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HD Radio

FSI 10
FM IBOC DIGITAL SIGNAL GENERATOR
Version 4.3.2
Instruction Manual

597-0542-002
Revision D
September 7, 2011

FSI 10
FM IBOC DIGITAL
SIGNAL GENERATOR
Version 4.3.2
Instruction Manual

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PLEASE READ AND OBSERVE ALL SAFETY PRECAUTIONS//

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The operation of power tubes and power transistors involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

A. **HIGH VOLTAGE -** Normal operating voltages can be deadly. Additional information follows.

B. **RF RADIATION -** Exposure to RF radiation may cause serious bodily injury possibly resulting in Blindness or death. Cardiac pacemakers may be affected. Additional information follows.

C. **HOT SURFACES** Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. Additional information follows.

D. **RF BURNS** Circuit boards with RF power transistors contain high RF potentials. Do not operate an RF power module with the cover removed.

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HIGH VOLTAGE –

Many power circuits operate at voltages high enough to kill through electrocution. Personnel should always break the primary AC Power when accessing the inside of the transmitter.

RADIO FREQUENCY RADIATION

Exposure of personnel to RF radiation should be minimized, personnel should not be permitted in the vicinity of open energized RF generating circuits, or RF transmission systems (waveguides, cables, connectors, etc.), or energized antennas. It is generally accepted that exposure to "high levels" of radiation can result in severe bodily injury including blindness. Cardiac pacemakers may be affected.

The effect of prolonged exposure to "low level" RF radiation continues to be a subject of investigation and controversy. It is generally agreed that prolonged exposure of personnel to RF radiation should be limited to an absolute minimum. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. A 10 mW/cm^2 per one tenth hour average level has been adopted by several U.S. Government agencies including the Occupational Safety and Health Administration (OSHA) as the standard protection guide for employee work environments. An even stricter standard is recommended by the American National Standards Institute which recommends a 1.0 mW/cm^2 per one tenth hour average level exposure between 30 Hz and 300 MHz as the standard employee protection guide (ANSI C95.1-1982).

RF energy must be contained properly by shielding and transmission lines. All input and output RF connections, such as cables, flanges and gaskets must be RF leak proof. Never operate a power tube without a properly matched RF energy absorbing load attached. Never look into or expose any part of the body to an antenna or open RF generating tube or circuit or RF transmission system while energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

HOT SURFACES –

The power components in the transmitter are cooled by forced-air and natural convection. When handling any components of the transmitter after it has been in operation, caution must always be taken to ensure that the component is cool enough to handle without injury.

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Table of Contents

1 HD RADIO™ FM REFERENCE FSI 10 1
1.1 System Overview 1
1.2 Document Overview 1

2 ABBREVIATIONS AND CONVENTIONS 2
2.1 Abbreviations and Acronyms 2
2.2 Presentation Conventions 2

3 INSTALLATION 3
3.1 FSi 10 Installation 3
3.2 IBOC System Connections 3
3.3 FSi 10 Install Checklist 4

4 FRONT PANEL DESCRIPTION 5
4.1 Graphical User Interface Display/Indicator Definitions 5
4.1.1 Platform Indicator 6
4.1.2 Station Information 7
4.1.3 Station Identification 8
4.1.4 Call Sign 8
4.1.5 Station Slogan 9
4.1.6 Standard Station Slogan 9
4.1.7 Station Message 10
4.1.8 Frequency 11
4.1.9 Band 11
4.1.10 Status Upper Section (Main Screen Upper Right) 11
4.1.11 Status Lower Section (Main Screen Upper Right) 11
4.1.12 Audio Bypass 11
4.1.13 Audio-A Bypass 12
4.1.14 Audio-B Bypass 12
4.1.15 Auto Startup 12
4.1.16 Auto Shutdown 12
4.1.17 Digital Carrier Control 12
4.1.18 FM Layer 1 Service Mode 12
4.1.19 Date and Time 13
4.1.20 Exciter Status Bottom Right 14
4.2 System Tab Control Buttons 16
4.2.1 Shutdown 16
4.2.2 Configuration 16
4.2.3 Config Channel 16
4.2.4 Save Config 17

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4.2.5 Configuration Selection 17
4.2.6 Restart Options 17
4.2.7 Restart 17
4.2.8 Versions 19
4.2.9 Configure Password 20
4.2.10 Command 21
4.2.11 Command/Results 21
4.2.12 Browse 21
4.2.13 Common Applications Display Virtual Keyboard 21
4.2.14 Common Applications Xterm 21
4.2.15 Common Applications gvim 23
4.2.16 Common Applications linuxconf 23
4.2.17 Common Applications gcalc 24
4.2.18 Common Applications Top 25
4.2.19 Common Applications ifconfig 25
4.2.20 Common Applications setemb 25
4.2.21 Common Applications setdev 26
4.2.22 GPS Data 26
4.2.23 GPS Antenna Delay 27
4.2.24 Local Time 28
4.3 Log Tab Control Buttons 28
4.3.1 Levels 28
4.3.2 Previous Page 28
4.3.3 Next Page 29
4.3.4 All Log Levels 29
4.3.5 All Verbose Levels 29
4.3.6 Exclusive Level 30
4.3.7 Parameters 31
4.3.8 Warning Message Rate 31
4.3.9 Window Size (sec): 31
4.3.10 ASCII Log Rate (bytes/sec): 31
4.3.11 ASCII Log Utilization: 31
4.3.12 ASCII Log Max Rate: 31
4.3.13 Binary Log Rate (bytes/sec): 31
4.3.14 Binary Log Utilization: 31
4.3.15 Binary Log Max Rate: 31
4.3.16 Start Archive 31
4.3.17 System Status 32
4.4 Platform Tab Control Buttons 33
4.4.1 Platform Configuration 33
4.4.2 Link Status 33
4.5 Station Tab Control Buttons 35
4.5.1 Station Interface 35

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4.5.2 Station Information Schedule 36
4.5.3 Station Information 38
4.5.4 Station Default PAD 38
4.5.5 General 38
4.5.6 Comment 39
4.5.7 Commercial 40
4.5.8 Last Message Sent 41
4.5.9 Send 42
4.5.10 Update 42
4.5.11 Cancel 43
4.5.12 Station Program Control 43
4.6 Audio Tab Control Buttons 44
4.6.1 Audio Levels 44
4.6.2 Range (dB) 44
4.6.3 Average (sec) 44
4.6.4 Peak (sec) 44
4.6.5 Peak Hold (sec) 45
4.6.6 Analog Audio Diversity 46
4.6.7 Delay 46
4.6.8 Increment 46
4.6.9 Delay in seconds 46
4.6.10 Current Delay in seconds 46
4.6.11 Automatic Adjustment Ramp Up 47
4.6.12 Automatic Adjustment Ramp Down 47
4.6.13 Rate 47
4.6.14 Audio Monitor 47
4.6.15 Invert Digital Audio Phase 47
4.6.16 Audio Diversity Delay Status 47
4.6.17 Audio Card 0 Input Level 47
4.6.18 Audio Card 0 Output Level 47
4.6.19 Audio Card 1 Input Level 47
4.6.20 Audio Card 1 Output Level 47
4.6.21 Audio Bypass 47
4.6.22 Audio Blend Control 48
4.6.23 Audio Level Control 48
4.7 Signal Tab Control Buttons 50
4.7.1 Frequency 50
4.7.2 Layer 1 Service Mode 50
4.7.3 Signal Configuration 50
4.7.4 Digital Carrier Control 51
4.7.5 PAR Control 51
4.7.6 I/Q Scale Factor 52
4.7.7 Secondary Scale Code 52

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4.7.8 Presets 52
4.8 Test Tab Control Buttons 53
4.8.1 Bit Error Rate Mode 54
4.8.2 Single Subcarrier Mode 55
4.8.3 Test Vector Capture 55
4.9 Utility Tab Control Buttons 56
4.9.1 Screen Resize 57
4.9.2 Width Value 57
4.9.3 Height Value 57
4.9.4 Test 57
4.9.5 Default Size 57
4.9.6 Apply 58
4.9.7 Cancel 58
4.9.8 Fonts 58
4.9.9 Virtual Chat 59
4.9.10 Up Time 60

5 WAVEFORM GENERATION PLATFORM 62
5.1 External Ethernet Hard Drive Support 64

6 OPERATING PROCEDURES 66
6.1 Startup 66
6.1.1 Startup NonEmbedded 66
6.1.2 Startup Embedded 66
6.2 Audio Diversity Blend Delay Adjustment 67
6.3 Log Levels 67
6.4 Shutdown Procedure Nonembedded 67
6.5 Shutdown Procedure Embedded 68
6.6 Remote GUI Control 68
6.7 Telco Dialup 69
6.8 Console User Interface 70

7 SOFTWARE UPGRADE 71
7.1 Software Upgrade Overview 71
7.1.1 Software Upgrade Detail 71
7.2 Touch Screen Configuration 76
7.3 Operational Software Upgrade From CDROM 77
7.4 Operational Software Upgrade From iBiquity Network 77
7.5 File Transfer (Waveform files) from CDROM 77

8 AES BYPASS CONFIGURATION 78
8.1 Introduction 78

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8.2 AES Bypass Part Numbers 78
8.3 AES Bypass System Configuration, Dual Processor 79
8.4 AES Bypass System, Dual Processor, Block Diagram 80
8.5 AES Bypass System Configuration, Single Processor - Omnia-6EX 81
8.6 AES Bypass System, Single Processor, Block Diagram – Omnia 6EX 82
8.7 AES Bypass System Configuration, Single Processor - Orban 8400HD 82
8.8 AES Bypass System, Single Processor, Block Diagram – Orban 8400HD 84
8.9 AES Bypass System, Wire Harness Connections 85
8.10 AES Bypass System, Wiring List 86
8.11 AES Bypass System, Notes 87
8.12 AES Bypass System Configuration, Single Processor - Orban 8500FM 88
8.13 AES Bypass System, Single Processor, Block Diagram – Orban 8500FM 89

9 RF TECHNICAL SERVICES CONTACT INFORMATION 90

10 BE PART NUMBERS 91

11 DRAWINGS 104
11.1 Introduction. 104

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1 HD Radio™ FM Reference FSi 10

1.1 System Overview

Broadcast Electronics uses the IBOC (in-band-on-channel) digital broadcasting system from iBiquity Digital Corporation now known as HD Radio. The system is designed to permit a smooth evolution from current analog amplitude modulation (AM) and frequency modulation (FM) radio to a fully digital IBOC system. This system delivers digital audio and data services to mobile, portable, and fixed receivers from terrestrial transmitters in the existing medium frequency (MF) and very high frequency (VHF) radio bands. Broadcasters may continue to transmit analog AM and FM simultaneously with the new, higher-quality and more robust digital signals, allowing themselves and their listeners to convert from analog to digital radio while maintaining their current frequency allocations. The FSi 10 is Broadcast Electronics' HD Radio Generator, part of a system used in creating the HD signal to overlay onto the FM signal.

NOTE: An FSi 10 is always used with an FXi 60/250.

1.2 Document Overview

This document provides a description of controls and indicators, system interconnection, and operating procedures for the FSi 10 FM IBOC Digital Signal Generator.

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2 Abbreviations and Conventions

2.1 Abbreviations and Acronyms

AES/EBU Audio Engineers Society / European Broadcast Union
ALFN Absolute L1 Frame Number
AM Amplitude Modulation
BER Bit Error Rate
CD Compact Disk
CD/ROM CD/Read Only Memory
DUN Dial-Up Networking
FCC Federal Communications Commission
FM Frequency Modulation
GEL Gateway to Exciter Link – Exciter = FSi 10
GPS Global Positioning System
GUI Graphical User Interface
IBOC In-band On-channel
L1 Layer 1
MF Medium Frequency
MPA Main Program Audio
MP1–MP7 Primary Service Modes 1 through 7
MS1–MS4 Secondary Service Modes 1 through 4
PAC Perceptual Audio Coder
PAR Peak-to-Average Ratio
RF Radio Frequency
RLS Radio Link Service
SIS Station Identification Service
VHF Very High Frequency

2.2 Presentation Conventions

- Unless otherwise noted, the following conventions apply to this document:
- Information enclosed in braces { } is either unavailable at the present time or subject to change.
- All vectors are indexed starting with 0.
- The element of a vector with the lowest index is considered to be first.
- In drawings and tables, the leftmost bit is considered to occur first.
- Bit 0 of a byte or word is considered the least significant bit.
- In representations of binary numbers, the least significant bit is on the right.
- When presenting the dimensions of a matrix, the number of rows is given first (e.g., an n x m matrix has n rows and m columns).
- In timing diagrams, earliest time is on the left.

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3 Installation

Installation of the FSi 10 IBOC digital signal generator consists of: 1) installing the unit in a rack and 2) connecting the FSi 10 to the digital link, audio processing equipment, and the FXi digital FM/IBOC exciter. Refer to the following text to install the FSi 10 and configure the FM system for IBOC transmission.

3.1 FSi 10 Installation

The FSi 10 may be installed in any convenient location in a 19 inch (48.3 cm) rack within reach of the transmitter, STL link, and audio processing equipment. The unit requires 7 inches (17.78 cm) of rack space. Please see the Transmitter Manual for details on physical placement of the FSi 10 in a transmitter rack.

3.2 IBOC System Connections

The FSi 10 is part of an HD Radio broadcasting system. This system consists of several pieces of equipment; the FSi 10, FXi 60/250 and an FMi Transmitter. The information to connect the system is found in the FXi Digital FM/IBOC Exciter/Transmitter manual 597-0541.

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3.3 FSi 10 Install Checklist

☐ Install FSi 10 in the transmitter.

☐ Connect 1PPS Out on FSi 10 to 1PPS In on FSi 10

☐ Connect GPS Data Out on FSi 10 to GPS Data In on FSi 10

☐ A mouse and keyboard must be connected before boot-up to do any editing such as Ethernet IP Address setup, etc.

☐ Connect FSi 10 LVDS IBOC Data to FXi 60/250 IBOC Data

☐ Connect J3-4(+) and J3-25(-) on FXi 60/250 Exciter to Output 13 (+/-) on the FSi 10.

☐ Connect 10MHz Out on FSi 10 to 10MHz Reference on FXi 60/250

☐ Connect Main Audio Feed from studio into Studio AES In on FXi 60/250 (This must be AES/EBU format at 32, 44.1, 48, or 96kbps).

☐ In a low-level combined system or when your existing FM transmitter can take AES input connect FM AES Out from FXi 60/250 to your FM Audio Processor AES Input. In a high-level combined or separate antenna installation where your existing transmitter requires a composite input, connect the FM AES Out from the FXi 60/250 directly to the AM/FM AES In on the FSi 10.

☐ Connect IBOC AES Out from FXi 60/250 to your HD Radio Audio Processor AES Input.

Note: When utilizing one processor for both FM and HD Radio you can use either the FM AES Out or IBOC AES Out from the FXi 60/250 to drive the AES input on your processor.

☐ In a low-level combined system or when your existing FM transmitter can take AES input connect the FM Audio Processor AES Out to the AM/FM AES input on FSi 10. In a high-level combined or separate antenna installation where your existing transmitter requires a composite input, connect the FM AES Out from the FXi 60/250 directly to the AM/FM AES In on the FSi 10.

☐ Connect the HD Radio Audio Processor AES Out to the IBOC AES In on FSi 10.

☐ In a low-level combined system connect the AM/FM AES Out to the AES/EBU input on the FXi 60. In a high-level combined or separate antenna system this output would go to your existing FM transmitter. If your existing FM transmitter requires a composite input, connect the AM/FM AES Out from the FSi 10 to the AES input on your FM Audio Processor and connect the composite output to your existing FM transmitter.

☐ If your Studio to Transmitter Link (STL) can support 4kbps of data you can send song artist and title information over the link. Connect the data output from the STL to the IBOC data input on the FSi 10. The input data stream must use the SLIP protocol. This type of data can also be sent via Ethernet or Modem.

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4 Front Panel Description

Front panel descriptions are divided into two categories: Display/Indicator Definitions and Control Buttons for the exciter and EASU.

In all windows the following general rules apply:

- Read-only fields have a light blue background
- Read/write fields have a blue-green background
- On data entry screens the Cancel button will not make any entered data permanent. Any screen with a Cancel button will also have an OK button that can be used to make data permanent.
- On data entry screens the Close button only closes the window. Any data that has been specified is already permanent because it was registered as entered.
- On Numeric keyboard screens the valid range of data will be displayed.
- Failures that need attention are displayed in RED.
- Warnings are displayed in Yellow.
- Normal status information is displayed in Green.

4.1 Graphical User Interface Display/Indicator Definitions

Figure 4-1 is the HD Radio™ FM Exciter graphical user interface (GUI) main menu, as configured upon startup. Descriptions of display/indicator fields accessible from this screen are provided in the following subparagraphs.

The first four lines depict the status of the four AES audio ports, Analog Input, Analog Output, Digital Input, and Monitor Output. These lights will blink from black to green as long as there is audio on each port. If silence is detected the light will remain black.

The Analog input and Digital input Fault lights should remain black during normal operation. If the AES stream at either port is not detected the light will turn Red indicating the Fault.

The Digital Up Converter activity monitor will blink from black to green as long as data is exchanged with the DUC. If no DUC data activity is detected this light will remain black.

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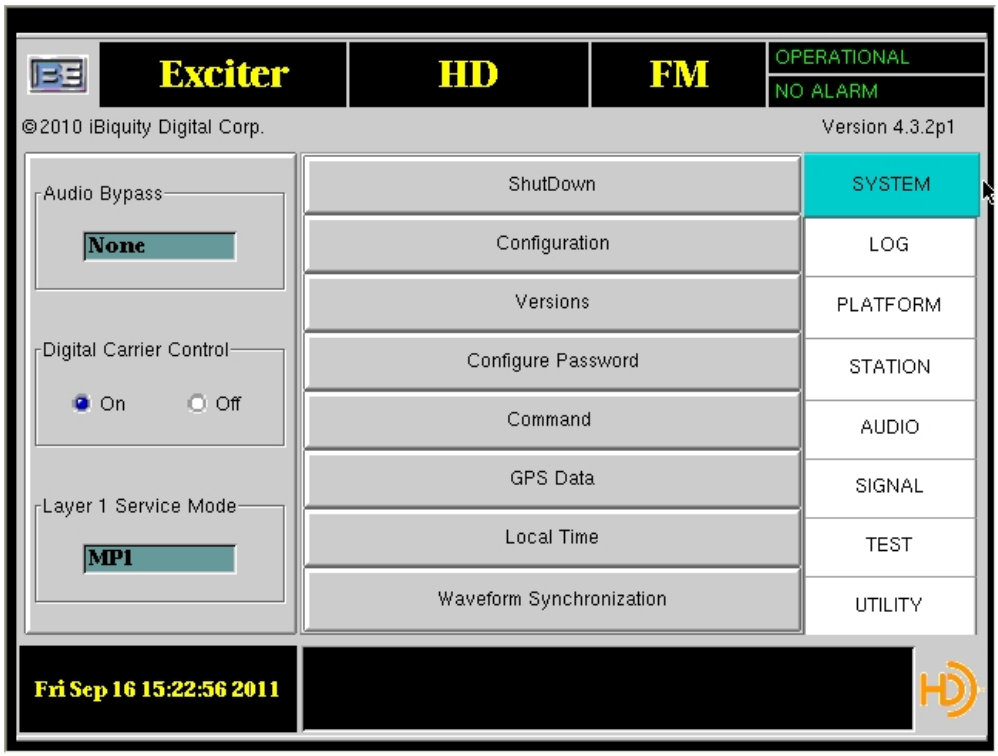

Figure 4-1 Reference Exciter GUI Interface System Tab

4.1.1 Platform Indicator

This identifies the present system platform. When selected a platform menu is displayed as shown in *Figure 4-2*.

To change the exciter platform select the desired setting and press Restart button. The system application will now be restarted as the new platform type. To exit the menu with no changes select Cancel to exit.

NOTE: The platform selected must be compatible with the hardware in use or errors will occur.

Figure 4-2 Version Properties Screen

4.1.2 Station Information

The Station Call Sign indicator displays the call sign being transmitted with the digital data. When selected, the Station Information screen (*Figure 4-3*) is displayed.

The Station Information screen is subdivided into 4 group boxes: Station Identification, Call Sign, Station Slogan, and Station Message.

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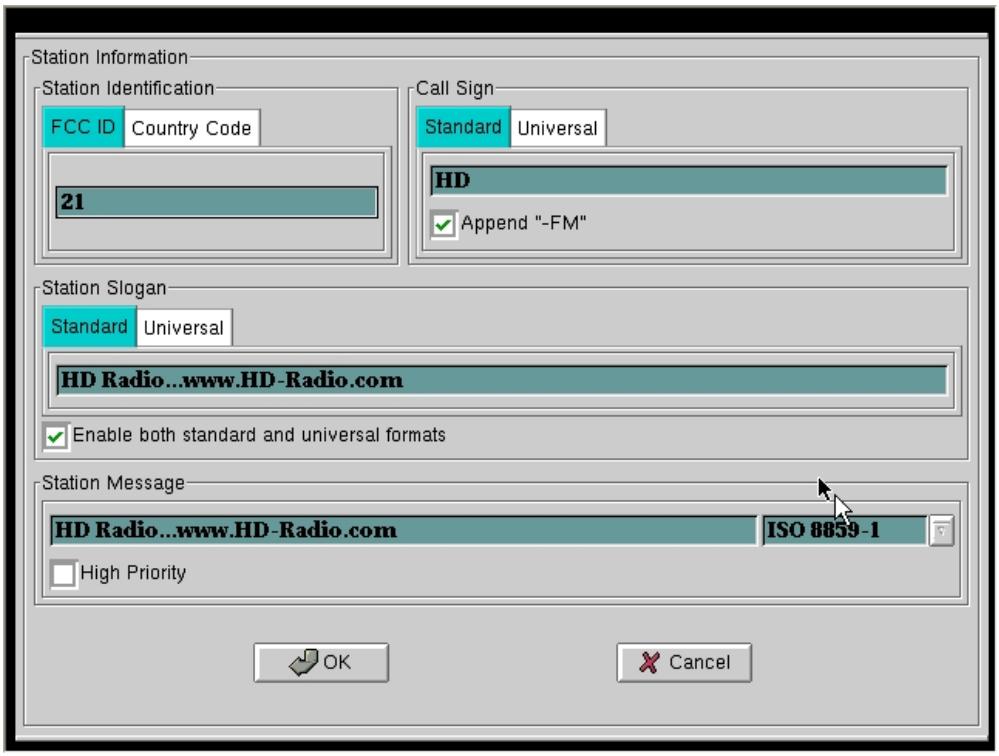

Figure 4-3 Station Information Screen

4.1.3 Station Identification

- Country Code

The Country Code tab, when selected, displays a Numeric Keyboard screen similar to *Figure 4-6*. To change the Country Code, enter the desired 2-letter Country Code using the alphanumeric keys. Press Enter to establish the new Country Code and return to the Station Information screen.

- FCC ID

The (Federal Communications Commission) FCC ID field, when selected, displays a Numeric Keyboard screen (*Figure 4-6*). To change the FCC ID, enter the desired FCC ID using the number keys. Press Enter to establish the new FCC ID and return to the Station Information screen.

4.1.4 Call Sign

There are 2, mutually exclusive, methods for transmitting a station's call signs: Standard & Universal.

- Standard

NOTE: The Standard Call Sign field is limited to four characters; all characters MUST be upper case.
The Standard Call Sign field, when selected, displays a Alphanumeric Keyboard screen similar to *Figure 4-5*. To change the Standard Call Sign, enter the desired letters. Selecting shift, type the desired four-character Call Sign using the character keys. Press Enter to establish the new call sign and return to the Station Information screen.

- Universal

If a station's call sign is longer than 4 characters, or contains international symbols, the Universal Call sign should be used. The Universal Call Sign supports 2 different character sets: ISO8859-1 and Unicode. Use the drop down box (as shown in *Figure 4-4*) to select the desired character set. The Universal Call Sign field, when

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selected, displays an Alphanumeric Keyboard screen similar to *Figure 4-5*. To change the Universal Call Sign, enter the desired letters. Press Enter to establish the new call sign and return to the Station Information screen. If "Append Band" is selected (checked), the current frequency band will be appended to the Universal Call Sign that is displayed at the receiver.

4.1.5 Station Slogan

There are 2 methods for transmitting a Station Slogan: Standard & Universal. Unlike the Call Sign, both methods can be transmitted simultaneously. However, if they are transmitted simultaneously, the entries must be identical. If "Enable both standard and universal formats" is selected (checked) then the Universal Station Slogan entry is grayed out and displays the contents of the Standard Slogan.

4.1.6 Standard Station Slogan

NOTE: The Standard Station Slogan field is limited to 56 characters.
The Standard Station Slogan tab, when selected, displays an Alphanumeric Keyboard screen, similar to *Figure 4-5*. To change the Standard Station Slogan, enter the characters using the Alphanumeric Keyboard. Press Enter to establish the new Standard Station Slogan and return to the Station Information screen.

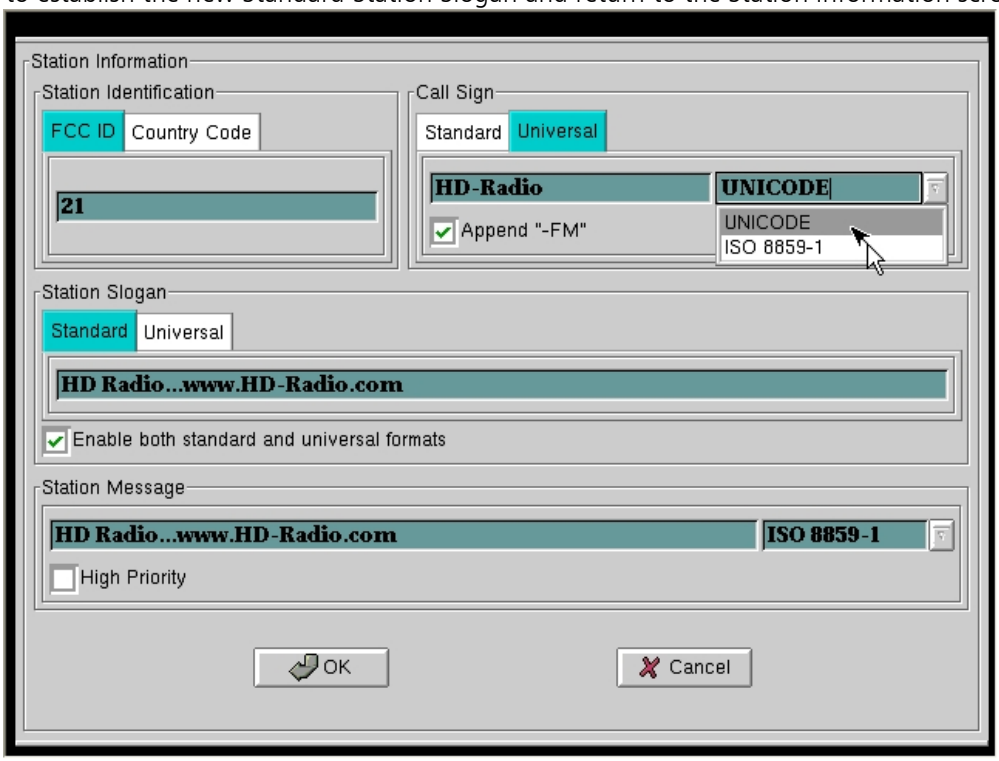

Figure 4-4 Universal Call Sign and Station Slogans

- Universal Station Slogan

If a station's slogan is longer than 56 characters, or contains international symbols, the Universal Station Slogan should be used. The Universal Station Slogan supports 2 different character sets: ISO8859-1 and Unicode. Use the drop down box (as shown in *Figure 4-4*) to select the desired character set. The Universal Station Slogan tab, when selected, displays an Alphanumeric Keyboard screen similar to *Figure 4-5*. To change the Universal Station Slogan, enter the desired characters and press Enter to establish the new slogan and return to the Station Information screen.

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4.1.7 Station Message

The Station Message field is used to transmit messages other than the call sign or station slogan. The Station Message field supports 2 different character sets: ISO8859-1 and Unicode. Use the drop down box (as shown in *Figure 4-4*) to select the desired character set. The Station Message field, when selected, displays an Alphanumeric Keyboard screen similar to *Figure 4-5*. To change the Station Message, enter the desired characters and press Enter to establish the new Station Message and return to the Station Information screen.

Check the "High Priority" box to indicate to receivers that current message has a high priority.

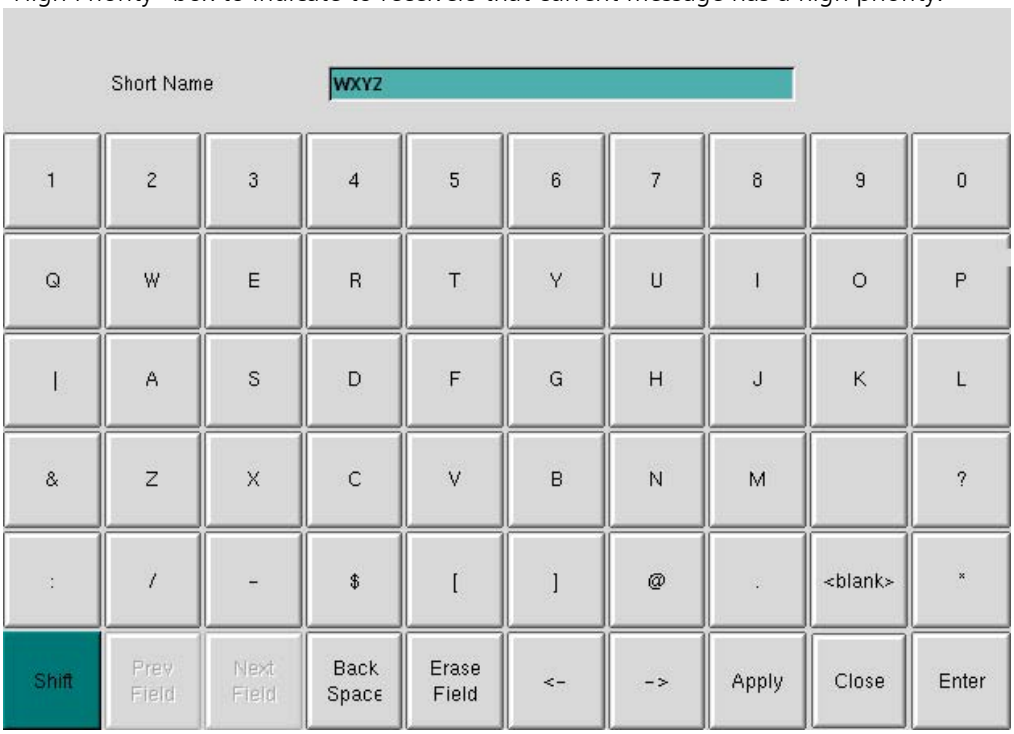

Figure 4-5 Alphanumeric Keyboard

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4.1.8 Frequency

Frequency indicates the carrier center frequency. Select this option to change the carrier frequency. The Numeric Keyboard, *Figure 4-6*, is displayed. To change the frequency, enter the desired frequency using the number keys. Press Enter to establish the new frequency and return to the main menu.

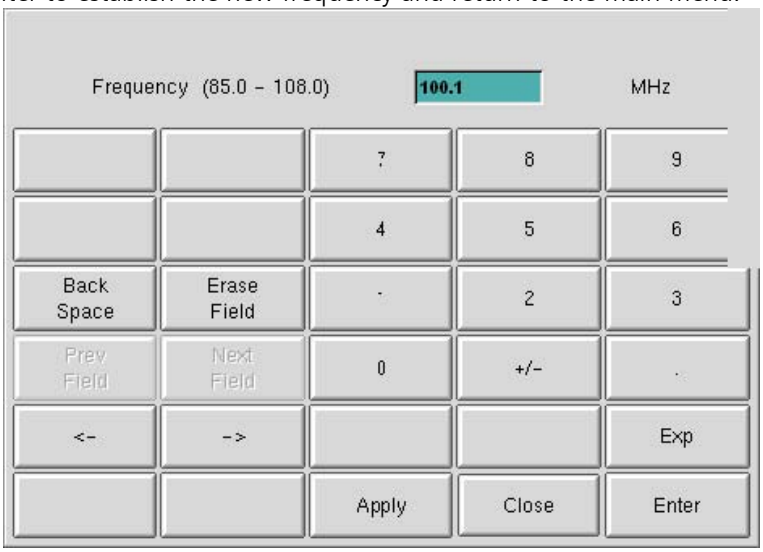

Figure 4-6 Numeric Keyboard

4.1.9 Band

The main menu frequency band indicator displays the exciter waveform selection: AM or FM.

4.1.10 Status Upper Section (Main Screen Upper Right)

The upper section displays current exciter state. Either Operational in Green or Non-Operational in Red.

4.1.11 Status Lower Section (Main Screen Upper Right)

The lower section displays current exciter Alarm state. Either No Alarm in Green or Alarm in Red. The Alarm can be cleared by selecting this area or the Station Interface section, see 4.5.1

4.1.12 Audio Bypass

The Audio Bypass indicator displays None, Bypass A, Bypass B or Bypass A&B. When Audio Bypass is selected, the Audio Bypass selection screen is displayed, (*Figure 4-7*).

NOTE: The EASU Audio toggle switches MUST be in the Auto position and Station Interface Outputs 13 and 14 must be connected to the EASU to enable this function.

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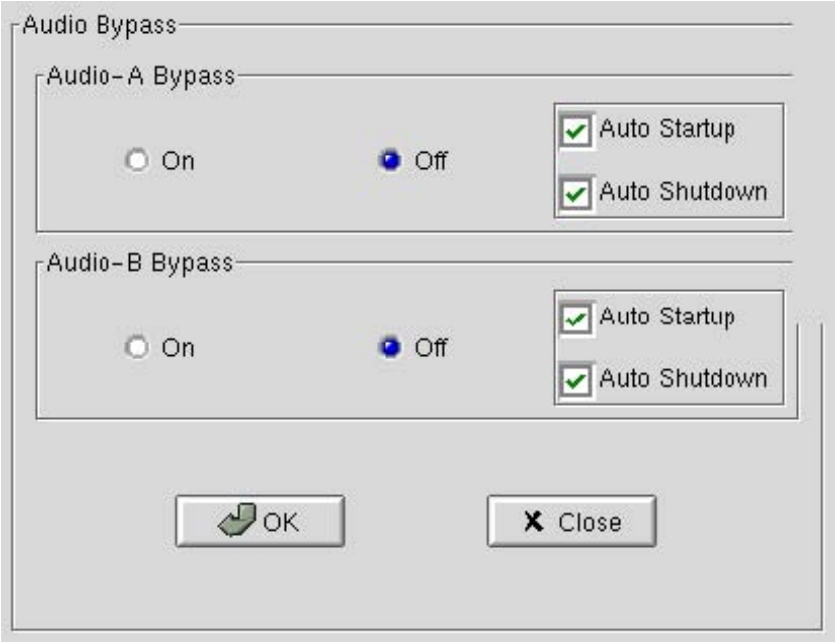

Figure 4-7 Audio Bypass Selection Screen

4.1.13 Audio-A Bypass

When on, Exciter Station Interface Output 13 closes to switch the Exciter Auxiliary Service Unit (EASU) to the Bypass position. When off, Exciter Station Interface Output 13 is determined by the software.

4.1.14 Audio-B Bypass

When on, Exciter Station Interface Output 14 closes to switch the Exciter Auxiliary Service Unit (EASU) to the Bypass position. When off, Exciter Station Interface Output 14 is determined by the software.

4.1.15 Auto Startup

When Auto Startup is selected, the audio bypass switches toggle to the delayed state to begin the audio ramp function (see paragraph 4.6.11). This overrides the Audio Bypass selection. If Auto Startup is not selected, the audio bypass switches toggle to the state defined by the Audio Bypass selection.

4.1.16 Auto Shutdown

When Auto Shutdown is selected, upon an error condition or receipt of a shutdown command, the audio bypass switches toggle to the Bypass state. This overrides the Audio Bypass selection. If Auto Shutdown is not selected, the audio bypass switches remain in the state defined by the Audio Bypass selection.

4.1.17 Digital Carrier Control

This indicator displays whether the digital subcarriers are on or off. All active IBOC digital subcarriers are added or removed by selecting On or Off.

4.1.18 FM Layer 1 Service Mode

The FM Layer 1 Service Mode indicator displays the current service mode of operation.
If selected when not in BER mode, the Error Box (*Figure 4-8*) is displayed. Select OK to return to the main menu.

Note: This is only valid in the Bit Error Rate (BER) mode. See paragraph 4.8.1

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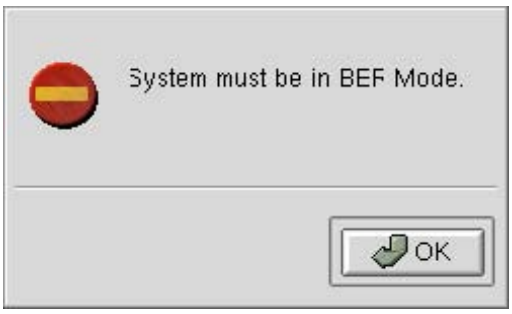

Figure 4-8 BER Mode Dialog Box

When the FM Layer 1 Service Mode is selected in BER Mode, the FM Service Mode screen (*Figure 4-9*) is displayed. Select the primary service mode by placing a check in the desired Service Mode, MP1 through MP11.

Select the secondary service mode with a check in the desired Service Mode, MS1 through MS4.

NOTE: Secondary service modes are not accessible unless the primary service mode is MP5, MP6 or MP7.

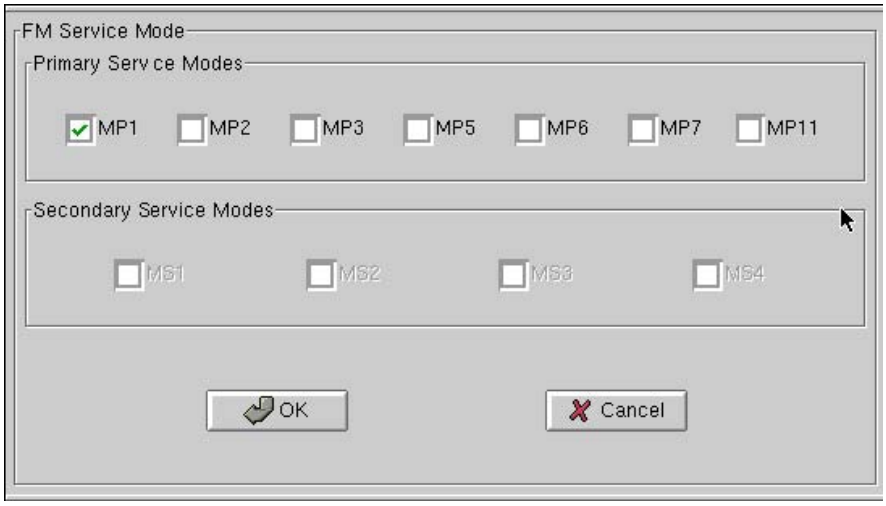

Figure 4-9 FM Service Mode Screen

4.1.19 Date and Time

Date and time displayed are local time. To obtain the Global Positioning System (GPS) and use it for display in the lower-left corner of the main menu, see Sync Local Time below. If the GPS is not connected to an antenna with access to GPS data, this window will display a time/date of 00:00:00 Jan 6, 1980 and increment from that time until the system attains GPS time lock.

When selected, the Local Time insertion screen is displayed, *Figure 4-10*. This screen is broken up into 4 different group boxes: Date & Time Settings, Time Zone, Daylight Savings Time, and GPS Time Synchronization.

