P-116. Lot formation and sampling procedure shall be as specified therein.

4.14.2.3 Packing inspection. Inspection of packing and the marking for shipment and storage shall consist of the examinations specified in table XII. Lot formation shall consist of all packs made of the same materials during an identifiable period and submitted at one time for acceptance. Sampling procedures shall be in accordance with MIL-STD-105, using a single sampling plan and AQL of 4.0 percent defective.

TABLE XII. Packing inspection provisions.

No.	CHARACTERISTIC	METHOD OF INSPECTION
101	Intermediate container not as specified	Visual
102	Improper closure of intermediate container	Visual
103	Shipping containers not in accordance with specification	Visual
104	Excessive cube	Visual
105	Improper blocking and bracing	Visual
106	Closure not in accordance with specification	Visual
107	Weight and size exceed container limitation	Weigh & Measure
108	Strapping not in accordance with specification, incorrectly applied, omitted	Visual
109	Marking omitted, incorrect, or illegible	Visual

4.15 Serial numbers. The equipment shall be inspected to verify that the serial numbers appear on each nomenclatured item and CCA.

4.16 Nuclear tests. (See 3.16) Applicable tests for nuclear survivability shall be performed on the equipment in accordance with Secton 3 of CR-CX-0173-001.

5. PACKAGING

5.1 Preservation. Preservation shall be as specified in MIL-STD-2073-2, tables I through VII, coded as follows:

5.1.1 Level A. 3Q-1-00-OO-NR-X-ED.

5.1.2 Level B. 2M-1-00-OO-NR-X-ED.

5.2 Packing and marking. Packing and marking shall be in accordance with MIL-E-55585.

6. NOTES

6.1 Intended use. The MD-1065(P)/G is a shelter or van mounted equipment which provides signal interface between the Radio Set AN/GRC-103 and other members of the DGM family of equipments. It provides transmission of analog voice, digital voice and data orderwires. It is mounted in an equipment case, with three units in one case.

6.1.1 Functional description. The MD-1065(P)/G accepts on its equipment side balanced NRZ group data and timing at bit rates ranging from 128 to 1152 kb/s. In addition, a system control telemetry at 2 kb/s signal and a digital orderwire signal at 16 kb/s is time-division multiplexed (TDM) with the group data. The multiplexed signal is transmitted to the radio. The inverse demultiplexing function occurs in the opposite direction.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification and any amendment thereto.

b. Level A or B preservation and packing. (See Section 5)

c. When first article rough handling tests are not required.

d. Quantity of first article units required.

e. Place of final inspection.

f. Technical literature required.

g. Quantity of tools and running spare parts required.

h. Group C failure requirements.

i. MIL-Q-9858.

j. Length of cable (if any are required).

k. When first article packaging inspection reports require Acquisition Activity approval prior to production unit packing.

6.3 Environmental. Environmental pollution prevention measures are contained in the packing material specifications referenced herein. Refer to material specifications or preparing activity for recommended disposability methods.

6.4 Final inspection. Approval to ship may be withheld at the discretion of the Government pending the decision from the contracting officer on the adequacy of corrective action.

6.4.1 Initial shipments. Initial shipments of end items will be contingent upon successful completion of all first article tests.

6.5 Location of operational inspection. (See 4.7.11) It is desirable that the operational system test be performed at a location that will minimize handling after this inspection is completed. It is recommended that the entire lot (including all previously inspected sample units) be sampled and inspected immediately prior to packaging.

6.6 Verification inspection. Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contract and will be limited in severity to the definitive quality assurance provisions established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

6.7 Level B preservation. When level B preservation is specified, this level of protection will only be used under known favorable conditions during transportation, storage, and handling.

6.8 Gorvernment-furnished property. The contracting officer should arrange to furnish the property listed in table VIII.

6.9 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

6.10 Subject terms (key-words) list.

Analog Orderwire
AN/GRC-103
Balanced
Binary
Biternary
Data Orderwire
Digital Group Multiplex
Digital Voice Orderwire
DOW
DVOW
Framing
Group
Modem
Modem, Digital Data
Modem, Digital Data, MD-1065/G
Radio Modem (RM)
Video Signal

CUSTODIAN:
ARMY-CR

Preparing Activity
ARMY-CR
Project Nr. 5820-A826

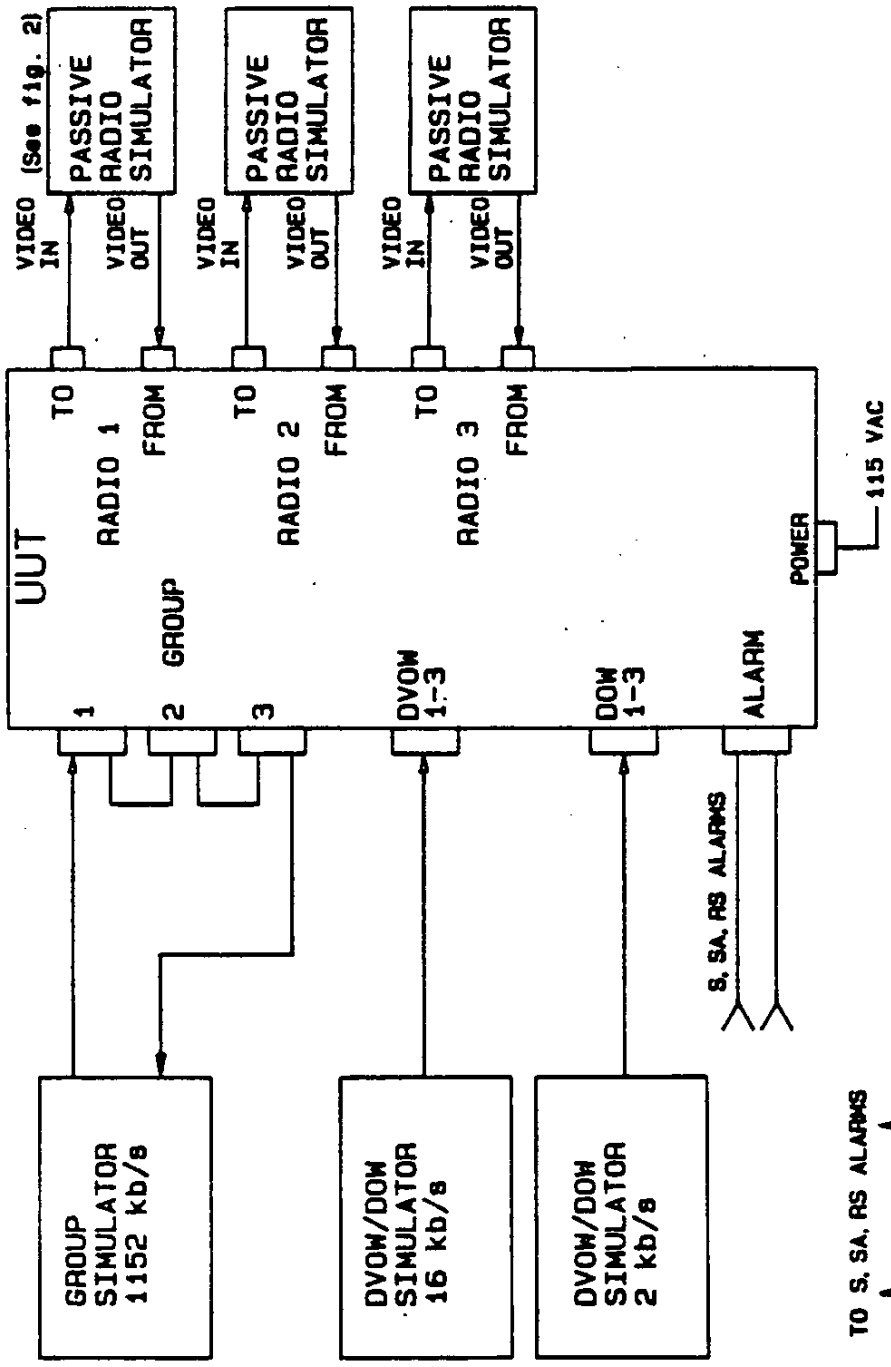


FIGURE 1 Burn-in.

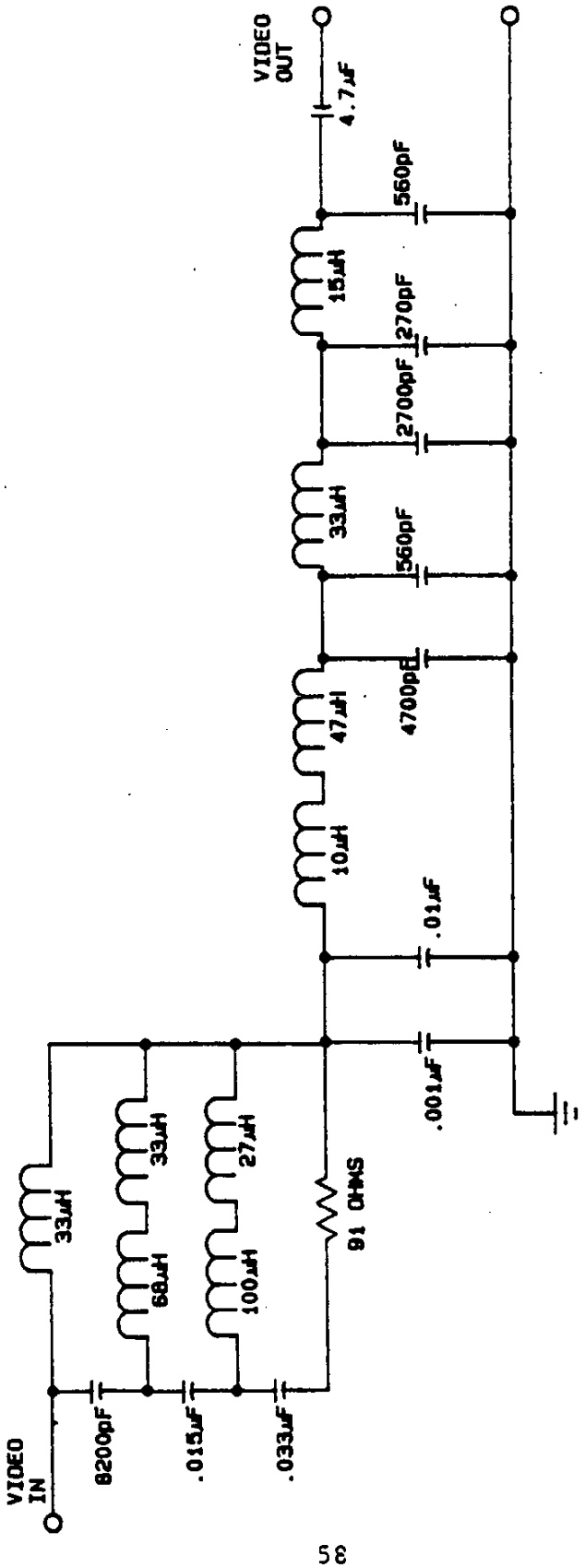


FIGURE 2. Passive radio simulator.

