REPORT OF MEASUREMENTS

LINEAR CORPORATION
FCC ID: EF4 SST00091A
Model : DXS-63 Wristband Alarm Transmitter

The enclosed documents reflect the requirements contained generally within the code of Federal Regulations, Title 47, Parts 2 and 15 as most recently published October 1, 1997 and all other applicable revisions made by the Commission since that time.

The specific rule sections for which the enclosed documents demonstrate compliance or rely upon to demonstrate compliance with the Commission's application and technical standards are as follows:

15.201-15.207, 15.231, Subpart C, Intentional Radiators.

Test Procedure C63.4-1992, Section 13, Measurement of Intentional Radiators was used for the testing of this device.

All of the information contained within this documentation is true, correct, and complete to the best of my knowledge.

In accord with Section 2.948 of the Commission's Rules, a Test Site submittal dated January 27, 1998 is on file with the Commission and a Letter of Acceptance dated March 13, 1998 (File 31040/SIT) is a portion of the Commission's records.

John W. Kuivinen, P.E.
Regulatory Compliance Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN W. KUIVINEN
ELECTRICAL
STATE OF CALIFORNIA

1/8/99
Date

TESTING INSTRUMENTATION AND EQUIPMENT LIST

SPECTRUM ANALYZERS:

H.P.	HP8562A	1KHz to 22GHz		
	S/N 2913A03742	Calibrated	4/98	
		Due	4/99	

ANTENNAS:

(2)	Ailtech DM105A T1	20-200 MHz		Tuned Dipole
	S/N 93412-105 and 93412-114	Calibrated 1/98	Due:	1/99
(2)	Ailtech DM105A T2	140-400 MHz	Tuned Dipole	
	S/N 93413-113 and 93413-117	Calibrated 1/98	Due:	1/99
(2)	Ailtech DM105A T3	400-1000 MHz	Tuned Dipole	
	S/N 93413-105 and 93414-111	Calibrated 1/98	Due	1/99
(2)	AH Systems SAS-200/511	1-12.4 GHz		Log Periodic
	S/N 118 and 124, P/Ns 2069			
(1)	AH Systems SAS-200/540	20-330 MHz		Biconical
	S/N 367 P/N 2052			

INSTRUMENTATION:

HP	HP8656B RF Generator	100 KHz - 99O MHz	
	S/N A4229590	Calibrated	1/98
		Due	1/99
Solar Electronics Line Impedance Stabilization Network, Type			
	8012-50-R-24-BNC	Calibrated:	1/98
	S/N 8379585	Due:	1/99
HP 8447D	Broadband preamplifier, 0.1-1300 MHz		
	S/N 2443A03660	Calibrated: 4/98	
		Due: 4/99	
Mini-Circuits	ZFL-2000 broadband preamplifier, 10-3000 MHz		
	S/N Lin 001	Calibrated: 4/98	
		Due: 4/99	

ACCESSORIES:

(2) Ailtech Rulers calibrated in MHz
4 Meter ABS Antenna Mast and Trolley
Tektronix C5C Scope Camera
Eighty Centimeter Tall, Motorized Wooden Turntable
BNC to BNC Cables - as-required

(2) 25' RG-214/U Low-loss Coaxial Cable
S/N- LIN001 & LIN002 Calibrated: 1/98
Due: 1/99

(2) 3' RG-55/U Low-loss Coaxial Cable, calibarated as part of the preamplifiers. Automatically taken into account when used with the above itemized range preamplifiers.

MEASUREMENT OF RADIO FREQUENCY EMISSION OF CONTROL AND SECURITY ALARM DEVICES FCC RULES PART 15, C63.4-1992 TEST PROCEDURE

I. INTRODUCTION

As part of a continuing series of quality control tests to ensure compliance with all applicable Rules and Regulations, this enclosure details the test procedures for certain radio control devices. Testing was performed at a test site located on the property of Linear Corporation, 2055 Corte del Nogal, Carlsbad, California 92009.

II. MEASUREMENT FACILITY DESCRIPTION

The test facility is a specially prepared area adequately combining the desirability of an interference free location with the convenience of nearby 120 volt power outlets, thus completely eliminating the incidence of inverter hash, so often a problem with field measurements.