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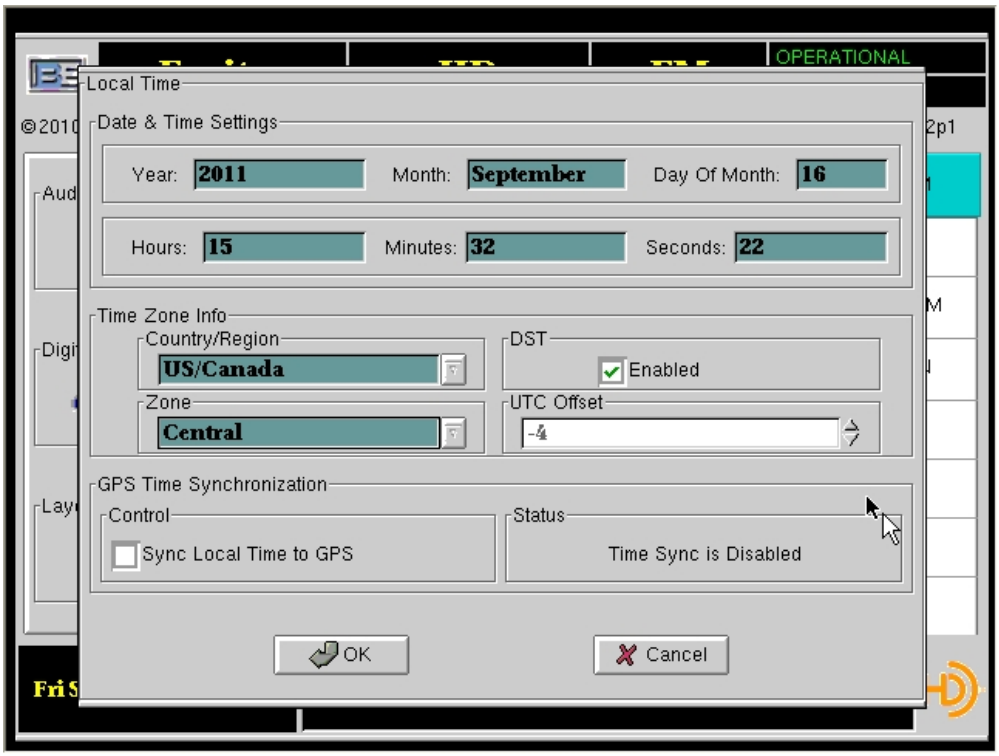

Figure 4-10 Local Time Insertion Screen

Date & Time Settings: This area allows manual entry of local time.

Time Zone: This area allows setting of the local time zone. If the Country/Region selection is None/Other the zone will be set to Universal (UTC) and an offset from UTC can be entered using the "UTC Offset" drop down box. Values from -12 to 12 are valid and are entered using a numeric keypad similar to *Figure 4-6*.

Daylight Savings Time: This area allows the enabling of daylight savings time parameters if Time Zone Info selection is not None/Other. Checking "Enabled" will use daylight savings time based on the zone selected. Unchecking "Enabled" indicates to the receiver that daylight savings time is not to be used in regardless of the "Time Zone Info"/"Zone" selections. Changing the Time Zone Info and/or the DST Enable button will require the system to be restarted in order for the changes to be applied.

GPS Time Synchronization: Select "Sync Local Time" to synchronize the system time to the GPS time. The Status box gives the current status of the GPS.

NOTE: 1PPS from the EASU to the Exciter must be connected to sync to local time.

4.1.20 Exciter Status Bottom Right

4.1.20.1 Status Section

The status section displays current exciter status. Error conditions are displayed in red and warning conditions are displayed in green. Select this area or the System Status Log button to view the status history as shown in *Figure 4-11*.

As seen in *Figure 4-11* several warnings appear. These indicate that the GPS is not time locked. The GPS antenna should be check for proper view of the sky. At times it will take time for lock to be acquired so you may have to wait for GPS lock.

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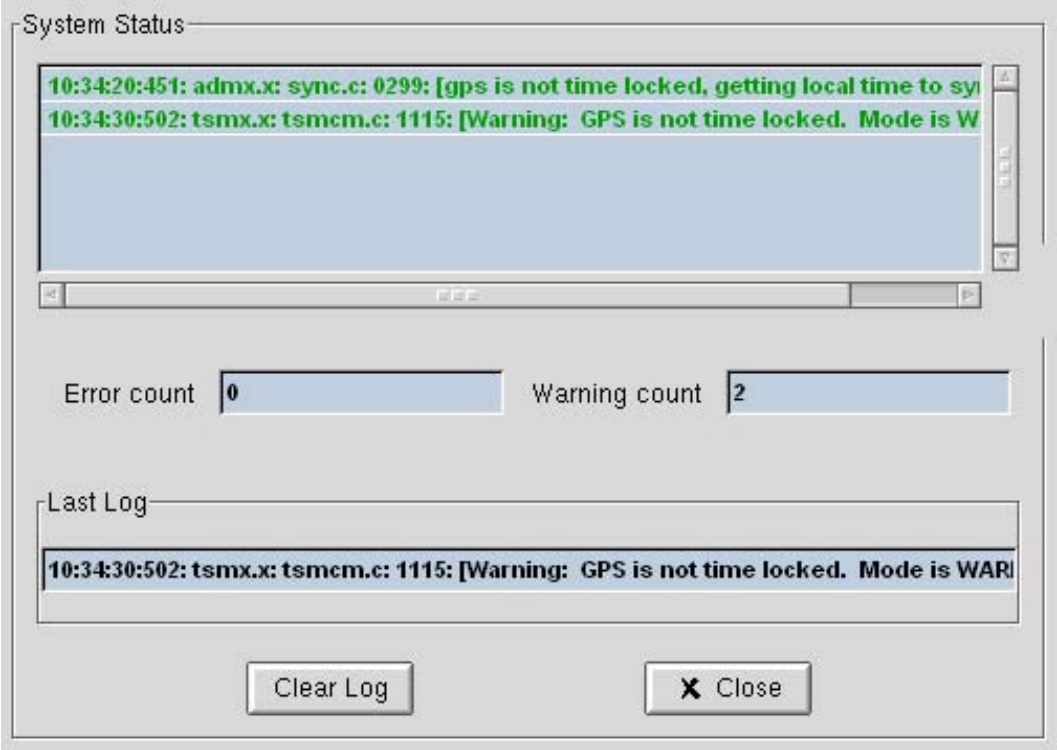

Figure 4-11 System Status Log Screen

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4.2 System Tab Control Buttons

Figure 4-1 shows the GUI main menu System Tab screen: This screen is displayed upon startup. Descriptions of control buttons displayed on the System Tab of this screen are provided in the following subparagraphs.

4.2.1 Shutdown

The Shutdown control screen, *Figure 4-12* Exciter Shutdown Control Screen is used to shutdown the exciter. If power is to be removed, select Shutdown and press OK. This will halt the OS. Wait until the display indicates OK to power down.

If the OS is to be restarted, select OS Restart and press OK. The system will reboot back to the default program. If the application is to be exited and restarted, select Restart and press OK to exit and rerun the program. If the application is to be exited and a console session started, select Console and press OK to exit and start the session.

NOTE: See paragraph 6.4and/or 6.5 for detailed shutdown options.

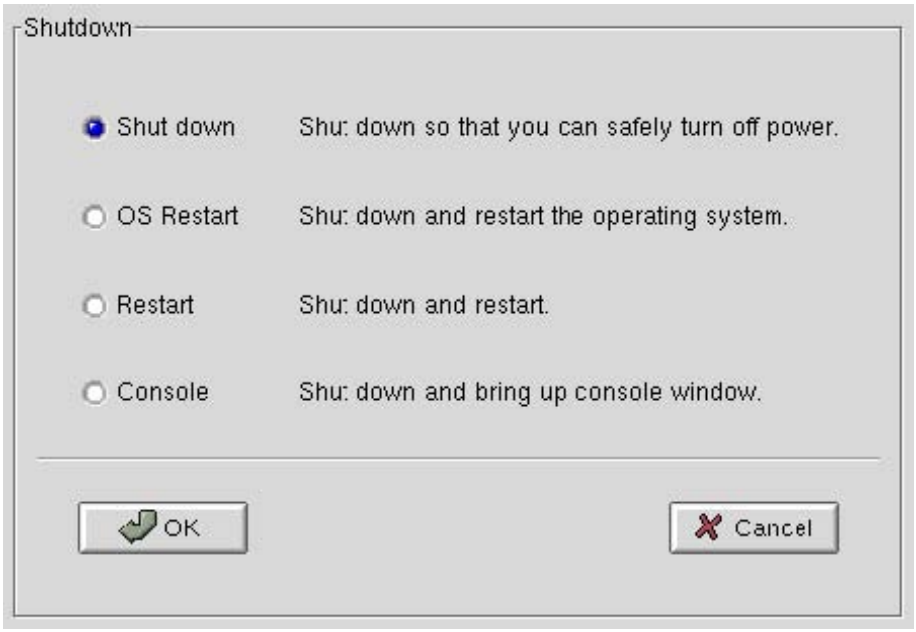

Figure 4-12 Exciter Shutdown Control Screen

4.2.2 Configuration

The System Configuration button provides access to the system configuration screen, *Figure 4-13*.

4.2.3 Config Channel

To view the rate of the logical channels select View Config. When selected, the Channel Configuration screen will be displayed, *Figure 4-14*.

4.2.3.1 Channel Configuration

The Channel Configuration screen is used to view the amount of bandwidth given to each service available; Audio, Station information, or Data. These settings are repeated for all logical channels available:
Channel 1 – P1 Channel 2 – P2
Channel 3 – P3 Channel 4 -SIS

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4.2.3.2 Carrier Configuration

Carrier Configuration displays the Layer 1 current configuration settings.

4.2.3.3 Mode

Mode displays the Service Mode.

4.2.3.4 Characteristics

The Characteristics group box displays the size of the logical channel PDU, the rate at which the PDU is sent, and the bandwidth (or average rate) of the PDU for each logical channel.

4.2.3.5 Partitioning

The Partitioning group box displays information pertaining to how each logical channel is partitioned between Main Program Audio (MPA), and Advanced Application Services (AAS).

MPA Size allows the selection of the amount of bytes to be used for the Main Program Audio (MPA).

4.2.3.6 Previous

Select Previous Page to scroll through all logical channels.

4.2.3.7 Next

Select Next Page to scroll through all logical channels.

4.2.4 Save Config

Selecting Save Config will create a file of the current system mode configuration files(freq, analog delay…) so that these configurations can be recalled at start-up.

4.2.5 Configuration Selection

Select the number adjacent to Enter Item No. for selected configuration. When selected, the Numeric Keyboard screen, similar to *Figure 4-6*, is displayed. To change the configuration value, enter the desired configuration value using the number keys. Press Enter to establish the new configuration. When a selection is made, the user is prompted to restart the system. See *Figure 4-13* for available choices.

4.2.6 Restart Options

Selecting Load Saved Configuration , the current system mode configuration files will be saved for use upon startup.

Selecting Load Default Configuration will use the default configuration values when restarted, from this screen only.

4.2.7 Restart

Selecting Restart will restart the system. Selecting Close will exit this window.

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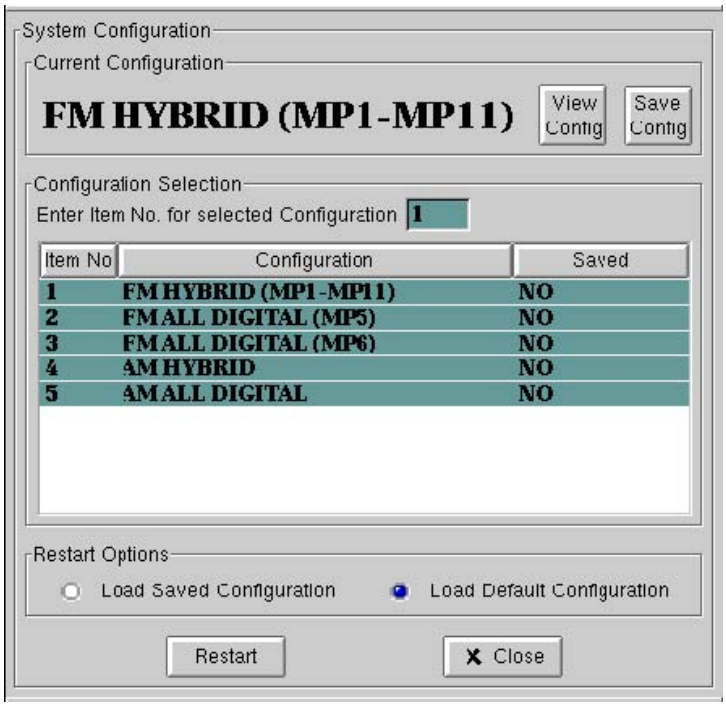

Figure 4-13 System Configuration Screens

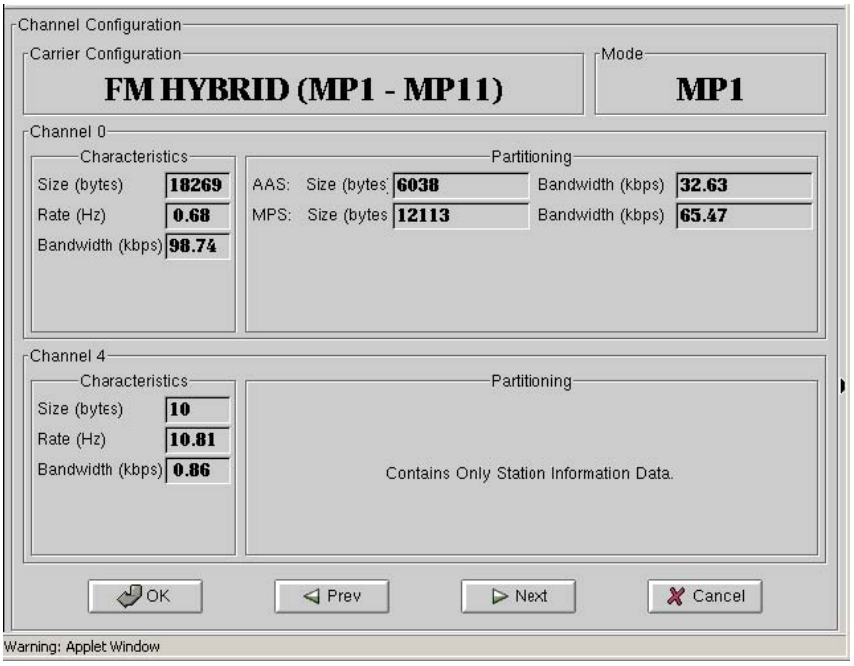

Figure 4-14 Channel Configuration Screen

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4.2.8 Versions

When selected a display of the present software/firmware/Motherboard configuration will be shown, *Figure 4-15*. This information will not be valid until after the system has indicated it is Operational.

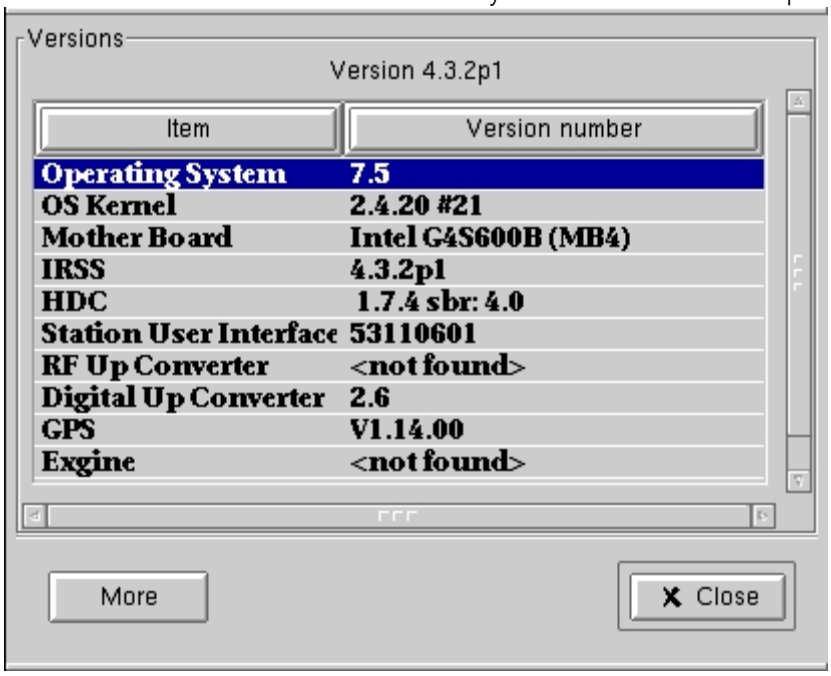

Figure 4-15 Versions Screen

To view additional detailed information, select the More button and the display in *Figure 4-16*.

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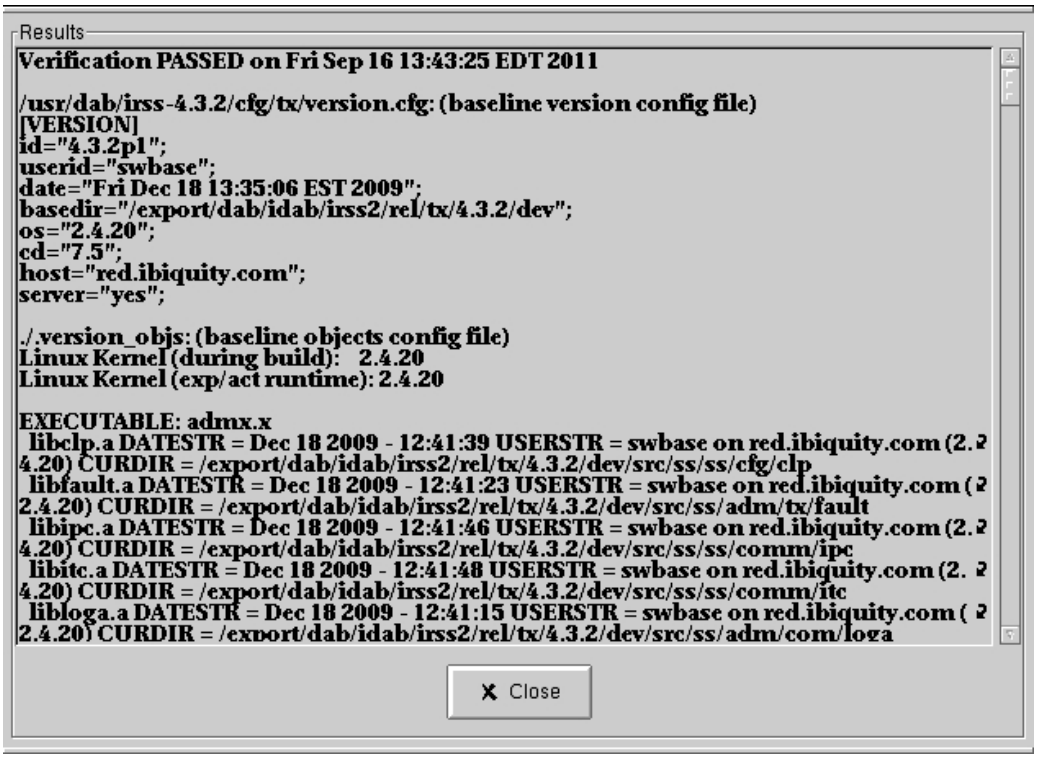

Figure 4-16 Versions More Screen

4.2.9 Configure Password

When selected the user will be prompted to enter the present password to gain access to the password configure screen, *Figure 4-17*.

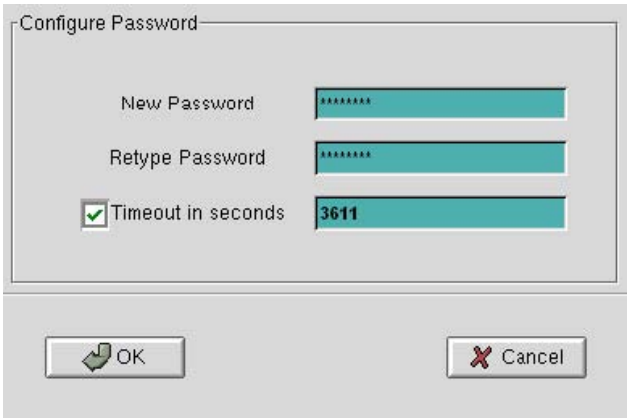

Figure 4-17 Password Screen

The new password can now be entered. Confirm the new password by entering it again in the Retype Password area.

Timeout in seconds value denotes how long, after entering a valid password, you have unlimited access before you are again prompted to enter the password again. If the checkbox is unchecked the access time has no limit and is valid until changed or the exciter is rebooted.

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4.2.10 Command

The System Command screen, *Figure 4-18*, is displayed when selected.

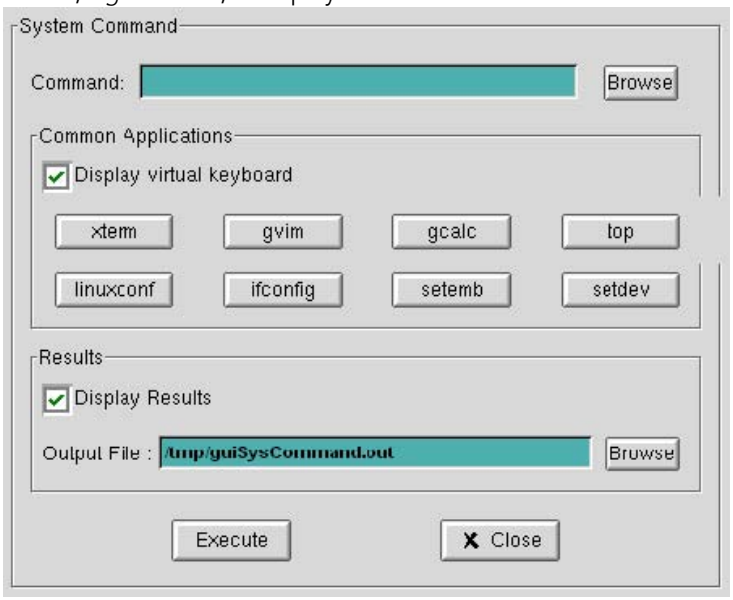

Figure 4-18 System Command Screen

4.2.11 Command/Results

To execute a linux system command (ls, pwd …), enter the command here. The results of the command can be displayed immediately by placing a check mark in the Display Results box. The results can also go to a file as defined by the file name in the Results/Output File: line. To execute the command select Execute.

If the Display Results option is selected, *Figure 4-20* will now be displayed. Select Close to return to the Exciter Submenu screen.

4.2.12 Browse

This button can be selected to choose a file/directory (for execution or results storage). *Figure 4-19* will appear. Press OK to enter the selection and return to the System Command screen.

4.2.13 Common Applications Display Virtual Keyboard

This button, if selected will display a virtual keyboard (*Figure 4-21*) on the display when the common application is run. This is useful only if a keyboard is not connected to the exciter.

4.2.14 Common Applications Xterm

This button, if selected, will display an Xterm Window, (*Figure 4-22*). The user can now type commands. When done, the user types exit and presses return to close the window and return to the System Command window.

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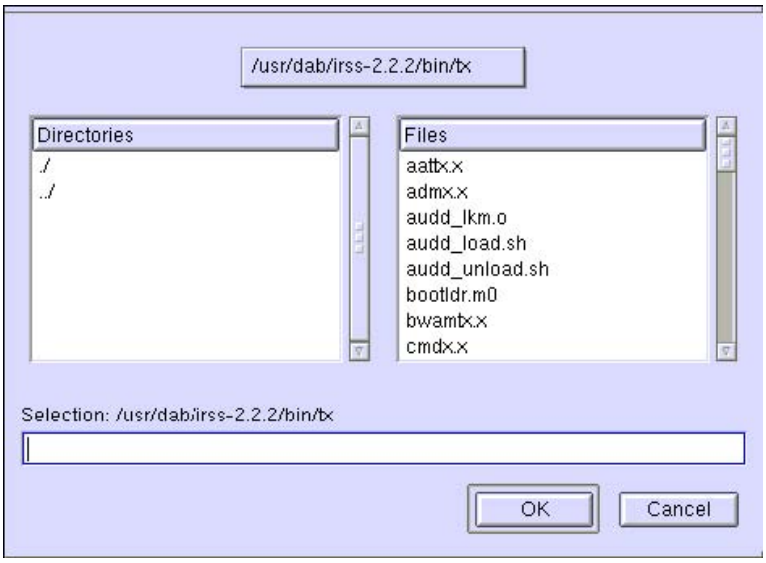

Figure 4-19 Browse Screen

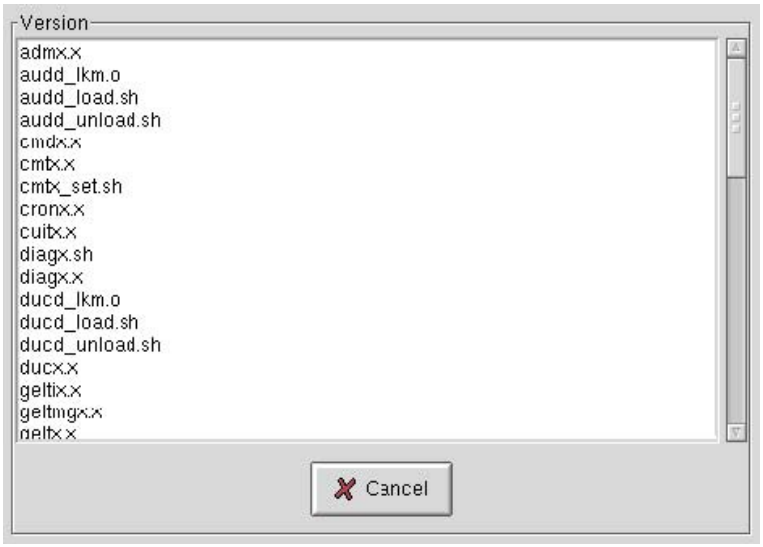

Figure 4-20 Command Results Display

Figure 4-21 Virtual Keyboard

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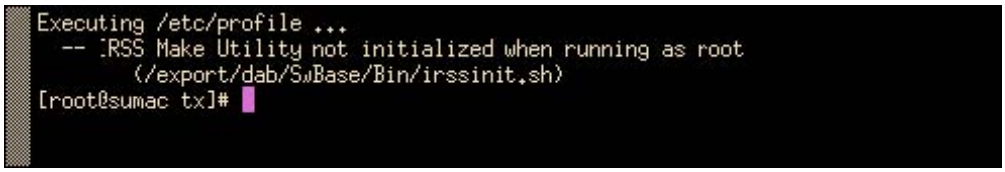

Figure 4-22 Xterm Window

4.2.15 Common Applications gvim

This button, if selected, will display a Graphical Text Editor (*Figure 4-23*). The user can now call up a file to edit. When done, select file/exit to return to the System Command screen.

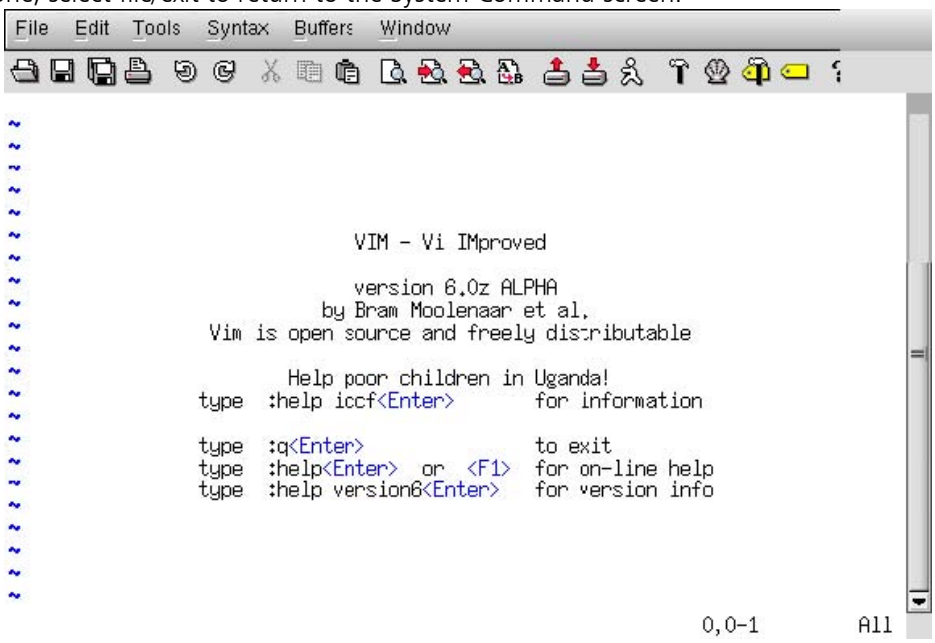

Figure 4-23 Gvim Editor

4.2.16 Common Applications linuxconf

This button, if selected, will display a graphical linux configuration application (*Figure 4-24*). The user can now configure the system as desired. When done, select Quit to return to the System Command screen.

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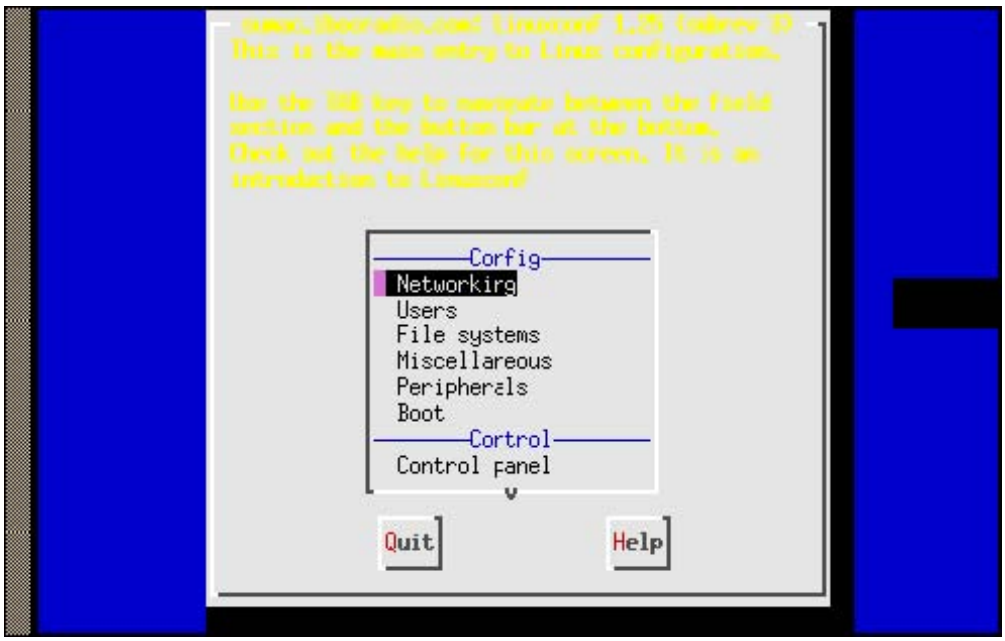

Figure 4-24 Linuxconf Screen

4.2.17 Common Applications gcalc

This button, if selected, will display a graphical calculator application (*Figure 4-25*). The calculator is now displayed. Select file/exit to return to the System command screen.

Figure 4-25 Graphical Calculator Screen

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4.2.18 Common Applications Top

This button, if selected, will display a summary of the processor usage (*Figure 4-26*). Press close when finished..

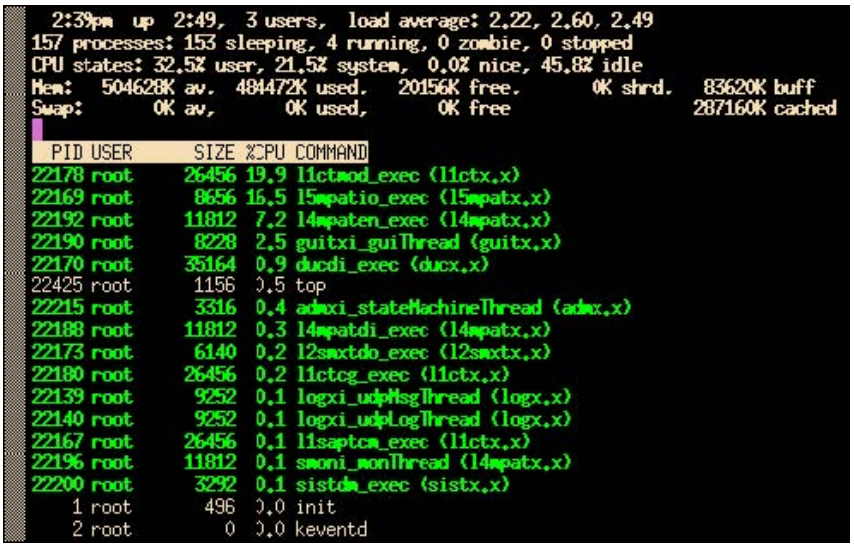

Figure 4-26 Top Display Screen

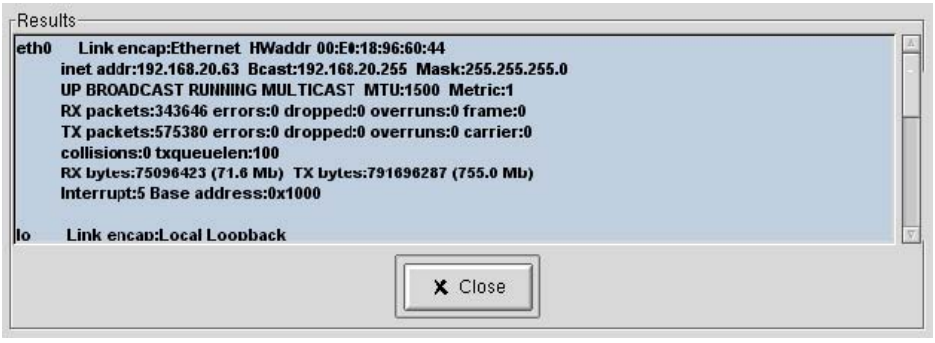

Figure 4-27 ifconfig Screen

4.2.19 Common Applications ifconfig

This button, if selected, will display a summary of the processor network configuration (*Figure 4-27*). Press close to quit and return to the System Command window.

4.2.20 Common Applications setemb

This button, if selected, will set the system to embedded mode. Press close to quit and return to the System Command window. The system is now in Embedded mode, see paragraph 6.1.2 Startup for embedded mode operation description.

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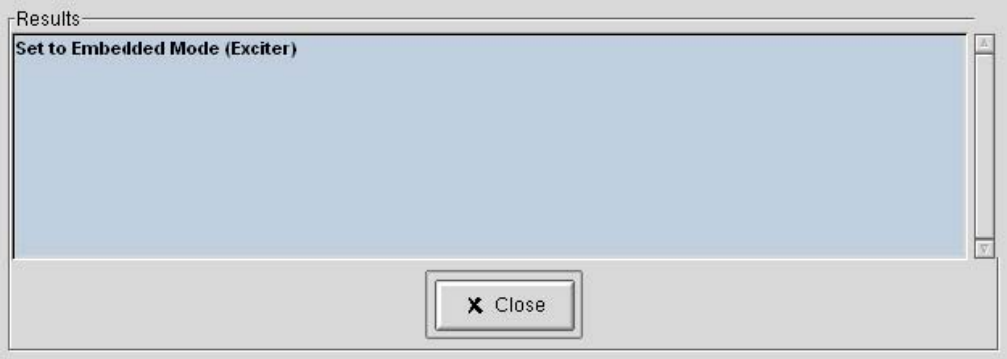

Figure 4-28 Dialog setemb Screen

4.2.21 Common Applications setdev

This button, if selected, will set the system to development mode. Press close to quit and return to the System Command window. The system is now in Development mode.

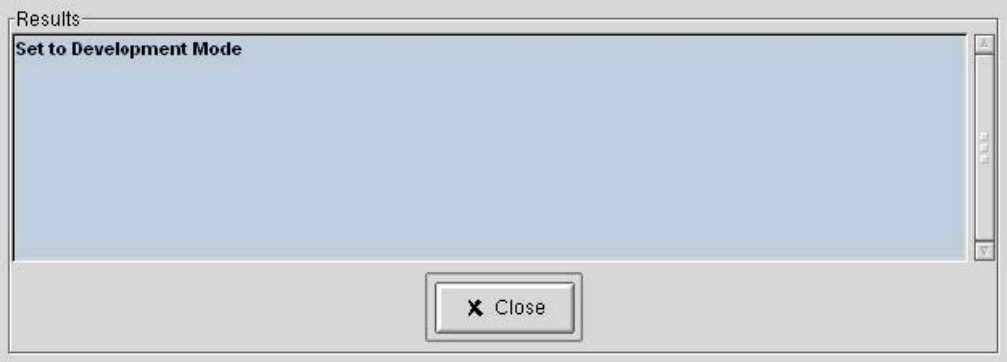

Figure 4-29 Dialog setemb Screen

4.2.22 GPS Data

The GPS Data button, when selected, displays the GPS Data screen shown in *Figure 4-30*. This screen displays GPS Version, status, and allows setting of the GPS values.

If the GPS mode is in the Not Locked mode (no antenna attached) all the position information can be edited. This information will not be used for transmission unless the system is reset. If the information is changed a warning will be displayed, *Figure 4-31* System Reset Warning Screen, as a reminder.

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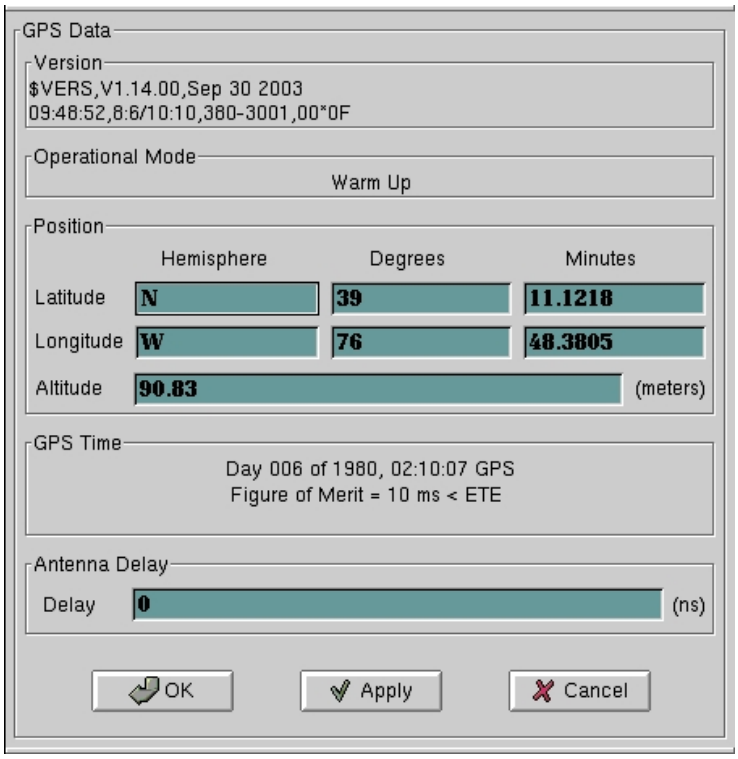

Figure 4-30 GPS Data Screen

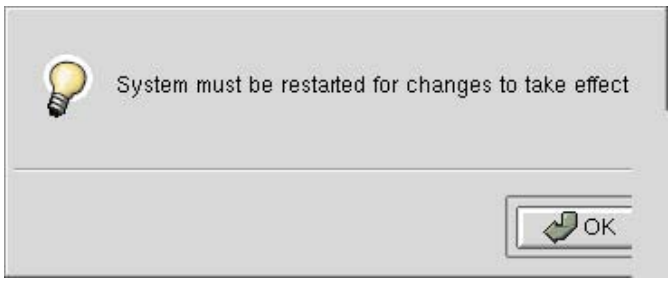

Figure 4-31 System Reset Warning Screen

4.2.23 GPS Antenna Delay

This variable is based on GPS cable type and length. Delay values for recommended cable types are listed in *Table 4-1*.

Table 4-1 GPS Cabling Delays

Cable Type	Delay Value
Belden 9311 (RG-58)	4.36 ns/m (1.33 ns/ft)
Belden 8267 (RG-213)	4.99 ns/m (1.52 ns/ft)
Belden 9104 (RG-59)	4.00 ns/m (1.22 ns/ft)
Belden 9913 (RG-8)	3.90 ns/m (1.19 ns/ft)

To determine the proper delay value, multiply the delay value from *Table 4-1* by the length of cable used. For example, if the antenna system includes 50 ft of RG-58 cable, the total cable delay is:

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50 ft x 1.33 ns/ft = 66.5 ns

When entering the data round the value to the nearest nanosecond (ns).

When Antenna Delay is selected, *Figure 4-6*, the Numeric Keyboard screen is displayed, *Figure 4-6*. To change the delay value enter the desired delay value using the number keys. Press Enter to establish the new delay value and return to the GPS Data screen.

4.2.24 Local Time

See Paragraph 4.1.19.

4.3 Log Tab Control Buttons

Figure 4-33 shows the GUI main screen Log Tab. Descriptions of control buttons displayed on the Log Tab of this screen are provided in the following subparagraphs.