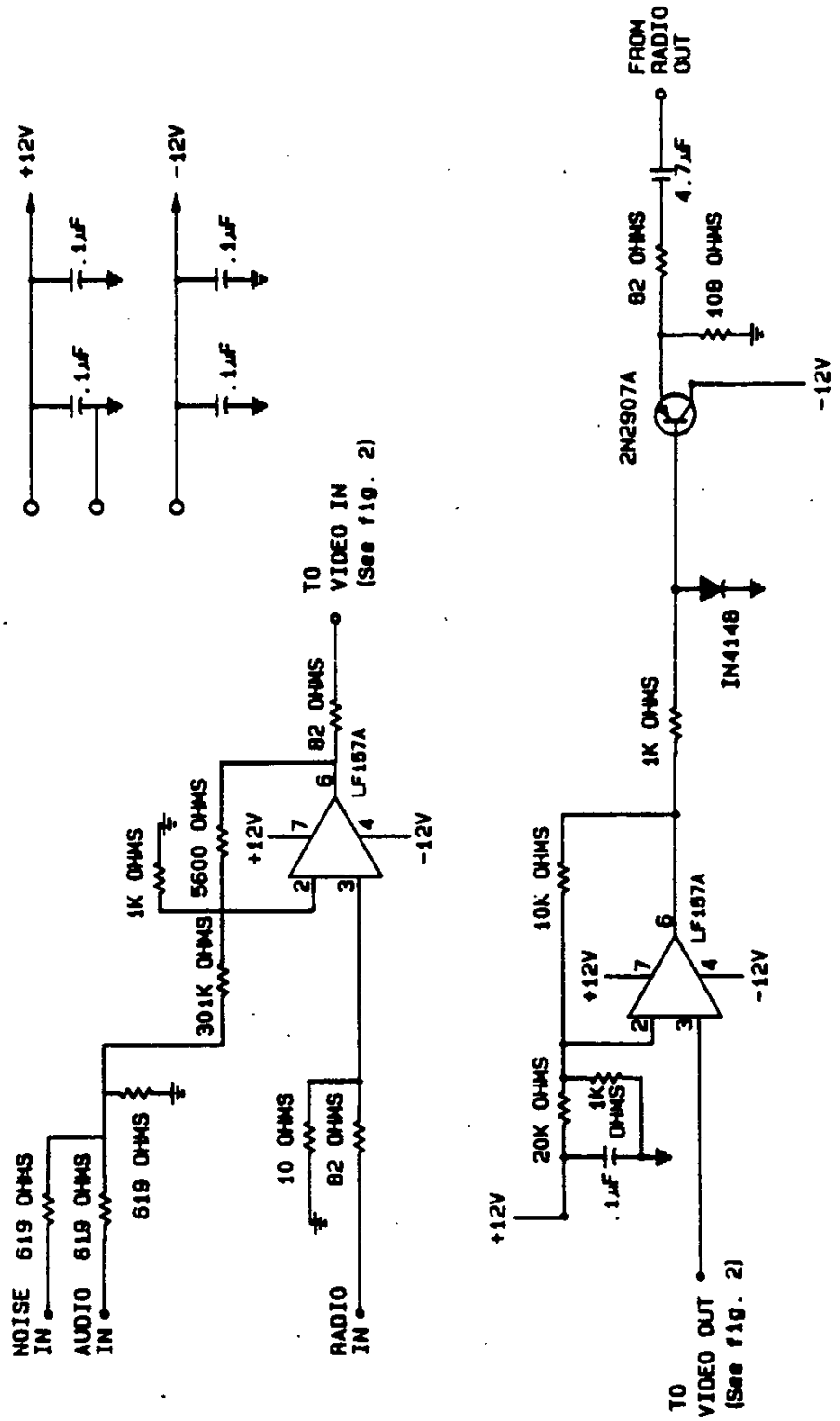
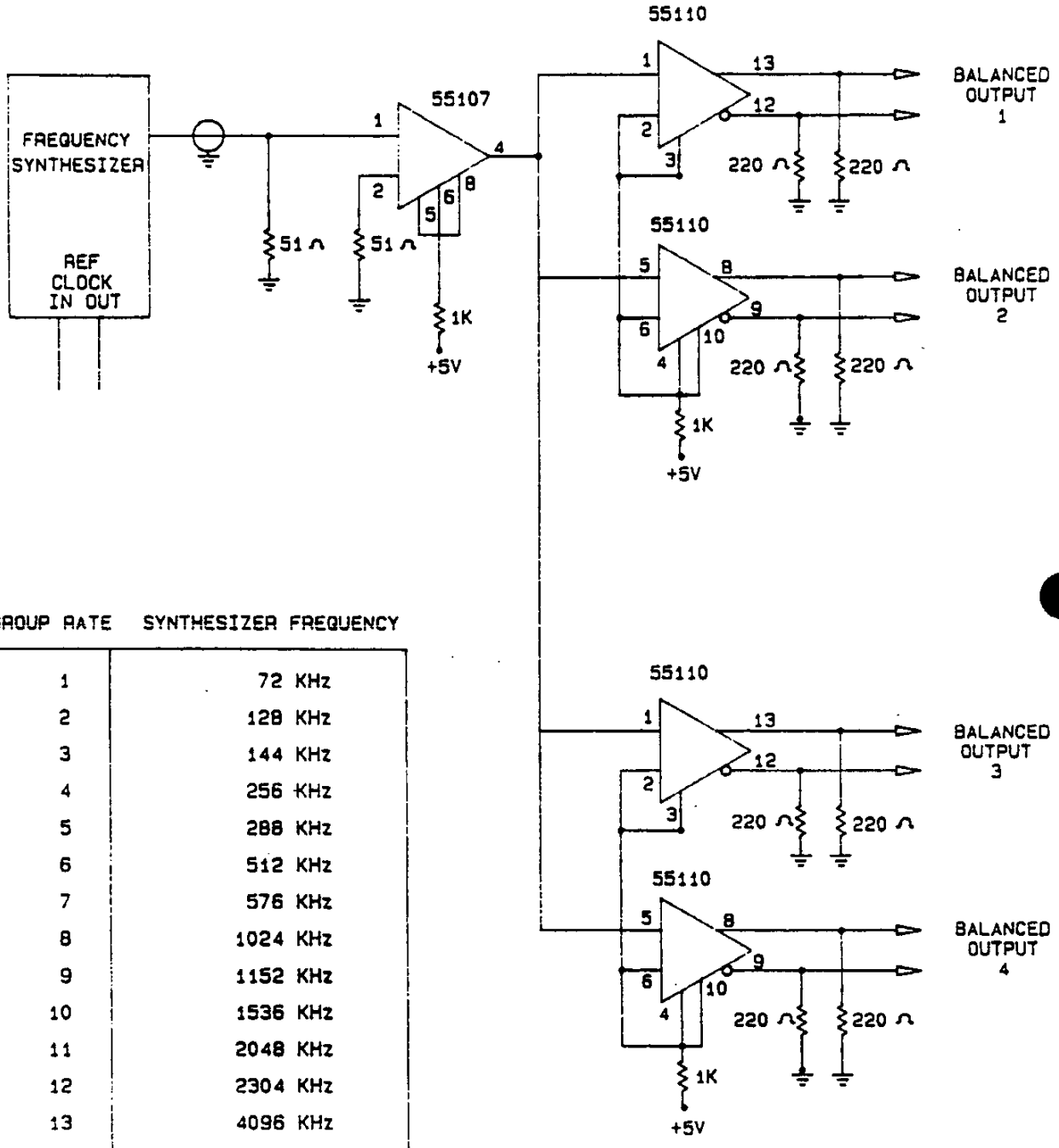


FIGURE 3. Active radio simulator.



GROUP RATE	SYNTHESIZER FREQUENCY
1	72 KHz
2	128 KHz
3	144 KHz
4	256 KHz
5	288 KHz
6	512 KHz
7	576 KHz
8	1024 KHz
9	1152 KHz
10	1536 KHz
11	2048 KHz
12	2304 KHz
13	4096 KHz
14	4608 KHz
15	4915.2 KHz

FIGURE 4. Alternate timing source.

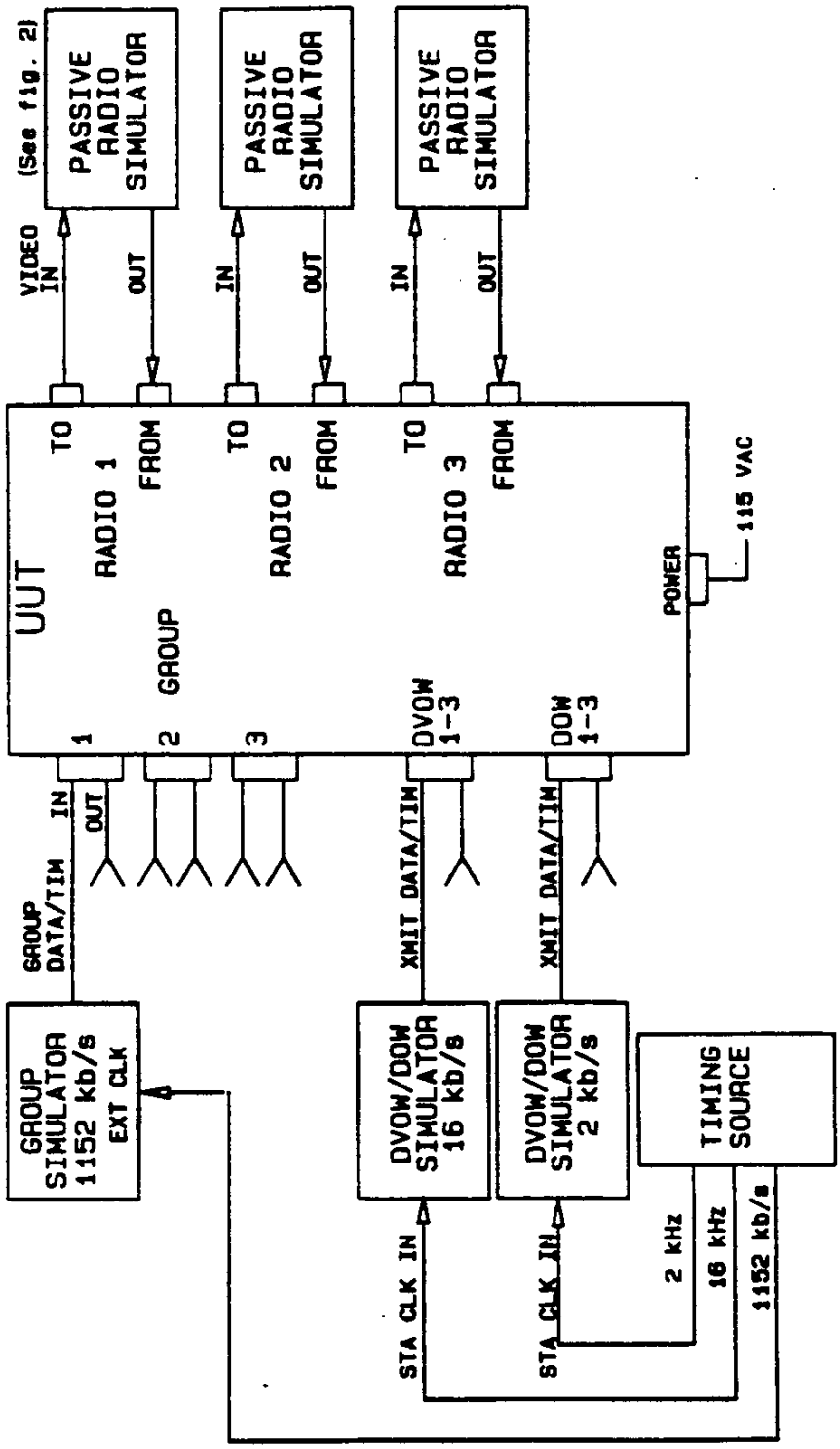
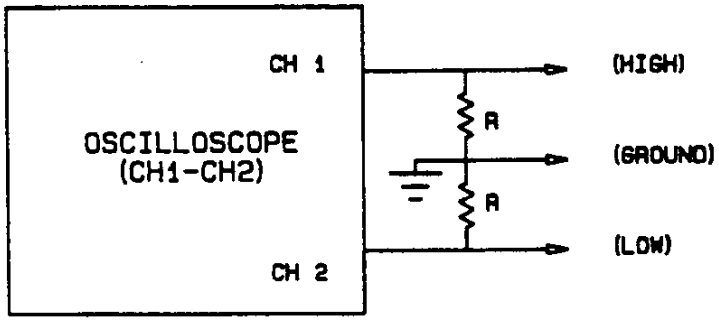
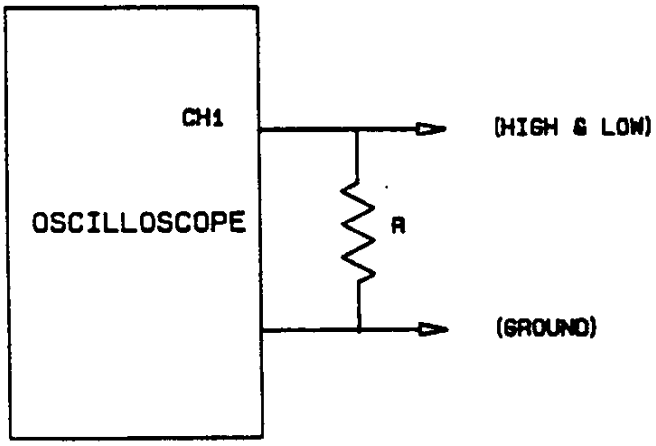


FIGURE 5. Line-to-line voltage levels.

(A) LINE TO LINE VOLTAGE.

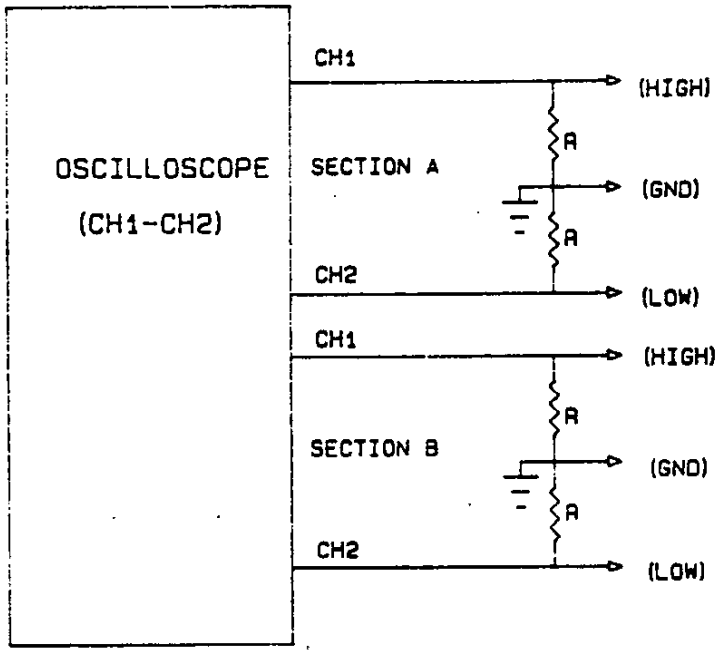


(B) LINE TO GROUND VOLTAGE.



R 50 OHMS±1%

FIGURE 6. Oscilloscope connections: line-to-ground voltage.



R 50 OHMS±1%

FIGURE 7. Oscilloscope connection: clock/data phasing.

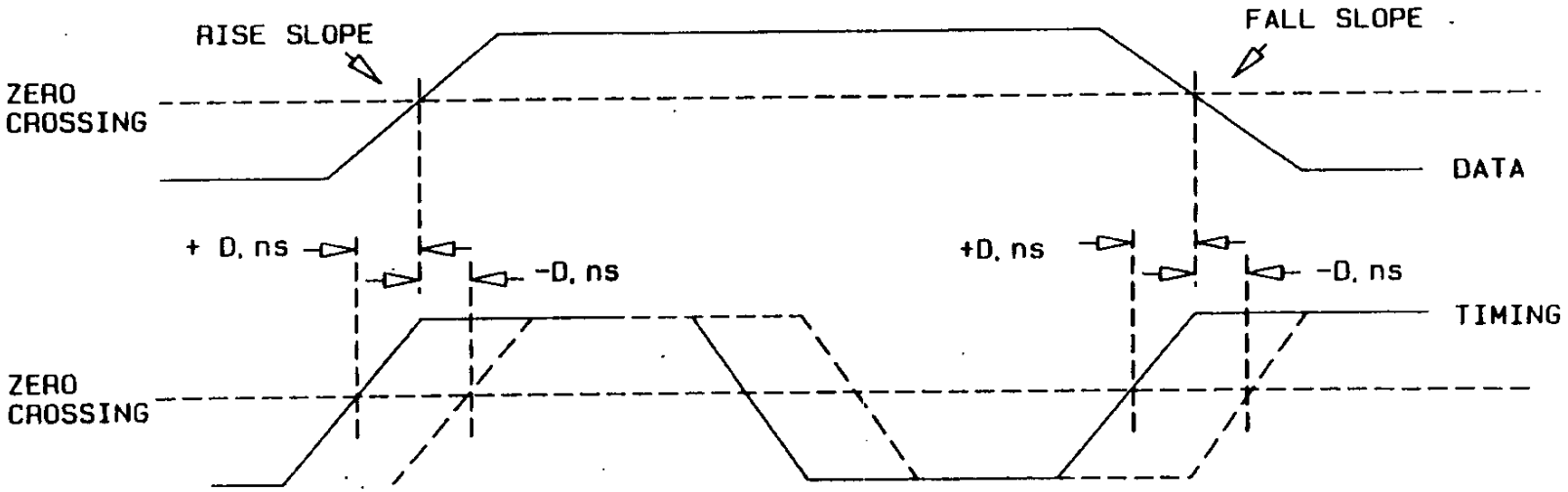
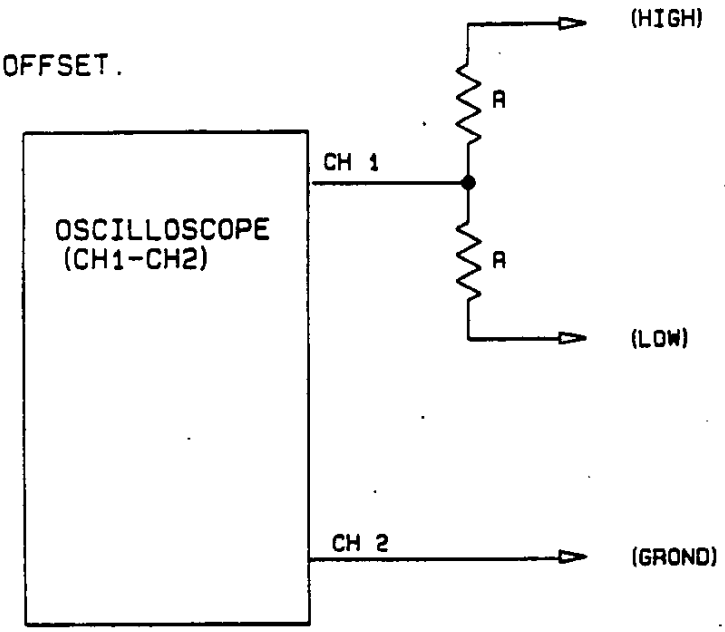


