ADDENDUM # 1

REQUESTS FOR INFORMATION

10/05/2017

Can BRAA provide the manufacture, part number, age and quantity of the Noise Monitors to be supported?

Answer: There are currently six Lochard EMU2100 installed in 2005, and one Bruel & Kjaer Type 3639-A-200 – General purpose Permanent Noise Monitoring Terminal with 4952 microphone installed in 2017.

"Attachment A" does not appear to be provided with the document. Can you please provide a copy?

Answer: Attachment A has been added

What is the anticipated time frame for the Interview/Selection process, and how much time will the Respondent have for the demo?

Answer: Interview/selection is anticipated in November 2017. A 30-minute demonstration period will be allowed, with 15 additional minutes for questions and answers.

Could you please provide the following information on the current noise monitors:

a. technical specifications

Answer: The NMT specification diagram and mast construction diagrams have been attached.

b. brand, type, version, and features

Answer: The NMT user manual has been attached.

c. interface with noise monitoring software

Answer: Noise monitors are wirelessly connected to the ANOMS system.

d. production year, years in operation to date

Answer: The six Lochard EMU2100s have been in use since 2005, and the one Type 3669-A-200 was installed in 2017.

e. recent calibration reports

This information is currently unavailable.

f. maintenance reports with issues in the last three years

This information is currently unavailable.

Is the limit of 15 pages per proposal for each contract award, of for three contract request combined?

Answer: 15 pages per contract award.

For the Public Flight Tracking Web Portal, what amount of time does BRAA consider "near real-time" (i.e. 5 min, 10 min, etc. delay)?

Answer: 20 minutes or less is considered acceptable.

In the Proposal Requirements section it states: Failure to provide the information required by Items 1 through 8 below by the deadline for submission may result in a finding of non-responsiveness by the BRAA. There are only 6 items listed. Are there 2 missing?

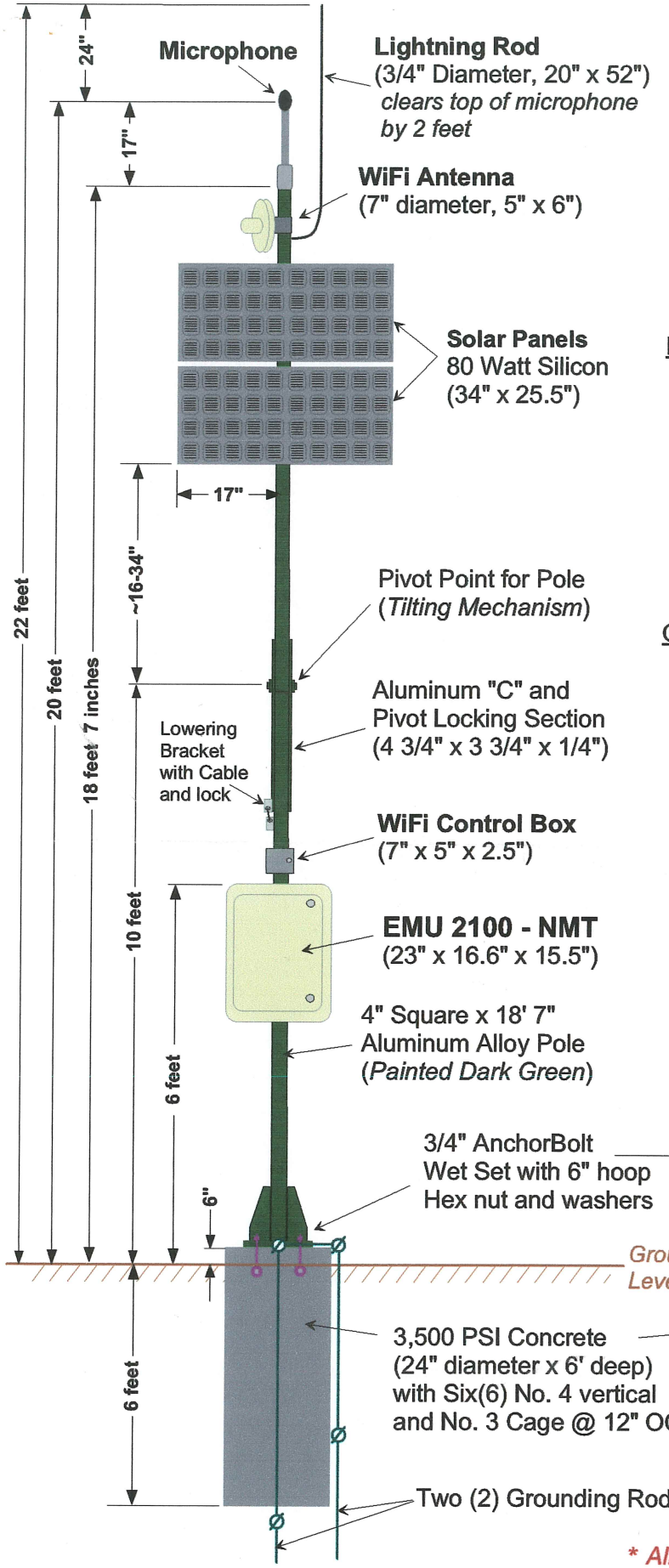
Answer: There are only 6 items.

LOCHARD

Boca Raton Airport Authority

BOCA RATON

NMT Pole Specifcation Diagram



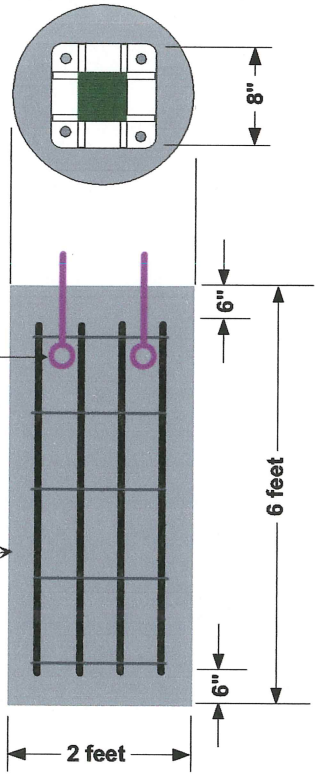
Environmental Monitoring Unit:

The EMU2100™ is the latest in a series of industry leading Noise Monitoring Terminals (NMT's) from Lochard. It is a self-contained, robust, unattended noise data-monitoring terminal, designed for remote installation in all weather environments. The EMU2100 is capable of collecting and handling data from multiple sources, storing it for extended periods, as well as transmitting to central processing systems for further analysis. These data sources include multiple noise paramenters, audio, optional weather and other internet enabled input sensors/sources.

Outdoor Microphone:

The Type 41AM microphone is designed for permanent outdoor-noise monitoring at airports or other locations. It complies with IEC 651 Type 1 and ANSI S1.4 1983 Type 1 requirements and can be used with any suitable electronic sound or vibration measurement system. It is PTB approved as part of an IEC 651Type 1 system.

Base/Mounting Details:



** All dimensions are approximate - **Not to Scale**.*

CITY OF BOCA RATON

BOCA RATON, FLORIDA

EMU MAST "H"
CONSTRUCTION DRAWINGS

MEA JOB No. 2004.4502

Prepared for

LOCHARD COMPANY

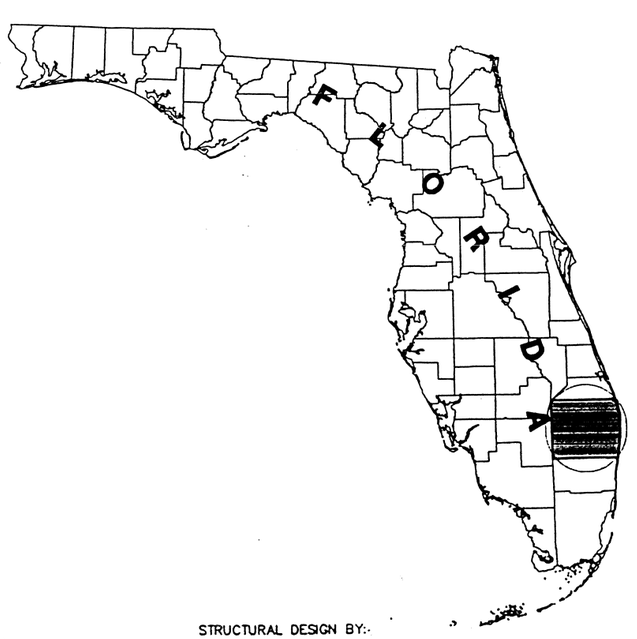
by

MEA GROUP, INC.
CONSULTING ENGINEERS AND PLANNERS
9015 TOWN CENTER PARKWAY, SUITE 105
LAKEWOOD RANCH, FL 34202 EB#0006170

JULY 1, 2005

INDEX OF DRAWINGS

N



PALM BEACH COUNTY

LOCATION MAP

CIVIL DESIGN BY:

CYNTHIA M. PORTNOY, P.E. DATE

REGISTERED ENGINEER No. 39603
STATE OF FLORIDA

STRUCTURAL DESIGN BY:
BILL M. GRAY, P.E.
542 RANGER LANE
LONGBOAT KEY, FL. 34228
(941) 383-2613

FL. REG. No. 46172

FILE NAME
xxxxx.xx_xxx
SHEET
1

STRUCTURAL NOTES

DESIGN
1. THE STRUCTURE DESCRIBED ON THE DRAWINGS HAS BEEN DESIGNED TO COMPLY WITH THE FLORIDA BUILDING CODE.
   WIND VELOCITY 140 MPH, 3 SECOND GUST
   EXPOSURE C
   CATEGORY II

2. DESIGN PRESSURES
   MAST 65 PSF
   SOLAR PANEL ASSEMBLY 41 PSF
   WIRELESS EQUIPMENT 41 PSF
   EMU CABINET 41 PSF

GENERAL
1. DRAWINGS ARE NOT TO BE SCALED.
2. NO PROVISIONS HAVE BEEN MADE IN THE STRUCTURAL DESIGN FOR TEMPORARY CONDITIONS OCCURRING DURING MAST INSTITUTION UNLESS SPECIFICALLY NOTED ON THE DRAWINGS. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SHORING AND BRACING REQUIRED TO RESIST STRESSES OR INSTABILITY OCCURRING DURING CONSTRUCTION. BRACING FOR STORMS SHALL BE THE OWNER'S RESPONSIBILITY.
3. REFER ALSO TO NOTES AND SCHEDULES ON THE DRAWINGS.

FOUNDATION
1. THE FOOTING DESIGN IS BASED ON AN ALLOWABLE SOIL PRESSURE BEARING OF 2000 PSF. PRIOR TO FOUNDATION CONSTRUCTION THE CONTRACTOR SHALL VERIFY THAT SOIL OF THIS VALUE IS FOUND ON THE SITE. SOIL OF THIS VALUE IS ASSUMED TO BE AT THE ELEVATIONS SHOWN. REPORT ANY VARIATIONS TO THE ENGINEER OF RECORD.
2. THE LINE OF SLOPE BETWEEN ADJACENT EXCAVATIONS FOR FOOTINGS OR ALONG STEP FOOTINGS SHALL NOT EXCEED A RISE OF 7:12. MAXIMUM FOOTING STEP DEPTH SHALL BE 2 FT.
3. KEEP FOOTING EXCAVATIONS CONTINUOUSLY DRY BEFORE PLACING CONCRETE. EXCAVATE MATERIAL SOFTENED BY WATER AND THICKEN FOOTING TO SUIT.

CONCRETE
1. CONCRETE MATERIALS, MIXING AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF ACI 301, ACI 318 AND ASTM C-94.
2. ALL ADMIXTURES SHALL CONFORM TO ASTM C-494 AND SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS.
3. REINFORCING STEEL SHALL COMPLY WITH ASTM A-615 GRADE 60 AND SHALL BE FREE FROM OIL, SCALE AND RUST.
4. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3500-PSI MINIMUM AT 28 DAYS WITH A SLUMP OF 6 INCHES MAXIMUM.
5. FOR READY MIX CONCRETE THE MAXIMUM TIME PERMITTED BETWEEN BATCHING AND DEPOSITING IN THE FORMS IS 90 MINUTES.

6. THE ADDITION OF WATER AT THE SITE TO ALTER THE SLUMP SHALL NOT BE ALLOWED.
   STRUCTURAL NOTES

7. THE MINIMUM LAP FOR CONTINUOUS REINFORCING STEEL IS 40 X BAR DIAMETER UNLESS OTHERWISE NOTED ON THE PLANS.
8. MINIMUM COVER FOR REINFORCING STEEL SHALL BE 3 INCHES.
9. ANCHORS IN CONCRETE SHALL BE WET SET ? INCH DIAMETER GALVANIZED OR STAINLESS STEEL RODS EMBEDDED A MINIMUM OF 18 INCHES WITH A 6-INCH END BEND.

COMPONENTS
1. THE STRUCTURAL INTEGRITY OF THE COMPONENTS AND THEIR ATTACHMENT TO THE MAST SHALL BE THE RESPONSIBILITY OF THE COMPONENT MANUFACTURER FOR THE FBC WIND LOADS SPECIFIC TO THE SITE. COMPONENT MOUNTING STRUCTURE DRAWINGS SHALL BE SIGN AND SEALED BY A FLORIDA REGISTERED ENGINEER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPONENT MOUNTING IN ACCORDANCE WITH THEE MANUFACTURER'S REQUIREMENTS.
3. THE COMPONENTS AND SUPPLIER ARE AS FOLLOWS:
   SOLAR COLLECTORS AND MOUNTING SYSTEM ALPHA SOLAR SYSTEMS
   MICROPHONE LOCHARD CORPORATION
   WIRELESS EQUIPMENT LOCHARD CORPORATION
   EMU LOCHARD CORPORATION

MAST MATERIALS
ALUMINUM 6061 SHEET AND PLATE SHALL BE PER ASTM B 209
ALUMINUM 6061 EXTRUSION SHALL BE PER ASTM B 221
ALUMINUM 6061 PIPE SHALL BE PER ASTM B 241
ALUMINUM EXTRUDED TUBING SHALL BE PER ASTM B 235
ALUMINUM 5052 SPECIAL SECTION SHALL BE PER ASTM B209
DEFORMED STEEL BARS FOR REINFORCED CONCRETE SHALL BE PER ASTM A 615
STAINLESS STEEL FASTENERS, WASHERS AND NUTS SHALL BE 300 SERIES PER ASTM A 276
ANCHOR BOLTS SHALL BE A325 GALVANIZED STEEL THREAD RODS

WELDING FABRICATION
1. FABRICATION - WELDING FABRICATION SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY, STRUCTURAL WELDING CODE - ALUMINUM (AWS D 1.2) AND FOLLOWED FOR THE PREPARATION FOR WELDING AND WELDING PROCEDURES.
2. WELDING OPERATORS WHO ARE CERTIFIED FOR WELDING ALUMINUM PARTS SHALL PERFORM THE WELDING.
3. WELD INSPECTION -AS A MINIMUM, INSPECTION SHALL BE VISUAL WITH THE USE OF SPECIFIC WELD GAGES. X-RAY, ZIGLOW AND OTHER NON-DESTRUCTIVE WELD INSPECTION PROCEDURES SHALL BE AT THE OPTION OF THE FABRICATOR TO ENSURE QUALITY WELDS. CRACKS IN WELDS SHALL BE MACHINED OR GROUND OUT AND REPLACED IN ACCORDANCE WITH THE WELDING CODE PROCEDURE. FLAME CUTTING SHALL NOT BE ALLOWED. PRIOR TO REWELDING, THE JOINT SHALL BE INSPECTED TO ASSURE THAT ALL THE DEFECTIVE WELD MATERIAL HAS BEEN REMOVED AND THAT THE JOINT IS ACCESSIBLE SO THAT THE WELDER CAN OBTAIN FULL PENETRATION THROUGH THE JOINT. THE FABRICATOR SHALL MAINTAIN INSPECTION LOGS FOR ALL WELD ITEMS INSPECTED AND / OR REWORKED.

