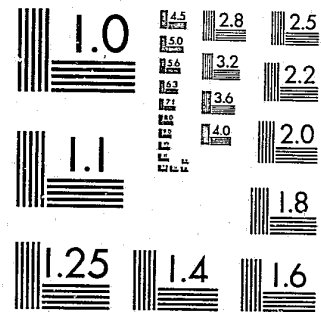


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POLICE
PORTABLE
FM TRANSCEIVERS
REPORT /

88750

Technology Assessment Program

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Police Portable FM Transceivers Report

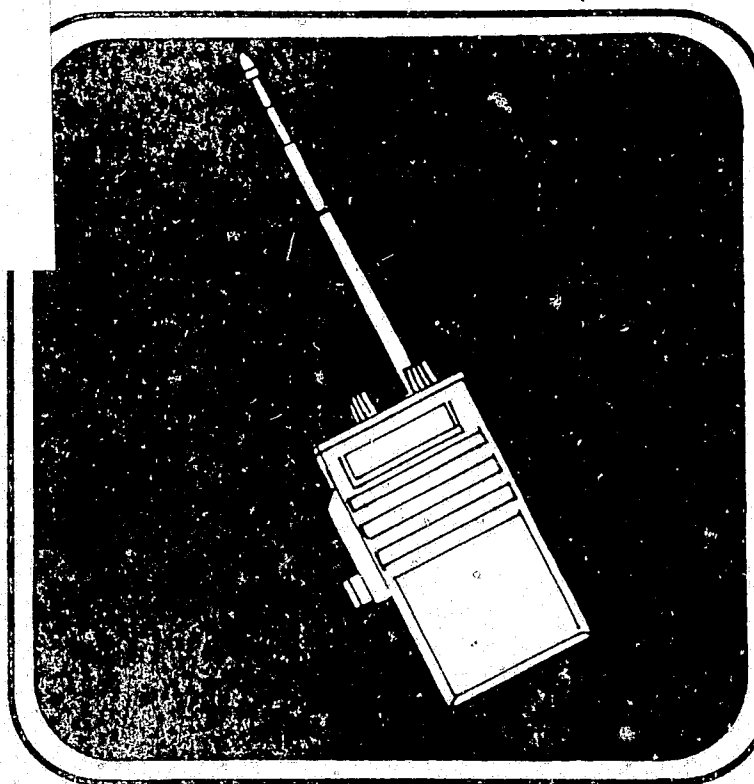
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The Technology Assessment Program is sponsored by the Office of Development, Testing, and Dissemination of the National Institute of Justice (NIJ), U.S. Department of Justice. The program responds to the mandate of the Justice System Improvement Act of 1979, which created NIJ and directed it to encourage research and development to improve the criminal justice system and to disseminate the results to Federal, State, and local agencies.

The Technology Assessment Program is an applied research effort that determines the technological needs of justice system agencies, sets minimum performance standards for specific devices, tests commercially available equipment against those standards, and disseminates the standards and the test results to criminal justice agencies nationwide and internationally.

The program operates through:

The Technology Assessment Program Advisory Council (TAPAC) consisting of nationally recognized criminal justice practitioners from Federal, State, and local agencies, which assesses technological needs and sets priorities for research programs and items to be evaluated and tested.

The Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards, which develops voluntary National performance standards for compliance testing to ensure that individual items of equipment are suitable for use by criminal justice agencies. The standards are based upon laboratory testing and evaluation of representative samples of each item of equipment to determine the key attributes, develop test methods, and establish minimum performance requirements for each essential attribute. In addition to the highly technical standards, LESL also produces user guides that explain in non-technical terms the capabilities of available equipment.

The Technology Assessment Program Information Center (TAPIC) operated by the International Association of Chiefs of Police (IACP), which supervises a national compliance testing program conducted by independent agencies. The standards developed by LESL serve as performance bench marks against which commercial equipment is measured. The facilities, personnel, and testing capabilities of the independent laboratories are evaluated by LESL prior to testing each item of equipment, and LESL helps the Information Center staff review and analyze data. Test results are published in Consumer Product Reports designed to help justice system procurement officials make informed purchasing decisions.

All publications issued by the National Institute of Justice, including those of the Technology Assessment Program, are available from the National Criminal Justice Reference Service (NCJRS), which serves as a central information and reference source for the nation's criminal justice community. For further information, or to register with NCJRS, write to the National Institute of Justice, National Criminal Justice Reference Service, Washington, DC 20531.

Paul Cascarano, Director
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FM Transceiver Test Data:

• Regency Communications, Inc. - 2180	2180-1
• Regency Communications, Inc. - 2181	2181-1
• Standard Communications Corporation - 2182	2182-1
• Standard Communications Corporation - 2183	2183-1
• IEC Electronics Corp. - 2186	2186-1
• IEC Electronics Corp. - 2187	2187-1
• IEC Electronics Corp. - 2188	2188-1
• REPCO, Inc. - 2192	2192-1
• REPCO, Inc. - 2195	2195-1
• REPCO, Inc. - 2198	2198-1
• REPCO, Inc. - 2201	2201-1
• Wilson Electronics Corp. - 2205	2205-1
• Wilson Electronics Corp. - 2206	2206-1
• RCA - 2207	2207-1
• RCA - 2208	2208-1
• Motorola - 2212	2212-1
• Motorola - 2213	2213-1
• Motorola - 2224	2224-1
• Motorola - 2225	2225-1
• Motorola - 2226	2226-1
• Motorola - 2227	2227-1
• General Electric - 2230	2230-1
• General Electric - 2231	2231-1
• General Electric - 2232	2232-1
• General Electric - 2233	2233-1
• General Electric - 2234	2234-1

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ACQUISITIONS

INTRODUCTION

The personal FM radio transceiver, at a rapidly increasing rate, is becoming a basic component of every law enforcement communications system. The need for this equipment and for more comprehensive information on personal transceivers was highlighted in two 1976 surveys as the top priority needs in the area of law enforcement communications. The surveys, "The Police Communications Equipment Survey of 1976", conducted by the Law Enforcement Standards Laboratory at the National Bureau of Standards, and the "Law Enforcement Equipment Survey" conducted by the IACP, specifically identified the need for personal transceiver equipment guidelines, performance standards and comparative performance data.

In consideration of the surveys and the additional information received through correspondence and personal contacts with law enforcement officials concerned with law enforcement communications equipment problems, the IACP's Technology Assessment Program Advisory Council (TAPAC) recommended that a transceiver testing program be undertaken by the Technology Assessment Program Information Center (TAPIC) at the IACP.

Upon the availability of funding, the program was implemented in 1978. Cost factors and the time element necessitated that testing be limited to transceivers representative of basic models available from manufacturers for use in law enforcement application within the United States. At the time of the program implementation in 1978, eight manufacturers of radio communications equipment advised that personal transceivers meeting these criteria were manufactured by them. From among the basic models available, twenty-six models, generally representative of each manufacturer's basic product lines, were selected for the transceiver testing program.

The advisory council, TAPAC, adopted the standard "Personal FM Transceivers", NILECJ-STD-0209.00 for use in the testing program. This standard is a law enforcement equipment standard developed by the Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards and accepted by the National Institute of Law Enforcement and Criminal Justice, now the National Institute of Justice, United States Department of Justice. The standard consists of performance and other requirements together with a detailed description of test methods.

Equipment which can meet the requirements of the standard is judged to be of superior quality and suited to the needs of law enforcement agencies.

In the use of the test data obtained in this transceiver testing program, it is important to note that each transceiver was tested to the performance specifications set forth in NILECJ-STD-0209.00 and not with reference to the manufacturer's specifications or to specifications set forth in other available transceiver standards. The performance specifications of some manufacturers may be more stringent than those set forth in the NILECJ standard while others may be less stringent. In some instances it will not be possible to directly relate the performance data of a particular transceiver tested to the manufacturer's specifications because test procedures, test conditions or measuring techniques specified by the manufacturer may be different from those set forth in NILECJ-STD-0209.00.

Communications equipment most generally is tested to the manufacturer's specifications or the specifications of the purchaser. This is a satisfactory procedure to evaluate the performance of a particular transceiver, to test for quality control purposes, or for compliance with purchaser's specifications. However, for development of comparative performance data, all equipment items must be tested in precisely the same manner, under the same conditions, and to the same performance requirements. Testing the twenty-six transceivers in accordance with the procedures and performance requirements of NILECJ-STD-0209.00 accomplished the principal objective of the transceiver testing program - development of a bank of objective comparative performance data on personal FM transceivers that are available for use in law enforcement communications systems.

The data compiled is very comprehensive in nature. At least ninety-four separate measurements relating to twenty-six performance characteristics of each transceiver were made. The data compiled represents transceiver performance under normal operating conditions, under conditions of high and low voltage, vibration and extremes of temperature and humidity. The test data of the twenty-six performance characteristics of each transceiver tested is summarized with reference to compliance or non-compliance with the requirements of NILECJ-STD-0209.00. In addition, the complete test data is presented in tabular form for each transceiver tested. The reports of test data, included as an appendix to this report, sets forth each transceiver characteristic, the requirement, the applicable test condition, the test result, and reference to the applicable section of NILECJ-STD-0209.00. Reference to the concise summaries of all transceiver test results and the detailed test data reports should enable the purchaser of transceiver equipment to evaluate any one or all of the transceivers tested with reference to the particular needs of his communications system and/or enable him to more accurately define and specify personal transceiver performance requirements for his communications system.

Since this testing program was implemented in 1978, the particular transceiver units tested are of late 1977 or early 1978 vintage, and may have since undergone specification changes. The prospective equipment purchaser should consult the manufacturer in this regard. In fact, several manufacturers have introduced entirely new equipment models which, it is hoped, can be tested as a continuation of this program.

METHODOLOGY

Implementation of the personal FM transceiver testing program began with a survey of communications equipment manufacturers to identify the personal FM transceiver models currently in production for law enforcement applications in the United States, and the issuance of a Request for Proposal (RFP) to test the transceivers.

Based upon the results of the survey twenty-six transceivers representing the basic models produced by eight manufacturers were selected for the program. Included among the twenty-six models were two Type I (25-50 MHz), fifteen Type II (150-174-mHz), and nine Type III (400-512 MHz) transceivers. Individual units ordered for the program were basic one or two channel units ranging in carrier output power from approximately two to six watts. When possible, universal type transceivers were obtained to provide the additional input-output jacks that would facilitate testing of the units. Also, the transceivers had no special subsystems such as selective signaling or voice privacy, or no such systems that could not be disabled or bypassed during compliance testing of the transceivers.

Substantial time and effort were expended in selection of the laboratories for the testing program. Based on responses to the IACP's RFP and follow-up visits to the laboratories to further assess their capability to perform the desired testing, two contracts were awarded. Recipients of the contracts were Dayton T. Brown, Inc., Bohemia, Long Island, New York, and E-Systems, Melpar Division, Falls Church, Virginia.

As a preliminary phase of the testing program each of the two laboratories was required to completely test one each of two identical personal FM transceivers in accordance with the procedures and requirements of NILECJ standard. Various phases of the testing were monitored by technical representatives of the IACP and LESL to follow progress of the testing and resolve any questions that might arise in application of the standard. During the on-the-site visits test instruments, environmental chambers, vibration exciters, etc., were inventoried and checked for calibration. Satisfactory completion of the initial transceiver testing firmly established the qualification of each laboratory to proceed with testing of the twenty-six transceivers selected for the testing program.

During the transceiver testing, transceiver-to-test-instrument interface accessories were used when specified by the equipment manufacturer. The accessories included items such as adapter cables, battery blocks, external power supply adapters, antenna adapters, etc. All batteries were charged in chargers specified by the manufacturer for the particular battery supplied with the transceiver.

With one exception noted below, tests were conducted on each transceiver in the condition that it was received from the manufacturer. That is, no adjustments were made to the transceiver before or during the testing. It is recognized that some performance characteristics of a transceiver can be changed by internal adjustments; however, it was not within the scope of this testing program to "peak" each transceiver for optimum performance of any

characteristic or to ascertain the cause of non-compliance performance. One exception was made. In the event of complete failure of a transceiver component, the testing laboratory was authorized to return the transceiver to the manufacturer or to a manufacturer's authorized service facility for repair in order that testing of the transceiver could be completed. Occurrences of transceiver repair during the transceiver testing program are noted in the test reports.

THE STANDARD

Testing of the transceivers in this program was conducted, except as noted below, in accordance with the procedures in the standard NILECJ-STD-0209.00, December 1978, captioned "Personal FM Transceivers". This standard is a law enforcement equipment standard developed by the Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards and adopted by the National Institute of Law Enforcement and Criminal Justice (now the Institute of Justice, United States Department of Justice).

The standard document consists of performance requirements together with definitions and descriptions of test methods. It is indicated in the foreword of the standard that equipment which can meet the requirements of the standard is of superior quality and is suited for the needs of law enforcement agencies. The transmitter performance requirements of the standard meet or exceed those specified in the Rules and Regulations of the Federal Communications Commission.

The IACP Technology Assessment Program Advisory Council (TAPAC) recommended that three exceptions to the standard be made in its application of this equipment testing program. The exceptions were made as follows: 1) the Audio Output Power (Earphones) Test was not performed; 2) the Shock Test (drop test) was not performed; 3) the testing sequence specified in the standard was reversed to require testing of the transceivers first under normal (ambient) conditions followed by testing under environmental conditions of vibration and extremes of temperature and humidity.

It is important to note that general differences as well as specific differences in personal transceiver performance requirements exist between NILECJ-STD-0209.00 and other available transceiver standards such as the Electronic Industries Association (EIA) standard RS-316-B which sets forth minimum standards for portable/personal radio transmitters and receivers. The principal general difference is the manner of specifying and testing various transceiver characteristics for compliance. The EIA standard RS-316-B provides generally for compliance testing with respect to the manufacturers specifications, whereas NILECJ-STD-0209.00 requires that compliance testing be conducted with respect to the minimum performance requirements specified in the NILECJ standard. Additionally, specific differences exist between the NILECJ standard and other standards in some test procedures, test conditions and performance requirements. These will be commented upon, as applicable, in the section, Application Notes and Comments on Test Data.

TEST RESULTS

The appendix to this report contains the detailed test data obtained in the measurement of twenty-six FM personal transceiver characteristics under normal operating conditions, and as applicable, under conditions of high and low voltage, vibration, and extremes of temperature and humidity. The test data reports set forth each transceiver characteristic, the performance requirement, the applicable test condition, the test result and reference to the applicable section of NILECJ-STD-0209.00. An asterisk (*) beside a test result indicates the test value did not meet the minimum requirement of the NILECJ standard. Where applicable explanatory notes accompany the test data reports.

The test reports are filed in the appendix in numerical order by IACP identification number.

The voluminous data contained in the test reports has been summarized in Tables 1, 2, 3 and 4, to facilitate use of the data resulting from the transceiver testing program. Tables 1, 2 and 3 show noncompliances of each transceiver with reference to the fourteen principal characteristics of receivers and the twelve principal characteristics relating to transmitters. The tables indicate only that noncompliance occurred under ambient (A) test conditions, under test conditions of environmental (E) extremes, or under both test conditions. The transceiver units in Tables 1, 2 and 3 are listed alphabetically by manufacturer and sequenced by IACP identification number.

Table 1 contains the summary of test results of two Type I (25-50 MHz) transceivers tested showing noncompliance with requirements of the NILECJ standard, under ambient test conditions (A) and under conditions of environmental (E) extremes. (For purposes of statistical summaries measurements made at prescribed high and low voltages are included with the environmental test results.)

Table 2 is a similar table containing the summary of test results of fifteen Type II (150-174 MHz) transceivers tested.

Table 3 is a similar table containing the summary of test results of nine Type III (450-512 MHz) transceivers tested.

Table 4 contains an overall statistical compilation of the FM transceiver test results showing noncompliance totals by individual test requirement and by the total number of transceiver units. The data is compiled separately for test results under ambient conditions (A), environmental conditions (E) and by overall total for each of Types I, II and III.

Reference to Table 4 will enable one to readily determine the areas of generally excellent performance among the twenty-six transceivers tested as well as those areas of substantial noncompliance with requirements of the standard. Reference to the appendix and Table 4 will enable one to readily compare the performance of any one transceiver tested to the overall group performance or to the performance of other transceivers of the same type.

In the way of explanation, the number in columns headed A, E and T represent the total number of transceiver units which were not in compliance with the requirements of a particular transceiver characteristic. The totals for each characteristic are not always directly additive since a transceiver may fail to meet a particular requirement under ambient test conditions and also under test conditions of extremes of humidity and temperature. In this situation a transceiver is recorded only once as not being in compliance for that transceiver characteristic. Similarly, the total number of transceiver units not in compliance under an environmental condition may not total the same as the number of individual noncompliance tests recorded. As an example, both situations are noted for Adjacent Channel Selectivity, Type II transceivers. Three transceivers failed to meet the standard requirement under ambient test conditions and five were not in compliance under environmental test conditions. However, the total number of transceiver units not meeting the Adjacent Channel Selectivity requirements is only six since some of the same units were not in compliance both under normal (ambient) temperature conditions and also under environmental test conditions. Likewise, the eight noncompliances noted under environmental test conditions involve a total of only five transceiver units.

TABLE 1
TRANSCEIVER COMPLIANCE SUMMARY

Type I 25-50 MHz
(Requirements Specified in NILECJ-STD-0209.00)

A = Ambient Temperature Test Conditions - = No Environmental Test Required
E = Environmental Test Conditions X = Requirement Of The Standard Was Not Met

	GE 2234		REPCO 2192	
	A	E	A	E
<u>RECEIVER REQUIREMENTS</u>				
SINAD Sensitivity		X		
Selectivity				
Usable Bandwidth		X		
Adjacent Channel Selectivity		X		
Spurious Response Attenuation		-		-
Intermodulation Attenuation	X	-		-
Squelch				
Threshold Squelch Sensitivity		X		X
Tight Squelch Sensitivity		X		
Squelch Block	X	-		-
Squelch Attack Time		-		-
Squelch Release Time		-		-
Audio Frequency				
Audio Output Power-Speaker		X		
Audio Distortion-Speaker		X		
Audio Frequency Response-Speaker		-	X	-
Audio Hum and Noise-Unsquelched		X		
-Squelched		X		
<u>TRANSMITTER REQUIREMENTS</u>				
RF Carrier				
Carrier Output Power	X	X	X	X
Carrier Frequency Tolerance		X		
AM Hum and Noise		-		-
Carrier Attack Time		-		-
Audio Frequency Modulation				
Audio Frequency Harmonic Distortion		X		
FM Hum and Noise Level	X	X	X	X
Audio Frequency Response	X	-	X	-
Frequency Deviation	X	-		-
Modulation Limiting		-		-
Electromagnetic Compatibility				
Radiated Spurious Emissions		-		-
Sideband Spectrum Separation-10kHz		-		-
-20kHz		-		-
Antenna				
Radiation Efficiency	N/A	-	N/A	-

TABLE 2
 TRANSCEIVER COMPLIANCE SUMMARY
 Type II 150-174 MHz
 (Requirements Specified in NILECJ-STD-0209.00)

A = Ambient Temperature Test Conditions - = No Environmental Test Required
 E = Environmental Test Conditions X = Requirement Of The Standard Was Not Met

	GE 2231		GE 2233		IEC 2186		IEC 2187		Motorola 2213		Motorola 2224		Motorola 2226		RCA 2207		Regency 2180		Regency 2181		REPCO 2201		REPCO 2195		Standard 2182		Wilson 2205		Wilson 2206	
	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E
RECEIVER REQUIREMENTS																														
SINAD Sensitivity							X								X		X		X					X						X
Selectivity																														
Usable Bandwidth			X		X		X								X				X		X									
Adjacent Channel Selectivity	X		X		X		X								X		X	X	X	X										
Spurious Response Attenuation	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	X	-	X	-
Intermodulation Attenuation	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	X	-	X	-	-	-	X	-	-	-	-	-	-	
Squelch																														
Threshold Squelch Sensitivity			X		X		X								X				X		X		X							
Tight Squelch Sensitivity															X		X		X		X		X							
Squelch Block	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Squelch Attack Time	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Squelch Release Time	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	X	-	-	-
Audio Frequency																														
Audio Output Power-Speaker								X							X				X		X									
Audio Distortion-Speaker			X				X								X		X	X	X		X					X		X	X	X
Audio Frequency Response-Speaker	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	X	-	X	-	X	-	-	X	-	X	-	X	-
Audio Hum and Noise-Unsquelched			X		X		X								X				X		X									
Audio Hum and Noise-Squelched			X		X		X								X				X		X									
TRANSMITTER REQUIREMENTS																														
RF Carrier																														
Carrier Output Power			X				X	X	X	X							X		X	X	X	X	X			X		X		X
Carrier Frequency Tolerance	X						X										X						X		X		X		X	
AM Hum and Noise	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrier Attack Time	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Audio Frequency Modulation																														
Audio Frequency Harmonic Distortion	X		X						X										X		X		X	X	X	X	X	X	X	X
FM Hum and Noise Level	X	X	X	X			X												X	X		X	X	X	X	X	X	X	X	X
Audio Frequency Response	X	-	X	-	X	-	X	-	X	-	-	-	X	-	-	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-
Frequency Deviation	-	-	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	X	-	X	-	
Modulation Limiting	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X	-	-	-	-	-	-	X	-	X	-	X	-	X	-	
Electromagnetic Compatibility																														
Radiated Spurious Emissions	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sideband Spectrum Separation-10kHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
Sideband Spectrum Separation-20kHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
Antenna																														
Radiation Efficiency	-	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-

2-1

TABLE 3
 TRANSCEIVER COMPLIANCE SUMMARY
 Type III 400-512 MHz
 (Requirements Specified in NILECJ-STD-0209.00)

A = Ambient Temperature Test Conditions - = No Environmental Test Required
 E = Environmental Test Conditions X = Requirement Of The Standard Was Not Met

	GE 2230		GE 2232		IEC 2188		MOTOROLA 2212		MOTOROLA 2225		MOTOROLA 2227		RCA 2208		REPCO 2198		STANDARD 2183	
	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E
RECEIVER REQUIREMENTS																		
SINAD Sensitivity																		
Selectivity																		
Usable Bandwidth							X											X
Adjacent Channel Selectivity																		X
Spurious Response Attenuation	X	-	X	-	X	-	X	-	-	-	-	-	X	-	-	-	X	-
Intermodulation Attenuation																		
Squelch																		
Threshold Squelch Sensitivity																		X
Tight Squelch Sensitivity																		X
Squelch Block	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Squelch Attack Time																		
Squelch Release Time																	X	-
Audio Frequency																		
Audio Output Power-Speaker																		X
Audio Distortion-Speaker																		X
Audio Frequency Response-Speaker							X	-	-	-	-	-	X	-	-	-	-	-
Audio Hum and Noise-Unsquelched																		X
-Scquelched																	X	X
TRANSMITTER REQUIREMENTS																		
RF Carrier																		
Carrier Output Power			X										X	X				
Carrier Frequency Tolerance		X					X		X				X					X
AM Hum and Noise																		
Carrier Attack Time																		
Audio Frequency Modulation																		
Audio Frequency Harmonic Distortion	X		X	X														
FM Hum and Noise Level	X	X	X	X									X		X		X	X
Audio Frequency Response	X	-	X	-	X	-	X	-	-	-	X	-	-	-	X	-	-	-
Frequency Deviation			X															
Modulation Limiting							X		X		X		X					
Electromagnetic Compatibility																		
Radiated Spurious Emissions																		
Sideband Spectrum Separation-10kHz															X		X	-
-20kHz	X	-											X	-				
Antenna																		
Radiation Efficiency	X	-													X	-	X	-
Power Test Degradation																		

3-1

Table 4

NONCOMPLIANCE STATISTICAL SUMMARY

Transceiver Type	I			II			III			Total		
Quantity Tested	2			15			9			26		
TRANSCEIVER CHARACTERISTIC	A	E	T	A	E	T	A	E	T	A	E	T
<u>RECEIVER SENSITIVITY</u>												
SINAD Sensitivity	0	1	1	0	6	6	0	0	0	0	7	7
SINAD Sensitivity Variance - Voltage +10%												
-20%				4						4		
Temperature -30°C		1								1		
+60°C												
Humidity 50°C, 90% RH				2						2		
<u>RECEIVER SELECTIVITY</u>												
Usable Bandwidth	0	1	1	0	5	5	0	2	2	0	8	8
Usable Bandwidth Variance - Temperature -30°C		1			1			2			4	
+60°C					4					4		
Humidity 50°C, 90% RH					4					4		
Adjacent Channel Selectivity	0	1	1	3	5	6	0	1	1	3	7	8
Adjacent Channel Selectivity Variance - Temperature -30°C		1			3			1			5	
+60°C					2					2		
Humidity 50°C, 90% RH					3					3		
Spurious Response Attenuation	0	-	0	6	-	6	6	-	6	12	-	12
Intermodulation Attenuation	1	-	1	4	-	4	0	-	0	5	-	5
<u>RECEIVER SQUELCH</u>												
Threshold Squelch Sensitivity	0	2	2	0	6	6	0	1	1	0	9	9
Threshold Squelch Variance - Voltage +10%												
-20%												
Temperature -30°C		1			2			1			4	
+60°C					1					1		
Humidity 50°C, 90% RH		1			4					5		
Tight Squelch Sensitivity	0	1	1	0	5	5	0	1	1	0	7	7
Tight Squelch Variance - Temperature -30°C		1			2			1			4	
+60°C					1					1		
Humidity 50°C, 90% RH					5					5		
Squelch Block	1	-	1	1	-	1	2	-	2	4	-	4
Squelch Attack Time	0	-	0	0	-	0	0	-	0	0	-	0
Squelch Release Time	0	-	0	3	-	3	1	-	1	4	-	4

RECEIVER AUDIO FREQUENCY

Audio Output Power
(loudspeaker)
Audio Output Power Variance -
Voltage +10%
-20%
Temperature -30°C
+60°C
Humidity 50°C, 90% RH
Audio Distortion (loudspeaker)
Temperature -30°C
+60°C
Humidity 50°C, 90% RH
Audio Frequency Response -
(loudspeaker)
300 Hz
500 Hz
1000 Hz
2000 Hz
3000 Hz
Audio Hum and Noise -
Unsquelled
Squelched
Audio Hum and Noise Variance -
Unsquelled
Temperature -30°C
+60°C
Humidity 50°C, 90% RH
Squelched
Temperature -30°C
+60°C
Humidity 50°C, 90% RH

