

KTL Test Report: 1R03630

Applicant: Digital Security Controls Ltd.
3301 Langstaff Road
Vaughn, Ontario
L4K 4L2

**Equipment Under Test:
(E.U.T.)** LCD5501Z32-433
& PICON-433 Wireless Keypads

FCC ID: F53005501Z32433

In Accordance With: **FCC Part 15, Subpart B**
Radio Receivers

Tested By: KTL Ottawa Inc.
3325 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By:

G. Westwell, Technologist

Date:

Total Number of Pages: 15

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
FCC ID: F53005501Z32433

Table Of Contents

Section 1. Summary of Test Results..... 3

Section 2. General Equipment Specification 10

Section 3. Radiated Emissions..... 11

Section 4. Block Diagrams..... 14

Section 5. Test Equipment List 15

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
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Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart B. Measurement procedure ANSI C63.4-1992 was used for all tests. Radiated Emissions were measured on an open area test site.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

C	Y	Y
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Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Russell Grant, Wireless Group Manager

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This report applies only to the items tested.

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
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Summary Of Test Data

Name Of Test	Para. No.	Results
Antenna Conducted Emissions	15.111	N/A
Radiated Emissions	15.109	Complies
Powerline Conducted Emissions	15.107	N/A

This equipment has been previously approved for use in the United States under FCC ID. F53005501Z32433.

The receiver ASIC has been changed from Philips SA636 to RFMD2919. See attached description of changes. The basic design remains the same.

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FEDERAL COMMUNICATIONS
COMMISSION
WASHINGTON, D.C. 20554

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GRANT OF EQUIPMENT
AUTHORIZATION
Certification

Digital Security Controls Limited
3301 Langstaff Road

Date of Grant: 09/20/2000

Concord, Ontario Canada L4K 4L2

Application Dated: 08/24/2000

Attention: Kevin Harris

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: ~~F53005501Z32433~~

Name of Grantee: ~~Digital Security Controls Limited~~

Equipment Class: ~~Communications Receiver used w/Pt 15 Transmitter~~

Notes: ~~LCD5501Z32-433 & PICON-433 Keypads~~

Grant Notes

FCC Rule Parts
15

Frequency Range (MHZ)
433.92 - 433.92

Output Watts

Frequency Tolerance

Emission Designator

Mail To:

EA98555

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
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Differences between the Philips SA636DK and the RFMD 2919 Designs

Date Feb 23, 01

Device: LCD5501Z32 LC

The LCD5501Z32 LC rev 01 receiver was based on the Philips SA 636 as the receiver ASIC. This chip took the LO, which was provide by an external source (RFMD 2916), mixed it together with the RF input signal to produce an IF signal at 10.7 MHz. The SA636 then amplified the IF signal and demodulated it to obtain the resultant baseband information. The reference oscillator frequency for the LO PLL circuit was derived from the crystal of the main microprocessor chip. For the LCD5501Z32 LC rev 02 product, the Philips chip was replaced by the RFMD 2919. The RFMD 2919 performs the same functions as the Philips SA 636 except that it provides its own LO and hence eliminated the need for the RFMD 2916 and its supporting circuitry. The layout of the LCD5501Z32 LC was redone to accommodate the RFMD 2919 chip.

Please find attached a technical description of the receiver section for the LCD5501Z32 LC Rev 02. Block diagrams of the two designs are also available.

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
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CIRCUIT DESCRIPTION

Device: Narrow Band Receiver

Model: LCD 5502Z32 433 LC

ETSI Identifier:

Schematic Diagram:

Description:

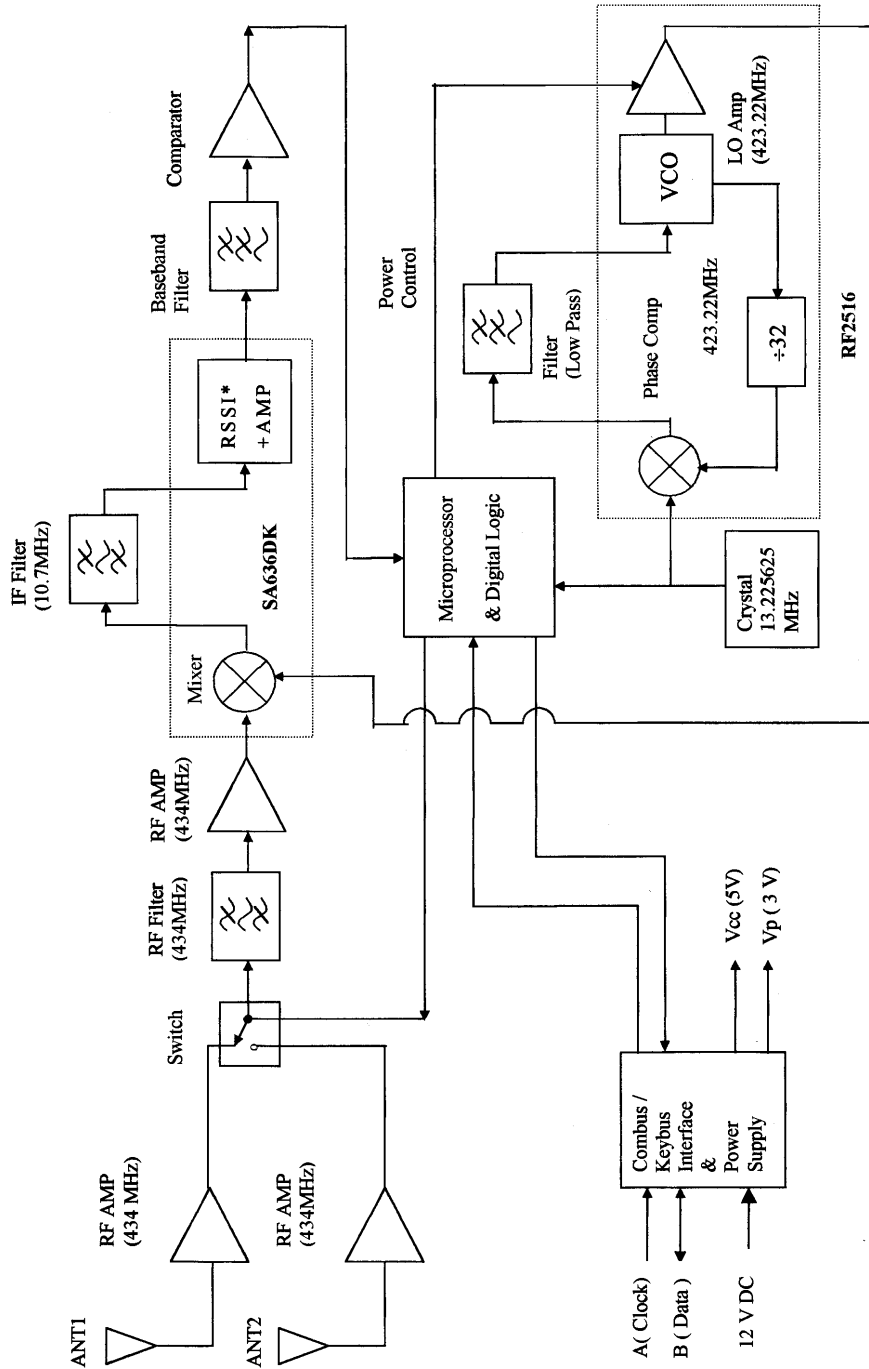
This is a description of the receiver section for the LCD5501Z32 433 LC product. The receiver of the LCD5501Z32 LC is a narrow band ASK design meant for 433.92MHz signal reception. It receives signals in the area of coverage, demodulate the signals then have those signals processed and acted upon by the microprocessor and digital section of the LCD5501Z32 LC.

The receiver can be divided into two main circuit sections, an ASK receiver and a control section which it shares with the other functions of the board.

ASK Receiver: The antenna receives the incoming signals and feeds them to the RF Front End amplifiers and filter to achieve good sensitivity and selectivity. The RF signal is then fed to the mixer. The mixer combines the signals from the RF filter and the local oscillator. The oscillator circuit consists of a crystal reference oscillator, a programmable divider, and a phase detector forming a phase-lock-loop (PLL) system. The PLL is responsible for locking the free running voltage control oscillator (VCO) to 423.22MHz. After mixing, a filter centered around 10.7 MHz is used to pass the desired IF signals to the IF amplifier and the demodulator. The demodulated signal from the Receiver chip is again externally filtered and shaped to derive the digital baseband information. This information is then presented to the microprocessor for decoding.

The Control Section: The digital control circuitry operates the selecting and switching of the two antennas that are terminated into the Front End of the receiver. It decodes the baseband information, makes the decision of whether or not the decoded information is a valid one and then acts upon it accordingly. It also monitors the receiver for any interference condition.