STRUCTURAL NOTES

QUALITY CONTROL
THE FABRICATOR SHALL HAVE QUALITY CONTROL PROCEDURES IN PLACE IN CONFORMANCE WITH THE LATEST ISO MANUAL. INCLUDED SHALL BE SERIAL NUMBER IDENTIFICATION, CERTIFICATION OF COMPLIANCE FROM SUPPLIERS FOR MATERIAL IDENTIFIED PER THE DRAWING SPECIFICATION AND INSPECTION LOGS.

STRUCTURAL DESIGN BY:
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LAKEWOOD RANCH, FLORIDA 34202
PHONE: 941 342-6321
FAX NO.: 941 379-6474 EB-0006170

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

SCALE	AS SHOWN	
DESIGNED	EC	5/16/05
DRAWN	JEA	5/17/05
CHECKED	EC	5/18/15

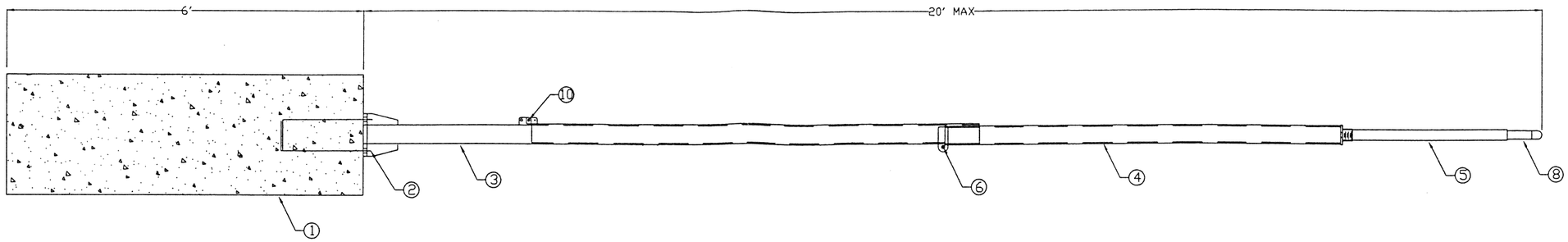
CLIENT: LOCHARD COMPANY
DWG NAME: EMUMAST.dwg
PROJECT NO.: 2004.4502

PROJECT NAME: BOCA RATON AIRPORT NOISE TOWER

SHEET NAME: STRUCTURAL NOTES

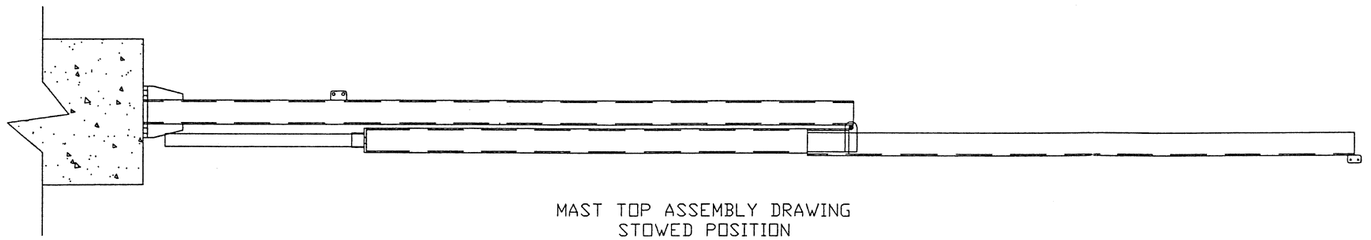
APPROVAL
BILL M. GRAY, P.E.
REGISTERED ENGINEER NO. STATE OF FLORIDA: 46172
DATE

SHEET NO. 2



MAST TOP ASSEMBLY DRAWING
OPERATIONAL POSITION (NO COMPONENTS)
1"=1'-0"

3



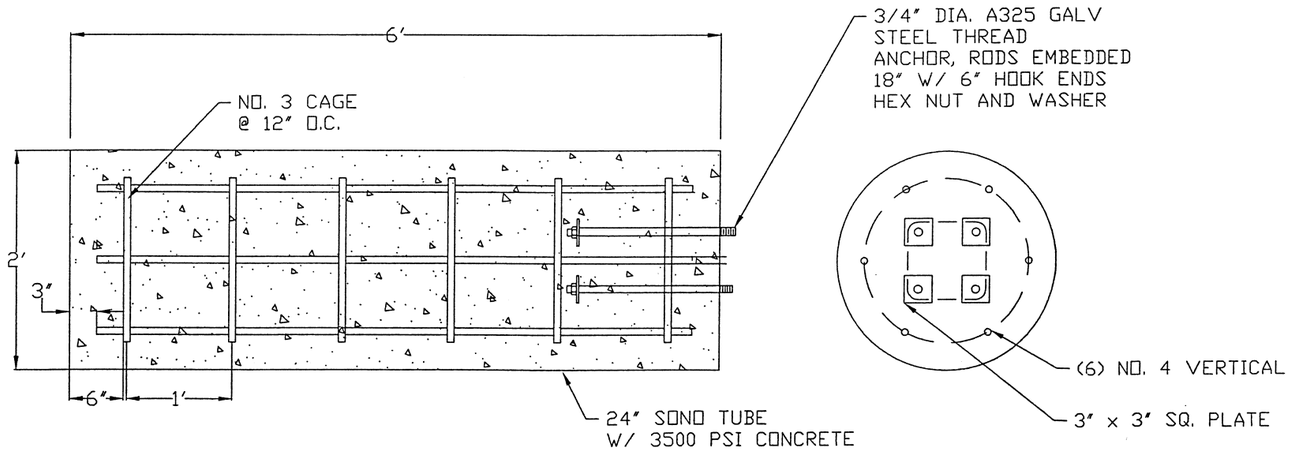
MAST TOP ASSEMBLY DRAWING
STOWED POSITION
1"=1'-0"

SEE MAST TOP ASSEMBLY DRAWING
OPERATIONAL POSTION FOR ITEMS

4

PARTS LIST

ITEM #	DESCRIPTION	QUANTITY
1	2' x 6' CONCRETE FOOTING	1
2	3/4" ANCHOR RODS x 20' LONG - EMBEDDED 18'	4
3	DRAWING #1 MAST BASE SECTION	1
4	DRAWING #2 MAST UPPER SECTION	1
5	DETAIL #7 MAST EXTENSION ASSEMBLY-MICROPHONE ATTACH	1
6	1/2" x 6' STAINLESS BOLT W/ 3/4" O.D. x 1/2" I.D. x 3/8" TK NYLON SPACER	1
8	MICROPHONE SYSTEM TYPE 41AM BY LOCHARD COMPANY	1
10	PADLOCK BY LOCHARD COMPANY	1
11	3/8" x 1" STAINLESS STEEL BOLT, 16 N.C. THREAD, FLAT WASHER, LOCK WASHER	2



FOOTING
DETAIL (1)
1"=1'-0"

NOTES:

1. POSITION, ANGLE, AND ASSEMBLY OF SOLAR COLLECTION SYSTEM TO BE VERIFIED BY ALPHA SOLAR COMPANY BEFORE INSTALLATION.
2. POSITION AND ASSEMBLY OF EMU 2100 IS TO BE VERIFIED BY LOCHARD COMPANY BEFORE INSTALLATION.
3. POSITION AND ASSEMBLY OF WEATHER SENSORS TO BE VERIFIED BY LOCHARD COMPANY BEFORE INSTALLATION.
4. PREP, PRIMER, AND PAINT OF ALL MAST PARTS MUST BE VERIFIED BY LOCHARD COMPANY BEFORE CONSTRUCTION.

STRUCTURAL DESIGN BY:
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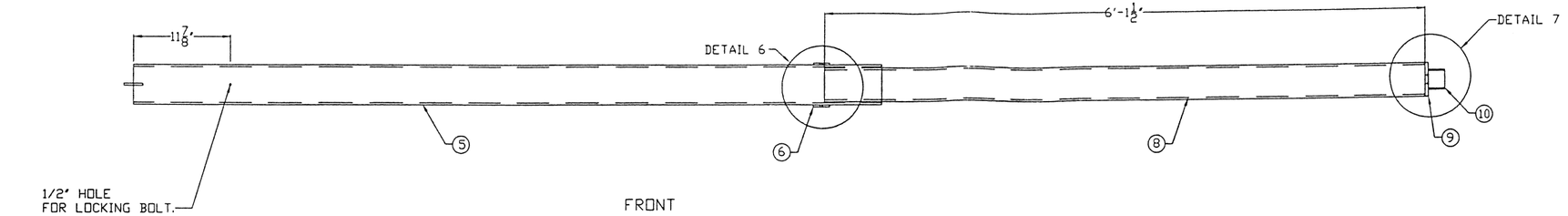
DRAWN	JEA	5/17/05	DWG NAME	EMUMAST.dwg
CHECKED	EC	5/18/15	PROJECT NO.	2004.4502

PROJECT NAME: BOCA RATON AIRPORT NOISE TOWER

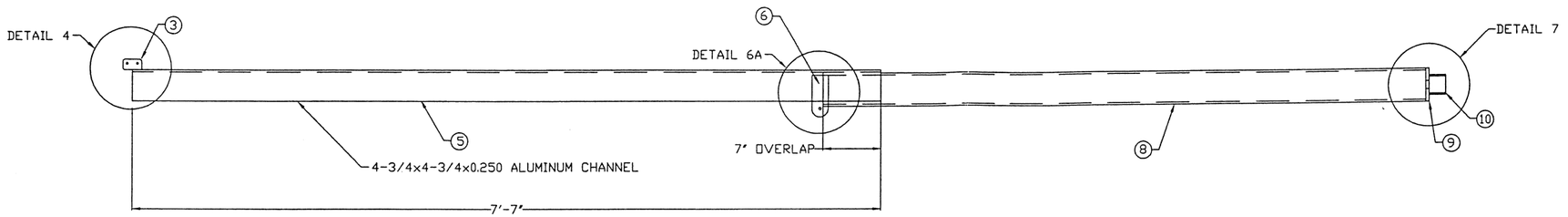
SHEET NAME: MAST SECTION CONSTRUCTION DRAWINGS

APPROVAL
BILL M. GRAY, P.E.
REGISTERED ENGINEER NO.
DATE STATE OF FLORIDA: 46172

SHEET NO. 3

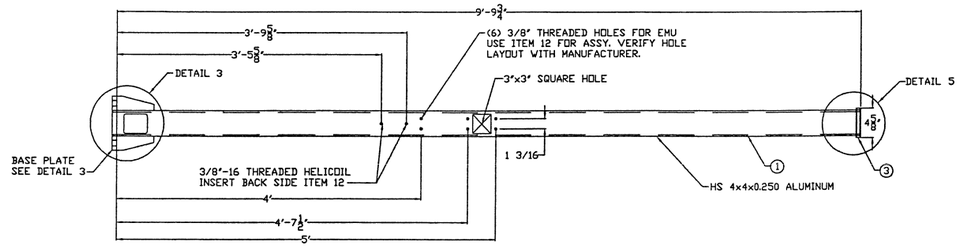


FRONT
UPPER MAST SECTION
1-1/2"=1'-0"

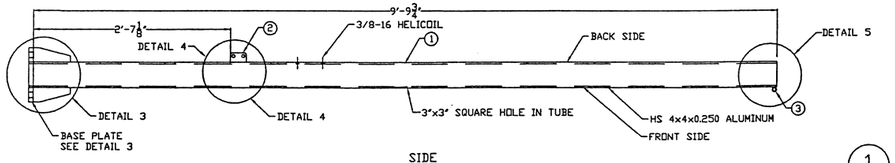


SIDE
UPPER MAST SECTION
1-1/2"=1'-0"

2



FRONT
MAST BASE SECTION
1-1/2"=1'-0"



SIDE
MAST BASE SECTION
1-1/2"=1'-0"

1

PARTS LIST

ITEM #	DESCRIPTION	QUANTITY
1	HS 4" x 4" x 0.250" - 117.75" LONG ALUMINUM HOLLOW TUBE 6061T6	1
2	1/4" ALUMINUM PLATE x 1-1/2" x 2-1/2" LONG 6061T6	1
3	3/4" O.D. ALUMINUM TUBE WITH 1/2" I.D. x 4-5/8" LONG 6061T6	1
4	1/4" ALUMINUM PLATE x 1-1/4" x 2-1/2" LONG 6061T6	1
5	CS 4-3/4" x 3-3/4 x 0.250 x 91" LONG ALUMINUM CHANNEL 5052H32	1
6	1/4" ALUMINUM PLATE x 2" x 5" LONG 6061T6	2
7	1/8" ALUMINUM PLATE x 3-7/8" x 7" LONG SPACER 6061T6	2
8	HS 4" x 4" x 0.250" - 73.5" LONG ALUMINUM HOLLOW TUBE 6061T6	1
9	3/8" ALUMINUM PLATE x 4" x 4" W/ 1" HOLE 6061T6 CAP PLATE)	1
10	2" DIA. x 2" LONG, NPT FEMALE THREAD SCH. 40 ALUMINUM PIPE, 20.67" I.D. 6061T6	1
11	3/4" ALUMINUM PLATE x 8" x 8" BASE PLATE ASSEMBLY 6061T6	1
12	3/8" x 16 HELI-COIL INSERT	2

STRUCTURAL DESIGN BY:
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PHONE: 941 342-6321
FAX NO.: 941 379-6474 EB-0006170

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

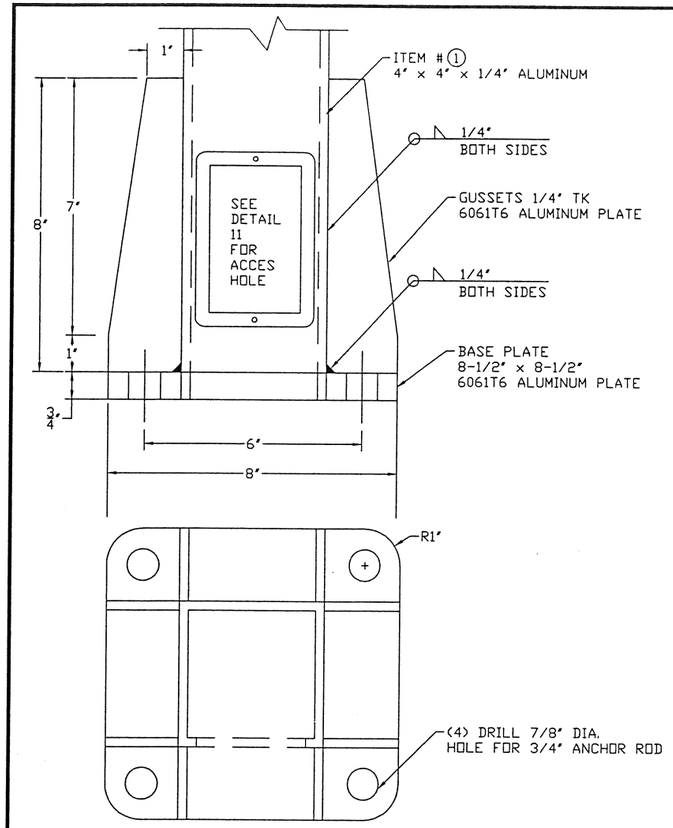
SCALE	AS SHOWN	CLIENT LOCHARD COMPANY			
DESIGNED	EC	5/16/05			
DRAWN	JEA	5/17/05	DWG NAME	EMUMAST.dwg	
CHECKED	EC	5/18/15	PROJECT NO.	2004.4502	