TRANSMITTER RF CARRIER

Carrier Output Power
Relation to Rated Output
Carrier Output Power Variance
Voltage +10%
-10%
-20%
Temperature -30°C
+60°C
Humidity 50°C, 90% RH
Carrier Frequency Tolerance
Carrier Frequency Stability -
Voltage +15%
-15%
Temperature -30°C
+60°C
Humidity 50°C, 90% RH
Vibration
AM Hum and Noise Level
Carrier Attack Time

	Type I			Type II			Type III			Total		
	A	E	T	A	E	T	A	E	T	A	E	T
Audio Output Power (loudspeaker)	0	1	1	0	3	3	0	1	1	0	5	5
Audio Output Power Variance - Voltage +10%												
-20%												
Temperature -30°C		1						1			2	
+60°C					1						1	
Humidity 50°C, 90% RH					3						3	
Audio Distortion (loudspeaker)	0	1	1	5	4	7	0	1	1	5	6	9
Temperature -30°C		1						1			2	
+60°C					2						2	
Humidity 50°C, 90% RH					3						3	
Audio Frequency Response - (loudspeaker)	1	-	1	8	-	8	2	-	2	11	-	11
300 Hz	1	-	1	6	-	6	-	-	-	7	-	7
500 Hz	-	-	-	1	-	1	-	-	-	1	-	1
1000 Hz	-	-	-	-	-	-	-	-	-	-	-	-
2000 Hz	-	-	-	1	-	1	-	-	-	1	-	1
3000 Hz	1	-	1	4	-	4	-	-	-	5	-	5
Audio Hum and Noise - Unsquelled	0	1	1	0	3	3	0	1	1	0	5	5
Squelched	0	1	1	0	5	5	1	1	1	1	7	7
Audio Hum and Noise Variance - Unsquelled												
Temperature -30°C		1			1			1			3	
+60°C												
Humidity 50°C, 90% RH					2						2	
Squelched												
Temperature -30°C		1			1			1			3	
+60°C												
Humidity 50°C, 90% RH					4						4	
<u>TRANSMITTER RF CARRIER</u>												
Carrier Output Power Relation to Rated Output	2	2	2	7	4	7	2	1	3	11	7	12
Carrier Output Power Variance Voltage +10%		1									1	
-10%					2						2	
-20%					2						2	
Temperature -30°C		1			3						4	
+60°C		1			2			1			4	
Humidity 50°C, 90% RH					3			1			4	
Carrier Frequency Tolerance	0	1	1	0	7	7	0	5	5	0	13	13
Carrier Frequency Stability - Voltage +15%												
-15%					1						1	
Temperature -30°C		1			4			2			7	
+60°C		1			3			2			6	
Humidity 50°C, 90% RH					2			3			5	
Vibration		1			3			1			5	
AM Hum and Noise Level	0	-	0	0	-	0	0	-	0	0	-	0
Carrier Attack Time	0	-	0	0	-	0	0	-	0	0	-	0

TRANSMITTER AUDIO FREQUENCY MODULATION

Audio Frequency Harmonic Distortion
 Temperature Stability -30°C
 +60°C
 FM Hum and Noise Level
 FM Hum and Noise Stability
 Temperature -30°C
 +60°C
 Humidity 50°C, 90% RH
 Vibration
 Audio Frequency Response
 300 Hz
 500 Hz
 1000 Hz
 2500 Hz
 3000 Hz
 Frequency Deviation
 Modulation Limiting
 300 Hz
 500 Hz
 1000 Hz
 2000 Hz
 2500 Hz
 3000 Hz

	Type I			Type II			Type III			Total		
	A	E	T	A	E	T	A	E	T	A	E	T
Audio Frequency Harmonic Distortion	0	1	1	4	3	6	2	1	2	6	5	9
Temperature Stability -30°C		1			2			1			4	
+60°C		1			1						2	
FM Hum and Noise Level	2	2	2	6	6	9	3	5	5	11	13	16
FM Hum and Noise Stability		2			3			4			9	
Temperature -30°C		2			1			4			7	
+60°C		2			2			5			7	
Humidity 50°C, 90% RH		1			2			2			5	
Vibration		1			2			2			5	
Audio Frequency Response	2	-	2	11	-	11	6	-	6	19	-	19
300 Hz	2	-	2	10	-	10	6	-	6	18	-	18
500 Hz	2	-	2	4	-	4	4	-	4	10	-	10
1000 Hz		-			-			-			-	
2500 Hz	2	-	2	6	-	6	3	-	3	11	-	11
3000 Hz	2	-	2	9	-	9	3	-	3	14	-	14
Frequency Deviation	1	-	1	6	-	6	1	-	1	8	-	8
Modulation Limiting	0	-	0	5	-	5	4	-	4	9	-	9
300 Hz	0	-	0	3	-	3	4	-	4	7	-	7
500 Hz	0	-	0	4	-	4	1	-	1	5	-	5
1000 Hz	0	-	0	3	-	3	0	-	0	3	-	3
2000 Hz	0	-	0	0	-	0	0	-	0	0	-	0
2500 Hz	0	-	0	1	-	1	0	-	0	1	-	1
3000 Hz	0	-	0	0	-	0	0	-	0	0	-	0

TRANSMITTER ELECTROMAGNETIC COMPATIBILITY

Radiated Spurious Emissions
 Sideband Spectrum -
 ±10 kHz Freq. Separation
 ±20 kHz Freq. Separation

Radiated Spurious Emissions	0	-	0	1	-	1	0	-	0	1	-	1
Sideband Spectrum -	0	-	0	1	-	1	4	-	4	5	-	5
±10 kHz Freq. Separation	0	-	0	1	-	1	2	-	2	3	-	3
±20 kHz Freq. Separation	0	-	0	1	-	1	2	-	2	3	-	3

ANTENNA

Radiation Efficiency
 Power Test Degradation

Radiation Efficiency	N/A	-	N/A	4	-	4	3	-	3	7	-	7
Power Test Degradation	0	-	0	0	-	0	0	-	0	0	-	0

BATTERY (NI-CAD)

Service Life: 20 to 30°C
 -30°C
 +60°C

Service Life: 20 to 30°C	2		2	14		14	8		8	24		24
-30°C		1			12			8			21	
+60°C		1			12			7			20	

APPLICATION NOTES AND COMMENTS ON TEST DATA

Receiver Sensitivity

Receiver sensitivity is universally regarded as one of the more important criterion of radio receiver performance. Several definitions of sensitivity and methods of receiver sensitivity measurement are in general usage in the communications industry. The applicable sensitivity measurement in NILECJ-STD-0209.00 is "SINAD Sensitivity", technically defined as the minimum modulated RF signal input level required to produce a specified signal plus noise plus distortion to noise plus distortion ratio at a specified audio output power level. The NILECJ standard specifies that measurements be made at a 12 dB SINAD ratio with an audio output power reference of 500 milliwatts. Measurement made in this manner indicates the "Usable Sensitivity" of the transceiver.

The NILECJ standard specifies a measurement method varying slightly from that in EIA RS-204, (Electronic Industries Association) standard, by stipulating that the sensitivity measurement shall be made with reference to an output power of 500 milliwatts rather than to each receiver's rated audio power output as in EIA RS-204. The procedure specified in the NILECJ standard provides comparative performance data since all transceiver sensitivity measurements are made with reference to the same minimum acceptable audio output power of 500 milliwatts.

The SINAD sensitivity specified by most transceiver manufacturers is well below the 0.5 microvolt set as a maximum value in the NILECJ standard. All of the transceivers tested met the sensitivity requirement under normal test conditions. However, seven did not meet requirements under environmental test conditions. Of the seven transceivers, four failed to meet the sensitivity requirement at a voltage 20% below nominal battery voltage. One failed to produce the required 500 milliwatts of audio output power; one failed to produce the 12 dB SINAD ratio; and the microvolt sensitivity of two was in excess of the specified maximum allowable. Three transceivers tested under extremes of temperature and humidity either produced no audio output or failed to produce the 500 milliwatts minimum output required.

In making decisions with reference to FM receiver sensitivity specifications or requirements, two points are worthy of consideration by the equipment purchaser. 1) If the transceiver is to be used in a geographical area where it will not be subjected to extremes of temperature or humidity, lesser performance requirements might be specified for the environmental tests depending upon the conditions applicable the specific equipment user. 2) Sensitivity, in general terms, is an indication of the ability of a receiver to respond properly to weak RF signals. In rural areas where extended range from a transmitter is often required good sensitivity is a necessary requirement. However, in an urban environment congested with interfering signals and man-made radio frequency noises receiver sensitivity becomes less important since the full receiver sensitivity may not be usable because of the interfering radio frequency noises.

Selectivity is the extent to which a receiver is capable of differentiating between the desired signal and signals at other frequencies. Four characteristics — Usable Bandwidth, Adjacent Channel Selectivity, Spurious Response Attenuation, and Intermodulation Attenuation — are measured to determine the overall quality of receiver's selectivity. Of the twenty-six transceivers tested, twenty did not comply with all four of the selectivity test requirements of the NILECJ standard. As will be noted, the selectivity requirements of NILECJ-STD-0209.00 are somewhat more stringent than those of EIA Standard RS-316-B which also sets forth minimum performance standards for personal FM transceivers.

The transceivers were in 100 percent compliance with the Usable Bandwidth requirement under ambient test conditions. However eight (39%) did not meet the requirement under either high temperature or high humidity test conditions. Under these test conditions three transceivers ceased functioning, but recovered operation under ambient temperature conditions.

NILECJ-STD-0209.00 requires a minimum Adjacent Channel Selectivity Attenuation of 60 dB for transceiver Types I and II and 70 dB for Type III. EIA RS-316-B requires 50 dB attenuation, except that 40 dB is acceptable if protective alerting circuits are used in the transceiver. Eight (31%) of the transceivers did not meet the more stringent requirements of the NILECJ standard, three under ambient test conditions, plus five additional under environmental test conditions.

Compliance with Spurious Response Attenuation requirement was least satisfactory, with twelve transceivers (46%) failing to meet this minimum performance requirement. (Spurious Response is the output of a receiver caused by signals at a frequency other than that to which the receiver is tuned.) Again, the more stringent requirement of the NILECJ standard is noted. The Spurious Response Attenuation requirement is 30 dB in RS-316-B versus 70 dB for Type I transceivers and 60 dB for transceiver Types II and III in the NILECJ standard.

The Intermodulation Attenuation requirement in RS-316-B is 40 dB as compared to the 60 and 70 dB requirements of NILECJ-STD-0209.00. It is noted, however, that all of the Type III transceivers tested met the more stringent Intermodulation Attenuation requirements of the NILECJ standard, as did twelve (71%) of the total transceivers of Types I and II.

Receiver Squelch

A receiver squelch circuit functions to prevent a receiver from producing audio output power in the absence of a radio frequency input signal. All transceivers tested were in compliance with Threshold and Tight Squelch Sensitivity requirements under ambient test conditions.

Four transceivers did not meet the Threshold Squelch requirement under environmental test condition of -30°C, and five were not in compliance under humidity conditions of 50°C and 90% relative humidity. One transceiver was not in compliance when tested at a temperature of 60°C. Seven transceivers did not meet Tight Squelch requirements under environmental test conditions. As with Threshold Squelch, the problem areas were at low temperature and at high humidity.

Receiver Audio Frequency

Four receiver characteristics each affecting the quality of the voice frequencies reproduced by a transceiver are measured in the NILECJ standard. They are Audio Output Power, Audio Distortion, Audio Frequency Response, and Audio Hum and Noise.

All transceivers tested met the required minimum Audio Output Power of 500 milliwatts under ambient test conditions, and also when tested at voltages varying +10% and -20% from nominal operating voltage of the transceiver. Under conditions of environmental extremes five units failed to meet requirements of the standard, three of the five not meeting the performance requirement under high humidity test conditions.

Under requirements of the NILECJ standard, Audio Distortion, measured at 500 milliwatts output power of the receiver, may not be more than 10% with reference to the input signal. Twenty-one of the twenty-six transceivers met this requirement under ambient test conditions. The five units which did not meet this requirement were all Type II transceivers. Four additional units did not meet the requirement under conditions of environmental extremes.

The Audio Frequency Response denotes the degree of closeness to which the audio output of a receiver follows a 6 dB/octave de-emphasis curve with constant frequency deviation over a given continuous frequency range. (EIA RS-316-B). The frequency range stipulated by both the NILECJ standard and EIA standard RS-316-B is 300 to 3000 Hz. Both standards specify that the frequency response shall not vary from the standard de-emphasis curve more than +2, -10 dB with 1000 Hz used as the reference frequency. This is also the specification specified by transceiver manufacturers. Only fifteen (58%) of the twenty-six transceivers tested met this requirement. The problem areas were at 300 Hz where the audio frequency output power of seven units was not within the allowable +2, 10 dB tolerance, and at 3000 Hz where five units did not test within the allowable tolerance. Noncompliance was most prominent among Type II transceivers, which accounted for 8 of 11 (73%) of the non-compliances.

Audio Hum and Noise is the audio frequency power measured at the output terminals of a receiver having an unmodulated radio frequency signal input. All transceivers met the audio hum and noise attenuation under ambient test conditions with receiver unswitched, and 25 met the requirement with the receiver squelched. Under extremes of temperature and humidity, five transceivers did not meet the requirements unswitched and seven did not comply with the requirements under the squelched test condition.

In overall summary of the Receiver Audio Frequency tests, nine (35%) of the units tested met all requirements of the four characteristics. The principal problem area was Audio Frequency Response, particularly at 300 Hz.

Some equipment manufacturers, commenting on the results of this transceiver testing program, have indicated that the low frequencies are deliberately attenuated in some equipment to improve rejection of CTCSS (Continuous Tone Coded Squelch System). This attenuation, in the receiver and/or the transmitter, they believe, results in no observable degradation of voice intelligence.

Transmitter RF Carrier

Transmitter RF Carrier parameters are established by the Federal Communications Commission (FCC). The performance requirements specified in NILECJ-STD-0209.00 meet or exceed those given in the Rules and Regulations of the FCC.

Transmitter RF carrier characteristics of major concern are Carrier Output Power and Carrier Frequency Tolerance. Transmitters in 19 (73%) of the transceivers tested were not in full compliance with the requirements specified in the NILECJ standard for these two characteristics.

The Carrier Output Power of 12 (46%) of the transmitters tested was not within the tolerances allowed by the NILECJ standard. Eleven of the 12 transmitters were not in compliance under normal test conditions. Six of the 11 transmitters also were not in compliance under conditions of environmental extremes. One unit met the transmitter requirements at ambient test conditions, but not at the +60°C environmental test condition. Twenty-four (92%) of the transceivers maintained Carrier Output Power within allowed tolerance at operating voltages 10% and 20% below nominal operating voltage.

The comments with reference to Carrier Output Power measurements which follow may be of assistance to the prospective equipment purchaser in making his evaluation of the test results.

NILECJ-STD-0209.00 specifies that the measured Carrier Output Power shall be within -0.3 dB, +1 dB of the manufacturer's rated (nominal) power of the transmitter. Rules and Regulations of the FCC state that Carrier Output Power shall not exceed by 20% the manufacturer's rated power. The EIA standard RS-316-B specifies that the manufacturer's rating of Carrier Output Power shall not be higher than that measured.

Recapitulating the test results in accordance with the requirements stated above results in the following: All transmitters tested under standard test conditions were in compliance with FCC regulations except one which tested 73% above the manufacturer's Carrier Output Power rating. Fifteen of the transmitters tested under standard test conditions were not in compliance with requirements of the EIA Standard RS-316-B since the measured Carrier Output Power was less than the manufacturer's rated output power. Of these fifteen transceivers, five meet the NILECJ standard requirement since the Carrier Output Power measured did not fall below the -0.3 dB of nominal power allowed by the NILECJ standard. Note should also be made of the fact that the method of measurement of Transmitter Carrier Output power may affect the measured value. Transmitter power measurements made at the transmitter output terminals (FCC approved method) in many instances will measure higher than that measured at the antenna input terminal because of impedance losses in the antenna circuit.

The 26 transceivers tested 100% in compliance with Carrier Frequency Tolerance requirements under normal test conditions and at operating voltages 15% above and below the nominal operating voltage. However, 13 (50%) did not meet the requirements specified by the NILECJ standard for tests under conditions of environmental extremes.

Of particular note are the five transceivers that did not meet the frequency stability vibration requirement. The vibration test specified in the NILECJ standard is more stringent than that required, for instance, by EIA RS-316-B, in that it requires that the stability measurements be made during the vibration cycle, not after completion of the vibration cycle. Stability of the carrier frequency of five transceivers was within allowable limits after completion of the required vibration cycles but not during the vibration cycle. This would indicate that the transceiver performance would, in all probability, not be affected by carrying the transceiver on the body of a person, but that performance could be affected if the transceiver were mounted in a vehicle where it would be subjected to vehicle vibration.

Transmitter Audio Frequency Modulation

Five measurements made indicate the overall quality of the audio frequency modulation of the transceiver transmitter. They are Audio Frequency Harmonic Distortion, FM Hum and Noise, Audio Frequency Response, Frequency Deviation, and Modulation Limiting. Taken Collectively, the test results indicate that the transceiver performance was least satisfactory in this general performance area. Only one of 26 transceivers tested met all performance requirements of the five tests. One additional transceiver showed good compliance, with only one measurement failing by a small margin to meet the requirement of the standard.

Audio Frequency Harmonic Distortion is the change in the harmonic content of the input signal as the result of passing through the transmitter circuits. The distortion of nine (35%) of the transmitters tested exceeded the 5% distortion allowed by the NILECJ standard. This requirement is more stringent than that of the EIA-316-B standard which allows an audio frequency distortion of 10%.

FM Hum and Noise is a measure of the frequency modulation present on an unmodulated carrier. Sixteen (62%) of the transmitters did not exhibit an attenuation of 40 dB or more as required by the standard. Eleven (42%) of the noncompliances resulted from tests under normal test conditions and five additional from tests under conditions of environmental extremes.

Transmitter Audio Frequency Response is the degree of precision with which a transmitter responds to a designated audio frequency level. The generally accepted requirement, as specified in the NILECJ standard, the EIA-RS-316-B standard and others is that the audio frequency response shall not vary more than +1, -3 dB from a true 6 dB per octave pre-emphasis characteristic from 0.3 to 3 kHz as referred to the 1 kHz level, with the exception that a 6 dB per octave roll-off from 2.5 to 3 kHz may be present. In Section 5.5.2.3 of the FM Transceiver Test Data report, this requirement is set forth in numerical values for ease of comparing the test results to the required performance values.

Failure to comply with Audio Frequency Response requirement was the single most frequent shortcoming of all transceiver characteristics tested. Nineteen (73%) of the transceivers did not meet the requirement at the 300 Hz

test point, eighteen (69%) at the 500 Hz test point, 11 (42%) at the 2500 Hz test point, 14 (54%) at the 3000 Hz test point. The closeness with which the transmitter Audio Frequency Response follows the prescribed pre-emphasis curve bears directly on the quality of the audio signal reproduced by the radio receiver.

Two points should be taken into consideration in evaluation of the Audio Frequency Response Test Data.

As has been mentioned previously, some transceiver manufacturers have advised that the lower audio frequencies are deliberately attenuated in some items of equipment to improve the performance of CTCSS (Continuous Tone Coded Squelch System) designed to operate at the lower end of the voice frequency range. Although none of the transceivers tested was equipped with CTCSS or other private line options the transceivers are adaptable to the use of this optional equipment.

Additionally, transmitters may be engineered so that the microphone element with which the transmitter is used is depended upon to provide all or part of the audio pre-emphasis. In testing of transmitters of this design, microphone simulators as specified by the equipment manufacturer, must be used to obtain accurate Transmitter Audio Frequency Response. Tests were made without microphone simulators, in some instances where the need for simulators was not specified in equipment manuals supplied with the transceivers tested. Manufacturers' comments in this respect are included with the notes to the test data reports.

Frequency Deviation of the types of transceivers tested is limited to a maximum of 5 kHz by Rules and Regulations of the FCC. The NILECJ standard stipulates that the deviation shall be within 5% of 4.75 kHz, which means the deviation must fall within the range of 4.5125 to 4.9875 kHz. The reason for this requirement is to set a lower limit of frequency deviation, it being noted that other factors being equal the greater the modulation (without exceeding the 5 kHz maximum) the better the quality of the transmitted signal.

Eight (31%) of the transceivers did not meet the NILECJ requirement of these, the frequency deviation of six was below the specified 4.5125 kHz minimum.

Nine (35%) of the transmitters produced modulation in excess of the 5 kHz maximum allowed by the FCC.

Both Frequency Deviation and Modulation Limiting are adjustable in the transceivers, however, the transceivers were tested as received and no effort was made to determine whether or not the Frequency Deviation and Modulation Limiting could be adjusted to bring performance within requirements of the NILECJ standard, or regulations of the FCC.

Antenna

Radiation Efficiency of an antenna is the ratio of the effective radiated power of a transmitter-antenna system to the transmitter output power as measured into a 50 ohm load. The standard does not require an antenna Radiation Efficiency test for Type I transceivers. The acceptable Radiation Efficiency for Type II transceivers is 20% and for Type III 50%. Four of 15 (27%) of the

Type II transceivers did not meet this requirement and three of nine (33%) of Type III did not meet the requirement.

The antennas were 100% in compliance with the Antenna Power Test Degradation requirement.

Battery

Battery Service Life tests were conducted by operating the transceivers through the 10-10-80 duty cycle (10% receive, 10% transmit, 80% standby) with an interval timer. Since the NILECJ requirement is based on an 8-hour battery at this duty cycle only one transceiver equipped with an 8-hour battery met the requirement of the standard, and this only at ambient temperature and low test temperature. Each transceiver was equipped with the battery normally supplied with the transceiver. Higher capacity batteries are available as options for most of the transceivers tested. Additionally, the battery test data is not complete due to transceiver operational problems encountered in the testing operation. For these reasons the battery test data is considered to be of limited value in accessing the service life of Ni-Cad batteries in the transceivers tested.

A program is already underway to provide more comprehensive service life data on the variety of Ni-Cad batteries available for use in FM personal transceivers. The batteries are being tested in accordance with the procedures set forth in NILECJ-STD-0211.00, Batteries for Personal/Portable Transceivers.