III. DESCRIPTION OF SUPPORTING STRUCTURES

For Measuring Equipment - The antenna is supported on a trolley that can be raised and lowered on a mast by means of remote control to any level between 1 meter and 4 meters above the ground. For measurements at 3 meters, an antenna height (center of dipole) of about 1 meter generally yields the greatest field strength. For measurements at 1 meter, an antenna height equal to the device under test generally yields the greatest field strength. Usually, horizontal polarization yields the greatest field strength for both 1 and 3 meter measurements.

For Equipment Under Test (EUT): The equipment to be tested is supported by a wooden turntable at a height of eighty centimeters. A two-axis swivel at the top of the turntable permits the unit under test to be manually oriented in the position of maximum received signal strength. The turntable can be rotated by remote control.

Test Configuration - All transmitters were located eighty centimeters above ground, at a distance of three meters from the antenna. They were each oriented for maximum radiation by rotating the turntable. The antenna was then moved vertically along the mast for optimum reception in both horizontal and vertical planes. Where no emissions were found, the antenna was also moved to one-meter distance to improve system sensitivity.

All receivers were located eighty centimeters above ground, at a distance of three meters from the antenna. They were each oriented for maximum radiation by rotating the turntable. The antenna was then moved vertically along the mast for optimum reception in both horizontal and vertical planes. Generally, emissions were very close to the observed spectrum analyzer noise floor, making accurate measurement difficult because of the analyzer detector's characteristic of adding signal and noise. To better observe and measure emissions well above the noise floor, the antenna was moved in to one meter. This provides a theoretical 9.54 dB improvement in received field strength, but a possible shift from far field to near field antenna characteristics may introduce an unknown error in measurement.

All transmitters and receivers tested are typical of production units.

A Hewlett-Packard spectrum analyzer consisting of an 8562A mainframe is used for the field strength meter. A set of Ailtech DM-105 series dipoles are used for the receiving antennas up to 1 GHz. An A.H. Systems model SAS-200/511 log periodic antenna is used from 1 to 5 GHz. Since the published antenna factor includes the small amount of balun loss, this factor is not included in the equations for correcting measured values. The cable loss is added to the raw data. For measurements up to 1 GHz, a Hewlett-Packard 8447D broadband RF preamplifier is inserted between the antenna cable and spectrum analyzer input to ensure adequate system sensitivity while measuring.

From 1 GHz to 3 GHz, a Mini-Circuits ZFL-2000 broadband RF preamplifier is used instead of the HP 8447D. In many cases, the antenna is moved in to a distance of 1 meter to enhance test range sensitivity after the 3 meter data is observed. A theoretical 9.54dB improvement is realized. Please see Excel data spreadsheet for details. For a particular device and frequency, the EUT to antenna distance is specified in the Report of Measurements.

Correction of Measured Values - The spectrum analyzer calibration is in units of dBm absolute. Published antenna factor, measured cable loss and preamplifier gain are in units of dB. All equipment is referenced to a 50 ohm characteristic impedance; therefore, any impedance terms will factor out of any calculations. Also, balun loss is included in the antenna factor, so this term will not appear in any calculation.

To obtain field strength, the reference (50 ohm system) 1 uV = 0 dBuV = -107 dBm is used.

For a given frequency: antenna factor, cable loss, preamplifier gain (if used) and a 9.54 dB gain factor (3 meters to 1 meter field strength conversion) when required are factored into the spectrum analyzer reading, resulting in a field strength in units of dBm.

Field strength reading (dBm) + 107 dB = dBuV, using 0 dBuV = 1 uV/meter at a specified distance as reference.

All of the equipment was calibrated to NBS-traceable factory specifications prior to the date of measurement.

IV MEASUREMENT PROCEDURE

Transmitters

1. Set the DIP-switch rockers of the transmitter (if needed) to all ON, jam the button in the ON position, and place the transmitter on the test stand.
2. Tune the antenna (if required).
3. Tune the spectrum analyzer.
4. Adjust the antenna height and polarization for peak field strength.
5. Rotate the turntable to orient the transmitter for the highest reading.
6. Record the observed peak emission.
7. Record the screen image (if required).