PROJECT NAME: BOCA RATON AIRPORT NOISE TOWER

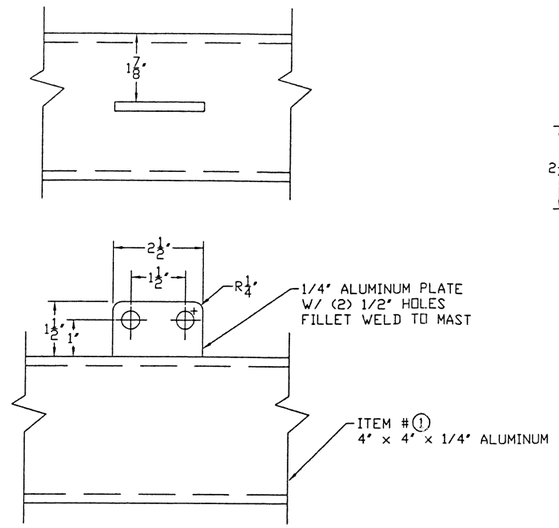
SHEET NAME: MAST SECTION CONSTRUCTION DRAWINGS

APPROVAL
BILL M. GRAY, P.E.
DATE REGISTERED ENGINEER NO. STATE OF FLORIDA: 46172

SHEET NO. 4

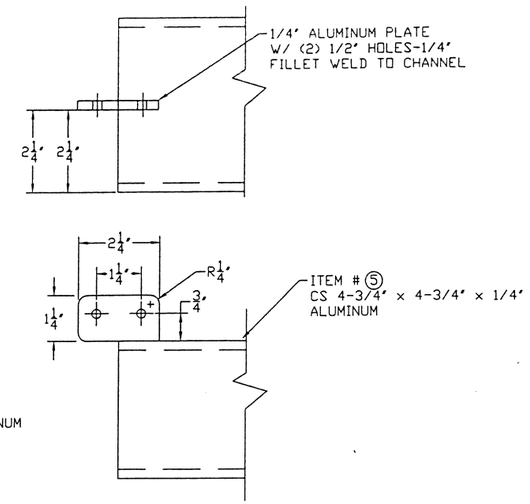


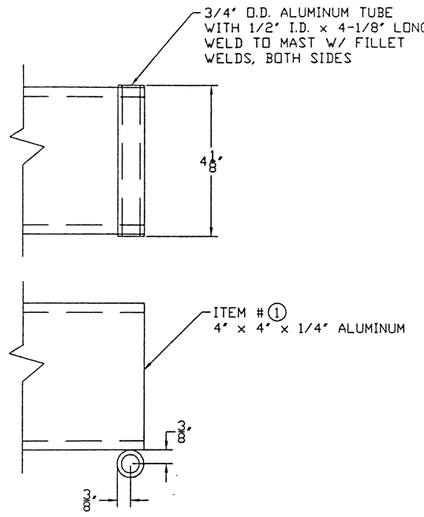
MAST DETAIL
DETAIL ③
6'=1'-0'



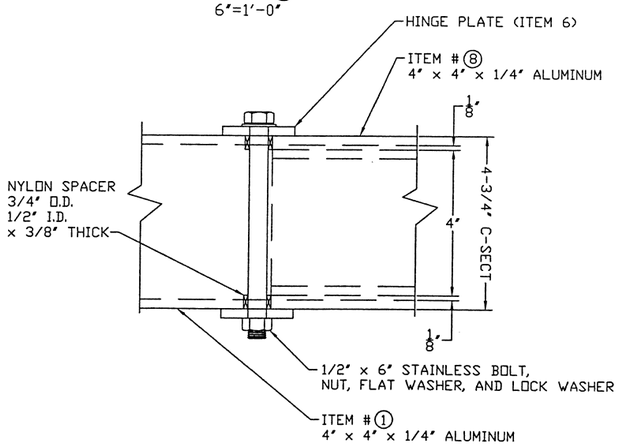
NOTE:
LOCK PLATES ARE TO BE ARRANGED SUCH THAT THE TOP HOLE ON THE BASE MATCHES BOTTOM HOLE ON THE MAST TO ALLOW FOR PADLOCK

LOCK PLATE DETAIL
DETAIL ④
6'=1'-0'

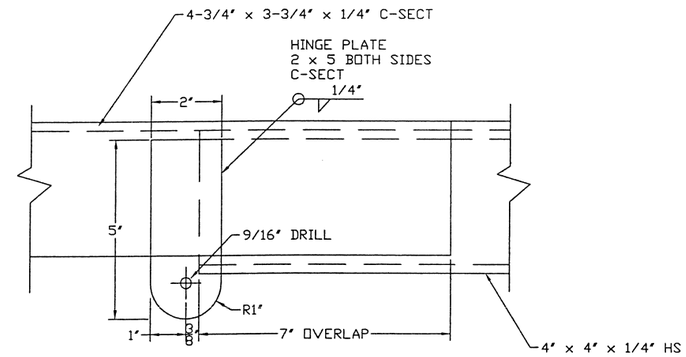




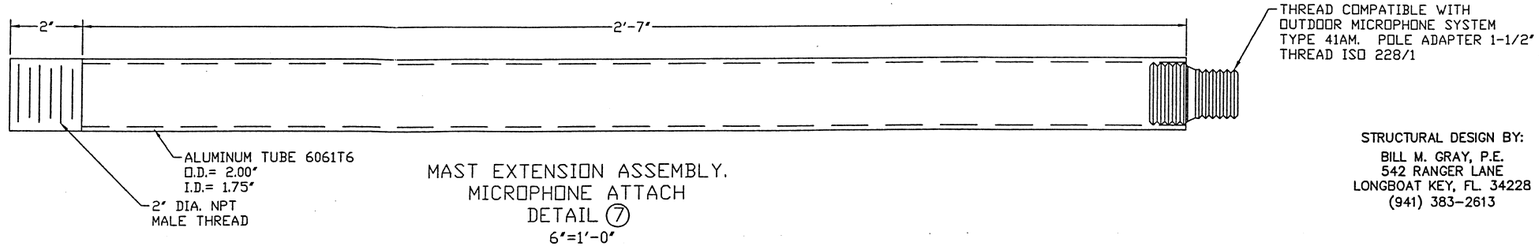
HINGE DETAIL
DETAIL ⑤
6'=1'-0'



BASE AND UPPER MAST
ASSY. DETAIL
DETAIL ⑥
6'=1'-0'



MAST ASSY. DETAIL
ADDING HINGE PLATES
DETAIL ⑥A
6'=1'-0'



MAST EXTENSION ASSEMBLY.
MICROPHONE ATTACH
DETAIL ⑦
6'=1'-0'

STRUCTURAL DESIGN BY:
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PHONE: 941 342-8321
FAX NO.: 941 379-6474
EB-0006170

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

SCALE	AS SHOWN		CLIENT LOCHARD COMPANY		
DESIGNED	EC	5/16/05			
DRAWN	JEA	5/17/05	DWG NAME	EMUMAST.dwg	
CHECKED	EC	5/18/15	PROJECT NO.	2004.4502	

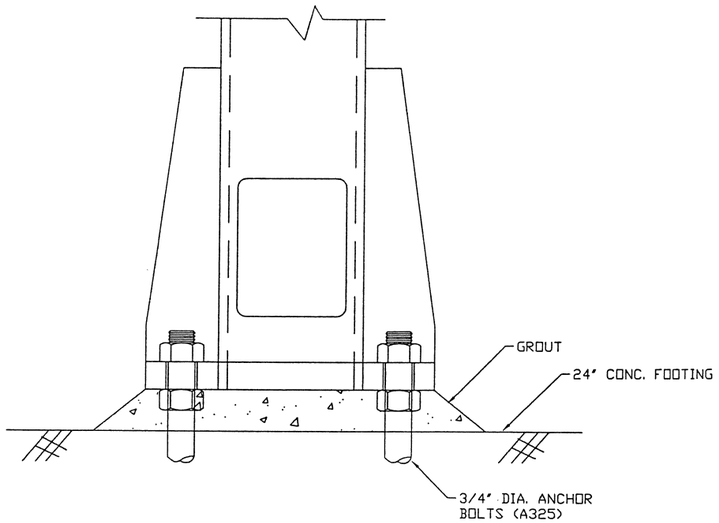
PROJECT NAME: BOCA RATON AIRPORT NOISE TOWER

SHEET NAME: CONSTRUCTION DETAILS

APPROVAL
BILL M. GRAY, P.E.
DATE
REGISTERED ENGINEER NO. STATE OF FLORIDA: 46172

SHEET NO. 5

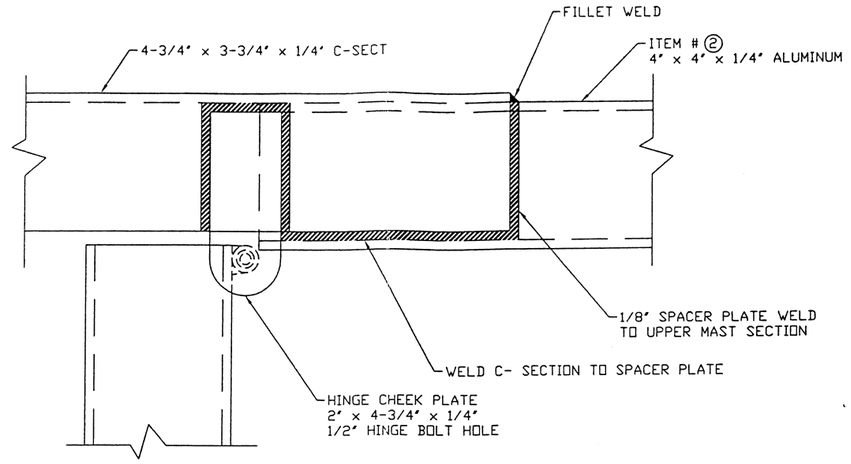
G:\BCT\2004.4502\2.0 DWG\ EMUMAST.dwg Sep 06, 2005 - 9:07am jmderson



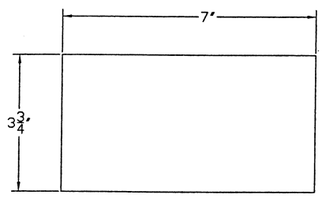
MOUNTING PROCEDURES

1. WET SEAL ANCHOR BOLT WITH TEMPLATE HOLE PATTERN TO MATCH MAST BASE PLATE
2. SET LEVELING NUTS AND ADJUST USING SURVEYOUR'S TRANSIT, STAKE NUTS WHEN LEVEL
3. ADD NON-SHRINK GROUT-RAPID SET OR EQUAL

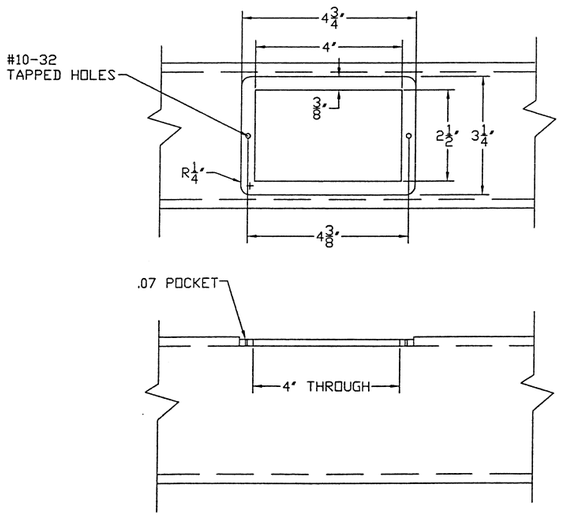
MAST MOUNTING AND LEVELING
DETAIL
DETAIL (8)
6"=1'-0"

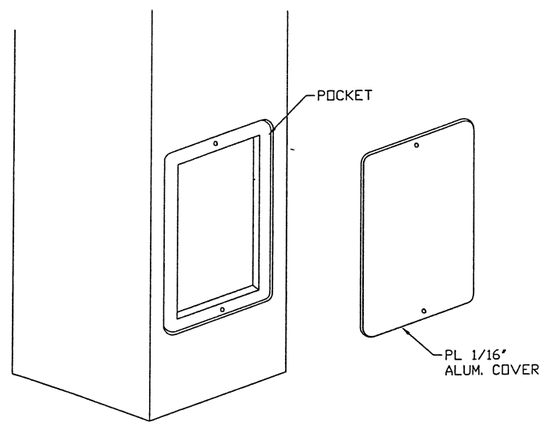


MAST MODIFICATION
HINGE DETAILS
DETAIL (9)
6"=1'-0"



1/8" ALUMINUM SPACER
DETAIL (10)
6"=1'-0"





1/4" ALUMINUM TAB
DETAIL (11)
6"=1'-0"

STRUCTURAL DESIGN BY:
BILL M. GRAY, P.E.
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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

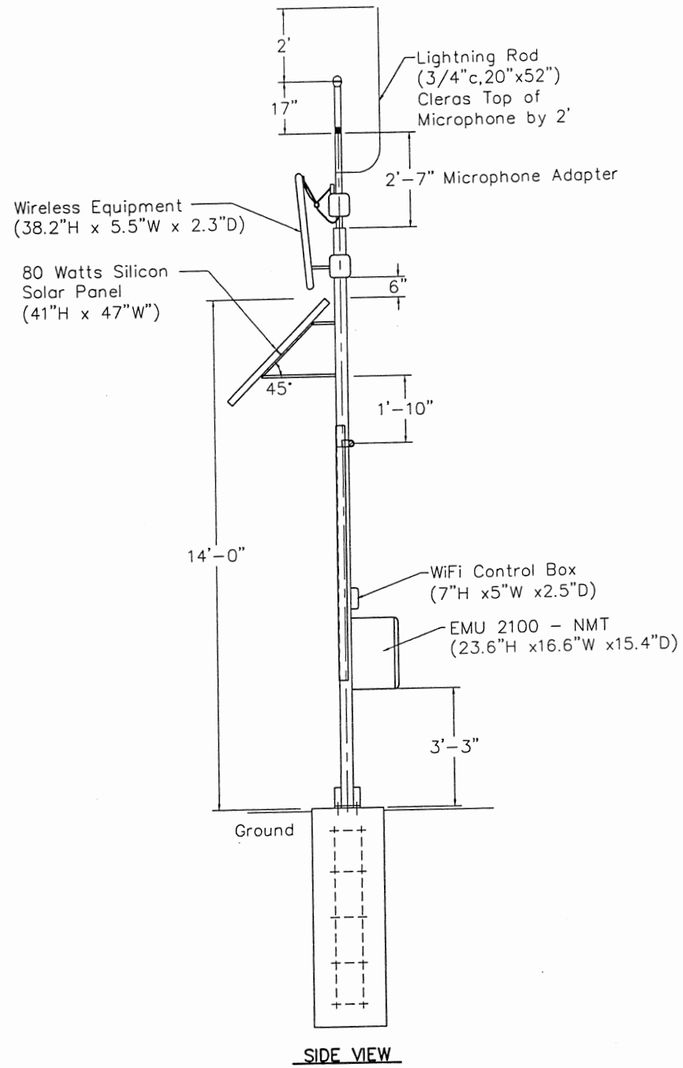
SCALE	AS SHOWN		CLIENT LOCHARD COMPANY	
DESIGNED	EC	5/16/05		
DRAWN	JEA	5/17/05	DWG NAME	EMUMAST.dwg
CHECKED	EC	5/18/15	PROJECT NO.	2004.4502