MANUFACTURERS OF TRANSCEIVERS TESTED

General Electric Company
 Mobile Radio Department
 Mountain View Road
 Lynchburg, Virginia 24502

IEC Electronics Corporation
 (now)
 Harmon Electronics Division
 SAB Harmon Industries, Inc.
 Grain Valley, Missouri 64029

Motorola Inc.
 Communications Division
 1301 E. Algonquin Road
 Schaumburg, Illinois 60196

RCA
 Mobile Communications Systems
 Meadow Lands, Pennsylvania 15347

Regency Communications, Inc.
 1227 S. Patrick Drive
 Satellite Beach, Florida 32937

REPCO Incorporated
 2421 North Orange Blossom Trail
 Orlando, Florida 32804

Standard Communications Corporation
 108 Victoria Street
 P.O. Box 92151
 Los Angeles, California 90000

Wilson Electronics Corporation
 4288 S. Polaris Avenue
 P.O. Box 19000
 Las Vegas, Nevada 89119

FM TRANSCEIVER TEST DATA

MANUFACTURER: Regency Communications, Inc.
 MODEL NO.: MCPH-406
 SERIAL NO.: 01007
 TYPE: II

ITEM NO.: 2180
 RF POWER (Nominal): 4.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.24 uV	
SINAD Sensitivity Variance - Voltage +10%	B	0.7 uV or less	0.25 uV	
-20%	B	0.7 uV or less	2.83 uV	*
Temperature -30°C	U	+6 dB max. above 0.5 uV	-10.8 dB	
+60°C	U	+6 dB max. above 0.5 uV	-0.8 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	0.9 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.40 kHz	
Usable Bandwidth Variance - Temperature -30°C	V	-20% max. below 5 kHz	7.8 %	
+60°C	V	-20% max. below 5 kHz	4.7 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-3.1 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	60.0 dB	*
Adjacent Channel Selectivity Variance - Temperature -30°C	W	58 dB min.	53.0 dB	*
+60°C	W	58 dB min.	64.0 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	59.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	56.5 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	56.5 dB	*
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.32 uV	
Threshold Squelch Variance - Voltage +10%	I	0.6 uV or less	0.29 uV	
-20%	I	0.6 uV or less	0.57 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-8.0 dB	
+60°C	Y	+6 dB max. above 0.4 uV	4.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-1.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.40 uV	
Tight Squelch Variance - Temperature -30°C	X	+6 dB max. above 4.0 uV	N	*1
+60°C	X	+6 dB max. above 4.0 uV	N	*1
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	N	*1
5.4.3.2 Squelch Block	J	5 kHz min.	8.0 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	85 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	175 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2180

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1290 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	0.9 dB	
-20%	O	-3 dB max. below 500 mW	-2.1 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	0.0 dB	
+60°C	Z	-6 dB max. below 500 mW	0.3 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.6 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	21.1 %	*
Temperature -30°C	AB	18% max. at 500 mW	14.0 %	
+60°C	AB	18% max. at 500 mW	23.2 %	*
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	20.1 %	*
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	-9.2 dB	*
500 Hz		+6.0 dB (-10, +2 dB)	-3.5 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	14.1 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	22.3 dB	*
5.4.4.4 Audio Hum and Noise -				
Unsquenced	S	40 dB min. below 500 mW	56.4 dB	
Squenced	T	50 dB min. below 500 mW	106.0 dB	
Audio Hum and Noise Variance -				
Unsquenced				
Temperature -30°C	AA	30 dB min.	62.4 dB	
+60°C	AA	30 dB min.	53.5 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	56.5 dB	
Squenced				
Temperature -30°C	AA	40 dB min.	96.5 dB	
+60°C	AA	40 dB min.	0.0 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	90.4 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			4.0 W	
Measured			3.69 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.36 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.48 dB	
-10%	BB	±3 dB of nominal	-1.35 dB	
-20%	BC	-6, +3 dB of nominal	-2.47 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.09 dB	
+60°C	BN	±3 dB of nominal	-0.87 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.50 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00039 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00037 %	
-15%	BE	0.0005% of nominal	0.00042 %	
Temperature -30°C	BP	0.0005% of nominal	0.00020 %	
+60°C	BP	0.0005% of nominal	0.00199 %	*
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00028 %	
Vibration	BV	0.0005% of nominal	0.00099 %	*
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	90.9 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	8 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2180

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	3.2 %	
Temperature Stability				
-30°C	BQ	9% max.	5.9 %	
+60°C	BQ	9% max.	3.2 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	50.4 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	45.9 dB	
+60°C	BO	34 dB min. attenuation	44.2 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	51.1 dB	
Vibration	BU	25 dB min. attenuation	53.1 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-18.4 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-8.1 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	4.2 dB	*
3000 Hz		+9.5 dB (+1, -4.6 dB)	4.0 dB	*
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.60 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	2.90 kHz	
500 Hz	BJ	≤5 kHz	4.90 kHz	
1000 Hz	BJ	≤5 kHz	4.20 kHz	
2000 Hz	BJ	≤5 kHz	4.40 kHz	
2500 Hz	BJ	≤5 kHz	4.40 kHz	
3000 Hz	BJ	≤5 kHz	4.30 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	55.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	26.5 %	
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	3 hrs. 55 min.	
-30°C	DB	2 hrs.	1 hr. 5 min.	
+60°C	DC	7 hrs.	2 hrs. 50 min.	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2181

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

TEST RESULTS NOTES

5.4.4 RECEIVER AUDIO FREQUENCY

5.4.4.1	Audio Output Power (Speaker)	M	500 mW min.	1290 mW	
	Audio Output Power Variance -				
	Voltage +10%	O	-3 dB max. below 500 mW	0.9 dB	
	Voltage -20%	O	-3 dB max. below 500 mW	-2.1 dB	
	Temperature -30°C	Z	-6 dB max. below 500 mW	0.1 dB	
	Temperature +60°C	Z	-6 dB max. below 500 mW	-15.9 dB	*
	Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	-14.3 dB	*
5.4.4.2	Audio Distortion (Speaker)	P	10% max. at 500 mW	17.1 %	*
	Temperature -30°C	AB	18% max. at 500 mW	12.4 %	
	Temperature +60°C	AB	18% max. at 500 mW	11.3 %	
	Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	12.6 %	
5.4.4.3	Audio Frequency Response (Speaker)	Q			
	300 Hz		+10.5 dB (-10, +2 dB)	-8.1 dB	*
	500 Hz		+6.0 dB (-10, +2 dB)	-2.3 dB	
	1000 Hz		0 dB 0 dB	0.0 dB	
	2000 Hz		-6.0 dB (-10, +2 dB)	-15.3 dB	*
	3000 Hz		-9.5 dB (-10, +2 dB)	-23.9 dB	*
5.4.4.4	Audio Hum and Noise -				
	Unsquenced	S	40 dB min. below 500 mW	57.2 dB	
	Squelched	T	50 dB min. below 500 mW	71.8 dB	
	Audio Hum and Noise Variance -				
	Unsquenced				
	Temperature -30°C	AA	30 dB min.	60.1 dB	
	Temperature +60°C	AA	30 dB min.	60.1 dB	
	Humidity 50°C, 90% RH	AI	30 dB min.	58.0 dB	
	Squelched				
	Temperature -30°C	AA	40 dB min.	85.2 dB	
	Temperature +60°C	AA	40 dB min.	56.7 dB	
	Humidity 50°C, 90% RH	AI	40 dB min.	1.8 dB	*

5.5.1 TRANSMITTER RF CARRIER

5.5.1.1	Carrier Output Power				
	Rated (nominal)			2.5 W	
	Measured			1.42 W	
	Relation to Rated Output	BA	-0.3, +1 dB of nominal	-2.46 dB	*
	Carrier Output Power Variance -				
	Voltage +10%	BB	±3 dB of nominal	1.11 dB	
	Voltage -10%	BB	±3 dB of nominal	-38.95 dB	*
	Temperature -20°C	BC	-6, +3 dB of nominal	N	*3
	Temperature -30°C	BN	±3 dB of nominal	N	*1
	Temperature +60°C	BN	±3 dB of nominal	-7.03 dB	*
	Humidity 50°C, 90% RH	BR	±3 dB of nominal	-6.71 dB	*
5.5.1.2	Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00005 %	
5.5.1.2	Carrier Frequency Stability -				
	Voltage +15%	BE	0.0005% of nominal	0.00005 %	
	Voltage -15%	BE	0.0005% of nominal	N	*3
	Temperature -30°C	BP	0.0005% of nominal	N	*1
	Temperature +60°C	BP	0.0005% of nominal	0.00035 %	
	Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00007 %	
	Vibration	BV	0.0005% of nominal	0.00033 %	
5.5.1.3	AM Hum and Noise Level	BF	34 dB min. attenuation	84.3 dB	
5.5.1.4	Carrier Attack Time	BG	100 ms max.	8 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2181

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION

5.5.2.1	Audio Frequency Harmonic Distortion				
	Temperature Stability	BH	5% max.	3.7 %	
	-30°C	BQ	9% max.	N	*1
	+60°C	BQ	9% max.	4.3 %	
5.5.2.2	FM Hum and Noise Level	BI	40 dB min. attenuation	46.8 dB	
	FM Hum and Noise Stability				
	Temperature -30°C	BO	34 dB min. attenuation	N	*1
	Temperature +60°C	BO	34 dB min. attenuation	39.2 dB	
	Humidity 50°C, 90% RH	BS	34 dB min. attenuation	48.3 dB	
	Vibration	BU	25 dB min. attenuation	52.9 dB	
5.5.2.3	Audio Frequency Response				
	300 Hz		-10.5 dB (+1, -3 dB)	-19.0 dB	*
	500 Hz		-6.0 dB (+1, -3 dB)	-8.6 dB	
	1000 Hz		0 dB 0 dB	0.0 dB	
	2500 Hz		+8.0 dB (+1, -3 dB)	4.3 dB	*
	3000 Hz		+9.5 dB (+1, -4.6 dB)	4.0 dB	*
5.5.2.4	Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.60 kHz	
5.5.2.5	Modulation Limiting				
	300 Hz	BJ	≤5 kHz	2.90 kHz	
	500 Hz	BJ	≤5 kHz	4.90 kHz	
	1000 Hz	BJ	≤5 kHz	4.40 kHz	
	2000 Hz	BJ	≤5 kHz	4.30 kHz	
	2500 Hz	BJ	≤5 kHz	4.30 kHz	
	3000 Hz	BJ	≤5 kHz	4.20 kHz	

5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY

5.5.3.1	Radiated Spurious Emissions	BK	43 dB min. attenuation	55.0 dB	
5.5.3.2	Sideband Spectrum -				
	±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
	±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	

5.6 ANTENNA

5.6.1	Radiation Efficiency	CA	20% min.	7.3 %	*
	Power Test Degradation	CB	1 dB max.	0.0 dB	

5.7 BATTERY (NI-CAD)

	Service Life: 20 to 30°C	DA	8 hrs.	1 hr.	8 min.	
	-30°C	DB	2 hrs.	n	n	4
	+60°C	DC	7 hrs.	n	n	4

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2181

1. All test data was not obtained. The transceiver failed operation at -30°C, but recovered operation at ambient temperature.
2. All test data was not obtained. The transceiver audio output was too low to make measurements at +60°C temperature and at 50°C, 90% relative humidity.
3. Output was too low for measurement.
4. The transmitter failed operation during the battery test after one hour and eight minutes operation. At this point, the battery measured 11.5 volts.

Manufacturer's Comments:

- A. The manufacturer has advised that this unit was not put into production.

FM TRANSCEIVER TEST DATA

MANUFACTURER: Standard Communications Corporation
 MODEL NO.: C831L06A
 SERIAL NO.: 89U010134
 TYPE: II

ITEM NO.: 2182
 RF POWER (Nominal): 3.0 Watts
 TEST FREQUENCIES: T- 155.010 MHz
 R- 155.010 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.22 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.22 uV	
-20%	B	0.7 uV or less	0.22 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-3.4 dB	
+60°C	U	+6 dB max. above 0.5 uV	0.0 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-2.9 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.1 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	-12 %	
+60°C	V	-20% max. below 5 kHz	-16 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-12 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	74.0 dB	
Adjacent Channel Selectivity				
Variance -				
Temperature -30°C	W	58 dB min.	58.1 dB	
+60°C	W	58 dB min.	80.5 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	74.5 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	44.6 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	64.9 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.07 uV	
Threshold Squelch Variance-				
Voltage +10%	I	0.6 uV or less	0.06 uV	
-20%	I	0.6 uV or less	0.10 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-4.4 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-4.8 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-13.8 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.63 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-4.1 dB	
+60°C	X	+6 dB max. above 4.0 uV	-2.2 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-9.8 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	5.7 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	9 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	350 ms	*

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2182

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1102 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	4.0 dB	
Voltage -20%	O	-3 dB max. below 500 mW	1.6 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	3.9 dB	
Temperature +60°C	Z	-6 dB max. below 500 mW	4.2 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	4.2 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	6.6 %	
Temperature -30°C	AB	18% max. at 500 mW	7.2 %	
Temperature +60°C	AB	18% max. at 500 mW	4.8 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	7.9 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	5.6 dB	
500 Hz		+6.0 dB (-10, +2 dB)	-4.5 dB	*
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-6.6 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-12.7 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelled	S	40 dB min. below 500 mW	51.3 dB	
Squelled	T	50 dB min. below 500 mW	51.7 dB	
Audio Hum and Noise Variance -				
Unsquelled				
Temperature -30°C	AA	30 dB min.	54.2 dB	
Temperature +60°C	AA	30 dB min.	53.0 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	50.4 dB	
Squelled				
Temperature -30°C	AA	40 dB min.	54.2 dB	
Temperature +60°C	AA	40 dB min.	63.0 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	50.4 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			3.0 W	
Measured			3.05 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	0.05 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	1.5 dB	
Voltage -10%	BB	±3 dB of nominal	-0.7 dB	
Voltage -20%	BC	-6, +3 dB of nominal	-2.1 dB	
Temperature -30°C	BN	±3 dB of nominal	0.5 dB	
Temperature +60°C	BN	±3 dB of nominal	1.2 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	0.0 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00010 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00013 %	
Voltage -15%	BE	0.0005% of nominal	0.00041 %	
Temperature -30°C	BP	0.0005% of nominal	-0.00098 %	*
Temperature +60°C	BP	0.0005% of nominal	0.00607 %	*
Humidity 50°C, 90% RH	BT	0.0005% of nominal	-0.00055 %	*
Vibration	BV	0.0005% of nominal	-0.00010 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	77.2 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	11 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2182

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	7.8 %	*
Temperature Stability				
-30°C	BQ	9% max.	4.7 %	
+60°C	BQ	9% max.	3.2 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	45.0 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	37.4 dB	
Temperature +60°C	BO	34 dB min. attenuation	34.9 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	27.0 dB	*
Vibration	BU	25 dB min. attenuation	30.7 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-10.9 dB	
500 Hz		-6.0 dB (+1, -3 dB)	-6.3 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	7.3 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	6.8 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	6.1 kHz	*
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	6.0 kHz	*
500 Hz	BJ	≤5 kHz	5.5 kHz	*
1000 Hz	BJ	≤5 kHz	5.9 kHz	*
2500 Hz	BJ	≤5 kHz	5.0 kHz	
3000 Hz	BJ	≤5 kHz	4.1 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	52.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	34.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	60.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	27.8 %	
Power Test Degradation	CB	1 dB max.	0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C				
-30°C	DA	8 hrs.	2 hrs. 42 min.	
+60°C	DB	2 hrs.	N	1
	DC	7 hrs.	3 hrs. 5 min.	

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2182

- No test data was obtained. The transceiver did not produce one-half of rated output at -30°C.

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FM TRANSCEIVER TEST DATA

MANUFACTURER: Standard Communications Corp.
 MODEL NO.: C731L06AUIX1
 SERIAL NO.: 91U010243
 TYPE: III

ITEM NO.: 2183
 RF POWER (Nominal): 6.0 Watts
 TEST FREQUENCIES: T- 460.025 MHz
 R- 460.025 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.30 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.31 uV	
-20%	B	0.7 uV or less	0.32 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	3.9 dB	
+60°C	U	+6 dB max. above 0.5 uV	2.9 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	4.0 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	5.5 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	N	*1
+60°C	V	-20% max. below 5 kHz	0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	4.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	77.0 dB	
Adjacent Channel Selectivity				
Variance -				
Temperature -30°C	W	48 dB min.	N	*1
+60°C	W	48 dB min.	74.7 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	75.1 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	48.0 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	61.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.07 uV	
Threshold Squelch Variance-				
Voltage +10%	I	0.6 uV or less	0.09 uV	
-20%	I	0.6 uV or less	0.19 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	N	*1
+60°C	Y	+6 dB max. above 0.4 uV	-6.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-2.5 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	2.0 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	N	*1
+60°C	X	+6 dB max. above 4.0 uV	4.9 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	3.8 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	7.7 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	89 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	320 ms	*

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2183

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

5.4.4 RECEIVER AUDIO FREQUENCY

REF.	TEST RESULTS	NOTES
5.4.4.1	Audio Output Power (Speaker) M 500 mW min. 1102 mW	
	Audio Output Power Variance -	
	Voltage +10% O -3 dB max. below 500 mW 4.2 dB	
	-20% O -3 dB max. below 500 mW 0.9 dB	
	Temperature -30°C Z -6 dB max. below 500 mW N *1	
	+60°C Z -6 dB max. below 500 mW 4.1 dB	
	Humidity 50°C, 90% RH AH -3 dB max. below 500 mW 3.5 dB	
5.4.4.2	Audio Distortion (Speaker) P 10% max. at 500 mW 2.8 %	
	Temperature -30°C AB 18% max. at 500 mW N *1	
	+60°C AB 18% max. at 500 mW 4.8 %	
	Humidity 50°C, 90% RH AJ 18% max. at 500 mW 4.8 %	
5.4.4.3	Audio Frequency Response (Speaker) Q	
	300 Hz +10.5 dB (-10, +2 dB) 5.2 dB	
	500 Hz +6.0 dB (-10, +2 dB) 4.0 dB	
	1000 Hz 0 dB 0 dB 0.0 dB	
	2000 Hz -6.0 dB (-10, +2 dB) -6.0 dB	
	3000 Hz -9.5 dB (-10, +2 dB) -9.5 dB	
5.4.4.4	Audio Hum and Noise -	
	Unsquelled S 40 dB min. below 500 mW 45.5 dB	
	Squelled T 50 dB min. below 500 mW 45.5 dB *	
	Audio Hum and Noise Variance -	
	Unsquelled	
	Temperature -30°C AA 30 dB min. N *1	
	+60°C AA 30 dB min. 46.1 dB	
	Humidity 50°C, 90% RH AI 30 dB min. 45.5 dB	
	Squelled	
	Temperature -30°C AA 40 dB min. N *1	
	+60°C AA 40 dB min. 46.8 dB	
	Humidity 50°C, 90% RH AI 40 dB min. 45.5 dB	
5.5.1	TRANSMITTER RF CARRIER	
5.5.1.1	Carrier Output Power	
	Rated (nominal) 2.0 W	
	Measured 1.92 W	
	Relation to Rated Output BA -0.3, +1 dB of nominal -0.18 dB	
	Carrier Output Power Variance -	
	Voltage +10% BB ±3 dB of nominal -0.45 dB	
	-10% BB ±3 dB of nominal -1.11 dB	
	-20% BC -6, +3 dB of nominal -2.29 dB	
	Temperature -30°C BN ±3 dB of nominal 0.79 dB	
	+60°C BN ±3 dB of nominal -0.18 dB	
	Humidity 50°C, 90% RH BR ±3 dB of nominal -2.73 dB	
5.5.1.2	Carrier Frequency Tolerance BD 0.0005% of nominal 0.00018 %	
5.5.1.2	Carrier Frequency Stability -	
	Voltage +15% BE 0.0005% of nominal 0.00027 %	
	-15% BE 0.0005% of nominal 0.00033 %	
	Temperature -30°C BP 0.0005% of nominal 0.0390 % *	
	+60°C BP 0.0005% of nominal 0.0063 % *	
	Humidity 50°C, 90% RH BT 0.0005% of nominal 0.00051 % *	
	Vibration BV 0.0005% of nominal 0.00027 % *	
5.5.1.3	AM Hum and Noise Level BF 34 dB min. attenuation 75.6 dB	
5.5.1.4	Carrier Attack Time BG 100 ms max. 7 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2183

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

5.5.2 TRANSMITTER AUDIO FREQUENCY
MODULATION

REF.	TEST RESULTS	NOTES
5.5.2.1	Audio Frequency Harmonic Distortion	
	Temperature Stability	
	-30°C BH 5% max. 3.6 %	
	+60°C BQ 9% max. 4.4 %	
	BQ 9% max. 3.6 %	
5.5.2.2	FM Hum and Noise Level BI 40 dB min. attenuation 30.2 dB *	
	FM Hum and Noise Stability	
	Temperature -30°C BO 34 dB min. attenuation 28.5 dB *	
	+60°C BO 34 dB min. attenuation 30.1 dB *	
	Humidity 50°C, 90% RH BS 34 dB min. attenuation 30.1 dB *	
	Vibration BU 25 dB min. attenuation 27.3 dB	
5.5.2.3	Audio Frequency Response	
	300 Hz -10.5 dB (+1, -3 dB) -10.6 dB	
	500 Hz -6.0 dB (+1, -3 dB) -5.8 dB	
	1000 Hz 0 dB 0 dB 0.0 dB	
	2500 Hz +8.0 dB (+1, -3 dB) +7.3 dB	
	3000 Hz +9.5 dB (+1, -4.6 dB) +6.6 dB	
5.5.2.4	Frequency Deviation BJ Limits: 4.5125 - 4.9875 kHz 4.75 kHz	
5.5.2.5	Modulation Limiting	
	300 Hz BJ ≤5 kHz 6.3 kHz	
	500 Hz BJ ≤5 kHz 5.5 kHz	
	1000 Hz BJ ≤5 kHz 4.4 kHz	
	2500 Hz BJ ≤5 kHz 5.3 kHz	
	3000 Hz BJ ≤5 kHz 4.6 kHz	

5.5.3 TRANSMITTER ELECTROMAGNETIC
COMPATIBILITY

5.5.3.1	Radiated Spurious Emissions BK 43 dB min. attenuation 48.0 dB	
5.5.3.2	Sideband Spectrum -	
	±10 kHz Freq. Separation BL 30 dB min. attenuation 26.0 dB *	
	±20 kHz Freq. Separation BM 60 dB min. attenuation 60.0 dB	

5.6 ANTENNA

5.6.1	Radiation Efficiency CA 50% min. 21.7 % *	
	Power Test Degradation CB 1 dB max. 0.0 dB	

5.7 BATTERY (NI-CAD)

	Service Life: 20 to 30°C	
	-30°C DA 8 hrs. 3 hrs. 10 min.	
	+60°C DB 2 hrs. N 2	
	DC 7 hrs. 2 hrs. 55 min.	

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2183

1. No test data was obtained. The transceiver produced no audio output power at a temperature of -30°C.
2. No test data was obtained. The battery did not produce one-half of rated audio output power of the transceiver at a temperature of -30°C.

2183-4

FM TRANSCEIVER TEST DATA

MANUFACTURER: IEC Electronics Corp.
 MODEL NO.: LE-100
 SERIAL NO.: 9791
 TYPE: II

ITEM NO.: 2186
 RF POWER (Nominal): 6.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.22 uV	
SINAD Sensitivity Variance - Voltage +10%	B	0.7 uV or less	0.22 uV	
-20%	B	0.7 uV or less	0.23 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	1.0 dB	
+60°C	U	+6 dB max. above 0.5 uV	-3.4 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-12.9 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.6 kHz	
Usable Bandwidth Variance - Temperature -30°C	V	-20% max. below 5 kHz	-16.7 %	
+60°C	V	-20% max. below 5 kHz	-24.2 %	*
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-48.5 %	*
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	84.0 dB	
Adjacent Channel Selectivity Variance - Temperature -30°C	W	58 dB min.	82.0 dB	
+60°C	W	58 dB min.	87.0 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	86.5 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	78.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	67.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.06 uV	
Threshold Squelch Variance- Voltage +10%	I	0.6 uV or less	0.09 uV	
-20%	I	0.6 uV or less	0.13 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	+18.0 dB	*
+60°C	Y	+6 dB max. above 0.4 uV	-5.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-14.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.45 uV	
Tight Squelch Variance - Temperature -30°C	X	+6 dB max. above 4.0 uV	0.0 dB	
+60°C	X	+6 dB max. above 4.0 uV	-4.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-11.0 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	8.5 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	54 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	20 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

2186-1

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2186

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1410 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	0.9 dB	
-20%	O	-3 dB max. below 500 mW	-2.2 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	-0.2 dB	
+60°C	Z	-6 dB max. below 500 mW	-0.1 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.5 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	3.9 %	
Temperature -30°C	AB	18% max. at 500 mW	2.8 %	
+60°C	AB	18% max. at 500 mW	5.6 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	14.6 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	2.3 dB	
500 Hz		+6.0 dB (-10, +2 dB)	2.9 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-5.7 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-10.9 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquenced	S	40 dB min. below 500 mW	60.0 dB	
Squelched	T	50 dB min. below 500 mW	100.0 dB	
Audio Hum and Noise Variance -				
Unsquenced				
Temperature -30°C	AA	30 dB min.	55.1 dB	
+60°C	AA	30 dB min.	60.0 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	59.3 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	90.5 dB	
+60°C	AA	40 dB min.	100.0 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	88.0 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			6.0 W	
Measured			5.9 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.07 dB	
Carrier Output Power Variance				
Voltage +10%	BB	±3 dB of nominal	0.8 dB	
-10%	BB	±3 dB of nominal	-1.0 dB	
-20%	BC	-6, +3 dB of nominal	-0.1 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.2 dB	
+60°C	BN	±3 dB of nominal	-0.7 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.5 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00001 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00001 %	
-15%	BE	0.0005% of nominal	0.00006 %	
Temperature -30°C	BP	0.0005% of nominal	0.00005 %	
+60°C	BP	0.0005% of nominal	0.00013 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00045 %	
Vibration	BV	0.0005% of nominal	0.00033 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	95.2 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	8 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2186

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	2.0 %	
Temperature Stability				
-30°C	BQ	9% max.	4.2 %	
+60°C	BQ	9% max.	2.2 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	46.2 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	37.3 dB	
+60°C	BO	34 dB min. attenuation	45.2 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	45.1 dB	
Vibration	BU	25 dB min. attenuation	44.8 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-15.3 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-7.2 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	6.4 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	3.6 dB	*
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.60 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	4.35 kHz	
500 Hz	BJ	≤5 kHz	4.80 kHz	
1000 Hz	BJ	≤5 kHz	4.70 kHz	
2000 Hz	BJ	≤5 kHz	4.85 kHz	
2500 Hz	BJ	≤5 kHz	4.30 kHz	
3000 Hz	BJ	≤5 kHz	3.15 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	50.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	33.0 %	
Power Test Degradation	CB	1 dB max.	1 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	2 hrs. 10 min.	
-30°C	DB	2 hrs.	0 hrs. 40 min.	
+60°C	DC	7 hrs.	2 hrs. 26 min.	

2186-3

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2186

2186-4

FM TRANSCEIVER TEST DATA

MANUFACTURER: IEC Electronics Corp.
 MODEL NO.: LE-100
 SERIAL NO.: 9792
 TYPE: II

ITEM NO.: 2187
 POWER (Nominal): 2.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.27 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.26 uV	
-20%	B	0.7 uV or less	0.32 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-1.5 dB	
+60°C	U	+6 dB max. above 0.5 uV	-2.5 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	N	*1
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.6 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	-9.1 %	
+60°C	V	-20% max. below 5 kHz	-21.2 %	*
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	N	*1
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	78.0 dB	
Adjacent Channel Selectivity				
Variance -				
Temperature -30°C	W	58 dB min.	82.0 dB	
+60°C	W	58 dB min.	92.0 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	N	*1
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	87.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	60.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.29 uV	
Threshold Squelch Variance -				
Voltage +10%	I	0.6 uV or less	0.29 uV	
-20%	I	0.6 uV or less	0.32 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	2.0 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-3.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	N	*1
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.45 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	1.0 dB	
+60°C	X	+6 dB max. above 4.0 uV	-4.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	N	*1
5.4.3.2 Squelch Block	J	5 kHz min.	8.5 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	68 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	15 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

2187-1

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2187

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1240 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	0.9 dB	
-20%	O	-3 dB max. below 500 mW	-2.2 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	0.0 dB	
+60°C	Z	-6 dB max. below 500 mW	0.2 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	N	*1
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	2.9 %	
Temperature -30°C	AB	18% max. at 500 mW	4.8 %	
+60°C	AB	18% max. at 500 mW	6.6 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	N %	*1
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	1.1 dB	
500 Hz		+6.0 dB (-10, +2 dB)	2.1 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-5.3 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-10.0 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquenced	S	40 dB min. below 500 mW	60.5 dB	
Squenced	T	50 dB min. below 500 mW	106.0 dB	
Audio Hum and Noise Variance -				
Unsquenced				
Temperature -30°C	AA	30 dB min.	60.9 dB	
+60°C	AA	30 dB min.	60.1 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	N	*1
Squenced				
Temperature -30°C	AA	40 dB min.	96.5 dB	
+60°C	AA	40 dB min.	100.0 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	N	*1
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			2.0 W	
Measured			1.77 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.52 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.34 dB	
-10%	BB	±3 dB of nominal	-1.49 dB	
-20%	BC	-6, +3 dB of nominal	-2.61 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.52 dB	
+60°C	BN	±3 dB of nominal	-0.85 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	N	*1
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00001 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.0 %	
-15%	BE	0.0005% of nominal	0.00004 %	
Temperature -30°C	BP	0.0005% of nominal	0.00006 %	
+60°C	BP	0.0005% of nominal	0.00013 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	N	*1
Vibration	BV	0.0005% of nominal	0.00033 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	93.1 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	8 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2187

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	3.1 %	
Temperature Stability -				
-30°C	BQ	9% max.	4.3 %	
+60°C	BQ	9% max.	3.1 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	50.2 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	41.5 dB	
+60°C	BO	34 dB min. attenuation	37.5 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	N	*1
Vibration	BU	25 dB min. attenuation	36.3 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-18.0 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-8.0 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	6.5 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	5.5 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.5000 kHz	*
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	4.90 kHz	
500 Hz	BJ	≤5 kHz	4.90 kHz	
1000 Hz	BJ	≤5 kHz	4.60 kHz	
2000 Hz	BJ	≤5 kHz	4.40 kHz	
2500 Hz	BJ	≤5 kHz	3.80 kHz	
3000 Hz	BJ	≤5 kHz	2.80 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	50.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	17.7 %	*
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	4 hrs. 56 min.	
-30°C	DB	2 hrs.	3 hrs. 28 min.	
+60°C	DC	7 hrs.	5 hrs. 10 min.	