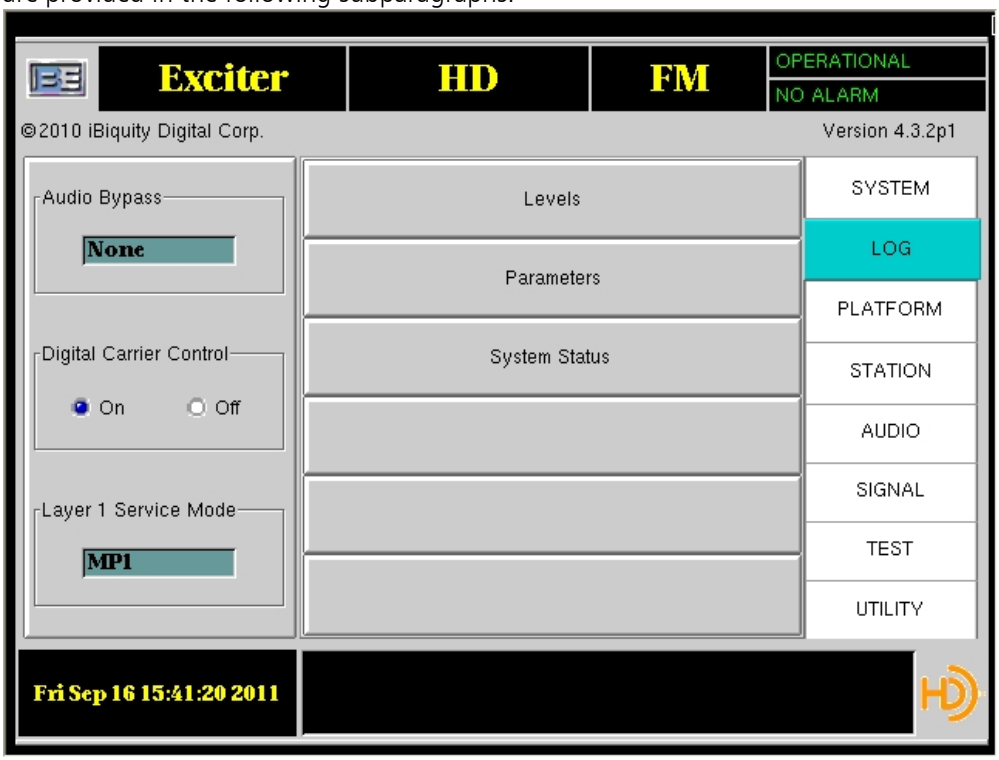

Figure 4-32 Reference Exciter GUI Interface Log Tab

4.3.1 Levels

Select Levels from the Log Tab main menu, to view and update log level information. The Log Levels screen, *Figure 4-33*, is displayed. To set the logging level for an individual process, set the Log Level to a value 0 through 7 (0=Off, 7=Max). To set the description associated with the screen logging of each process (not to a file), increase the number under the Verbose Level column (0=Off, 7=Max) to the appropriate level. This sets the logging stored in file /mnt/data/irss.log. This file is archived to a date associated file. For example: /mnt/data/02-19-03/irss02:33:00.log.

4.3.2 Previous Page

Select Previous Page to scroll backward through exciter processes.

4.3.3 Next Page

Select Next Page to scroll forward through exciter processes.

4.3.4 All Log Levels

To set the log level to the same value for all processes, select All Log Levels. *Figure 4-34* is displayed. Select the level desired for all processes and press Close to enter the new values.

This will log all data with a log level of the selected value or lower.

4.3.5 All Verbose Levels

To set the verbose level to the same value for all processes, select All Verbose Levels to display the screen shown in *Figure 4-34*. Select the desired level and click Close to activate the new level.

This will print all data with a verbose level of the selected value or lower.

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4.3.6 Exclusive Level

Exclusive Level, when selected will only print data that is the same level as the level selected (not lower or higher).

Figure 4-33 Log Level Screen

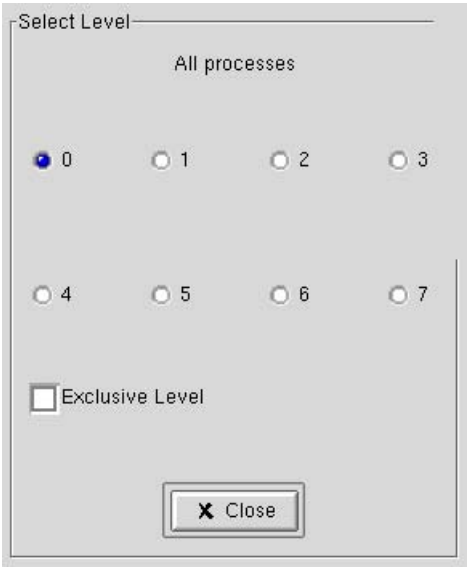

Figure 4-34 Select Level Screen

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4.3.7 Parameters

Select Parameters from the Log main menu. The Log Parameters screen (*Figure 4-35*) is displayed. This screen will display the present logging utilization and allow for the setting of warning parameters.

4.3.8 Warning Message Rate

When Warning Message Rate is selected, the Numeric Keyboard screen is displayed (*Figure 4-6*). To set how often the user is warned that the maximum log rates have been exceeded, enter the desired time in seconds. Press enter to use the new value and return to the Log Parameters screen.

4.3.9 Window Size (sec):

When Window Size is selected, the Numeric Keyboard screen is displayed (*Figure 4-6*). To set the duration over which the logging rate is calculated, enter the desired time in seconds. Press enter to use the new value and return to the Log Parameters screen.

4.3.10 ASCII Log Rate (bytes/sec):

ASCII Log Rate displays the instantaneous amount of ASCII logging.

4.3.11 ASCII Log Utilization:

ASCII Log Utilization displays the instantaneous amount of ASCII logging represented as a percentage of the maximum rate.

4.3.12 ASCII Log Max Rate:

When Max ASCII Log Rate is selected, the Numeric Keyboard screen is displayed (*Figure 4-6*). To set the log rate for which, if exceeded, a warning will be issued, enter the desired rate. Press enter to use the new value and return to the Log Parameters screen.

4.3.13 Binary Log Rate (bytes/sec):

Binary Log Rate displays the instantaneous amount of Binary logging.

4.3.14 Binary Log Utilization:

Binary Log Utilization displays the instantaneous amount of Binary logging represented as a percentage of the Maximum rate.

4.3.15 Binary Log Max Rate:

When Max Binary Log Rate is selected, the Numeric Keyboard screen is displayed similar to *Figure 4-6*. To set the log rate for which, if exceeded, a warning will be issued, enter the desired rate. Press enter to use the new value and return to the Log Parameters screen.

4.3.16 Start Archive

When Start Archive is selected, all log files in the /mnt/data path along with any core files in the bin/tx path will be collected and placed in the specified archived file.

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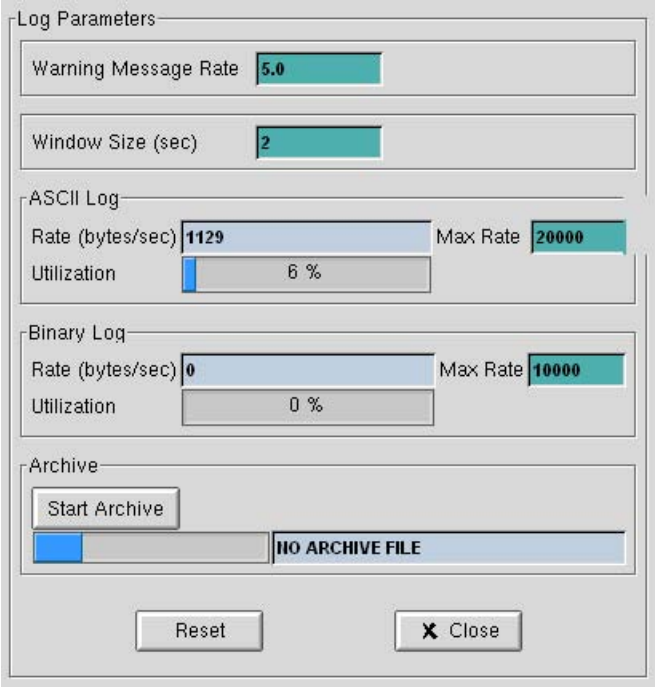

Figure 4-35 Log Parameters Screen

4.3.17 System Status

See paragraph 4.1.20.1.

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4.4 Platform Tab Control Buttons

Figure 4-32 shows the GUI main screen Platform Tab. Descriptions of control buttons displayed on the Platform Tab of this screen are provided in the following subparagraphs.

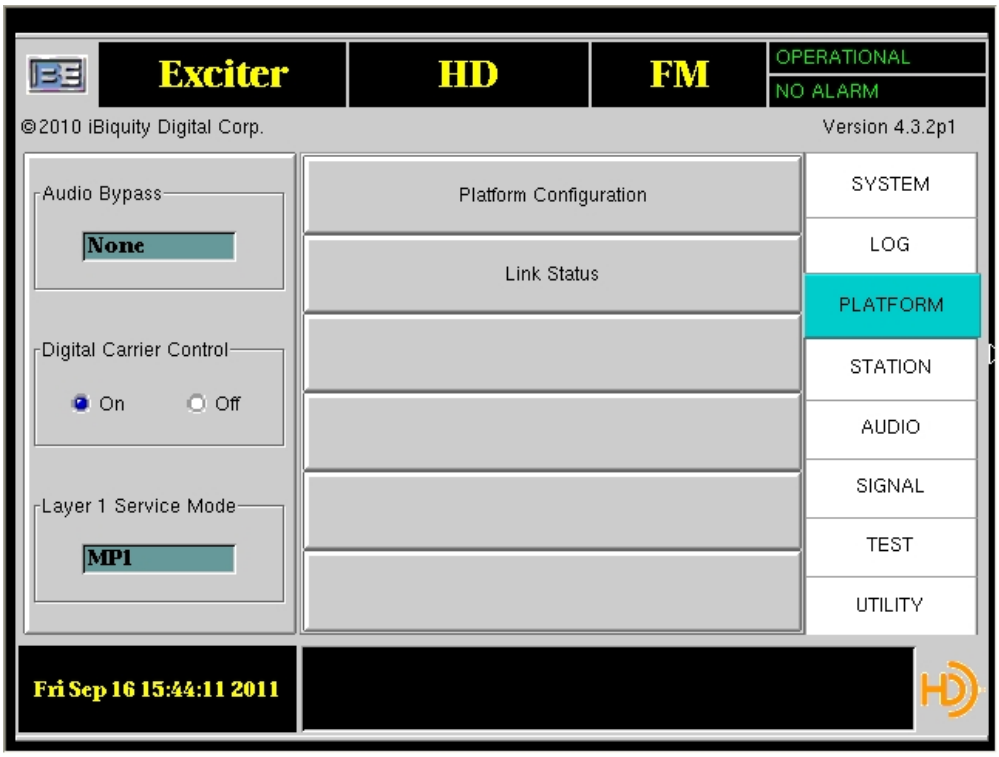

Figure 4-36 Reference Exciter GUI Interface Platform Tab

4.4.1 Platform Configuration

See paragraph 4.1.1.

4.4.2 Link Status

The Link Status window provides status all active TCP/UDPLink connections, *Figure 4-37*.
Each Link (e.g. I2E, E2x) window is divided into 2 panels: a send panel and a receive panel. In both cases, statistics are displayed for all the messages received on the indicated connection. The connection being examined is displayed in the upper left corner. In *Figure 4-38* it is the I2E link. In addition, an error count for a number of different types of standard failures is also displayed.

Each link has its own window. The user can scroll through each link by pressing the "Prev"or "Next" button. The number and types of windows available will depend on the platform type. For example, the E2X window is not displayed on an Exciter platform because it does not exist.

Figure 4-38 shows the GUI main screen Station Tab. Descriptions of control buttons displayed on the Station Tab of this screen are provided in the following subparagraphs.

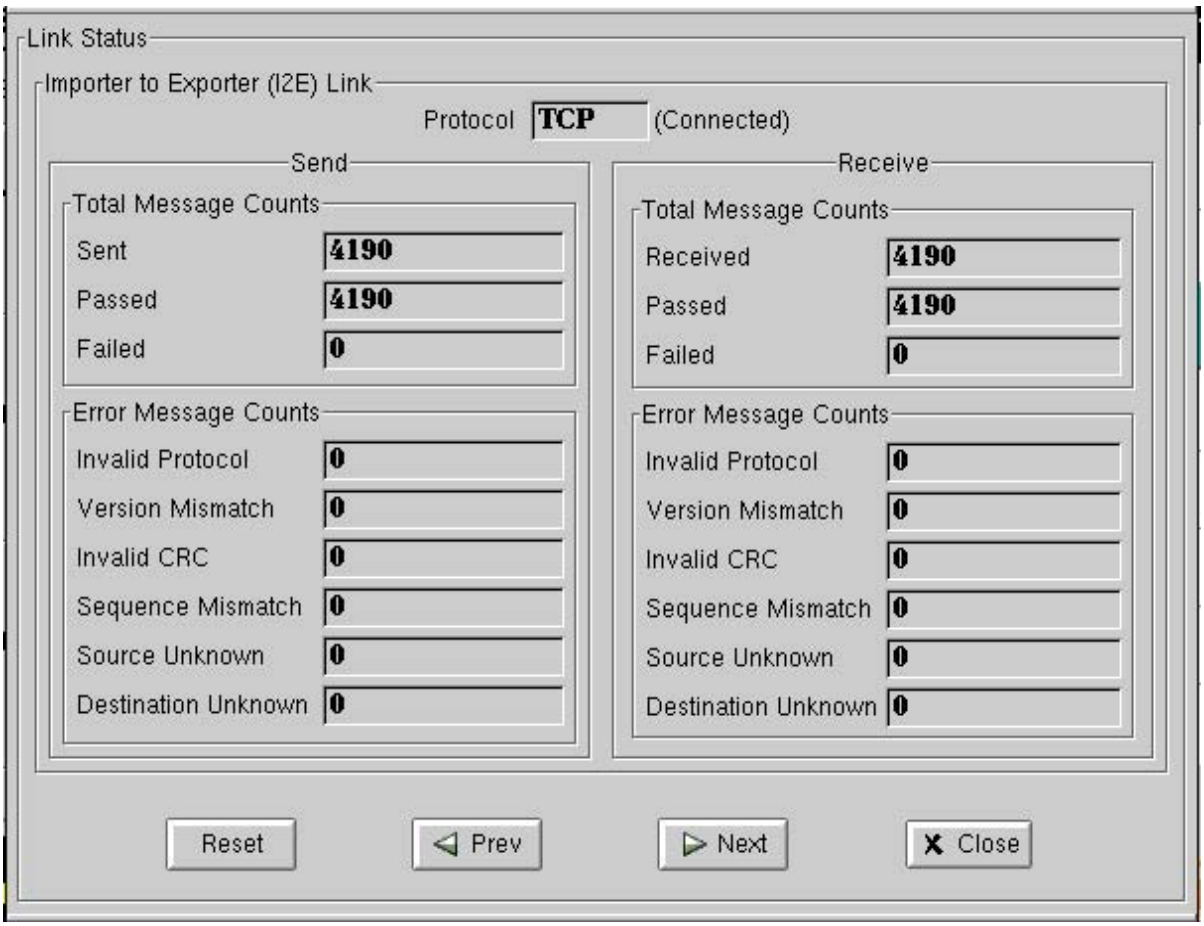

Figure 4-37 Link Status Activity Monitor Screen 4.5 Station Tab Control Buttons

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4.5 Station Tab Control Buttons

Figure 4-38 shows the GUI main screen Station Tab.

Descriptions of control buttons displayed on the Station Tab of this screen are provided in the following subparagraphs.

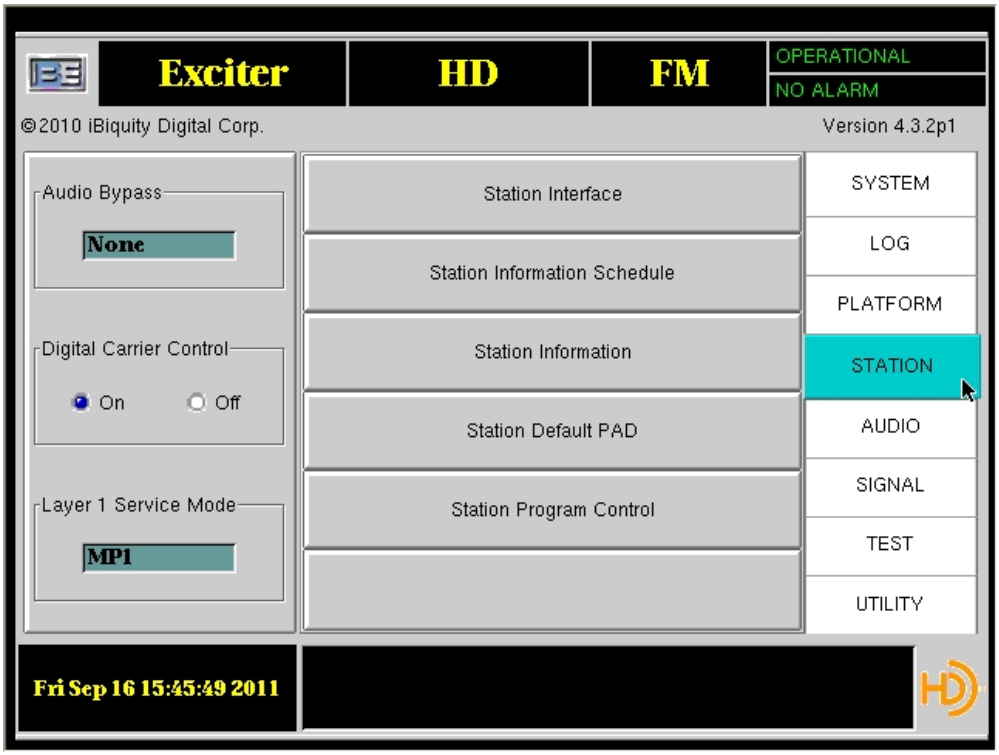

Figure 4-38 Reference Exciter GUI Interface Station Tab

4.5.1 Station Interface

Select Station Interface, to display the Station Interface screen, *Figure 4-39*.

The current state of all 16 inputs is shown in the left column. For inputs 1 through 14, a high-to-low transition will initiate the corresponding action. For inputs 15 and 16, the input must be held low for at least 5 seconds, then, on the ensuing positive edge, the corresponding action is executed. The current status is shown in the right-hand column. To clear any present alarm select Clear State Alarms. To set the Non-operational state back to Operational select Clear State Non-operational. This will place the system back into a operational state until the next error is encountered.

When Start Test is selected, the outputs will all be set to a low state, and a high state will be walked through spending a second in each state. The inputs will still be continuously monitored. When Stop Test is selected, the outputs will return to the values stored prior to entering test mode. When Enable Watchdog is selected, the Watchdog timer on the Station Interface Card (SIC) will be enabled. When enabled, the SIC will monitor the serial port, if there is no activity for 1 second the host processor is assumed to be locked up. The Audio bypass relays will be set to Bypass, the system operational relay will be opened and the exciter will be rebooted.

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Press Close to return to the Main Menu.

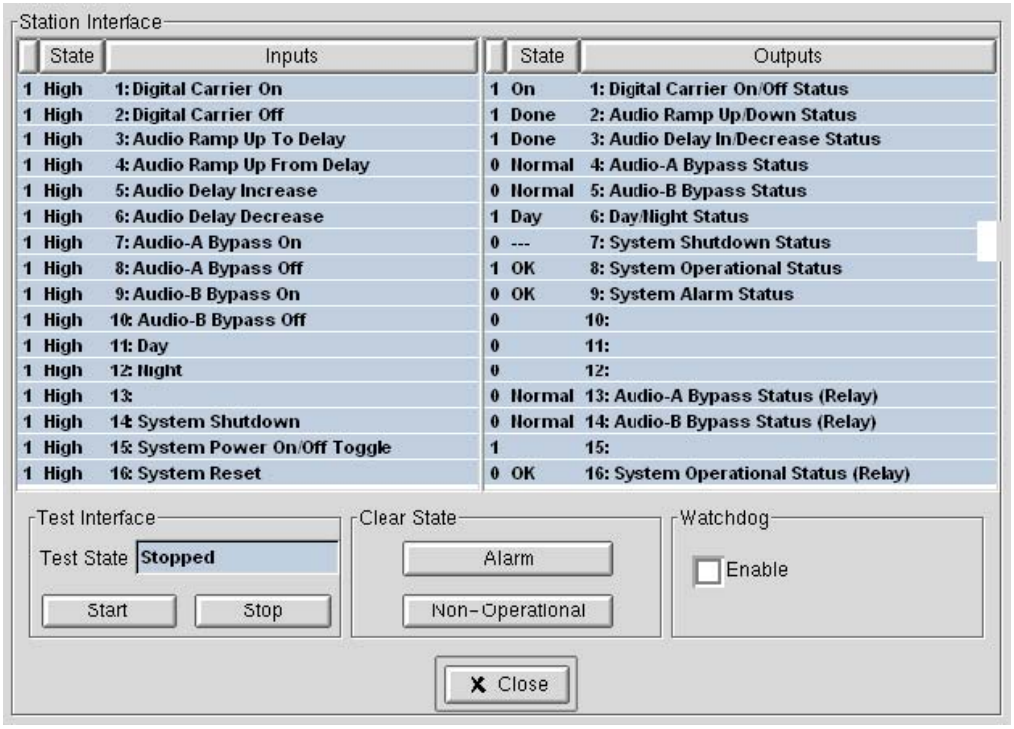

Figure 4-39 Station Interface Display Screen

4.5.2 Station Information Schedule

The Station Information Schedule, *Figure 4-40*, is displayed when selected from the main menu.

Select the block to be changed and the payload selection menu will be displayed, *Figure 4-41*. Select the payload option desired, and press OK to enter the new settings and return to the main menu.

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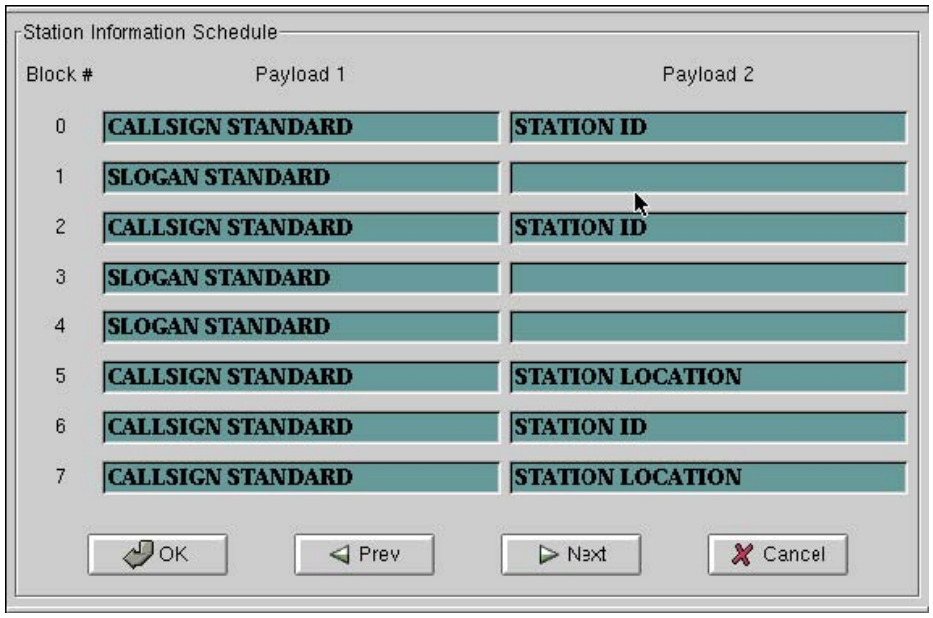

Figure 4-40 Station Information Schedule Screen

Care must be taken when selecting payload options as some options are not compatible with other options. For example Slogan Universal requires both payloads, so Payload 2 must be left blank. If an incompatible payload is selected a warning message similar to *Figure 4-42* will be displayed.

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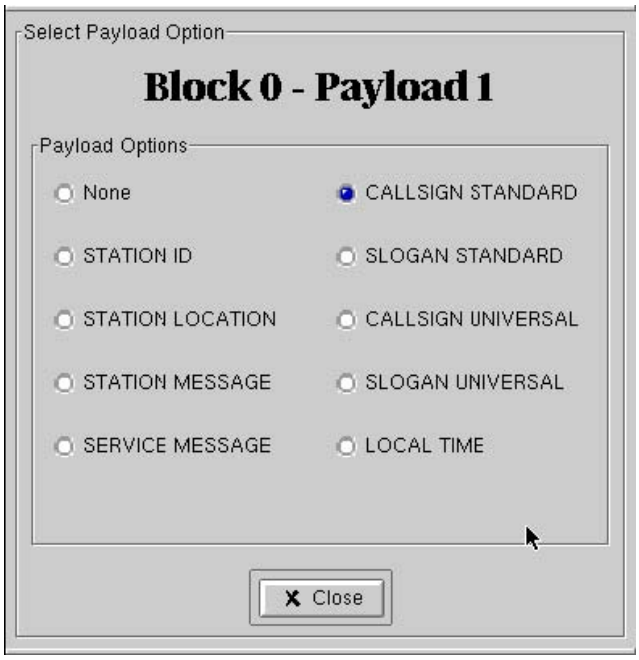

Figure 4-41 Station Information Payload Selection

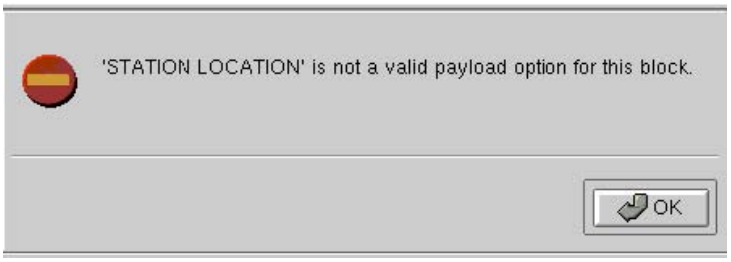

Figure 4-42 Incompatible payload option warning message

4.5.3 Station Information

See paragraph 4.1.2.

4.5.4 Station Default PAD

The Station's default PAD information, *Figure 4-43*, is displayed when selected from the Station main menu. This menu has four tabs: General, Comment, Commercial, and Last Message Sent. Each tab is described in turn.

4.5.5 General

Use this tab shown in *Figure 4-43* to enter the Title, Artist, Album, and Genre information by selecting the desired field and using the alphanumeric keyboard similar to the one in *Figure 4-5*. To include this information as part of the PAD message make sure the "Enable" box is checked. Clearing the Enable box will exclude this information from being sent.

Note: Even though Genre is a text field, the user should select one of the types defined in the IDS standard, if possible.

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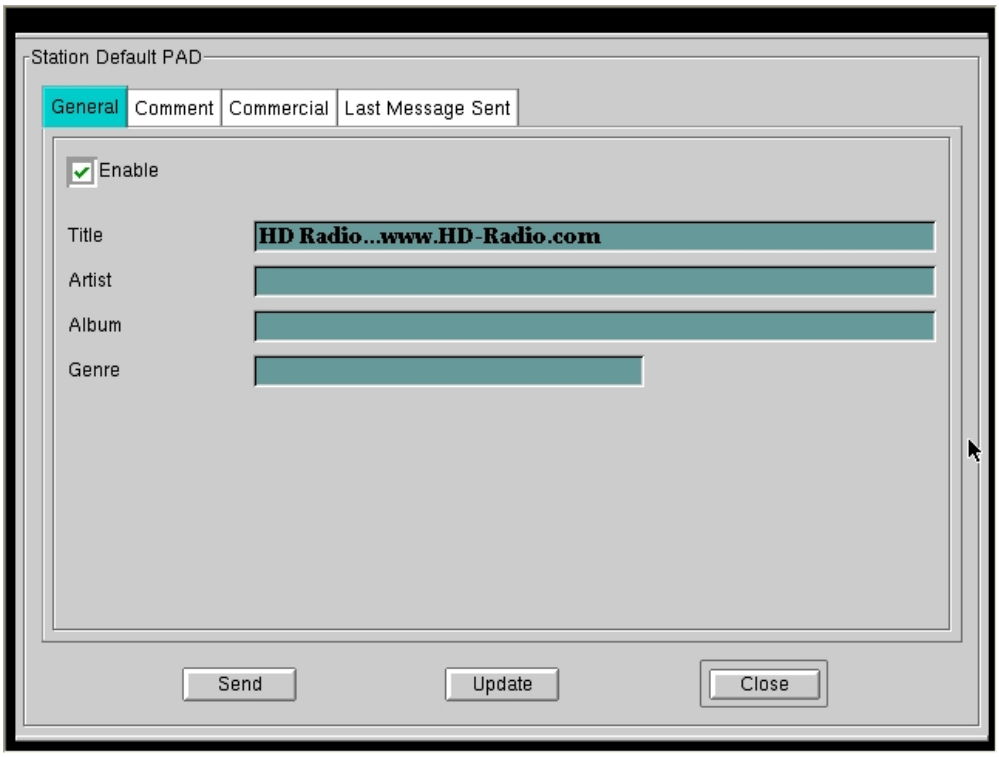

Figure 4-43 Station Default PAD (General Tab)

4.5.6 Comment

Use this tab shown in *Figure 4-44* to enter the Comment Title and Comment Description information by selecting the desired field and using the alphanumeric keyboard similar to the one in *Figure 4-5*. To include this information as part of the PAD message make sure the "Enable" box is checked. Clearing the Enable box will exclude this information from being sent.

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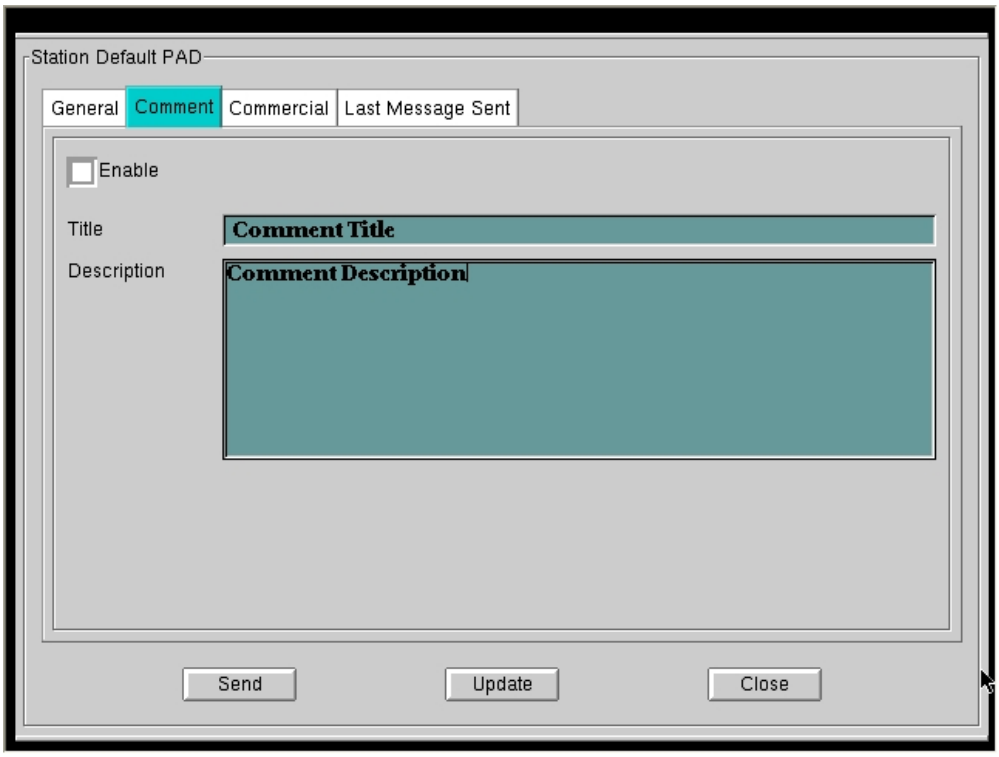

Figure 4-44 Station Default PAD (Comment Tab)

4.5.7 Commercial

Use this tab shown in *Figure 4-45* to enter the Commercial information by selecting the desired field and using the alphanumeric keyboard similar to the one in *Figure 4-5*. To include this information as part of the PAD message make sure the "Enable" box is checked. Clearing the Enable box will exclude this information from being sent.

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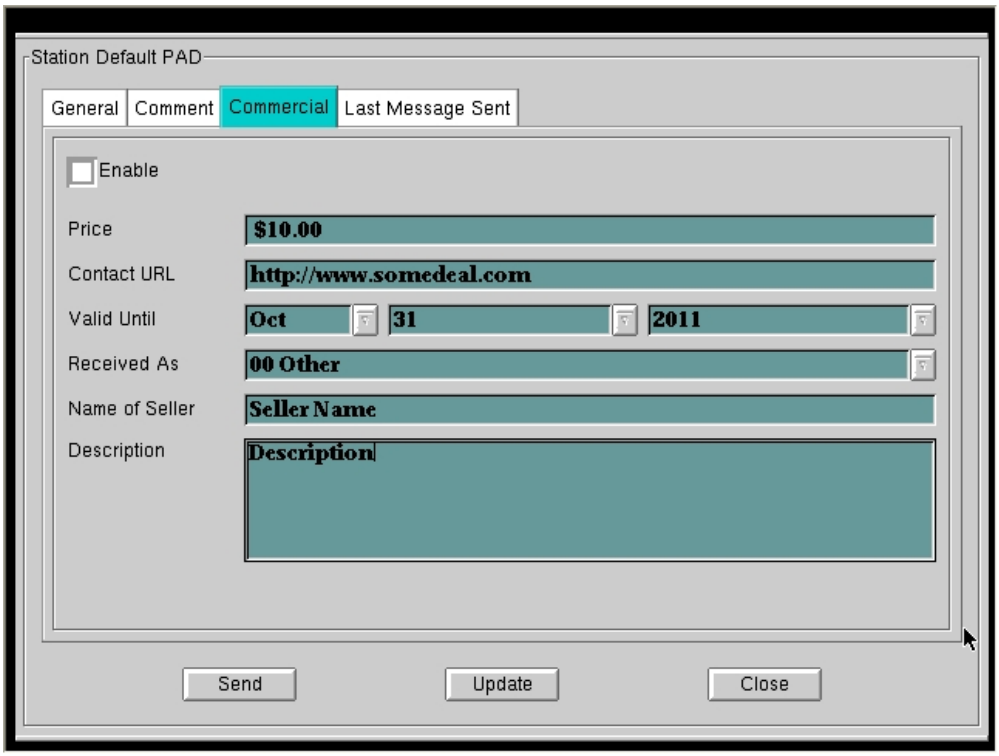

Figure 4-45 Station Default PAD (Commercial Tab)

4.5.8 Last Message Sent

Use this tab, shown in *Figure 4-46* , to view the last message sent in ID3 format.

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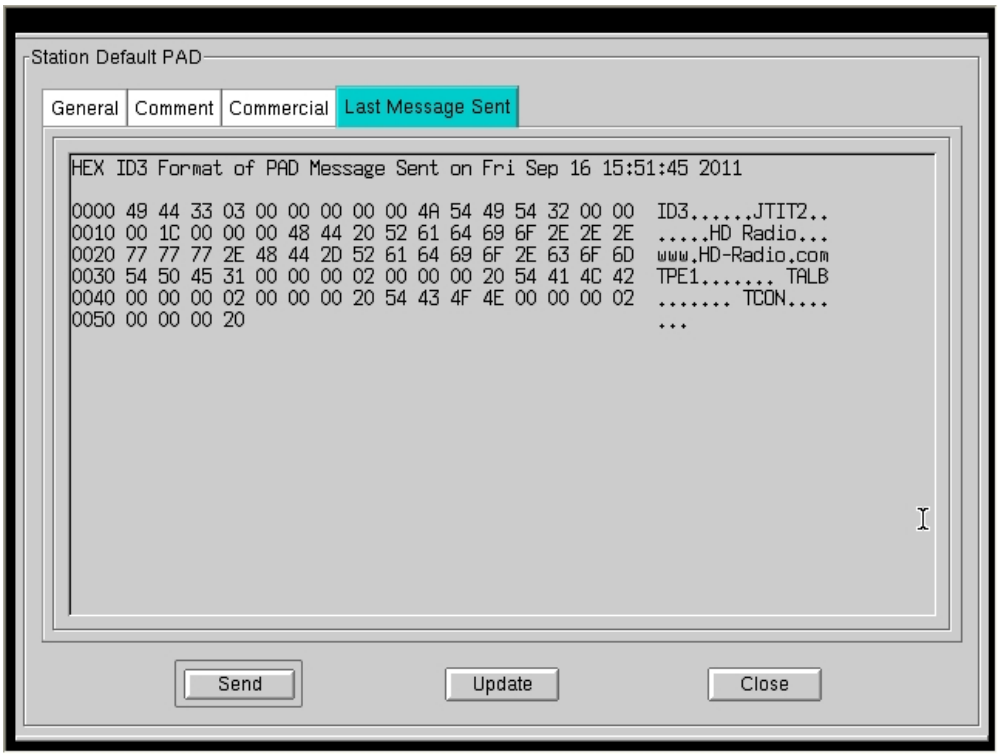

Figure 4-46 Station Default PAD (Last Message Sent Tab)

In addition to the four tabs, the Station Default PAD screen also has four buttons: Send, Update, Advanced, and Cancel.

4.5.9 Send

When pressed, the current information in the General, Comment and Commercial screens, if enabled, will be queued for transmission as indicated by the screen shown in *Figure 4-47*.

Figure 4-47 PAD Information Sent acknowledgement message.

4.5.10 Update

When pressed, the current information in the General, Comment, and Commercial screens is saved as part of the default configuration for that Service Mode as indicated by the acknowledgement message shown in *Figure 4-48*.

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Figure 4-48 PAD Configuration update acknowledgement

4.5.11 Cancel

Use Cancel to return to the main Station screen.

4.5.12 Station Program Control

The station's programming genre selection, *Figure 4-49*, is displayed when the Select Station Program Control is selected.

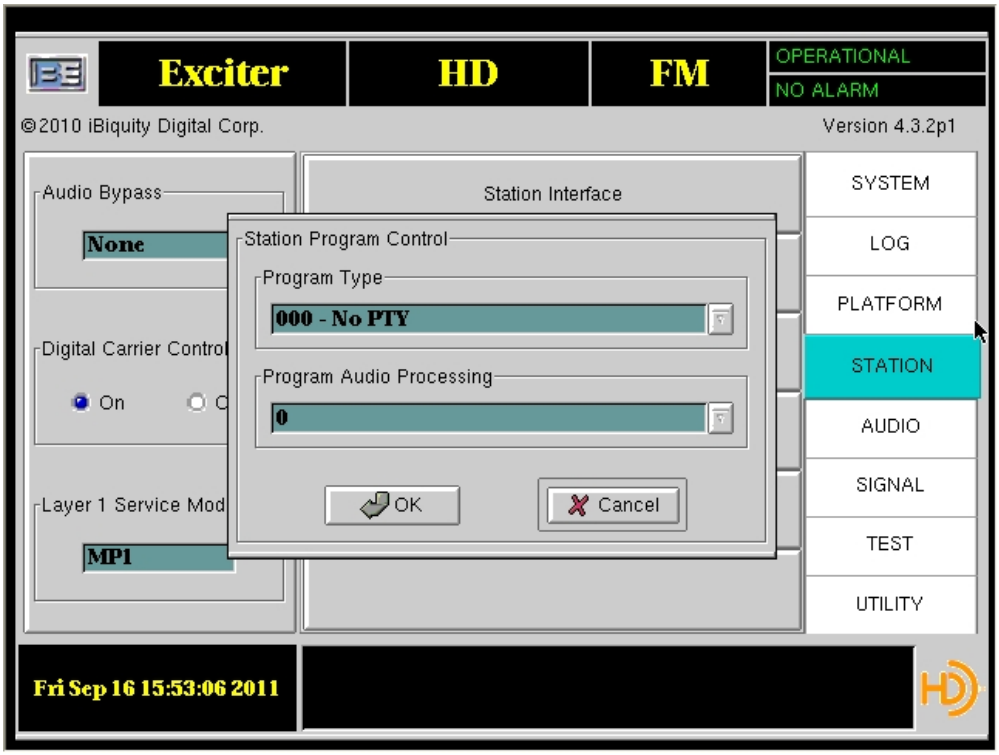

Figure 4-49 Station Program Control screen

This menu allows the user to send a genre type embedded in the main program audio bit-stream. Once "Enable" is checked, the genre information will be sent as part of the main program audio bit-stream. To change the genre, use the pull down menu and select the genre type most appropriate. The Program Audio Processing box is used to set the 5-bit value in the Station Information Guide (SIG) and is application specific.

4.6 Audio Tab Control Buttons

Figure 4-50 shows the GUI main screen Audio Tab. Descriptions of control buttons displayed on the Audio Tab of this screen are provided in the following subparagraphs.