PROJECT NAME: BOCA RATON AIRPORT NOISE TOWER

SHEET NAME: CONSTRUCTION DETAILS

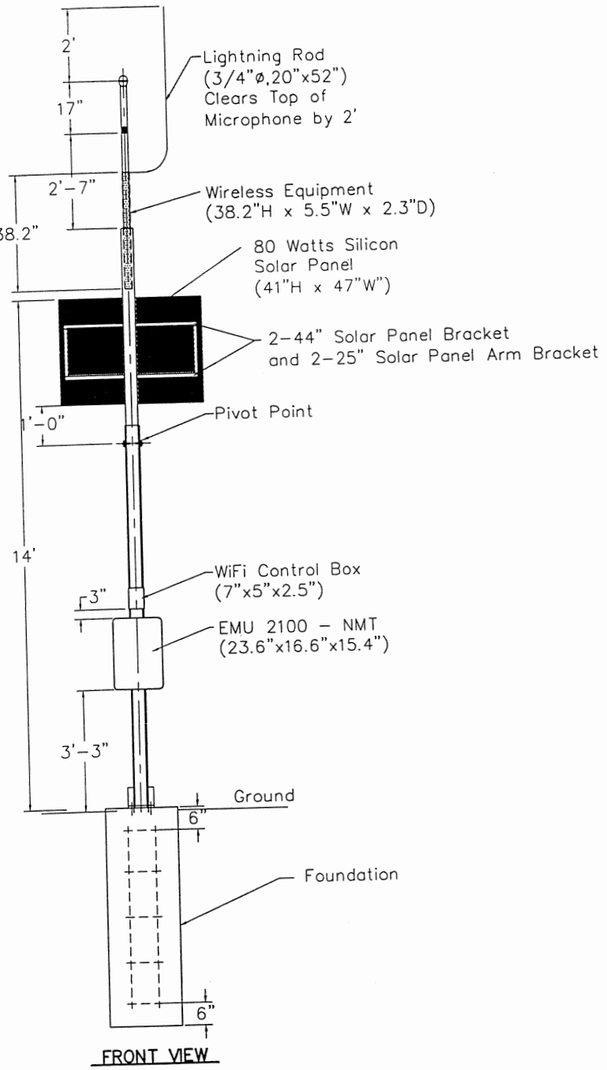
APPROVAL
BILL M. GRAY, P.E.
REGISTERED ENGINEER NO. STATE OF FLORIDA: 46172
DATE

SHEET NO. 6



SIDE VIEW

SCALE: 1" = 2'



FRONT VIEW

STRUCTURAL DESIGN BY:
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FAX NO.: 941 379-6474
EB-0006170

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

SCALE	AS SHOWN		CLIENT	LOCHARD COMPANY	
DESIGNED	EC	5/16/05			
DRAWN	JEA	5/17/05	DWG NAME	EMUMAST.dwg	
CHECKED	EC	5/18/15	PROJECT NO.	2004.4502	

PROJECT NAME: BOCA RATON AIRPORT NOISE TOWER

SHEET NAME: COMPONENT SCHEMATIC CONFIGURATION "A"

APPROVAL
BILL M. GRAY, P.E.
REGISTERED ENGINEER NO. STATE OF FLORIDA: 46172
DATE

SHEET NO. 7

G:\JBCT\2004.4502\2.0 DWG\ EMUMAST.dwg Sep 06, 2005 - 8:01am jmderson

LOCHARD

Version: 1.15

For EMU 1.24 firmware and later

EMU 2 User Manual

LOCHARD

Amendment Sheet

Version	Date	Author	Amendments
0.1	27 January 2004		Initial version. Portions copied over from EMU1100 manual.
0.2	30 January 2004	Matthew Barry	
0.3	12 February 2004	Andrea Morton, Harold Chu	New styling and minor corrections.
0.4	12 February 2004	Harold Chu	Re-organized sections
0.5	16 February 2004	Harold Chu	
0.6	27 August 2004	Mark Kofler	Updated style.
0.7	7 October 2004	Harold Chu	Minor corrections and updates related to the EMU 2.
1.0	14 October 2004	Matthew Barry	Released
1.1	4 November 2004	Harold Chu	Pocket PC setup instructions added.
1.2	9 November 2004	Harold Chu	Updated Pocket PC setup instructions.
1.3	14 December 2004	Harold Chu	Updated Bluetooth setup instructions.
1.4	17 December 2004	Harold Chu	Updated Bluetooth setup instructions.
1.5	4 February 2005	Harold Chu	
1.6	7 February 2005	Mike Osborne	Added Appendices 10 & 11
1.7	8 February 2005	Harold Chu	Added EMU firmware version number.
1.8	15 March 2005	Harold Chu	Added Wi-Fi setup instructions. Added EMU 2200 usage checklist.
1.9	17 March 2005	Harold Chu	Minor updates and re-organised some sections.
1.10	18 March 2005	Harold Chu	Minor addition to calibration instructions.
1.11	10 May 2005	Harold Chu	Fixed error that incorrectly stated that the EMU used 48 Ah batteries. The EMU uses 38 Ah batteries.
1.12	10 May 2005	Mike Osborne	Clarification to Li-ion charger time-out
1.13	13 May 2005	Mike Osborne	Further clarification on charging.

LOCHARD

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Figures

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About this Document

This document provides the information required to operate an EMU 2 running 1.17 or later firmware. It is intended to provide descriptions of the EMU capabilities and how to access them through the EMU's user interface. It is not intended to provide an in depth technical knowledge of the system.

EMU Functionality

The functionality of the EMU can be grouped into:

- Acoustic functionality (time history / event and its audio / noise climate reports)
- Meteorological functionality (weather reports)
- Diagnostic functionality (calibration / alarm)

A significant benefit of the EMU's processing power lies in its ability to analyze a multitude of noise and meteorological data in real-time. Various reports are generated by the EMU which present the results of the processed data. Once a report is generated it is saved in a report store. There are several types of reports generated (outlined below) and a separate store exists for each type of report. A report can be viewed and/or downloaded from the EMU.

Each report store is circular so that the EMU will always save the latest report. Once a store is full the EMU begins overwriting from the start of the store, thus only the oldest reports are erased. This way no incoming data is lost as a result of the EMU's memory becoming full. The EMU is capable of running indefinitely without being cleared.

The EMU comes standard with sufficient non-volatile solid state storage to hold up to ten days of normal acoustic, and weather data for an average installation location. By adding additional storage, this can be extended almost indefinitely, providing capacity for extended data requirements such as audio or image capture.

EMU1100 Compatibility Mode

The EMU 2 is designed to be backward compatible with the EMU1000 and EMU1100. This allows the EMU 2 to replace existing EMU1000 or EMU1100 installations. Data can be retrieved from the EMU using the existing EMU1100 protocol or the newer EMU 2 protocol. The EMU 2 mode is used to access newer features like extended storage.

Acoustic Functionality

Input Signals

The following noise signals are produced by the EMU and can be used for detecting noise events. One of the signals is selected to be the noise parameter to detect events. This parameter is also recorded in the EMU's time-history store and is transmitted to the central computer in real-time.

- **LAeq** 1-second 'A' frequency-weighted equivalent continuous sound level.
- **LAS** 1-second slow time-weighted, 'A' frequency-weighted sound level.

Noise Climate Reports

The noise climate information is used to give a representation of the entire noise energy received by the microphone over a particular measurement period. Typically the EMU is configured to record the 'noise climates' for each hour, day and curfew periods.

See Noise Climate Parameters for information on what is recorded in a noise climate report.

Meteorological Functionality

Weather Reports

The EMU has inputs designated for meteorological sensors. A typical selection would be wind speed and direction, air temperature and humidity, air pressure and rainfall. When fitted, weather sensors are monitored to provide regular reports. The timing of the weather measurements are defined in the same manner as for noise climate measurements. Typically weather reports are generated hourly. Some weather parameters may also be included in other reports. For example, if the wind speed sensor is fitted then the wind speed during an event is recorded in the event report. High wind speeds may contribute to the noise level and thus can be identified this way.

See Weather Report Parameters for information on what is recorded in a weather report.

Diagnostic Functionality

Calibration Reports

The EMU can perform electrostatic actuator and pistonphone calibrations of the microphone (for detailed explanations see Calibrating the Microphone, p.32). After each calibration a report is generated for future reference. The report includes the type of calibration performed, the status of the calibration (e.g. successful, user aborted, etc.), the expected calibration level, the actual level obtained, the drift from the last level obtained, and the time of calibration.

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Accessing an EMU using a Web Browser

The EMU is designed for two modes of interaction:

- Directly from a Web browser
- From an integrated software system

This chapter describes accessing the EMU using a Web browser. For more information on how to interact with the EMU using an integrated software system, for example, ANOMS, consult your ANOMS manual.

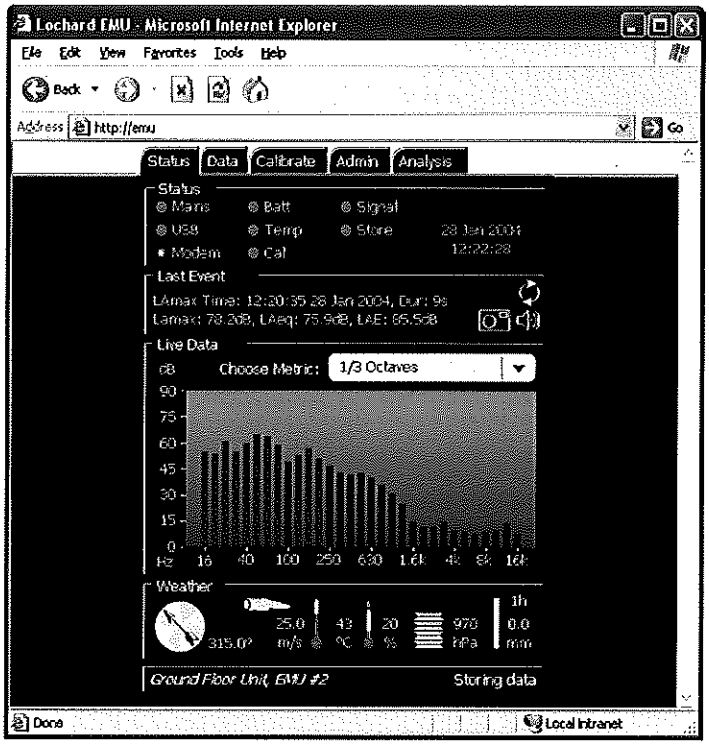

Figure 4: The Web Interface

Prerequisites

Windows Computer

To view the interface on a PC you will need to have the following installed:

- Microsoft Internet Explorer (6 or better).
- Macromedia Flash plugin (6 or better) installed in the browser.
- Optionally, Windows Media Player (9 or better) to play audio.

Interface Overview

The user interface consists of the following panels:

- Status Panel
- Data Panel
- Calibrate Panel
- Admin Panel
- Analysis Panel

The Status Panel

The Status Panel is divided into the following sections and displays the following information.

The **Status** display shows the current status of the EMU, & any fault conditions that may exist. The **Last Event** display shows a summary of the last event report.

The **Live Data** display shows the current level that the EMU is measuring such as the Leqs, and 1/3 octaves.

The **Live Weather** display shows live weather data from the EMU.

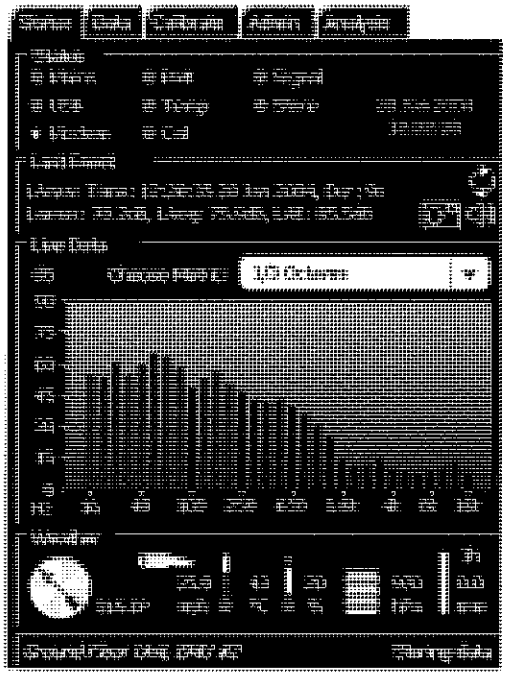

Figure 5: The Status Panel

The following table describes each component or parameter in the Status section and the meaning of any applicable status indicators.

Component	Indicator			
	●	●	●	●
Mains	Charger/mains present			No mains present
Batt	Battery voltage within acceptable levels	Battery voltage is low	Battery is discharged and the EMU will shutdown soon	
Signal	Microphone signal present			No signal present
USB	EMU 2 Sound Level Meter is connected			EMU 2 Sound Level Meter is not connected
Temp	Internal temperature is within tolerance	Internal temperature is approaching the high temperature		Internal temperature is too high
Store		Indicates EMU is in maintenance mode and data is not being stored		
Modem	Modem is online			Modem is not offline
Cal	Microphone is calibrated		Microphone is not calibrated	

Displaying more information about an EMU component or parameter

The following table describes the additional information you can display for certain EMU components and parameters.

For metrics other than 1/3 octaves, the maximum value the metric has reached is displayed on the graph.

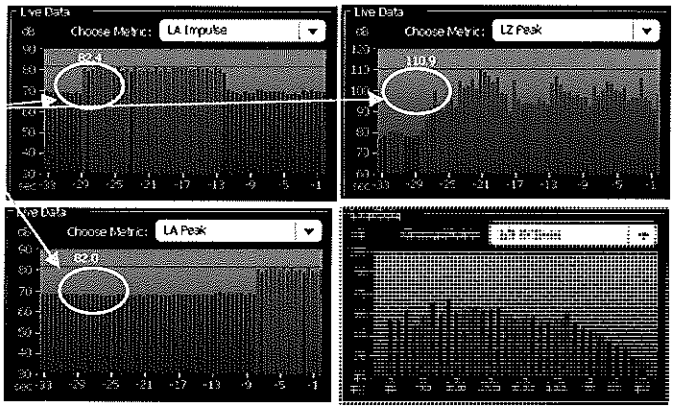

Figure 8: The Live Data Display

To choose which metric the data is displayed in:

- On the **Live Data** display, select a metric from the **Choose Metric** list.