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2187

1. Test data was not obtained. The transmitter and receiver ceased to function during the humidity test at 50°C, 90% relative humidity. The recovered operation upon drying out under ambient temperature and humidity conditions.

FM TRANSCEIVER TEST DATA

MANUFACTURER: IEC Electronics Corp.
 MODEL NO.: LE-100
 SERIAL NO.: 9793
 TYPE: III

ITEM NO.: 2188
 RF POWER (Nominal): 2.0 Watts
 TEST FREQUENCIES: T- 464.500 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)		REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY					
5.4.1	SINAD Sensitivity	A	0.5 uV or less	0.33 uV	
	SINAD Sensitivity Variance -				
	Voltage +10%	B	0.7 uV or less	0.31 uV	
	-20%	B	0.7 uV or less	0.36 uV	
	Temperature -30°C	U	+6 dB max. above 0.5 uV	-0.4 dB	
	+60°C	U	+6 dB max. above 0.5 uV	-1.8 dB	
	Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-5.5 dB	
5.4.2 RECEIVER SELECTIVITY					
5.4.2.1	Usable Bandwidth	C	5 kHz min.	5.40 kHz	
	Usable Bandwidth Variance -				
	Temperature -30°C	V	-20% max. below 5 kHz	-16.7 %	
	+60°C	V	-20% max. below 5 kHz	24.1 %	
	Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-11.1 %	
5.4.2.2	Adjacent Channel Selectivity	D	60 dB min.	74.0 dB	
	Adjacent Channel Selectivity				
	Variance -				
	Temperature -30°C	W	48 dB min.	72.0 dB	
	+60°C	W	48 dB min.	87.0 dB	
	Humidity 50°C, 90% RH	AE	48 dB min.	69.0 dB	
5.4.2.3	Spurious Response Attenuation	E	60 dB min.	44.5 dB	*
5.4.2.4	Intermodulation Attenuation	F	60 dB min.	61.0 dB	
5.4.3 RECEIVER SQUELCH					
5.4.3.1	Threshold Squelch Sensitivity	G	0.4 uV or less	0.12 uV	
	Threshold Squelch Variance -				
	Voltage +10%	I	0.6 uV or less	0.02 uV	
	-20%	I	0.6 uV or less	0.34 uV	
	Temperature -30°C	Y	+6 dB max. above 0.4 uV	-7.0 dB	
	+60°C	Y	+6 dB max. above 0.4 uV	0.0 dB	
	Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-9.0 dB	
5.4.3.1	Tight Squelch Sensitivity	H	4.0 uV or less	0.53 uV	
	Tight Squelch Variance -				
	Temperature -30°C	X	+6 dB max. above 4.0 uV	2.0 dB	
	+60°C	X	+6 dB max. above 4.0 uV	-1.0 dB	
	Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-4.0 dB	
5.4.3.2	Squelch Block	J	5 kHz min.	7.1 kHz	
5.4.3.3	Squelch Attack Time	K	150 ms max.	45 ms	
5.4.3.4	Squelch Release Time	L	250 ms max.	65 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2188

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.4.4 RECEIVER AUDIO FREQUENCY

5.4.4.1	Audio Output Power (Speaker)	M	500 mW min.	1300 mW	
	Audio Output Power Variance -				
	Voltage +10%	O	-3 dB max. below 500 mW	1.0 dB	
	Voltage -20%	O	-3 dB max. below 500 mW	-2.1 dB	
	Temperature -30°C	Z	-6 dB max. below 500 mW	-0.4 dB	
	Temperature +60°C	Z	-6 dB max. below 500 mW	-0.7 dB	
	Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.0 dB	
5.4.4.2	Audio Distortion (Speaker)	P	10% max. at 500 mW	3.5 %	
	Temperature -30°C	AB	18% max. at 500 mW	3.7 %	
	Temperature +60°C	AB	18% max. at 500 mW	2.1 %	
	Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	9.0 %	
5.4.4.3	Audio Frequency Response (Speaker)	Q			
	300 Hz		+10.5 dB (-10, +2 dB)	3.0 dB	
	500 Hz		+6.0 dB (-10, +2 dB)	3.4 dB	
	1000 Hz		0 dB 0 dB	0.0 dB	
	2000 Hz		-6.0 dB (-10, +2 dB)	-6.7 dB	
	3000 Hz		-9.5 dB (-10, +2 dB)	-11.8 dB	
5.4.4.4	Audio Hum and Noise -				
	Unsquelled	S	40 dB min. below 500 mW	61.1 dB	
	Squelched	T	50 dB min. below 500 mW	100.0 dB	
	Audio Hum and Noise Variance -				
	Unsquelled				
	Temperature -30°C	AA	30 dB min.	60.1 dB	
	Temperature +60°C	AA	30 dB min.	59.6 dB	
	Humidity 50°C, 90% RH	AI	30 dB min.	57.8 dB	
	Squelched				
	Temperature -30°C	AA	40 dB min.	94.0 dB	
	Temperature +60°C	AA	40 dB min.	100.0 dB	
	Humidity 50°C, 90% RH	AI	40 dB min.	89.1 dB	

5.5.1 TRANSMITTER RF CARRIER

5.5.1.1	Carrier Output Power				
	Rated (nominal)			2.0 W	
	Measured			1.98 W	
	Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.04 dB	
	Carrier Output Power Variance -				
	Voltage +10%	BB	±3 dB of nominal	1.10 dB	
	Voltage -10%	BB	±3 dB of nominal	-1.21 dB	
	Voltage -20%	BC	-6, +3 dB of nominal	-2.80 dB	
	Temperature -30°C	BN	±3 dB of nominal	-0.37 dB	
	Temperature +60°C	BN	±3 dB of nominal	-0.92 dB	
	Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.65 dB	
5.5.1.2	Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00007 %	
5.5.1.2	Carrier Frequency Stability -				
	Voltage +15%	BE	0.0005% of nominal	0.00007 %	
	Voltage -15%	BE	0.0005% of nominal	0.00005 %	
	Temperature -30°C	BP	0.0005% of nominal	0.00028 %	
	Temperature +60°C	BP	0.0005% of nominal	0.00015 %	
	Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00028 %	
	Vibration	BV	0.0005% of nominal	0.00011 %	
5.5.1.3	AM Hum and Noise Level	BF	34 dB min. attenuation	77.5 dB	
5.5.1.4	Carrier Attack Time	BG	100 ms max.	8 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2188

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION

5.5.2.1	Audio Frequency Harmonic Distortion	BH	5% max.	2.9 %	
	Temperature Stability				
	-30°C	BQ	9% max.	3.6 %	
	+60°C	BQ	9% max.	3.6 %	
5.5.2.2	FM Hum and Noise Level	BI	40 dB min. attenuation	48.4 dB	
	FM Hum and Noise Stability				
	Temperature -30°C	BO	34 dB min. attenuation	36.0 dB	
	Temperature +60°C	BO	34 dB min. attenuation	35.2 dB	
	Humidity 50°C, 90% RH	BS	34 dB min. attenuation	37.0 dB	
	Vibration	BU	25 dB min. attenuation	35.4 dB	
5.5.2.3	Audio Frequency Response				
	300 Hz		-10.5 dB (+1, -3 dB)	-18.8 dB	*
	500 Hz		-6.0 dB (+1, -3 dB)	-8.2 dB	
	1000 Hz		0 dB 0 dB	0.0 dB	
	2500 Hz		+8.0 dB (+1, -3 dB)	6.8 dB	
	3000 Hz		+9.5 dB (+1, -4.6 dB)	6.4 dB	
5.5.2.4	Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.70 kHz	
5.5.2.5	Modulation Limiting				
	300 Hz	BJ	≤5 kHz	3.60 kHz	
	500 Hz	BJ	≤5 kHz	4.35 kHz	
	1000 Hz	BJ	≤5 kHz	4.70 kHz	
	2000 Hz	BJ	≤5 kHz	3.75 kHz	
	2500 Hz	BJ	≤5 kHz	3.20 kHz	
	3000 Hz	BJ	≤5 kHz	2.70 kHz	

5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY

5.5.3.1	Radiated Spurious Emissions	BK	43 dB min. attenuation	50.0 dB	
5.5.3.2	Sideband Spectrum -				
	±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
	±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	

5.6 ANTENNA

5.6.1	Radiation Efficiency	CA	50% min.	69.9 %	
	Power Test Degradation	CB	1 dB max.	0.0 dB	

5.7 BATTERY (NI-CAD)

	Service Life: 20 to 30°C	DA	8 hrs.	3 hrs. 35 min.	
	-30°C	DB	2 hrs.	1 hr. 20 min.	
	+60°C	DC	7 hrs.	3 hrs. 33 min.	

2188-3

FM TRANSCEIVER TEST DATA

MANUFACTURER: REPCO, Inc.
 MODEL NO.: RPX 50
 SERIAL NO.: HGC 79680
 TYPE: I

ITEM NO.: 2192
 RF POWER (Nominal): 3.0 Watts
 TEST FREQUENCIES: T- 34.000 MHz
 R- 34.525 MHz

TRANSCEIVER CHARACTERISTIC (25-50 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.18 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.19 uV	
-20%	B	0.7 uV or less	0.19 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-9.9 dB	
+60°C	U	+6 dB max. above 0.5 uV	-6.7 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-7.5 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	7.3 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	54.0 %	
+60°C	V	-20% max. below 5 kHz	62.0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	42.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	83.2 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	48 dB min.	73.0 dB	
+60°C	W	48 dB min.	75.1 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	75.1 dB	
5.4.2.3 Spurious Response Attenuation	E	70 dB min.	>70.0 dB	
5.4.2.4 Intermodulation Attenuation	F	70 dB min.	73.4 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.3 uV or less	0.05 uV	
Threshold Squelch Variance -				
Voltage +10%	I	0.45 uV or less	0.05 uV	
-20%	I	0.45 uV or less	0.05 uV	
Temperature -30°C	Y	+6 dB max. above 0.30 uV	-13.2 dB	
+60°C	Y	+6 dB max. above 0.30 uV	-10.1 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.30 uV	12.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	3.0 uV or less	0.76 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 3.0 uV	-18.9 dB	
+60°C	X	+6 dB max. above 3.0 uV	-8.7 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 3.0 uV	-7.3 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	5.3 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	45 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	18 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2192

TRANSCEIVER CHARACTERISTIC (25-50 MHz)

PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

TRANSCEIVER CHARACTERISTIC (25-50 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1021 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	4.0 dB	
-20%	O	-3 dB max. below 500 mW	0.8 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	3.4 dB	
+60°C	Z	-6 dB max. below 500 mW	3.8 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	2.3 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	2.4 %	
Temperature -30°C	AB	18% max. at 500 mW	3.0 %	
+60°C	AB	18% max. at 500 mW	1.2 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	1.5 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	-2.7 dB	* A
500 Hz		+6.0 dB (-10, +2 dB)	5.3 dB	
1000 Hz		0 dB (0 dB)	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-7.0 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-25.7 dB	*
5.4.4.4 Audio Hum and Noise -				
Unsquelched	S	40 dB min. below 500 mW	90.8 dB	1
Squelched	T	50 dB min. below 500 mW	90.8 dB	
Audio Hum and Noise Variance -				
Unsquelched				
Temperature -30°C	AA	30 dB min.	90.8 dB	
+60°C	AA	30 dB min.	90.8 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	90.8 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	90.8 dB	
+60°C	AA	40 dB min.	90.8 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	90.8 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			3.0 W	
Measured			5.2 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	2.4 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	3.5 dB	*
-10%	BB	±3 dB of nominal	1.1 dB	
-20%	BC	-6, +3 dB of nominal	1.0 dB	
Temperature -30°C	BN	±3 dB of nominal	1.3 dB	
+60°C	BN	±3 dB of nominal	2.7 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	1.2 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.002% of nominal	0.00027 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.002% of nominal	0.00032 %	
-15%	BE	0.002% of nominal	0.00059 %	
Temperature -30°C	BP	0.002% of nominal	0.0014 %	
+60°C	BP	0.002% of nominal	0.00013 %	
Humidity 50°C, 90% RH	BT	0.002% of nominal	0.00014 %	
Vibration	BV	0.002% of nominal	0.00009 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	56.5 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	15 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2192

TRANSCEIVER CHARACTERISTIC
(25-50 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

REF.	TEST RESULTS	NOTES
5.5.2	<u>TRANSMITTER AUDIO FREQUENCY MODULATION</u>	
5.5.2.1	Audio Frequency Harmonic Distortion	BH 5% max. 2.5 %
	Temperature Stability	BQ 9% max. 2.0 %
	-30°C	BQ 9% max. 2.0 %
	+60°C	BI 40 dB min. attenuation 32.3 dB *
5.5.2.2	FM Hum and Noise Level	BO 34 dB min. attenuation 33.6 dB *
	FM Hum and Noise Stability	BO 34 dB min. attenuation 33.5 dB *
	Temperature -30°C	BO 34 dB min. attenuation 36.6 dB
	+60°C	BS 34 dB min. attenuation 30.9 dB
	Humidity 50°C, 90% RH	BU 25 dB min. attenuation
	Vibration	
5.5.2.3	Audio Frequency Response	
	300 Hz	-10.5 dB (+1, -3 dB) 0.3 dB * B
	500 Hz	-6.0 dB (+1, -3 dB) 0.4 dB *
	1000 Hz	0 dB 0 dB 0.0 dB
	2500 Hz	+8.0 dB (+1, -3 dB) 0.0 dB *
	3000 Hz	+9.5 dB (+1, -4.6 dB) -0.4 dB *
5.5.2.4	Frequency Deviation	BJ Limits: 4.5125 - 4.9875 kHz 4.80 kHz
5.5.2.5	Modulation Limiting	
	300 Hz	BJ 5 kHz 4.52 kHz
	500 Hz	BJ 5 kHz 4.65 kHz
	1000 Hz	BJ 5 kHz 4.72 kHz
	2500 Hz	BJ 5 kHz 4.90 kHz
	3000 Hz	BJ 5 kHz 4.20 kHz
5.5.3	<u>TRANSMITTER ELECTROMAGNETIC COMPATIBILITY</u>	
5.5.3.1	Radiated Spurious Emissions	BK 43 dB min. attenuation 53.0 dB
5.5.3.2	Sideband Spectrum -	
	±10 kHz Freq. Separation	BL 25 dB min. attenuation 27.0 dB
	±20 kHz Freq. Separation	BM 50 dB min. attenuation 60.0 dB
5.6	<u>ANTENNA</u>	
5.6.1	Radiation Efficiency	CA N/A N/A
	Power Test Degradation	CB 2 dB max. 0.0 dB
5.7	<u>BATTERY (NI-CAD)</u>	
	Service Life: 20 to 30°C	DA 8 hrs. 2 hrs. 25 min.
	-30°C	DB 2 hrs. 0 hrs. 55 min.
	+60°C	DC 7 hrs. 3 hrs. 15 min.

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2192

1. Audio hum and noise measurement of -90.8 dB represent the measuring limit of the test instrumentation. The audio hum and noise was less than the measuring capability of the test instrumentation.

Comments of manufacturer:

A. Low Frequencies are deliberately attenuated to improve rejection of CTCSS tone.

B. The microphone element provides the pre-emphasis in our audio circuit. A microphone simulator is required for audio response measurements. All unit data indicates that the unit will pass when measured with the simulator circuit.

FM TRANSCEIVER TEST DATA

MANUFACTURER: REPCO, Inc.
 MODEL NO.: TEK 10-8
 SERIAL NO.: 118287
 TYPE: II

ITEM NO.: 2195
 RF POWER (Nominal): 2.2 Watts
 TEST FREQUENCIES: T- 155.145 MHz
 R- 155.145 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.20 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.20 uV	
-20%	B	0.7 uV or less	0.22 uV	*1
Temperature -30°C	U	+6 dB max. above 0.5 uV	-8.9 dB	
+60°C	U	+6 dB max. above 0.5 uV	-6.4 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-6.4 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.8 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	38 %	
+60°C	V	-20% max. below 5 kHz	22 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	36 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	74.4 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	58 dB min.	73.1 dB	
+60°C	W	58 dB min.	67.4 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	72.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	>60.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	55.5 dB	*
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.08 uV	
Threshold Squelch Variance -				
Voltage +10%	I	0.6 uV or less	0.08 uV	
-20%	I	0.6 uV or less	0.10 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-14.2 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-12.2 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-11.6 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.26 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-21.4 dB	
+60°C	X	+6 dB max. above 4.0 uV	-22.8 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-20.9 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	5.0 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	60 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	300 ms	*

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2195

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	753 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	3.5 dB	
-20%	O	-3 dB max. below 500 mW	-2.0 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	2.7 dB	
+60°C	Z	-6 dB max. below 500 mW	2.9 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	3.0 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	1.8 %	
Temperature -30°C	AB	18% max. at 500 mW	3.7 %	
+60°C	AB	18% max. at 500 mW	4.1 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	2.4 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	8.1 dB	
500 Hz		+6.0 dB (-10, +2 dB)	5.5 dB	
1000 Hz		0 dB (0, 0 dB)	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.2 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-16.0 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquenced	S	40 dB min. below 500 mW	51.2 dB	
Squenced	T	50 dB min. below 500 mW	82.8 dB	
Audio Hum and Noise Variance -				
Unsquenced				
Temperature -30°C	AA	30 dB min.	51.7 dB	
+60°C	AA	30 dB min.	50.8 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	52.2 dB	
Squenced				
Temperature -30°C	AA	40 dB min.	77.7 dB	
+60°C	AA	40 dB min.	66.2 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	72.7 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			2.2 W	
Measured			2.4 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	0.38 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.9 dB	
-10%	BB	±3 dB of nominal	-0.6 dB	
-20%	BC	-6, +3 dB of nominal	-1.7 dB	
Temperature -30°C	BN	±3 dB of nominal	0.2 dB	
+60°C	BN	±3 dB of nominal	0.0 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	0.2 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00001 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00002 %	
-15%	BE	0.0005% of nominal	0.00002 %	
Temperature -30°C	BP	0.0005% of nominal	0.00027 %	
+60°C	BP	0.0005% of nominal	0.00027 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00045 %	
Vibration	BV	0.0005% of nominal	0.00053 %	*2
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	69.4 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	12 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2195

TRANSCIEVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	6.0 %	*
Temperature Stability	BQ	9% max.	7.2 %	"
-30°C	BQ	9% max.	22.0 %	*
+60°C	BI	40 dB min. attenuation	36.4 dB	*
5.5.2.2 FM Hum and Noise Level	BO	34 dB min. attenuation	32.0 dB	*
FM Hum and Noise Stability	BO	34 dB min. attenuation	33.3 dB	*
Temperature -30°C	BS	34 dB min. attenuation	36.7 dB	"
+60°C	BU	25 dB min. attenuation	26.4 dB	"
Humidity 50°C, 90% RH				
Vibration				
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	10.1 dB	
500 Hz		-6.0 dB (+1, -3 dB)	-5.8 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	9.0 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	8.8 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	5.3 kHz	*
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	4.70 kHz	
500 Hz	BJ	≤5 kHz	4.90 kHz	
1000 Hz	BJ	≤5 kHz	4.75 kHz	
2500 Hz	BJ	≤5 kHz	5.00 kHz	
3000 Hz	BJ	≤5 kHz	4.30 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	n	3
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	31 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	60 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	n	3
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	7 hrs.	0 min.
-30°C	DB	2 hrs.		N
+60°C	DC	7 hrs.		N 4

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2195

1. The transceiver would not produce the required 500mW output at -20% of nominal voltage. Results indicated are for -10% reduction of nominal voltage.
2. The transceiver was within the compliance requirement at 10-30 Hz vibration but not during the 30-60 Hz vibration.
3. The transceiver failed to operate during the radiated spurious emissions and antenna efficiency tests.
4. The transceiver did not produce one-half of nominal power at -30°C or +60°C. No test could be conducted.

FM TRANSCEIVER TEST DATA

MANUFACTURER: REPCO
 MODEL NO.: RPX 450
 SERIAL NO.: HGC 79785
 TYPE: III

ITEM NO.: 2198
 RF POWER (Nominal): 2.0 Watts
 TEST FREQUENCIES: T- 484.00 MHz
 R- 487.00 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.18 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.18 uV	
-20%	B	0.7 uV or less	0.18 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-6.7 dB	
+60°C	U	+6 dB max. above 0.5 uV	-8.0 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-8.0 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.7 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	4.0 %	
+60°C	V	-20% max. below 5 kHz	8.0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	42.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	76.7 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	48 dB min.	62.6 dB	
+60°C	W	48 dB min.	73.8 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	74.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	>60.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	61.5 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.07 uV	
Threshold Squelch Variance-				
Voltage +10%	I	0.6 uV or less	0.10 uV	
-20%	I	0.6 uV or less	0.08 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-11.2 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-15.1 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-12.4 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.32 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-22.2 dB	
+60°C	X	+6 dB max. above 4.0 uV	-20.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-20.4 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	4.7 kHz	*
5.4.3.3 Squelch Attack Time	K	150 ms max.	55 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	68 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2198

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	960 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	3.9 dB	
-20%	O	-3 dB max. below 500 mW	0.7 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	2.8 dB	
+60°C	Z	-6 dB max. below 500 mW	3.2 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	3.6 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	0.8 %	
Temperature -30°C	AB	18% max. at 500 mW	2.8 %	
+60°C	AB	18% max. at 500 mW	1.5 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	1.4 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	0.7 dB	
500 Hz		+6.0 dB (-10, +2 dB)	6.5 dB	
1000 Hz		0 dB (0 dB)	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-9.7 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-13.3 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelled	S	40 dB min. below 500 mW	90.8 dB	
Squelched	T	50 dB min. below 500 mW	90.8 dB	
Audio Hum and Noise Variance -				
Unsquelled				
Temperature -30°C	AA	30 dB min.	84.8 dB	
+60°C	AA	30 dB min.	90.8 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	90.8 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	84.8 dB	
+60°C	AA	40 dB min.	90.1 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	90.8 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			2.0 W	
Measured			2.12 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	0.25 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	1.0 dB	
-10%	BB	±3 dB of nominal	-0.8 dB	
-20%	BC	-6, +3 dB of nominal	-1.6 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.1 dB	
+60°C	BN	±3 dB of nominal	-0.1 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-1.8 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00001 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00002 %	
-15%	BE	0.0005% of nominal	-0.00002 %	
Temperature -30°C	BP	0.0005% of nominal	-0.00023 %	
+60°C	BP	0.0005% of nominal	-0.00033 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	-0.00048 %	
Vibration	BV	0.0005% of nominal	-0.00013 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	70.1 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	12 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2198

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

PERFORMANCE REQUIREMENT
DEC-78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.5.2 TRANSMITTER AUDIO FREQUENCY
MODULATION

TEST POINT	CHARACTERISTIC	REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.5.2.1	Audio Frequency Harmonic Distortion	BH	5% max.	3.8 %	
	Temperature Stability -30°C	BQ	9% max.	3.0 %	
	+60°C	BQ	9% max.	3.4 %	
5.5.2.2	FM Hum and Noise Level	BI	40 dB min. attenuation	40.0 dB	
	FM Hum and Noise Stability -30°C	BO	34 dB min. attenuation	30.4 dB	*
	+60°C	BO	34 dB min. attenuation	28.5 dB	*
	Humidity 50°C, 90% RH	BS	34 dB min. attenuation	30.1 dB	*
	Vibration	BU	25 dB min. attenuation	27.9 dB	
5.5.2.3	Audio Frequency Response				
	300 Hz		-10.5 dB (+1, -3 dB)	0.2 dB	* A
	500 Hz		-6.0 dB (+1, -3 dB)	0.3 dB	*
	1000 Hz		0 dB 0 dB	0.0 dB	
	2500 Hz		+8.0 dB (+1, -3 dB)	-1.0 dB	*
	3000 Hz		+9.5 dB (+1, -4.6 dB)	-1.6 dB	*
5.5.2.4	Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.67 kHz	
5.5.2.5	Modulation Limiting				
	300 Hz	BJ	≤5 kHz	4.59 kHz	
	500 Hz	BJ	≤5 kHz	4.62 kHz	
	1000 Hz	BJ	≤5 kHz	4.67 kHz	
	2500 Hz	BJ	≤5 kHz	4.60 kHz	
	3000 Hz	BJ	≤5 kHz	3.95 kHz	

5.5.3 TRANSMITTER ELECTROMAGNETIC
COMPATIBILITY

5.5.3.1	Radiated Spurious Emissions	BK	43 dB min. attenuation	51.0 dB	
5.5.3.2	Sideband Spectrum -				
	±10 kHz Freq. Separation	BL	30 dB min. attenuation	-24.0 dB	*
	±20 kHz Freq. Separation	BM	60 dB min. attenuation	-60.0 dB	

5.6 ANTENNA

5.6.1	Radiation Efficiency	CA	50% min.	13.8 %	*
	Power Test Degradation	CB	1 dB max.	0 dB	

5.7 BATTERY (NI-CAD)

Service Life: 20 to 30°C	DA	8 hrs.	4 hrs. 2 min.		
-30°C	DB	2 hrs.	N	1	
+60°C	DC	7 hrs.	0 hrs. 50 min.		