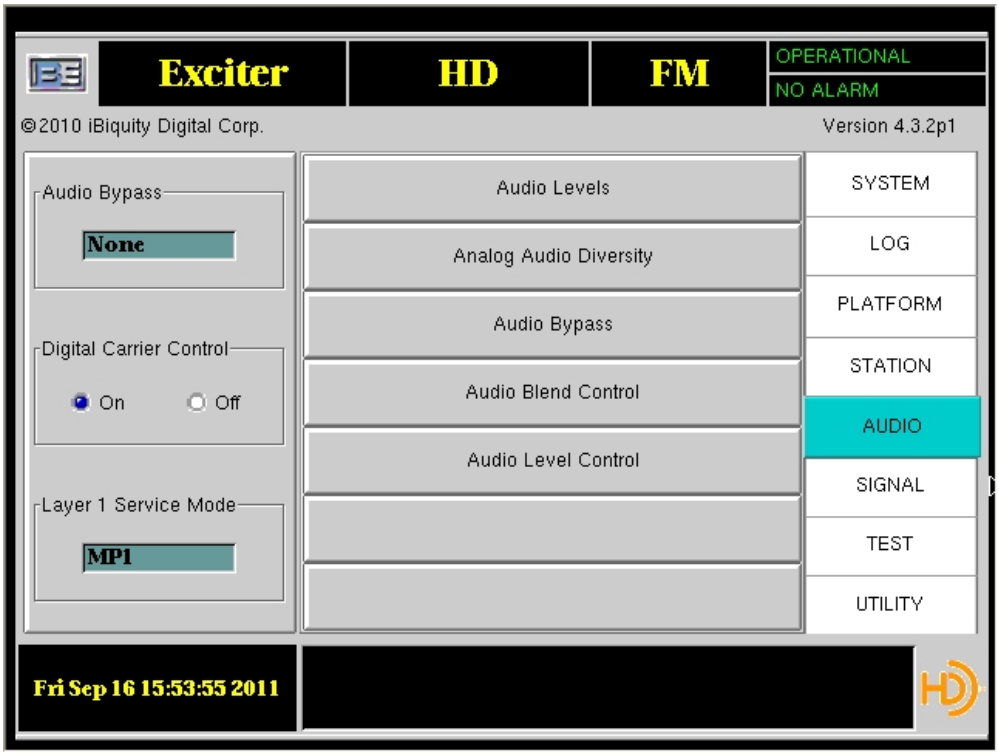

Figure 4-50 Reference Exciter GUI Interface Audio Tab

4.6.1 Audio Levels

This button, if selected, will display a dynamic Audio Monitor, *Figure 4-51*.

4.6.2 Range (dB)

Select this option to change the Minimum value (left most value of audio bars) of the audio Bar graph, the Numeric Keyboard (*Figure 4-6*) is displayed. To change the Range, in dB down from Full Scale, enter the new value using the number keys.

4.6.3 Average (sec)

Select this option to change the time over which the average of audio power is taken to be displayed as the green portion of the audio Bar graph. The Numeric Keyboard (*Figure 4-6*) is displayed. To change the average time, enter the new value using the number keys.

NOTE: If this number is larger than the peak and/or peak hold numbers they will be changed to equal the Average time.

4.6.4 Peak (sec)

Select this option to change the time over which the peak of audio power is taken to be displayed as the Yellow portion of the audio Bar graph. The Numeric Keyboard (*Figure 4-6*) is displayed. To change the Peak time, enter the new value using the number keys.

NOTE: If this number is larger than the peak hold number it will be changed to equal the Peak time.

4.6.5 Peak Hold (sec)

Select this option to change the time over which the peak of audio power is taken to be displayed as the Red portion of the audio Bar graph. The Numeric Keyboard (*Figure 4-6*) is displayed. To change the Peak Hold time, enter the new value using the number keys.

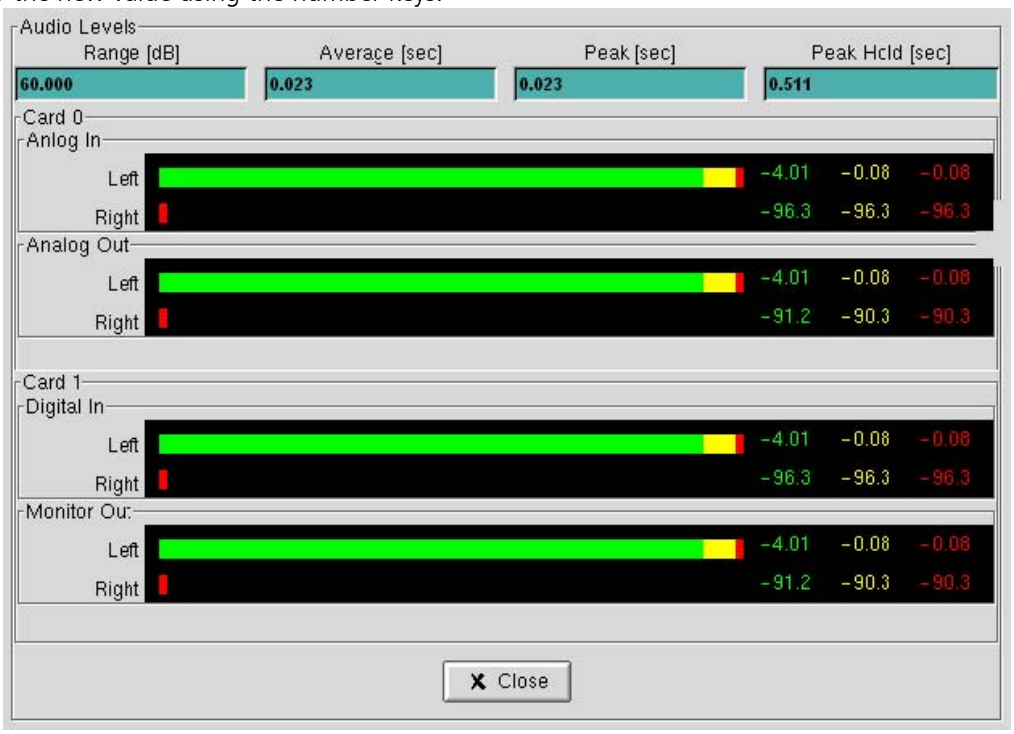

Figure 4-51 Audio Levels Screen

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4.6.6 Analog Audio Diversity

This button, if selected, will display the Analog Audio Diversity Screen, *Figure 4-52*.

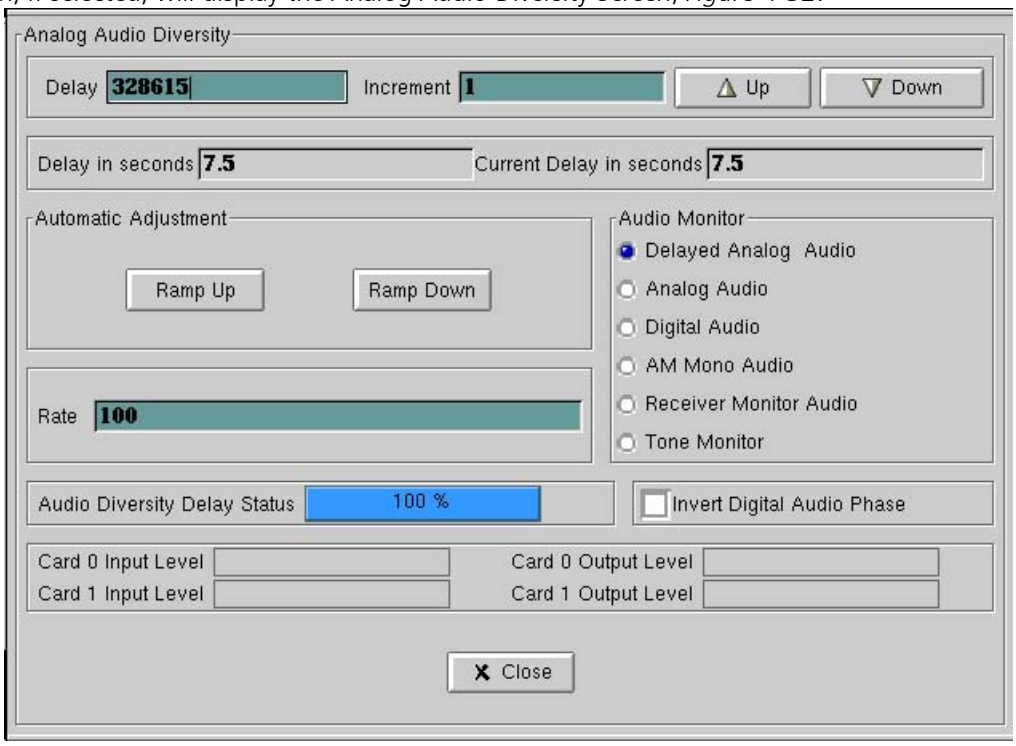

Figure 4-52 Analog Diversity Delay Screen

4.6.7 Delay

The Delay indicator displays the number of 44.1-kHz audio samples (22.67 us/sample) analog audio is to be delayed if the Analog Audio Diversity Status is 100%.

The Delay field, when selected, displays the Numeric Keyboard screen similar to *Figure 4-6*. To change the delay value, enter the desired Delay Value using the number keys. Press *Enter* to establish the new delay value and return to the Analog Audio Diversity screen.

4.6.8 Increment

The Increment indicator displays the number of 44.1-kHz audio samples the delay value is changed when the up or down arrow buttons are selected.

The Increment field, when selected, displays the Numeric Keyboard screen to *Figure 4-6*. To change the increment value, enter the desired increment value using the number keys. Press *Enter* to establish the new increment value and return to the Analog Audio Diversity screen.

4.6.9 Delay in seconds

The Delay-in-seconds indicator displays the total analog audio delay when the Audio Diversity Delay Status is 100%.

4.6.10 Current Delay in seconds

The Current Delay-in-seconds indicator displays the current analog audio delay in seconds. Depending on the delay and the rate, the current value should either be equal to or converging to the delay value.

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4.6.11 Automatic Adjustment Ramp Up

Ramp Up, when selected, begins a delay increase using the rate value from 0 to the desired delay value.

4.6.12 Automatic Adjustment Ramp Down

Ramp Down, when selected, begins a delay decrease using the Rate value from the present delay value to 0.

4.6.13 Rate

The Rate indicator displays the rate at which the total delay can be changed. If the rate is 0 when the delay is changed, it will be executed immediately. If the rate is 100 and the delay is changed, that change will slowly take effect: for every 100 audio samples, 1 extra sample is inserted or extracted. The higher the rate, the longer it will take to achieve the final value.

The Rate field, when selected, brings up the Numeric Keyboard screen (*Figure 4-6*). To change the Rate value, enter the desired rate using the number keys. Press *Enter* to establish the new Rate and return to the Analog Audio Diversity screen.

4.6.14 Audio Monitor

The Audio Monitor indicates/controls the audio stream present at the Exciter Monitor output. The options are:

- Delayed Analog Audio is (same as the analog Audio out) the diversity delayed input analog audio.
- Analog Audio is the input analog audio.
- Digital Audio is the input digital audio.
- AM Mono Audio is the monophonic input analog audio. Any internal band-limit filtering, 5 or 8 kHz, has not been applied.
- Receiver Monitor Audio is the digital audio encoded then decoded.
- Tone Monitor places a 1-kHz full-scale sine wave on the monitor output.

4.6.15 Invert Digital Audio Phase

When this box is checked, the phase of the digital audio stream is inverted.

4.6.16 Audio Diversity Delay Status

The Audio Diversity Delay Status indicator displays the percentage of current diversity delay.

4.6.17 Audio Card 0 Input Level

The Audio Card 0 Input Level indicator displays activity on the audio card 0 input path.

4.6.18 Audio Card 0 Output Level

The Audio Card 0 Output Level indicator displays activity on the audio card 0 output path.

4.6.19 Audio Card 1 Input Level

The Audio Card 1 Input Level indicator displays activity on the audio card 1 input path.

4.6.20 Audio Card 1 Output Level

The Audio Card 1 Output Level indicator displays activity on the audio card 1 output path.

4.6.21 Audio Bypass

See Paragraph 4.1.12.

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4.6.22 Audio Blend Control

The Exciter can transmit a control bit to the receiver that indicates not to blend between analog and digital. This could be used in cases of different audio content or non-time alignment. When this bit is set it is up to the receiver to determine which audio stream is used. *Figure 4-53* shows the selection.

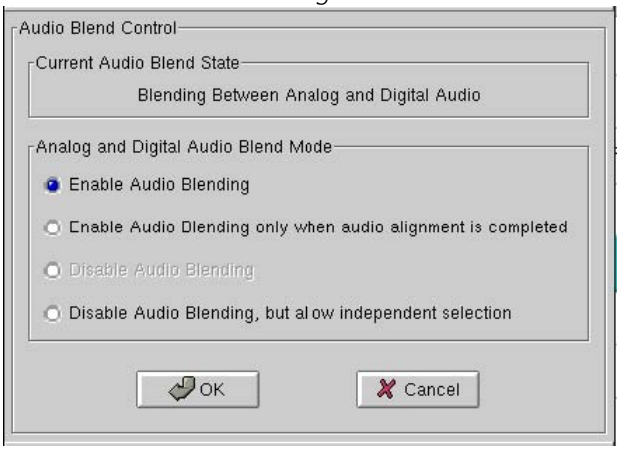

Figure 4-53 Audio Blend Control Screen

If the *Enable Audio Blending* Control is selected, blending will occur regardless of the mode or the state of the diversity delay. If the *Enable Automatic Blending only when audio alignment is completed* Control is selected, blending will only be enabled if the diversity delay is completely ramped up. Blending will automatically be disabled when diversity delay is either being applied (Section 4.6.11) or removed (Section 4.6.12) and if the diversity delay is completely ramped down. *Disable Audio Blending* allows the blending to be disabled for certain service modes. *Disable Audio Blending, But Allow Independent Selection* is used when different program material is being transmitted on the digital or analog channels.

4.6.23 Audio Level Control

The exciter can transmit control information to the receiver to indicate adjustments between the analog and digital audio. When selected the screen in *Figure 4-54* is displayed. To change the recommended level adjustment, enter the desired value in the New Audio Control Value text box using the numeric keyboard. Press "Enter" to establish the new value and return to the Audio screen.

Figure 4-55 shows the GUI main screen Signal Tab. Descriptions of control buttons displayed on the Signal Tab of this screen are provided in the following subparagraphs.

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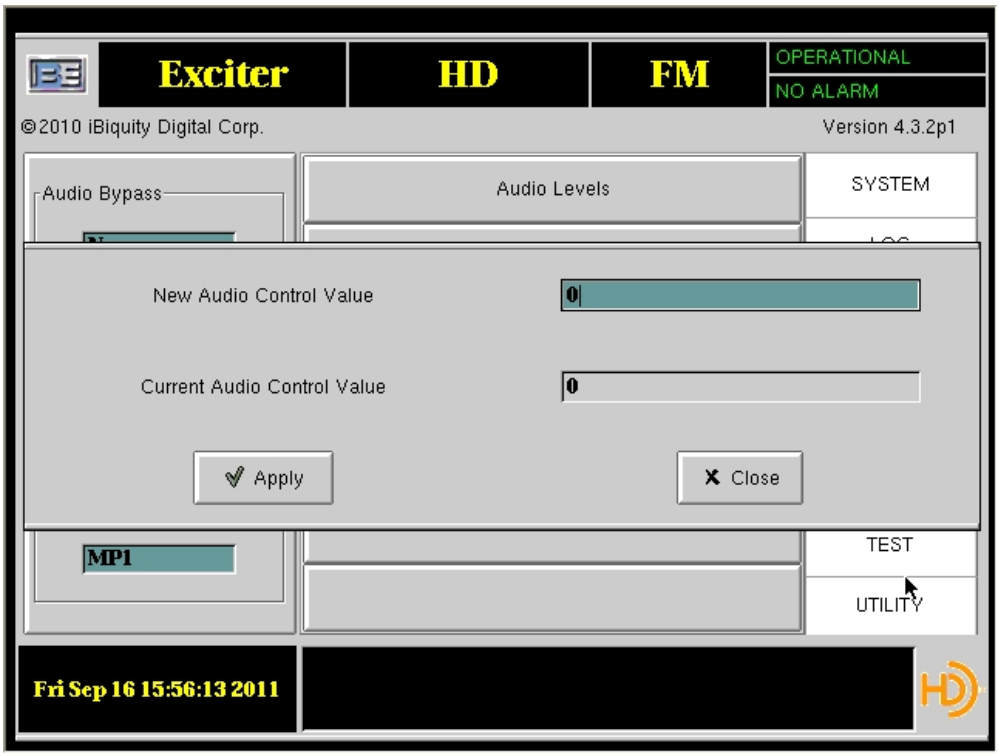

Figure 4-54 Audio Level Control

4.7 Signal Tab Control Buttons

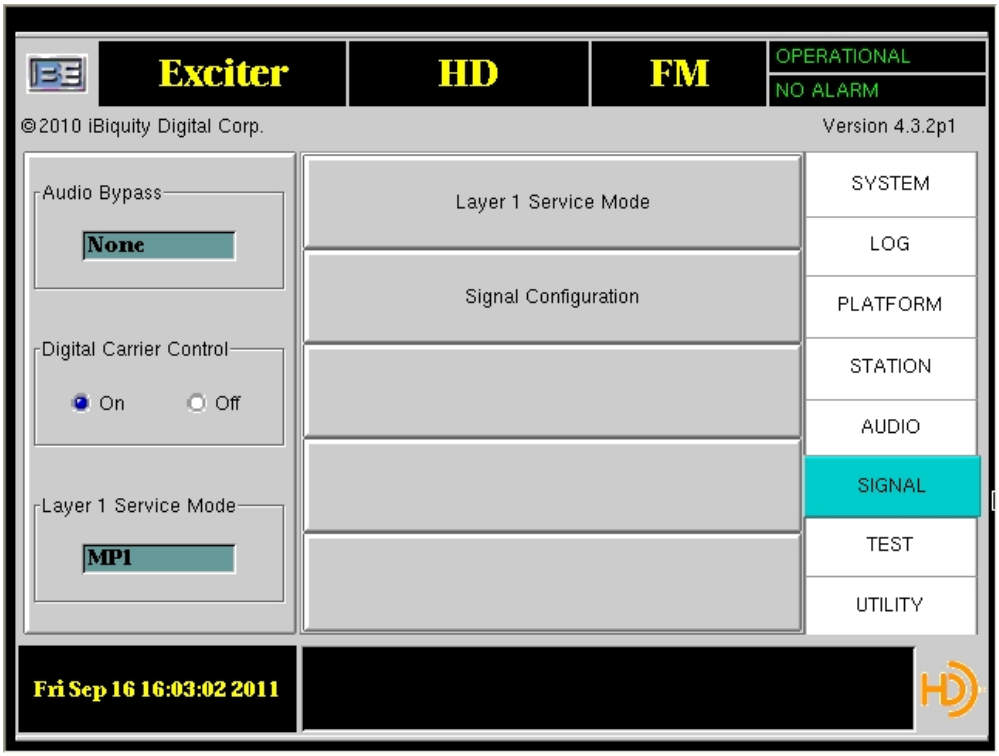

Figure 4-55 Reference Exciter GUI Interface Signal Tab

4.7.1 Frequency

See paragraph 4.1.8.

4.7.2 Layer 1 Service Mode

See paragraph 4.1.18.

4.7.3 Signal Configuration

Figure 4-56 shows the signal configuration screen. Descriptions of control button and value selections displayed on this screen are provided in the following subparagraphs.

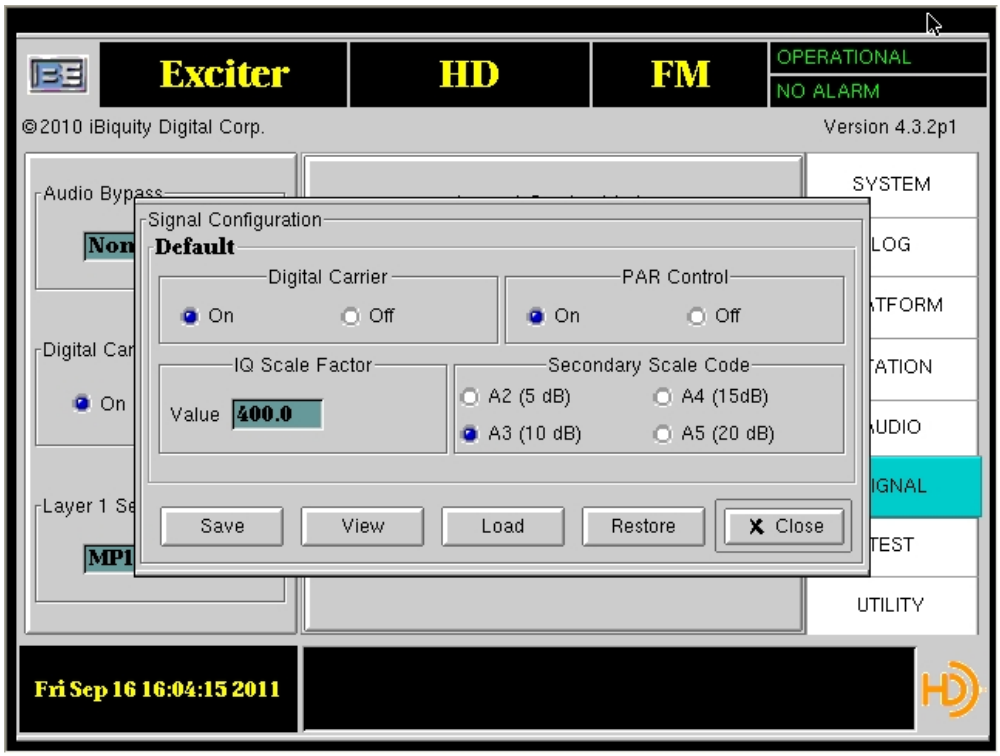

Figure 4-56 Signal Configuration Window

4.7.4 Digital Carrier Control

See paragraph 4.1.17.

4.7.5 PAR Control

Peak-to-Average Ratio (PAR) Control enables/disables the peak-to-average ratio limiting of the digital subcarriers. Care should be exercised when setting PAR to Off. This, in combination with I/Q Scale Factor and waveform type, can cause D/A overflows resulting in spectral distortion.

When a PAR On or Off selection is made, the PAR Dialog Box (*Figure 4-57*) is displayed, warning of a potential problem. From the Dialog Box, select OK to display the Numeric Keyboard screen (*Figure 4-6*). With PAR On, use a scale factor of 400. With PAR Off, the maximum scale factor is 300. To change the I/Q Scale Factor, enter the desired I/Q Scale Factor using the number keys. Press *Enter* to establish the new I/Q Scale Factor and return to the main menu.

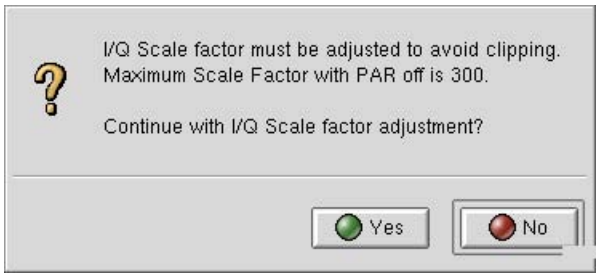

Figure 4-57 PAR Dialog Screen

4.7.6 I/Q Scale Factor

This factor is used to set the level of the composite signal prior to the last D/A. Care should be taken when adjusting this value. This, in combination with PAR Off, can cause D/A overflows resulting in spectral distortion.

When Scale Factor is selected, the Numeric Keyboard screen is displayed, similar to *Figure 4-6*. With PAR On, a scale factor of 400 is acceptable for all waveform types. With PAR Off, the maximum scale factor is 300. To change the I/Q Scale Factor, enter the desired I/Q Scale Factor using the number keys. Press *Enter* to execute the new I/Q Scale Factor and return to the main menu.

4.7.7 Secondary Scale Code

The Secondary Scale Code (level of secondary subcarriers below the primary subcarriers) is set by selecting the desired Secondary Scale Code, A2 through A5.

4.7.8 Presets

The 5 buttons at the bottom of the Signal Configuration menu allow for the management of the available preset configurations. Once the desired signal configurations are set, press *Save* and a dialog box similar to *Figure 4-58* is displayed. Select the desired preset, enter the desired name and hit OK.

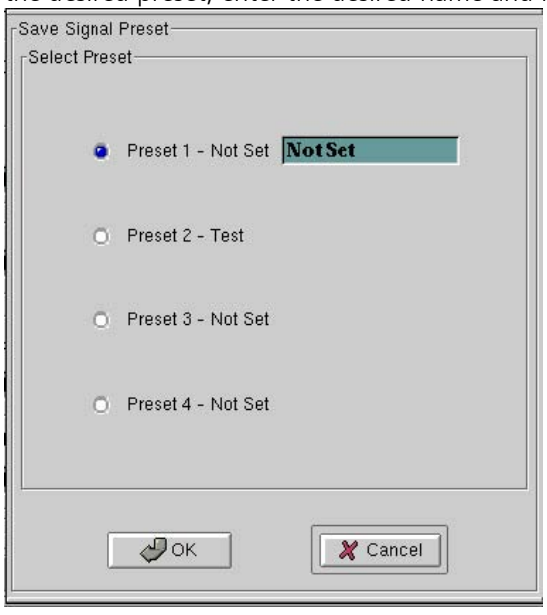

Figure 4-58 Save Signal Preset Dialog box

To view the setting for all presets select *View* and a display box similar to *Figure 4-59* will be displayed.

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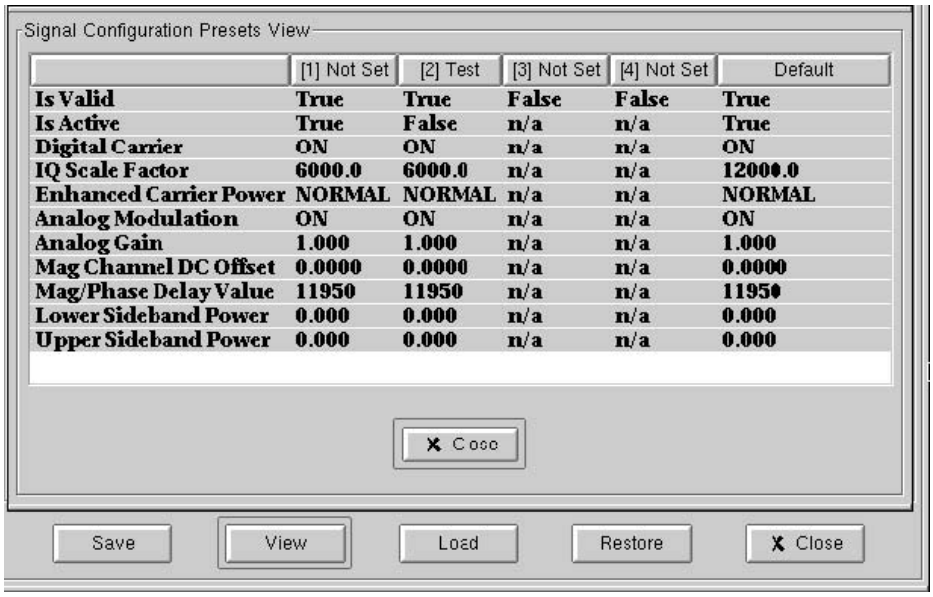

Figure 4-59 Signal Preset View Window

To load a preset simply press *Load* and a dialog box similar to *Figure 4-58* will be displayed. Select the desired preset and hit OK to return to the Signal Configuration menu. To restore the signal configurations to the factory default parameters select *Restore*. Finally to return to the main menu press *Close*.

4.8 Test Tab Control Buttons

Figure 4-60 shows the GUI main screen Test Tab. Descriptions of control buttons displayed on the Test Tab of this screen are provided in the following subparagraphs.

NOTE: All functions under the Test Tab REQUIRE a password to be accessed.

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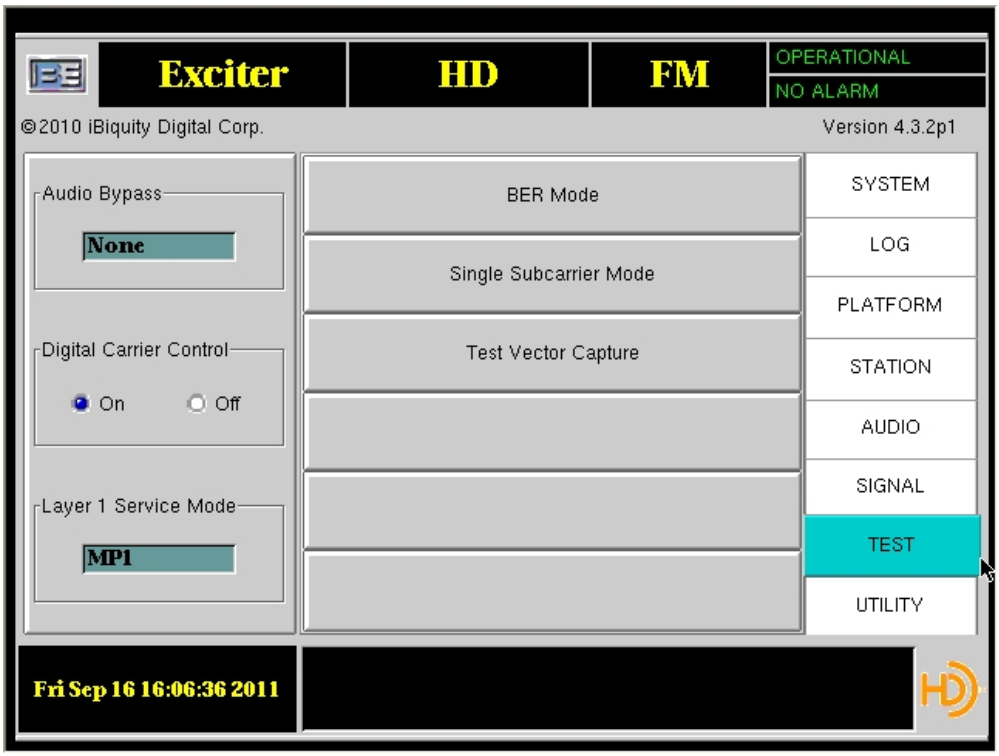

Figure 4-60 Reference Exciter GUI Interface Test Tab

4.8.1 Bit Error Rate Mode

The Bit Error Rate (BER) mode control selects either normal audio mode or Layer 1 BER mode (no digital audio) (*Figure 4-61*).

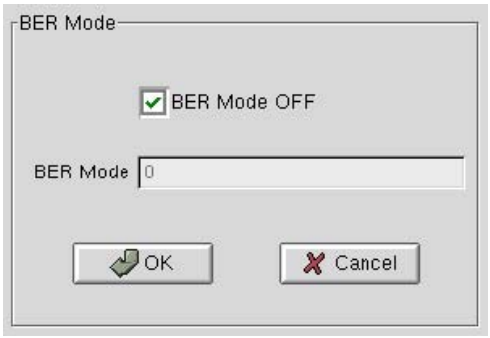

Figure 4-61 Bit Error Rate Mode Screen

BER Mode 1 sets the exciter to transmit a bit pattern that can be checked at the receiver Modem output. BER Mode 2 sets the exciter to transmit all zeros that can be checked at the receiver Viterbi decoder output. BER Mode 3 sets the exciter to transmit a PN (Pseudo Noise) sequence that can be checked at the receiver Viterbi decoder output.

In BER Mode, the FM Layer 1 service mode can be selected. To exit BER Mode, return the Layer 1 service mode to MP1 and select BER Mode Off.

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4.8.2 Single Subcarrier Mode

The Single Subcarrier Mode screen, *Figure 4-62*, is displayed when selected from the main menu,. This screen provides digital carrier selection for test purposes.

The subcarrier number refers to the one subcarrier that will be transmitted. The value -546 corresponds to the lowest frequency subcarrier and the value 546 to the highest frequency subcarrier.

When Single Subcarrier Mode is selected, the numeric keyboard (*Figure 4-6*) is displayed. To change the Subcarrier Number, enter the desired number using the number keys. Press *Enter* to establish the new Subcarrier Number and return to the main menu.

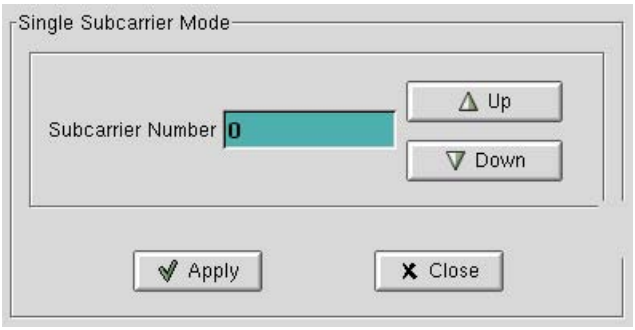

Figure 4-62 Single Subcarrier Selection screen

4.8.3 Test Vector Capture

The Test Vector Capture screen, *Figure 4-63*, is displayed when selected from the GUI Test Menu. This screen provides the ability to capture IF modulated IQ samples over a number of L1 Frame times. This functionality requires specialized knowledge of other system configuration elements which must be correctly set and is use for iBiquity test purposes. Without the correct configuration no data can be captured and this screen has no effect.

Figure 4-64 shows the GUI main screen Test Tab. Descriptions of control buttons displayed on the Test Tab of this screen are provided in the following subparagraphs.

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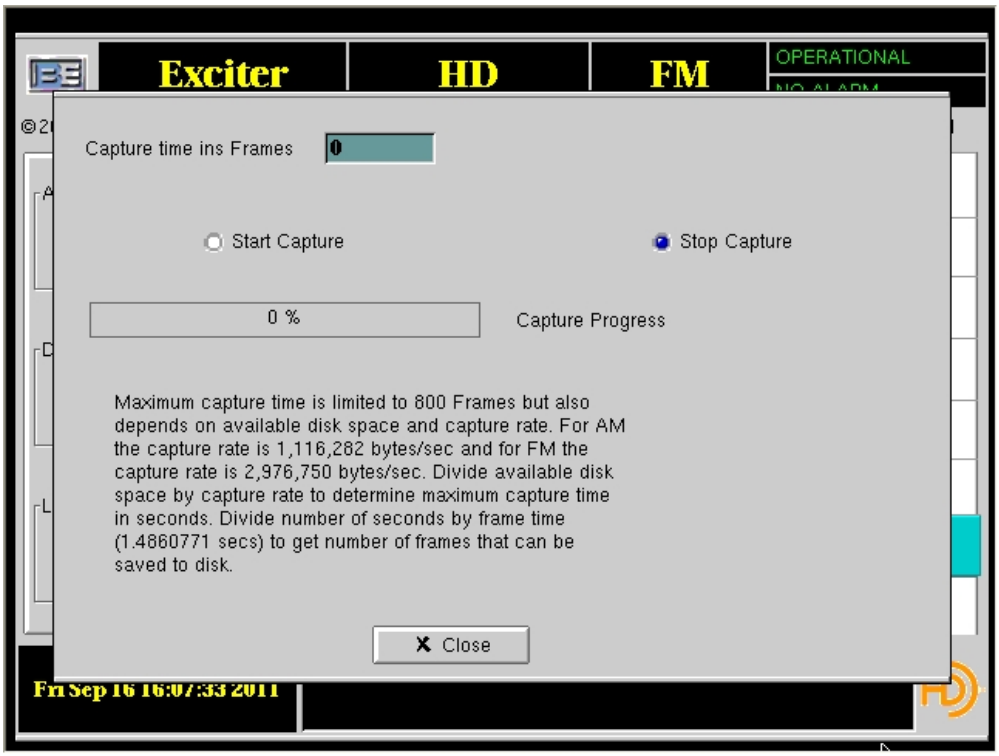

Figure 4-63 Test Vector Capture Screen

4.9 Utility Tab Control Buttons

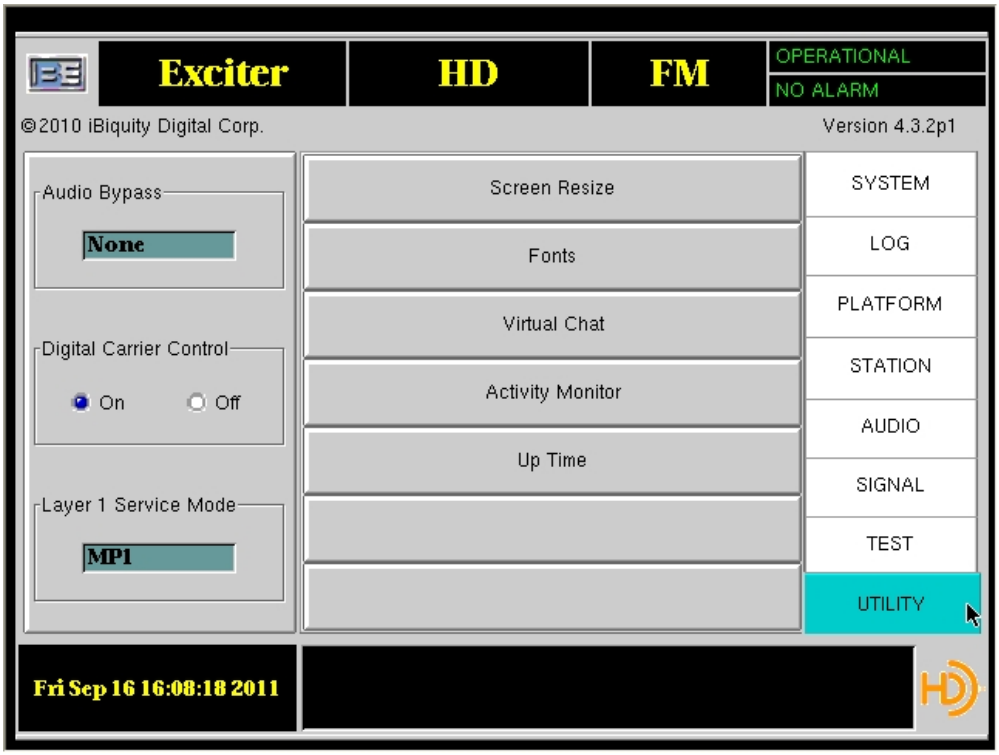

Figure 4-64 Reference Exciter Gui Utility Tab Screen

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4.9.1 Screen Resize

The Screen Resize window allows the user to change the dimensions of the display, *Figure 4-65*.

4.9.2 Width Value

This displays the present value of the screen width. This can be raised or lowered using the + or – buttons.

4.9.3 Height Value

This displays the present value of the screen height. This can be raised or lowered using the + or – buttons.

4.9.4 Test

When selected, Test will display a test screen, *Figure 4-66*. Verify that the entire border is visible and select OK when complete.

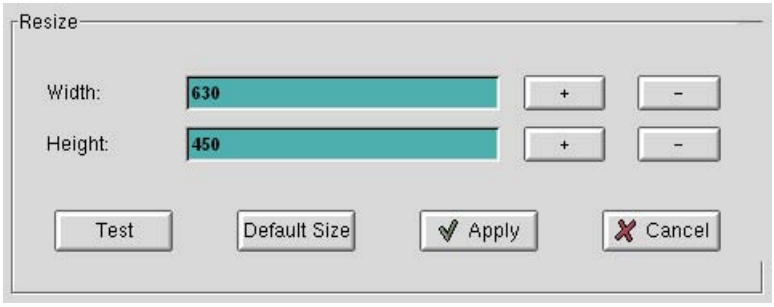

Figure 4-65 Screen Resize Screen

Figure 4-66 Screen Size Test Screen

4.9.5 Default Size

When selected, both the height and the width values will be reset to default settings.

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4.9.6 Apply

When selected, the user will be prompted to reboot the system to make use of the new screen settings, *Figure 4-67*. Selecting Yes will proceed with the reboot and NO will cancel the action and return to the Exciter Main screen.

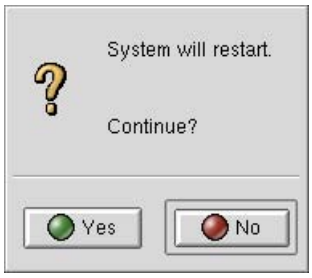

Figure 4-67 Apply Reboot Screen

4.9.7 Cancel

When selected, the user will be returned to the Exciter Main screen.

4.9.8 Fonts

This button, if selected, will display a System Fonts screen, *Figure 4-68*.

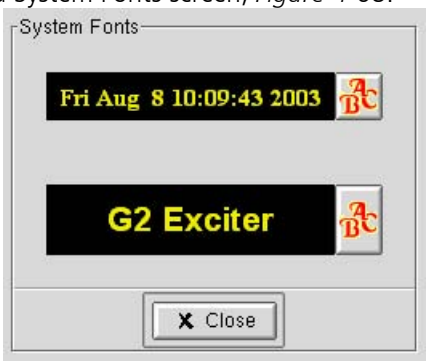

Figure 4-68 System Fonts Screen

The upper section if selected allows the user to select the font used on all small data presentation areas, *Figure 4-69*.

The lower section if selected allows the user to select the font used on all large data presentation areas, *Figure 4-69*.