You can choose the following metrics:

Metric	
1/3 Octave	LC Fast
LA EQ	LC Peak
LA Slow	LC Impulse
LA Fast	LZ EQ
LA Peak	LC Slow
LA Impulse	LC Fast
LC EQ	LZ Peak
LC Slow	LZ Impulse

The color of the bars is blue when the level is below 60 dB, purple up to 80 dB and red above this level.

The Live Weather Display

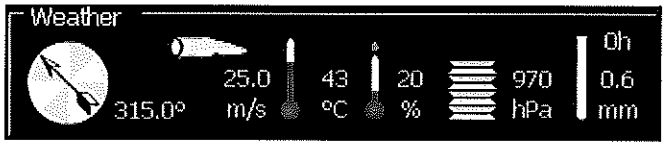

Figure 9: The Live Weather display

If weather sensors are connected, the Live Weather display shows the following:

- Wind direction and speed
- Temperature

The Data Panel

You can use the Data Panel used to download report data from the EMU. Normally ANOMS will automatically download data from the EMU but you can use this panel to manually download data. The data can then be uploaded to ANOMS. You can also view the data, standalone, on a PC using the EMU 2 Data Decoder program.

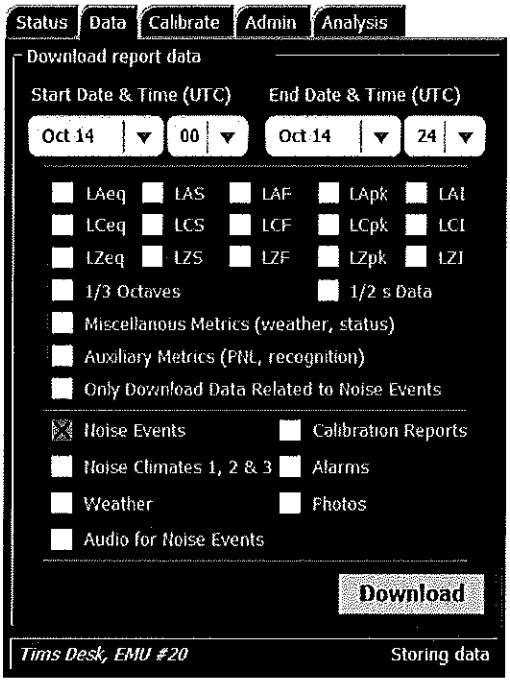

Figure 10: The Data Panel

You can download the following types of data:

- Half-second metrics for all time and frequency weightings
- 1/3 octave values
- Noise event reports
- Audio for noise events
- Microphone calibration reports
- Weather climate reports
- System alarms and log messages
- Noise climate reports
- Images

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The Analysis Panel

You can use the Analysis Panel to quickly review the noise event data held by the EMU. The interface is designed to assist in the quick identification of problems with the template settings or the acoustic environment. It is not designed to act as a data analysis tool.

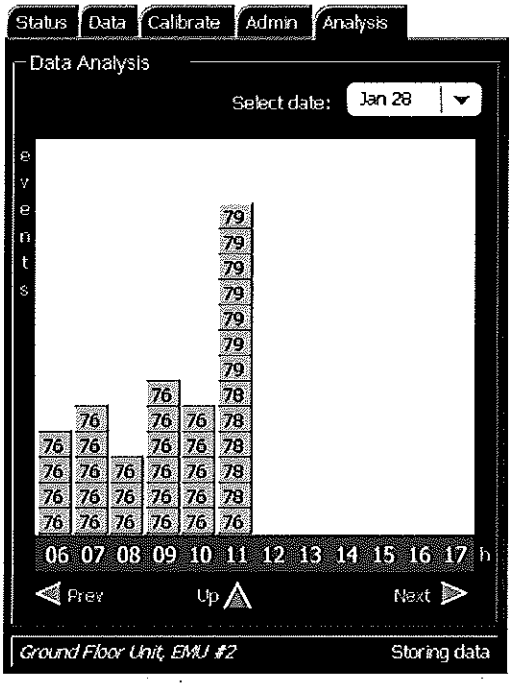

Figure 11: The Analysis Panel

The Analysis Panel displays the number of noise events that occurred in each of hour of a day, sorted by hour. Each noise event is represented by a block on the vertical axis of the graph, allowing you to quickly see the number of noise events that occurred in each hour. Each block displays the LAmax value of the noise event. Noise events that exceed defined thresholds are displayed in the following colors as shown in the table below:

Color	Value
Blue	0 < value ≤ 75
Yellow	75 < value ≤ 85
Red	value > 85

LAmax value and time that it occurred
LAeqmax value and time that it occurred
Reference level
Max PNL
EPNL
Weather Information at LAmax
Temperature
C-Weighting Related Results
Lcmax
LCEqmax
LCE
LCeq

4 To cycle through the event information, click  or  .

5 To listen to the audio for the noise event, click  .

6 To view the images taken during the event (if the EMU is equipped with a camera) click  .

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Saving to a USB Flash Drive

A USB flash drive can be used to download data from the EMU. This feature is intended mainly for use on portable EMUs (EMU 2200) that have a slow or no communications link and where manual retrieval of the data is more convenient or cost effective. The USB flash drive is not meant to be used at the same time as a laptop or PDA. When these devices are available the Data panel capabilities should be used to download the data.

Note that some flash drives are incompatible with the EMU. We recommend that you check with Lochard support if you are unsure that your flash drive can be used. Alternatively you can purchase a suitable flash drive from Lochard.

To save data to a flash drive:

1 Insert an empty flash drive into the front USB port.

2 To indicate that the download is in progress the EMU will make this sound: beep ... *long pause* ... beep ... *long pause* ... etc.

3 When the download is complete the EMU will: beep-beep-beep ... *short pause* ... beep-beep-beep ... *short pause* ... etc.

4 When you hear the above sound it is safe to remove the flash drive.

5 Note that the EMU may beep continuously. This indicates that the flash disk is full and not all the data was written to the disk. If you have another flash disk then you can insert it to continue the download.

You can connect only one USB flash drive at a time.

Error conditions:

The EMU may beep to indicate error conditions. The error condition sound consists of two tones and is similar a siren sound. If you here this sound then the data may not have been correctly saved to disk. You should contact Lochard support for assistance.

Place the EMU into Maintenance mode when performing a calibration. This means the EMU will ignore the noise samples during the period of calibration. This must be done before a PCL calibration can be performed. See Putting the EMU in Maintenance Mode. Failure to do so will lead to events with very high values. These values will corrupt the reporting from your noise monitoring system.

The calibration correction (the offset applied to the microphone signal) can be modified by performing either a PCL or an ACL. An ACK measures the actuator signal, but does not modify the calibration correction (hence the name 'check'). There is only one calibration correction setting. An ACL will override the last PCL calibration correction, and vice-versa. All three types of calibrations store a report.

You can choose to calibrate the unit using the actuator (say, twice a day) or periodically calibrating with a pistonphone (say, once or twice a year). It is recommended the second technique be used. Typically a PCL is performed twice a year to adjust the calibration correction and an ACK (which does not modify the calibration correction) is performed twice a day for diagnostic purposes. Long term observations of ACK results will identify any microphone faults which may otherwise pass undetected.

While a calibration is in progress you cannot change screens until the calibration has been completed.

During a calibration, the event detection and noise climate processing is suspended, thus preventing the calibration signal from affecting the stored measurements.

When a calibration (ACK, ACL or PCL) fails the unit status will show that the calibration failed. To clear the status you need to do an ACL or PCL calibration. A common cause of temporary failure is dew or rain on the microphone. You should avoid scheduling checks at times when dew is likely.

Pistonphone Calibration

A pistonphone calibration can only be performed locally. Whereas electrostatic calibrations can be carried out frequently, a pistonphone calibration need only be performed when required for maintenance purposes (for example, every 6 months).

The process of carrying out a pistonphone calibration makes a lot of noise (lowering the mast, removing the wind shield etc. It is essential that you enter Maintenance Mode before commencing starting the procedure.

The adaptor correction ΔL_A is supplied and is usually engraved on the adaptor itself. A typical value for ΔL_A is -0.5 dB. Alternatively the adaptor may be engraved with an absolute sound level such as 123.5 dB. This number indicates the expected sound level when using a pistonphone providing exactly 124.0 dB. Therefore an adaptor engraved with 123.5 dB indicates that a 0.5 dB loss occurs, and so ΔL_A = -0.5 dB. If there are two values you should select the one labelled 'linear.'

To Calibrate a Pistonphone:

1 Remove the windshield by unscrewing from the microphone body.

2 Screw the cylindrical support tube marked RA0009 onto the windshield mounting thread.

3 Slide the collar ring down over the tube.

4 Assemble the two halves of the coupler around the microphone assembly. In the two halves there is a small groove which fits around the thin capillary tube on the microphone. For an accurate measurement it is very important the two halves are fitted accurately to form a reliable air seal around the microphone.

5 Push the collar ring up onto the lower part of the coupler to fix the two halves together. Mount the pistonphone onto the adaptor.

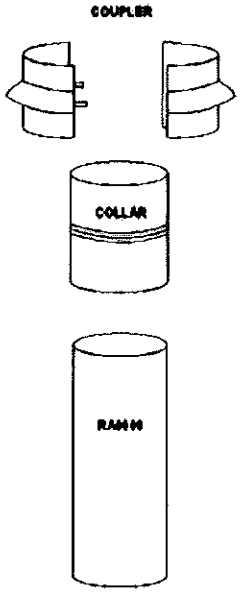

Figure 15: The pistonphone adaptor

6 Put the EMU in Maintenance mode. See Putting the EMU in Maintenance Mode.

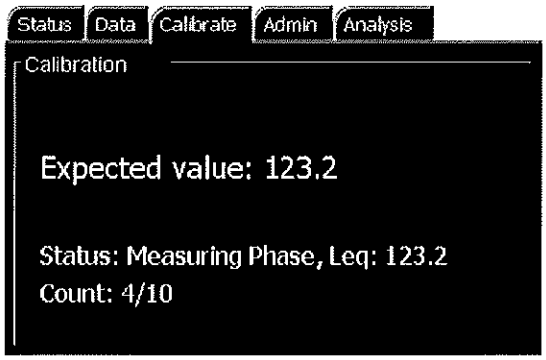

Figure 17: Measurement phase

The measurement phase will begin once a stable signal has been detected. During the next ten seconds the signal is analyzed, and the expected value of the calibration signal is compared with the actual measured value. At the end the calibration correction is calculated.

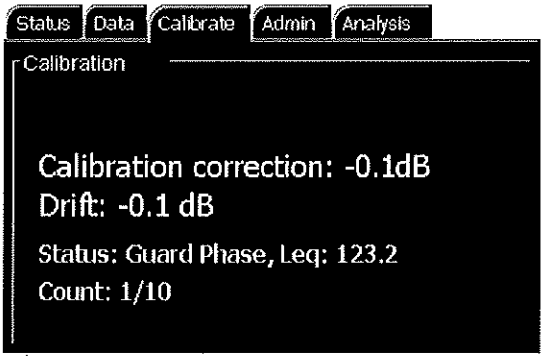

Figure 18: Guard phase

A ten second guard time follows to allow time for the pistonphone to be removed and for the signal to settle back to normal values.

Pistonphones require periodic re-certification to ensure that they are still accurate. This is especially important if you require legal traceability of the measurement chain. Lochard is able to arrange for re-certification.

The CCM module must have software version 1.12 or greater installed.

As the interaction is limited Lochard strongly recommends that calibrations are not done using the front panel.

To start an ACL or ACK Calibration:

You can press the Reset button at any time to abort the calibration.

1 Switch to Name Display mode and select **CALIB**.

2 Press the Cycle button until **ACL** or **ACK** is displayed and press Enter.

3 You will see the letter C followed by the calibration level value. When the level stabilises to approximately 90 dB press Enter to accept the value.

4 The EMU will now display the calibration correction. Press Enter to accept this value or press Reset to cancel.

5 ACLOK will be displayed. If you requested an ACL then the calibration offset will have been updated and a calibration report will be saved. If **FAIL** is displayed then the correction is outside the value range of ±1.2 dB. A calibration report is not saved in this case.

To start a PCL (Pistonphone) Calibration:

1 Switch to Name Display mode and select **CALIB**.

2 Press the Cycle button until **PCL** is displayed and press Enter.

3 Calculate the expected pistonphone level using formula in the previous section.

4 You can now enter in the expected PCL value. Press the Cycle button to change the currently digit (the blinking one) and the Enter key to move to the next digit. Press Enter on the last digit to accept the value.

5 Attach the pistonphone to the microphone using the same procedure in the previous section.

6 Turn on the pistonphone.

7 You will see the letter C followed by the calibration level value on the display. Press Enter to accept the value once it has stabilised.

8 The EMU will now display the calibration correction. Press Enter to accept this value or press Reset to cancel.

Figure 20: The Store indicator is amber, indicating the EMU is not storing data.

Lochard recommends that any site visit be preceded by activation of the maintenance mode. This ensures that noise records produced during the maintenance period not recorded and avoids corruption of reported results.

Setting and Editing Templates

You can use the Edit Template screen to manually adjust the noise parameter and template parameters for the detection of noise events. There are four templates that can be changed.

To edit a template:

1 On the **Admin Panel**, under **Set/Edit Templates**, click **Edit.**

2 Select the template from the list you want to modify, then click **Edit.**

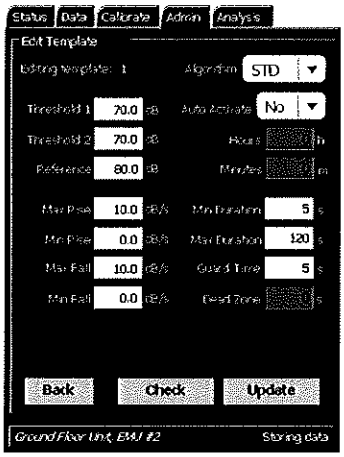

Figure 21: Viewing template settings

3 Edit the values as required.

4 To validate the parameters you have entered, click **Check.**

5 To modify and update the template, click **Update.**

Test Mode

Test mode is available for acoustic laboratories to carry out certification testing of the sound level meter capabilities of the EMU. Special equipment, that is not supplied as part of a standard EMU, is required to make use of test mode. The **Test Mode On** button enables external injection of a signal. The external signal can be injected through the *Signal Injector Box* (not supplied).

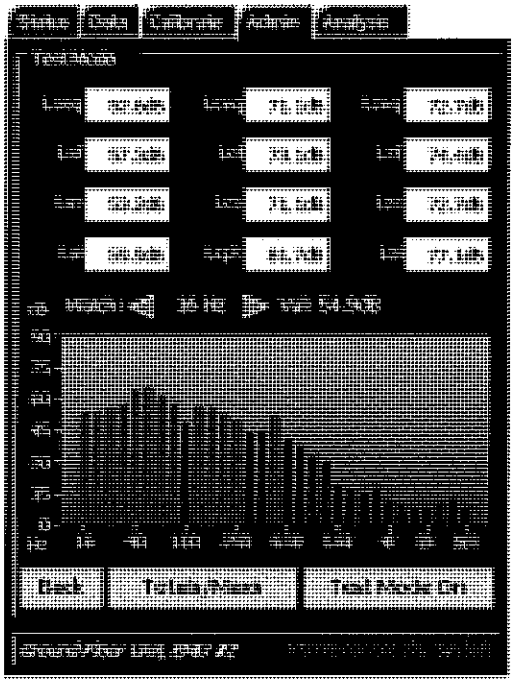

Figure 22: The Test Mode panel

The Test Mode Panel is used exclusively for testing the EMU. The data is display in the top part of the screen.