2198-3

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2198

- No test was conducted. The battery did not produce one-half of rated audio output power of the transceiver at -30°C.

Comments of manufacturer:

- The microphone element provides the pre-emphasis in our audio circuit. A microphone simulator is required for audio response measurements. All unit data indicates that the unit will pass when measured with the simulator circuit.

2198-4

FM TRANSCEIVER TEST DATA

MANUFACTURER: REPCO, Inc.
 MODEL NO.: RPX 150
 SERIAL NO.: HGC 79679
 TYPE: II

ITEM NO.: 2201
 RF POWER (Nominal): 3.0 Watts
 TEST FREQUENCIES: T- 157.000 MHz
 R- 155.815 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.18 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.18 uV	
-20%	B	0.7 uV or less	0.18 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-8.4 dB	
+60°C	U	+6 dB max. above 0.5 uV	-7.1 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-7.5 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	7.7 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	52.0 %	
+60°C	V	-20% max. below 5 kHz	30.0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	40.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	86.8 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	58 dB min.	76.6 dB	
+60°C	W	58 dB min.	84.0 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	83.4 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	>60.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	71.1 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.09 uV	
Threshold Squelch Variance -				
Voltage +10%	I	0.6 uV or less	0.08 uV	
-20%	I	0.6 uV or less	0.16 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-13.4 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-12.2 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	N	*1
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.50 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-21.9 dB	
+60°C	X	+6 dB max. above 4.0 uV	-15.4 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	N	*1
5.4.3.2 Squelch Block	J	5 kHz min.	5.25 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	55 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	63 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2201

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1042 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	4.2 dB	
-20%	O	-3 dB max. below 500 mW	1.0 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	3.2 dB	
+60°C	Z	-6 dB max. below 500 mW	3.7 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	3.2 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	1.7 %	
Temperature -30°C	AB	18% max. at 500 mW	1.8 %	
+60°C	AB	18% max. at 500 mW	2.4 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	2.1 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	-1.8 dB	* A
500 Hz		+6.0 dB (-10, +2 dB)	5.6 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.3 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-14.8 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelched	S	40 dB min. below 500 mW	90.8 dB	
Squelched	T	50 dB min. below 500 mW	90.8 dB	
Audio Hum and Noise Variance -				
Unsquelched				
Temperature -30°C	AA	30 dB min.	73.6 dB	
+60°C	AA	30 dB min.	90.8 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	90.8 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	73.6 dB	
+60°C	AA	40 dB min.	90.8 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	1.7 dB	*
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			3.0 W	
Measured			1.27 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-3.73 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	-3.0 dB	*
-10%	BB	±3 dB of nominal	-4.8 dB	*
-20%	BC	-6, +3 dB of nominal	-5.7 dB	*
Temperature -30°C	BN	±3 dB of nominal	-3.6 dB	*
+60°C	BN	±3 dB of nominal	-3.8 dB	*
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-3.8 dB	*
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00014 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00010 %	
-15%	BE	0.0005% of nominal	0.00030 %	
Temperature -30°C	BP	0.0005% of nominal	0.00018 %	
+60°C	BP	0.0005% of nominal	0.00019 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00029 %	
Vibration	BV	0.0005% of nominal	0.00021 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	45.6 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	12 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2201

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.5.2	<u>TRANSMITTER AUDIO FREQUENCY MODULATION</u>		
5.5.2.1	Audio Frequency Harmonic Distortion	BH 5% max. 3.2 %	
	Temperature Stability	BQ 9% max. 1.5 %	
	-30°C	BQ 9% max. 1.5 %	
	+60°C	BI 40 dB min. attenuation 38.4 dB	*
5.5.2.2	FM Hum and Noise Level		
	FM Hum and Noise Stability	BO 34 dB min. attenuation 37.9 dB	
	Temperature -30°C	BO 34 dB min. attenuation 39.2 dB	
	+60°C	BS 34 dB min. attenuation 40.8 dB	
	Humidity 50°C, 90% RH	BU 25 dB min. attenuation 31.2 dB	
	Vibration		
5.5.2.3	Audio Frequency Response		
	300 Hz	-10.5 dB (+1, -3 dB) -0.1 dB	* B
	500 Hz	-6.0 dB (+1, -3 dB) 0.2 dB	*
	1000 Hz	0 dB 0 dB	
	2500 Hz	+8.0 dB (+1, -3 dB) 0.5 dB	*
	3000 Hz	+9.5 dB (+1, -4.6 dB) 0.1 dB	*
5.5.2.4	Frequency Deviation	BJ Limits: 4.5125 - 4.9875 kHz 5.4 kHz	*
5.5.2.5	Modulation Limiting		
	300 Hz	BJ ≤5 kHz 4.85 kHz	
	500 Hz	BJ ≤5 kHz 5.30 kHz	*
	1000 Hz	BJ ≤5 kHz 5.40 kHz	*
	2500 Hz	BJ ≤5 kHz 5.50 kHz	*
	3000 Hz	BJ ≤5 kHz 4.35 kHz	*
5.5.3	<u>TRANSMITTER ELECTROMAGNETIC COMPATIBILITY</u>		
5.5.3.1	Radiated Spurious Emissions	BK 43 dB min. attenuation 63.0 dB	
5.5.3.2	Sideband Spectrum -		
	±10 kHz Freq. Separation	BL 30 dB min. attenuation 24.0 dB	*
	±20 kHz Freq. Separation	BM 60 dB min. attenuation 56.0 dB	*
5.6	<u>ANTENNA</u>		
5.6.1	Radiation Efficiency	CA 20% min. 59 %	
	Power Test Degradation	CB 1 dB max. 0.0 dB	
5.7	<u>BATTERY (NI-CAD)</u>		
	Service Life: 20 to 30°C	DA 8 hrs. 8 hrs. 25 min.	
	-30°C	DB 2 hrs. 3 hrs. 0 min.	
	+60°C	DC 7 hrs. 4 hrs. 30 min.	

2201-3

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2201

- No test data was obtained. The transceiver produced no squelch under 50°C temperature and 90% relative humidity conditions.

Comments of manufacturer:

- Low frequencies are deliberately attenuated to improve rejection of CTCSS tones.
- The microphone element provides the pre-emphasis in our audio circuit. A microphone simulator is required for audio response measurements. All unit data indicates that the unit will pass when measured with the simulator circuit.

2201-4

FM TRANSCEIVER TEST DATA

MANUFACTURER: Wilson Electronics Corp.
 MODEL NO.: HH-400-C4
 SERIAL NO.: C-13880
 TYPE: II

ITEM NO.: 2205
 RF POWER (Nominal): 4.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1.1 SINAD Sensitivity	A	0.5 uV or less	0.22 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.19 uV	
-20%	B	0.7 uV or less	0.40 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-5.7 dB	
+60°C	U	+6 dB max. above 0.5 uV	-5.4 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-6.7 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.5 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	44.0 %	
+60°C	V	-20% max. below 5 kHz	10.0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	20.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	77.7 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	58 dB min.	73.3 dB	
+60°C	W	58 dB min.	75.4 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	77.8 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	44.5 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	62.6 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.08 uV	
Threshold Squelch Variance -				
Voltage +10%	I	0.6 uV or less	0.09 uV	
-20%	I	0.6 uV or less	0.26 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-2.2 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-5.2 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-10.1 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.39 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-17.6 dB	
+60°C	X	+6 dB max. above 4.0 uV	-18.4 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-19.2 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	7.2 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	52 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	400 ms	*

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2205

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY			
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	661 mW
Audio Output Power Variance -			
Voltage +10%	O	-3 dB max. below 500 mW	2.2 dB
-20%	O	-3 dB max. below 500 mW	-1.1 dB
Temperature -30°C	Z	-6 dB max. below 500 mW	1.6 dB
+60°C	Z	-6 dB max. below 500 mW	1.8 dB
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	1.8 dB
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	16.5 %
Temperature -30°C	AB	18% max. at 500 mW	9.7 %
+60°C	AB	18% max. at 500 mW	14.0 %
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	12.0 %
5.4.4.3 Audio Frequency Response (Speaker)	Q		
300 Hz		+10.5 dB (-10, +2 dB)	6.5 dB
500 Hz		+6.0 dB (-10, +2 dB)	-0.2 dB
1000 Hz		0 dB (0 dB)	0.0 dB
2000 Hz		-6.0 dB (-10, +2 dB)	15.2 dB
3000 Hz		-9.5 dB (-10, +2 dB)	25.3 dB
5.4.4.4 Audio Hum and Noise -			
Unsquenced	S	40 dB min. below 500 mW	74.0 dB
Squenced	T	50 dB min. below 500 mW	76.5 dB
Audio Hum and Noise Variance -			
Unsquenced			
Temperature -30°C	AA	30 dB min.	70.5 dB
+60°C	AA	30 dB min.	75.1 dB
Humidity 50°C, 90% RH	AI	30 dB min.	74.4 dB
Squenced			
Temperature -30°C	AA	40 dB min.	71.5 dB
+60°C	AA	40 dB min.	75.1 dB
Humidity 50°C, 90% RH	AI	40 dB min.	74.9 dB
5.5.1 TRANSMITTER RF CARRIER			
5.5.1.1 Carrier Output Power			
Rated (nominal)			4.0 W
Measured			3.06 W
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-1.16 dB
Carrier Output Power Variance -			
Voltage +10%	BB	±3 dB of nominal	-0.2 dB
-10%	BB	±3 dB of nominal	-1.6 dB
-20%	BC	-6, +3 dB of nominal	-2.4 dB
Temperature -30°C	BN	±3 dB of nominal	0.4 dB
+60°C	BN	±3 dB of nominal	-1.6 dB
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-1.4 dB
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	-0.00003 %
5.5.1.2 Carrier Frequency Stability -			
Voltage +15%	BE	0.0005% of nominal	-0.00002 %
-15%	BE	0.0005% of nominal	-0.00003 %
Temperature -30°C	BP	0.0005% of nominal	-0.00090 %
+60°C	BP	0.0005% of nominal	-0.00026 %
Humidity 50°C, 90% RH	BT	0.0005% of nominal	-0.00030 %
Vibration	BV	0.0005% of nominal	-0.00007 %
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	71.6 dB
5.5.1.4 Carrier Attack Time	BG	100 ms max.	3 ms

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2205

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.5.2 TRANSMITTER AUDIO FREQUENCY
MODULATION

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.5.2.1	Audio Frequency Harmonic Distortion	BH 5% max. 4.2 %	
	Temperature Stability		
	-30°C	BQ 9% max. 3.0 %	
	+60°C	BQ 9% max. 4.9 %	
5.5.2.2	FM Hum and Noise Level	BI 40 dB min. attenuation 39.3 dB	*
	FM Hum and Noise Stability		
	Temperature -30°C	BO 34 dB min. attenuation 37.2 dB	
	+60°C	BO 34 dB min. attenuation 39.2 dB	
	Humidity 50°C, 90% RH	BS 34 dB min. attenuation 40.2 dB	
	Vibration	BU 25 dB min. attenuation 31.3 dB	
5.5.2.3	Audio Frequency Response		
	300 Hz	-10.5 dB (+1, -3 dB) -18.4 dB	*
	500 Hz	-6.0 dB (+1, -3 dB) -8.3 dB	
	1000 Hz	0 dB 0 dB 0.0 dB	
	2500 Hz	+8.0 dB (+1, -3 dB) 0.6 dB	*
	3000 Hz	+9.5 dB (+1, -4.6 dB) 2.1 dB	*
5.5.2.4	Frequency Deviation	BJ Limits: 4.5125 - 4.9875 kHz 4.72 kHz	
5.5.2.5	Modulation Limiting		
	300 Hz	BJ ≤5 kHz 4.25 kHz	
	500 Hz	BJ ≤5 kHz 5.50 kHz	*
	1000 Hz	BJ ≤5 kHz 4.70 kHz	
	2500 Hz	BJ ≤5 kHz 3.32 kHz	
	3000 Hz	BJ ≤5 kHz 2.55 kHz	

5.5.3 TRANSMITTER ELECTROMAGNETIC
COMPATIBILITY

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.5.3.1	Radiated Spurious Emissions	BK 43 dB min. attenuation 46 dB	
5.5.3.2	Sideband Spectrum -		
	±10 kHz Freq. Separation	BL 30 dB min. attenuation 30.0 dB	
	±20 kHz Freq. Separation	BM 60 dB min. attenuation 62.0 dB	

5.6 ANTENNA

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.6.1	Radiation Efficiency	CA 20% min. 48.1 %	
	Power Test Degradation	CB 1 dB max. 0.0 dB	

5.7 BATTERY (NI-CAD)

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
	Service Life: 20 to 30°C	DA 8 hrs. 2 hrs. 34 min.	
	-30°C	DB 2 hrs. 0 hr. 40 min.	
	+60°C	DC 7 hrs. 2 hrs. 30 min.	

FM TRANSCEIVER TEST DATA

MANUFACTURER: Wilson Electronics Corp.
MODEL NO.: HH-250-C4
SERIAL NO.: C-13524
TYPE: II

ITEM NO.: 2206
RF POWER (Nominal): 2.5 Watts
TEST FREQUENCIES: T- 151.625 MHz
R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.4.1 RECEIVER SENSITIVITY

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.4.1	SINAD Sensitivity	A 0.5 uV or less 0.18 uV	
	SINAD Sensitivity Variance -		
	Voltage +10%	B 0.7 uV or less 0.17 uV	
	-20%	B 0.7 uV or less 0.21 uV	*1
	Temperature -30°C	U +6 dB max. above 0.5 uV -2.4 dB	
	+60°C	U +6 dB max. above 0.5 uV -7.1 dB	
	Humidity 50°C, 90% RH	AC +10 dB max. above 0.5 uV -7.0 dB	

5.4.2 RECEIVER SELECTIVITY

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.4.2.1	Usable Bandwidth	C 5 kHz min. 6.3 kHz	
	Usable Bandwidth Variance -		
	Temperature -30°C	V -20% max. below 5 kHz -2.0 %	
	+60°C	V -20% max. below 5 kHz 8.0 %	
	Humidity 50°C, 90% RH	AD -20% max. below 5 kHz 14.0 %	
5.4.2.2	Adjacent Channel Selectivity	D 70 dB min. 82.4 dB	
	Adjacent Channel Selectivity Variance -		
	Temperature -30°C	W 58 dB min. 71.3 dB	
	+60°C	W 58 dB min. 74.8 dB	
	Humidity 50°C, 90% RH	AE 58 dB min. 75.9 dB	
5.4.2.3	Spurious Response Attenuation	E 60 dB min. 46.0 dB	
5.4.2.4	Intermodulation Attenuation	F 60 dB min. 61.5 dB	*

5.4.3 RECEIVER SQUELCH

REF.	PERFORMANCE REQUIREMENT	TEST RESULTS	NOTES
5.4.3.1	Threshold Squelch Sensitivity	G 0.4 uV or less 0.14 uV	
	Threshold Squelch Variance -		
	Voltage +10%	I 0.6 uV or less 0.11 uV	
	-20%	I 0.6 uV or less 0.12 uV	
	Temperature -30°C	Y +6 dB max. above 0.4 uV -5.2 dB	
	+60°C	Y +6 dB max. above 0.4 uV -2.8 dB	
	Humidity 50°C, 90% RH	AG +10 dB max. above 0.4 uV -5.6 dB	
5.4.3.1	Tight Squelch Sensitivity	H 4.0 uV or less 0.39 uV	
	Tight Squelch Variance -		
	Temperature -30°C	X +6 dB max. above 4.0 uV -9.1 dB	
	+60°C	X +6 dB max. above 4.0 uV -17.4 dB	
	Humidity 50°C, 90% RH	AF +10 dB max. above 4.0 uV -18.4 dB	
5.4.3.2	Squelch Block	J 5 kHz min. 6.4 kHz	
5.4.3.3	Squelch Attack Time	K 150 ms max. 115 ms	
5.4.3.4	Squelch Release Time	L 250 ms max. 104 ms	

* Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
N No test data was obtained. Requirement was not met.
n No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2206

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

REF.	TEST RESULTS	NOTES	
5.4.4	RECEIVER AUDIO FREQUENCY		
5.4.4.1	Audio Output Power (Speaker) M Audio Output Power Variance - Voltage +10% O -20% O -30°C Z +60°C Z Temperature -30°C +60°C Humidity 50°C, 90% RH AH Audio Distortion (Speaker) P Temperature -30°C AB +60°C AB Humidity 50°C, 90% RH AJ Audio Frequency Response (Speaker) Q 300 Hz 500 Hz 1000 Hz 2000 Hz 3000 Hz 5.4.4.4 Audio Hum and Noise - Unsquelled S Squelched T Audio Hum and Noise Variance - Unsquelled Temperature -30°C AA +60°C AA Humidity 50°C, 90% RH AI Squelched Temperature -30°C AA +60°C AA Humidity 50°C, 90% RH AI	500 mW min. 793 mW -3 dB max. below 500 mW -3 dB max. below 500 mW -6 dB max. below 500 mW -6 dB max. below 500 mW -3 dB max. below 500 mW 10% max. at 500 mW 18% max. at 500 mW 18% max. at 500 mW 18% max. at 500 mW +10.5 dB (-10, +2 dB) +6.0 dB (-10, +2 dB) 0 dB 0 dB -6.0 dB (-10, +2 dB) -9.5 dB (-10, +2 dB) 40 dB min. below 500 mW 50 dB min. below 500 mW 30 dB min. 30 dB min. 30 dB min. 40 dB min. 40 dB min. 40 dB min.	 2.92 dB -0.35 dB 2.28 dB 2.67 dB 1.82 dB 20.1 % 13.0 % 19.3 % 18.0 % -7.5 dB -1.1 dB 0.0 dB -14.9 dB -25.6 dB 63.8 dB 71.1 dB 63.4 dB 70.0 dB 70.5 dB 69.4 dB 73.0 dB 73.3 dB
5.5.1	TRANSMITTER RF CARRIER		
5.5.1.1	Carrier Output Power Rated (nominal) Measured Relation to Rated Output Carrier Output Power Variance - Voltage +10% BB -10% BB -20% BC Temperature -30°C BN +60°C BN Humidity 50°C, 90% RH BR Carrier Frequency Tolerance BD Carrier Frequency Stability - Voltage +15% BE -15% BE Temperature -30°C BP +60°C BP Humidity 50°C, 90% RH BT Vibration BV 5.5.1.3 AM Hum and Noise Level BF 5.5.1.4 Carrier Attack Time BG	2.5 W 2.9 W -0.3, +1 dB of nominal ±3 dB of nominal ±3 dB of nominal -6, +3 dB of nominal ±3 dB of nominal ±3 dB of nominal ±3 dB of nominal ±3 dB of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 0.0005% of nominal 34 dB min. attenuation 100 ms max.	 2.5 W 2.9 W 0.64 dB 1.07 dB 0.23 dB 1.26 dB 0.79 dB -0.76 dB 0.0 dB -0.00021 % -0.00022 % -0.00024 % -0.00138 % 0.00113 % -0.00039 % -0.00026 % 71.4 dB 4 ms

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2206

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

REF.	TEST RESULTS	NOTES
5.5.2	TRANSMITTER AUDIO FREQUENCY MODULATION	
5.5.2.1	Audio Frequency Harmonic Distortion Temperature Stability -30°C +60°C	BH 5% max. 3.8 % BQ 9% max. 2.4 % BQ 9% max. 3.8 %
5.5.2.2	FM Hum and Noise Level FM Hum and Noise Stability Temperature -30°C +60°C Humidity 50°C, 90% RH Vibration	BI 40 dB min. attenuation 39.2 dB * BO 34 dB min. attenuation 35.5 dB BO 34 dB min. attenuation 39.6 dB BS 34 dB min. attenuation 39.6 dB BU 25 dB min. attenuation 30.1 dB
5.5.2.3	Audio Frequency Response. 300 Hz 500 Hz 1000 Hz 2500 Hz 3000 Hz	-10.5 dB (+1, -3 dB) -19.0 dB * -6.0 dB (+1, -3 dB) -8.8 dB 0 dB 0 dB 0.0 dB +8.0 dB (+1, -3 dB) 0.6 dB * +9.5 dB (+1, -4.6 dB) -2.7 dB *
5.5.2.4	Frequency Deviation	BJ Limits: 4.5125 - 4.9875 kHz 3.8 kHz *
5.5.2.5	Modulation Limiting 300 Hz 500 Hz 1000 Hz 2500 Hz 3000 Hz	BJ ≤5 kHz 3.7 kHz BJ ≤5 kHz 4.7 kHz BJ ≤5 kHz 4.1 kHz BJ ≤5 kHz 3.0 kHz BJ ≤5 kHz 2.3 kHz
5.5.3	TRANSMITTER ELECTROMAGNETIC COMPATIBILITY	
5.5.3.1	Radiated Spurious Emissions	BK 43 dB min. attenuation 54 dB
5.5.3.2	Sideband Spectrum - ±10 kHz Freq. Separation ±20 kHz Freq. Separation	BL 30 dB min. attenuation 40.0 dB BM 60 dB min. attenuation 64.0 dB
5.6	ANTENNA	
5.6.1	Radiation Efficiency Power Test Degradation	CA 20% min. 22.9 % CB 1 dB max. 0.0 dB
5.7	BATTERY (NI-CAD) Service Life: 20 to 30°C -30°C +60°C	DA 8 hrs. 2 hrs. 41 min. DB 2 hrs. 1 hr. 0 min. DC 7 hrs. 3 hrs. 25 min.

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2206

- The required 12 dB SINAD could not be obtained at -20% of nominal battery voltage. Test results shown were obtained at -10% of nominal battery voltage.

2206-4

FM TRANSCEIVER TEST DATA

MANUFACTURER: RCA
 MODEL NO.: TACTEC HCB36AA12
 SERIAL NO.: HO 2516
 TYPE: II

ITEM NO.: 2207
 RF POWER (Nominal): 6.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)		REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY					
5.4.1	SINAD Sensitivity	A	0.5 uV or less	0.20 uV	
	SINAD Sensitivity Variance - Voltage +10%	B	0.7 uV or less	0.20 uV	
	-20%	B	0.7 uV or less	0.22 uV	
	Temperature -30°C	U	+6 dB max. above 0.5 uV	0.20 dB	
	+60°C	U	+6 dB max. above 0.5 uV	0.80 dB	
	Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	N	*1
5.4.2 RECEIVER SELECTIVITY					
5.4.2.1	Usable Bandwidth	C	5 kHz min.	7.70 kHz	
	Usable Bandwidth Variance - Temperature -30°C	V	-20% max. below 5 kHz	-1.3 %	
	+60°C	V	-20% max. below 5 kHz	-2.6 %	
	Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	N	*1
5.4.2.2	Adjacent Channel Selectivity	D	70 dB min.	80.0 dB	
	Adjacent Channel Selectivity Variance - Temperature -30°C	W	58 dB min.	84.0 dB	
	+60°C	W	58 dB min.	86.0 dB	
	Humidity 50°C, 90% RH	AE	58 dB min.	N	*1
5.4.2.3	Spurious Response Attenuation	E	60 dB min.	64.0 dB	
5.4.2.4	Intermodulation Attenuation	F	60 dB min.	67.5 dB	
5.4.3 RECEIVER SQUELCH					
5.4.3.1	Threshold Squelch Sensitivity	G	0.4 uV or less	0.18 uV	
	Threshold Squelch Variance- Voltage +10%	I	0.6 uV or less	0.20 uV	
	-20%	I	0.6 uV or less	0.13 uV	
	Temperature -30°C	Y	+6 dB max. above 0.4 uV	3.0 dB	
	+60°C	Y	+6 dB max. above 0.4 uV	0.0 dB	
	Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	N	*1
5.4.3.1	Tight Squelch Sensitivity	H	4.0 uV or less	0.40 uV	
	Tight Squelch Variance - Temperature -30°C	X	+6 dB max. above 4.0 uV	1.0 dB	
	+60°C	X	+6 dB max. above 4.0 uV	-4.0 dB	
	Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	N	*1
5.4.3.2	Squelch Block	J	5 kHz min.	9.4 kHz	
5.4.3.3	Squelch Attack Time	K	150 ms max.	18 ms	
5.4.3.4	Squelch Release Time	L	250 ms max.	8 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

2207-1

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2207

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	1060 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	0.9 dB	
-20%	O	-3 dB max. below 500 mW	-2.2 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	-0.4 dB	
+60°C	Z	-6 dB max. below 500 mW	0.0 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	N	*1
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	1.3 %	
Temperature -30°C	AB	18% max. at 500 mW	1.7 %	
+60°C	AB	18% max. at 500 mW	1.3 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	N	*1
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	0.6 dB	
500 Hz		+6.0 dB (-10, +2 dB)	2.6 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.4 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-17.0 dB	
5.4.4.4 Audio Hum and Noise - Unspeled	S	40 dB min. below 500 mW	61.4 dB	
Squelched	T	50 dB min. below 500 mW	68.2 dB	
Audio Hum and Noise Variance - Unspeled				
Temperature -30°C	AA	30 dB min.	60.2 dB	
+60°C	AA	30 dB min.	62.2 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	N	*1
Squelched				
Temperature -30°C	AA	40 dB min.	68.5 dB	
+60°C	AA	40 dB min.	67.5 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	N	*1
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power Rated (nominal)			6.0 W	
Measured			5.69 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.23 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.14 dB	
-10%	BB	±3 dB of nominal	-1.40 dB	
-20%	BC	-6, +3 dB of nominal	-2.85 dB	
Temperature -30°C	BN	±3 dB of nominal	-2.01 dB	
+60°C	BN	±3 dB of nominal	-0.74 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.63 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00013 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00007 %	
-15%	BE	0.0005% of nominal	0.00025 %	
Temperature -30°C	BP	0.0005% of nominal	0.00010 %	
+60°C	BP	0.0005% of nominal	0.00007 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00023 %	
Vibration	BV	0.0005% of nominal	0.00033 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	72.2 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	50 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2207

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	1.4 %	
Temperature Stability				
-30°C	BQ	9% max.	3.4 %	
+60°C	BQ	9% max.	3.7 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	58.0 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	45.3 dB	
+60°C	BO	34 dB min. attenuation	45.8 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	35.8 dB	
Vibration	BU	25 dB min. attenuation	52.9 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-11.7 dB	
500 Hz		-6.0 dB (+1, -3 dB)	-6.4 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	6.9 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	7.1 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.60 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	5.05 kHz	*
500 Hz	BJ	≤5 kHz	4.30 kHz	
1000 Hz	BJ	≤5 kHz	4.50 kHz	
2000 Hz	BJ	≤5 kHz	3.50 kHz	
2500 Hz	BJ	≤5 kHz	3.30 kHz	
3000 Hz	BJ	≤5 kHz	3.20 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	50.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	35.0 %	
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	3 hrs. 52 min.	
-30°C	DB	2 hrs.	1 hr. 15 min.	
+60°C	DC	7 hrs.	3 hrs. 35 min.	