Spectrum Analyzer Control Settings:

Tuning:	As required
Bandwidth	100 KHz for Field Strength,
Scan Width:	100 KHz/div (may be different when tuning or adjusting display for photographs)
Input Attenuator:	10 dB
Scan Time:	50 mSec. sweep
Reference Level:	0 dBm
Display Mode:	Log 10 dB/division
Video Filter:	OFF
Scan Mode:	Internal
Scan Trigger:	Auto

REPORT OF MEASUREMENTS

Applications for control,security alarm,door opener or remote switch

Description: 315.00 MHz transmitter DXS format supervised TX

DATE: May 15, 1998

ITEM TESTED: DXS-63 Emergency Alarm Transmitter
MANUFACTURER: Linear Corporation
TRADE NAME: N/A
PRODUCT ID: EF4 SST00091A

DISTANCE AT WHICH MEASURED: 3 meters, DUT 0.8 meters above ground
REFERENCE: 15.231
MEASUREMENT PROCEDURE: C63.4-1992

RADIATION: 15.231

A	B	C		D		E		F	G	H	I	J	K	L	M	N	P	Q
Tuned Frequency MHz	Emission Frequency MHz	Ambient Level dBm		FCC Limit dBm		Meter Reading dBm	UUT & Ant. Pos.**	Antenna Factor dB	Cable Loss dB	Amp Gain dB	Dist Fac dB	Duty Cycle dB	Emission Data dBm/mtr	dBuV/mtr	uV/M	FCC Limit uV/M	dB:FCC	FREQ. MHz
315.00	315.00	-98.40		-3.98	V	-17.6	H H	18.6	1.2	27.2	0.00	20.0	-45.00	62.00	1258.93	6042.00	-13.62	315.00
	630.00	-89.80		-32.58	H	-61.7	H H	26.0	1.7	26.5	0.00	20.0	-80.50	26.50	21.13	604.00	-29.12	630.00
	945.00	-85.90		-36.48	H	-57.0	H H	29.4	2.2	26.5	0.00	20.0	-71.90	35.10	56.89	604.00	-20.52	945.00
	1260.00	-82.00		-40.38	H	-60.5	H H	26.8	2.6	20.4	0.00	20.0	-71.50	35.50	59.57	604.00	-20.12	1260.00
	1575.00	-79.10		-43.28	H	-58.6	H H	28.7	3.0	19.8	0.00	20.0	-66.70	40.30	103.51	604.00	-15.32	1575.00
	1890.00	-77.40		-44.98	H	-67.4	H H	30.0	3.3	19.7	0.00	20.0	-73.80	33.20	45.71	604.00	-22.42	1890.00
	2205.00	-85.14	*	-37.92	*	#N/A	H H	30.8	3.6	18.3	9.54	20.0	#N/A	#N/A	#N/A	605.00	#N/A	2205.00
	2520.00	-84.04	*	-43.14	*	#N/A	H H	31.7	3.8	14.2	9.54	20.0	#N/A	#N/A	#N/A	604.00	#N/A	2520.00
	2835.00	-82.94	*	-46.94	*	#N/A	H H	32.4	4.2	11.5	9.54	20.0	#N/A	#N/A	#N/A	604.00	#N/A	2835.00
	3150.00	-82.04	*	-59.34	*	#N/A	H H	33.1	4.4	0.0	9.54	20.0	#N/A	#N/A	#N/A	604.00	#N/A	3150.00

NOTES:
* 1 meter measurement corrected to 3 meters
** Device (UUT) and antenna position = H (horizontal) or V (Vertical)

The spectrum was searched from 25 to 3500 MHz
No other emissions were observed except those shown on this page.

15.207 Conducted Emissions Not Applicable- Battery Powered

John W. Kuwman 1/8/99 (signed)
TESTED BY DATE

John W Kuwman 5/15/98 (DATA MEASUREMENTS)
ENGINEER DATE

FILE NAME: SST063_1.XLS DISK NAME: FCC DATA

Reference: Application EF4 SST00091A

Supervised Emergency Transmitter

The status or low battery transmissions of the SST00091 supervised handheld transmitters are limited to 8 data words of 100 mSec. Each every four hours. This is done to conserve battery power and insure that even in the presence of heavy interference at least one status word every 8 hours will be received by the supervised receiver.