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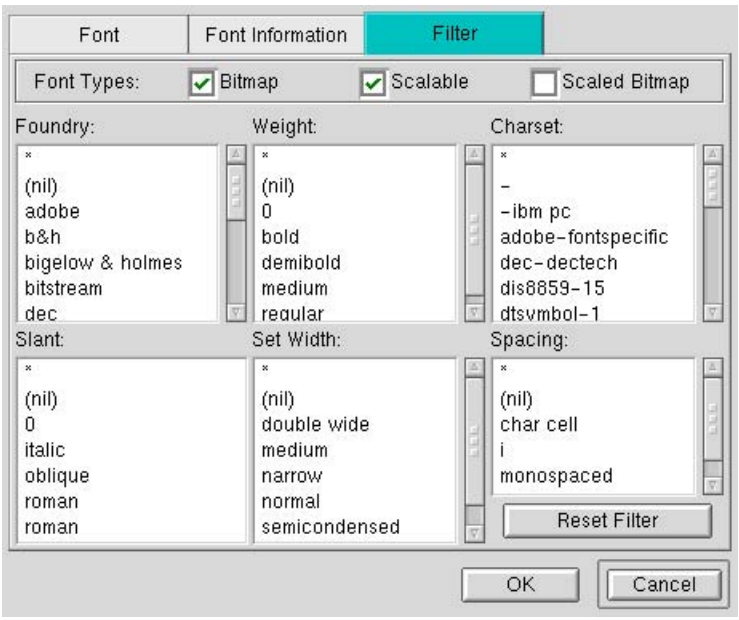

Figure 4-69 PickaFont Screen

4.9.9 Virtual Chat

The Virtual Chat Screen, *Figure 4-70*, allows direct communication between 2 users logged in to the same exciter. If a user is at the exciter and a second user has logged in remotely, see paragraph 6.6, using Virtual Chat they can communicate directly. By entering the information to be sent in the bottom window and pressing Send the message will be relayed to the other user. All communications will be displayed in the upper window.

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Figure 4-70 Virtual Chat Screen

4.9.10 Up Time

When selected, the screen shown in *Figure 4-71* displays information about the length of time the exciter has been operational. Two columns are displayed: Calendar Time and Elapsed Time. Calendar Time represents the date and time the last event occurred. The Elapsed Time displays the total time in years, days, minutes, and seconds from the last event.
The events displayed are:

1. OS Start – The last time the OS was restarted.

2. System Start – The last time the application was started.

3. Last System Shut-down – The last time the system was shutdown.

4. Last System Error – The last time a warning or system error occurred.

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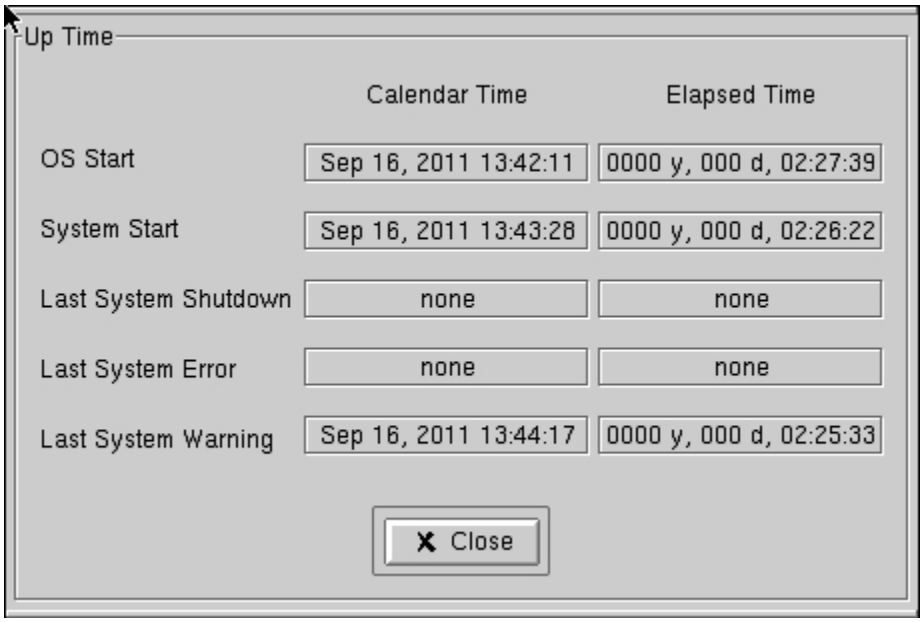

Figure 4-71 Up Time Information Screen

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5 WAVEFORM GENERATION PLATFORM

This platform type is used when "Canned" data is to be sent through the exciter. It is a different platform type because it can use significantly less hardware. The only hardware needed is a DUC and a RUC. All other hardware, such as audio cards and station interface cards, are not used. However, if the hardware is present it is simply not used.

When the system is started in the platform type *WaveGen*, the screen shown in *Figure 5-1* is displayed. All the tabs and buttons, except those displayed in the Waveform Generator group box, work the same as in the Exciter platform type. Please refer to the appropriate section for a description of the usage.

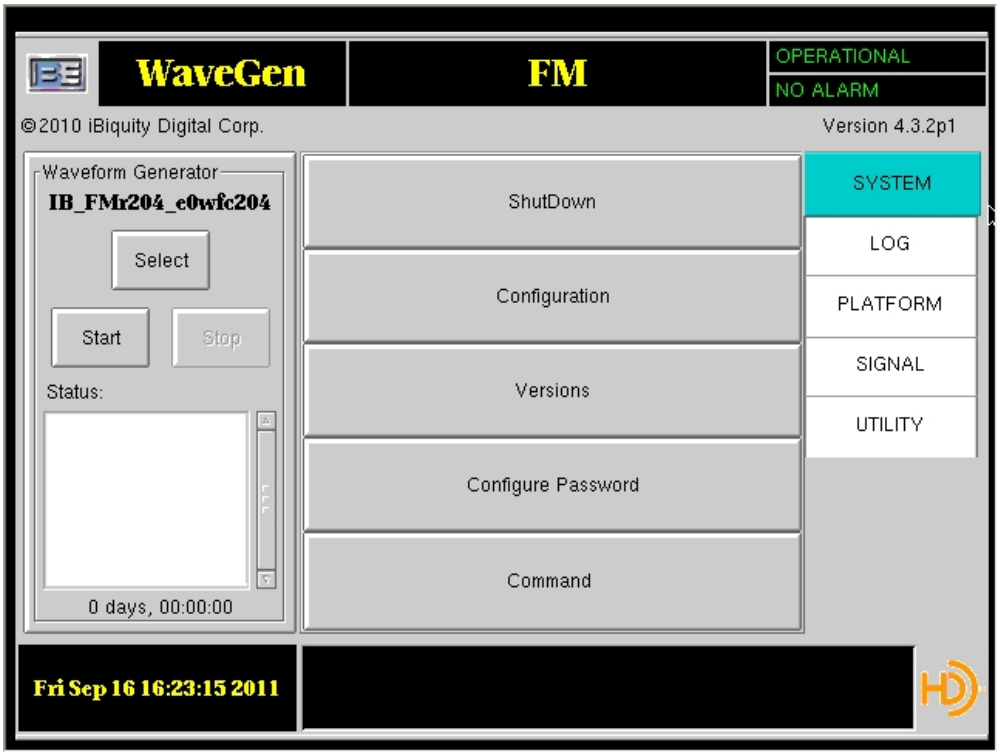

Figure 5-1 Waveform Generation Main Screen

To begin sending canned waveform data, first press the Select button and the screen shown in *Figure 5-2* is displayed. Use this screen to enter the name of the file containing the waveform data or select browse to select an available file, *Figure 5-3*. Select *OK* when the desired file is found. Select *Close* to close the Select window.

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Figure 5-2 Waveform Generation File Selection Window

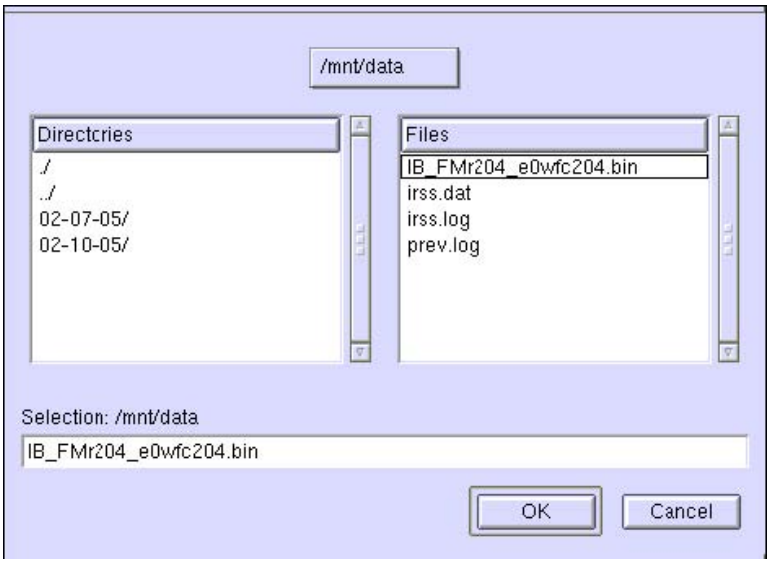

Figure 5-3 Waveform Generation File Browse Window

To start the sending of the waveform data, simply press Start. At this point the information in the Status field will begin to be updated, *Figure 5-4*. The status displays which symbol number, in hex, has been transmitted.

In addition, the amount of time the waveform file has been playing is also displayed. When the end of file is reached, the output is automatically restarted from the beginning of the file. Select *Stop* to stop the transmission of waveform data.

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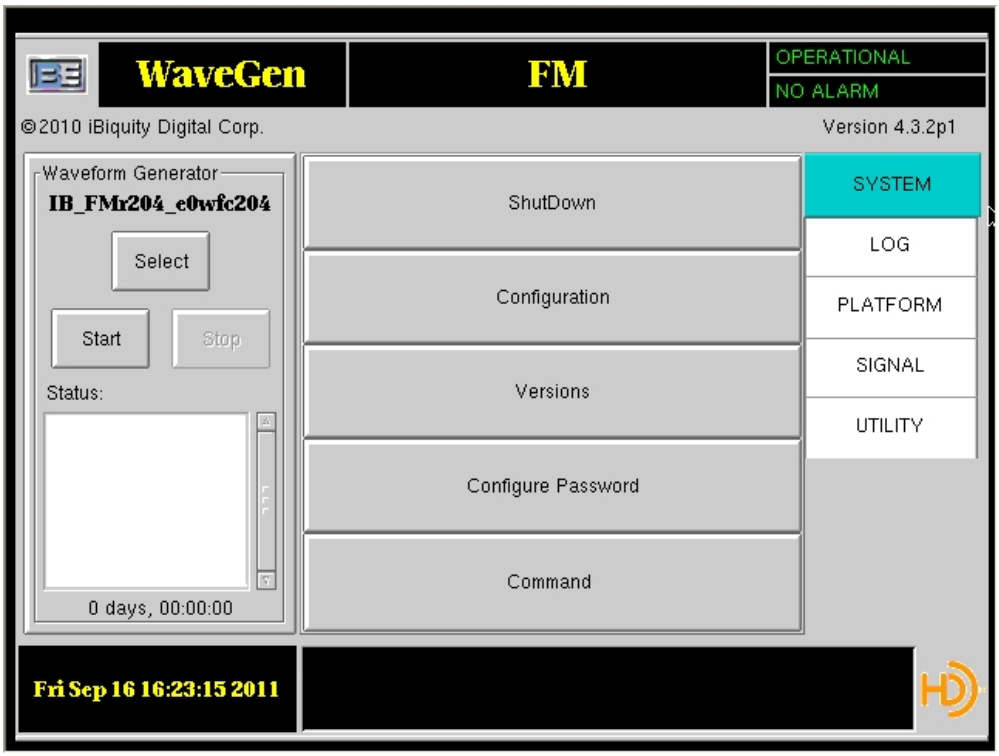

Figure 5-4 Waveform Generation Screen with Status Information

5.1 External Ethernet Hard Drive Support

The exciter supports the ability to stream test vectors from an external Snap Server. A Snap Server is a Snap Appliance external Ethernet based Server/Hard Drive solution. It must be connected via static IP (and Ethernet cross-over cable) to the exciter. A picture of a Snap Appliance Snap Server is shown in *Figure 5-5*.

Figure 5-5 Snap Appliance Snap Server 1100

When the Snap Server device is used to "stream" (real-time) waveforms (Waveform Generator Test screen) to an iBiquity IBOC Exciter, the following restrictions should be enforced:

1) Local Exciter 1-on-1 configuration should be used.

2) Up to 6 day runs have been tested and supported. If the plan is to run for more that 6 days, the recommended procedure is to copy the test vector file to the Exciter local hard drive (/mnt/data).

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3) No IRSS application recovery tests have been performed on removing power or Ethernet cabling to the Snap Server Device DURING the "streaming" process. Use at your own risk on such sequences. When iBiquity IBOC Exciters are configured to be off the network (setmode away), a mount point is available for a locally connected Snap Server using a static IP (10.10.10.99) and local mount point (/mnt/vector_server). The locally connected Snap Server will be automatically mounted at boot time (if available) starting with Linux OS noted in the "Platform" section. If the Snap Server becomes available after boot time, ANY of the following Linux commands (when executed as root) will mount it:

reboot
mount –a
mount /mnt/vector_server
mount_test_vectors –m
mtv -m

Note: This configuration uses a "hard" mount to increase the priority and reliability of data transfers from the Snap Server (for real-time streaming). Caution should be used when removing power or the Ethernet cable without un-mounting the Snap drive. Processes on the Linux side may become blocked (locked up) otherwise.

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6 Operating Procedures

This section contains HD Radio™ FM Exciter operating procedures.

6.1 Startup

Startup can be executed as embedded or non-embedded. The non-embedded startup requires manual entering of system configuration information from the keyboard, as described in paragraph 6.1.1. To have the exciter run the latest software upon power up with no user intervention, use embedded startup as described in paragraph 6.1.2. Perform the appropriate startup procedure to initialize the exciter.

NOTE . All Set commands must be executed as Root user to have effect.

6.1.1 Startup NonEmbedded

Perform the following procedures to initialize the exciter and EASU in **non-embedded** mode:

Set primary power on the exciter and EASU to On.

If the system is in the embedded mode, open an xterm window and type the following:

For general non-embedded operation	setdev	Press Return
To Set the IP address to 10.10.10.10	setaway	Press Return
To set local network settings for MD type	setmode MD	Press Return
Or to set local network settings for NJ type	setmode NJ	Press Return

The system must be rebooted for the change to take effect. Once the system boots up completely, login as root with the appropriate password.

Type: *start* Press Return

The following information is displayed:

/usr/dab
run ./init_loader.x ...
Executing Kernel: 2.4.20
Available baselines Kernel (built from)
0) /usr/dab/irss-x.x.x 2.4.20 (default)
Type: *0* and press *Enter*

The system initializes and the main menu is displayed. When the frequency (paragraph 4.1.8) is displayed, the system is ready for operation.

6.1.2 Startup Embedded

Perform the following procedures to initialize the exciter and EASU in **embedded** mode.
Set primary power on the exciter and EASU to On.

To set for embedded operation	setemb	Press Return
To Set the IP address to 10.10.10.10	setaway	Press Return
To set local settings for MD type	setmode MD	Press Return
Or to set local settings for NJ type	setmode NJ	Press Return

The system must be rebooted for the change to take effect. Press Return the default program is run without login on subsequent start-up.

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6.2 Audio Diversity Blend Delay Adjustment

On a calibrated receiver, set the Audio Mode to Split Analog/Digital. On the exciter:

1. select Analog Audio Diversity, *Figure 4-52*.

2. set Delay to 400000

3. set Increment to 1024

4. set Rate to 0. Monitor the audio from the receiver while using the up/down arrow keys until proper alignment of the digital and analog audio streams is achieved. Close all adjustment windows and the values will be saved for subsequent startup.

6.3 Log Levels

To set the hard-drive logging level, press Log Levels. The screen in *Figure 4-33* is displayed. To set the logging level for an individual process, set the Log Level to a value 0 through 7 (0=Off, 7=Max). To set the description associated with the screen logging (not to a file) of each process, increase the number under the Verbose Level column (0=Off, 7=Max) to the appropriate level. This sets the Log Level stored in file /mnt/data/irss.log. This file is archived to a date associated file ex: /mnt/data/03-0203/irss02:33:00.log.

The size and number of these files can be set by editing /usr/dab/irss-x.x.x/cfg/com/logx.cfg

Excerpt from logx.cfg

logFilePath=".";

logFileName="irss";

logAsciiFileSize=%d : 10000000;

logBinFileSize=%d : 209715200;

logSentCycleFlag=%d : 0;

logArchiveDay=%d : 2;

logArchFileCount=%d : 5;

To increase the size of each file, change logAsciiFileSize.

To increase the number of days to hold data files, change logArchiveDay.

To increase the number of files stored each day, change logArchFileCount.

Exercise caution when setting these file sizes and log levels: excessive data can lead to a full disk.

6.4 Shutdown Procedure Nonembedded

Select Shutdown.

If power is to be removed, type *halt*. This will stop the OS. Wait until *OK* is displayed to turn power off.

If the OS is to be restarted, type *reboot*. The system reboots to the login prompt.

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If the application is to be restarted, type: *start* to restart the program.

6.5 Shutdown Procedure Embedded

Select Shutdown.

If power is to be removed, select *Shutdown* and press *OK*. This will halt the OS. Wait until the display indicates *OK* to power down.

If the OS is to be restarted, select *OS Restart* and press OK. The system will reboot back to the default program.

If the application is to be exited and restarted, select *Restart* and press *OK* to exit and rerun the program.

6.6 Remote GUI Control

When the Exciter operating system is running, control can be remotely established using a standard web browser such as Internet Explorer. A network connection to the exciter must be established either by Ethernet or modem (see Paragraph 6.7).

Once a network connection is established, with the web browser on a standard PC, type the IP address or machine name in the Address field. The VNC Authentication screen is displayed, *Figure 6-1*.

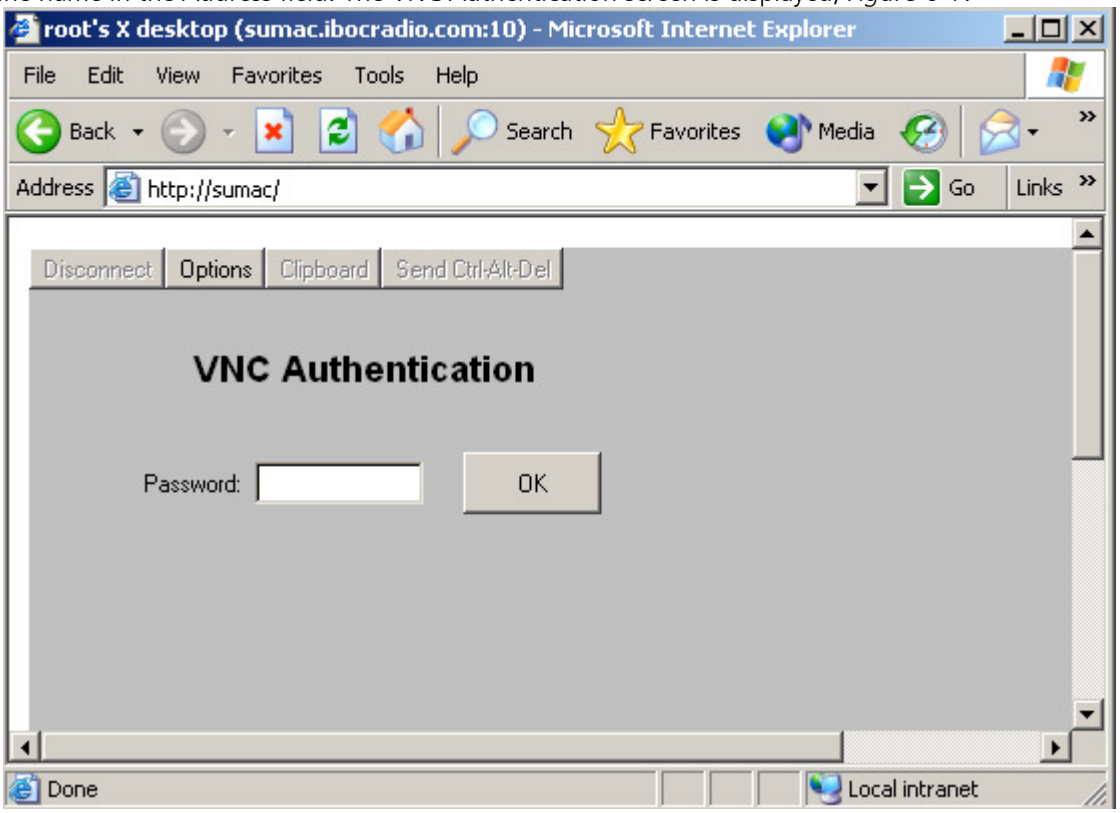

Figure 6-1 VNC Authentication Screen

Type *password* for the password and select OK. The Exciter Main Menu is displayed in the web-browser as shown in *Figure 6-2*. The Exciter can now be controlled from the remote location, just as if you were at the console, without limitation.

Note: Any number of connections to the same exciter is permitted (i.e. there is no lock-out for multiple users).

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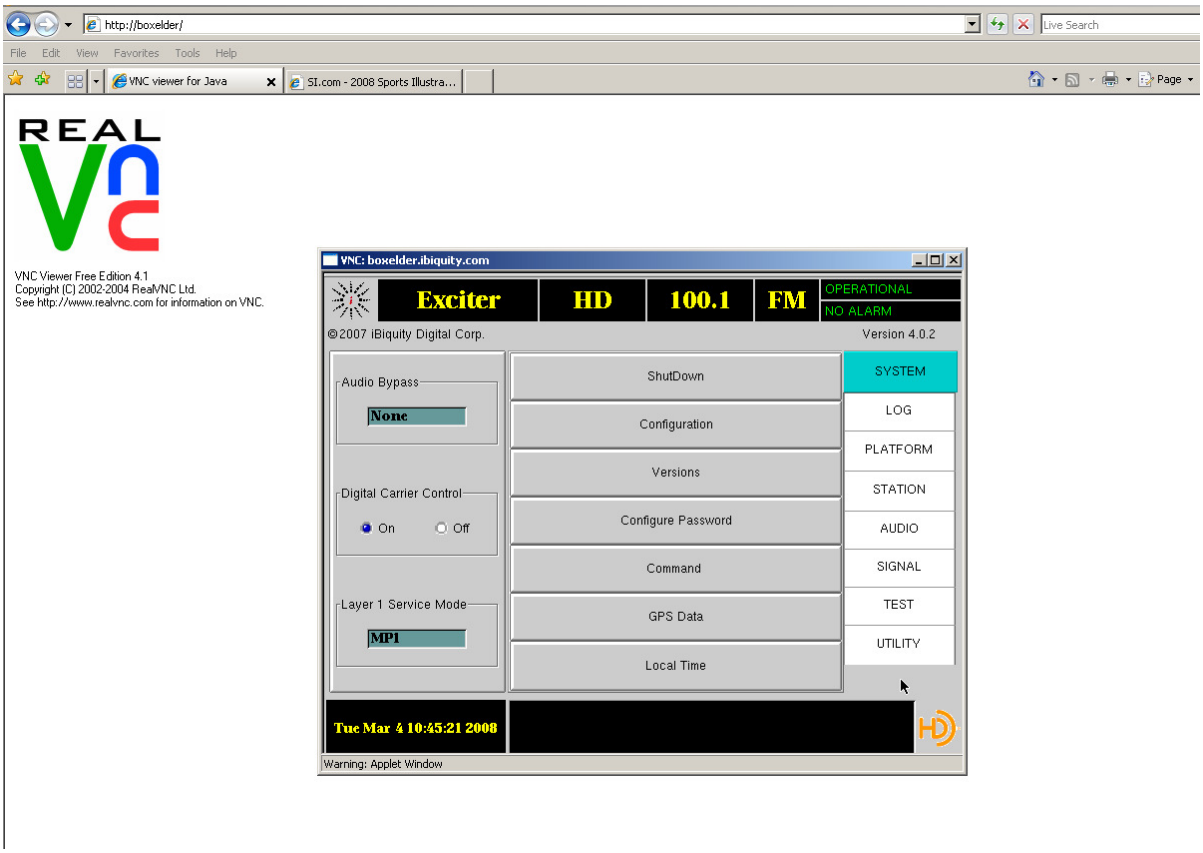

Figure 6-2 Remote Exciter Main Menu Access Screen

Access any X-windows applications and/or a console by using the System Command function, see paragraph 4.2.10.

6.7 Telco Dialup

The capabilities described in Paragraph 6.7 are available via modem connection. Perform the following procedures to access the Exciter OS via dialup connection.

Note: The MODEM will only answer when in the setemb mode.

On standard PC with Windows 95, 98, 2000, NT, or XP OS, set up a Dial-up Networking (DUN) account using the Windows OS Dial-up Networking Wizard.

Connect the Exciter Telco modem input jack to an analog phone line.

The exciter by default will answer on the first ring. To change the ring to be answered on to 5, edit file etc/mgetty+sendfax/mgetty.config adding the following, left justified, anywhere in the file:

rings 5

The exciter must now be rebooted for the change to take effect.

Connect the Windows PC modem to another analog phone line. From the Windows PC, use the newly created DUN account to dial into the exciter.

Once the connection is established, use a web browser as described in Paragraph 6.6, and type http://10.0.0.1 in the address field. The VNC Authentication screen should now displayed *Figure 6-1*.

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Note: Once the DUN connection is made, any TCP/IP-based client application can be run on the Windows PC to interact with the exciter (e.g. telnet, ftp, Exceed, ssh, etc.).

Note: The DUN connection assigns IP addresses to both the exciter and Windows PC. The IP address assigned to the Exciter is 10.0.0.1 and the IP address assigned to the Windows host is 10.0.0.2.

6.8 Console User Interface

All the capabilities described in Paragraph 3 can be invoked through the Console User Interface for the exciter, cuitx.x. For complete use and syntax go to the proper directory and view the help file:

cd /usr/dab/irss-x.x.x/bin/tx

./cuitx.x –h | more

Press the space bar to walk through the file.

Additionally any cuitx function can be set on a schedule utilizing the cronx feature. The following is an example of a script, tgldab.sh, that toggles the digital carriers on/off:

#read the dab state and write it to the variable flag

flag =`./cuitx.x –getL1Stat | grep "digital carrier control" | awk '{ print $5 }'`

#toggle the dab state, if on turn dab off if dab off turn it on.

If ["$flag" == "ON"]

then

./cuitx.x –dab 0

Else

./cuitx.x –dab 1

fi

This script can be invoked on a schedule by executing the following command.

./cronx.x ./tgldab.sh 10

This will execute the script ./tgldab.sh every 10 seconds. When you no longer want the script to run type:

q to quit.

Note: You must type q to quit do not press ctl-c this will cause errors on the exciter display.

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7 Software Upgrade

7.1 Software Upgrade Overview

CAUTION: This process removes all user software/data from the hard drive.

Obtain the proper version and place the CD into the rear CDROM and reboot the FSi 10. The iBiquity Digital Reference Platform Install screen is displayed.

The upgrade advances without interdiction.

After approximately 9 minutes, the CD should eject and the FSi will reboot.

NOTE: All network configuration (name, ip number…) is saved and need not be reset.

NOTE: A mouse and keyboard must be connected before boot-up to do any editing such as Ethernet IP Address setup, etc.

7.1.1 Software Upgrade Detail

The update software for the FSi 10 is contained on a single CD-ROM that is placed in the FSi 10 CD-ROM drive. The internal hard drive will be overwritten except for IP address if you have configured the exciter for Ethernet connectivity.

1. Make sure transmitter is off.

2. Turn On the FSi 10, if not already On. Allow FSi 10 to fully boot to the Main Screen. The Main Screen shot may be different from below depending on the Version currently installed.

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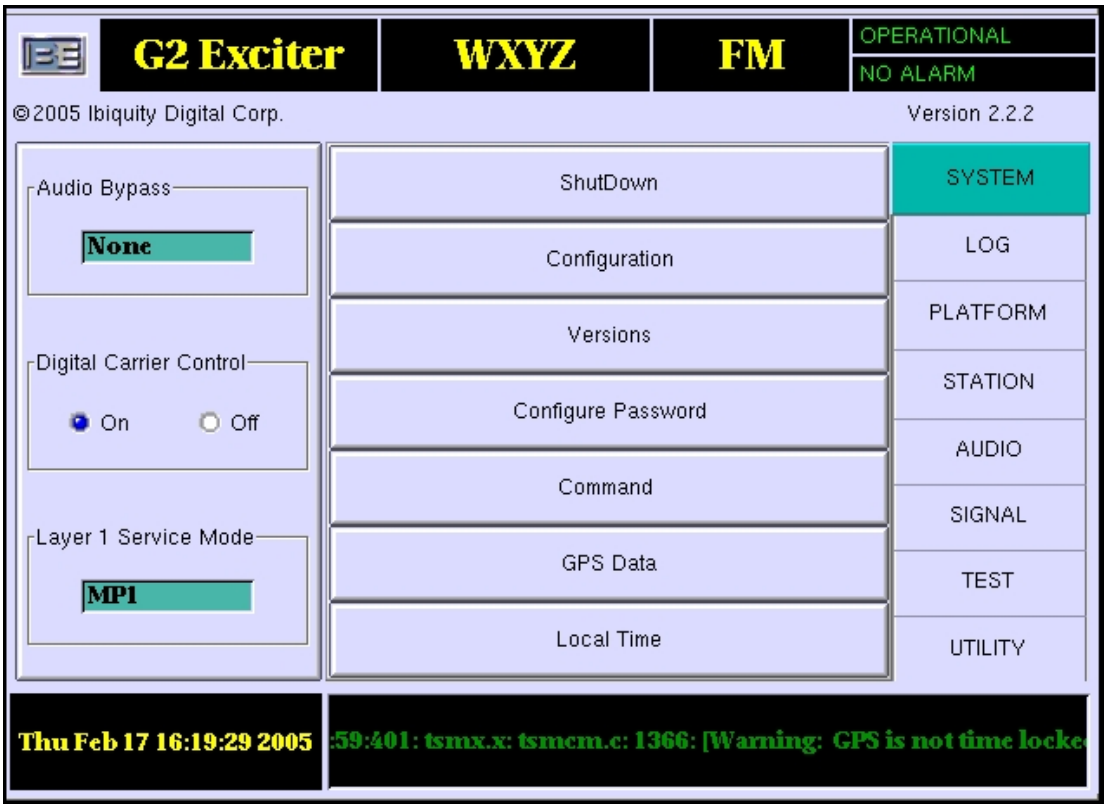

Figure 7-1 Main Screen of Software to be updated

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1. The software defaults to a delay that should be close to optimum. You will need to readjust the Analog Audio Diversity Delay on your actual system due to delays such as processing delay. Write the current delay down in case of needing to revert to the previous version.

   Audio Diversity Delay _____

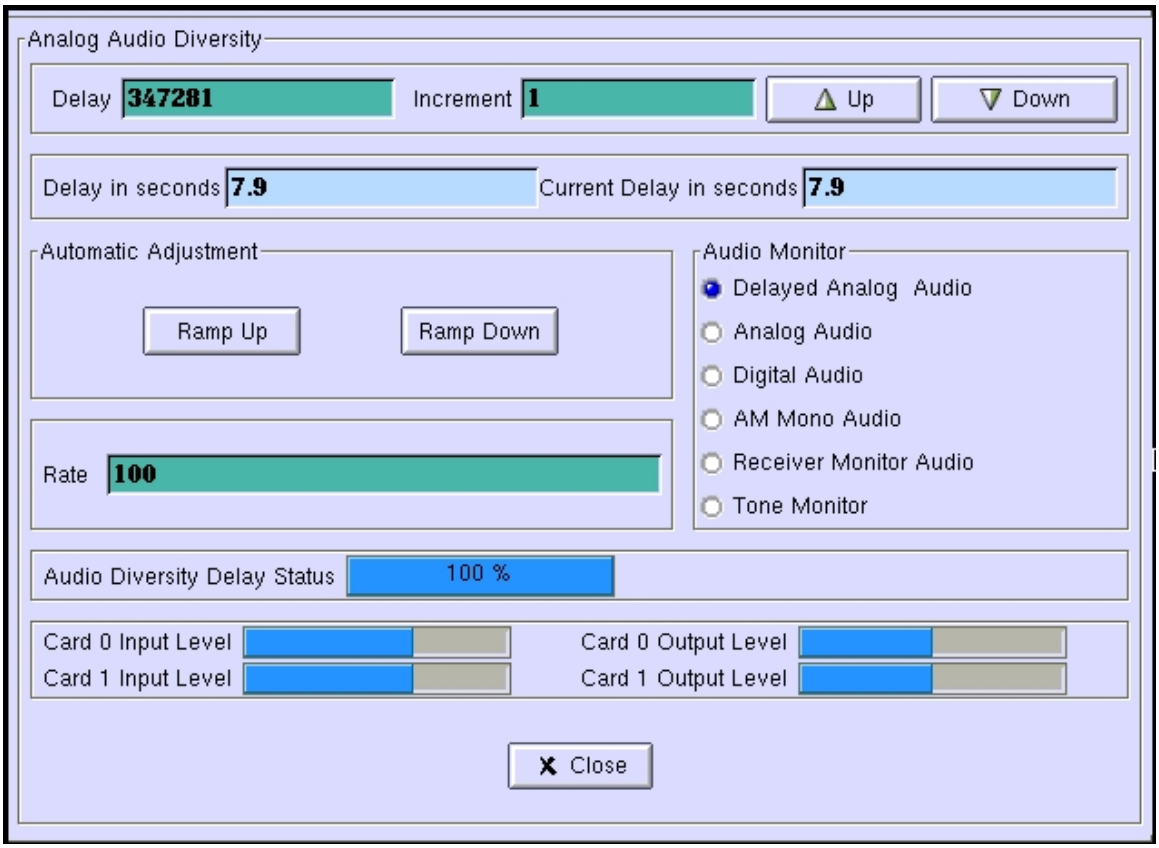

Figure 7-2 Analog Audio Diversity Screen

2. Please record any other parameters or settings that you may have adjusted from the default settings such as Station Call Sign. _____
   _____
   _____

3. Open CD ROM drive on back of FSi 10 (push button on CD tray) and place BE software CD in tray.
4. Ensure the CD is snapped onto spindle of CD ROM drive.
5. Press **OS Restart** on **Shutdown** menu and then **OK**.

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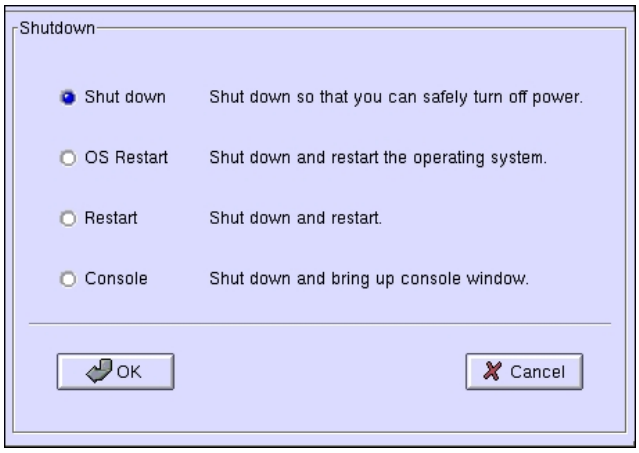

Figure 7-3 Shutdown Screen

6. The FSi 10 should automatically start reboot process.
7. Software will automatically load in about 15 minutes.
8. CD will automatically eject when finished.
9. Exciter will automatically reboot and start up the exciter program. This will take approximately 5 minutes.
10. In the FSi 10/FXi system the frequency is controlled by the FXi. No frequency is entered into the FSi 10.
11. Unit should be running with no errors (errors show in red) on the System Status Log screen. If errors show up, please try to reinstall again starting at step 5. If errors persist, please call BE Customer Service. Green warnings are OK.

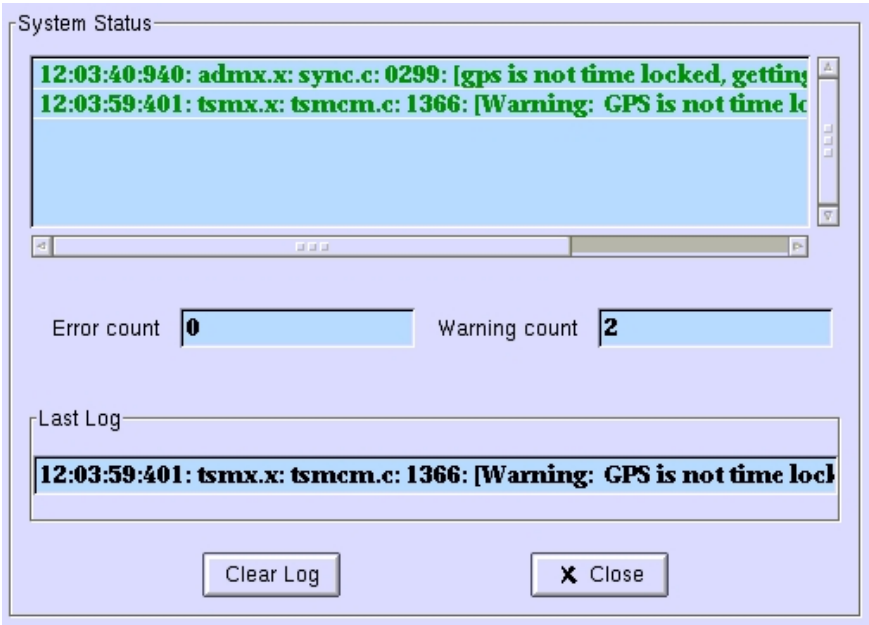

Figure 7-4 System Status Screen

1. Re-input values previously recorded.

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If alarm display is flashing red, this is generally due to GPS not being locked. To eliminate the flashing alarm display press the "**Station Interface**" on the **Station** Tab.

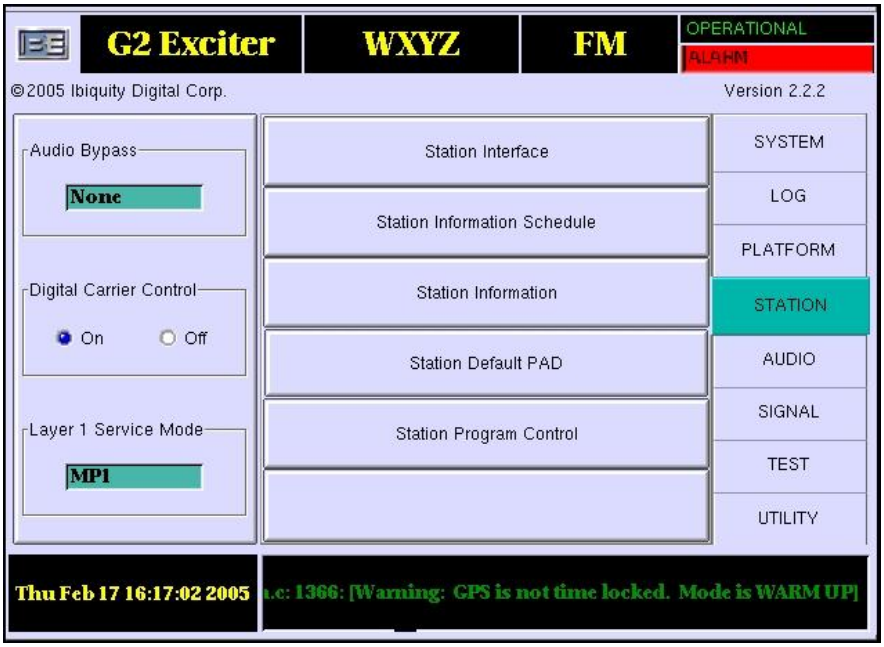

Figure 7-5 Main Screen Station Tab

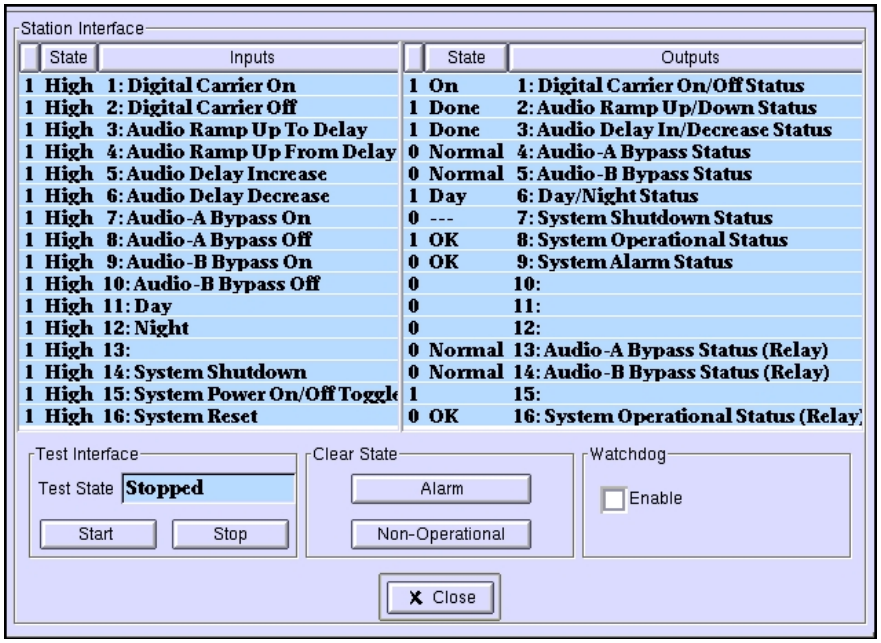

Figure 7-6 Station Interface

1. Press "Clear State - **Alarm**". The flashing red Alarm will display "No Alarm".

1. Transmitter is ready to be turned on.
2. Remove CD and close tray.

7.2 Touch Screen Configuration

The iBiquity Linux OS supports 3 touch screen configurations within the Mother Board 4 configuration (MB4 - Intel G4S600-B 865G ATX):

1) OmniVision touch screen (DEFAULT)
2) 3M Dynapro touch screen with 3M touch driver for 3M part RES4-232-BRD controller (old controller)
3) 3M Dynapro touch screen with TouchWare driver for SC402S serial controller (new controller)
Notes:
iBiquity Linux OS 6.8 was the 1st OS that supports MB4 with only configuration #1 listed above.
iBiquity Linux OS 7.0 added support for configuration #2 listed above.
iBiquity Linux OS 7.2 added support for configuration #3 listed above.