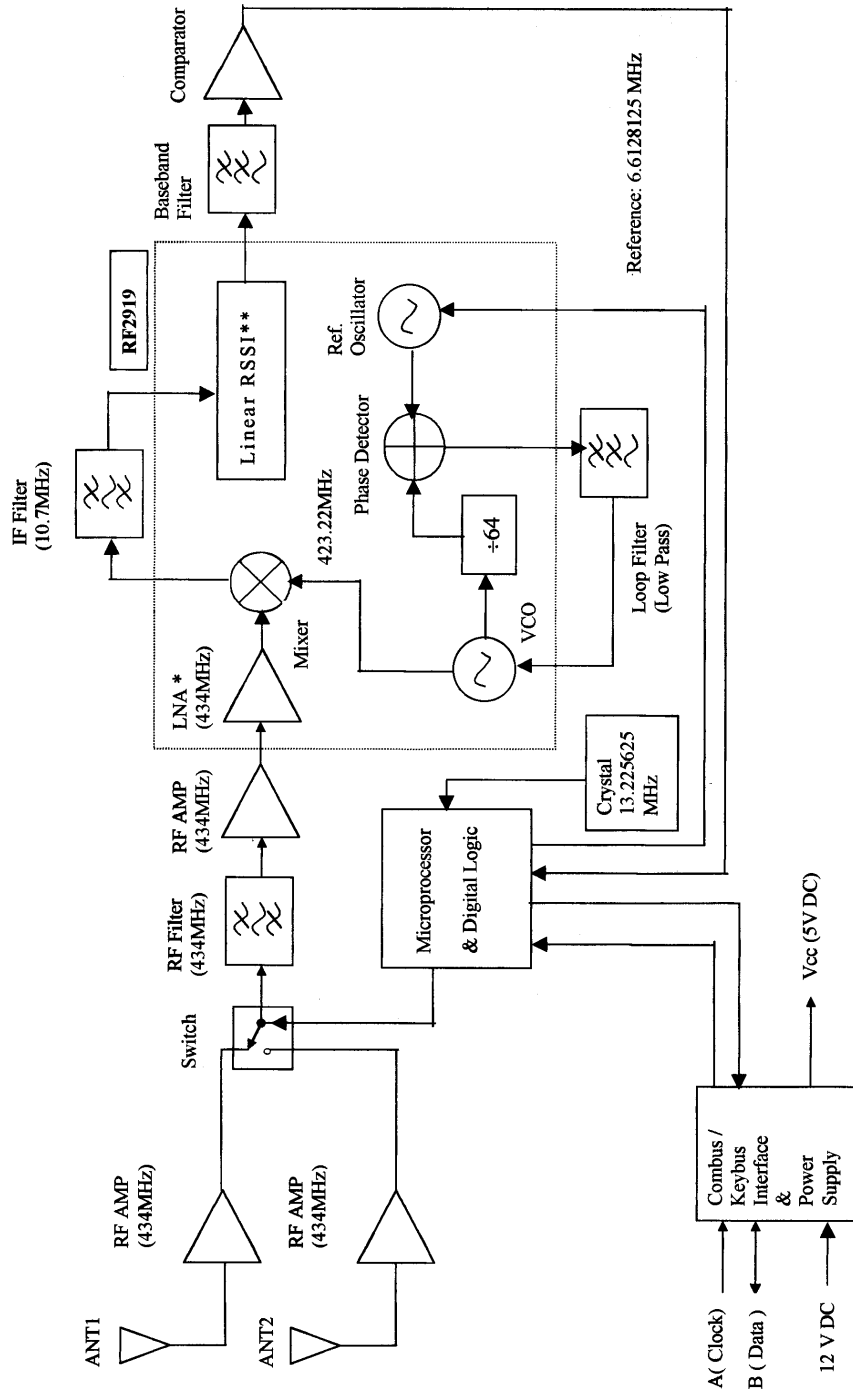
EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
FCC ID: F53005501Z32433



Note: * RSSI --- Received Signal Strength Indicator

BLOCK DIAGRAM
Device: LCD5501Z32 433.92 MHz WLS Receiver
Model: UA243 Rev.01
Date: Feb 23, 2001
FCC Identifier:
Industry Canada:

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
 FCC ID: F53005501Z32433



Note: * LNA --- Low Noise Amplifier
 ** RSSI --- Received Signal Strength Indicator

BLOCK DIAGRAM
 Device: LCD5501Z32 LC 433.92 Mhz
 Model: UA243 Rev. 02
 Date: Feb 23, 2001
 FCC Identifier:
 Industry Canada:

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
FCC ID: F53005501Z32433

Section 2. General Equipment Specification

Manufacturer: Digital Security Controls Ltd.