From first data bit to the last data bit of a status transmission, the total time is 785 mSec. or 0.785 seconds. FCC Rules 15.231(a)(3) permits regular status transmissions of no longer than 1 second every hour.

The transmitter is normally manually activated. It is used only for emergency signals or remote control of a security/alarm system. As such the transmitter may be operated continuously by the user (FCC Rules 15.231(a)(4)). However, due to battery constraints and an accidental continuous activation causing interference to the system, the maximum manually activated transmission is no longer than 30 seconds.

An emergency transmission will immediately cease transmission upon the completion of a current data word (maximum duration of 85 mSec.). FCC Rules 15.231 (a)(1) allows no longer than 5 seconds upon the release of a manually activated transmitter.

Signed:

John W. Kuivinen, P.E.
Regulatory Compliance Engineer

1.0 DESCRIPTION

The DXS-63 is a low power, two button, three channel, medical/emergency alarm transmitter operating at a frequency of 315 MHz. The signal is a binary coded, pulse-position type D modulated transmission which has an information rate of approximately 200 bits per second (bps). The DXS-63 is water-resistant and is designed to be worn on the wrist when fitted with the wrist strap or around the neck with the nylon cord provided.

The DXS-63 is designed to work with DX code compatible receivers such as the DXR-701 and DXR-702 and the 2400 and 2408 consoles.

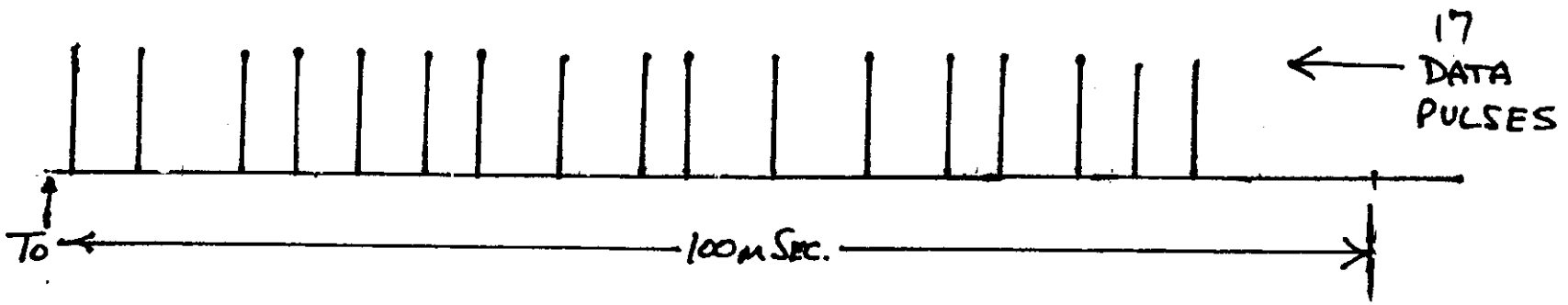
2.0 OPERATION

Depressing either switch, S2 (channel one) or S3 (channel two), activates the transmitter. Depressing both S2 and S3 together activates channel three. Transmission will continue for a maximum of 30 seconds if the switch is held down. A piezo enunciator, Y1, emits, an audible tone and light emitting diode, DS1, is illuminated during transmission. The audible tone and LED illumination both stop when the switches are released. When the battery voltage goes below 2.2 volts, the LED will not light. Pressing either switch five times within two seconds enables status supervision. The DXS-63 will emit five beeps to indicate that the status mode is enabled. Once the status mode is enabled it cannot be disabled. Status transmissions are sent every four hours. The piezo will not sound during status transmissions except when the battery is low.

The digital modulation is programmed into microprocessor, U1. Data is output at pin 3 of U1. SAW resonator, FR1, controls frequency of oscillation. Final amplifier, Q3, drives antenna, E1, with the modulated signal. Antenna, E1, is tuned by C5. Low voltage detector, U2, monitors battery voltage and pulls U1, pin 5 low when battery voltage goes below 2.2 volts.

Product Identification:	DXS-63 three channel Medical Pendant Transmitter
Encoding Technique:	A1D Pulse-Position Modulation @ 200 bits/sec
Number of Codes:	1,048,576
RF Carrier Frequency:	315 MHz +/- 125 kHz
Power Requirements:	3 VDC battery (Lithium Type 2025)
Operating Temperature Range:	0 degrees C to +50 degrees C
Timing:	30-second maximum transmission when button held continuously.
Size:	PCB only 1.2" x 1.05" x 0.24" (approx.)
Other Specifications:	Current consumption: 4 mA (MAX) Transmitting, 2uA standby.