Upon OS installation on a MB4 configuration, the touch screen configuration will have to be manually configured if the configuration is not #1 listed above to ensure the pointer on the touch screen is tracking properly. This consists of configuring the correct Linux OS kernel driver and associated 'X' Windows configuration file. A "touch-screen-test.sh" script is available to manually test the configurations above. Once the settings have been verified, no further configuration will be necessary since the configuration settings will be save to the local hard drive and persist thru future iBiquity Linux OS upgrades. Only a hard drive change, or change to the actual touch screen/controller configuration will require this process to be performed again.

To properly configure the touch screen configuration:

1) Log in using user name and password (root/password). This must be done in console mode, with no application running (which is the default configuration upon a new iBiquity Linux OS install).
2) Enter: >> touch-screen-test.sh
3) Follow the on screen directions. This script will loop thru the above 3 configurations, setting up the proper touch screen configuration, enter 'X' Windows, and ask the user to test the touch screen and see if the cursor follows manual touches.
If so, the test ends, and the configuration has been saved.
If the cursor does not follow the manual touches, the next touch screen configuration is entered, and the manual touch screen test continues (until a successful configuration is found).

If the configuration is known, the "touch-screen-test.sh" script can be used to directly configure the touch screen:

1) Log in using user name and password (root/password). This must be done in console mode,with no application running (which is the default configuration upon a new iBiquity Linux OS install).
2) Configure the touch screen directly:
    a. For the default OmniVision touch screen:

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>> touch-screen-test.sh -default

b. For the 3M Dynapro touch screen with 3M touch driver (old controller):

>> touch-screen-test.sh -3Mmmm

c. For the 3M Dynapro touch screen with 3M TouchWare driver (new controller):

>> touch-screen-test.sh -3Mtwd

In addition, for the 3M Dynapro touch screen with 3M TouchWare driver (new controller), a calibration utility is available:

1) Log in using user name and password (root/password). This must be done in console mode, with no application running (which is the default configuration upon a new iBiquity Linux OS install).
2) Execute the calibration utility:

>> touch-screen-test.sh -3Mtwdcalibrate

Follow the onscreen directions which consist of touching 2 target areas within the "X" Windows
System to calibrate the pointer tracking device.

The following command provides addition help for this script: >> touch-screen-test.sh -h

7.3 Operational Software Upgrade From CDROM

Obtain the proper version and place the CD into the rear CDROM. Login to the exciter as root and type:

farmer –cdrom –f

When prompted, enter the mode (*tx*) and select the proper load. If the load does not match the OS (Kernel), a warning is displayed. The warning can be ignored and the load continued. Carefully select the appropriate OS on boot up (see paragraph 4.1.1).

To eject the CD type: *eject*

7.4 Operational Software Upgrade From iBiquity Network

Login to the exciter as root and type:

farmer

When prompted, enter the mode (*tx*) and select the proper load. If the farmer detects that the load does not match the OS(Kernel), a warning will appear. The warning can be ignored and the load continued.

Carefully select the appropriate OS on boot up (see paragraph 4.1.1).

7.5 File Transfer (Waveform files) from CDROM

Login to the exciter as root.

Insert CD into the drive then mount the CDROM

Type: mount /dev/cdrom /mnt/cdrom

To mount the data partition of the drive:

Type: mount /mnt/data skip if application is running.

Files can now be copied example: cp /mnt/cdrom/filename.ext /mnt/data/*

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8 AES Bypass Configuration

8.1 Introduction

In the FSi 10/FXi 60/250 system used to generate the HD (IBOC) signal, audio is routed through both the FXi and FSi components before being applied to the Main FM transmitter. This is done to provide delay synchronization of the Analog and Digital Audio AES audio streams. The process of creating the HD signal takes approximately 9 secs, so the Analog FM signal must be delayed to create synchronization of the HD and Analog FM signals at the HD radio receiver. The failure of one of either the FSi or FXi could cause the Main FM transmitter to not have audio applied. With the addition of an external AES router and AES distribution Amp, the FSi 10/FXi 60/250 HD (IBOC) generation system can be bypassed to ensure audio continues to be delivered to the main Analog FM transmitter. The AES router in this system is controlled by software in the FXi to act upon any serious errors that occur in either the FXi or FSi. If either unit fails, the AES Router will be switched to the bypass mode so that the audio to the main FM transmitter will not be going through the FXi (IBOC card sample rate converter) or the FSi (audio delay function).

Please Note: When a fault occurs and the bypass becomes active there will be an abrupt loss of ~9 seconds of audio on the main Analog FM transmitter because the signal being applied is no longer being delayed by the FSi 10.

Most faults are latched in the FXi and the AES Bypass System will not switch back unless the Fault is manually cleared in the FXi. This can be done remotely by using the external Fault reset on J3-13 of the FXi or locally using the Diagnostics Fault Reset button. Similarly the FSi 10 can be remotely reset, which if it restarts correctly will cause the AES bypass A to be turned off and audio routed through the FSi/FXi HD system normally.

The Audio Bypass A switch will simulate what occurs when the FSi-10 indicates it has faulted, thus forcing an AES bypass to occur. Select Audio Bypass A On and then OK and the external AES router will bypass the HD system. Select Audio Bypass Off and then OK and the external AES router will then reroute the audio through the HD system.

8.2 AES Bypass Part Numbers

Three different versions of the AES Bypass system are available depending on the type of Audio Processing used in the system. These are:

979-0552 …KIT, HD, AES BYPASS SYS., DUAL, DMS-III

979-0552-001 ... KIT, HD, AES BYPASS SYS., OMNIA, DMS-III

979-0552-002 ... KIT, HD, AES BYPASS SYS., ORBAN, DMS-III

The first is the more generic system using two separate processors, one for the HD AES and one for the Analog FM AES. The next two are systems for specific single input processors that provide two outputs that are processed optimally for HD and Analog FM. They differ in the way the External AES synchronization inputs are connected. If your system is configured differently than these please call BE Customer Service to discuss your options.

The following pages describe the bypass system interconnect.

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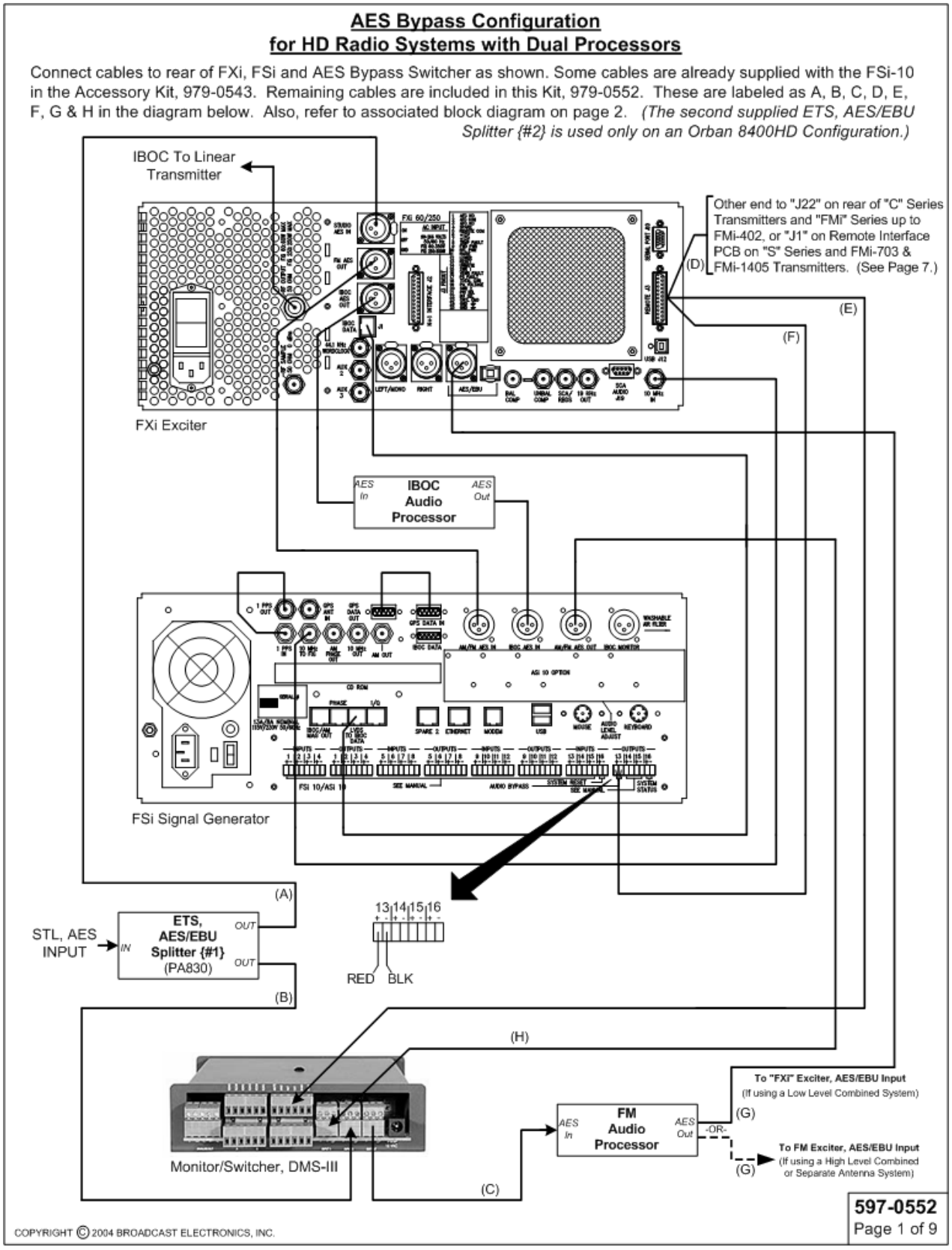
8.3 AES Bypass System Configuration, Dual Processor



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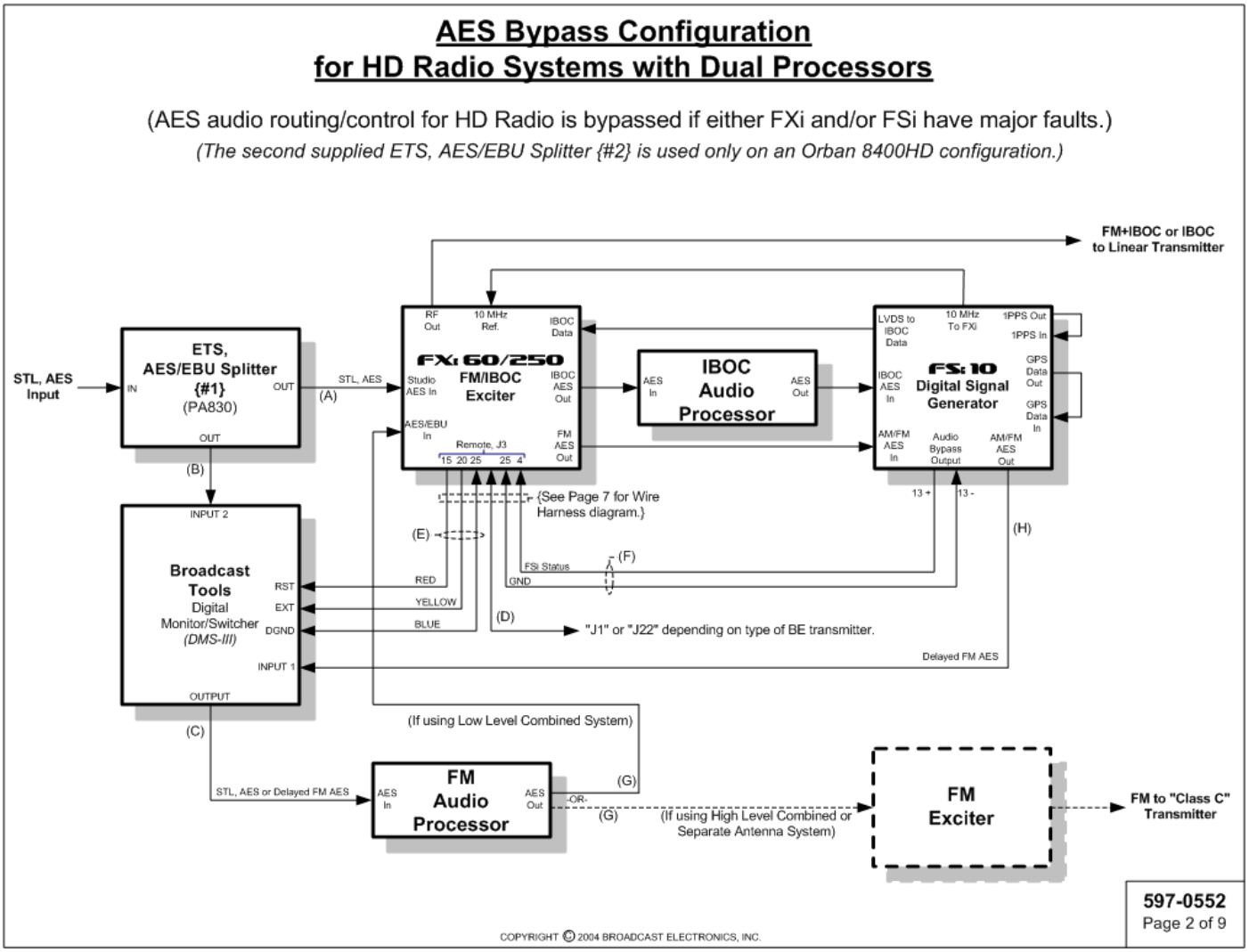
8.4 AES Bypass System, Dual Processor, Block Diagram



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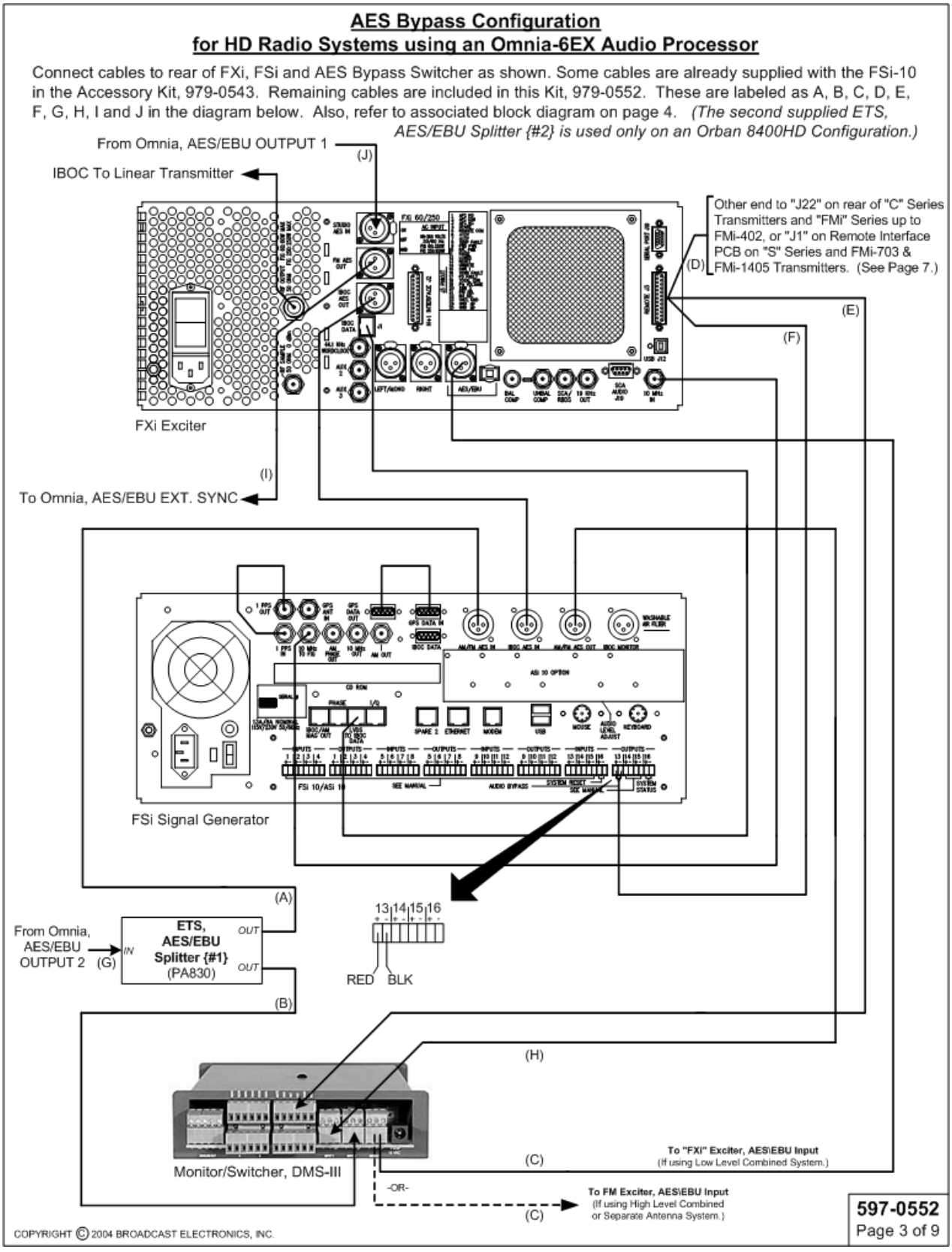
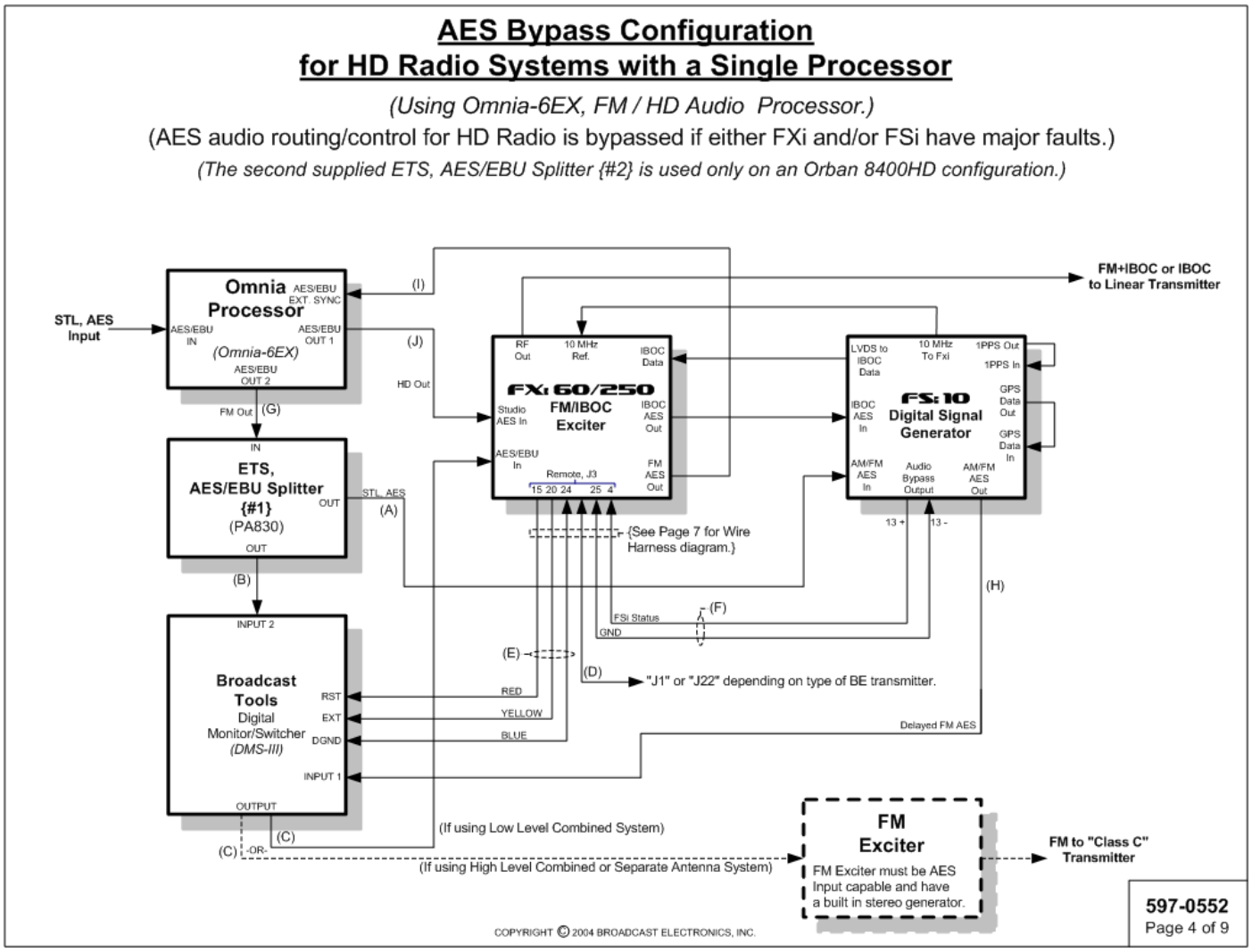
8.5 AES Bypass System Configuration, Single Processor - Omnia-6EX



8.6 AES Bypass System, Single Processor, Block Diagram – Omnia 6EX



8.7 AES Bypass System Configuration, Single Processor - Orban 8400HD

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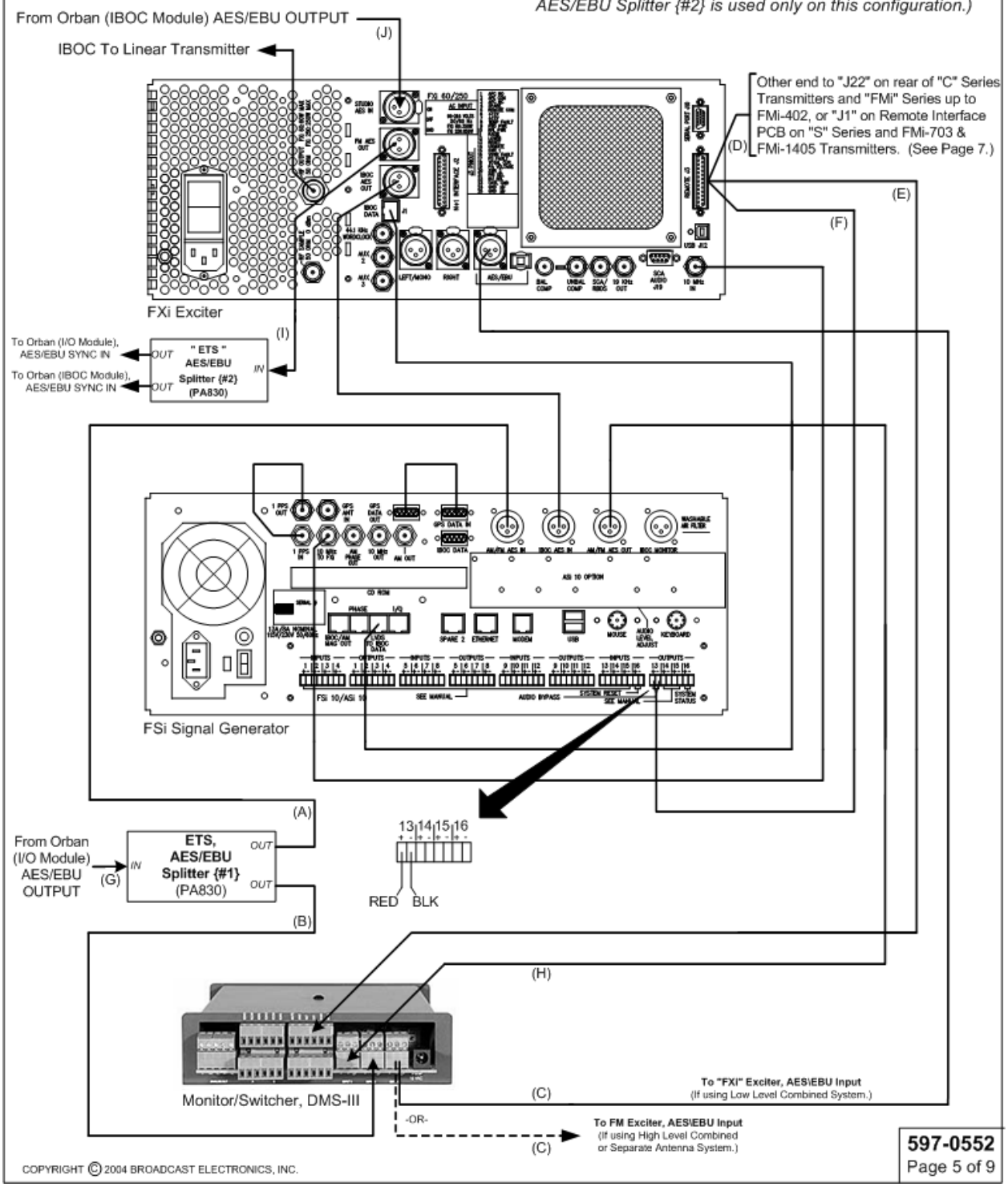
AES Bypass Configuration
for HD Radio Systems using an Orban, 8400HD Audio Processor

Connect cables to rear of FXi, FSi and AES Bypass Switcher as shown. Some cables are already supplied with the FSi-10 in the Accessory Kit, 979-0543. Remaining cables are included in this Kit, 979-0552. These are labeled as A, B, C, D, E, F, G, H, I and J in the diagram below. Also, refer to associated block diagram on page 6. *(The second supplied ETS, AES/EBU Splitter {#2} is used only on this configuration.)*



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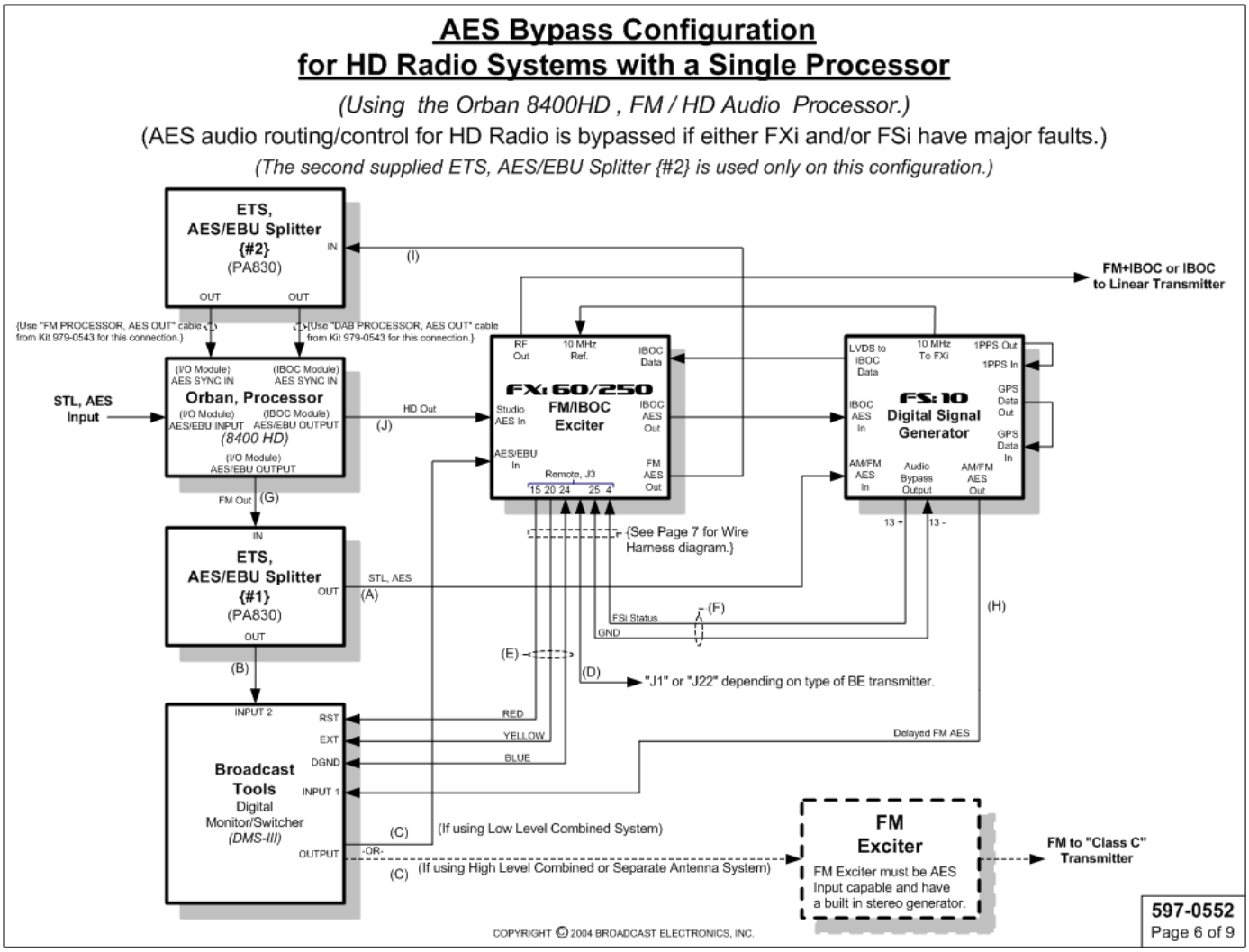
597-0552
Page 5 of 9

8.8 AES Bypass System, Single Processor, Block Diagram – Orban 8400HD



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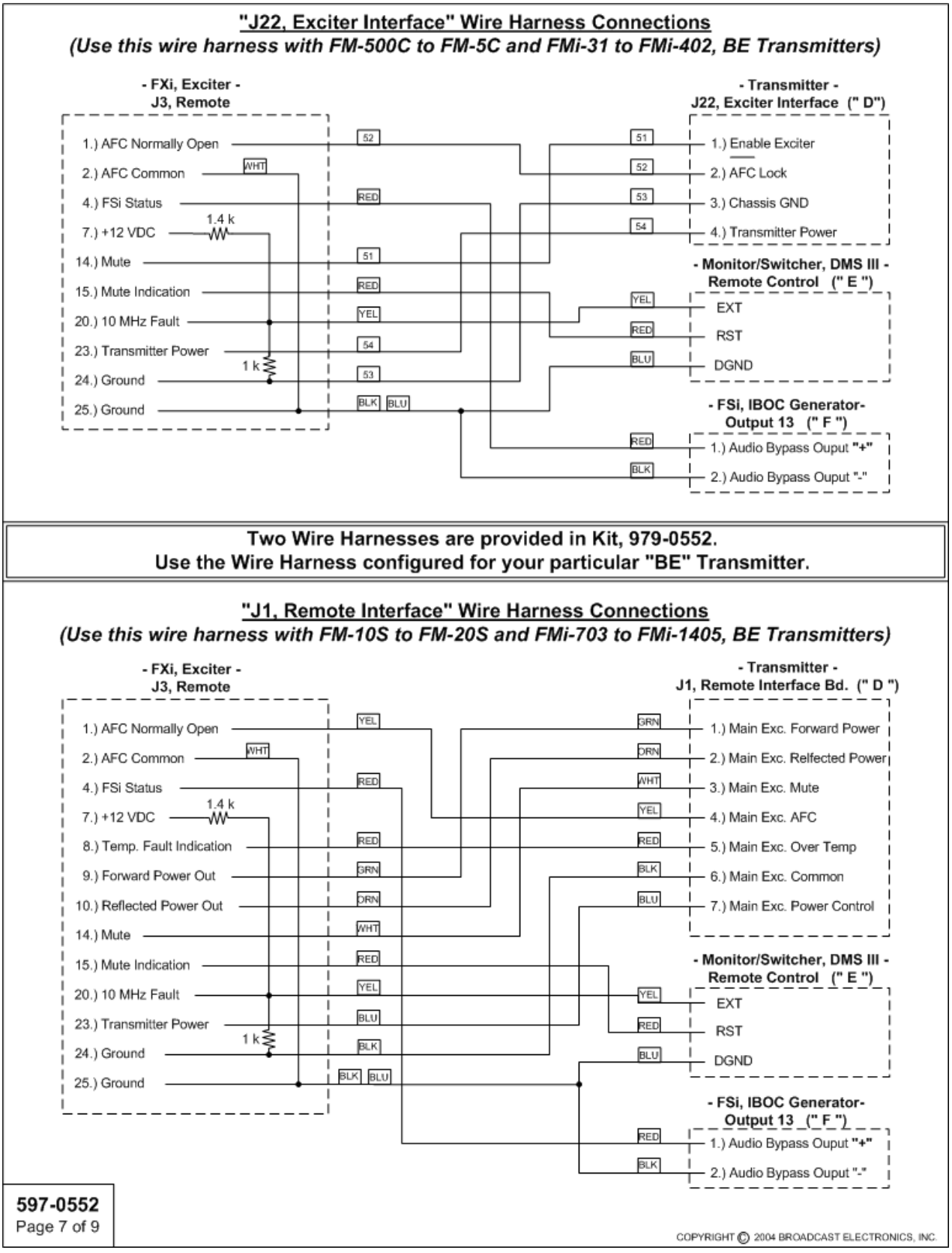
8.9 AES Bypass System, Wire Harness Connections



8.10 AES Bypass System, Wiring List

AES Bypass Configuration for HD Radio Systems with "Dual Processors" *"Wiring List"*		
CABLE	**FROM**	**TO**
" A "	ETS, PA830, #1, AES/EBU Splitter "In"	FXi, Exciter "Studio AES In"
" B "	ETS, PA830, #1, AES/EBU Splitter "In"	DMS-III, Monitor/Switcher "Input 2"
" C "	DMS-III, Monitor/Switcher "Output"	FM Audio Processor "AES/EBU Input"
" D " (Two Wire Harnesses are provided. Use the Wire Harness configured for your particular "BE" Transmitter. See Page 7.)	FXi, Exciter "Remote J3"	"J22" on rear of "C" Series Transmitters and "FMi" Series to FMi-402, or "J1" on Remote Interface PCB on "S" Series and FMi-703 & FMi-1405 Transmitters.
" E "	FXi, Exciter "Remote J3"	DMS-III, Monitor/Switcher (See Page 7)
" F "	FXi, Exciter "Remote J3"	FSi, Signal Generator "Output 13"
" G " (Low Level Combined System) (High Level Combined or Separate Antenna Sys.)	FM Audio Processor, "AES/EBU Output"	FXi, Exciter "AES/EBU In" FM Exciter "AES/EBU Input"
" H "	FSi, Signal Generator "AM/FM AES Out"	DMS-III, Monitor/Switcher "Input 1"
"FM, AES Out, FXi" to "FM, Processor, AES In"	FXi, Exciter "FM AES Out"	FSi, Signal Generator "AM/FM AES In"
"IBOC AES, Out FXi" to "DAB, Processor, AES In"	FXi, Exciter "IBOC AES Out"	IBOC Audio Processor "AES/EBU Input"
"DAB, Processor, AES Out" to "IBOC, AES In, FSi"	IBOC Audio Processor "AES/EBU Output"	FSi, Signal Generator "IBOC AES In"
"LVDS, FSi" to "IBOC Data, FXi"	FSi, Signal Generator "LVDS to IBOC Data"	FXi, Exciter "IBOC Data"
"FSi, 10MHz, to FXi" to "10 MHz Ref, FXi"	FSi, Signal Generator "10 MHz Out"	FXi, Exciter "10 MHz Reference"
"GPS Data"	FSi, Signal Generator "GPS Data Out"	FSi, Signal Generator "GPS Data In"
"1 PPS"	FSi, Signal Generator "1 PPS Out"	FSi, Signal Generator "1 PPS In"

AES Bypass Configuration for HD Radio Systems using an "Omnia-6EX Processor" *"Wiring List"*		
CABLE	**FROM**	**TO**
" A "	ETS, PA830, #1, AES/EBU Splitter "Out"	FSi, Signal Generator "AM/FM AES In"
" B "	ETS, PA830, #1, AES/EBU Splitter "Out"	DMS-III, Monitor/Switcher "Input 2"
" C " (Low Level Combined System) (High Level Combined or Separate Antenna Sys.)	DMS-III, Monitor/Switcher "Output"	FXi, Exciter "AES/EBU In" FM Exciter, AES/EBU Input
" D " (Two Wire Harnesses are provided. Use the Wire Harness configured for your particular "BE" Transmitter. See Page 7.)	FXi, Exciter "Remote J3"	"J22" on rear of "C" Series Transmitters and "FMi" Series to FMi-402, or "J1" on Remote Interface PCB on "S" Series and FMi-703 & FMi-1405 Transmitters.
" E "	FXi, Exciter "Remote J3"	DMS-III, Monitor/Switcher (See Page 7)
" F "	FXi, Exciter "Remote J3"	FSi, Signal Generator "Output 13"
" G "	Omnia "AES/EBU Output 2"	ETS, PA830, #1, AES/EBU Splitter "In"
" H "	FSi, Signal Generator "AM/FM AES Out"	DMS-III, Monitor/Switcher "Input 1"
" I "	FXi, Exciter "FM AES Out"	Omnia, "AES/EBU EXT. SYNC"
" J "	Omnia "AES/EBU Output 1"	FXi, Exciter "Studio AES In"
"IBOC AES, Out FXi" to "DAB, Processor, AES In"	FXi, Exciter "IBOC AES Out"	FSi, Signal Generator "IBOC AES In"
"LVDS, FSi" to "IBOC Data, FXi"	FSi, Signal Generator "LVDS to IBOC Data"	FXi, Exciter "IBOC Data"
"FSi, 10MHz, to FXi" to "10 MHz Ref, FXi"	FSi, Signal Generator "10 MHz To FXi"	FXi, Exciter "10 MHz Reference"
"GPS Data"	FSi, Signal Generator "GPS Data Out"	FSi, Signal Generator "GPS Data In"
"1 PPS"	FSi, Signal Generator "1 PPS Out"	FSi, Signal Generator "1 PPS In"

AES Bypass Configuration for HD Radio Systems using an "Orban, 8400HD Processor" *"Wiring List"*		
CABLE	**FROM**	**TO**
" A "	ETS, PA830, #1, AES/EBU Splitter "Out"	FSi, Signal Generator "AM/FM AES In"
" B "	ETS, PA830, #1, AES/EBU Splitter "Out"	DMS-III, Monitor/Switcher "Input 2"
" C " (Low Level Combined System) (High Level Combined or Separate Antenna Sys.)	DMS-III, Monitor/Switcher "Output"	FXi, Exciter "AES/EBU In" FM Exciter, AES/EBU Input
" D " (Two Wire Harnesses are provided. Use the Wire Harness configured for your particular "BE" Transmitter. See Page 7.)	FXi, Exciter "Remote J3"	"J22" on rear of "C" Series Transmitters and "FMi" Series to FMi-402, or "J1" on Remote Interface PCB on "S" Series and FMi-703 & FMi-1405 Transmitters.
" E "	FXi, Exciter "Remote J3"	DMS-III, Monitor/Switcher (See Page 7)
" F "	FXi, Exciter "Remote J3"	FSi, Signal Generator "Output 13"
" G "	Orban (I/O Module) "AES/EBU Output"	ETS, PA830, #1, AES/EBU Splitter "In"
" H "	FSi, Signal Generator "AM/FM AES Out"	DMS-III, Monitor/Switcher "Input 1"
" I "	FXi, Exciter "FM AES Out"	ETS, PA830, #2, AES/EBU Splitter "In"
" J "	Orban (IBOC Module) "AES/EBU Output"	FXi, Exciter "Studio AES In"
"FM, AES Out, FXi" to "FM, Processor, AES In"	ETS, PA830, #2, AES/EBU Splitter "Out"	Orban (I/O Module) "AES/EBU SYNC IN"
"DAB, Processor, AES Out" to "IBOC, AES In, FSi"	ETS, PA830, #2, AES/EBU Splitter "Out"	Orban (IBOC Module) "AES/EBU SYNC IN"
"IBOC AES, Out FXi" to "DAB, Processor, AES In"	FXi, Exciter "IBOC AES Out"	FSi, Signal Generator "IBOC AES In"
"LVDS, FSi" to "IBOC Data, FXi"	FSi, Signal Generator "LVDS to IBOC Data"	FXi, Exciter "IBOC Data"
"FSi, 10MHz, to FXi" to "10 MHz Ref, FXi"	FSi, Signal Generator "10 MHz To FXi"	FXi, Exciter "10 MHz Reference"
"GPS Data"	FSi, Signal Generator "GPS Data Out"	FSi, Signal Generator "GPS Data In"
"1 PPS"	FSi, Signal Generator "1 PPS Out"	FSi, Signal Generator "1 PPS In"

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8.11 AES Bypass System, Notes

NOTE:
If it is desired to monitor for digital errors only and to defeat the analog silence sense alarm, set SW2-7 to the "ON" position. The analog silence sense feature may cause the DMS-III to switch to the bypass mode when the silence's between program material is detected.