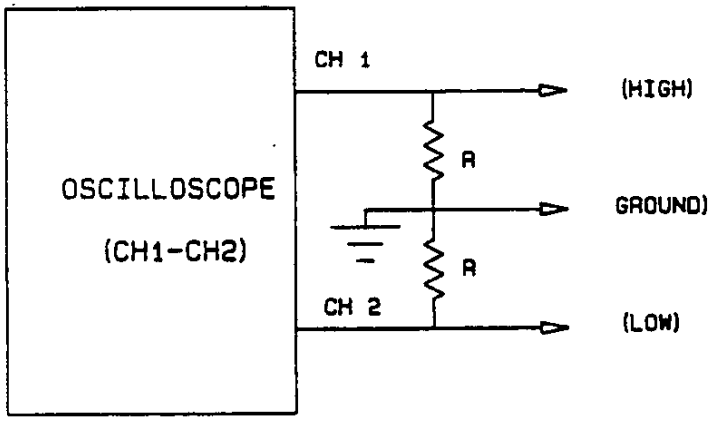
FIGURE 8. Delay measurement (clock/data phasing).

(A) OFFSET.



R 50 OHMS±1%

(B) SLEW RATE.



CONNECT TO 100 FEET RG-108 CABLE BETWEEN UUT AND TEST CURCUIT.

R 39 OHMS±1%

FIGURE 9. Ocsilloscope connections: offset; slew rate.

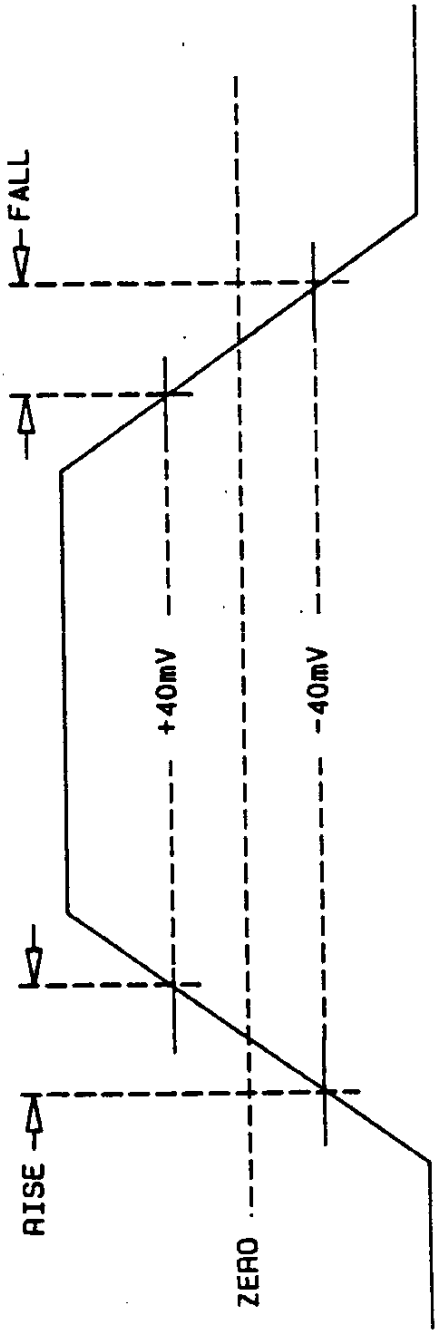


FIGURE 10. Rise and fall slopes (slew rate).

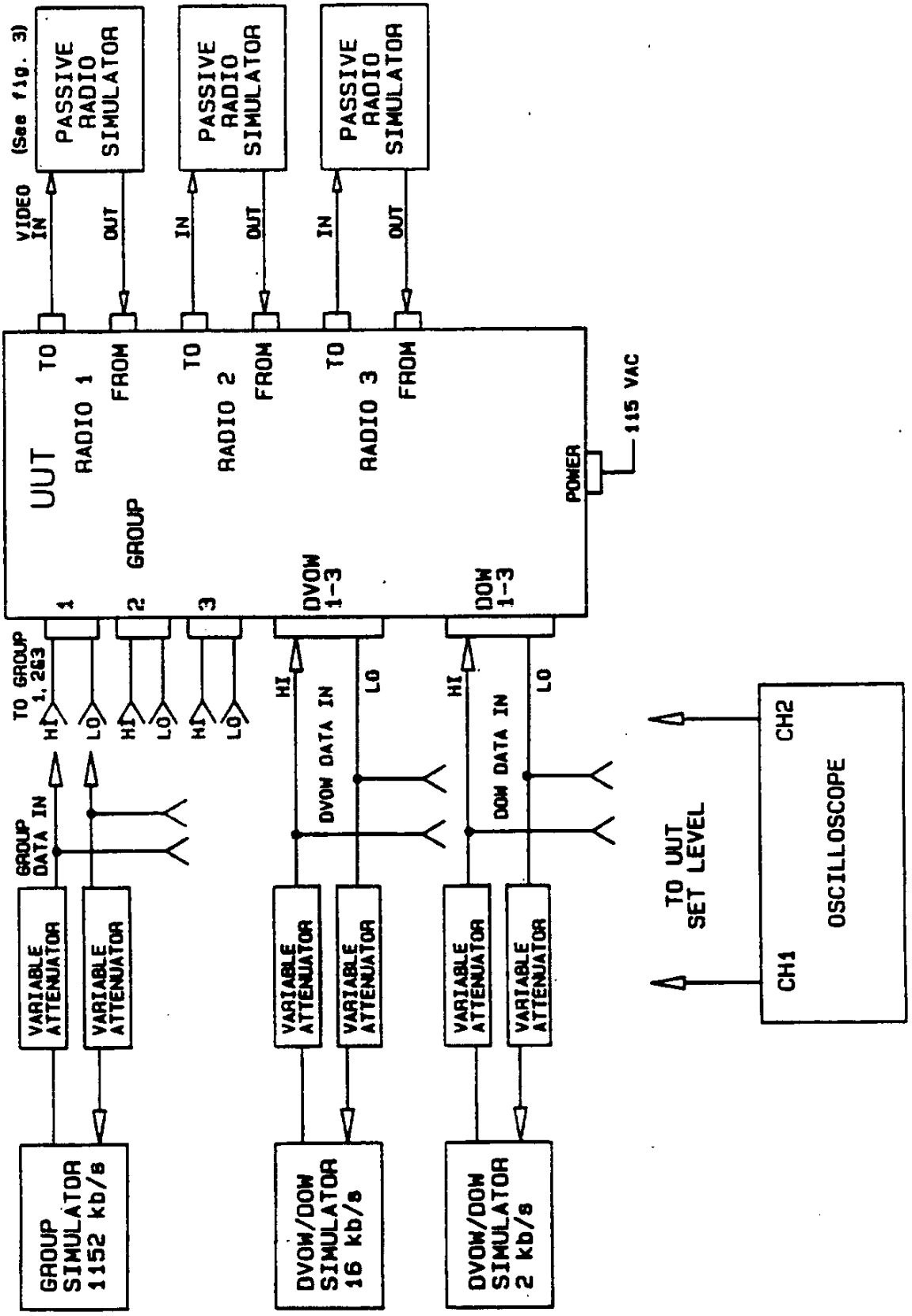
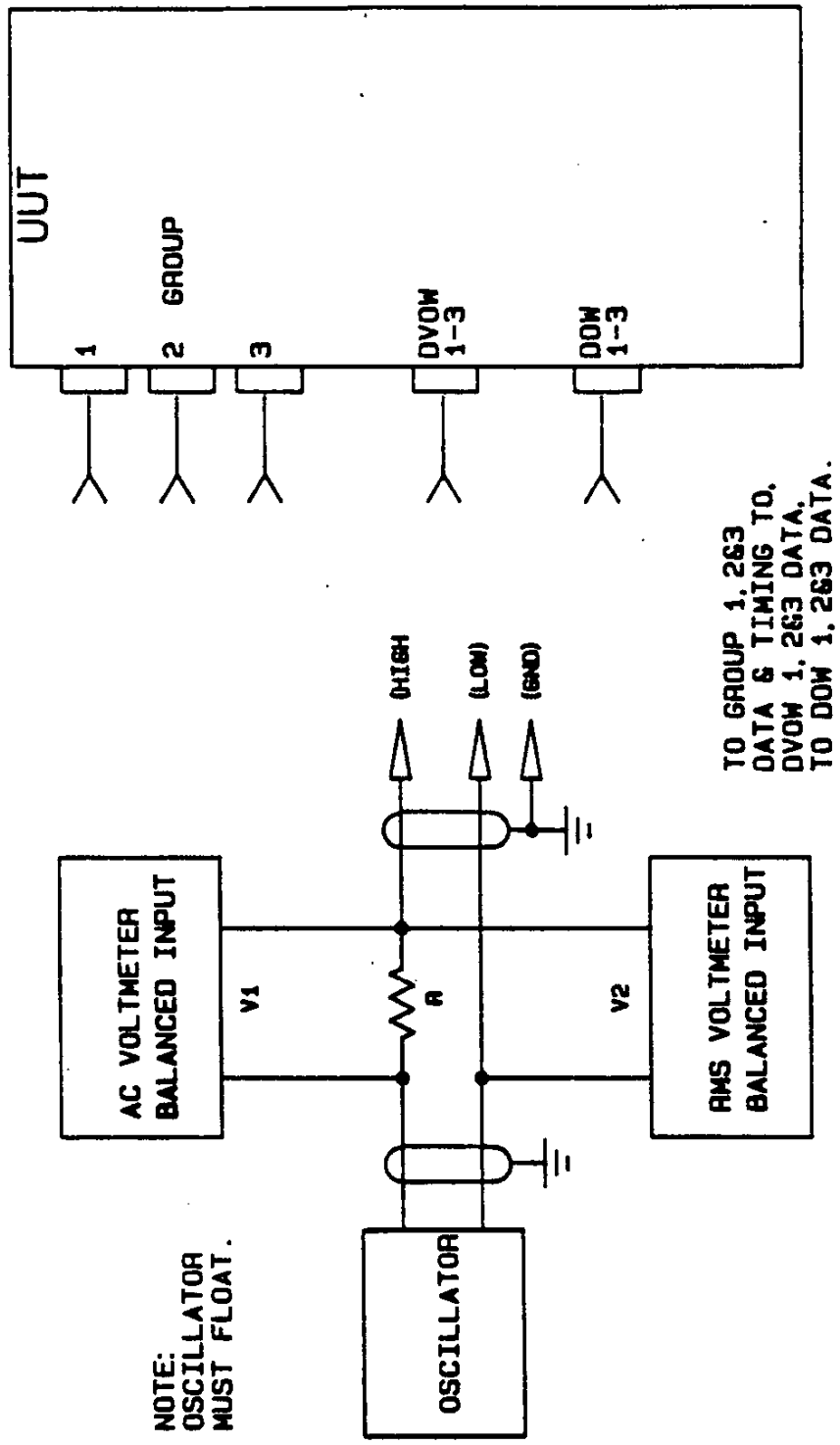


FIGURE 11. Receiver dynamic range.



R 100 OHMS ±1%

FIGURE 12. Input impedance.

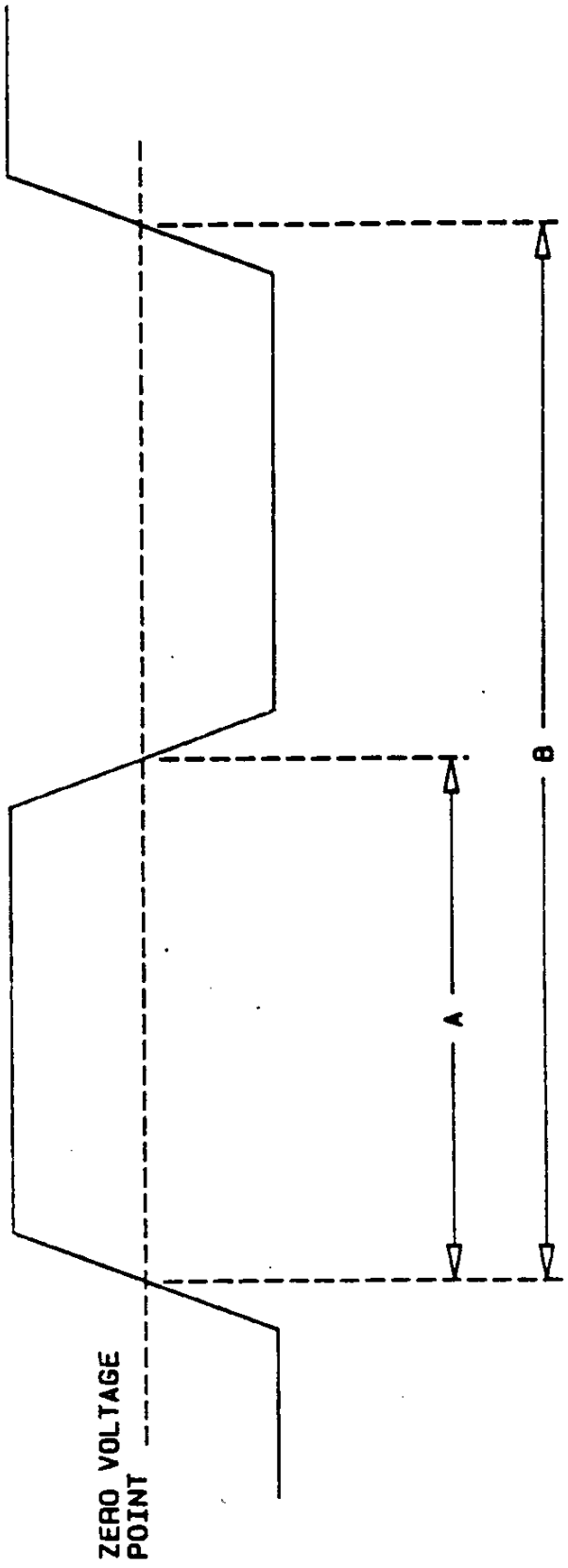


FIGURE 13. Clock asymmetry.