All Specifications are nominal.



Transmitter Duty Cycle Calculations
and Time Domain Information
DX Data Format

Worst case duty cycle is computed because coded pulse width type A1D modulation is used. Data rate is seventeen 500 uSec pulses in any 100 mSec. time window.

During transmission, the transmitter sequentially emits a group of 17 encoded pulses in the form of a pulse-keyed carrier. The data stream consists of preamble and encoded data string.

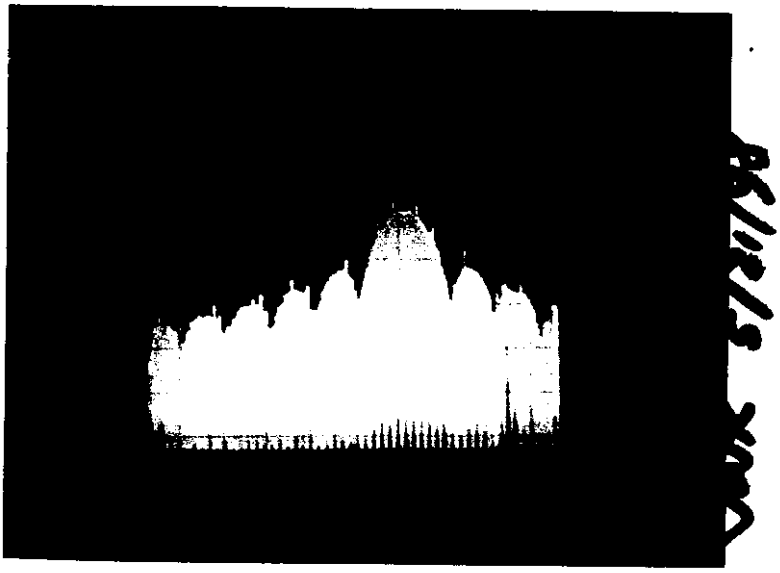
REAL TIME ANALYSIS:

Description	Total Time	"On" Time
Total Transmission	17 x 500 uSec. = 8.5 E-3 Sec on time	

In compliance with FCC Rules 15.35(c), the following duty cycle factor is used for all field strength calculations. A 100 mSec. full word time window is selected with the worst case programmable on time ratio.

$\frac{\text{8.5 E-3 On time}}{\text{100 E-3 Total time Window}}$ = 8.5 E-2 on time per 100 mSec. time window

20 log (8.5E-2) = -21.4 dB Duty Cycle Ratio (Per FCC Rules)



DEVICE: DXS-63 Wristband Alarm Transmitter

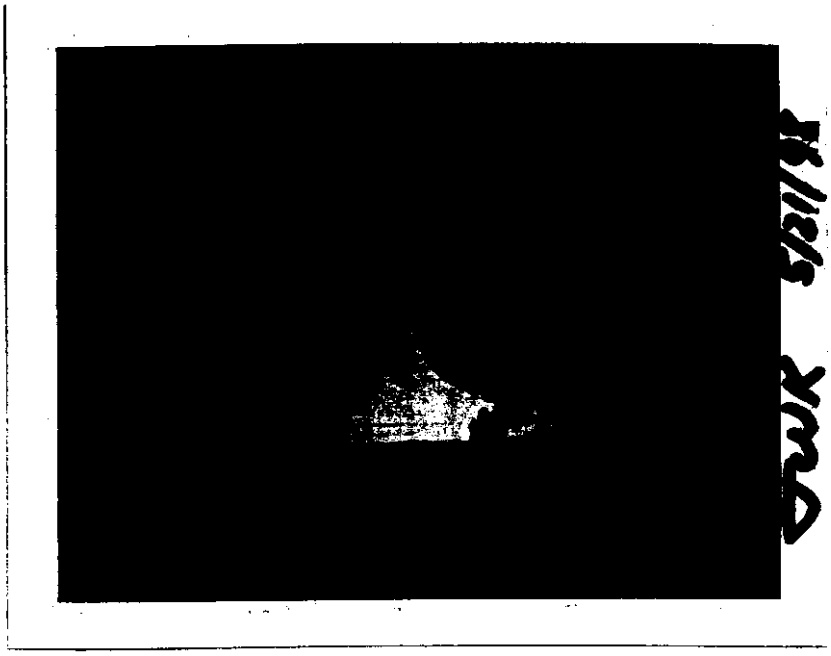
PHOTOGRAPH: Occupied Bandwidth

CONDITIONS: Transmitter Fundamental. A1D Modulation - Pulse Position Modulation. Fixed Duty Cycle. SAW Resonator Frequency Determining Element.