If you choose to set the Time Delay for bypass switchover to zero seconds, move SW2-6 to "OFF" and all SW1 switches to "OFF".

See the Broadcast Tools, DMS-III manual for more configuration details.

Broadcast Tools DMS-III, Switch and Jumper Setup : (As Configured At Broadcast Electronics, Inc.)
JP-3 … Removed. (Buzzer Disabled)
JP-6 … Input One set to 110 Ohm Termination.
JP-7 … Input Two set to 110 Ohm Termination.
SW1 … All Switches to "OFF".
SW2 … SW2-7 to "ON", All Other Switches to "OFF".

PAGE 9 of 9

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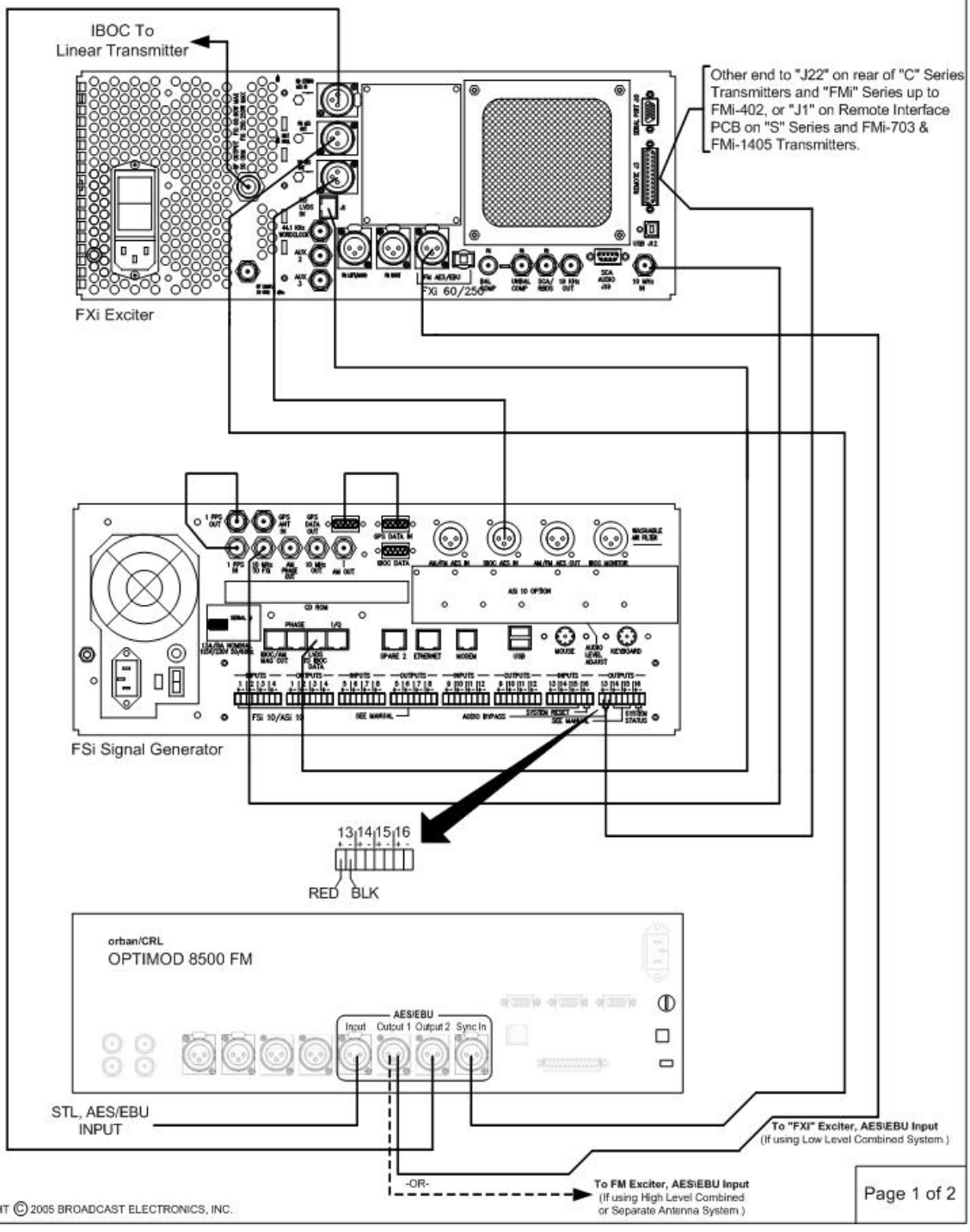
8.12 AES Bypass System Configuration, Single Processor - Orban 8500FM

AES Bypass Configuration
for HD Radio Systems using an Orban, 8500FM Audio Processor

Connect cables to rear of FXi, FSi and Orban 8500FM as shown. Some cables are already supplied with the FSi-10 in the Accessory Kit, 979-0543. Also, refer to associated block diagram on page 2.



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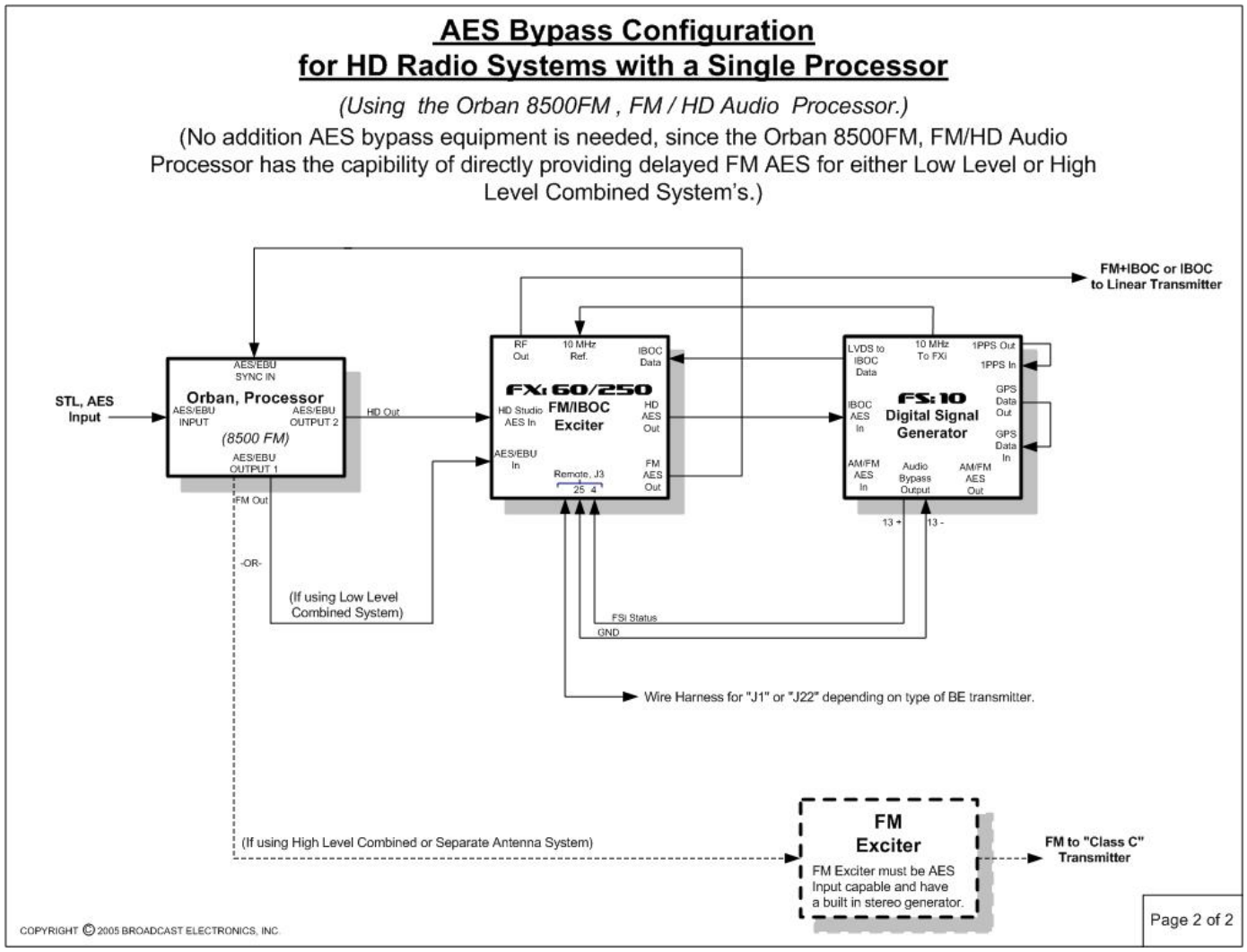
Page 1 of 2

8.13 AES Bypass System, Single Processor, Block Diagram – Orban 8500FM



9 RF TECHNICAL SERVICES CONTACT INFORMATION

RF Technical Service -

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E-Mail: **rfservice@bdcast.com**
Fax: **(217) 224-6528**
web**:** **www.bdcast.com**

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10 BE Part Numbers

This section provides parts lists for the FSI-10 IBOC Digital Signal Generator. The parts lists provide descriptions and part numbers of electrical components, assemblies, and selected mechanical parts required for maintenance. Each parts list entry in this section is indexed by reference designators appearing on the applicable schematic diagrams.

This bill of material uses an indented structure to show relationships of parts into sub assemblies. Example; all BOM LEVEL 2 parts are contained in the BOM LEVEL 1 part immediately above it.

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	909-6025-MB3	FSi-10,HD,DIGITAL SIGNAL GENERATOR,MB3		
..1	229-8085-003	IC,CPU,P4,3.0GHz FSB,FSi/ASi/XPi	1	
..1	380-0310	FAN,12v,150 CFM	1	
..1	380-4831	FAN,CPU COOLER & HEATSINK,INTEL P4	1	
..1	400-1725	STRIP,QUIET SHIELD,17.25x.394	1.08	
..1	401-0015	MTG,ADH BACK,SMS-A-15-PANDUIT	1	
..1	402-0000	TY-RAP	18	
..1	402-0005	PRESS CLIP,NYLON W/ADHESIVE BACK	4	
..1	402-0006	MT,ADH BACKED,FOR CBL TIES	7	
..1	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	3	
..1	402-0047	TY-WRAP, 14.6 LOOP, 40LBS, BLACK	1	
..1	402-0051	TY-RAP, W/FLAG	8	
..1	403-0008	BUMPER, RUBBER, RECESS STYLE, 11/32 TALL"	3	
..1	407-0176	FILTER, AIR, ELECTROMAZE ESF 5.500 X 8.500 X .25	1	
..1	409-5500	CARD GUIDE,BIVAR VERT-O-GUIDE VG3-6	1	
..1	410-0101-001	DISPLAY, COLOR LCD, FLAT PANEL, TOUCH SCREEN,XPi/ASi/FSi DSG	1	
..1	417-0017	RECP,BNC,BULKHEAD,UG-492A/U	1	
..1	417-0115	CONN,BNC TEE JACK-PLUG-JACK	1	
..1	417-0608	CONN, BNC, STRAIGHT, P-P	1	
..1	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	3	
..1	420-2104	SCREW,2-56X.250,S.S. PH SC	8	
..1	420-2704	SCREW,M2 X 4,PHILLIPS PAN HEAD,SS	4	
..1	420-3710	SCREW,M3 X 10,PHILLIPS PAN HEAD,SS	8	
..1	420-4103	SCREW,4-40X.187,S.S. PH	6	
..1	420-4105	SCREW,4-40X.312,S.S. PH	4	
..1	420-6002	SCREW,6-32X.437,S.S. PH FH UC	1	
..1	420-6112	SCREW,6-32X.750,S.S. PH	1	
..1	420-6514	SCREW,6-32X.875,S.S. PH FH	4	
..1	420-6605	SCREW,6-32X.312,S.S. PH FH UC	13	
..1	421-0102	10-32 KEP NUT	1	
..1	421-1113	RIV,CLOSED-END .125 X .316L	2	
..1	421-4008	4-40 KEP NUT	17	
..1	421-6005	6-32 ELASTIC STOP HEX NUT	5	
..1	421-6011	6-32 S.S. HEX THICK NUT	1	
..1	421-8028	NUT,JAM,1/2-28 UNEF-2B	5	
..1	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	75	

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	422-6107	SCREW,SEMS 6-32 X 7/16 PAN PH.ST."	12	
..1	423-2002	#2 LOCK SPLIT	20	
..1	423-4002	#4 LOCK S.S. SPLIT	14	
..1	423-6006	#6 FLAT, 0.75 O.D, 0.140 I.D., 0.062 THK, SST	4	
..1	423-6011	#6 FLAT .310 X .160 X .030	4	
..1	423-9002	WASH,INT TOOTH,1/2	5	
..1	441-0000	STOFF, #2-56 X .25 L, 5/32 HEX, MF, SST"	4	
..1	441-5402	STOFF,#4-40 ALUM 3/16HEX X 3/4"LONG"	6	
..1	453-0027	BRKT, SERIAL CARD, FSI-10	1	
..1	471-5333	ANGLE,FRONT PANEL MOUNT,DTC EXCITER	2	
..1	471-5336-100	PANEL,FRONT,NEW PCB,DIGITAL SIGNAL GENERATOR	1	
..1	471-5337-200	CHASSIS,NEW,DIGITAL SIGNAL GENERATOR	1	
..1	471-5338-001	PANEL,REAR,DIGITAL SIGNAL GENERATOR,FSi10/XPi10	1	
....2	471-5338-009	PANEL,REAR,DIGITAL SIGNAL GENERATOR,UNSCREENED	1	
..1	471-5339-200	COVER,NEW,TOP,DIGITAL SIGNAL GENERATOR	1	
..1	471-5340	ANGLE,PCB MOUNT,DIGITAL SIGNAL GENERATOR	4	
..1	471-5341-200	BRACE,NEW,PCB SUPPORT,DIGITAL SIGNAL GENERATOR	1	
..1	471-5343	BRACKET, CD-ROM, DIGITAL SIGNAL GENERATOR	1	
..1	471-5344	FILLER, REAR, DIGITAL SIGNAL GENERATOR	1	
..1	471-5453	ANGLE,DAUGHTER CARD BRACE SUPPORT,FSi10/ASi10/XPi10	1	
..1	500-210	Screw,SEMS 4-40x1/4 Phil Pan Head MS Blk Zinc(external lock)	22	
..1	586-149	9 inch Phone Jumper (SBCM)	1	
....2	550-279	Connector,Line Plug 6 Pos 4 Conn Adamtech #ADTMTP6-4-U	2	
....2	580-154	Cable,26 AWG/4C Silver Satin #M264SS	0.75	
..1	591-0035	NAMEPLATE,FSi10,DIGITAL SIGNAL GENERATOR	1	
..1	591-0036	LABEL,POWER,DTC EXCITER	1	
..1	591-0038	LABEL,GPS LOCK,DIGITAL SIGNAL GENERATOR	1	
..1	594-0073	LABEL,WARNING ROTATING FANS	2	
..1	594-0503	LABEL, DANGER-HAZARDOUS VOLTAGE	1	
..1	594-0505	LABEL, WARNING-ONLY AUTHORIZED PERSONNEL	1	
..1	611-1501	TUB,HT SHK,1-1/2ID,BLACK"	1	
..1	700-0148	TAPE,JOINING 3/4	0.001	
..1	849-0680	CBL, ASSY, COAX 18, OSX RT-OSX STRAIT"	3	
..1	849-0681	CBL, ASSY, COAX 18, OSX RT-BNC"	1	
..1	849-0682	CABLE, USB, 20 INCH	2	

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	849-0683	CABLE, VGA, HDDB15M TO HDDB15M, 2 FOOT	1	
..1	849-6027	POWER SUPPLY CABLE MOLEX 4 PIN MALE TO FLOPPY DRIVE FEMALE	1	
..1	919-0548-001	PCB,ASSY,DIGITAL UPCONVERTER,FM-IBOC,DSG,MB2.5 (SBCM)	1	
....2	007-0018-006	CAP,0603,18pF,50V,5%	1	C219
....2	007-0150-006	CAP,150pF,50v,5%,0603	2	C300, C304
....2	007-0207-006	CAP,0.27uF,6.3v,10%,0603	1	C292
....2	007-1034-001	CAP,CER,.01UF,10%,50V,0603,SMD	23	C39, C337, C338, C339, C340, C341, C342, C343, C344, C345, C346, C347, C348, C349, C350, C351, C352, C353, C354, C355, C356, C357, C358
....2	007-1040-025	CAP,CER,.1UF,+80,-20%,25V,0603,SMD	149	C12, C23, C32, C33, C40, C44, C45, C46, C47, C50, C51, C52, C75, C76, C77, C80, C82, C84, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100, C101, C102, C104, C107, C108, C109, C110, C111, C112, C113, C115, C116, C123, C124, C127, C128, C131, C133, C134, C137, C139, C140, C143, C144, C
....2	007-1054-002	CAP,CER,1000PF,+80,-20%,50V,0603,SMD	2	C385, C386
....2	007-3003-006	CAP,0.033uF,25v,10%,0603	2	C297, C301
....2	007-4700-501	CAP,CER,4.7NF,10%,50V,0603,SMD	2	C298, C302
....2	009-0010-001	CAP,10uF,6.3v,20%,ELECTROLYTIC,D	14	C242, C244, C246, C256, C328, C329, C330, C331, C333, C334, C335, C336, C382, C383
....2	009-0100-001	CAP,100uF,16v,20%,ELECTROLYTIC,E	2	C320, C327
....2	009-0202	CAP,TANALUM CHIP,100UF,POLAR,10%,6V,SMD	9	C311, C312, C313, C315, C316, C317, C318, C319, C322
....2	009-0303-001	CAP,3.3uF,50v,20%,B,ELECTROLYTIC	18	C241, C243, C245, C247, C248, C249, C250, C251, C252, C253, C254, C255, C258, C276, C314, C321, C323, C324
....2	009-0407-001	CAP,4.7uF,12.5v,20%,ELECTROLYTIC,D	1	C306

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	104-0000	RES,CHIP,0 OHM JUMPER,0603,SMD	2	R161, R198
....2	104-0027	RESISTOR,27.4ohm,1%,1/16W,SMD,0603	4	R12, R15, R23, R26
....2	104-0051	RESISTOR,51.1ohm1%,1/16W,SMD,0603	11	R72, R128, R141, R144, R149, R153, R158, R168, R171, R172, R173,
....2	104-0220	RESISTOR,221ohm,1/16W,SMD,0603	4	R10, R14, R21, R25
....2	104-0820	RESISTOR,825ohm,1%,1/16W,SMD,0603	1	R73
....2	104-1001	RES,CHIP,1.0 K OHM,1%,1/16W,0603,SMD	3	R145, R154, R38
....2	104-1002	RES,CHIP,10.0 K OHM,1%,1/16W,0603,SMD	3	R112, R114, R197
....2	104-1201	resistor,1.21Kohm1/16W,1%,SMD,0603	9	R31, R66, R69, R70, R140, R151, R164, R165, R166
....2	104-1802	RESISTOR,1.82Kohm1/16W,1%,SMD,0603	8	R67, R68, R71, R86, R87, R88, R89, R185
....2	104-2000	RESISTOR,2Kohm,1/16W,1%,SMD,0603	5	R74, R142, R143, R150, R152
....2	104-3301	RES,CHIP,3.32Kohm,1%,1/16W,0603,SMD	1	R184
....2	104-3901	RESISTOR,3.92Kohm1%,1/16W,SMD,0603	2	R16, R125
....2	104-5105	RESISTOR,5.1M,5%,1/10W,SMD,0603	1	R32
....2	104-5600	RES,CHIP,562 OHM,1%,1/16W,0603,SMD	6	R11, R22, R121, R123, R139, R148
....2	104-8202	RESISTOR,82.5K,1%,1/16W,SMD,0603	1	R162
....2	198-0203	TRMR, 20K OHMS, SINGLE TURN, TOP ADJUST, SMD	1	R199
....2	216-1355	LT1355 12MHz op amp	4	U54, U55, U56, U57
....2	216-2524	IC, CGS74LCT2524M 3v Clock Driver SMD	2	U60, U61
....2	216-2524-001	IC, CGS74CT2524M Clock Driver SMD	1	U62
....2	216-3904	TSTR,MMBT3904LT1,NPN,SMD	1	Q1
....2	216-5170	IC, MC145170DT2 PLL FREQUENCY SYNTHESIZER TSSOP-16 SMD	1	U22
....2	216-6245	IC PI74LPT16245AA 16 Bit BIDIR Transcvr 48TSSOP SMD	2	U77, U78
....2	216-6531	IC, SN65LVDS31D HIGH SPEED DIFFENENTIAL LINE DRIVER SMD	1	U58
....2	216-7125	IC, NC7SZ125M5 Single Tristate Buffer SOT23	1	U80
....2	216-7409	IC, 74AC109SC Dual JK Flip Flop Pos Edge Trig SMD	1	U59
....2	216-9754	IC,AD9754ARU D/A Converter 14BIT 125MSPS SMD	2	U11, U18
....2	220-7408-001	IC, DM74LS08M,Quad 2-Input AND Gates SO14	1	U63
....2	224-1637	IC, MC74LCX16374DT 3.3v 16 Bit Register SMD	4	U9, U10, U16, U17
....2	226-0047-001	RESISTOR NETWORK,47ohm,0.5w,16 PIN,2%	4	R137, R138, R146, R147
....2	226-1002	RESISTOR NETWORK,10Kohm,16pin,50v,2.3W,SMD	10	RN1, RN2, RN6, RN7, RN8, RN9, RN10, RN11, RN12, RN13
....2	227-1521	VR, 3.3v,LT1521CST-3.3 SMD	3	U27, U43, U79

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	227-2931	VR, LM2931,5v SMD	5	U66, U67, U68, U69, U71
....2	227-2937	VR, LM2937,8v SMD	1	U70
....2	227-7955	Negative VR MC79M05BDT,-5v SMD	2	U42, U47
....2	229-0705	IC, MAX705CSA Microprocessor Supervisor SMD	1	U72
....2	229-4325	32K X 32 MEMORY, SRAM	1	U53
....2	229-9080	EEPROM PCI9080-3 PCI Interface	1	U39
....2	320-1371	LED,LNJ306G5TRW GREEN SMD	12	D1, D2, D3, D4, D5, D6, DD7, D8, D9, D10, D11, D12
....2	366-0180-001	INDUCTOR, 180nH, 10%, SMD, 1008	2	L13, L14
....2	366-1000	INDUCTOR,100uH,20%,SMD	5	L4, L5, L9, L10, L11
....2	390-5953	VCUGLA at 59.535MHz VCXO SMD	1	U24
....2	417-1023	CONN HEADER,10-PIN RT ANGLE,PCB MAL	1	JP1
....2	417-1040	HEADER 20-PIN RIGHT ANGLE	1	J36
....2	417-2284	CONN MCX RIGHT ANGLE JACK 50 OHM PCB MOUNT	6	J2, J4, J8, J38, J39, J40
....2	417-4004	CONN,HEADER,2 PIN	6	J21, J22, J23, J25, J37, J42
....2	417-4040	CONNECTOR, HEADER STRAIGHT POST	4	J13, J15, J20, J26
....2	417-5565	CONN 8-PIN MODULAR JACK RT ANGLE PCB MOUNT SHIELDED	2	J41, J43
....2	431-0800	SOCKET,8-PIN,DIP,SMD note	1	XU40
....2	453-0000	BRACKET,PC PCB,KEYSTONE 9203	1	
....2	500-210	Screw,SEMS 4-40x1/4 Phil Pan Head MS Blk Zinc(external lock)	2	
....2	519-0548	PCB, MACH, DIGITAL UPCONVERTER, DIGITAL SIGNAL GENERATOR	1	
....2	979-0548-U25	KIT,SOFTWARE,EEPROM,U25,DUC	1	U25
......3	229-7512	EEPROM EPM7512AEQC208-7 CMOS PLD	1	U25
....2	979-0548-U37	KIT,SOFTWARE,EEPROM,U37,DUC	1	U37
......3	229-7512	EEPROM EPM7512AEQC208-7 CMOS PLD	1	U37
....2	979-0548-U40	KIT,SOFTWARE,EEPROM,U40,DUC	1	U40
......3	229-9356	2048-BIT SERIAL EEPROM	1	U40
..1	919-0549	PCB, ASSY, STATION INTERFACE, FM-IBOC & AM-IBOC, DSG(SBCM)	1	
....2	007-0020-006	CAP,20pF,5%,50v,SMD,0603	2	C26, C27
....2	007-1044-025	CAP,CER,100 NFD,10%,25V,1206,SMD	13	C7, C8, C11, C13, C17, C18, C22, C23, C25, C30, C31, C33, C34
....2	007-4744-050	CAP, CER, .47UF, 50V, -20% TO +80%	3	C28, C29, C32
....2	070-0010	Cap,Lytic 10uF 16V SMD	2	C2, C35
....2	104-0039	RESISTOR,39ohm,5%,.1W,SMD,0603	1	R6
....2	104-0330	resistor,332ohm,1/8W,1%,SMD,1206	4	R20, R21, R22, R23
....2	104-1802	RESISTOR,1.82Kohm1/16W,1%,SMD,0603	4	R24, R25, R27, R28
....2	104-4701	RES,CHIP,4.75KOHM,1%,1/16W,0603,SMD	1	R18
....2	104-4701-001	RES,CHIP,4.75KOHM,1%,1/8W,1206,SMD	1	R32
....2	229-0705	IC, MAX705CSA Microprocessor Supervisor SMD	1	U5

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	229-3221	IC,RS 232 TRANSCEIVER +3V TO +5V 1uA SUPPLY-CURRENT	1	U24
....2	320-1371	LED,LNJ306G5TRW GREEN SMD	2	D1, D2
....2	340-0004	SW,JUMPER PROGRAMMABLE	5	P3, P89, P90, P94, P95
....2	390-2000	XTAL,20MHz, CYL XTAL CA-301 Type	1	Y1
....2	417-0003	CONN,HEADER 3 PIN	1	J3
....2	417-0173	CONN,PCB,40-PIN,609-4037	1	J135
....2	417-1050	.100,10 pin double row terminal strip"	3	J113, J115, J116
....2	417-2524	SHROUDED HEADER 24 POS STRAIGHT	1	JP1
....2	417-4004	CONN,HEADER,2 PIN	5	J89, J90, J94, J95, J130
....2	417-5163	Mod Jack 6-6 low profile w/stops	1	J8
....2	418-1001-001	CONN, MALE, 10 PIN, LONG LATCH, PCB MT	1	J133
....2	418-1003	CONN,PCB 10PIN(DUAL 5)	1	J2
....2	453-0000	BRACKET,PC PCB,KEYSTONE 9203	1	
....2	500-210	Screw,SEMS 4-40x1/4 Phil Pan Head MS Blk Zinc(external lock)	2	
....2	519-0549	PCB, MACH, STATION INTERFACE, FM-IBOC & AM-IBOC, DSG	1	
....2	979-0549-U11	KIT,SOFTWARE,CPLD,U11,SIC	1	U11
.....3	229-4192	HIGH PERFORMANCE E*CMOS	1	U11
....2	979-0549-U4	KIT,SOFTWARE,EEPROM,U4,SIC	1	U4
.....3	229-0877	IC,EEPROM MCU LDS 20MHz 8K Flash TQFP SMD	1	U4
..1	919-0551	PCB, ASSY, XLR-BNC I/O INTERFACE, FM & AM-IBOC, DSG(SBCM)	1	
....2	007-0047	CAP,4.7uF,16v,20%,SMD,3216/Y	1	C10
....2	007-1044	CAP,CER,0.1uF,50V,10%,SMD note	9	C1, C2, C3, C4, C5, C6, C7, C8, C9
....2	104-0020	RES,20ohm,.25W,1%, SMD, 1210	1	R11
....2	104-0036	RES,35.7ohm,. 25W, 1%, SMD, 1210	3	R9, R16, R17
....2	104-0051-063	RES,51.1ohm,.25W,1%,SMD,1210	1	R6
....2	104-0103	RES,10Kohm,.1W,1%, SMD, 0603	1	R12
....2	104-0122	res,1.2Kohm,.1W,5%, SMD, 0603	1	R2
....2	104-0165	RES,16.5ohm,. 25W, 1%, SMD, 1210	1	R18
....2	104-0200	RES,200ohm,.1W,5%, SMD, 0603	1	R1
....2	104-0242	RES,2.4Kohm,.1W,5%,SMD,0603	1	R13
....2	104-0303	RES,30.1Kohm,.1W,1%,SMD,0603	4	R4, R5, R7, R8
....2	104-0390	RES,390ohm,.25W,5%,SMD,1206	1	R14
....2	104-0620	RES,620ohm,.1W,5%,SMD,0603	1	R3
....2	216-0111	IC,Closed loop buffer, Ultra high slew rate, 8 pin SMD	3	U1, U2, U3
....2	227-1128	IC,VR,8V,LOW DROPOUT,SOT23-5L,SMD	1	U4
....2	320-0603	LED GREEN SMD	1	D1
....2	340-0004	SW,JUMPER PROGRAMMABLE	16	P5A, P5B, P6A, P6B, P7A, P7B, P8A, P8B, P9A, P9B, P10A, P10B, P11A, P11B, P12A, P12B
....2	367-1128	XFMR, 5MHz-120MHz SMD	1	T1
....2	411-0103	Chip,EMI Filter,10,000pF 50V 20% SMD	1	L1

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	411-0222	Chip EMI Filter, 2200pF 50V 20% SMD	8	L2, L3, L4, L5, L6, L7, L8, L9
....2	417-0037	BNC,R ANGLE PC MT 227161-1 AMP (NOTE)	5	J1, J2, J3, J4, J5
....2	417-1701	STRAIGHT JACK RECEPTACLE,SMB PCB MOUNT 50 OHM	1	J11
....2	417-2284	CONN MCX RIGHT ANGLE JACK 50 OHM PCB MOUNT	6	J6, J7, J8, J9, J10, J12
....2	417-2600	CONN,HEADER,26PIN	2	JP5, JP6, JP7, JP8, JP9, JP10, JP11, JP12
....2	417-2838	HEADER 4-PIN .100 R.ANGLE LOCKING"	1	JP3
....2	417-4209	CONN,DUAL-PORT D-SUB,9-PIN,MALE,PCB MOUNT	1	P1
....2	418-0058	RECEPTACLE XLR FEMALE RT. ANGLE PCB MOUNT	4	JR1, JR2, JR7, JR8
....2	418-0059	RECEPTACLE XLR MALE RT. ANGLE PCB MOUNT	4	JR3, JR4, JR5, JR6
....2	418-1003	CONN,PCB 10PIN(DUAL 5)	2	JP1, JP2
....2	519-0551	PCB, MACH, XLR-BNC I/O INTERFACE, FM-IBOC & AM-IBOC, DSG	1	
..1	919-0552	PCB, ASSY, RJ-45/USB/DB-9 I/O INTERFACE, FM&AM-IBOC,DSG	1	
....2	417-0318	CONN,USB TYPE A DOUBLE PCB MOUNT	1	JP13
....2	417-0319	Conn,USB Type B Single Right Angle PCB Mount	2	JP14, JP15
....2	417-6466	CONN,RJ-11 JACK SINGLE PORT 6-PIN SHIELD PCB MOUNT	2	JP11, JP12
....2	417-7187	CONN,RJ-45 JACK 4-PORT 8-PIN SHIELDED PCB MOUNT	1	P1
....2	417-7188	CONN,RJ-45 JACK SINGLE PORT 8-PIN SHIELDED PCB MOUNT	6	P2, P3, P4, P5, P6, P7
....2	418-1003	CONN,PCB 10PIN(DUAL 5)	1	JP1
....2	519-0552	PCB,MACH,RJ-45/USB/DB-9 I/O INTERFACE,FM-IBOC & AM-IBOC,DSG	1	
..1	919-0553	PCB,ASSY,TERMINAL STRIP I/O INTERFACE,FM & AM-IBOC,DSG(SBCM)	1	
....2	007-1044	CAP,CER,0.1uF,50V,10%,SMD note	3	C13, C14, C15
....2	063-1074	CAP,TANT,10UF,25V,20%	6	C7, C8, C9, C10, C11, C12
....2	101-0390	RES, 390ohm, 1W, 5%, SMD, 2512	2	R10, R11
....2	104-3301	RES,CHIP,3.32Kohm,1%,1/16W,0603,SMD	2	R12, R13
....2	204-0052	Silicon Rectifier 2A 50V SMD	12	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12
....2	204-0718	Diode Network Schottky Barrier Diodes	5	DN1, DN2, DN3, DN4, DN5
....2	216-0621	Multi-Channel Phototransistor Optocoupler	4	U1, U2, U3, U4
....2	216-7414	IC,74AC14,HEX INVERTER,SCHMITT TRIG,SO-14,SMD	3	U13, U14, U15
....2	226-3301	res net, 3.3Kohm, smd, 2512	2	R4, R5

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	226-3900	res net, 390ohm, 10pin, SMD	6	R1, R2, R3, R6, R7, R14
....2	270-4111	IC,DUAL,SOLID STATE RELAY,8-PIN,DIP	8	U5, U6, U7, U8, U9, U10, U11, U12
....2	411-0223	EMI FILTER, 1000pF, SMD	6	C1, C2, C3, C4, C5, C6
....2	417-0173	CONN,PCB,40-PIN,609-4037	1	JP5
....2	417-1550-008	CONN,HEADER,RT.ANGLE,8-PIN,3.81MM SPACING,PCB MOUNT	8	JP1, JP2, JP3, PJ4, JP6, JP7, JP8, JP9
....2	519-0553	PCB,MACH,TERMINAL STRIP I/O INTERFACE,FM-IBOC & AM-IBOC DSG	1	
....2	540-0505	1.5W Modular DC/DC Converter	2	U17, U18
....2	540-1055	DC/DC Converter SMD	1	U16
..1	919-0557-001	ASSY, PCB, FRONT PANEL LED, FM-IBOC & AM-IBOC, DSG	1	
....2	103-4993	RES,499 OHM,1/4W,1%,METAL	2	R1, R2
....2	323-9224	IND,LED,GRN,521-9270	2	LED1, LED2
....2	340-0004	SW,JUMPER PROGRAMMABLE	1	P2
....2	417-4004	CONN,HEADER,2 PIN	2	J2, J3
....2	418-0255	CONN,MALE,4PIN	1	J1
....2	441-0009	SPR,PHENOLIC 1/4RND X 1/2 #6	2	
....2	519-0557	PCB, MACH, FRONT PANEL LED, DTG DIGITAL EXCITER	1	
..1	919-0558	PCB, ASSY, LCD POWER, FM-IBOC & AM-IBOC, DSG	1	
....2	020-4773	CAP,LYTIC,47UF,35V,STDUP	1	C1
....2	103-4741	RES,4.75K OHM,1/4W,1%,METAL	1	R1
....2	224-0200	IC, TWO TUBE DC TO AC CONVERTER, +12 VDC INPUT	1	U1
....2	417-0070	CONN,HEADER 4 PIN	1	J1
....2	431-0280	CONN,2PIN,HV,8MM,RT ANGLE,SMD	2	J2, J3
....2	519-0558	PCB, MACH, LCD POWER, FM-IBOC & AM-IBOC, DSG	1	
..1	949-0541-003	ASSY,WIRE HARNESS,FSi/ASi,MB3 (SBCM)	1	
....2	402-0051	TY-RAP, W/FLAG	36	
....2	417-0053	SKT,CONN 641294-1 AMP	3	
....2	417-0138	HSNG,MOD IV 4 POS 87499-7 AMP	2	
....2	417-0142	PIN,.050 DIA 26-22 745254-3	5	
....2	417-0143	SKT,PIN .050 26-22 745253-3	7	
....2	417-0165	HSNG,5POS MOD IV S.ROW 87499-9	1	
....2	417-0224	KEYING PLUG MOD IV 87077 AMP	4	
....2	417-0286	PLUG,2.5 MM FEMALE	1	
....2	417-0323	CONNECTOR,TNC BULKHEAD,FOR RG316/U COAXIAL CABLE	1	
....2	417-0402	CONN,20 PIN,DUAL ROW,MINI-FIT,FEMALE	1	
....2	417-0405	CONTACT, CRIMP, 18-24 AWG, FEM	20	
....2	417-0407	CONTACT, MALE, 18-24 AWG, CRIMP	20	
....2	417-0408	CONN, 20 PIN, MALE,	1	
....2	417-0413	Contact FEM 22-28 AWG XHP Series	3	
....2	417-0414	Conn, FEM, 4 Pin	1	
....2	417-0415	Conn, FEM, 5 Pin	1	
....2	417-0900	PLUG,9 PIN STD 205204-3 AMP	1	

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	417-0901	RCPT,9 PIN STD 205203-3 AMP	2	
....2	417-1003	SKT,CONN 10PIN ANSLEY 622-1030	6	
....2	417-1702	RIGHT ANGLE CRIMP TYPE PLUG,SMB,50 OHM	2	
....2	417-2011	CONN,SOCKET,10 POS, .100 POLARIZED WIREMOUNT"	1	
....2	417-2020	CONN,SOCKET,20 POS, .100 POLARIZED WIREMOUNT"	1	
....2	417-2021	CONN,SOCKET,24 POS, .100 POLARIZED WIREMOUNT"	1	
....2	417-2560	CONN,MINI-DIN,6-POS,SOCKET,PANEL MOUNT	2	
....2	417-2570	CONN,MINI-DIN,6-POS,IN-LINE PLUG	2	
....2	417-2814	PLUG, 8 POS ETHERNET 10BaseT	6	
....2	417-2815	CONN, 9-PIN, FEMALE, IDC, Dsub	2	
....2	417-8030	CONN,PLUG,RT ANG,SMA,HEX CRIMP	2	
....2	417-8766	CONTACT,CRIMP,MOD-IV 87809-1	8	
....2	417-8980	Male Crimp Terminal	4	
....2	417-8981	Male Crimp Housing	1	
....2	418-0034	PLUG,BNC DUAL CRIMP 1-227079-6	1	
....2	418-0240	PLUG,FEM,4PIN	1	
....2	418-4001	CONN,RIBBON CBL,40COND	2	
....2	600-0002	RIBBON CBL,3580-10 ALPHA	6.916	
....2	600-0040	CBL,40COND,28GA,100 ANSLEY	1.333	
....2	601-2209	WIRE,AWG22,19/34 WHT	48.853	
....2	602-2202	WIRE,TW,AWG22,PVC INS,BLK/RED	4.562	
....2	603-2200	WIRE,TW,AWG22,INS,RED-YEL-BLU	1.666	
....2	610-5096	CBL,6 CONDUCTOR,24 AWG,SHIELDED,PVC	3.1	
....2	610-8723	CBL,SH 4 COND #22 ST 8723 BELD	5.166	
....2	621-1359	CBL,COAX,RG316/U,50 OHM	7.166	
....2	622-1245	CBL,ETHERNET,10BASET,CAT5	5.874	
..1	949-0541-300	ASSY,CABLE,ADAPT PWR TO 959-4167-100	1	
....2	417-4303	CONN, CRIMP TERMINAL, FEMALE, 20-24 AWG	2	
....2	417-4364	CONN, RECEPTACLE 2 POS, HEADERS & WIRE HOUSINGS	1	
....2	418-0712	CONN, DC POWER 2.5MM ROUND W/NUT	1	
....2	601-2209	WIRE,AWG22,19/34 WHT	1.167	
....2	611-0938	TUBE, HEAT SHINK, 3/32, BLACK"	0.083	
....2	611-5000	TUB,HT SHK 1/2	0.062	
..1	949-0546	ASSY,CABLE,FAN,FSi/ASi (SBCM)	1	
....2	417-8500	PLUG AND CORD ET,AM500 FAN	1	
....2	417-8980	Male Crimp Terminal	2	
....2	417-8981	Male Crimp Housing	1	
..1	949-4263-100	VGA CABLE FOR 959-4167-100	1	
..1	959-0252-001	3M SC4 TOUCH SCREEN CONTROLLER BD	1	
..1	959-0376-001	GPS,TIME & FREQUENCY MODULE,FSi/ASi	1	
..1	959-0377-001	MEMORY MODULE,512MB,184-PIN DDR SDRAM DIMM,FSi/ASi	1	
..1	959-0378	MODEM CARD,INTERNAL,56K,PCI,FM-IBOC & AM-IBOC DSG	1	