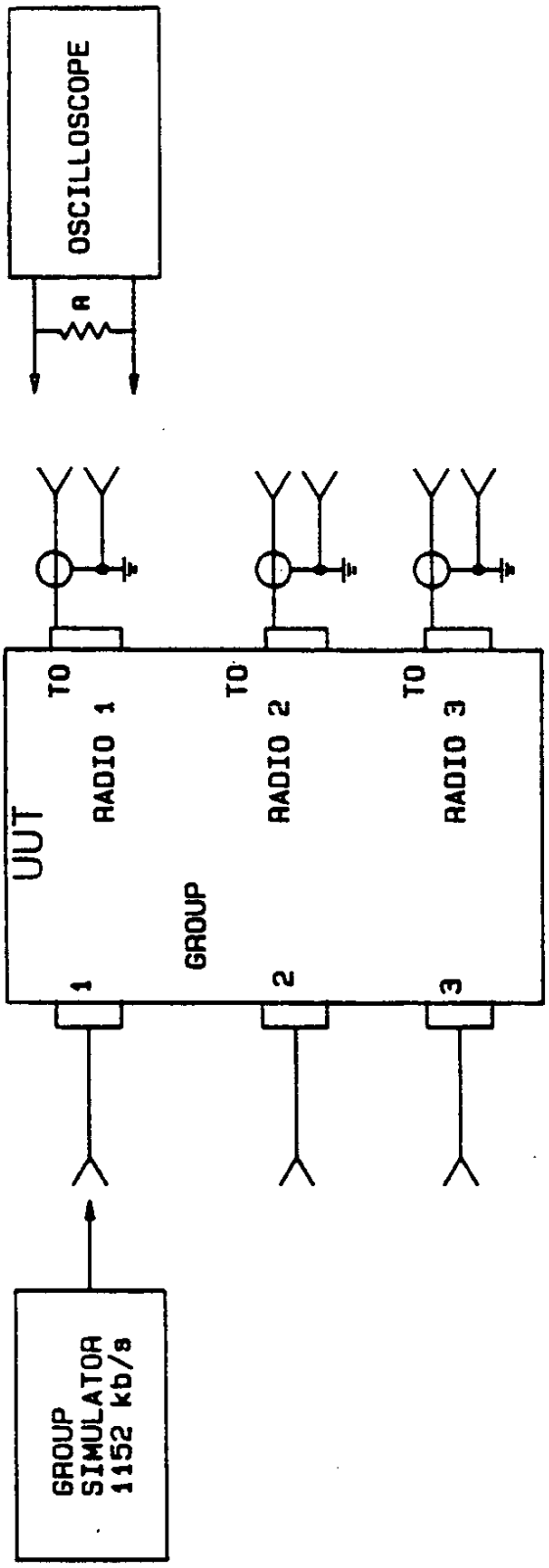


FIGURE 14. Transmitted video signal.

R 91 OHMS ±1%

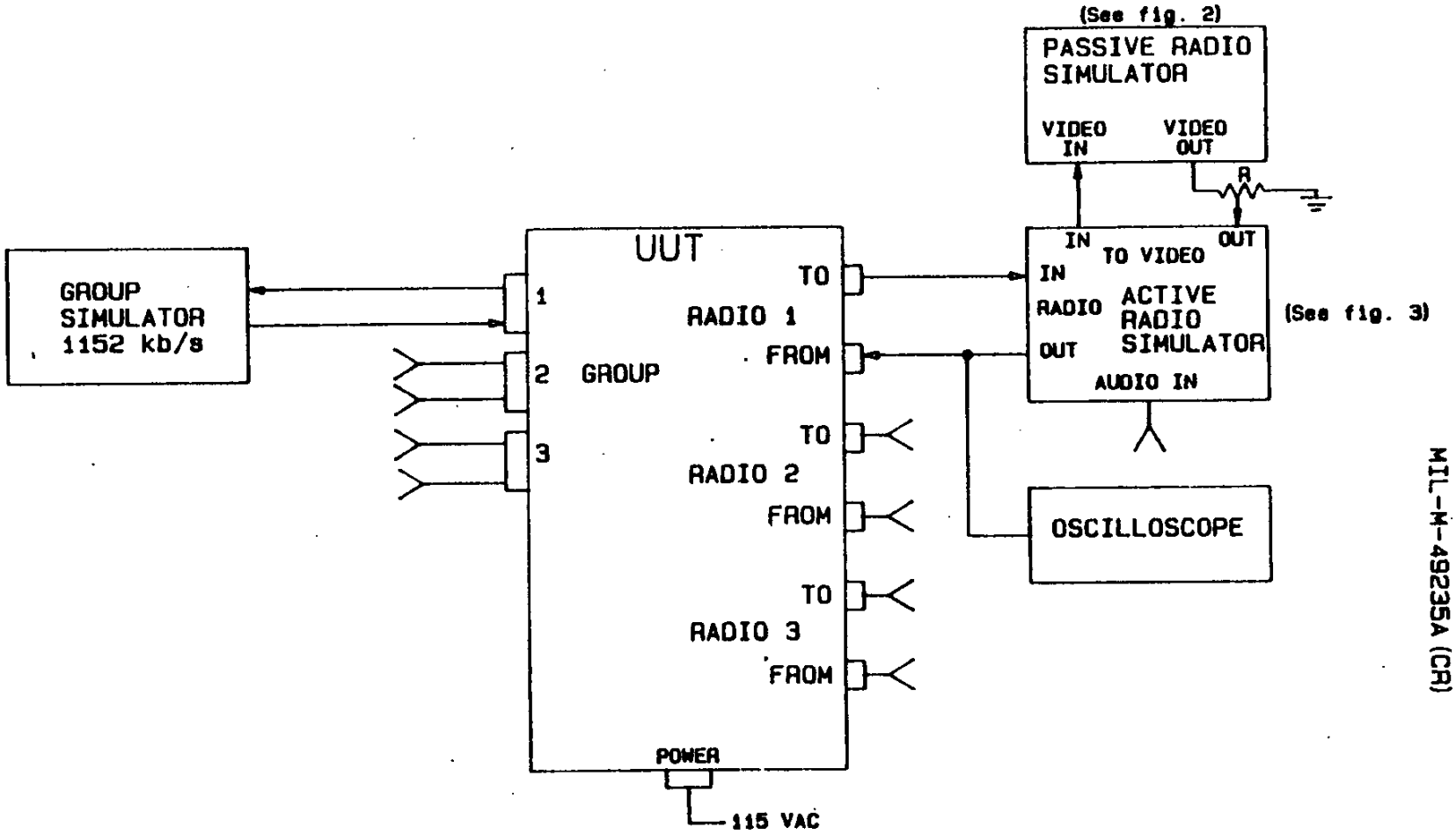
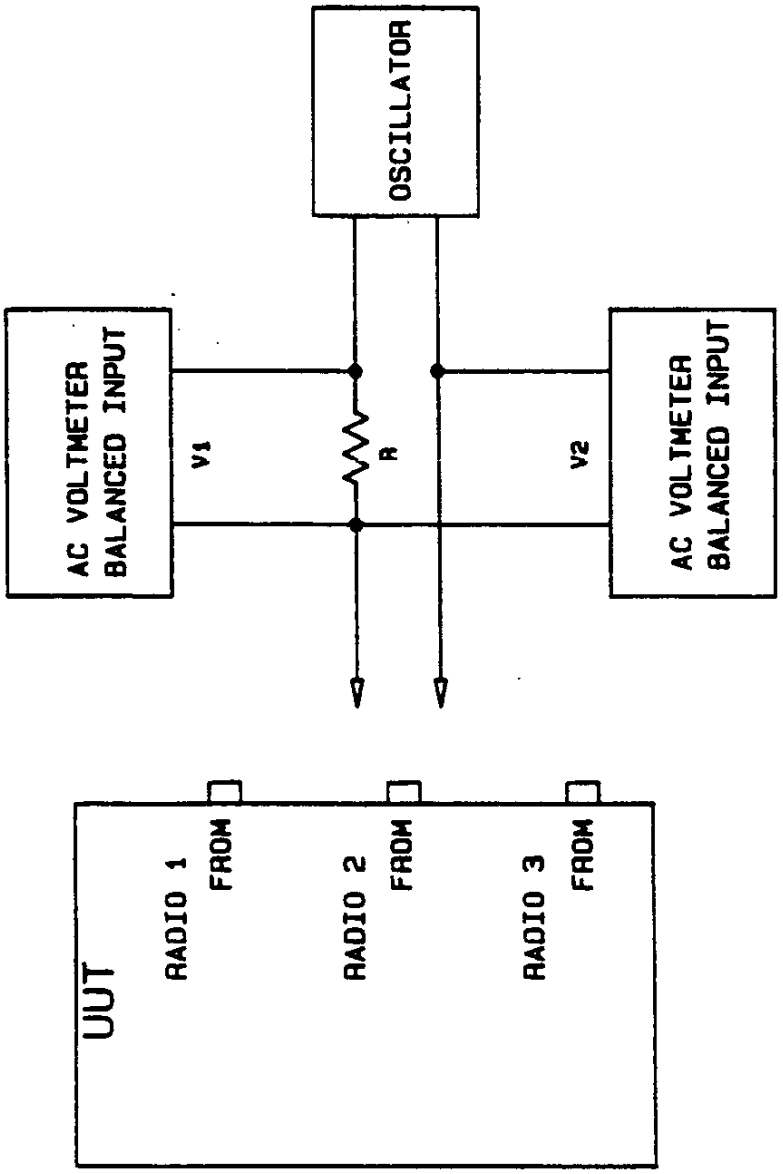


FIGURE 15. Receive video signal voltage.



R 91 OHMS ±1%

FIGURE 16. Input and output impedance.

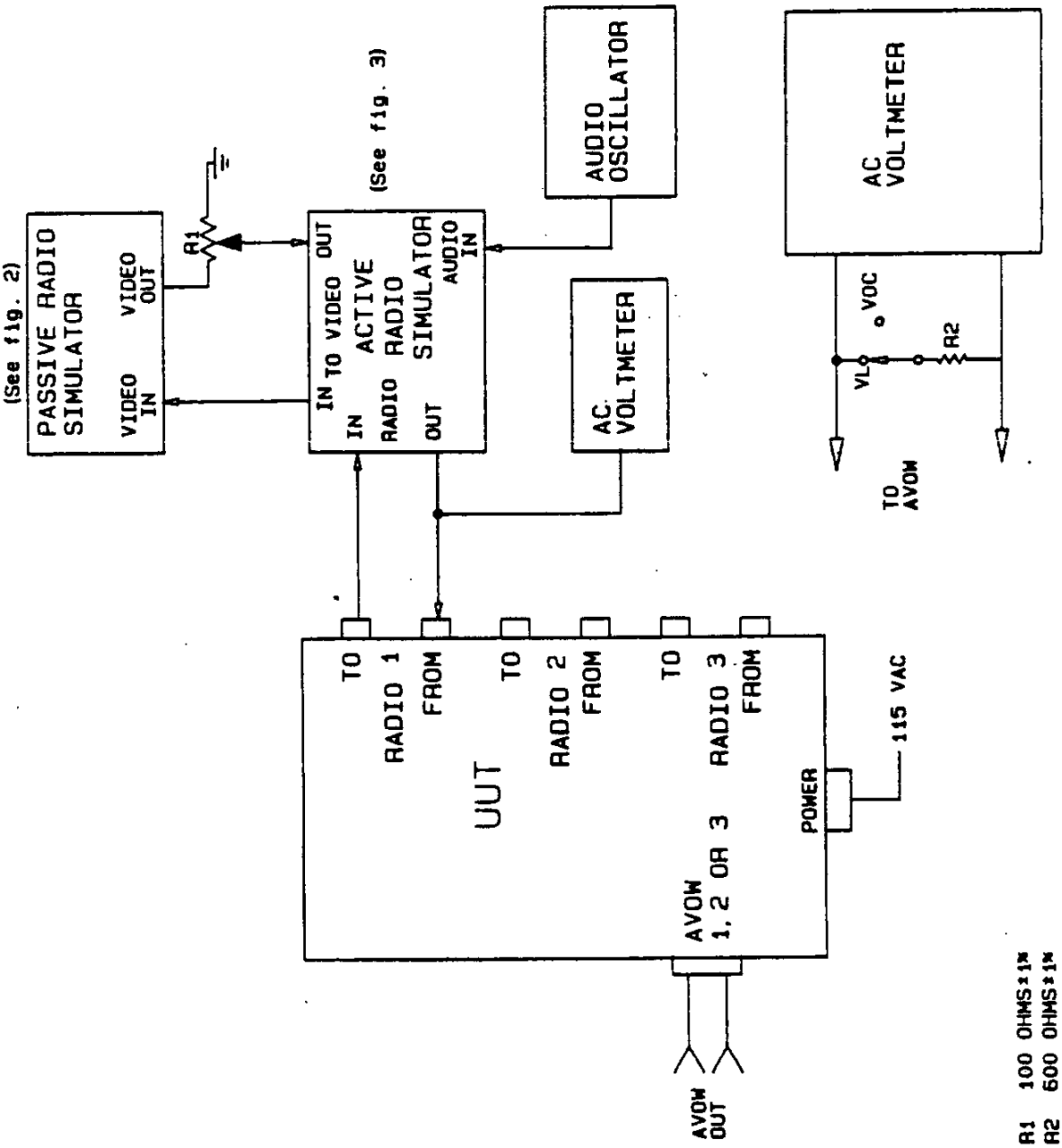


FIGURE 17. Analog orderwire impedance.