The test panel operates in two modes. It displays either:

1 One second real-time metrics or,

2 Integration results over a period.

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Portable EMU (EMU 2200) Setup and Download

Equipment Required

- Laptop computer with:
  - A network port.
  - The EMU 2 Data Decoder installed. This program is supplied by Lochard.
- Ethernet cross-over cable.
- An EMU 2200 with:
  - Microphone.
  - Microphone cable.
  - Tripod.
  - And external battery packs if required.

Setup

- Assess the site and ensure that:
  - There is a secure location to position the EMU and tripod.
  - If possible seek a location nearby mains power.
- Setup the tripod and microphone. See Microphone and Tripod Set Up. Connect the microphone to EMU using the microphone cable.
- Connect mains or the external batteries to the EMU. See Power Options for EMU 2200 Portable and High Capacity Battery Pack: User Guide for more information on using the battery packs.
- Turn on the EMU.
- Do a pistonphone calibration on the microphone to ensure that it is correctly calibrated. See Calibrating the Microphone.

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1. VRLA (valve regulated lead acid) battery packs.
2. High capacity lithium ion battery packs.

See Power Options for EMU 2200 Portable and High Capacity Battery Pack: User Guide for more information on how to setup and charge the batteries.

```
                        CONFIGURATION MENU
                  (configuration for EMU #3, site Roof)

Please type in a option and press Enter:
  1.  Ethernet network configuration
  2.  Modem configuration

  3.  System time
  4.  View system status
  5.  View stores information
  6.  View version and patchlevel information

  q   Quit


Selection >>
```

Figure 23: The Configuration Menu

4 To select the Ethernet network configuration, type 1, then press Enter.

5 Select **IP address allocation**, and then select **DHCP & DNS Servers** enabled direct connection mode.

6 Select **Reboot EMU** to apply the changes. The EMU will reboot.

Windows Network Set up

1 Start the Control Panel. Depending on your Operating System, do one of the following:

- If you are using Windows XP, click **Control Panel** on the **Start Menu**.
- If you are using Windows 2000, click the **Start Menu**, point to **Settings**, then click **Control Panel**.

2 Start Network and Internet Connections. Depending on your Operating System, do one of the following:

- If you are using Windows XP, click **Network and Internet Connections**, then click **Network Connections**.
- If you are using Windows 2000, click **Network Connections**.

3 Right-click **Local Area Connection** and then click **Properties**.

4 Under **This connection uses the following items:** select **Internet Protocol (TCP/IP)** and then click **Properties**.

5 On the **Internet protocol TCP/IP Properties** sheet, do the following:

- Click Select **Obtain an IP address automatically**.
- Click **Obtain DNS server address automatically**.
- Click **OK**.

6 On the **Local Area Connection Properties** sheet, click OK.

7 In **Network Connections** do the following:

- Right click **Local Area Connection** and select **Disable**.

If the connection has been successfully established, the following reply will be received:

Reply from 192.168.0.1: bytes=32...

3 If you cannot establish a successful connection, restart your laptop and repeat from step 2.

4 If you cannot establish a successful connection after restarting your laptop, contact Lochard Support for assistance.

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Appendix 3 Pocket PC Setup

This section explains how to set up a Pocket PC device to access the web interface. This section consists of two parts, the first part explains how to install the necessary software on your Pocket PC device to view the web page. The second part explains how to configure Bluetooth access so that the Pocket PC can communicate with the EMU wirelessly.

The instructions in this section are for a HP iPAQ running Pocket PC 2003. The instructions may not be exactly the same if you are using a different device.

These instructions apply to version 1.16 EMUs and later.

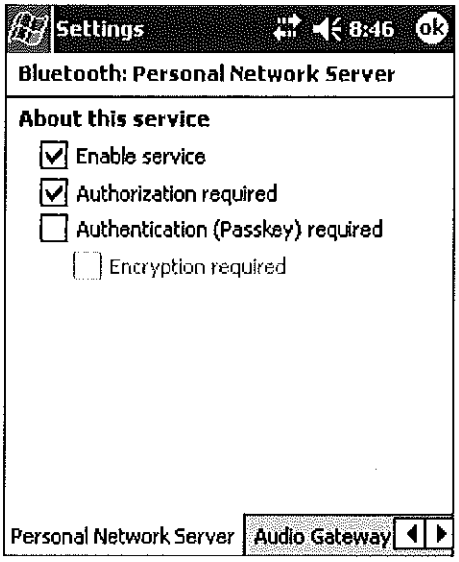
Pocket PC Requirements

Your Pocket PC device should meet these requirements:

- Run Pocket PC 2002 or later.
- Has internal storage space or has a slot to accept SD or Compact Flash memory cards.
- Has a Compact Flash slot if you wish to connect an Ethernet adaptor. We recommend that you use the Ethernet CF Card from Socket. The web site (http://www.socketcom.com) has a list of compatible Pocket PC devices. Note since the Compact Flash slot will be used by the Ethernet adaptor so you will a second card slot for your memory card.
- Bluetooth if you wish to use it to communicate with the EMU.

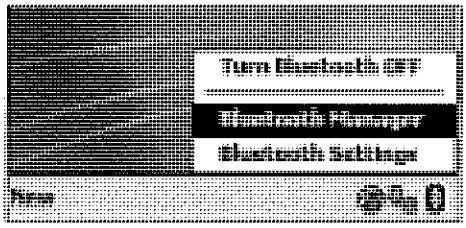
Installing Pocket PC Software

1. Install Microsoft Active Sync on a PC. A copy of Microsoft Active Sync is supplied with the Pocket PC.
2. Connect your Pocket PC device to your computer using the docking cradle or sync cable supplied.
3. On your PC download the Flash player from http://www.macromedia.com/software/flashplayer/pocketpc/2002.html and install it on the Pocket PC.

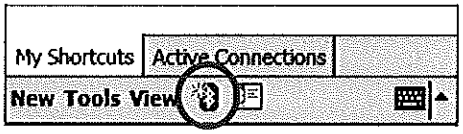


3. Make sure the **Enable service** and **Authorization required** check boxes are ticked.

4. Tap ok to continue.



5. Open the **Bluetooth Manager**.



6. Create a new connection by clicking on the icon shown.

7. Select **Connect to the Internet** and tap **Next**.

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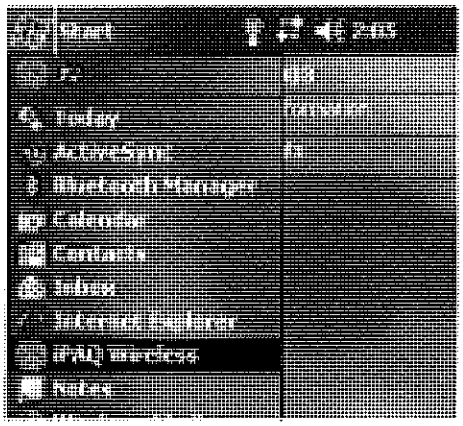
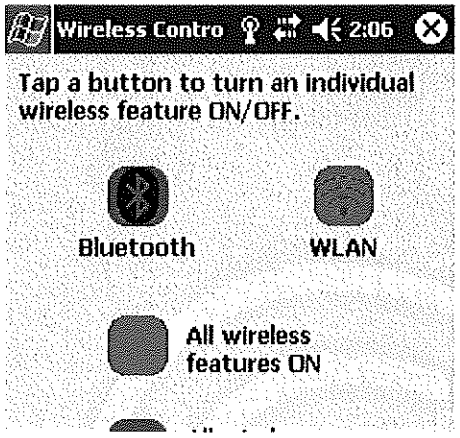
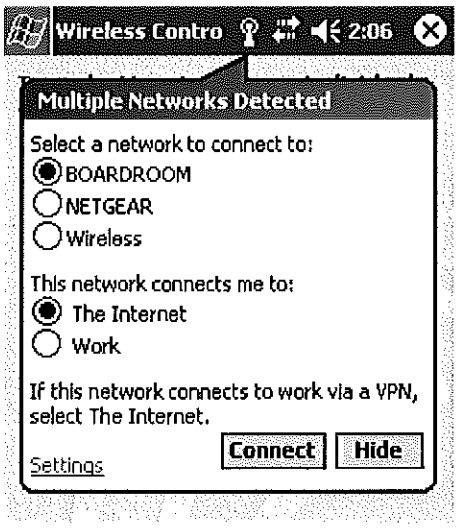
Wi-Fi Configuration



1. Open the **Start** menu.
2. Select the **iPAQ Wireless.**



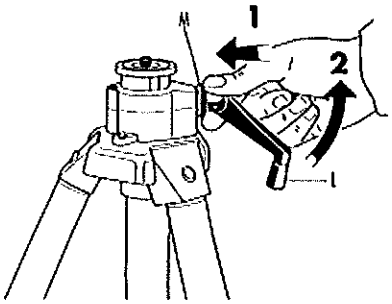
3. Tap **WLAN** to turn on the Wi-Fi.



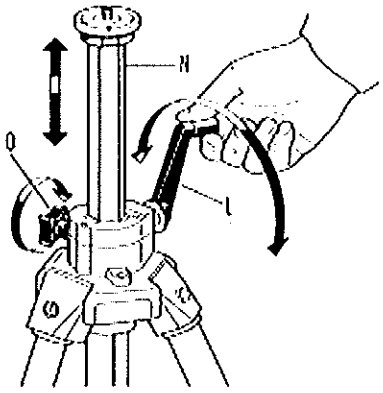
4. You will be prompted to select the Wi-Fi network. Select the network and tap **Connect.**
5. Follow any other prompts that may follow.

You are now connected to the Wi-Fi network.

Raising the Tripod Head



1. Unlock the handle by pushing (1) in the locking disc (M) while pulling (2) the handle into position.



2. Rotate the handle (L) to raise or lower the main tripod head (N).
3. Lock the head into position by tightening the black coloured cross knob (O).

Figure 26: Raising the Tripod Head

3. Attach the guy ropes and peg them to the ground (as though you were erecting a tent). This is very important because when the microphone is attached, the whole structure can easily blow over in relatively light winds. The result is always a damaged microphone. Even if there is no wind, it is very easy for someone to trip over the cable or pull on the cable to line up with the EMU, causing the tripod to overbalance.
4. If the tripod cannot be secured with guy ropes (as on a paved surface), you must attach the feet of the tripod firmly to heavy objects (concrete blocks, railway iron or other convenient objects).

4. Place the EMU 2200 case horizontally onto a bench, or on the ground if no bench is available, and open the case lid.

5. Remove the digital microphone from the case and insert the cable plug that has been fed through the threaded adaptor into the bottom of the microphone.

6. Secure the microphone onto the threaded adaptor. Use the spanner provided to ensure a tight fit. Do not over-tighten as the microphone will have to be removed at a later date.

7. Remove the cylindrical black-coloured cover on the top of the digital microphone and carefully insert the windscreen in its place. Again, use the spanner provided to ensure a secure tight fit. Be very careful not to damage the white-coloured plastic rain cap and the thin stainless-steel tube at the head of the microphone.

8. Place both the microphone spanner and the black-coloured cover into EMU 2200 case for safekeeping.

9. Located on one of the tripod legs is a plastic clip. Use this plastic clip to anchor the microphone cable to the tripod.

The following table describes the function of each component on the EMU front Panel

Component	Description
Display	The display shows one of the following: • The name of the metric parameter (Name Display mode) • The value of the parameter (Value Display mode) • Names of other menus
Power LED	● Power Connected ◎ No power connected
Battery Voltage LED	◍ Battery Good battery voltage, indicating a fully charged battery. ◍ Battery Voltage not optimal ● Battery Voltage is low
USB LED	◍ Indicates that the Analyser unit is communicating with the PC unit. ◎ No USB device connected
Microphone LED	◍ Microphone connected ◎ No Microphone connected
Cycle button	Use the Cycle button to: • When in Name Display mode, display the next menu item.

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Appendix 6 Using the EMU 2 Data Decoder

This section explains how to the EMU 2 Data Decoder to decode and import a .emu file into ANOMS.

Start the decoder program, by default the icon is placed on the Desktop and looks like:

Figure 28: The EMU 2 Data Decoder icon

The decoder will decode files for one EMU at a time. If you have more than one EMU will need to run the decoder program once for each EMU.

Select the file that you downloaded from the EMU. If you use a USB memory key then you will have more that one file. Use the shift key to select all the files.

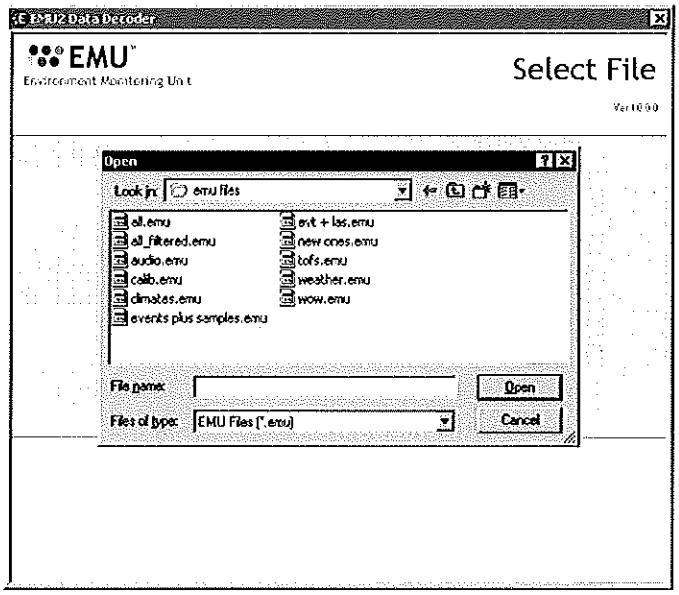

Figure 29: Selecting File.

Choose Save in format ready to import to ANOMS and click Continue.

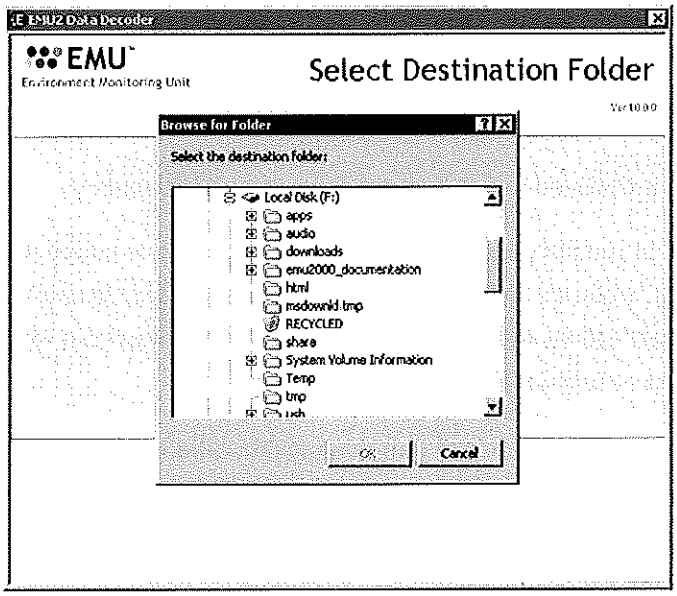

Figure 32: Selecting the destination folder.