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2207

- No test data was obtained. The receiver had no audio output during humidity test at +50°C, 90% relative humidity. The transceiver recovered operation upon drying out under ambient test conditions. A defective audio module in this transceiver was replaced with a properly operating module prior to the testing under humidity conditions.

FM TRANSCEIVER TEST DATA

MANUFACTURER: RCA
 MODEL NO.: HCB 54 AA12
 SERIAL NO.: HO 2517
 TYPE: III

ITEM NO.: 2208
 RF POWER (Nominal): 4.0 Watts
 TEST FREQUENCIES: T- 464.500 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC
 (400-512 MHz)

	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1		SINAD Sensitivity	A 0.5 uV or less	0.22 uV
		SINAD Sensitivity Variance - Voltage +10%	B 0.7 uV or less	0.22 uV
		-20%	B 0.7 uV or less	0.22 uV
		Temperature -30°C	U +6 dB max. above 0.5 uV	-1.6 dB
		+60°C	U +6 dB max. above 0.5 uV	-1.3 dB
		Humidity 50°C, 90% RH	AC +10 dB max. above 0.5 uV	-38.6 dB
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1		Usable Bandwidth	C 5 kHz min.	6.60 kHz
		Usable Bandwidth Variance - Temperature -30°C	V -20% max. below 5 kHz	-16.7 %
		+60°C	V -20% max. below 5 kHz	-3.0 %
		Humidity 50°C, 90% RH	AD -20% max. below 5 kHz	6.1 %
5.4.2.2		Adjacent Channel Selectivity	D 60 dB min.	78.0 dB
		Adjacent Channel Selectivity Variance - Temperature -30°C	W 48 dB min.	71.0 dB
		+60°C	W 48 dB min.	78.0 dB
		Humidity 50°C, 90% RH	AE 48 dB min.	69.0 dB
5.4.2.3		Spurious Response Attenuation	E 60 dB min.	51.0 dB
5.4.2.4		Intermodulation Attenuation	F 60 dB min.	71.0 dB
5.4.3 RECEIVER SQUELCH				
5.4.3.1		Threshold Squelch Sensitivity	G 0.4 uV or less	0.16 uV
		Threshold Squelch Variance - Voltage +10%	I 0.6 uV or less	0.16 uV
		-20%	I 0.6 uV or less	0.18 uV
		Temperature -30°C	Y +6 dB max. above 0.4 uV	-5.4 dB
		+60°C	Y +6 dB max. above 0.4 uV	1.6 dB
		Humidity 50°C, 90% RH	AG +10 dB max. above 0.4 uV	-39.4 dB
5.4.3.1		Tight Squelch Sensitivity	H 4.0 uV or less	0.51 uV
		Tight Squelch Variance - Temperature -30°C	X +6 dB max. above 4.0 uV	-2.4 dB
		+60°C	X +6 dB max. above 4.0 uV	0.6 dB
		Humidity 50°C, 90% RH	AF +10 dB max. above 4.0 uV	-37.4 dB
5.4.3.2		Squelch Block	J 5 kHz min.	8.9 kHz
5.4.3.3		Squelch Attack Time	K 150 ms max.	28 ms
5.4.3.4		Squelch Release Time	L 250 ms max.	150 ms

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2208

TRANSCEIVER CHARACTERISTIC (400-512 mHz)		REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY					
5.4.4.1	Audio Output Power (Speaker)	M	500 mW min.	1030 mW	
	Audio Output Power Variance -				
	Voltage +10%	O	-3 dB max. below 500 mW	0.9 dB	
	-20%	O	-3 dB max. below 500 mW	-2.3 dB	
	Temperature -30°C	Z	-6 dB max. below 500 mW	0.3 dB	
	+60°C	Z	-6 dB max. below 500 mW	0.0 dB	
	Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.1 dB	
5.4.4.2	Audio Distortion (Speaker)	P	10% max. at 500 mW	1.9 %	
	Temperature -30°C	AB	18% max. at 500 mW	6.5 %	
	+60°C	AB	18% max. at 500 mW	1.1 %	
	Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	2.6 %	
5.4.4.3	Audio Frequency Response (Speaker)	Q			
	300 Hz		+10.5 dB (-10, +2 dB)	0.4 dB	*
	500 Hz		+6.0 dB (-10, +2 dB)	2.4 dB	
	1000 Hz		0 dB (0, 0 dB)	0.0 dB	
	2000 Hz		-6.0 dB (-10, +2 dB)	-8.1 dB	
	3000 Hz		-9.5 dB (-10, +2 dB)	-16.2 dB	
5.4.4.4	Audio Hum and Noise -				
	Unsquelled	S	40 dB min. below 500 mW	59.9 dB	
	Squelched	T	50 dB min. below 500 mW	66.7 dB	
	Audio Hum and Noise Variance -				
	Unsquelled				
	Temperature -30°C	AA	30 dB min.	59.8 dB	
	+60°C	AA	30 dB min.	59.1 dB	
	Humidity 50°C, 90% RH	AI	30 dB min.	68.8 dB	
	Squelched				
	Temperature -30°C	AA	40 dB min.	66.9 dB	
	+60°C	AA	40 dB min.	67.4 dB	
	Humidity 50°C, 90% RH	AI	40 dB min.	67.2 dB	
5.5.1 TRANSMITTER RF CARRIER					
5.5.1.1	Carrier Output Power				
	Rated (nominal)			4.0 W	
	Measured			3.11 W	
	Relation to Rated Output	BA	-0.3, +1 dB of nominal	-1.10 dB	*
	Carrier Output Power Variance -				
	Voltage +10%	BB	±3 dB of nominal	-1.15 dB	
	-10%	BB	±3 dB of nominal	-1.07 dB	
	-20%	BC	-6, +3 dB of nominal	-1.83 dB	
	Temperature -30°C	BN	±3 dB of nominal	-2.05 dB	
	+60°C	BN	±3 dB of nominal	-1.83 dB	
	Humidity 50°C, 90% RH	BR	±3 dB of nominal	-80.0 dB	*1
5.5.1.2	Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00002 %	
5.5.1.2	Carrier Frequency Stability -				
	Voltage +15%	BE	0.0005% of nominal	0.00004 %	
	-15%	BE	0.0005% of nominal	0.00012 %	
	Temperature -30°C	BP	0.0005% of nominal	0.00008 %	
	+60°C	BP	0.0005% of nominal	0.00016 %	
	Humidity 50°C, 90% RH	BT	0.0005% of nominal	N	*1
	Vibration	BV	0.0005% of nominal	0.00011 %	
5.5.1.3	AM Hum and Noise Level	BF	34 dB min. attenuation	86.8 dB	
5.5.1.4	Carrier Attack Time	BG	100 ms max.	1.1 μs	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2208

TRANSCEIVER CHARACTERISTIC (400-512 mHz)		REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION					
5.5.2.1	Audio Frequency Harmonic Distortion	BH	5% max.	1.0 %	
	Temperature Stability				
	-30°C	BQ	9% max.	1.8 %	
	+60°C	BQ	9% max.	1.7 %	
5.5.2.2	FM Hum and Noise Level	BI	40 dB min. attenuation	52.8 dB	
	FM Hum and Noise Stability				
	Temperature -30°C	BO	34 dB min. attenuation	40.3 dB	
	+60°C	BO	34 dB min. attenuation	41.2 dB	
	Humidity 50°C, 90% RH	BS	34 dB min. attenuation	N	*1
	Vibration	BU	25 dB min. attenuation	43.9 dB	
5.5.2.3	Audio Frequency Response				
	300 Hz		-10.5 dB (+1, -3 dB)	-11.7 dB	
	500 Hz		-6.0 dB (+1, -3 dB)	-6.2 dB	
	1000 Hz		0 dB (0, 0 dB)	0.0 dB	
	2500 Hz		+8.0 dB (+1, -3 dB)	5.6 dB	
	3000 Hz		+9.5 dB (+1, -4.6 dB)	5.6 dB	
5.5.2.4	Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.70 kHz	
5.5.2.5	Modulation Limiting				
	300 Hz	BJ	≤5 kHz	5.10 kHz	*
	500 Hz	BJ	≤5 kHz	5.00 kHz	
	1000 Hz	BJ	≤5 kHz	4.10 kHz	
	2000 Hz	BJ	≤5 kHz	3.20 kHz	
	2500 Hz	BJ	≤5 kHz	3.10 kHz	
	3000 Hz	BJ	≤5 kHz	3.10 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY					
5.5.3.1	Radiated Spurious Emissions	BK	43 dB min. attenuation	65.0 dB	
5.5.3.2	Sideband Spectrum -				
	±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
	±20 kHz Freq. Separation	BM	60 dB min. attenuation	58.0 dB	*
5.6 ANTENNA					
5.6.1	Radiation Efficiency	CA	50% min.	174.7 %	
	Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)					
	Service Life: 20 to 30°C	DA	8 hrs.	3 hrs. 40 min.	
	-30°C	DB	2 hrs.	n	2
	+60°C	DC	7 hrs.	3 hrs. 41 min.	

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2208

1. All test data was not obtained. Audio output of the transmitter was intermittent during the humidity tests at 50°C, 90% relative humidity. The transmitter ceased functioning but resumed operation upon drying out at ambient temperature.
2. No test data was obtained. The transceiver failed to operate at -30°C during battery service life test.

FM TRANSCEIVER TEST DATA

MANUFACTURER: Motorola
 MODEL NO.: HT 220 - H34FFN1130D
 SERIAL NO.: 236 ADU 0317
 TYPE: III

ITEM NO.: 2212
 RF POWER (Nominal): 4.0 Watts
 TEST FREQUENCIES: T- 464.500 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.33 uV	
SINAD Sensitivity Variance - Voltage +10%	B	0.7 uV or less	0.31 uV	
-20%	B	0.7 uV or less	0.36 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-5.9 dB	
+60°C	U	+6 dB max. above 0.5 uV	2.8 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-2.3 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	5.40 kHz	
Usable Bandwidth Variance - Temperature -30°C	V	-20% max. below 5 kHz	-22.2 %	*
+60°C	V	-20% max. below 5 kHz	18.5 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-5.6 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	68.0 dB	
Adjacent Channel Selectivity Variance - Temperature -30°C	W	48 dB min.	64.0 dB	
+60°C	W	48 dB min.	63.0 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	69.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	53.0 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	60.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.12 uV	
Threshold Squelch Variance- Voltage +10%	I	0.6 uV or less	0.02 uV	
-20%	I	0.6 uV or less	0.34 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-13.0 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-4.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-9.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.53 uV	
Tight Squelch Variance - Temperature -30°C	X	+6 dB max. above 4.0 uV	-10.0 dB	
+60°C	X	+6 dB max. above 4.0 uV	0.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-7.0 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	7.1 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	120 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	80 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2212

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.4.4 RECEIVER AUDIO FREQUENCY

TEST RESULTS	NOTES
5.4.4.1 Audio Output Power (Speaker) M 500 mW min. 770 mW	
Audio Output Power Variance -	
Voltage +10% O -3 dB max. below 500 mW 0.8 dB	
-20% O -3 dB max. below 500 mW -2.0 dB	
Temperature -30°C Z -6 dB max. below 500 mW -0.6 dB	
+60°C Z -6 dB max. below 500 mW 0.0 dB	
Humidity 50°C, 90% RH AH -3 dB max. below 500 mW -0.2 dB	
5.4.4.2 Audio Distortion (Speaker) P 10% max. at 500 mW 6.3 %	
Temperature -30°C AB 18% max. at 500 mW 13.3 %	
+60°C AB 18% max. at 500 mW 3.2 %	
Humidity 50°C, 90% RH AJ 18% max. at 500 mW 3.5 %	
5.4.4.3 Audio Frequency Response (Speaker) Q	
300 Hz +10.5 dB (-10, +2 dB) -1.0 dB *	
500 Hz +6.0 dB (-10, +2 dB) 4.3 dB	
1000 Hz 0 dB 0 dB 0.0 dB	
2000 Hz -6.0 dB (-10, +2 dB) -10.5 dB	
3000 Hz -9.5 dB (-10, +2 dB) -18.1 dB	
5.4.4.4 Audio Hum and Noise -	
Unsquelched S 40 dB min. below 500 mW 64.8 dB	
Squelched T 50 dB min. below 500 mW 86.1 dB	
Audio Hum and Noise Variance -	
Unsquelched	
Temperature -30°C AA 30 dB min. 62.6 dB	
+60°C AA 30 dB min. 59.9 dB	
Humidity 50°C, 90% RH AI 30 dB min. 70.7 dB	
Squelched	
Temperature -30°C AA 40 dB min. 87.2 dB	
+60°C AA 40 dB min. 87.9 dB	
Humidity 50°C, 90% RH AI 40 dB min. 87.2 dB	

5.5.1 TRANSMITTER RF CARRIER

5.5.1.1 Carrier Output Power	
Rated (nominal) 4.0 W	
Measured 4.08 W	
Relation to Rated Output BA -0.3, +1 dB of nominal 0.09 dB	
Carrier Output Power Variance -	
Voltage +10% BB ±3 dB of nominal 1.08 dB	
-10% BB ±3 dB of nominal -1.11 dB	
-20% BC -6, +3 dB of nominal -2.62 dB	
Temperature -30°C BN ±3 dB of nominal -1.18 dB	
+60°C BN ±3 dB of nominal -1.24 dB	
Humidity 50°C, 90% RH BR ±3 dB of nominal -1.70 dB	
5.5.1.2 Carrier Frequency Tolerance BD 0.0005% of nominal 0.00021 %	
5.5.1.2 Carrier Frequency Stability -	
Voltage +15% BE 0.0005% of nominal 0.00007 %	
-15% BE 0.0005% of nominal 0.00005 %	
Temperature -30°C BP 0.0005% of nominal 0.00021 %	
+60°C BP 0.0005% of nominal 0.00058 % *	
Humidity 50°C, 90% RH BT 0.0005% of nominal 0.00078 % *	
Vibration BV 0.0005% of nominal 0.00003 %	
5.5.1.3 AM Hum and Noise Level BF 34 dB min. attenuation 77.5 dB	
5.5.1.4 Carrier Attack Time BG 100 ms max. 8 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2212

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION

5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	2.9 %
Temperature Stability			
-30°C BQ 9% max. 7.5 %			
+60°C BQ 9% max. 6.3 %			
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	45.0 dB
FM Hum and Noise Stability			
Temperature -30°C BO 34 dB min. attenuation 39.9 dB			
+60°C BO 34 dB min. attenuation 36.4 dB			
Humidity 50°C, 90% RH BS 34 dB min. attenuation 40.3 dB			
Vibration BU 25 dB min. attenuation 35.3 dB			
5.5.2.3 Audio Frequency Response			
300 Hz -10.5 dB (+1, -3 dB) -18.8 dB *			
500 Hz -6.0 dB (+1, -3 dB) -8.2 dB			
1000 Hz 0 dB 0 dB 0.0 dB			
2500 Hz +8.0 dB (+1, -3 dB) 6.8 dB			
3000 Hz +9.5 dB (+1, -4.6 dB) 6.4 dB			
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.65 kHz
5.5.2.5 Modulation Limiting			
300 Hz BJ ≤5 kHz 5.10 kHz *			
500 Hz BJ ≤5 kHz 5.10 kHz *			
1000 Hz BJ ≤5 kHz 4.80 kHz			
2000 Hz BJ ≤5 kHz 4.60 kHz			
2500 Hz BJ ≤5 kHz 4.30 kHz			
3000 Hz BJ ≤5 kHz 3.80 kHz			

5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY

5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	55.0 dB
5.5.3.2 Sideband Spectrum -			
±10 kHz Freq. Separation BL 30 dB min. attenuation 40.0 dB			
±20 kHz Freq. Separation BM 60 dB min. attenuation 65.0 dB			

5.6 ANTENNA

5.6.1 Radiation Efficiency	CA	50% min.	73.9 %
Power Test Degradation	CB	1 dB max.	0.0 dB

5.7 BATTERY (NI-CAD)

Service Life: 20 to 30°C	DA	8 hrs.	3 hrs. 28 min.
-30°C	DB	2 hrs.	2 hrs. 0 min.
+60°C	DC	7 hrs.	4 hrs. 5 min.

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FM TRANSCEIVER TEST DATA

MANUFACTURER: Motorola
 MODEL NO.: HT220-H23FFN1130E
 SERIAL NO.: 231 ADU 0839
 TYPE: II

ITEM NO.: 2213
 RF POWER (Nominal): 1.8 Watts
 TEST FREQUENCIES: T- 151.625 mHz
 R- 151.625 mHz

TRANSCEIVER CHARACTERISTIC (150-174 mHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.21 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.21 uV	
-20%	B	0.7 uV or less	0.25 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-6.0 dB	
+60°C	U	+6 dB max. above 0.5 uV	-4.3 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-4.8 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.30 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	-7.9 %	
+60°C	V	-20% max. below 5 kHz	-4.8 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-17.5 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	88.0 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	58 dB min.	78.0 dB	
+60°C	W	58 dB min.	81.0 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	79.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	54.0 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	77.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.14 uV	
Threshold Squelch Variance -				
Voltage +10%	I	0.6 uV or less	0.20 uV	
-20%	I	0.6 uV or less	0.01 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-10.0 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-9.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-10.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.32 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-7.0 dB	
+60°C	X	+6 dB max. above 4.0 uV	-9.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-11.0 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	8.70 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	120 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	80 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2213

TRANSCEIVER CHARACTERISTIC (150-174 mHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	870 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	0.8 dB	
-20%	O	-3 dB max. below 500 mW	-2.0 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	-0.6 dB	
+60°C	Z	-6 dB max. below 500 mW	-0.1 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	-0.2 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	6.2 %	
Temperature -30°C	AB	18% max. at 500 mW	4.7 %	
+60°C	AB	18% max. at 500 mW	7.3 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	11.3 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	-1.4 dB	*
500 Hz		+6.0 dB (-10, +2 dB)	4.3 dB	
1000 Hz		0 dB (0, 0 dB)	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-9.5 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-16.7 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelched	S	40 dB min. below 500 mW	64.5 dB	
Squelched	T	50 dB min. below 500 mW	86.5 dB	
Audio Hum and Noise Variance -				
Unsquelched				
Temperature -30°C	AA	30 dB min.	65.3 dB	
+60°C	AA	30 dB min.	56.8 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	57.3 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	88.3 dB	
+60°C	AA	40 dB min.	86.5 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	88.9 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			1.8 W	
Measured			1.60 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.51 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.48 dB	
-10%	BB	±3 dB of nominal	-1.75 dB	
-20%	BC	-6, +3 dB of nominal	-3.17 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.75 dB	
+60°C	BN	±3 dB of nominal	-1.38 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-2.46 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00003 %	
Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00004 %	
-15%	BE	0.0005% of nominal	0.00011 %	
Temperature -30°C	BP	0.0005% of nominal	0.00081 %	*
+60°C	BP	0.0005% of nominal	0.00008 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00022 %	
Vibration	BV	0.0005% of nominal	0.00017 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	86.9 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	6 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2213

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	8.1 %	*
Temperature Stability				
-30°C	BQ	9% max.	6.5 %	
+60°C	BQ	9% max.	6.9 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	44.3 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	43.5 dB	
+60°C	BO	34 dB min. attenuation	38.5 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	50.2 dB	
Vibration	BU	25 dB min. attenuation	36.8 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-12.8 dB	
500 Hz		-6.0 dB (+1, -3 dB)	-6.9 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	5.1 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	3.8 dB	*
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.65 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	5.05 kHz	*
500 Hz	BJ	≤5 kHz	5.15 kHz	*
1000 Hz	BJ	≤5 kHz	5.18 kHz	*
2000 Hz	BJ	≤5 kHz	4.65 kHz	
2500 Hz	BJ	≤5 kHz	3.90 kHz	
3000 Hz	BJ	≤5 kHz	3.00 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	55.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	26.6 %	
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	4 hrs. 45 min.	
-30°C	DB	2 hrs.	1 hr. 40 min.	
+60°C	DC	7 hrs.	4 hrs. 40 min.	

FM TRANSCEIVER TEST DATA

MANUFACTURER: Motorola
MODEL NO.: MX320-H33AAU1120B
SERIAL NO.: 278 ADU 2000
TYPE: II

ITEM NO.: 2224
RF POWER (Nominal): 2.5 Watts
TEST FREQUENCIES: T- 151.625 MHz
R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.27 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.26 uV	
-20%	B	0.7 uV or less	0.28 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	1.2 dB	
+60°C	U	+6 dB max. above 0.5 uV	-2.0 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-6.3 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	5.6 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	-5.4 %	
+60°C	V	-20% max. below 5 kHz	1.8 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-17.9 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	88.0 dB	
Adjacent Channel Selectivity Variance -				
Temperature -30°C	W	58 dB min.	90.0 dB	
+60°C	W	58 dB min.	80.0 dB	
Humidity 50°C, 90% RH	AE	58 dB min.	76.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	107.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	74.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.08 uV	
Threshold Squelch Variance-				
Voltage +10%	I	0.6 uV or less	0.09 uV	
-20%	I	0.6 uV or less	0.07 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	0.0 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-4.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-11.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.23 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-1.0 dB	
+60°C	X	+6 dB max. above 4.0 uV	0.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-9.0 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	8.7 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	12 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	28 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
N-No test data was obtained. Requirement was not met.
n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2224

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	930 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	1.0 dB	
-20%	O	-3 dB max. below 500 mW	-2.4 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	-0.4 dB	
+60°C	Z	-6 dB max. below 500 mW	0.0 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.4 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	1.2 %	
Temperature -30°C	AB	18% max. at 500 mW	2.5 %	
+60°C	AB	18% max. at 500 mW	2.0 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	1.2 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	0.2 dB	*
500 Hz		+6.0 dB (-10, +2 dB)	7.7 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-9.0 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-17.3 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelched	S	40 dB min. below 500 mW	61.6 dB	
Squelched	T	50 dB min. below 500 mW	92.7 dB	
Audio Hum and Noise Variance -				
Unsquelched				
Temperature -30°C	AA	30 dB min.	61.1 dB	
+60°C	AA	30 dB min.	61.5 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	62.3 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	91.7 dB	
+60°C	AA	40 dB min.	87.2 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	80.1 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			2.5 W	
Measured			2.54 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	0.06 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.10 dB	
-10%	BB	±3 dB of nominal	0.0 dB	
-20%	BC	-6, +3 dB of nominal	-1.0 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.3 dB	
+60°C	BN	±3 dB of nominal	-0.7 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.2 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00012 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00013 %	
-15%	BE	0.0005% of nominal	0.00011 %	
Temperature -30°C	BP	0.0005% of nominal	0.00036 %	
+60°C	BP	0.0005% of nominal	0.00006 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00034 %	
Vibration	BV	0.0005% of nominal	0.00033 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	85.5 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	10 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2224

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	2.5 %	
Temperature Stability				
-30°C	BQ	9% max.	1.3 %	
+60°C	BQ	9% max.	1.5 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	50.3 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	47.9 dB	
+60°C	BO	34 dB min. attenuation	46.0 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	49.7 dB	
Vibration	BU	25 dB min. attenuation	47.3 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-10.5 dB	
500 Hz		-6.0 dB (+1, -3 dB)	-6.1 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	7.3 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	6.4 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.70 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	4.50 kHz	
500 Hz	BJ	≤5 kHz	4.80 kHz	
1000 Hz	BJ	≤5 kHz	4.80 kHz	
2000 Hz	BJ	≤5 kHz	4.90 kHz	
2500 Hz	BJ	≤5 kHz	4.55 kHz	
3000 Hz	BJ	≤5 kHz	3.60 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	55.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	18.2 %	*
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	6 hrs. 21 min.	
-30°C	DB	2 hrs.	0 hrs. 45 min.	
+60°C	DC	7 hrs.	6 hrs. 7 min.	