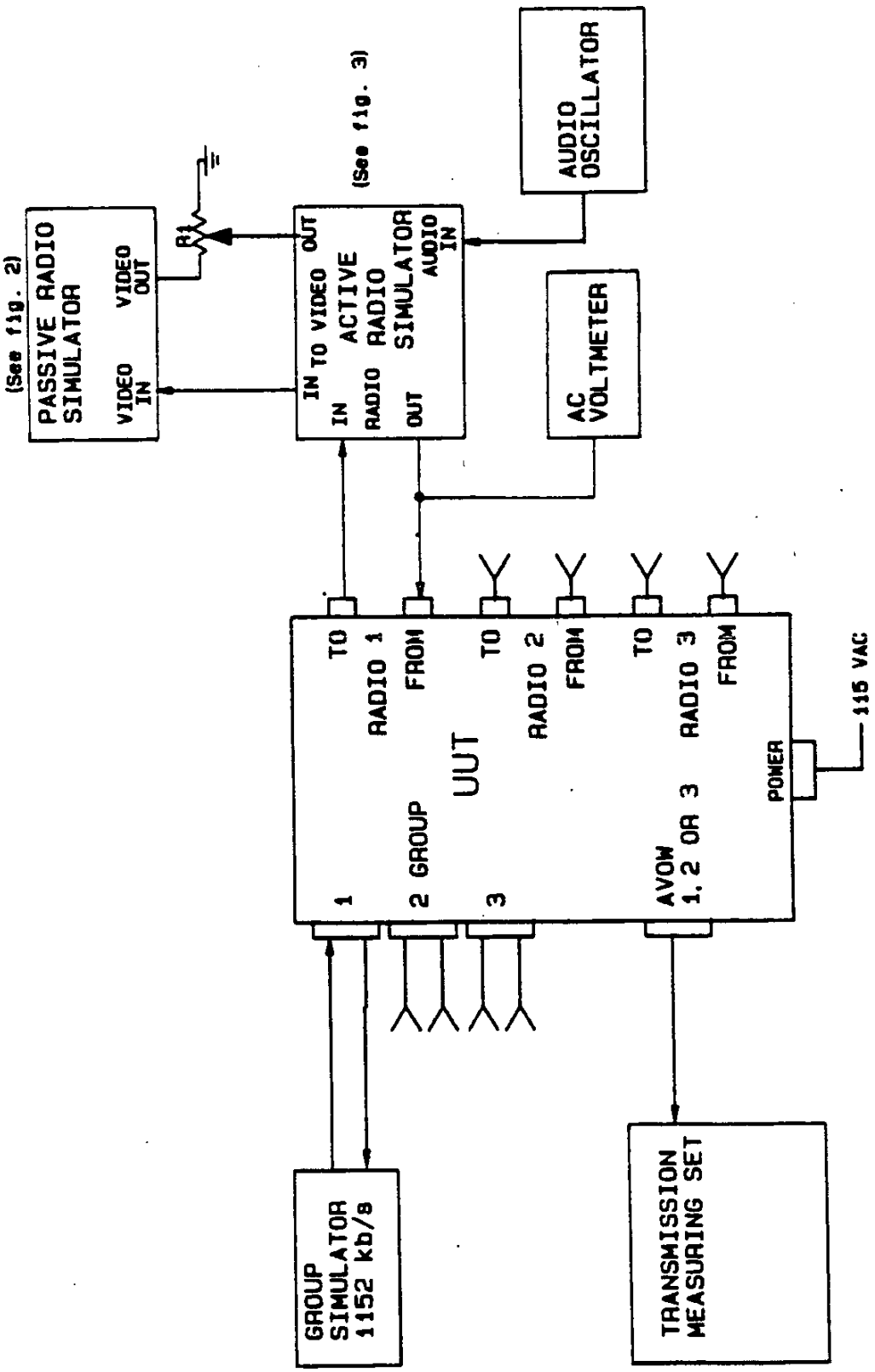


FIGURE 18. Maintenance orderwire signal-to noise ratio.

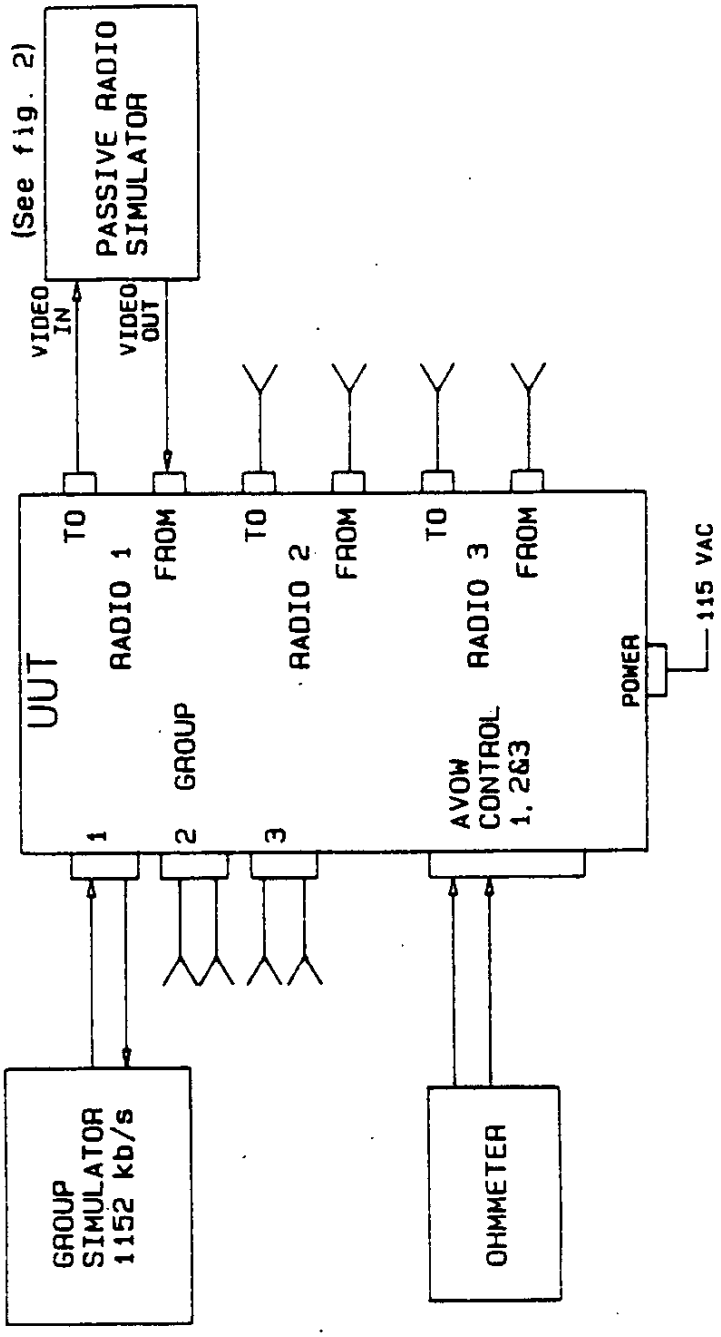


FIGURE 19. Orderwire control interface.

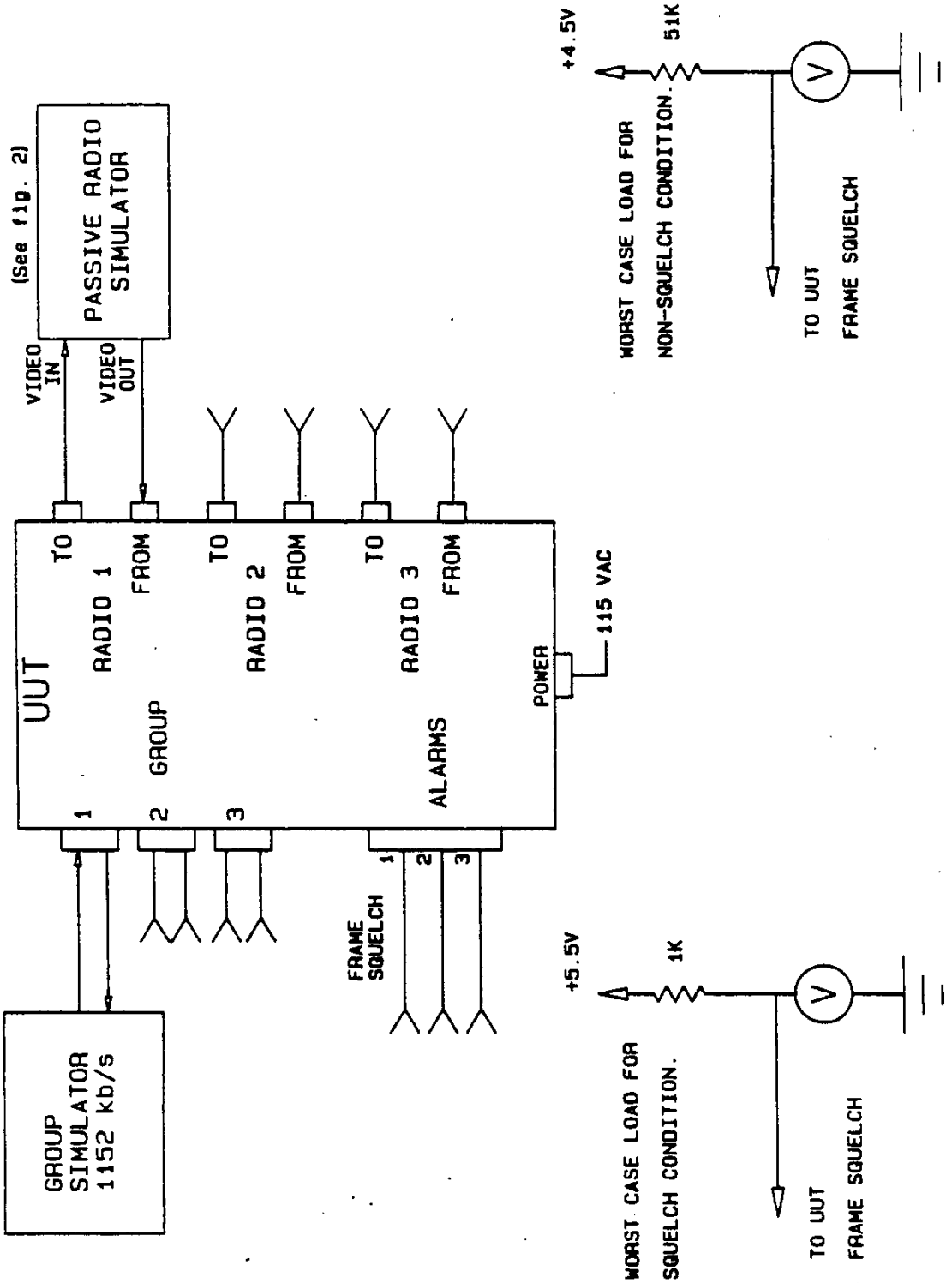


FIGURE 20. Frame s[illegible]ch inhibit.

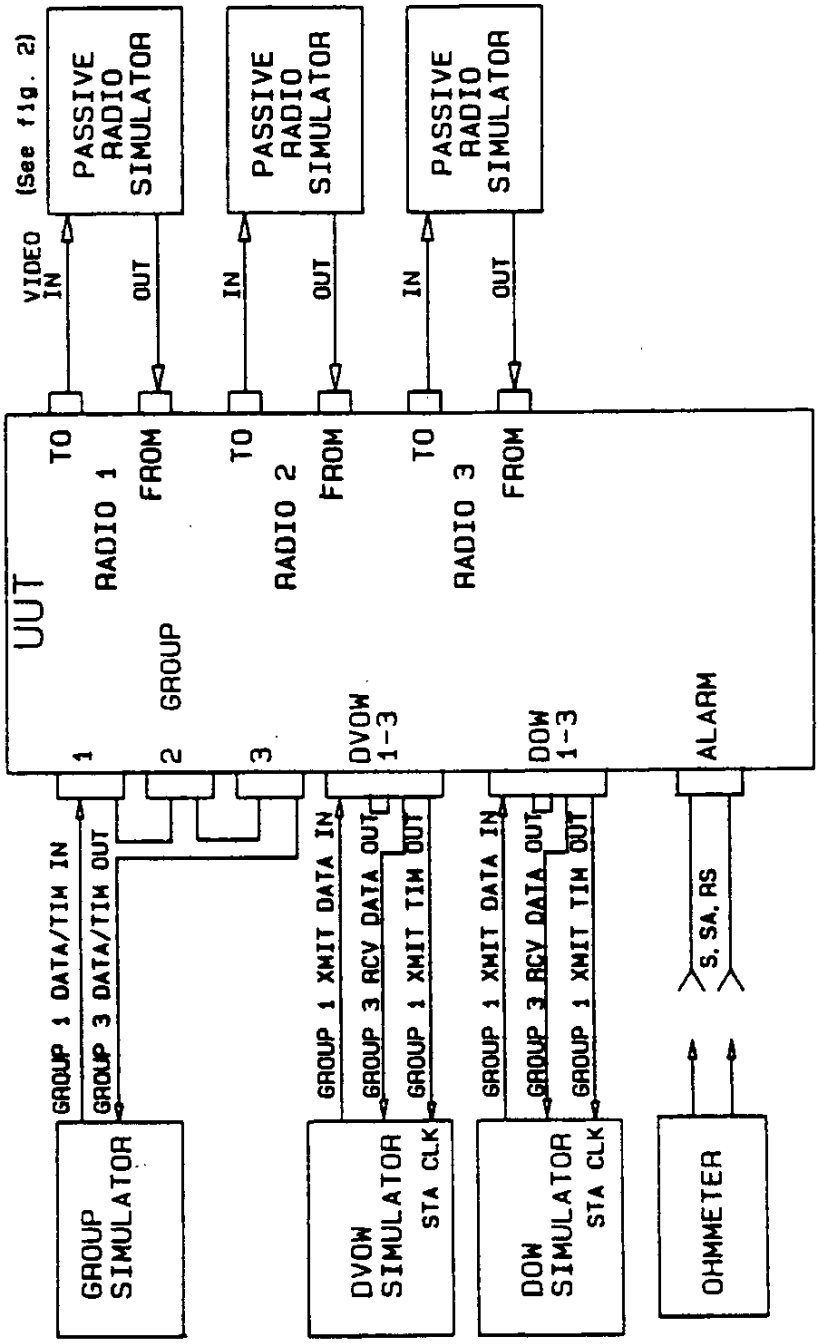


FIGURE 21. BITE and alarm.