The files will be decoded. Once the files are decoded upload the decoded files to the designated FTP server. Contact Lochard support if you do not know the FTP server address. Make sure the files are uploading in binary mode. You should place all the files in same location. Your FTP folder should look like:

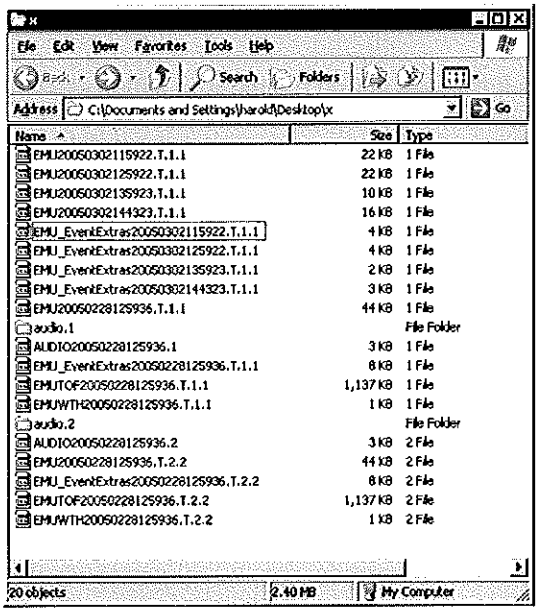

Figure 33: Layout of FTP folder.

AC mains powered with internal battery backup.

This is the most common mode of operation. The 24 volt input is supplied from a 24 volt output in-line switch mode power supply of 65 watt capacity (Amtex type ZVC65SG24) that is normally supplied with the EMU 2200. This supply can be either placed adjacent to the unit or it can be connected by up to 100 m of suitable cable. Two standard extension cables are offered, 30.5 m (100 ft) and 100 m. The unit can tolerate a cable resistance of up to about 4.8 ohms however cable resistances of more than 3 ohms will degrade the battery charging current resulting in a longer recovery time. The 100 ft cable is about 1.5 ohm, the 100 m one is 4.8 ohm. The power supply is intended to be mounted indoors with the extension cable operating at 24 volts for safety. The 24 Ah internal battery gives approximately 20 hours of autonomous operation in the event of mains failure.

AC mains powered with external battery backup.

If more than 20 hours of backup time is required, an external battery can be connected to increase it. Two standard external battery packs are available, of 36 and 48 amp hour capacity. These packs have two connectors, one for connection to the EMU and one for connection to either another pack to further increase the backup capacity or to the 24 volt supply. The two connectors on the external battery pack are connected straight through with the battery connected between pins 1 and 3 via a protective fuse. When operated this way, the external battery is float charged from the 24 volt supply in the same way as the internal battery. Any reasonable number of battery packs can be "daisy chained" to obtain a required backup time, the only limitation being that the more packs that are used the longer the recovery time will be. The block diagram of a setup with two battery packs is shown below.

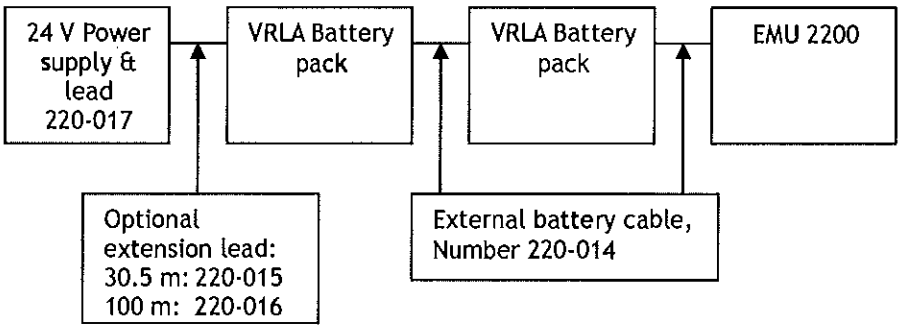

Figure 34: Setup with two VRLA battery packs

If it is acceptable to visit the site twice a week, the following scenarios are examples of ways to power a unit continuously using either a single high capacity pack and a VRLA pack or five VRLA packs.

Using One High capacity pack and one 36 Ah VRLA pack, site 2 hours or less from office.

- Start unit at 16:00 on Tuesday or replace the VRLA pack with the recharged High capacity pack,
- Replace the High capacity pack at 10:00 the following Monday with a fully charged 36 Ah VRLA pack,
- Start recharge of High capacity pack at 12:00,
- Cycle charger power at 18:00 to reset timeout,
- Cycle charger at 09:00 on Tuesday to reset timeout again,
- Turn off charger when all green LEDs are on (this may take one or two hours),
- Take battery back to site and replace VRLA unit before 16:00,
- Recharge the VRLA unit during the week to be ready to repeat the cycle.

Using Five 48 Ah VRLA packs, site 2 hours or less from office.

- Start unit at 10:00 on Monday, powered by three 48 Ah VRLA packs or replace two VRLA packs with three fully charged ones,
- Recharge two packs during the week,
- Replace the three packs with two fully charged 48 Ah packs at 16:00 on Friday,
- Recharge three packs over the weekend and repeat the cycle.

Permanent Battery Power with Periodic Charging

This is the situation where the EMU is permanently connected to a large external battery which is periodically charged from the mains or other power source. An example of this mode of operation would be a mobile unit with a large battery which could be brought to a charging station periodically for recharge.

In this case the external battery should be connected between pins 1 and 3 of the power input connector using a female Binder cable plug type 440-99-4806-00-03, the 24 volt input should not be used. While the external battery is being recharged, the lead from the battery to the EMU should be unplugged and the 24 volt power supply should be plugged in and connected to the mains. This will ensure that the internal battery is kept in good condition.

The EMU can be left running or turned off during the recharging operation, it makes no difference to the way the internal battery is recharged.

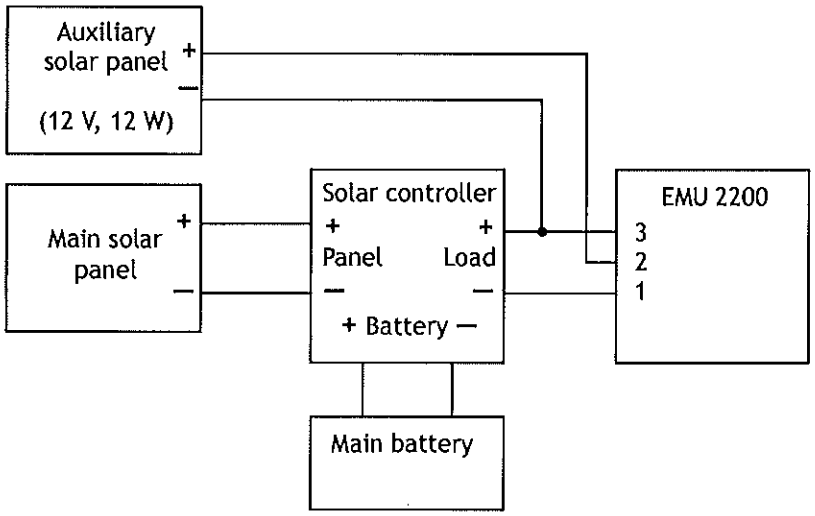

Figure 36: Solar Power Wiring with Auxiliary Panel

Using the Battery Pack

Prior to use, the battery pack should be checked to ensure that it is fully charged by connecting it to the charger as described in the next section, turning on the charger and waiting until all of the green LEDs come on. Even with a recently charged pack, this could take a couple of hours.

To turn on the battery pack insert the two activating plugs in to the sockets labelled "ONE" and "TWO" as shown below. Do this before connecting the battery pack to the EMU.

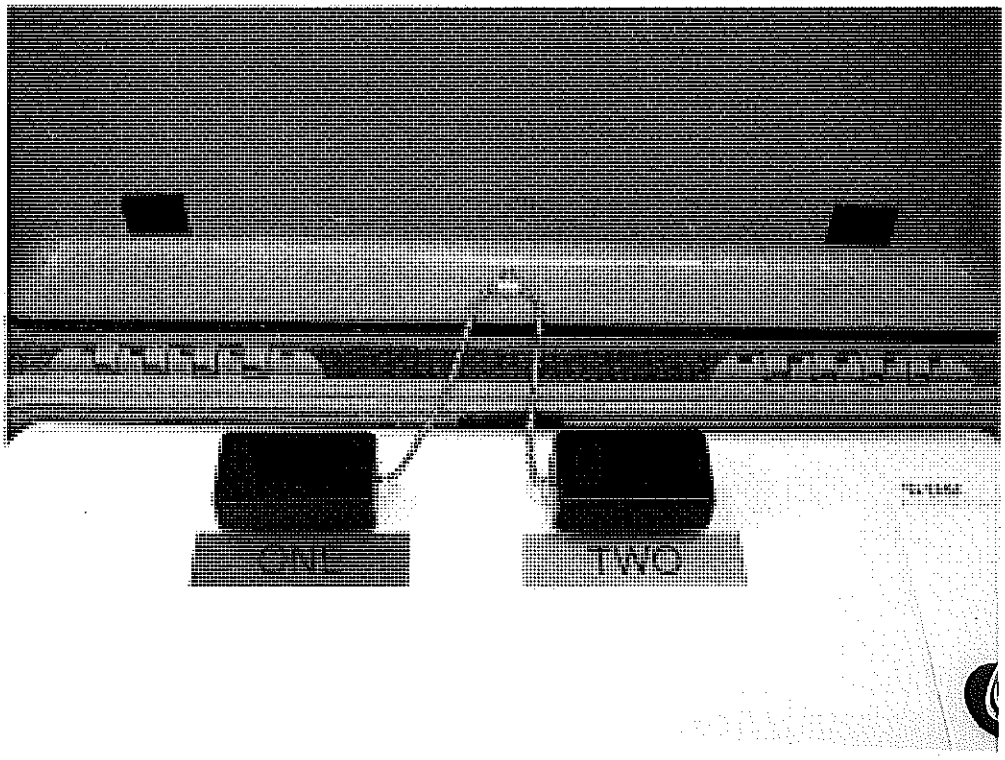

Figure 38: Activating Plugs in Position

Connect the battery pack to the EMU 2200 using the External battery cable (Number 220-014). This is the same cable as is used to connect the standard lead acid battery packs.

When one of these packs is connected it is not possible to connect the mains supply to the EMU. These packs are intended for use where mains power is not available at the site, they are not intended for extended backup of mains powered units; the lead acid packs must be used for this.

It is not necessary to turn the EMU off while replacing the external battery, its internal battery will keep it going whilst the changeover is taking place.

After about nine hours the charger modules will time out even if their respective battery pack is not yet fully charged; when this happens the green LED will come on, indicating that the charger module has turned off. At this time, assuming that the battery had been fully discharged at the start of the charging period, the battery will be at least 80% charged. If the battery was not fully discharged when charging started, the state of charge at the end will be higher. To make sure that the batteries are fully charged, the charger should be turned off and on again after 9 hours to start a second cycle. The rate of charge during this cycle will be quite low and some of the green LEDs may not come on again until their respective charger module times out again. This does not indicate that the particular block is not fully charged, it simply means that it is still drawing more than the threshold current required for the charger to switch off. If all of the green LEDs come on during either the first or second cycle in less than 9 hours, the battery can be considered fully charged and the charger can be turned off and disconnected.

Summary:

- Do not turn off the charger until all the red LEDs have gone out, this may take up to 9 hours.
- At the end of one 9 hour charging period the battery will be at least 80% charged.
- The charger can be left on indefinitely with the green LEDs on without any fear of damage or overcharging of the battery.
- If some red LEDs are still alight at the end of the first charging period or it is known that the battery was fully discharged before it started, a second cycle will be needed to ensure that the battery is fully charged.
- If the state of the LEDs is not known at the end of the first cycle a second cycle can always be started without any risk to the battery.
- Two 9 hour charging cycles will ensure that the battery is charged to better than 95% of its capacity regardless of the state of the LEDs prior to the end of the second cycle.
- If all of the red LEDs go out in less than 9 hours, charging is complete and the charger may be turned off.

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Appendix 10 Report Parameters

Event Report Parameters

The following parameters are stored with each event report:

- Event start time and date
- Detection algorithm used
- Values of the detection parameters used
- Event duration (TG)
- The total time [noise param] was above the REF level (TX)
- The reference exceedance level dBX = max[noise param] - REF
- Event LAeq (EVT-LAeq)
- Event LAE (EVT-SEL)
- Value and time of maximum sound level (LAmax)
- Weather sensor readings at time of generating report (if sensors fitted)
- Dead zone LAE
- Flag indicating if maximum duration was exceeded
- Max PNL (if 1/3 octaves enabled)
- Event EPNL (if 1/3 octaves enabled)
- 1/3 octave levels at the time of LAmax (if 1/3 octaves enabled)
- 1/3 octave SELs for the event duration (if 1/3 octaves enabled)
- 1/3 octave time-history for the event duration (if enabled)

Noise Climate Parameters

The following parameters are stored in a noise climate report:

- Start time and date of measurement
- Duration of measurement
- LAeq
- LAmax
- Time of LAmax
- Statistical exceedance levels L1, L5, L10, L50, L90, L95, L99 (for example, L50 is the noise level which was exceeded for 50% of the time)
- 2 user defined Ln values from L0.1 to L99.9
- The time spent above a user configurable noise threshold (10 values)

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Appendix 11 Event Detection Algorithms

The EMU continuously analyses the incoming noise signal to decide whether the noise is potentially caused by aircraft or other sources. Noise that exceeds a certain threshold level above the general level of background noise is recorded as a "noise event". Depending on the level as function of time, it is possible to exclude some events that are due to causes other than aircraft. Figure 5-1 shows some stylised patterns of noise levels as functions of time with their probable causes.

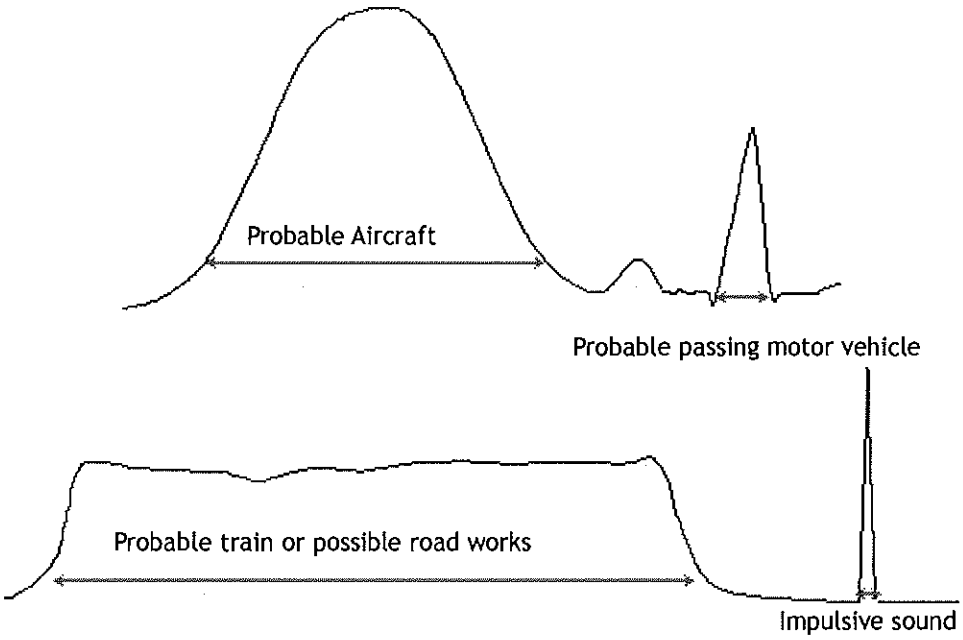


Figure 40: Stylised patterns of some noise events

The EMU has a choice of three algorithms (three different methods) for detecting noise events:

STD The standard detection algorithm.