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CONTINUED

1 OF 2

FM TRANSCEIVER TEST DATA

MANUFACTURER: Motorola
 MODEL NO.: MX 330 - H44AAU11208
 SERIAL NO.: 278 ADU 2113
 TYPE: III

ITEM NO.: 2225
 RF POWER (Nominal): 5.0 Watts
 TEST FREQUENCIES: T- 464.450 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.23 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.24 uV	
-20%	B	0.7 uV or less	0.31 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-0.4 dB	
+60°C	U	+6 dB max. above 0.5 uV	-3.4 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-9.1 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.10 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	-13.1 %	
+60°C	V	-20% max. below 5 kHz	0.0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-18.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	80.0 dB	
Adjacent Channel Selectivity				
Variance -				
Temperature -30°C	W	48 dB min.	84.0 dB	
+60°C	W	48 dB min.	85.0 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	82.0 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	120.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	72.0 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.15 uV	
Threshold Squelch Variance-				
Voltage +10%	I	0.6 uV or less	0.13 uV	
-20%	I	0.6 uV or less	0.13 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-1.0 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-5.0 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-3.0 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.34 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-1.0 dB	
+60°C	X	+6 dB max. above 4.0 uV	-4.0 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-9.0 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	12.5 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	60 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	50 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2225

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

5.4.4 RECEIVER AUDIO FREQUENCY

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	950 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	1.0 dB	
-20%	O	-3 dB max. below 500 mW	-2.4 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	0.2 dB	
+60°C	Z	-6 dB max. below 500 mW	0.0 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.2 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	0.8 %	
Temperature -30°C	AB	18% max. at 500 mW	3.1 %	
+60°C	AB	18% max. at 500 mW	3.3 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	4.5 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	1.9 dB	
500 Hz		+6.0 dB (-10, +2 dB)	6.9 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-7.8 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-15.3 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelched	S	40 dB min. below 500 mW	61.8 dB	
Squelched	T	50 dB min. below 500 mW	87.3 dB	
Audio Hum and Noise Variance -				
Unsquelched				
Temperature -30°C	AA	30 dB min.	63.5 dB	
+60°C	AA	30 dB min.	64.5 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	62.2 dB	
Squelched				
Temperature -30°C	AA	40 dB min.	79.3 dB	
+60°C	AA	40 dB min.	93.9 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	93.3 dB	

5.5.1 TRANSMITTER RF CARRIER

5.5.1.1 Carrier Output Power				
Rated (nominal)			5.0 W	
Measured			5.18 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	0.16 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.42 dB	
-10%	BB	±3 dB of nominal	-0.94 dB	
-20%	BC	-6, +3 dB of nominal	-2.33 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.58 dB	
+60°C	BN	±3 dB of nominal	-1.23 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.32 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00009 %	
Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00019 %	
-15%	BE	0.0005% of nominal	0.00017 %	
Temperature -30°C	BP	0.0005% of nominal	0.00057 %	
+60°C	BP	0.0005% of nominal	0.00003 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00037 %	
Vibration	BV	0.0005% of nominal	0.00032 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	83.1 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	6 ms	

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2225

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.5.2 TRANSMITTER AUDIO FREQUENCY
MODULATION

5.5.2.1	Audio Frequency Harmonic Distortion	BH	5% max.	0.7 %	
	Temperature Stability				
	-30°C	BQ	9% max.	4.8 %	
	+60°C	BQ	9% max.	4.4 %	
5.5.2.2	FM Hum and Noise Level	BI	40 dB min. attenuation	51.0 dB	
	FM Hum and Noise Stability				
	Temperature -30°C	BO	34 dB min. attenuation	51.1 dB	
	+60°C	BO	34 dB min. attenuation	46.7 dB	
	Humidity 50°C, 90% RH	BS	34 dB min. attenuation	49.1 dB	
	Vibration	BU	25 dB min. attenuation	42.1 dB	
5.5.2.3	Audio Frequency Response				
	300 Hz		-10.5 dB (+1, -3 dB)	-10.5 dB	
	500 Hz		-6.0 dB (+1, -3 dB)	-6.1 dB	
	1000 Hz		0 dB 0 dB	0.0 dB	
	2500 Hz		+8.0 dB (+1, -3 dB)	7.7 dB	
	3000 Hz		+9.5 dB (+1, -4.6 dB)	7.0 dB	
5.5.2.4	Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.65 kHz	
5.5.2.5	Modulation Limiting				
	300 Hz	BJ	≤5 kHz	5.05 kHz	*
	500 Hz	BJ	≤5 kHz	4.70 kHz	
	1000 Hz	BJ	≤5 kHz	4.60 kHz	
	2000 Hz	BJ	≤5 kHz	4.40 kHz	
	2500 Hz	BJ	≤5 kHz	4.10 kHz	
	3000 Hz	BJ	≤5 kHz	3.25 kHz	

5.5.3 TRANSMITTER ELECTROMAGNETIC
COMPATIBILITY

5.5.3.1	Radiated Spurious Emissions	BK	43 dB min. attenuation	55.0 dB	
5.5.3.2	Sideband Spectrum -				
	±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
	±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	

5.6 ANTENNA

5.6.1	Radiation Efficiency	CA	50% min.	94.5 %	
	Power Test Degradation	CB	1 dB max.	0.0 dB	

5.7 BATTERY (NI-CAD)

Service Life: 20 to 30°C	DA	8 hrs.	4 hrs. 57 min.	
-30°C	DB	2 hrs.	3 hrs. 19 min.	
+60°C	DC	7 hrs.	4 hrs. 42 min.	

FM TRANSCEIVER TEST DATA

MANUFACTURER: Motorola
MODEL NO.: MT500-H338BU1124A
SERIAL NO.: 230 ADU 1660
TYPE: II

ITEM NO.: 2226
RF POWER (Nominal): 5.0 Watts
TEST FREQUENCIES: T- 151.625 MHz
R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

REF. PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00 TEST RESULTS NOTES

5.4.1 RECEIVER SENSITIVITY

5.4.1	SINAD Sensitivity	A	0.5 uV or less	0.19 uV	
	SINAD Sensitivity Variance -				
	Voltage +10%	B	0.7 uV or less	0.21 uV	
	-20%	B	0.7 uV or less	0.22 uV	
	Temperature -30°C	U	+6 dB max. above 0.5 uV	1.0 dB	
	+60°C	U	+6 dB max. above 0.5 uV	-1.5 dB	
	Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-1.2 dB	

5.4.2 RECEIVER SELECTIVITY

5.4.2.1	Usable Bandwidth	C	5 kHz min.	6.00 kHz	
	Usable Bandwidth Variance -				
	Temperature -30°C	V	-20% max. below 5 kHz	1.7 %	
	+60°C	V	-20% max. below 5 kHz	-1.7 %	
	Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-6.7 %	
5.4.2.2	Adjacent Channel Selectivity	D	70 dB min.	86.0 dB	
	Adjacent Channel Selectivity Variance -				
	Temperature -30°C	W	58 dB min.	89.0 dB	
	+60°C	W	58 dB min.	94.0 dB	
	Humidity 50°C, 90% RH	AE	58 dB min.	85.0 dB	
5.4.2.3	Spurious Response Attenuation	E	60 dB min.	75.0 dB	
5.4.2.4	Intermodulation Attenuation	F	60 dB min.	56.0 dB	*

5.4.3 RECEIVER SQUELCH

5.4.3.1	Threshold Squelch Sensitivity	G	0.4 uV or less	0.10 uV	
	Threshold Squelch Variance -				
	Voltage +10%	I	0.6 uV or less	0.01 uV	
	-20%	I	0.6 uV or less	0.10 uV	
	Temperature -30°C	Y	+6 dB max. above 0.4 uV	-3.0 dB	
	+60°C	Y	+6 dB max. above 0.4 uV	-6.0 dB	
	Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-3.0 dB	
5.4.3.1	Tight Squelch Sensitivity	H	4.0 uV or less	0.40 uV	
	Tight Squelch Variance -				
	Temperature -30°C	X	+6 dB max. above 4.0 uV	0.0 dB	
	+60°C	X	+6 dB max. above 4.0 uV	-1.0 dB	
	Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-1.0 dB	
5.4.3.2	Squelch Block	J	5 kHz min.	10.5 kHz	
5.4.3.3	Squelch Attack Time	K	150 ms max.	45 ms	
5.4.3.4	Squelch Release Time	L	250 ms max.	85 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
N-No test data was obtained. Requirement was not met.
n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2226

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

5.4.4 RECEIVER AUDIO FREQUENCY

REF.	TEST RESULTS	NOTES
5.4.4.1	Audio Output Power (Speaker) M 500 mW min. 930 mW	
	Audio Output Power Variance -	
	Voltage +10% O -3 dB max. below 500 mW 0.9 dB	
	Voltage -20% O -3 dB max. below 500 mW -2.1 dB	
	Temperature -30°C Z -6 dB max. below 500 mW -0.3 dB	
	Temperature +60°C Z -6 dB max. below 500 mW 0.1 dB	
	Humidity 50°C, 90% RH AH -3 dB max. below 500 mW 0.1 dB	
5.4.4.2	Audio Distortion (Speaker) P 10% max. at 500 mW 1.3 %	
	Temperature -30°C AB 18% max. at 500 mW 1.7 %	
	Temperature +60°C AB 18% max. at 500 mW 1.5 %	
	Humidity 50°C, 90% RH AJ 18% max. at 500 mW 1.2 %	
5.4.4.3	Audio Frequency Response (Speaker) Q	
	300 Hz +10.5 dB (-10, +2 dB) 1.5 dB	
	500 Hz +6.0 dB (-10, +2 dB) 4.1 dB	
	1000 Hz 0 dB 0 dB 0.0 dB	
	2000 Hz -6.0 dB (-10, +2 dB) -7.4 dB	
	3000 Hz -9.5 dB (-10, +2 dB) -17.4 dB	
5.4.4.4	Audio Hum and Noise -	
	Unsquelched S 40 dB min. below 500 mW 73.3 dB	
	Squelched T 50 dB min. below 500 mW 63.5 dB	
	Audio Hum and Noise Variance -	
	Unsquelched	
	Temperature -30°C AA 30 dB min. 75.1 dB	
	Temperature +60°C AA 30 dB min. 67.4 dB	
	Humidity 50°C, 90% RH AI 30 dB min. 69.7 dB	
	Squelched	
	Temperature -30°C AA 40 dB min. 64.5 dB	
	Temperature +60°C AA 40 dB min. 63.2 dB	
	Humidity 50°C, 90% RH AI 40 dB min. 78.1 dB	
5.5.1	TRANSMITTER RF CARRIER	
5.5.1.1	Carrier Output Power	
	Rated (nominal) 5.0 W	
	Measured 6.06 W	
	Relation to Rated Output BA -0.3, +1 dB of nominal 0.84 dB	
	Carrier Output Power Variance -	
	Voltage +10% BB ±3 dB of nominal 1.8 dB	
	Voltage -10% BB ±3 dB of nominal -0.4 dB	
	Voltage -20% BC -6, +3 dB of nominal -1.8 dB	
	Temperature -30°C BN ±3 dB of nominal 0.7 dB	
	Temperature +60°C BN ±3 dB of nominal 0.1 dB	
	Humidity 50°C, 90% RH BR ±3 dB of nominal 0.0 dB	
5.5.1.2	Carrier Frequency Tolerance BD 0.0005% of nominal 0.00017 %	
5.5.1.2	Carrier Frequency Stability -	
	Voltage +15% BE 0.0005% of nominal 0.00016 %	
	Voltage -15% BE 0.0005% of nominal 0.00017 %	
	Temperature -30°C BP 0.0005% of nominal 0.00010 %	
	Temperature +60°C BP 0.0005% of nominal 0.00022 %	
	Humidity 50°C, 90% RH BT 0.0005% of nominal 0.00015 %	
	Vibration BV 0.0005% of nominal 0.00018 %	
5.5.1.3	AM Hum and Noise Level BF 34 dB min. attenuation 81.8 dB	
5.5.1.4	Carrier Attack Time BG 100 ms max. 4 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2226

TRANSCEIVER CHARACTERISTIC
(150-174 MHz)

PERFORMANCE REQUIREMENT
DEC-'78 NILECJ-STD-0209.00

5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION

REF.	TEST RESULTS	NOTES
5.5.2.1	Audio Frequency Harmonic Distortion	
	Temperature Stability -30°C BH 5% max. 1.2 %	
	Temperature Stability +60°C BQ 9% max. 4.0 %	
	Temperature Stability +60°C BQ 9% max. 1.7 %	
5.5.2.2	FM Hum and Noise Level	
	FM Hum and Noise Stability -30°C BI 40 dB min. attenuation 46.7 dB	
	FM Hum and Noise Stability +60°C BO 34 dB min. attenuation 39.3 dB	
	Humidity 50°C, 90% RH BS 34 dB min. attenuation 52.7 dB	
	Vibration BU 25 dB min. attenuation 44.2 dB	
5.5.2.3	Audio Frequency Response	
	300 Hz -10.5 dB (+1, -3 dB) -7.8 dB	* A
	500 Hz -6.0 dB (+1, -3 dB) -3.9 dB	*
	1000 Hz 0 dB 0 dB 0.0 dB	
	2500 Hz +8.0 dB (+1, -3 dB) 2.9 dB	*
	3000 Hz +9.5 dB (+1, -4.6 dB) 1.7 dB	*
5.5.2.4	Frequency Deviation	
5.5.2.5	Modulation Limiting	
	300 Hz BJ ≤5 kHz 5.00 kHz	
	500 Hz BJ ≤5 kHz 4.80 kHz	
	1000 Hz BJ ≤5 kHz 4.70 kHz	
	2000 Hz BJ ≤5 kHz 4.60 kHz	
	2500 Hz BJ ≤5 kHz 4.30 kHz	
	3000 Hz BJ ≤5 kHz 3.60 kHz	
5.5.3	TRANSMITTER ELECTROMAGNETIC COMPATIBILITY	
5.5.3.1	Radiated Spurious Emissions	
5.5.3.2	Sideband Spectrum -	
	±10 kHz Freq. Separation BL 43 dB min. attenuation 55.0 dB	
	±20 kHz Freq. Separation BM 30 dB min. attenuation 40.0 dB	
	±20 kHz Freq. Separation BM 60 dB min. attenuation 65.0 dB	
5.6	ANTENNA	
5.6.1	Radiation Efficiency	
	Power Test Degradation CA 20% min. 20.8 %	
	Power Test Degradation CB 1 dB max. 0.0 dB	
5.7	BATTERY (NI-CAD)	
	Service Life: 20 to 30°C	
	-30°C DA 8 hrs. 4 hrs. 0 min.	
	+60°C DB 2 hrs. 1 hr. 30 min.	
	+60°C DC 7 hrs. 3 hrs. 45 min.	

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2226

Comments of manufacturer:

- A. A microphone compensator must be used to obtain audio response measurements.

FM TRANSCEIVER TEST DATA

MANUFACTURER: Motorola
 MODEL NO.: MT 500 - H34BBU124A
 SERIAL NO.: 411 ADU 1096
 TYPE: III

ITEM NO.: 2227
 RF POWER (Nominal): 4.0 Watts
 TEST FREQUENCIES: T- 464.500 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)		REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY					
5.4.1	SINAD Sensitivity	A	0.5 uV or less	0.26 uV	
	SINAD Sensitivity Variance -				
	Voltage +10%	B	0.7 uV or less	0.25 uV	
	Voltage -20%	B	0.7 uV or less	0.26 uV	
	Temperature -30°C	U	+6 dB max. above 0.5 uV	-4.9 dB	
	Temperature +60°C	U	+6 dB max. above 0.5 uV	-1.7 dB	
	Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-3.7 dB	
5.4.2 RECEIVER SELECTIVITY					
5.4.2.1	Usable Bandwidth	C	5 kHz min.	5.50 kHz	
	Usable Bandwidth Variance -				
	Temperature -30°C	V	-20% max. below 5 kHz	7.3 %	
	Temperature +60°C	V	-20% max. below 5 kHz	16.4 %	
	Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	3.6 %	
5.4.2.2	Adjacent Channel Selectivity	D	60 dB min.	79.0 dB	
	Adjacent Channel Selectivity Variance -				
	Temperature -30°C	W	48 dB min.	70.0 dB	
	Temperature +60°C	W	48 dB min.	77.0 dB	
	Humidity 50°C, 90% RH	AE	48 dB min.	81.0 dB	
5.4.2.3	Spurious Response Attenuation	E	60 dB min.	72.0 dB	
5.4.2.4	Intermodulation Attenuation	F	60 dB min.	77.0 dB	
5.4.3 RECEIVER SQUELCH					
5.4.3.1	Threshold Squelch Sensitivity	G	0.4 uV or less	0.19 uV	
	Threshold Squelch Variance -				
	Voltage +10%	I	0.6 uV or less	0.19 uV	
	Voltage -20%	I	0.6 uV or less	0.21 uV	
	Temperature -30°C	Y	+6 dB max. above 0.4 uV	-5.0 dB	
	Temperature +60°C	Y	+6 dB max. above 0.4 uV	-3.0 dB	
	Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-2.0 dB	
5.4.3.1	Tight Squelch Sensitivity	H	4.0 uV or less	0.42 uV	
	Tight Squelch Variance -				
	Temperature -30°C	X	+6 dB max. above 4.0 uV	-6.0 dB	
	Temperature +60°C	X	+6 dB max. above 4.0 uV	-1.0 dB	
	Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-4.0 dB	
5.4.3.2	Squelch Block	J	5 kHz min.	10.6 kHz	
5.4.3.3	Squelch Attack Time	K	150 ms max.	65 ms	
5.4.3.4	Squelch Release Time	L	250 ms max.	110 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2227

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	670 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	0.7 dB	
-20%	O	-3 dB max. below 500 mW	-1.8 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	-3.6 dB	
+60°C	Z	-6 dB max. below 500 mW	0.5 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	0.4 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	2.9 %	
Temperature -30°C	AB	18% max. at 500 mW	2.5 %	
+60°C	AB	18% max. at 500 mW	2.0 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	3.4 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	4.8 dB	
500 Hz		+6.0 dB (-10, +2 dB)	4.3 dB	
1000 Hz		0 dB (0, 0 dB)	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-6.1 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-14.8 dB	
5.4.4.4 Audio Hum and Noise - Unsquelled	S	40 dB min. below 500 mW	61.8 dB	
Squelled	T	50 dB min. below 500 mW	84.9 dB	
Audio Hum and Noise Variance - Unsquelled				
Temperature -30°C	AA	30 dB min.	57.4 dB	
+60°C	AA	30 dB min.	62.4 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	61.7 dB	
Squelled				
Temperature -30°C	AA	40 dB min.	86.5 dB	
+60°C	AA	40 dB min.	85.9 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	85.6 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power Rated (nominal)			4.0 W	
Measured			4.91 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	0.89 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	1.80 dB	
-10%	BB	±3 dB of nominal	-0.20 dB	
-20%	BC	-6, +3 dB of nominal	-1.43 dB	
Temperature -30°C	BN	±3 dB of nominal	0.29 dB	
+60°C	BN	±3 dB of nominal	-0.36 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	0.07 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00022 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00025 %	
-15%	BE	0.0005% of nominal	0.00028 %	
Temperature -30°C	BP	0.0005% of nominal	0.00015 %	
+60°C	BP	0.0005% of nominal	0.00016 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00015 %	
Vibration	BV	0.0005% of nominal	0.00019 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	64.9 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	6 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2227

TRANSCEIVER CHARACTERISTIC
(400-512 MHz)

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	0.7 %	
Temperature Stability				
-30°C	BQ	9% max.	4.7 %	
+60°C	BQ	9% max.	1.5 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	45.5 dB	
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	39.1 dB	
+60°C	BO	34 dB min. attenuation	38.5 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	51.0 dB	
Vibration	BU	25 dB min. attenuation	48.3 dB	
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-7.8 dB	* A
500 Hz		-6.0 dB (+1, -3 dB)	-3.9 dB	*
1000 Hz		0 dB (0, 0 dB)	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	1.2 dB	*
3000 Hz		+9.5 dB (+1, -4.6 dB)	-0.9 dB	*
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.60 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	5.05 kHz	*
500 Hz	BJ	≤5 kHz	4.90 kHz	
1000 Hz	BJ	≤5 kHz	4.80 kHz	
2000 Hz	BJ	≤5 kHz	4.50 kHz	
2500 Hz	BJ	≤5 kHz	3.90 kHz	
3000 Hz	BJ	≤5 kHz	3.00 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	60.0 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	65.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	50% min.	60.3 %	
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	4 hrs. 0 min.	
-30°C	DB	2 hrs.	3 hrs. 0 min.	
+60°C	DC	7 hrs.	3 hrs. 45 min.	

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2227

Comments of manufacturer:

- A. A microphone compensator must be used to obtain audio response measurements..

FM TRANSCEIVER TEST DATA

MANUFACTURER: General Electric
 MODEL NO.: PE65RBSBMX
 SERIAL NO.: 938261346
 TYPE: III

ITEM NO.: 2230
 RF POWER (Nominal): 3.5 Watts
 TEST FREQUENCIES: T- 464.500 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
<u>5.4.1 RECEIVER SENSITIVITY</u>				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.27 uV	
SINAD Sensitivity Variance - Voltage +10%	B	0.7 uV or less	0.28 uV	
-20%	B	0.7 uV or less	0.29 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	2.9 dB	
+60°C	U	+6 dB max. above 0.5 uV	-1.5 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	-1.5 dB	
<u>5.4.2 RECEIVER SELECTIVITY</u>				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	6.4 kHz	
Usable Bandwidth Variance - Temperature -30°C	V	-20% max. below 5 kHz	-16 %	
+60°C	V	-20% max. below 5 kHz	+10 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	-14 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	81.4 dB	
Adjacent Channel Selectivity Variance - Temperature -30°C	W	48 dB min.	58.3 dB	
+60°C	W	48 dB min.	69.9 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	68.7 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	52.6 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	62.3 dB	
<u>5.4.3 RECEIVER SQUELCH</u>				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.11 uV	
Threshold Squelch Variance- Voltage +10%	I	0.6 uV or less	0.10 uV	
-20%	I	0.6 uV or less	0.17 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	0.8 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-5.2 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-5.6 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.56 uV	
Tight Squelch Variance - Temperature -30°C	X	+6 dB max. above 4.0 uV	-15.1 dB	
+60°C	X	+6 dB max. above 4.0 uV	-10.8 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-9.8 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	4.1 kHz	*
5.4.3.3 Squelch Attack Time	K	150 ms max.	24 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	130 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2230

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	891 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	3.4 dB	
-20%	O	-3 dB max. below 500 mW	0.2 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	2.9 dB	
+60°C	Z	-6 dB max. below 500 mW	3.2 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	3.1 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	3.3 %	
Temperature -30°C	AB	18% max. at 500 mW	4.6 %	
+60°C	AB	18% max. at 500 mW	3.2 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	3.0 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	4.9 dB	
500 Hz		+6.0 dB (-10, +2 dB)	3.8 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.9 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-15.7 dB	
5.4.4.4 Audio Hum and Noise -				
Unscelched	S	40 dB min. below 500 mW	61.9 dB	
Scelched	T	50 dB min. below 500 mW	61.9 dB	
Audio Hum and Noise Variance -				
Unscelched				
Temperature -30°C	AA	30 dB min.	64.1 dB	
+60°C	AA	30 dB min.	63.3 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	62.8 dB	
Scelched				
Temperature -30°C	AA	40 dB min.	74.7 dB	
+60°C	AA	40 dB min.	76.5 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	72.4 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			3.5 W	
Measured			3.4 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.13 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.6 dB	
-10%	BB	±3 dB of nominal	-1.1 dB	
-20%	BC	-6, +3 dB of nominal	-2.2 dB	
Temperature -30°C	BN	±3 dB of nominal	0.1 dB	
+60°C	BN	±3 dB of nominal	-3.4 dB	*
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-0.9 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	-0.00006 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	-0.00009 %	
-15%	BE	0.0005% of nominal	-0.00007 %	
Temperature -30°C	BP	0.0005% of nominal	-0.00003 %	
+60°C	BP	0.0005% of nominal	-0.00002 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	-0.00024 %	
Vibration	BV	0.0005% of nominal	N	*1
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	40.5 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	15 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2230

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	6.0 %	*
Temperature Stability				
-30°C	BQ	9% max.	7.4 %	
+60°C	BQ	9% max.	5.2 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	24.4 dB	*
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	23.5 dB	*
+60°C	BO	34 dB min. attenuation	25.3 dB	*
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	27.8 dB	*
Vibration	BU	25 dB min. attenuation	N	*1
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-32.3 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-16.7 dB	*
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	3.7 dB	*
3000 Hz		+9.5 dB (+1, -4.6 dB)	3.7 dB	*
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.82 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	1.10 kHz	
500 Hz	BJ	≤5 kHz	4.32 kHz	
1000 Hz	BJ	≤5 kHz	4.82 kHz	
2500 Hz	BJ	≤5 kHz	4.15 kHz	
3000 Hz	BJ	≤5 kHz	3.90 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	49.5 dB	
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	-32 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	-52 dB	*
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	50% min.	23.0 %	*
Power Test Degradation	CB	1 dB max.	0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	2 hrs.	40 m ⁺ l.
-30°C	DB	2 hrs.	1 hr.	5 m. n.
+60°C	DC	7 hrs.		n

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2230

- This unit failed during the room temperature measurements (no RF output) and it was returned to a General Electric service shop for repair. Upon return of the repaired unit the room temperature tests were completed. During the vibration testing the RF output was found to be intermittent. NO measurements could be made. When the unit was checked without vibration, its operation was normal. During the +60°C portion of the battery service life test the test unit produced no audio output power.