Date Received In Laboratory: February 26, 2001

KTL Identification No.: Item #1

Frequency Range: 433.92MHz

Number of Channels: 1

Primary Power Requirement: 12VDC Power Supply

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
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Section 3. Radiated Emissions

Para. No.: 15.109(a)

Test Performed By: Russell Grant	Date of Test: February 26, 2001
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Minimum Standard:

Frequency(MHz)	Field Strength (dBμV/m @ 3m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

Test Results: Complies. The worst-case emission level is 45.5 dB μ V/m @ 3m at 1269.66 MHz. This is 8.5 dB below the specification limit.

Measurement Data: See attached table.

For super-regenerative receivers the receiver is coerhered using a signal generator and dipole antenna.

Handheld equipment and equipment not designed to be mounted in any fixed orientation, the E.U.T. is tested in three orthogonal axis to obtain worst case results.

EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
 FCC ID: F53005501Z32433

Test Data - Radiated Emissions

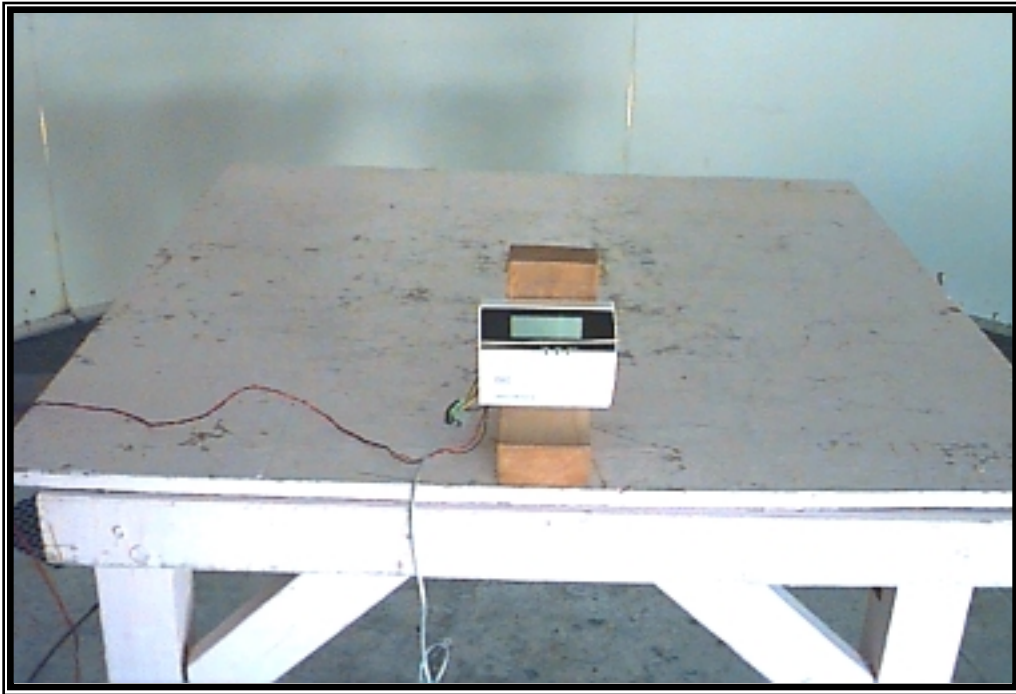
Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW(kHz): 120		Detector: Q-Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
423.22	E/D4	V	5.3	24.7			30.0	46.0	16.0
423.22	E/D4	H	5.2	24.7			29.9	46.0	16.1
846.44	E/D4	V	2.0	31.3			33.3	46.0	12.7
846.44	E/D4	H	-2.0	31.3			29.3	46.0	16.7
1269.66	E/D4	V	63.0	30.5	-48.0		45.5	54.0	8.5
1269.66	E/D4	H	55.0	30.5	-48.0		37.5	54.0	16.5
1692.88	E/D4	V	52.0	32.0	-48.0		36.0	54.0	18.0
1692.88	E/D4	H	59.0	32.0	-48.0		43.0	54.0	11.0

Notes:
 B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
 N.D. = Not Detected

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Radiated Photographs (Worst Case Configuration)