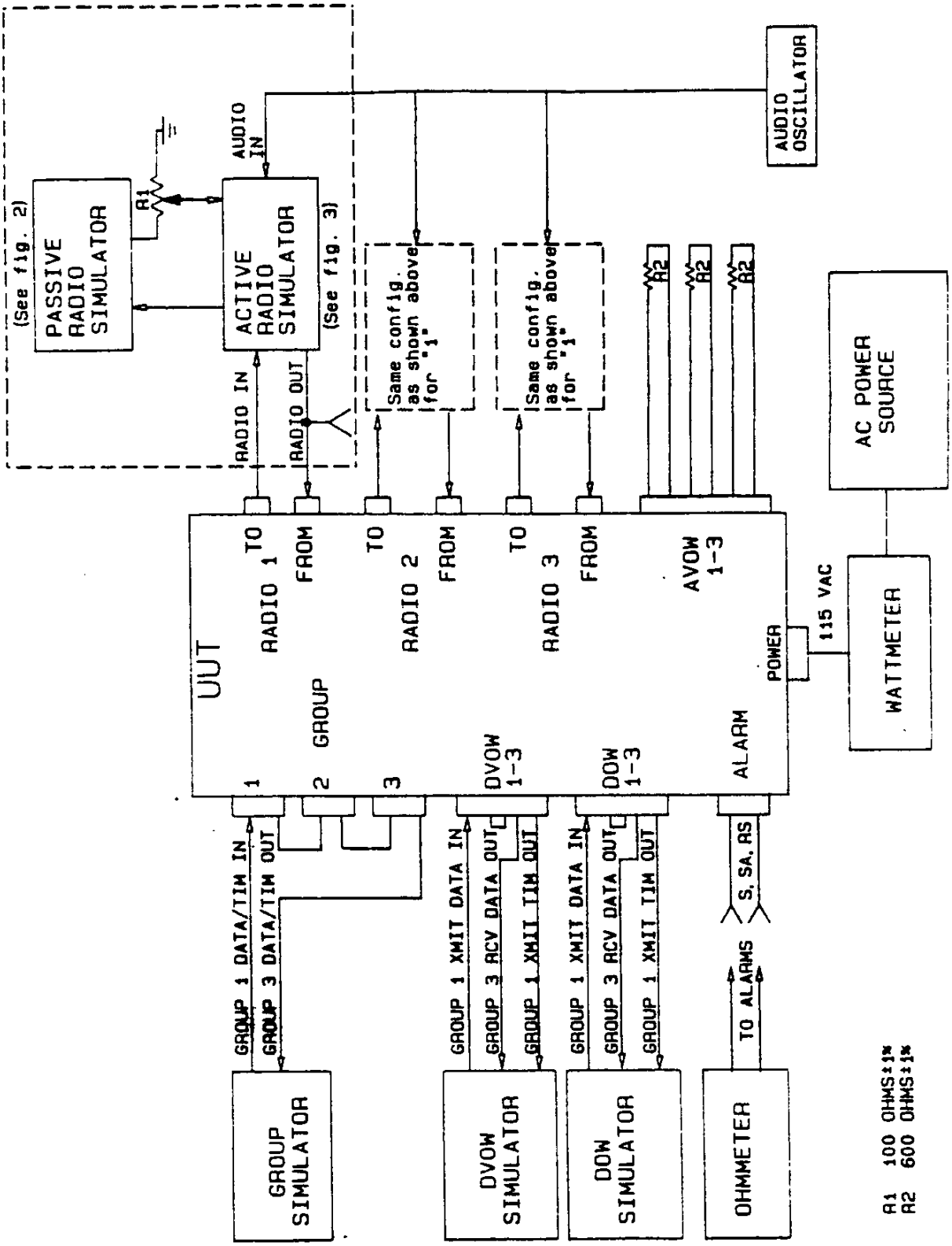


FIGURE 22. Prime power interface.

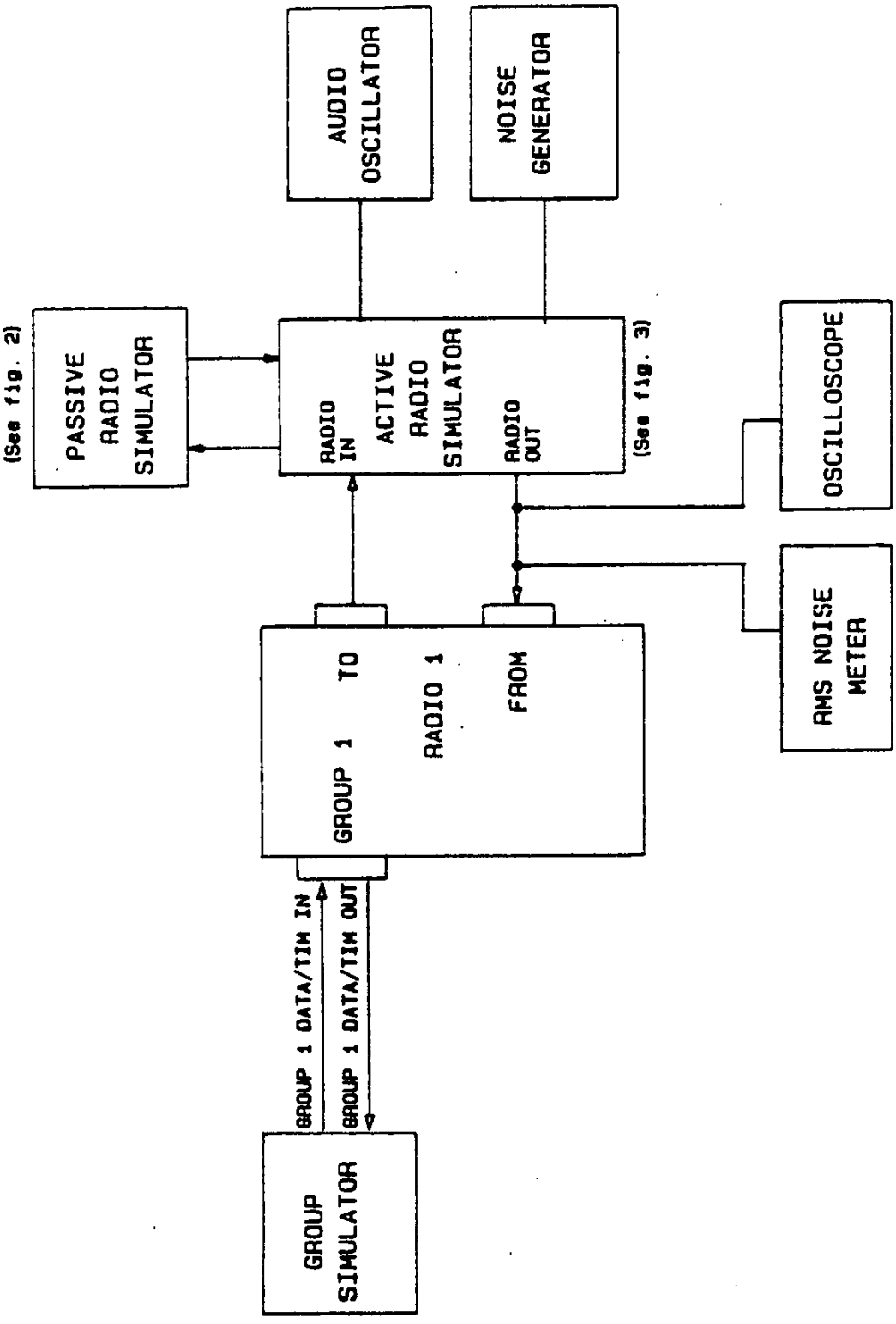


FIGURE 23. Signal detection.

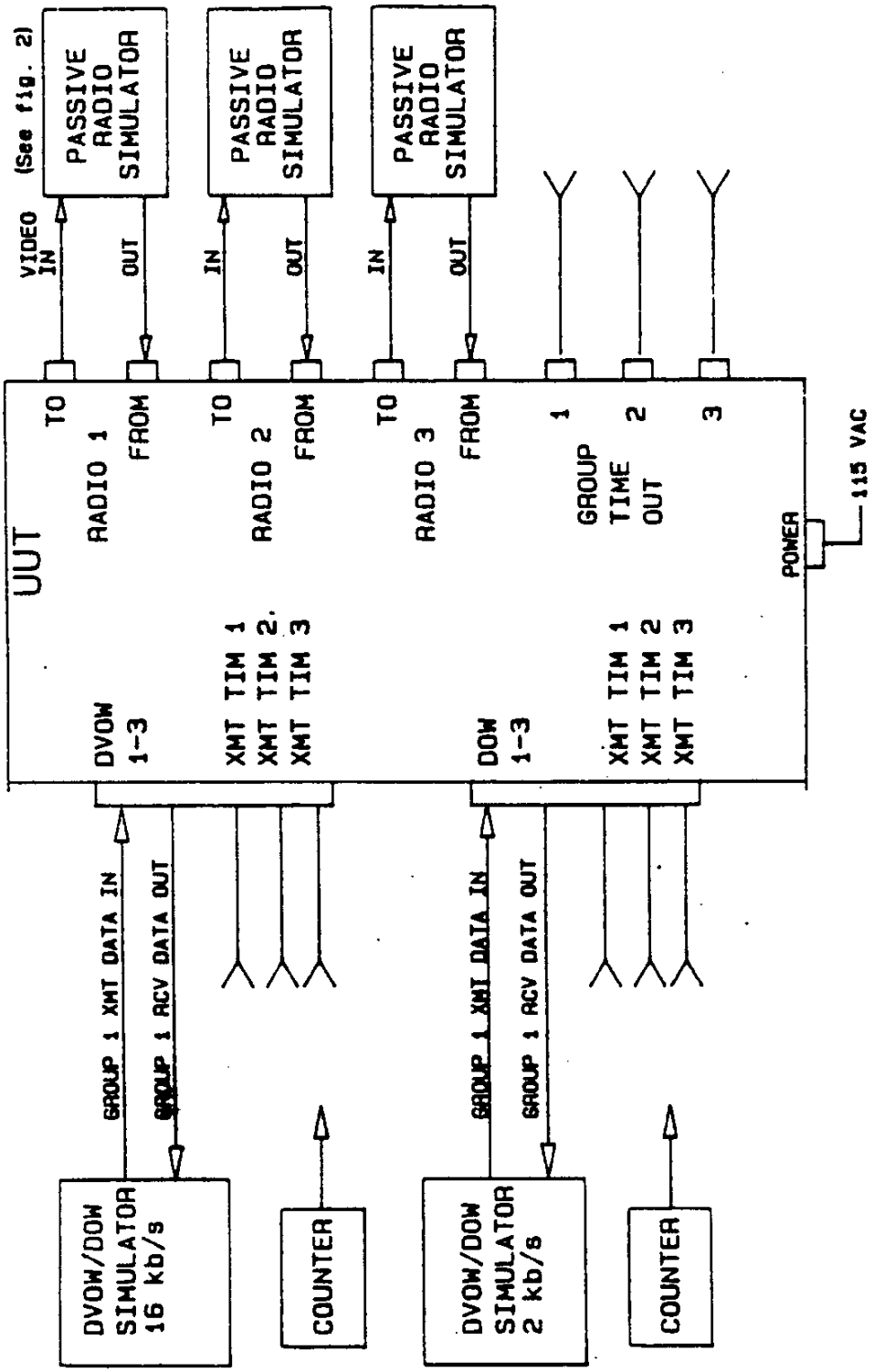


FIGURE 24. Normal operation, related timing and transition to master timing.

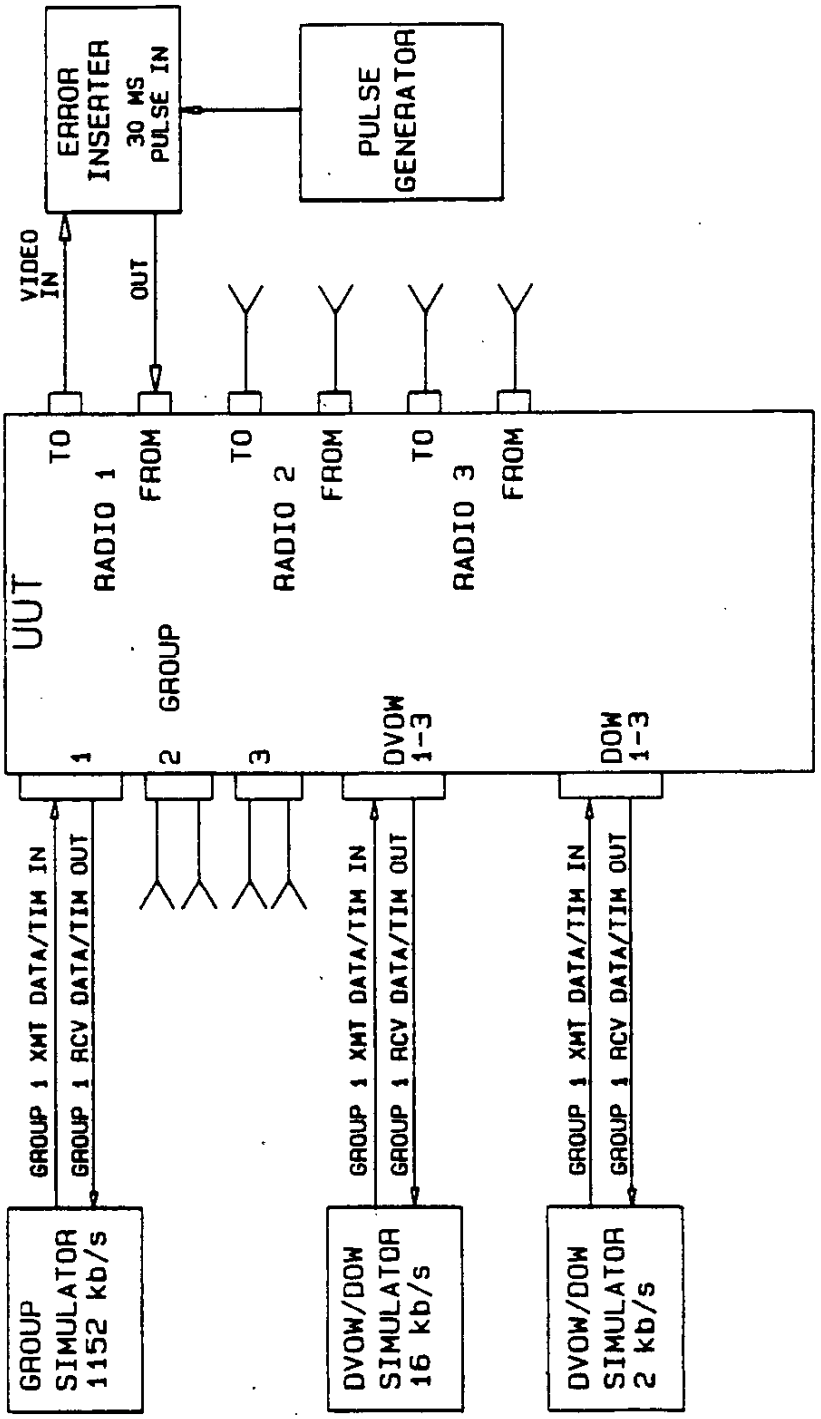


FIGURE 25. Viedo interrupt.