FM TRANSCEIVER TEST DATA

MANUFACTURER: General Electric
 MODEL NO.: PY56YBSBH
 SERIAL NO.: 938261446
 TYPE: II

ITEM NO.: 2231
 RF POWER (Nominal): 2.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC
 (150-174 MHz)

REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY			
5.4.1	SINAD Sensitivity	A 0.5 uV or less	0.19 uV
	SINAD Sensitivity Variance - Voltage +10%	B 0.7 uV or less	0.18 uV
	-20%	B 0.7 uV or less	0.32 uV
	Temperature -30°C	U +6 dB max. above 0.5 uV	n
	+60°C	U +6 dB max. above 0.5 uV	n
	Humidity 50°C, 90% RH	AC +10 dB max. above 0.5 uV	n
5.4.2 RECEIVER SELECTIVITY			
5.4.2.1	Usable Bandwidth	C 5 kHz min.	7.2 kHz
	Usable Bandwidth Variance - Temperature -30°C	V -20% max. below 5 kHz	n
	+60°C	V -20% max. below 5 kHz	n
	Humidity 50°C, 90% RH	AD -20% max. below 5 kHz	n
5.4.2.2	Adjacent Channel Selectivity	D 70 dB min.	61.5 dB
	Adjacent Channel Selectivity Variance - Temperature -30°C	W 58 dB min.	n
	+60°C	W 58 dB min.	n
	Humidity 50°C, 90% RH	AE 58 dB min.	n
5.4.2.3	Spurious Response Attenuation	E 60 dB min.	>60 dB
5.4.2.4	Intermodulation Attenuation	F 60 dB min.	62.1 dB
5.4.3 RECEIVER SQUELCH			
5.4.3.1	Threshold Squelch Sensitivity	G 0.4 uV or less	0.05 uV
	Threshold Squelch Variance- Voltage +10%	I 0.6 uV or less	0.05 uV
	-20%	I 0.6 uV or less	0.09 uV
	Temperature -30°C	Y +6 dB max. above 0.4 uV	n
	+60°C	Y +6 dB max. above 0.4 uV	n
	Humidity 50°C, 90% RH	AG +10 dB max. above 0.4 uV	n
5.4.3.1	Tight Squelch Sensitivity	H 4.0 uV or less	0.44 uV
	Tight Squelch Variance - Temperature -30°C	X +6 dB max. above 4.0 uV	n
	+60°C	X +6 dB max. above 4.0 uV	n
	Humidity 50°C, 90% RH	AF +10 dB max. above 4.0 uV	n
5.4.3.2	Squelch Block	J 5 kHz min.	6.1 kHz
5.4.3.3	Squelch Attack Time	K 150 ms max.	23 ms
5.4.3.4	Squelch Release Time	L 250 ms max.	68 ms

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2231

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	878 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	3.4 dB	
Voltage -20%	O	-3 dB max. below 500 mW	0.0 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	n	
Temperature +60°C	Z	-6 dB max. below 500 mW	n	1
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	n	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	2.4 %	
Temperature -30°C	AB	18% max. at 500 mW	n	
Temperature +60°C	AB	18% max. at 500 mW	n	1
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	n	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	3.8 dB	
500 Hz		+6.0 dB (-10, +2 dB)	2.0 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.2 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-15.4 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquenced	S	40 dB min. below 500 mW	68.5 dB	
Squelched	T	50 dB min. below 500 mW	92.0 dB	
Audio Hum and Noise Variance -				
Unsquenced				
Temperature -30°C	AA	30 dB min.	n	
Temperature +60°C	AA	30 dB min.	n	1
Humidity 50°C, 90% RH	AI	30 dB min.	n	
Squelched				
Temperature -30°C	AA	40 dB min.	n	
Temperature +60°C	AA	40 dB min.	n	1
Humidity 50°C, 90% RH	AI	40 dB min.	n	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			2.0 W	
Measured			2.55 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	1.0 dB	
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	1.8 dB	
Voltage -10%	BB	±3 dB of nominal	0.0 dB	
Voltage -20%	BC	-6, +3 dB of nominal	-1.5 dB	
Temperature -30°C	BN	±3 dB of nominal	n	
Temperature +60°C	BN	±3 dB of nominal	n	1
Humidity 50°C, 90% RH	BR	±3 dB of nominal	n	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00003 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00003 %	
Voltage -15%	BE	0.0005% of nominal	0.00001 %	
Temperature -30°C	BP	0.0005% of nominal	n	1
Temperature +60°C	BP	0.0005% of nominal	n	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	n	
Vibration	BV	0.0005% of nominal	n	*1
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	76.7 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	15 ms	

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2231

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	7.2 %	*
Temperature Stability -30°C	BQ	9% max.	n	1
Temperature +60°C	BQ	9% max.	n	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	38.6 dB	*
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	n	
Temperature +60°C	BO	34 dB min. attenuation	n	1
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	n	
Vibration	BU	25 dB min. attenuation	n	*1
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-24.8 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-14.5 dB	*
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	5.7 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	4.3 dB	*
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.80 kHz	
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	2.35 kHz	
500 Hz	BJ	≤5 kHz	4.60 kHz	
1000 Hz	BJ	≤5 kHz	4.75 kHz	
2500 Hz	BJ	≤5 kHz	3.60 kHz	
3000 Hz	BJ	≤5 kHz	3.30 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	n	1
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	30.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	60.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	n	1
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	2 hrs. 24 min.	
-30°C	DB	2 hrs.	n	
+60°C	DC	7 hrs.	n	1

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FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2231

- The test item operated properly for all room temperature tests excluding vibration, radiated spurious emissions and antenna efficiency. During the vibration test the RF output was found too intermittent and no measurements were performed. Spot checking the transmitter without vibration indicated normal operation. During the +60°C environment, the test unit failed to operate. The unit was spot checked at room temperature and found not to be operating. The unit was sent to a General Electric service facility for repair. The long turn-around time for the repair prohibited any further environmental testing to be performed. Upon return of the repaired unit, it was spot checked and found to be operating, but during the radiated spurious emissions and antenna efficiency tests, the unit failed with an indication of no RF output power.

FM TRANSCEIVER TEST DATA

MANUFACTURER: General Electric
 MODEL NO.: PY65YBSBMX
 SERIAL NO.: 938261546
 TYPE: III

ITEM NO.: 2232
 RF POWER (Nominal): 4.0 Watts
 TEST FREQUENCIES: T- 464.500 MHz
 R- 464.500 MHz

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.31 uV	
SINAD Sensitivity Variance -				
Voltage +10%	B	0.7 uV or less	0.31 uV	
-20%	B	0.7 uV or less	0.31 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	1.0 dB	
+60°C	U	+6 dB max. above 0.5 uV	-1.9 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	1.3 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	7.6 kHz	
Usable Bandwidth Variance -				
Temperature -30°C	V	-20% max. below 5 kHz	2.0 %	
+60°C	V	-20% max. below 5 kHz	8.0 %	
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	16.0 %	
5.4.2.2 Adjacent Channel Selectivity	D	60 dB min.	84.4 dB	
Adjacent Channel Selectivity				
Variance -				
Temperature -30°C	W	48 dB min.	73.8 dB	
+60°C	W	48 dB min.	76.3 dB	
Humidity 50°C, 90% RH	AE	48 dB min.	79.8 dB	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	55.2 dB	*
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	64.3 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.11 uV	
Threshold Squelch Variance-				
Voltage +10%	I	0.6 uV or less	0.10 uV	
-20%	I	0.6 uV or less	0.18 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-2.5 dB	
+60°C	Y	+6 dB max. above 0.4 uV	-4.8 dB	
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	-3.1 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	1.42 uV	
Tight Squelch Variance -				
Temperature -30°C	X	+6 dB max. above 4.0 uV	-1.9 dB	
+60°C	X	+6 dB max. above 4.0 uV	-4.8 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-3.4 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	5.2 kHz	
5.4.3.3 Squelch Attack Time	K	150 ms max.	24 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	140 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2232

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	980 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	3.5 dB	
Voltage -20%	O	-3 dB max. below 500 mW	0.2 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	3.1 dB	
Temperature +60°C	Z	-6 dB max. below 500 mW	3.2 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	3.1 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	2.9 %	
Temperature -30°C	AB	18% max. at 500 mW	5.2 %	
Temperature +60°C	AB	18% max. at 500 mW	1.2 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	1.1 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	5.0 dB	
500 Hz		+6.0 dB (-10, +2 dB)	1.7 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-7.6 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-14.3 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelled	S	40 dB min. below 500 mW	66.5 dB	
Squelled	T	50 dB min. below 500 mW	89.1 dB	
Audio Hum and Noise Variance -				
Unsquelled				
Temperature -30°C	AA	30 dB min.	60.4 dB	
Temperature +60°C	AA	30 dB min.	66.5 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	64.1 dB	
Squelled				
Temperature -30°C	AA	40 dB min.	75.1 dB	
Temperature +60°C	AA	40 dB min.	82.5 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	71.1 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			4.0 W	
Measured			3.68 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.36 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	1.1 dB	
Voltage -10%	BB	±3 dB of nominal	-1.6 dB	
Voltage -20%	BC	-6, +3 dB of nominal	-2.6 dB	
Temperature -30°C	BN	±3 dB of nominal	0.0 dB	
Temperature +60°C	BN	±3 dB of nominal	-0.5 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-1.2 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	-0.00015 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00013 %	
Voltage -15%	BE	0.0005% of nominal	0.00011 %	
Temperature -30°C	BP	0.0005% of nominal	0.00016 %	
Temperature +60°C	BP	0.0005% of nominal	0.00013 %	
Humidity 50°C, 90% RH	BT	0.0005% of nominal	0.00031 %	
Vibration	BY	0.0005% of nominal	0.00030 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	69.8 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	n	1

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FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2232

TRANSCEIVER CHARACTERISTIC (400-512 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	17.5 %	*
Temperature Stability				
-30°C	BQ	9% max.	9.2 %	*
+60°C	BQ	9% max.	7.4 %	*
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	26.9 dB	*
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	24.9 dB	*
Temperature +60°C	BO	34 dB min. attenuation	28.7 dB	*
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	28.1 dB	*
Vibration	BU	25 dB min. attenuation	23.0 dB	*
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-23.6 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-13.8 dB	*
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	7.8 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	7.1 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.20 kHz	*
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤ 5 kHz	2.35 kHz	
500 Hz	BJ	≤ 5 kHz	3.90 kHz	
1000 Hz	BJ	≤ 5 kHz	4.10 kHz	
2500 Hz	BJ	≤ 5 kHz	3.10 kHz	
3000 Hz	BJ	≤ 5 kHz	2.82 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	n	2
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	37.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	60.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	50% min.	n	2
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	n	
-30°C	DB	2 hrs.	n	1
+60°C	DC	7 hrs.	n	

2232-3

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2232

1. No test was conducted. The mechanical push-to-talk (PTT) switch used in this transceiver was not adaptable for making accurate measurements of carrier attack time, and battery service life.
2. The unit failed to operate (no RF output power) during the radiated spurious emissions and antenna efficiency tests.

FM TRANSCEIVER TEST DATA

MANUFACTURER: General Electric
 MODEL NO.: PE66RBSBH
 SERIAL NO.: 938261246
 TYPE: II

ITEM NO.: 2233
 RF POWER (Nominal): 5.0 Watts
 TEST FREQUENCIES: T- 151.625 MHz
 R- 151.625 MHz

TRANSCEIVER CHARACTERISTIC
 (150-174 MHz)

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY				
5.4.1 SINAD Sensitivity	A	0.5 uV or less	0.31 uV	
SINAD Sensitivity Variance - Voltage +10%	B	0.7 uV or less	0.30 uV	
-20%	B	0.7 uV or less	0.52 uV	
Temperature -30°C	U	+6 dB max. above 0.5 uV	-5.4 dB	
+60°C	U	+6 dB max. above 0.5 uV	-2.4 dB	
Humidity 50°C, 90% RH	AC	+10 dB max. above 0.5 uV	5.1 dB	
5.4.2 RECEIVER SELECTIVITY				
5.4.2.1 Usable Bandwidth	C	5 kHz min.	7.6 kHz	
Usable Bandwidth Variance - Temperature -30°C	V	-20% max. below 5 kHz	28 %	
+60°C	V	-20% max. below 5 kHz	N	*1
Humidity 50°C, 90% RH	AD	-20% max. below 5 kHz	26 %	
5.4.2.2 Adjacent Channel Selectivity	D	70 dB min.	89.3 dB	
Adjacent Channel Selectivity Variance - Temperature -30°C	W	58 dB min.	N	*1
+60°C	W	58 dB min.	N	*1
Humidity 50°C, 90% RH	AE	58 dB min.	70.3	
5.4.2.3 Spurious Response Attenuation	E	60 dB min.	>60.0 dB	
5.4.2.4 Intermodulation Attenuation	F	60 dB min.	80.5 dB	
5.4.3 RECEIVER SQUELCH				
5.4.3.1 Threshold Squelch Sensitivity	G	0.4 uV or less	0.13 uV	
Threshold Squelch Variance - Voltage +10%	I	0.6 uV or less	0.13 uV	
-20%	I	0.6 uV or less	0.56 uV	
Temperature -30°C	Y	+6 dB max. above 0.4 uV	-11.2 dB	
+60°C	Y	+6 dB max. above 0.4 uV	N	*1
Humidity 50°C, 90% RH	AG	+10 dB max. above 0.4 uV	0.4 dB	
5.4.3.1 Tight Squelch Sensitivity	H	4.0 uV or less	0.58 uV	
Tight Squelch Variance - Temperature -30°C	X	+6 dB max. above 4.0 uV	-17.4 dB	
+60°C	X	+6 dB max. above 4.0 uV	-14.9 dB	
Humidity 50°C, 90% RH	AF	+10 dB max. above 4.0 uV	-9.1 dB	
5.4.3.2 Squelch Block	J	5 kHz min.	4.8 kHz	*
5.4.3.3 Squelch Attack Time	K	150 ms max.	24 ms	
5.4.3.4 Squelch Release Time	L	250 ms max.	192 ms	

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2233

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	780 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	2.8 dB	
-20%	O	-3 dB max. below 500 mW	0.1 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	2.3 dB	
+60°C	Z	-6 dB max. below 500 mW	2.8 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	2.9 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	13.3 %	*
Temperature -30°C	AB	18% max. at 500 mW	3.3 %	
+60°C	AB	18% max. at 500 mW	3.8 %	1
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	11.0 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	5.6 dB	
500 Hz		+6.0 dB (-10, +2 dB)	3.7 dB	
1000 Hz		0 dB 0 dB	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.7 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-15.9 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquelled	S	40 dB min. below 500 mW	67.5 dB	
Squelled	T	50 dB min. below 500 mW	86.0 dB	
Audio Hum and Noise Variance -				
Unsquelled				
Temperature -30°C	AA	30 dB min.	N	*1
+60°C	AA	30 dB min.	60.0 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	66.5 dB	
Squelled				
Temperature -30°C	AA	40 dB min.	N	*1
+60°C	AA	40 dB min.	72.3 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	72.3 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			5.0 W	
Measured			4.18 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-0.78 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	0.4 dB	
-10%	BB	±3 dB of nominal	-1.9 dB	
-20%	BC	-6, +3 dB of nominal	-3.2 dB	
Temperature -30°C	BN	±3 dB of nominal	-0.7 dB	
+60°C	BN	±3 dB of nominal	-1.7 dB	
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-1.6 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.0005% of nominal	0.00003 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.0005% of nominal	0.00003 %	
-15%	BE	0.0005% of nominal	0.00004 %	
Temperature -30°C	BP	0.0005% of nominal	0.00017 %	
+60°C	BP	0.0005% of nominal	-0.00027 %	
Humidity 50°C, 90% RH	ET	0.0005% of nominal	-0.00027 %	
Vibration	BV	0.0005% of nominal	-0.00027 %	
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	67.7 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	4 ms	

2233-2

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2233

TRANSCEIVER CHARACTERISTIC (150-174 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION				
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	4.3 %	
Temperature Stability				
-30°C	BQ	9% max.	11.0 %	*
+60°C	BQ	9% max.	4.3 %	
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	38.4 dB	*
FM Hum and Noise Stability				
Temperature -30°C	BO	34 dB min. attenuation	22.7 dB	*
+60°C	BO	34 dB min. attenuation	36.9 dB	
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	36.3 dB	
Vibration	BU	25 dB min. attenuation	N	*2
5.5.2.3 Audio Frequency Response				
300 Hz		-10.5 dB (+1, -3 dB)	-31.1 dB	*
500 Hz		-6.0 dB (+1, -3 dB)	-16.6 dB	*
1000 Hz		0 dB 0 dB	0.0 dB	
2500 Hz		+8.0 dB (+1, -3 dB)	5.7 dB	
3000 Hz		+9.5 dB (+1, -4.6 dB)	5.4 dB	
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.15 kHz	*
5.5.2.5 Modulation Limiting				
300 Hz	BJ	≤5 kHz	0.92 kHz	
500 Hz	BJ	≤5 kHz	4.05 kHz	
1000 Hz	BJ	≤5 kHz	4.15 kHz	
2500 Hz	BJ	≤5 kHz	3.40 kHz	
3000 Hz	BJ	≤5 kHz	3.17 kHz	
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY				
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	38.0 dB	*
5.5.3.2 Sideband Spectrum -				
±10 kHz Freq. Separation	BL	30 dB min. attenuation	40.0 dB	
±20 kHz Freq. Separation	BM	60 dB min. attenuation	60.0 dB	
5.6 ANTENNA				
5.6.1 Radiation Efficiency	CA	20% min.	16.0 %	*
Power Test Degradation	CB	1 dB max.	0.0 dB	
5.7 BATTERY (NI-CAD)				
Service Life: 20 to 30°C	DA	8 hrs.	2 hrs. 55 min.	
-30°C	DB	2 hrs.	1 hr. 10 min.	
+60°C	DC	7 hrs.	n	1

2233-3

FM TRANSCEIVER TEST DATA (continued)

NOTES AND COMMENTS

ITEM NO.: 2233

1. The test unit had intermittent audio output during the +60°C and -30°C environmental conditions. Data that was recorded at these conditions is of limited value because of the above observations. A spot check of the test item at room temperature conditions indicated normal operation.
2. The transceiver met the vibration requirement during 10-20 Hz vibration with an attenuation of 29.2 dB. During 30-60 Hz vibration deviation was too unstable to permit measurement to be made.

FM TRANSCEIVER TEST DATA

MANUFACTURER: General Electric
 MODEL NO.: PE 54RBSBAX
 SERIAL NO.: 938261146
 TYPE: I

ITEM NO.: 2234
 RF POWER (Nominal): 2.0 Watts
 TEST FREQUENCIES: T- 34.525 MHz
 R- 34.525 MHz

TRANSCEIVER CHARACTERISTIC
 (25-50 MHz)

REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.1 RECEIVER SENSITIVITY			
5.4.1	SINAD Sensitivity	A 0.5 uV or less	0.47 uV
	SINAD Sensitivity Variance - Voltage +10%	B 0.7 uV or less	0.48 uV
	-20%	B 0.7 uV or less	0.51 uV
	Temperature -30°C	U +6 dB max. above 0.5 uV	N
	+60°C	U +6 dB max. above 0.5 uV	-0.5 dB
	Humidity 50°C, 90% RH	AC +10 dB max. above 0.5 uV	-0.4 dB
5.4.2 RECEIVER SELECTIVITY			
5.4.2.1	Usable Bandwidth	C 5 kHz min.	7.50 kHz
	Usable Bandwidth Variance - Temperature -30°C	V -20% max. below 5 kHz	N
	+60°C	V -20% max. below 5 kHz	42.0 %
	Humidity 50°C, 90% RH	AD -20% max. below 5 kHz	42.0 %
5.4.2.2	Adjacent Channel Selectivity	D 60 dB min.	84.1 dB
	Adjacent Channel Selectivity Variance - Temperature -30°C	W 48 dB min.	N
	+60°C	W 48 dB min.	66.4 dB
5.4.2.3	Humidity 50°C, 90% RH	AE 48 dB min.	81.4 dB
5.4.2.4	Spurious Response Attenuation	E 70 dB min.	>70.0 dB
	Intermodulation Attenuation	F 70 dB min.	67.8 dB
5.4.3 RECEIVER SQUELCH			
5.4.3.1	Threshold Squelch Sensitivity	G 0.3 uV or less	0.19 uV
	Threshold Squelch Variance- Voltage +10%	I 0.45 uV or less	0.24 uV
	-20%	I 0.45 uV or less	0.16 uV
	Temperature -30°C	Y +6 dB max. above 0.30 uV	N
	+60°C	Y +6 dB max. above 0.30 uV	-3.5 dB
	Humidity 50°C, 90% RH	AG +10 dB max. above 0.30 uV	-4.5 dB
5.4.3.1	Tight Squelch Sensitivity	H 3.0 uV or less	1.1 uV
	Tight Squelch Variance - Temperature -30°C	X +6 dB max. above 3.0 uV	N
	+60°C	X +6 dB max. above 3.0 uV	-11.1 dB
	Humidity 50°C, 90% RH	AF +10 dB max. above 3.0 uV	-11.3 dB
5.4.3.2	Squelch Block	J 5 kHz min.	3.8 kHz
5.4.3.3	Squelch Attack Time	K 150 ms max.	25 ms
5.4.3.4	Squelch Release Time	L 250 ms max.	174 ms

*-Requirement of NILECJ Standard was not met. See fourth page for notes and comments.
 N-No test data was obtained. Requirement was not met.
 n-No test data was obtained. No evaluation was made.

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2234

TRANSCEIVER CHARACTERISTIC (25-50 MHz)	REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.4.4 RECEIVER AUDIO FREQUENCY				
5.4.4.1 Audio Output Power (Speaker)	M	500 mW min.	858 mW	
Audio Output Power Variance -				
Voltage +10%	O	-3 dB max. below 500 mW	3.3 dB	
-20%	O	-3 dB max. below 500 mW	0.1 dB	
Temperature -30°C	Z	-6 dB max. below 500 mW	N	*1
+60°C	Z	-6 dB max. below 500 mW	2.8 dB	
Humidity 50°C, 90% RH	AH	-3 dB max. below 500 mW	1.8 dB	
5.4.4.2 Audio Distortion (Speaker)	P	10% max. at 500 mW	3.4 %	
Temperature -30°C	AB	18% max. at 500 mW	N	*1
+60°C	AB	18% max. at 500 mW	3.2 %	
Humidity 50°C, 90% RH	AJ	18% max. at 500 mW	3.4 %	
5.4.4.3 Audio Frequency Response (Speaker)	Q			
300 Hz		+10.5 dB (-10, +2 dB)	5.3 dB	
500 Hz		+6.0 dB (-10, +2 dB)	3.9 dB	
1000 Hz		0 dB (0, 0 dB)	0.0 dB	
2000 Hz		-6.0 dB (-10, +2 dB)	-8.9 dB	
3000 Hz		-9.5 dB (-10, +2 dB)	-16.0 dB	
5.4.4.4 Audio Hum and Noise -				
Unsquenced	S	40 dB min. below 500 mW	66.9 dB	
Squenced	T	50 dB min. below 500 mW	90.5 dB	
Audio Hum and Noise Variance -				
Unsquenced				
Temperature -30°C	AA	30 dB min.	N	*1
+60°C	AA	30 dB min.	72.0 dB	
Humidity 50°C, 90% RH	AI	30 dB min.	66.9 dB	
Squenced				
Temperature -30°C	AA	40 dB min.	N	*1
+60°C	AA	40 dB min.	76.5 dB	
Humidity 50°C, 90% RH	AI	40 dB min.	72.0 dB	
5.5.1 TRANSMITTER RF CARRIER				
5.5.1.1 Carrier Output Power				
Rated (nominal)			2.0 W	
Measured			1.42 W	
Relation to Rated Output	BA	-0.3, +1 dB of nominal	-1.5 dB	*
Carrier Output Power Variance -				
Voltage +10%	BB	±3 dB of nominal	-0.5 dB	
-10%	BB	±3 dB of nominal	-2.8 dB	
-20%	BC	-6, +3 dB of nominal	-4.4 dB	
Temperature -30°C	BN	±3 dB of nominal	N	*2
+60°C	BN	±3 dB of nominal	N	*2
Humidity 50°C, 90% RH	BR	±3 dB of nominal	-1.3 dB	
5.5.1.2 Carrier Frequency Tolerance	BD	0.002% of nominal	0.00087 %	
5.5.1.2 Carrier Frequency Stability -				
Voltage +15%	BE	0.002% of nominal	0.00058 %	
-15%	BE	0.002% of nominal	0.00087 %	
Temperature -30°C	BP	0.002% of nominal	N	*2
+60°C	BP	0.002% of nominal	N	*2
Humidity 50°C, 90% RH	BT	0.002% of nominal	0.00058 %	
Vibration	BV	0.002% of nominal	N	*3
5.5.1.3 AM Hum and Noise Level	BF	34 dB min. attenuation	66.6 dB	
5.5.1.4 Carrier Attack Time	BG	100 ms max.	4 ms	

2234-2

FM TRANSCEIVER TEST DATA (continued)

ITEM NO.: 2234

TRANSCEIVER CHARACTERISTIC
(25-50 MHz)

REF.	PERFORMANCE REQUIREMENT DEC-'78 NILECJ-STD-0209.00	TEST RESULTS	NOTES
5.5.2 TRANSMITTER AUDIO FREQUENCY MODULATION			
5.5.2.1 Audio Frequency Harmonic Distortion	BH	5% max.	3.2 %
Temperature Stability			
-30°C	BQ	9% max.	N
+60°C	BQ	9% max.	N
5.5.2.2 FM Hum and Noise Level	BI	40 dB min. attenuation	34.1 dB
FM Hum and Noise Stability			
Temperature -30°C	BO	34 dB min. attenuation	N
+60°C	BO	34 dB min. attenuation	N
Humidity 50°C, 90% RH	BS	34 dB min. attenuation	36.2 dB
Vibration	BU	25 dB min. attenuation	N
5.5.2.3 Audio Frequency Response			
300 Hz		-10.5 dB (+1, -3 dB)	-21.1 dB
500 Hz		-6.0 dB (+1, -3 dB)	-12.0 dB
1000 Hz		0 dB (0, 0 dB)	0.0 dB
2500 Hz		+8.0 dB (+1, -3 dB)	+9.4 dB
3000 Hz		+9.5 dB (+1, -4.6 dB)	-8.5 dB
5.5.2.4 Frequency Deviation	BJ	Limits: 4.5125 - 4.9875 kHz	4.00 kHz
5.5.2.5 Modulation Limiting			
300 Hz	BJ	5 kHz	2.77 kHz
500 Hz	BJ	5 kHz	3.87 kHz
1000 Hz	BJ	5 kHz	3.92 kHz
2500 Hz	BJ	5 kHz	3.70 kHz
3000 Hz	BJ	5 kHz	3.25 kHz
5.5.3 TRANSMITTER ELECTROMAGNETIC COMPATIBILITY			
5.5.3.1 Radiated Spurious Emissions	BK	43 dB min. attenuation	n
5.5.3.2 Sideband Spectrum -			
±10 kHz Freq. Separation	BL	25 dB min. attenuation	36.0 dB
±20 kHz Freq. Separation	BM	50 dB min. attenuation	60.0 dB
5.6 ANTENNA			
5.6.1 Radiation Efficiency	CA	N/A	N/A
Power Test Degradation	CB	2 dB max.	0 dB
5.7 BATTERY (NI-CAD)			
Service Life: 20 to 30°C	DA	8 hrs.	3 hrs. 0 min.
-30°C	DB	2 hrs.	n
+60°C	DC	7 hrs.	n

2234-3

FM TRANSCEIVER TEST DATA (Continued)

NOTES AND COMMENTS

ITEM NO.: 2234

1. The receiver failed to produce 500 mW of audio at -30°C but operated normally during post room temperature check.
2. The transmitter failed to produce RF output power at $+60^{\circ}\text{C}$ and -30°C but operated normally during post room temperature check.
3. The transmitter produced intermittent RF output during vibration but operated normally during non-vibration spot check.
4. The transmitter failed to operate during radiated spurious emission test. (Last test to be performed.)

2234-4

END