SPECTRUM ANALYZER CONTROL SETTINGS

CENTER FREQUENCY:	315.00 MHz	INPUT ATTENUATION:	-10 dB
SCAN WIDTH:	2.0 KHz/ DIV.	PREAMPLIFIER GAIN:	0 dB
SCAN TIME:	500 mSEC/DIV.	LOG REF. LEVEL:	-20 dBm
RF BANDWIDTH:	300 Hz		
ANTENNA:	9" Whip on Analyzer Input	TUNED TO:	N/A MHz
ANTENNA DISTANCE:	0.25 Meters	ANTENNA HEIGHT:	N/A
SYSTEM NOISE FLOOR:	N/A		

NOTES: Per 15.231(c), Occupied Bandwidth (20 dB down) is less than +/- 7 KHz. This is less than 0.005% of the center frequency. FCC Rules, 15.231(c) devices must be less than 0.25% of center frequency. This device therefore complies with 15.231(c).



DEVICE: DXS-63 Wristband Alarm Transmitter

PHOTOGRAPH: Transmitter Spurious Emissions +/- 5 MHz of the center freq.

CONDITIONS: Transmitter Fundamental. A1D Modulation, SAW Resonator Frequency Determining Element.

SPECTRUM ANALYZER CONTROL SETTINGS

CENTER FREQUENCY:	315.00 MHz	INPUT ATTENUATION:	-10 dB
SCAN WIDTH:	1.0 MHz/ DIV.	PREAMPLIFIER GAIN:	0 dB
SCAN TIME:	100 mSEC/DIV.	LOG REF. LEVEL:	-20 dBm
RF BANDWIDTH:	10 KHz		
ANTENNA:	9" Whip on Analyzer Input	TUNED TO:	N/A MHz
ANTENNA DISTANCE:	0.25 Meters	ANTENNA HEIGHT:	N/A
SYSTEM NOISE FLOOR:	N/A		

No fundamental emissions occur outside of the of the rated center freq. The oscillator is locked to the SAW stabilized frequency determining element.

DXS-62
DXS-63


DXS-62


DXS-63

SUPERVISED EMERGENCY TRANSMITTERS

Operation Instructions

Linear®

(760) 438-7000 • FAX (760) 438-7043
USA & Canada (800) 421-1587 & (800) 392-0123
Toll Free FAX (800) 468-1340

PRODUCT DESCRIPTION

The Models DXS-62 and DXS-63 are battery powered, miniature, water-resistant, supervised transmitters designed for use in emergency applications with Linear's DX and DXS Format receivers. Each is supplied with a wristband, a pocket clip, and a Nylon pendant necklace. Pressing a button on either transmitter sends a digital coded wireless signal to its companion receiver. **To insure sending a complete signal, press the transmitter button for a minimum of two seconds.**

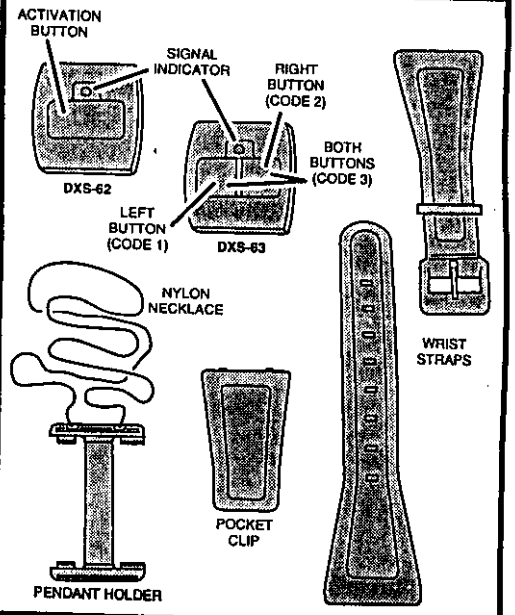
Each DXS transmitter is factory set to a unique code, so no field coding is required. The one-button DXS-62 sends a single code when its button is pressed. The two-button DXS-63 transmitter can send three different codes: the left button sends code one, the right button sends code two, pressing both buttons together sends code three. These transmitters can send a signal for up to 30 seconds per activation. The red signal indicator on the transmitter lights and a built-in sounder beeps when the unit is activated.