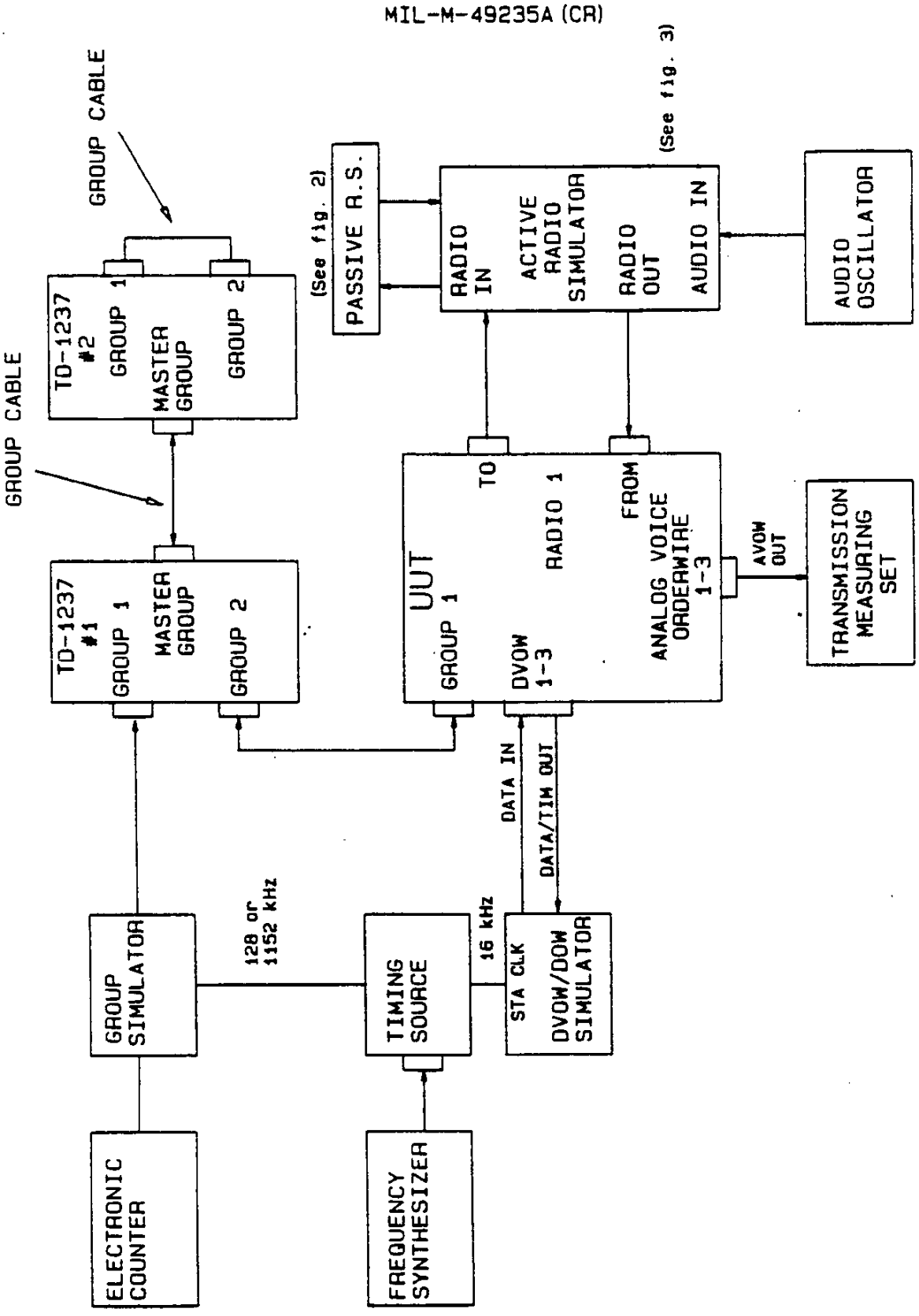


FIGURE 26. TD-1237 jitter.

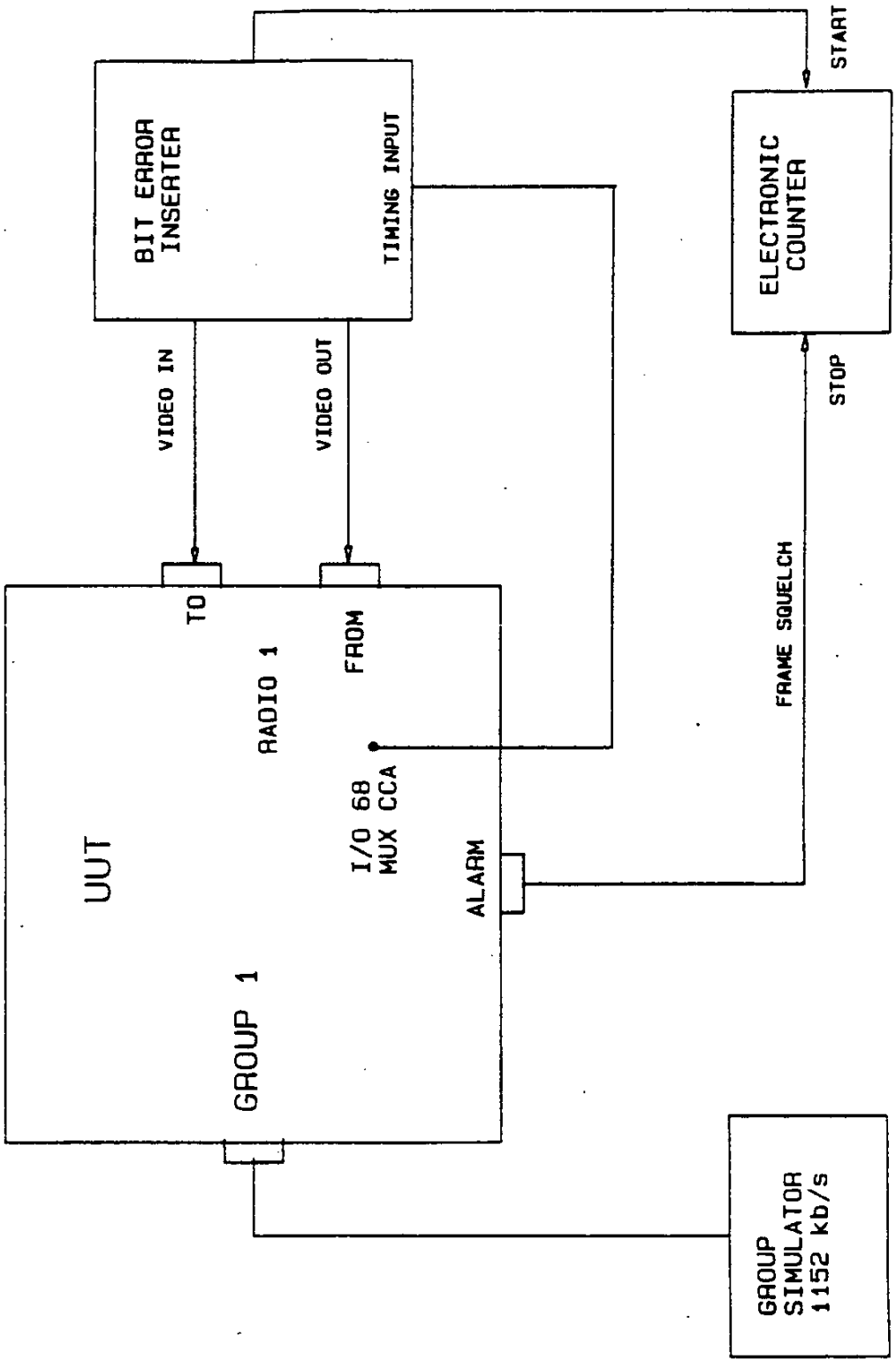


FIGURE 27. Frame acquisition time.

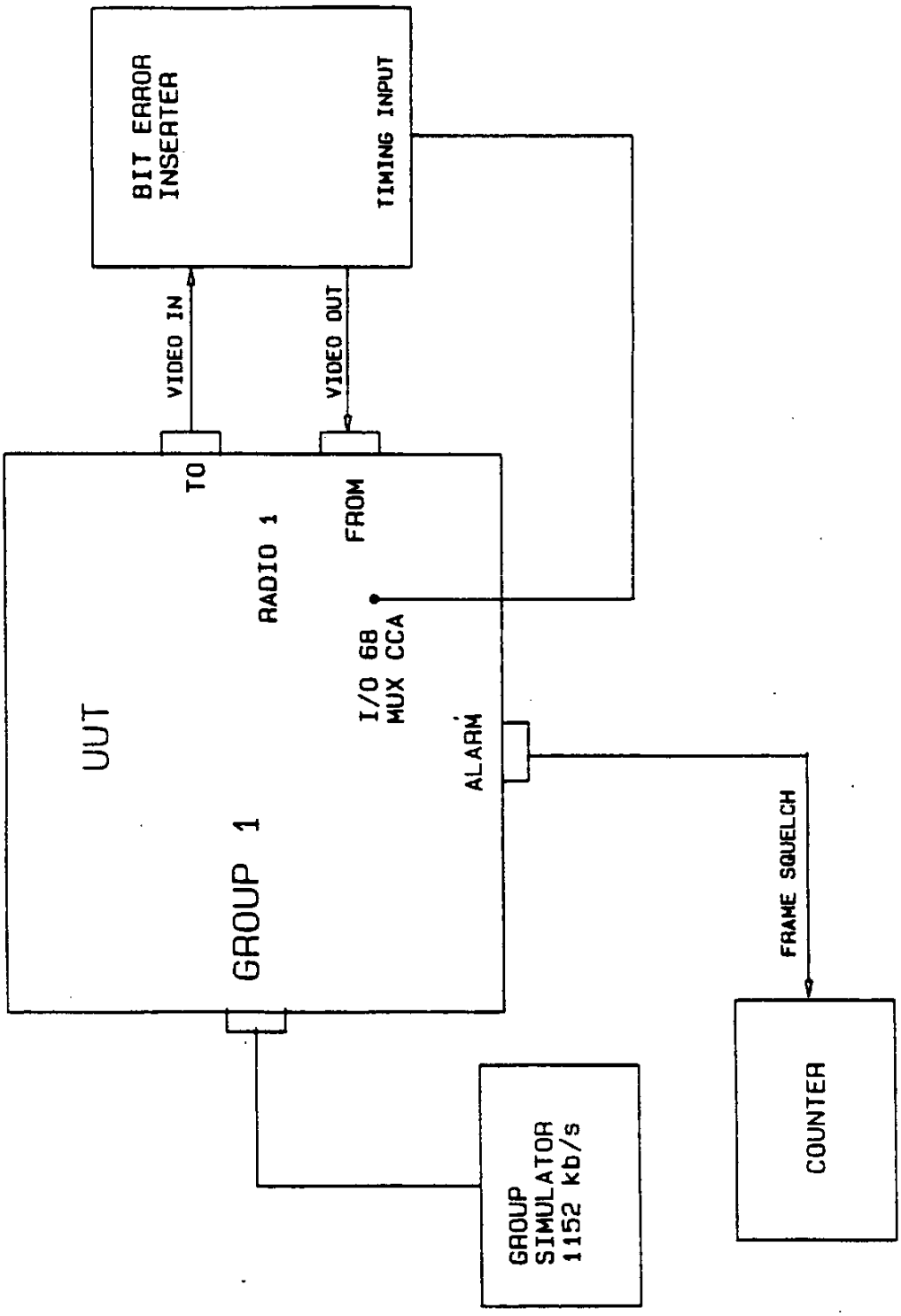


FIGURE 28. Frame maintenance.