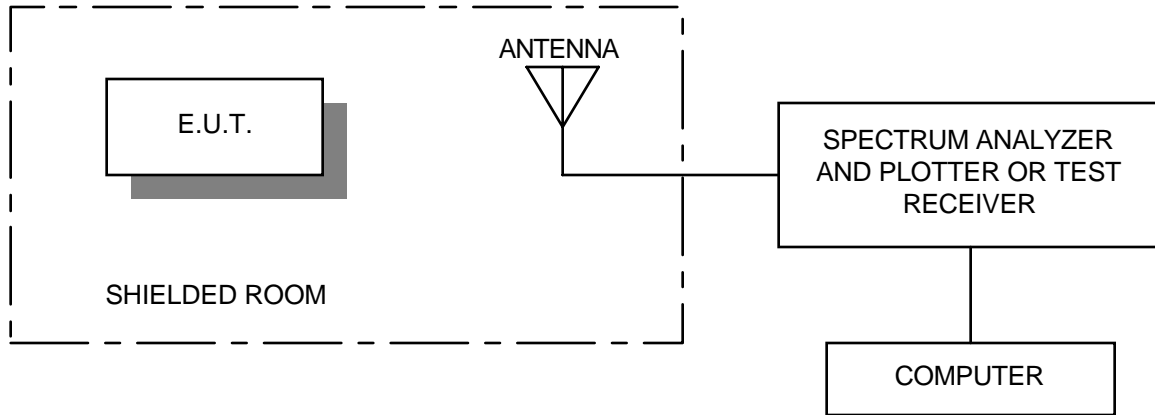
Front View



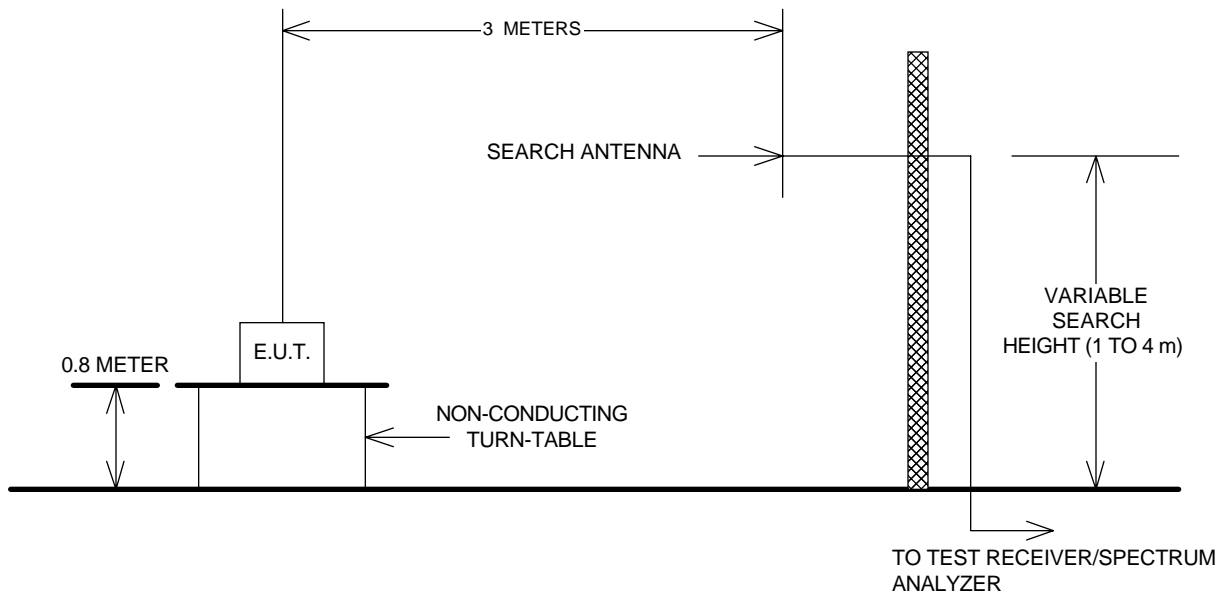
EQUIPMENT: LCD5501Z32-433 & PICON-433 Wireless Keypads
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Section 4. Block Diagrams

Radiated Prescan



Outdoor Test Site For Radiated Emissions



The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

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Section 5. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	April 5/00	April 5/01
1 Year	Horn Antenna	EMCO #2	3115	4336	Dec. 1/00	Dec. 1/01
1 Year	Dipole Antenna Set	EMCO #2	3121C	FA001349	June 27/00	June 27/01

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use