Each transmitter self-monitors its battery's condition and is able to send timed automatic status reports (status reports are optional). Every four hours the transmitter tests for a low battery. If the battery tests low, a low battery signal is sent. If status transmissions are enabled, they will be sent every four hours. Some receivers are able to use these signals, others are not. The transmitter's sounder will beep during any supervisory transmission with a low battery.

Receivers must be programmed to the transmitter's code before system testing and operation. Refer to the receiver's instructions for details on operation and programming.

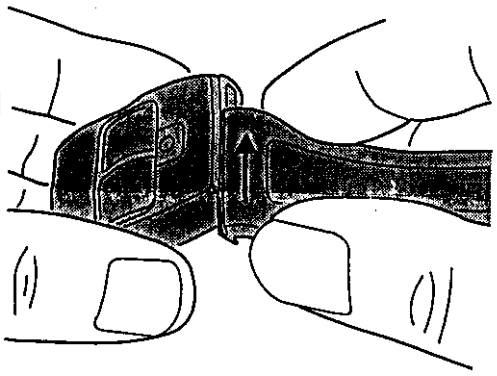
Each transmitter is sealed to provide water-resistance. The unit's battery is not replaceable. The transmitter should be discarded at the end of its battery life (up to seven years).

FEATURES



WRISTBAND INSTALLATION

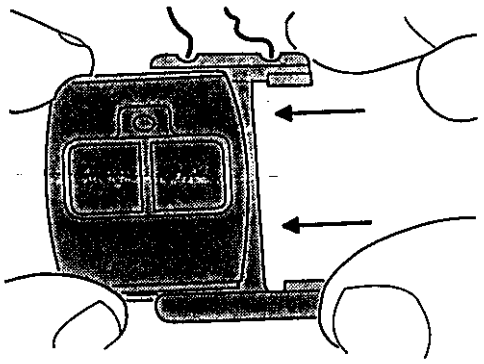
TO INSTALL WRISTBAND, SLIDE STRAPS INTO SLOTS ON ENDS OF TRANSMITTER



NOTE: BUCKLE SIDE OF STRAP ATTACHES TO THE END CLOSEST TO THE SIGNAL INDICATOR

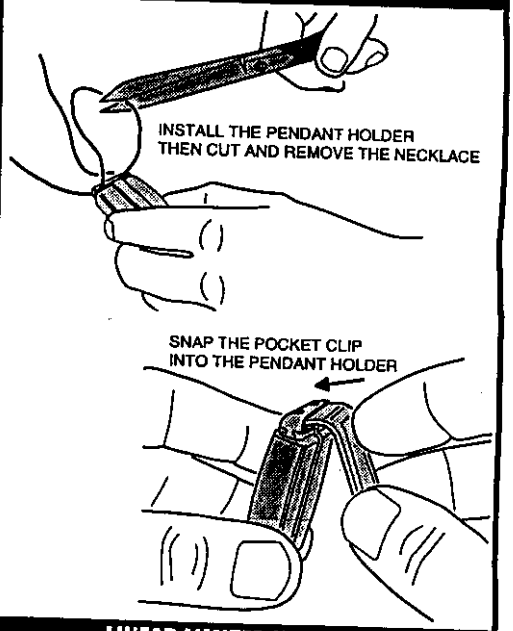
PENDANT HOLDER INSTALLATION

TO INSTALL PENDANT HOLDER, SLIDE HOLDER INTO SLOTS ON ENDS OF TRANSMITTER



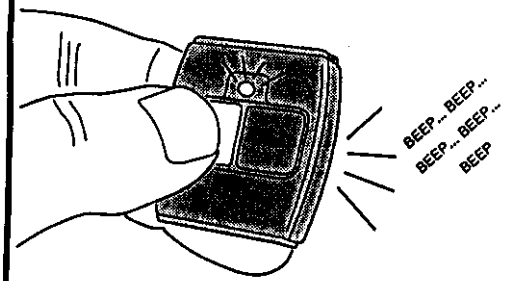
NOTE: NECKLACE SIDE OF PENDANT HOLDER FITS CLOSEST TO THE SIGNAL INDICATOR

POCKET CLIP INSTALLATION



STATUS OPTION & PROGRAMMING

IF THE FOUR HOUR STATUS TIMER IS REQUIRED FOR SUPERVISION, PERMANENTLY ENABLE THE TIMER BY PRESSING THE TRANSMITTER BUTTON FIVE TIMES IN SUCCESSION (USE THE LEFT BUTTON ON DXS-63). THE TRANSMITTER WILL SOUND A BEEP AFTER EACH BUTTON PRESS, THEN FIVE BEEPS WHEN THE TIMER IS ENABLED.



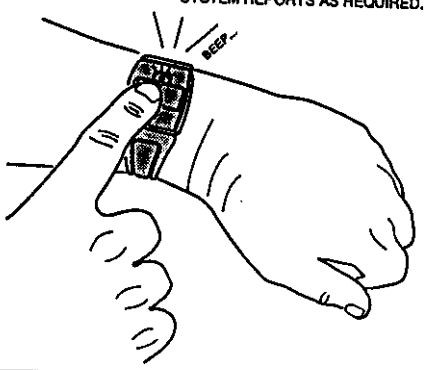
PROGRAM THE TRANSMITTER INTO THE RECEIVER BY PLACING THE RECEIVER INTO PROGRAM MODE, THEN SEND A SIGNAL TO THE RECEIVER FROM THE TRANSMITTER. REFER TO THE RECEIVER'S PROGRAMMING INSTRUCTIONS FOR DETAILS.

SYSTEM TESTING

IMPORTANT! TEST SYSTEM WEEKLY

The manufacturer strongly recommends that you test security equipment frequently. Over a period of time, no electronic products are better than the inspection and maintenence they receive. Therefore, from the time of installation, it is absolutely necessary to test the system at least once a week.