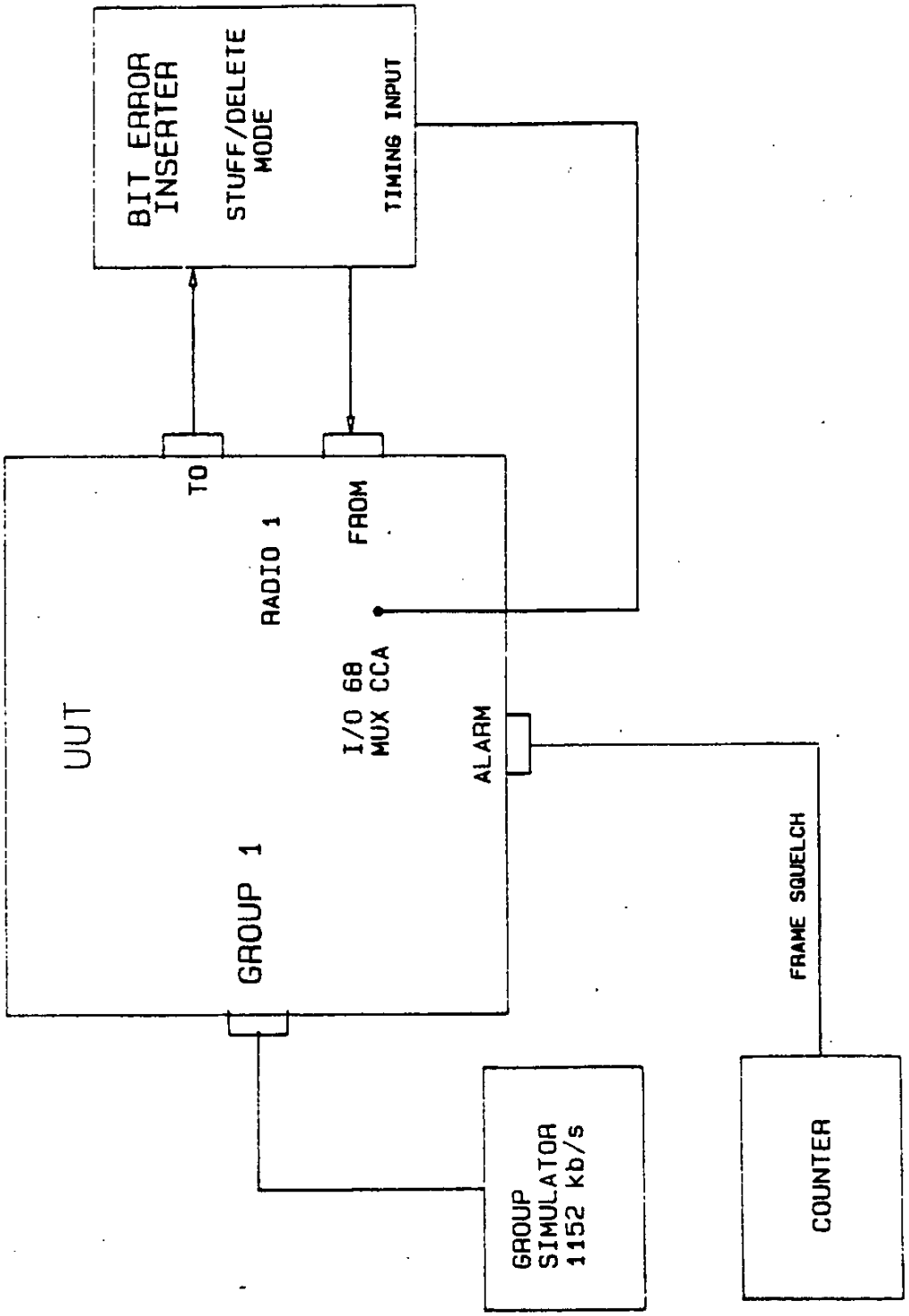


FIGURE 29. Detection of loss-of-frame and reacquisition.

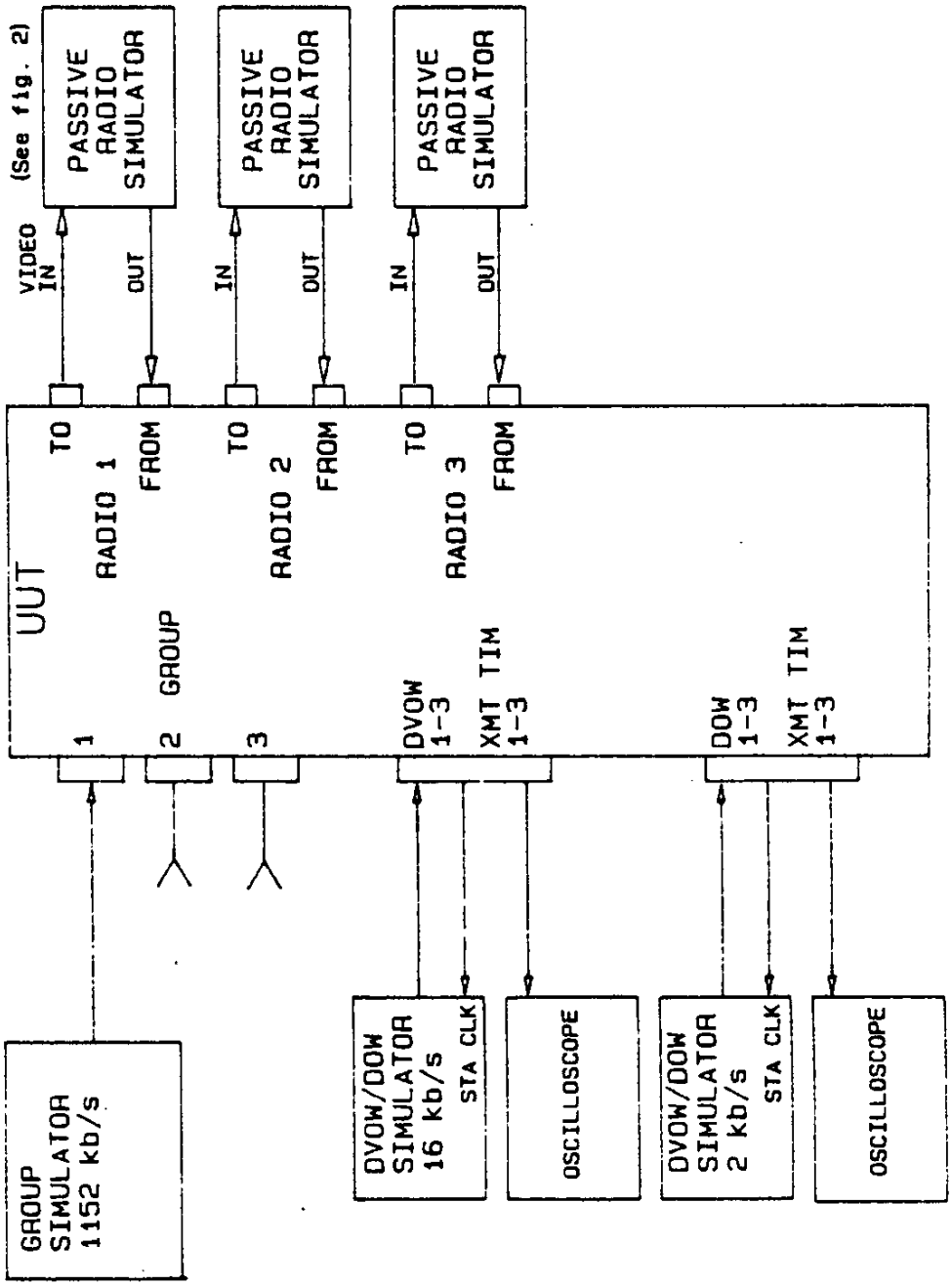


FIGURE '30. Data [illegible]uelch.

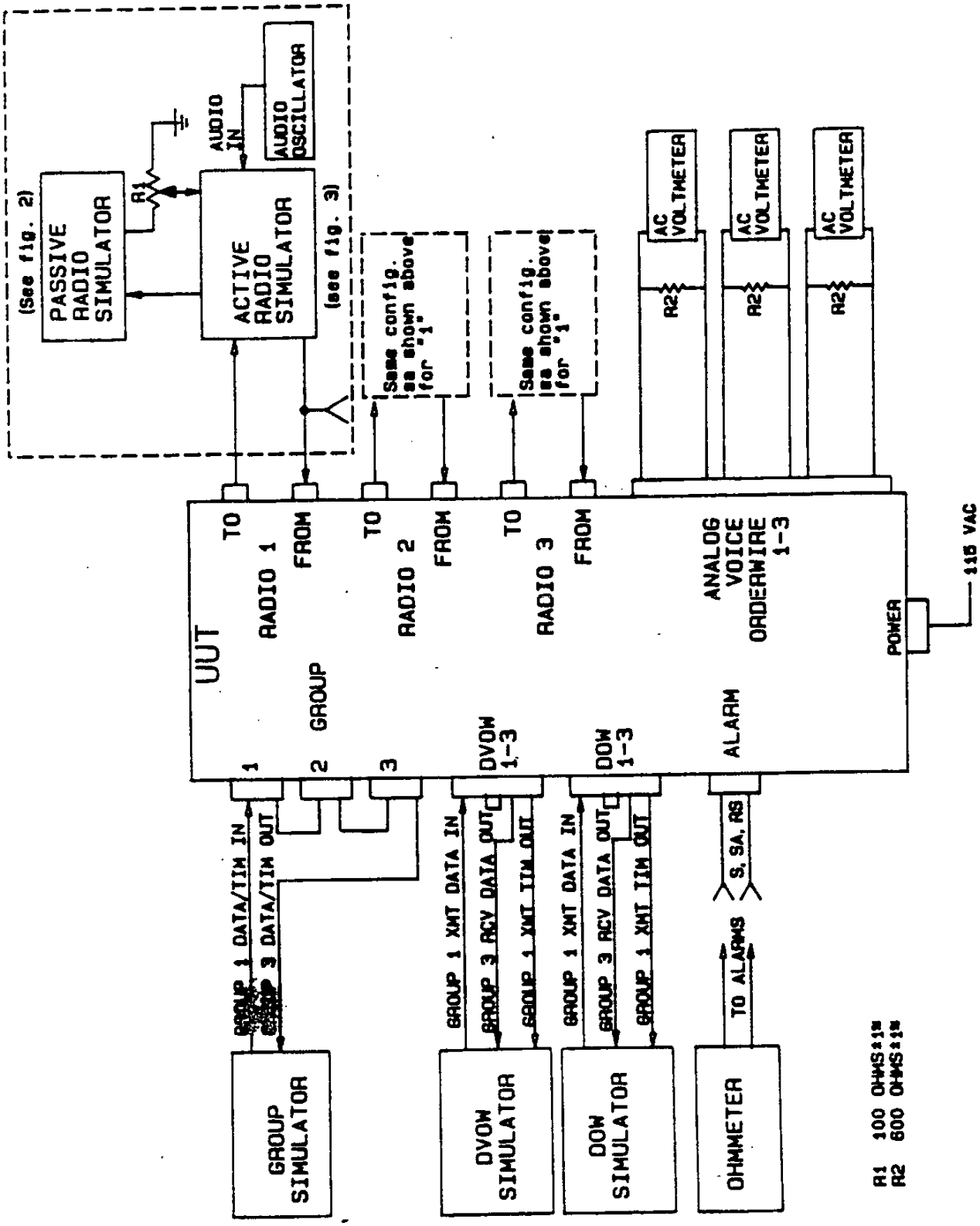


FIGURE 31. Operational check.

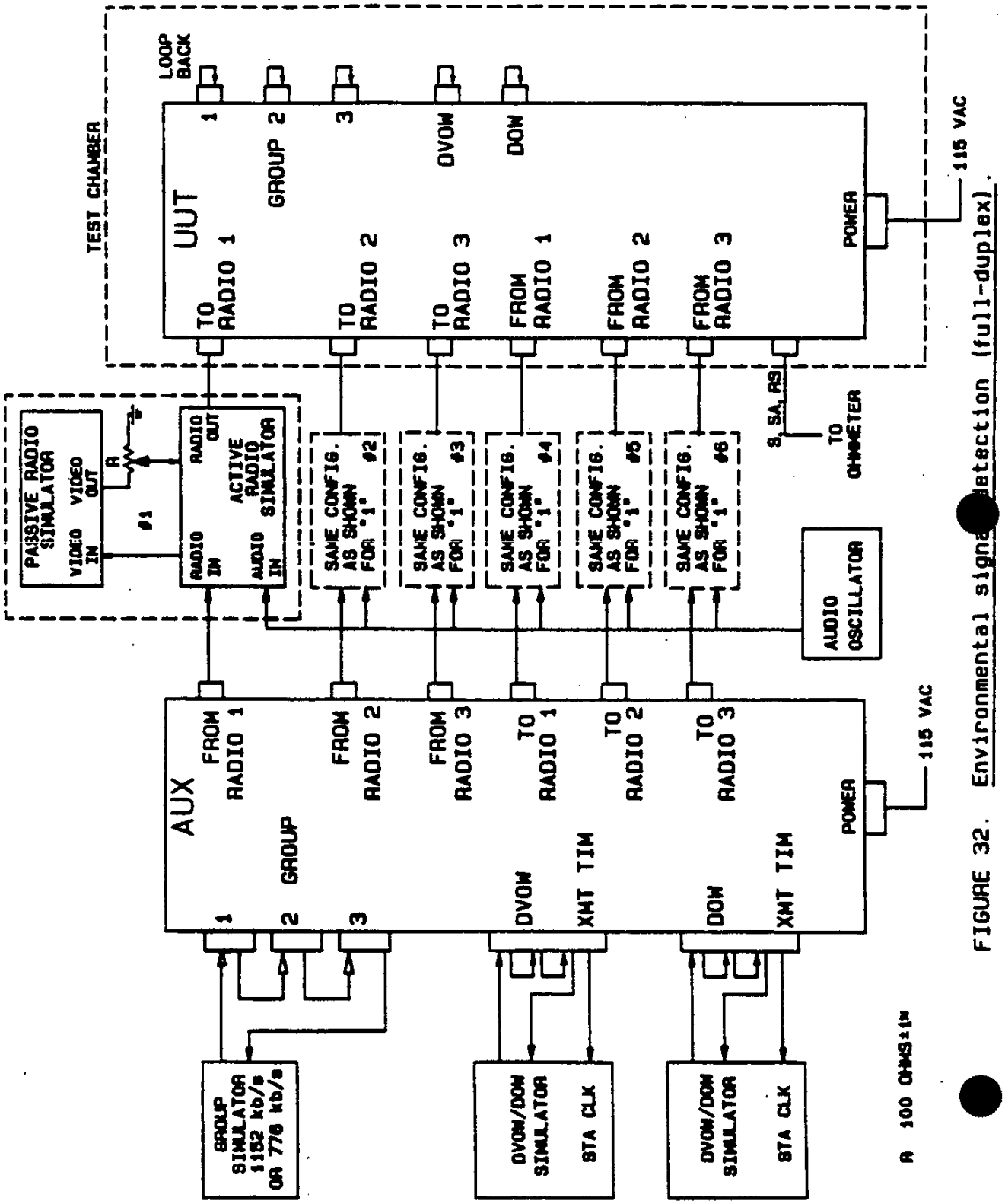


FIGURE 32. Environmental signal detection (full-duplex).

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