DIN An algorithm complying with the German standard DIN45643.

SWD Developed by Zürich Airport (FDZ) from the DIN algorithm and incorporating some different features.

Common to the STD and DIN Algorithms

A possible event starts when the noise parameter first rises above the primary threshold T1. The event continues while the noise level remains above the threshold T1 or T2 (in the case of STD). Once the level moves below this threshold, it must remain below for a given time, equal to the GUARD time (*Horchzeit*), before the event terminates. If it rises above the threshold within the guard time interval, the event continues. The guard time can be extended to ensure that any trailing noise due to aircraft engine reverse thrust is captured and included in the measurements of the noise event. The event duration TG does not include the guard time. The event duration, TG, must equal or exceed the minimum duration UZ otherwise the event is discarded.

If the event duration TG exceeds the maximum duration OZ, then the event is terminated (a report is generated) and a new event is started immediately. Such events may indicate that the detection parameters require adjustments to accommodate longer events. The follow-on event will not be discarded if TG < UZ since the event data 'belong' to the previous event. The SELs of the guard time intervals at the beginning and end of an event contribute to the non-aircraft (background) noise SEL.

Note: DIN 45643 does not specify whether a follow-on event, in which TG < UZ, should be discarded or not. The EMU records the event in any case, and the user may decide to discard it from the reports stored in the central database.

STD Algorithm

This is the standard detection algorithm that is employed by most customers around the world. The noise parameter used to detect events can be one of LAeq, LAS, LAF or LAI. Usually, either LAS or LAeq is chosen. When LAeq is used, Lmax is obtained from LAS. Once the level exceeds T1, the event continues so long as the noise level remains above the secondary threshold T2. The secondary threshold can never exceed the primary threshold T1. If T2 were allowed to exceed T1, a logical contradiction would result: the event both starts and is into the guard-time phase at the same instant.

Next, there are two cases to consider:

(a) DETECTION_PRIORITY = GUARD

(b) DETECTION_PRIORITY = DURATION

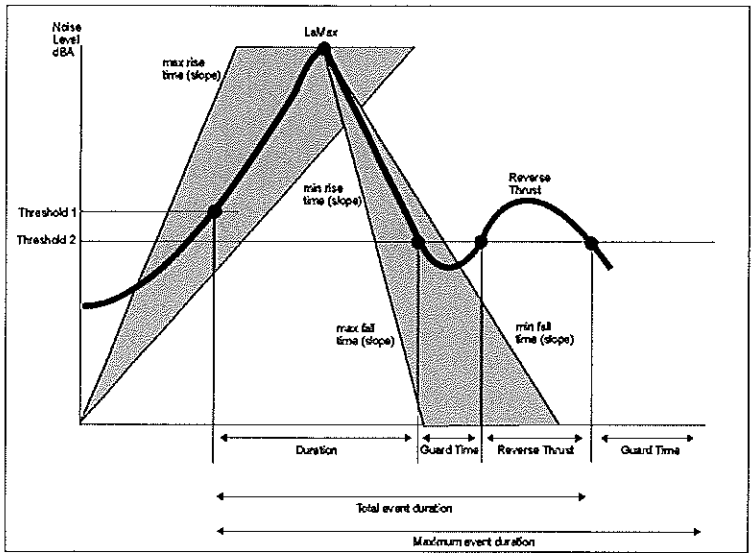


Figure 41: Principal parameters of the STD detection algorithm

DIN Algorithm

This is the method for identifying aircraft noise events as stipulated by the German standard, DIN 45643.

The noise parameter used to detect events is LAS. Part 1 of the standard DIN 45643 specifies only a single threshold T1. Part 2 of the standard does permit a secondary threshold, but its introduction leads to additional complications. It has not been implemented in the standard EMU software. In respect of the threshold and guard time, the algorithm works the same way as the STD algorithm. But in respect of the duration and the calculation of the SEL there are significant differences.

The duration TG is defined as the sum of all time intervals (t's in Figure 5-3) for which LAS(t) ≥ T1. Thus the duration is in general less than the duration according to STD for the same event profile and threshold (T1 = T2).

A key new parameter is t10. There are three cases to consider:

(a) Lmax >= T1 + 10

(b) T1 + 10 > Lmax >= T1 + 3

(c) T1 + 3 > Lmax.

In case (c), both the SEL and t10 are set to zero. The event, however, is still logged with its Lmax and TG.

DIN 45643 also allows various approximations, based solely on Lmax and t10. Depending on the profile of the event, the errors induced by such approximations can range from a few tenths of a dB to several dB. Some customers or outside consultants, who know only these rather crude approximations, may try to dispute the accuracy of the EMU. The EMU checks all conditions and calculates the SEL by integration according to well-established international standards.

The Leq,1s samples that lies outside the time intervals covered by t10, contribute to the so-called dead-zone SEL (the DZ_SEL, see below). This is not part of the background noise, nor is it part of the event SEL. It is also not part of the DIN 45643 standard. Its purpose is to act as an overall check on the monitoring process. Over any period of time, encompassing complete events, the following "energy" balance equation must apply:

$$10^{0.1*LAE\_total} = 10^{0.1*LAE\_events} + 10^{0.1*LAE\_background} + 10^{0.1*LAE\_dead\_zone}$$

Here, LAE is the level of the A-weighted exposure, i.e., the numerical value of the sound exposure level (SEL).

SWD Algorithm

This detection algorithm is a modified version of DIN, which was devised by the Zürich Airport Authority. Instead of guard-time, it employs the concepts of dead-time and dead-zone. An event commences as soon as the level exceeds the threshold, but terminates as soon as the level drops below the threshold. Immediately prior and subsequent to an event, a dead-zone is defined which has a maximum width equal to the pre-set dead-time (DZ). The actual width depends in a rather complicated way on closely preceding or closely following events (Figure 5-4), so that dead-zones of neighbouring events effectively may overlap.

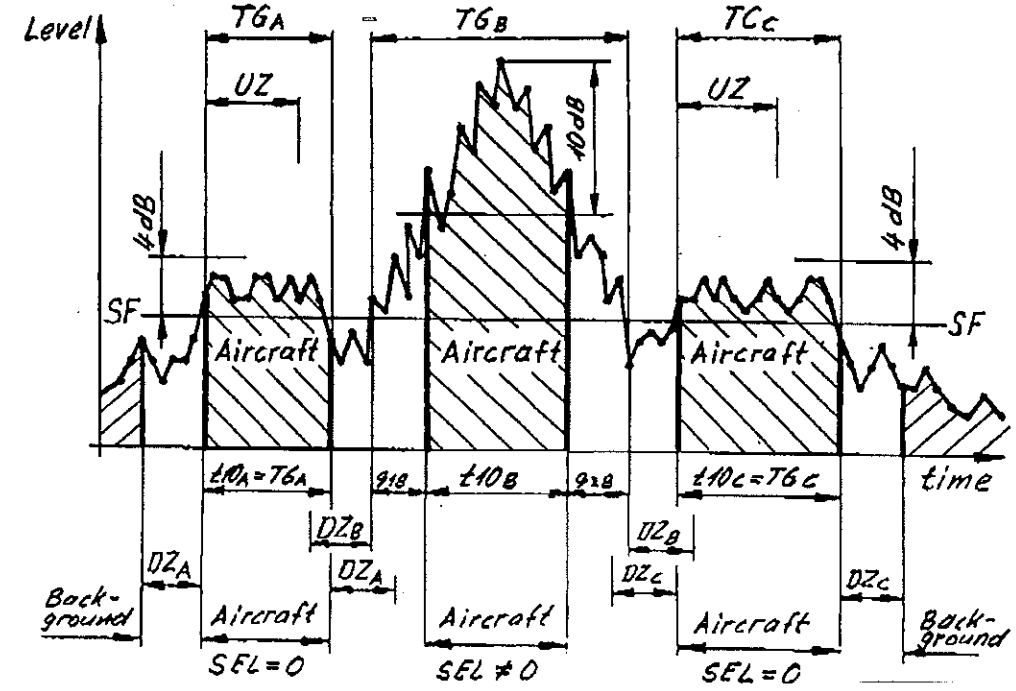
The SELs pertaining to the dead-zones are taken as a measure of the background noise energy during the event itself.

In respect of the event_SEL calculations, there are three cases to consider:

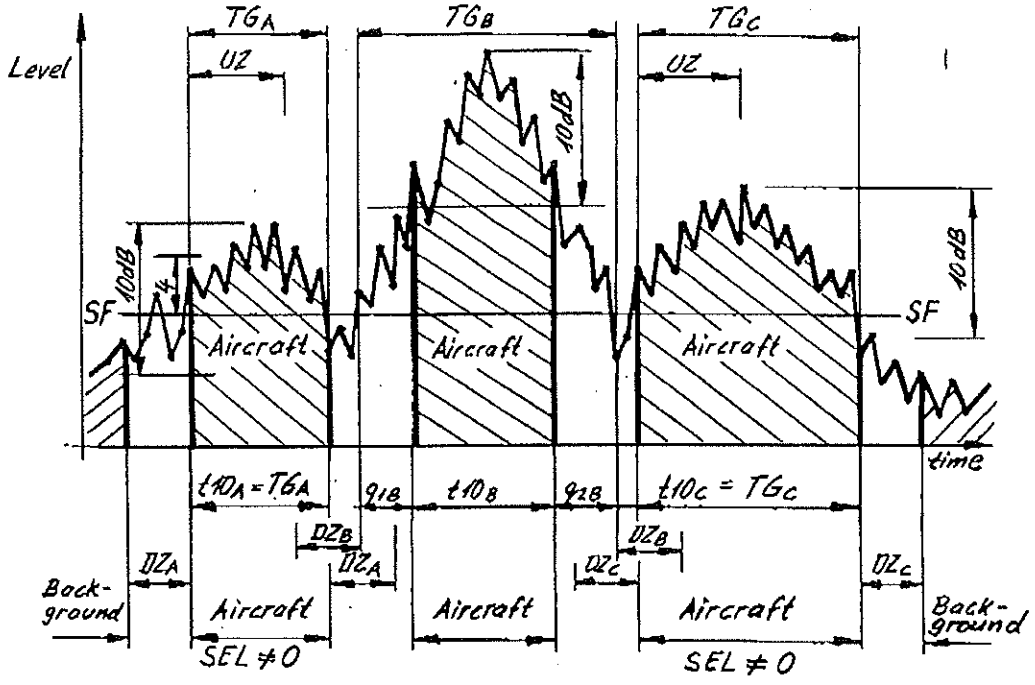
(a) Lmax ≥ T1 + 10

(b) T1 + 10 > Lmax ≥ T1 + 4

(c) T1 + 4 > Lmax.


Level
TGA
TGB
TCc
UZ
UZ
10dB
4dB
4dB
SF
SF
Aircraft
Aircraft
Aircraft
t10A=TGA
g1B
t10B
g2B
t10c=TGc
time
DZB
DZB
DZA
DZA
DZc
DZc
Back-ground
Aircraft
Aircraft
Aircraft
Back-ground
SEL=0
SEL≠0
SEL=0

(a)


Level
TGA
TGB
TGc
UZ
UZ
10dB
10dB
4
10dB
SF
SF
Aircraft
Aircraft
Aircraft
time
t10A=TGA
g1B
t10B
g2B
t10c = TGc
DZB
DZB
DZA
DZA
DZc
DZc
Back-ground
Aircraft
Aircraft
Aircraft
Back-ground
SEL≠0
SEL≠0

(b)

Figure 43

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Measurements

Broadband metrics	Lx,y (where x = A, C or Z and y = S or F)¤LAI, LCPK and LZI¤Lxeq (where x = A, C or Z)
1/3rd octaves	31 frequency bands:16, 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800 (Hz)1.0, 1.25, 1.6, 2.0, 2.5, 3.15, 4.0, 5.0, 6.3, 8.0, 10.0, 12.5, 16.0 (kHz)

Weather (Option)

Wind speed	0 - 125 knots with 0.02 knots resolution (0 - 75 m/s with 0.1 m/s resolution)
Wind direction	0 - 354.375 (° from N) with 5.625° resolution
Air temperature	-40°F to 140°F with 0.1°F resolution (-40°C to 60°C with 0.1°C resolution)
Air pressure	800 to 1060 hPa with 1 hPa resolution
Relative humidity	1 to 100% with 1% resolution
Rainfall	0 to 85 in/hr (0 to 2160 mm/hr)

Outputs

Analogue level (DC)	2 x 20mV/dB range 0-2.8V¤Factory selectable metric (Default LAF and LAS)
AC Analogue (option)	1 x 15 dB to 105 dB¤1 x 50 dB to 140 dB
Digital audio (option)	1 x EBU/AES digital audio (IEC958) or SPDIF (factory option) 1 channel 15 dB to 140 dB with 24 bits 1 channel 15 dB to 105 dB with 16 bits
Digital output	2 x general purpose output for relays or LEDs
Status LED	Mains or solar charger active Battery charge level Microphone operating Host computer accepting output

Inputs

Analogue	Battery voltage, battery and load currents
	Microphone supply current

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Measurements

	Alarms
Noise event contents	Event start and end time
	Detection algorithm and parameters
	Time spend above a pre-defined reference level
	Event LAeq and LCeq (option)
	Event LAE and LCE (option)
	LAS maximum level and time
	1s 1/3rd octaves-spectra history, LAE spectrum and spectra at max LAS (option)
	PNL max (option)
	Event EPNL (option)
	"Dead zone" SEL
	Weather readings at maximum (with weather option)
Climate reports	Start time and duration of measurement
	Statistical exceedance levels L1, L5, L10, L50, L90, L95, L99
	2 statistical exceedance levels of user-defined percentiles (e.g. L75.5, L99.9)
	Level and time of maximum noise level
	Leq over the measurement period
	Reports the time spent above a user configurable noise threshold (10 levels)
Weather reports (option)	Measurement start time and duration
	Wind speed (avg, max, time of max)
	Wind direction (dir at max wind speed, distribution of time spent at each of 16 compass points)
	Temperature (avg, min/max, time of min/max)
	Humidity (avg, min/max, time of min/max)
	Pressure (avg, min/max, time of min/max)
	Rainfall (total mm in measurement period)
Status reports	Mains failure, battery low, case open, no microphone signal, reset occurred and microphone calibration required
Calibration	Electrostatic check and set capability
	Up to 4 programmable times per day
Audio storage (option)	Audio storage of 16 bit samples at 8 or 16 kHz for events only

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Power

	EN61000-6-2, EN61000-4-2, EN 61000-4-3,▫EN 61000-4-4, EN 61000-4-5, EN 61000-4-6,▫EN61000-4-11
	IEC 60801 1/2/3