PLACE THE RECEIVER IN A "TEST" MODE AND ACTIVATE THE TRANSMITTTER. VERIFY THAT THE SIGNAL IS RECEIVED AND THAT THE SYSTEM REPORTS AS REQUIRED.



LINEAR LIMITED WARRANTY

This Linear product is warranted against defects in material and workmanship for twelve (12) months. The Warranty Expiration Date is labeled on the product. This warranty extends only to wholesale customers who buy direct from Linear or through Linear's normal distribution channels. Linear does not warrant this product to consumers. Consumers should inquire from their selling dealer as to the nature of the dealer's warranty, if any. There are no obligations or liabilities on the part of Linear corporation for consequential damages arising out of or in connection with use or performance of this product or other indirect damages with respect to loss of property, revenue, or profit, or cost of removal, installation, or reinstallation. All implied warranties, including implied warranties for merchantability and implied warranties for fitness, are valid only until Warranty Expiration Date as labeled on the product. This Linear Corporation Warranty is in lieu of all other warranties express or implied.

All products returned for warranty service require a Return Product Authorization Number (RPA#). Contact Linear Technical Services at 1-800-421-1587 for an RPA# and other important details.

IMPORTANT !!!

Linear radio controls provide a reliable communications link and fill an important need in portable wireless signaling. However, there are some limitations which must be observed.

* For U.S. installations only: The radios are required to comply with FCC Rules and Regulations as Part 15 devices. As such, they have limited transmitter power and therefore limited range.
* A receiver cannot respond to more than one transmitted signal at a time and may be blocked by radio signals that occur on or near their operating frequencies, regardless of code settings.
* Changes or modifications to the device may void FCC compliance.
* Infrequently used radio links should be tested regularly to protect against undetected interference or fault.
* A general knowledge of radio and its vagaries should be gained prior to acting as a wholesale distributor or dealer, and these facts should be communicated to the ultimate users.
* This device complies with FCC Part 15 and Canada Rules and Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.