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	959-0379	AUDIO CARD,FM-IBOC & AM-IBOC DSG	2	
..1	959-0382-003	PS,SWITCHING PFC 485W UNIV. IN, FSi/ASi/XPi (NOTE)	1	
..1	959-0383-003	MOTHERBOARD,ATX,800MHz FSB SUPPORT,FSi/ASi/XPi	1	
..1	959-0384-001	HARD DRIVE,80GB,7200 RPM,ULTRA ATA/100,FSi/ASi,MB2	1	
..1	959-0385	SERIAL PORT CARD,PCI,FM-IBOC & AM-IBOC DSG	1	
..1	959-0386	CD-ROM DRIVE,SLIM 24X,INTERNAL MOUNT,BLACK,FM/AM-IBOC DSG	1	
..1	959-0386-001	ADAPTER,SLIMLINE CD TO 40-PIN IDE CONVERTER BOARD	1	
..1	959-0387	KIT,OSD ROTARY	1	
..1	959-4167-100	ALR-1400 FLAT PANEL INTERFACE CONTROLLER	1	
..1	979-0542-FM4	KIT,BINDER AND MANUAL,FSi	1	
....2	597-0542-002	INSTRUCTION MANUAL, FSI 10 GENERATOR, FM-IBOC	1	
....2	598-0010-001	BINDER,1 IN, BLUE,W CD POCKET	1	
....2	979-6026-433	KIT,SOFTWARE CDROM,FSI-10,V4.3.2P1	1	
......3	579-0007	CD-CASE CLEAR PLASTIC	1	
......3	597-0542-006	APPLICATION GUIDE, FSI 10 SOFTWARE UPGRADE	1	
......3	701-0018	ANTISTATIC BAG ZIPLOC 9X12 4M	1	
......3	979-6026-FM9	CDROM,FSI10,V4.3.2p1	1	
..1	979-0543	KIT,INSTALLATION,FM-IBOC,DSG	1	
....2	417-0910	KIT,BACKSHELL FOR 9-PIN D CONN	1	
....2	418-1550-008	CONN,PLUG,8-PIN,CAGE CLAMP,3.81MM SPACING	8	
....2	420-0007	SCREW,12-24 X 3/4,NATURAL SST,TRUSS HD, PHILLIPS DRIVE"	4	
....2	420-0710	SCR,10-32 X 5/8,NATURAL SST,TRUSS HD,PHILLIPS DRIVE"	4	
....2	420-4105	SCREW,4-40X.312,S.S. PH	-6	
....2	420-4204	SCREW,4-40X.250,PH FLH UC	6	
....2	421-0002	12-24 SPEED NUT (NOTE)	4	
....2	421-4008	4-40 KEP NUT	-2	
....2	421-8028	NUT,JAM,1/2-28 UNEF-2B	3	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	1	
....2	423-4002	#4 LOCK S.S. SPLIT	-6	
....2	423-6006	#6 FLAT, 0.75 O.D, 0.140 I.D., 0.062 THK, SST	-2	
....2	423-9002	WASH,INT TOOTH,1/2	3	
....2	471-5363	FILLER,DAUGHTER CARD,PLAIN.FXi60/250	-1	
....2	550-112	Connector, D-Sub 9 pin male Keltron DN-09PYSH-G	1	
....2	597-0543	INSTRUCTIONS,FXi,IBOC INSTALLATION	1	
....2	682-0001	CORD LINE,3 COND,DETACH 7.5FT	1	
....2	682-0003	CORD,PWR EUROPEAN RIGHT ANGLE, 6'	1	
....2	701-0005	ANTISTATIC ZIPLOC BAG 4X6 4MIL	1	
....2	701-0007	ANTISTATIC ZIPLOC BAG 12X12	1	

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	919-0546	PCB, ASSY, IBOC DTC DIGITAL EXCITER (SBCM)	1	
.....3	007-0183	CAP CERAMIC,0.018uF,25V,10%,SMD 0805,X7R	1	C3
.....3	007-0823	Cap, 0.082uF,50V ceramic SMD	1	C4
.....3	007-1024	CAP,CER,.001uF,50V,10%,SMD	2	C9, C11
.....3	007-1034	CAP,CER,0.01uF,50V,10%,SMD	6	C1, C21, C23, C34, C35, C36
.....3	007-1044	CAP,CER,0.1uF,50V,10%,SMD note	17	C13, C22, C27, C28, C30, C31, C32, C40, C42, C43, C45, C46, C47, C48, C49, C50, C51
.....3	007-2224-500	CAP,CER,.0022uF,50V,10%,SMD	1	C26
.....3	007-3313	CAP,CER,330pF,50V,5%,SMD	5	C5, C6, C7, C8, C10
.....3	007-4724	CAP,CER,0.047uF,50V,10%,SMD	1	C52
.....3	070-1054	CAP,TANT,1uF,35V,10%,SMD	7	C2, C12, C20, C24, C29, C41, C44
.....3	070-1064	CAP,TANT,10uF,35V,20%,SMD	10	C14, C15, C16, C17, C18, C19, C33, C37, C38, C39
.....3	102-0000	RES,CHIP,0 OHM,0805,SMD	7	R68, R72, R73, R74, R75, R76, R77
.....3	102-0100	RES,CHIP,10.0 OHMS,1/10W,1%,SMD	1	R15
.....3	102-1000	RES,CHIP,100 OHMS,1/10W,1%,SMD	5	R16, R21, R58, R59, R60
.....3	102-1001	RES,CHIP,1.00K OHMS,1/10W,1%,SMD	14	R5, R22, R23, R24, R33, R37, R38, R39, R50, R57, R62, R63, R64, R66
.....3	102-1002	RES,CHIP,10.0K OHMS,1/10W,1%,SMD	5	R4, R7, R8, R13, R70
.....3	102-1003	RES,CHIP,100K OHMS,1/10W,1%,SMD	1	R71
.....3	102-1004	RES,CHIP,1.00M OHMS,1/10W,1%,SMD	2	R2, R3
.....3	102-1133	RES,CHIP,110 OHMS,1/10W,1%,SMD	3	R25, R40, R41
.....3	102-1825	RES,CHIP,18.2 K OHM,1/10W,1%	1	R17
.....3	102-2212	RES,CHIP,22.1K OHMS,1/10W,1%,SMD	1	R48
.....3	102-2410	RES,CHIP,243 OHMS,1/10W,1%,0805,SMD	5	R20, R32, R44, R61, R69
.....3	102-2432	RES,CHIP, 24.3K OHM, 1%, 1/10W, 0805, SMD	1	R11
.....3	102-3011	RES,CHIP,3.01K OHMS,1/10W,1%,SMD	1	R26
.....3	102-3012	RES,CHIP,30.1K,1/10W,1%,SMD	1	R9
.....3	102-3321	RES,CHIP,3.32K OHMS,1/10W,1%,SMD	1	R6
.....3	102-4711	RES,CHIP,475 OHMS,1/10W,1%,SMD	1	R14
.....3	102-4755	RES,CHIP,47.5K OHM,1/10W,1%	11	R18, R27, R28, R29, R30, R31, R42, R43, R45, R46, R47
.....3	102-4872	RES,CHIP,48.7K,1/10W,1%,SMD	1	R10
.....3	102-7150	RES,CHIP,715 OHMS,1/10W,1%,SMD	1	R19
.....3	204-0914	DIODE,SWITCHING,MMBD914LT1,SMD	2	D1, D3

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
.....3	205-0833	VARIABLE CAPACITANCE DIODE, SOT-23 SMD	1	D2
.....3	210-3906-001	TSTR,3906,SMD	1	Q2
.....3	216-0634	IC, BUFFER, BUF634U, SO-8, SMD	1	U13
.....3	216-3904	TSTR,MMBT3904LT1,NPN,SMD	2	Q1, Q3
.....3	216-4013	IC,MC14013BD DUAL D FLIP FLOP,SMD	1	U12
.....3	216-7002	IC,MOSFET,2N7002LT1,SMD	1	Q4
.....3	216-7414	IC,74AC14,HEX INVERTER,SCHMITT TRIG,SO-14,SMD	1	U4
.....3	216-9001	IC,3.3v LVDS Buffer 8 pin SOIC SMD	3	U7, U8, U9
.....3	220-1451	IC, CMOS PLL FREQUENCY SYNTHESIZER	1	U3
.....3	220-8922	IC, Dual Differential Line Driver SMT	1	U2
.....3	224-0708	IC, MICRO SUPERVISOR, 3V, SMD	1	U14
.....3	224-8420	IC, SAMPLE RATE CONVERER 96 KHZ	1	U1
.....3	228-0161	IC,74ACT161,SYNCH. BINARY COUNTER,16-PIN SMD,SOIC	2	U10, U11
.....3	231-3170	VR,LM317,SMD	1	U5
.....3	325-0250	LED,DUAL RED/GREEN,LOW PROFILE,SMD	2	DS1, DS2
.....3	350-030	INDUCTOR, 3.0 - 7 UH W/SHIELD CAN #47271-023	1	L1
.....3	366-0011	IND,10UH,SHIELDED,SMD	7	L2, L3, L4, L5, L6, L7, L8
.....3	367-9370	XFMR,SMT,AES/EBU,SC937-02	3	T1, T2, T3
.....3	413-1206	CHIP,TEST POINT,1206,SMD	10	TP1, TP2, TP3, TP4, TP5, TP6, TP8, TP9, TP10, TP11
.....3	417-0262	MALE XLR, PANEL MOUNT	2	J6, J7
.....3	417-0265	CONN,BNC,JACK,THREADED,PC EDGE MOUNT,LOW PROFILE	3	J11, J12, J13
.....3	417-0267	CONN,RJ-45,8 PIN,R.ANGLE MODULAR JACK,SHIELDED,LOW PROFILE	1	J9
.....3	417-0804	SOCKET,8-PIN DIP,BURNDY	1	XK6
.....3	417-1701	STRAIGHT JACK RECEPTACLE,SMB PCB MOUNT 50 OHM	3	J1, J2, J3
.....3	418-0000	CONN, HEADER, 80 POSITION, DOUBLE ROW, .8MM, EDGEMOUNT	1	J10
.....3	418-0051	CONN,AUDIO PC 3 PIN FEM E3FRAB	1	J4
.....3	479-0175	SHIELD,1.5x1.75"x1.0",PC MOUNT"	1	
.....3	519-0546	PCB, MACH, IBOC DTC DIGITAL EXCITER	1	
.....3	979-0546-U6	KIT,SOFTWARE,MICRO,U6,IBOC	1	U6
.....4	229-0519	Microprocessor 8pin DIP PIC12CE519-04/P	1	U6
....2	949-0542	ASSY,CABLE,GPS DATA IN/OUT,FSi/ASi (SBCM)	1	
.....3	402-0051	TY-RAP, W/FLAG	1	
.....3	417-0142	PIN,.050 DIA 26-22 745254-3	4	
.....3	417-0143	SKT,PIN .050 26-22 745253-3	4	
.....3	417-0900	PLUG,9 PIN STD 205204-3 AMP	1	
.....3	417-0901	RCPT,9 PIN STD 205203-3 AMP	1	
.....3	417-0910	KIT,BACKSHELL FOR 9-PIN D CONN	2	
.....3	610-8723	CBL,SH 4 COND #22 ST 8723 BELD	0.666	
....2	949-0543	ASSY,CABLE,1PPS IN/OUT,FSi/ASi (SBCM)	1	
.....3	402-0051	TY-RAP, W/FLAG	1	

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BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
.....3	418-0034	PLUG,BNC DUAL CRIMP 1-227079-6	2	
.....3	621-1359	CBL,COAX,RG316/U,50 OHM	0.333	
....2	949-0545	ASSY,CABLE,IBOC CARD,FXi60/250 (SBCM)	1	
.....3	402-0051	TY-RAP, W/FLAG	2	
.....3	417-1702	RIGHT ANGLE CRIMP TYPE PLUG,SMB,50 OHM	1	
.....3	417-1703	Straight Crimp Type Plug,SMB,50 ohm	1	
.....3	621-1359	CBL,COAX,RG316/U,50 OHM	1.5	
....2	949-0549	ASSY,WIRE HARNESS,FXi TO FSi (SBCM)	1	
.....3	402-0051	TY-RAP, W/FLAG	30	
.....3	417-0094	CONN,BNC RG/U58 31-320 AMPH	2	
.....3	417-2814	PLUG, 8 POS ETHERNET 10BaseT	2	
.....3	418-1550-008	CONN,PLUG,8-PIN,CAGE CLAMP,3.81MM SPACING	1	
.....3	602-2202	WIRE,TW,AWG22,PVC INS,BLK/RED	2	
.....3	608-1800	CBL,SHLD,AES/EBU,BELDEN 1800B (N)	13.75	
.....3	611-0061	TUB,HT SHK CLEAR 3/64	1.46	
.....3	622-0050	CBL,SH,50 OHM,RG-58/CU	2.33	
.....3	622-1245	CBL,ETHERNET,10BASET,CAT5	1.66	
.....3	829-4216	PLUG,FEM XLR, A3F (XLR-3-11C)	5	
.....3	829-4217	PLUG,MALE XLR, A3M (XLR-3-12C)	5	

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11 Drawings

11.1 Introduction.

The following text provides assembly drawings and schematic diagrams as indexed below for the FSi 10, FM IBOC Digital Signal Generator.

FIGURE	TITLE	NUMBER
9-1	FSi 10 REAR PANEL DESCRIPTIONS	597-0541-83
9-2	FSi 10 REMOTE CONTROL INPUTS/OUTPUTS	597-0541-84
9-3	OVERALL BLOCK DIAGRAM, FSi 10	SD909-6025-MB3
9-4	SCHEMATIC DIAGRAM, DIGITAL UPCONVERTER, FM-IBOC, DSG, MB2.5, CIRCUIT BOARD	SD919-0548-001
9-5	ASSEMBLY DIAGRAM, DIGITAL UPCONVERTER, FM-IBOC, DSG, MB2.5, CIRCUIT BOARD	AC919-0548-001
9-6	SCHEMATIC DIAGRAM, DIGITAL UPCONVERTER II, (DUC II) CIRCUIT BOARD	SD919-0548-002
9-7	ASSEMBLY DIAGRAM, DIGITAL UPCONVERTER II, (DUC II) CIRCUIT BOARD	AC919-0548-002
9-8	SCHEMATIC DIAGRAM, STATION INTERFACE CIRCUIT BOARD	SD919-0549
9-9	ASSEMBLY DIAGRAM, STATION INTERFACE CIRCUIT BOARD	AC919-0549
9-10	SCHEMATIC DIAGRAM, XLR-TO-BNC I/O INTERFACE CIRCUIT BOARD	SD919-0551
9-11	ASSEMBLY DIAGRAM, XLR-TO-BNC I/O INTERFACE CIRCUIT BOARD	AB919-0551
9-12	SCHEMATIC DIAGRAM, RJ-45/USB/DB-9 I/O INTERFACE CIRCUIT BOARD	SD919-0552
9-13	ASSEMBLY DIAGRAM, RJ-45/USB/DB-9 I/O INTERFACE CIRCUIT BOARD	AC919-0552
9-14	SCHEMATIC DIAGRAM, TERMINAL STRIP I/O INTERFACE CIRCUIT BOARD	SD919-0553
9-15	ASSEMBLY DIAGRAM, TERMINAL STRIP I/O INTERFACE CIRCUIT BOARD	AC919-0553
9-16	SCHEMATIC DIAGRAM, FRONT PANEL LED CIRCUIT BOARD	SA919-0557-001
9-17	ASSEMBLY DIAGRAM, FRONT PANEL LED CIRCUIT CIRCUIT BOARD	AA919-0557-001
9-18	SCHEMATIC DIAGRAM, LCD POWER CIRCUIT BOARD	SA919-0558
9-19	ASSEMBLY DIAGRAM, LCD POWER CIRCUIT BOARD	AA919-0558

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FSi, REAR-PANEL CONNECTOR DESCRIPTIONS, 597-0541-83.

FSi, REAR-PANEL CONNECTOR DESCRIPTIONS (Sheet 1 of 2)			
Function	**Input/Output**	**Description**	**Connector**
1PPS OUT	Output	TTL level, one pulse per second signals from the GPS. Pulse width is defaulted to 2ms.	BNC
GPS ANT IN	Input	Power is supplied to the antenna via the center conductor of the coaxial cable. This connection must be made with a single cable and not through any other devices such as an amplifier or splitter/combiner.	TNC
GPS DATA OUT	Output	RS-232. The GPS data output provides data to the ASi/FSi via the GPS DATA IN connector in serial format at 19200 8 N 1. Upon startup, the GPS outputs a packet of information that includes the type and status of the device. The GPS can then be controlled by the ASi/FSi. Once the GPS is locked and stable, it provides timing and position information in one second bursts.	DB9 Female
GPS DATA IN	Input	RS-232	DB9 Male
1 PPS IN	Input	TTL level, 50 ohm	BNC Female
10 MHz To FXi	Output	0 dBm, 50 ohm	BNC Female
AM PHASE OUT	Output (50 Ohm)	500 - 1770 kHz {Used On ASi-10 Only.}	BNC Female
10 MHZ OUT	Output	GPS 10MHz sine wave @ +3dBm into 50 ohms	BNC Female
AM OUT	Output (50 Ohm)	IF/RF OUTPUT {Not Used}	BNC Female
IBOC DATA	Input	RS-232	DB9 Male
AM/FM AES IN	Input	AES/EBU Audio	XLR Female
IBOC AES IN	Input	AES/EBU Audio	XLR Female
AM/FM AES OUT	Output	AES/EBU Audio	XLR Male
IBOC MONITOR	Output	AES/EBU Audio	XLR Male
IBOC/AM MAG OUT	Output	Balanced Analog Audio, 600 ohm, Pin 5+ ,4 -	RJ45 Female
PHASE	Output	RS422, 100 ohm	RJ45 Female
LVDS TO IBOC DATA	Output	LVDS, IEEE1596.3 BaseBand Digital I/Q data, 100 ohm	RJ45 Female
		Pin 1=FS+, 2=FS-,	
		4=CLK+, 5=CLK-	
		7=Data+, 8=Data -	
I/Q	Output	BaseBand Analog I/Q, 100 ohm	RJ45 Female
		Pin 5=I+, 4=I-, 3=Q+, 6=Q-	
SPARE 2	Input/Output	Not Connected.	RJ45 Female
ETHERNET	Input/Output	100 MHz Network Connection.	RJ45 Female
MODEM	Input/Output	Two Wire Telephony connection.	RJ11 Female
USB	Input/Output	USB.	Dual USB Female
MOUSE	Input	PS2 Compatible.	PS2
KEYBOARD	Input	PS2 Compatible.	PS2
AC POWER	Input	115VAC @ 13 Amps or 230VAC @ 8 Amps	IEC, AC input
INPUTS 1 THRU 14	Input	Static Input "+", 390 ohm pullup to 5V, All "–" tied together.	Phoenix, 8 pin Female

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FSi, REAR-PANEL CONNECTOR DESCRIPTIONS (Sheet 2 of 2)			
INPUT15	Input	Static Input "+", 390 ohm pullup to 5V, All "–" tied together. Short + to – for 3 seconds for system reset.	Phoenix, 8 pin Female
INPUT 16	Input	Static Input "+", 390 ohm pullup to 5V, All "–" tied together. Short + to – for 3 sec's for a system power down, repeat for a power up.	Phoenix, 8 pin Female
OUTPUT 1 THRU 12	Output	Static Output "+", 390 ohm pullup to 5V, All "–" tied together.	Phoenix, 8 pin Female
OUTPUT 13 AND 14	Output	Bypass A. Static Outputs S.S. relay from + to -. Connected to AUDIO BYPASS.	Phoenix, 8 pin Female
OUTPUT 15 AND 16	Output	Static Outputs, S.S. relay from + to -.	Phoenix, 8 pin Female

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FSi, REMOTE CONTROL INPUTS/OUTPUTS, 597-0541-84.

FSi REMOTE CONTROL INPUTS		
INPUT #	**INPUT NAME**	**SIGNALING METHOD**
1	Digital Carrier On	high-to-low/negative edge
2	Digital Carrier Off	high-to-low/negative edge
3	Audio Ramp Up To Delay	high-to-low/negative edge
4	Audio Ramp Down From Delay	high-to-low/negative edge
5	Audio Delay Increase	high-to-low/negative edge
6	Audio Delay Decrease	high-to-low/negative edge
7	Audio-A Bypass On	high-to-low/negative edge
8	Audio-A Bypass Off	high-to-low/negative edge
9	Audio-B Bypass On	high-to-low/negative edge
10	Audio-B Bypass Off	high-to-low/negative edge
11	Day	high-to-low/negative edge
12	Night	high-to-low/negative edge
13	---	---
14	System Shutdown	high-to-low/negative edge
15	System Power On/Off Toggle	hold low for at least 2 seconds, then high
16	System Reset	hold low for at least 2 seconds, then high

Note: ”Low” or ”Low Voltage” refers to a nominal TTL low logic level (0 volts).
”High” or ”High Voltage” refers to a nominal TTL high logic level (+5 volts).

FSi REMOTE CONTROL OUTPUTS			
OUTPUT #	**OUTPUT NAME**	**LOW VOLTAGE OR CLOSED RELAY**	**HIGH VOLTAGE OR OPEN RELAY**
1	Digital Carrier On/Off Status	Digital Carrier Off	Digital Carrier On
2	Audio Ramp Up/Down Status	Ramping Not Done	Ramping Done
3	Audio Delay In/Decrease Status	In/Decrease Not Done	In/Decrease Done
4	Audio-A Bypass Status	Audio-A Bypass Off	Audio-A Bypass On
5	Audio-B Bypass Status	Audio-B Bypass Off	Audio-B Bypass On
6	Day/Night Status	Night	Day
7	System Shutdown Status	Shutdown Not Done	Shutdown Done
8	System Operational Status	System Not Operational	System Operational
9	System Alarm Status	No System Alarm	System Alarm
10	---	---	---
11	---	---	---
12	---	---	---
13	Audio-A Bypass Status (relay)	Audio-A Bypass Off	Audio-A Bypass On
14	Audio-B Bypass Status (relay)	Audio-B Bypass Off	Audio-B Bypass On
15	---	---	---
16	System Operational Status (relay)	System Operational	System Not Operational

Note: ”Low” or ”Low Voltage” refers to a nominal TTL low logic level (0 volts).
”High” or ”High Voltage” refers to a nominal TTL high logic level (+5 volts).

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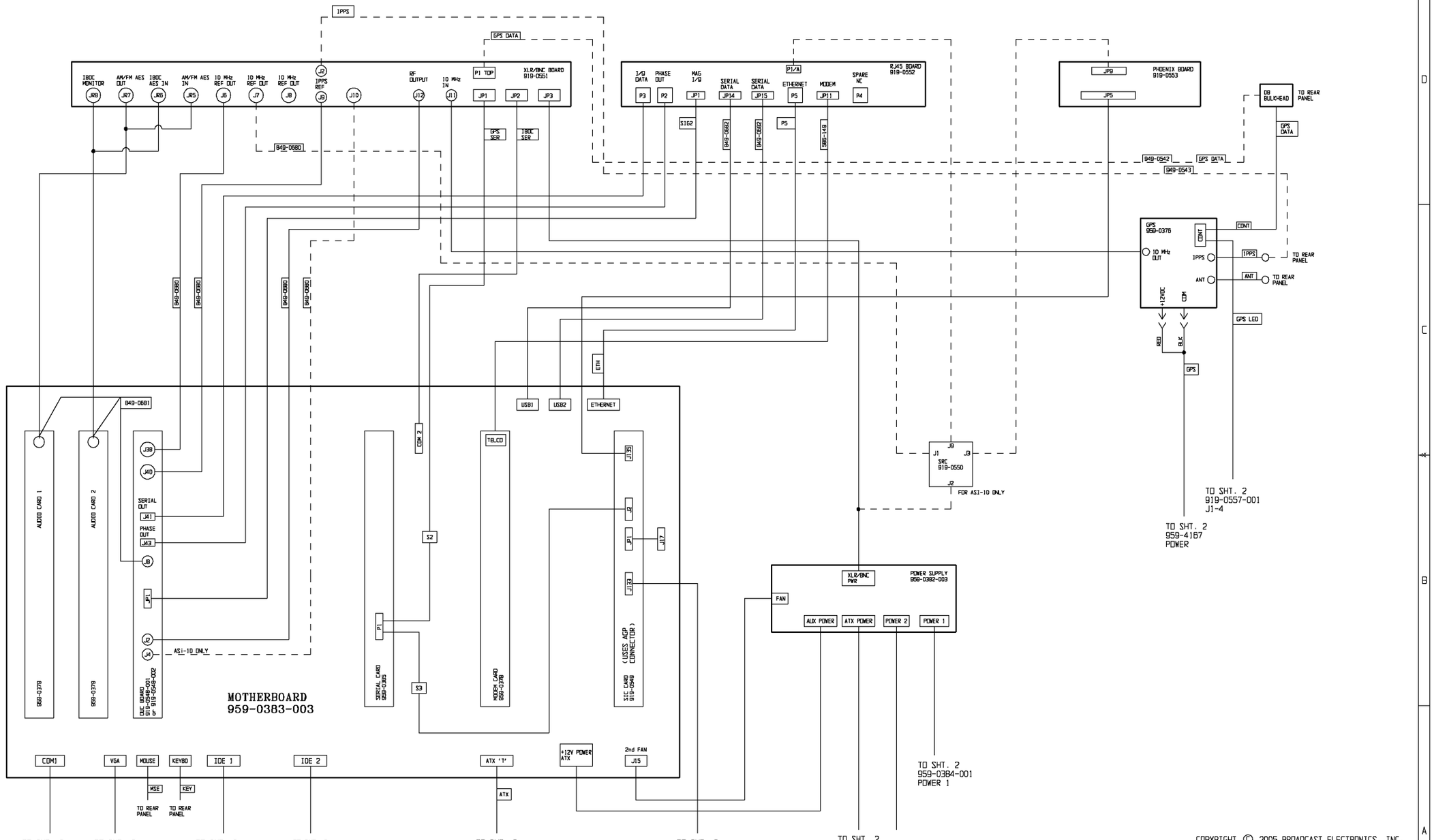
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	2-22-05
DESIGNER(S)	
PROJ. LEADER	
MFG.	
MATERIAL	
FINISH	
	SEE DWG RA5B2-0000
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: OVERALL WIRING DIAGRAM FSI-10/ASI-10

TYPE	SIZE	DWG. NO.	REV
S	D	909-6025-MB3 909-6026-MB3	A

MODEL: FSI/ASI | SCALE: NTS | SHEET: 1 OF 2

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN

TO SHT. 1
959-0383-003
COM 1

TO SHT. 1
959-0383-003
VGA

TO SHT. 1
959-0383-003
IDE 1

TO SHT. 1
959-0383-003
IDE 2

TO SHT. 1
959-0383-003
ATX

TO SHT. 1
919-0549
SIC CARD
J133

TO SHT. 1
959-0382-003
ATX POWER

TO SHT. 1
959-0382-003
POWER 1

TO SHT. 1
959-0382-003
POWER 2

TO SHT. 1
959-0376
+12VDC/COM

TO SHT. 1
959-0376
CONT

S2

949-0383

TSC SER

DISPLAY 410-0101

H2
H4 TSC H1
959-0252-001

TSC PWR

949-4263

DISPLAY CONTROLLER 959-4157
CN2 CN3 P1 CN8 CN1A CN3J POWER

OSD 959-0387

LCD

J1
J3
J2
LCD PWR 919-0558

DSPY

IOC 40
POWER 1
HARD DRIVE 959-0384-001

IOC 40
POWER 1
CD-ROM 959-0386

LED 919-0557-001
J1
1 +5VSB
2 COM
3
4 GPS

RED
BLK
WHT

TYPICAL
RED
BLK
BLK
YEL
+5V
COM
COM
+12V
BLK
RED

380-0310 FAN
RED
BLK
+12V
COM

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 2-22-05
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL
FINISH
SEE DWG RA582-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE
OVERALL WIRING DIAGRAM
FSI-10/ASI-10

TYPE	SIZE	DWG. NO.	REV
S	D	909-6025-MB3	A
		909-6026-MB3	

MODEL FSI/ASI SCALE NTS SHEET 2 OF 2

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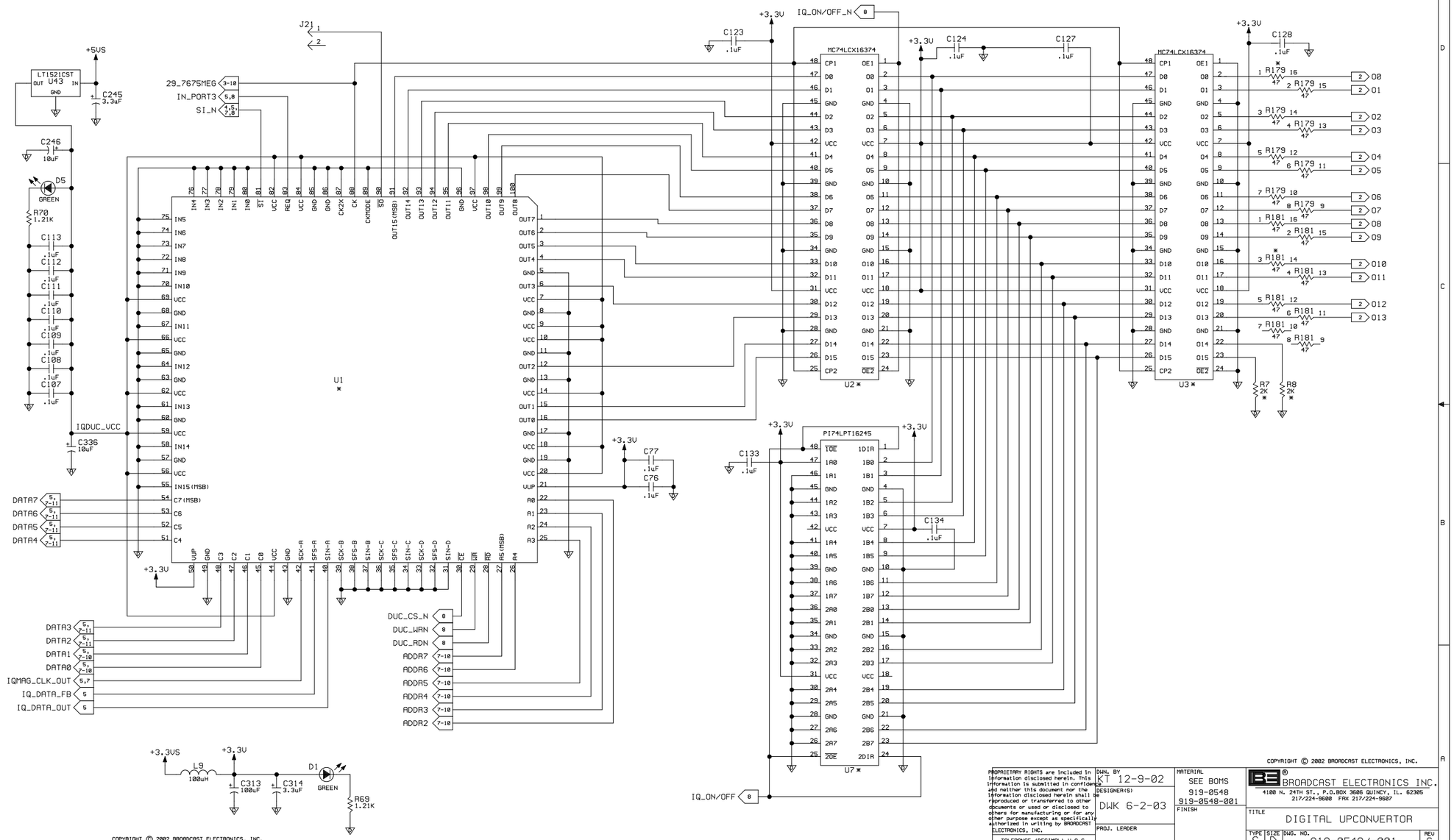
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----
B	6-2-03	ADDED 919-0548-001 & INDICTED PARTS NOT USED	KT	DWK	10988
C	2-20-04	SEE SHEET 2	KT		11089



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

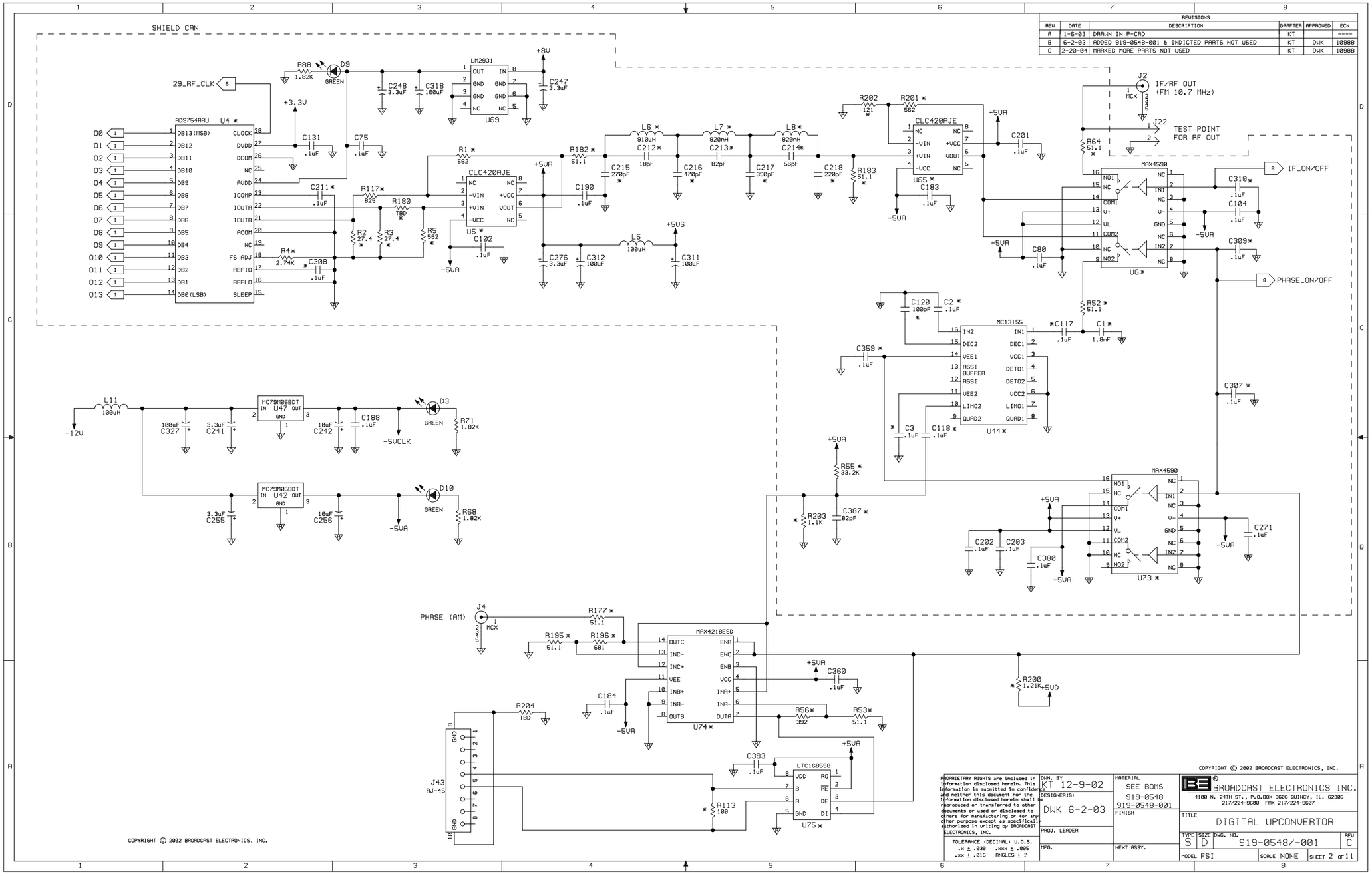
DWN. BY	KT 12-9-02
DESIGNER(S)	DWK 6-2-03
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOMS 919-0548 919-0548-001
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9687

TITLE: DIGITAL UPCONVERTOR

TYPE	SIZE	DWG. NO.	REV
S	D	919-0548/-001	C

MODEL FSI | SCALE NONE | SHEET 1 OF 11



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REVISIONS

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----
B	6-2-03	ADDED 919-0548-001 & INDICTED PARTS NOT USED	KT	DWK	10988
C	2-20-04	MARKED MORE PARTS NOT USED	KT	DWK	10988

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 12-9-02
DESIGNER(S) DWK 6-2-03
PROJ. LEADER
MFG.

MATERIAL SEE BOMS 919-0548 919-0548-001
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE DIGITAL UPCONVERTOR

TYPE S | SIZE D | DWG. NO. 919-0548/-001 | REV C

MODEL FSI | SCALE NONE | SHEET 2 OF 11

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REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----
B	6-2-03	ADDED 919-0548-001 & INDICTED PARTS NOT USED	KT	DWK	10988

I_DAC(0..15)
FRAME_CLK
29_7675MEG
29_TP_CLK
I_DAT(0..13)
29_MAG_CLK
Q_OUT_N
Q_OUT_P

DIFFERENTIAL OUTPUTS
JP1 MAG_NEG
JP1 MAG_POS
JP1 I_OUT_N
JP1 I_OUT_P
JP1 Q_OUT_N
JP1 Q_OUT_P

18kHz LOW PASS FILTER
CHEBYSHEV 3rd ORDER

BASEBAND OUTPUT
+10dBm AT 100%
MODULATION

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

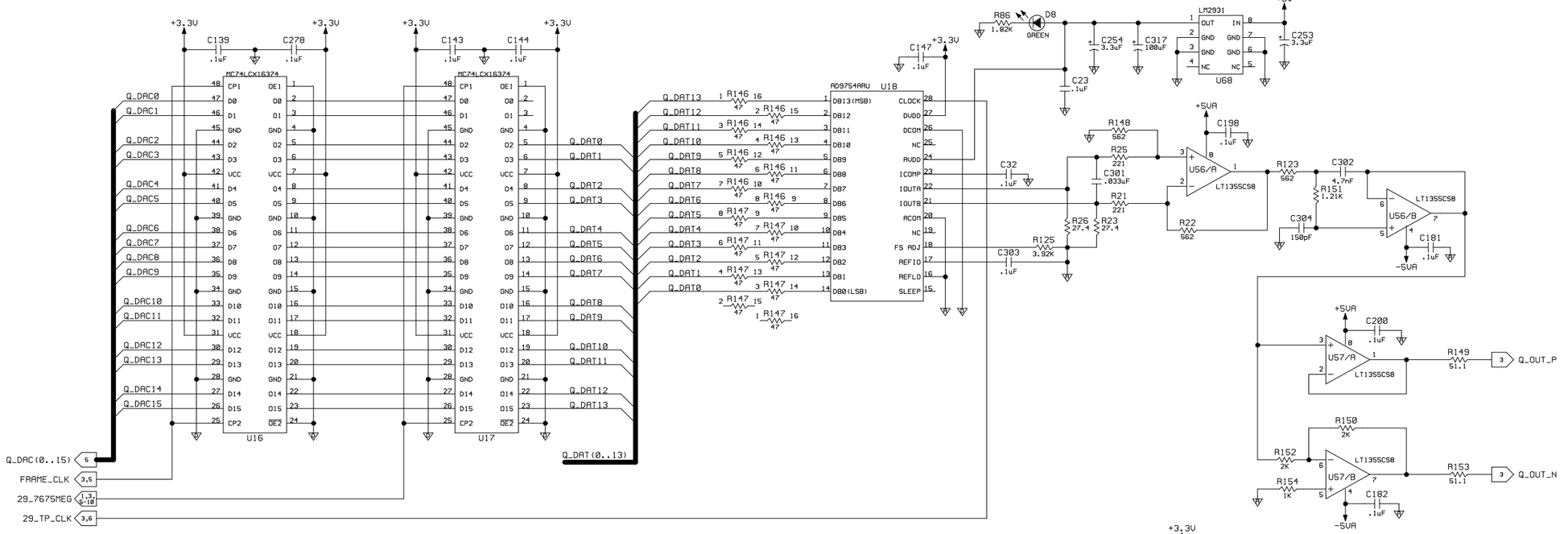
DWN. BY: KT 12-9-02
DESIGNER(S): DWK 6-2-03
PROJ. LEADER:
MFG.:
MATERIAL: SEE BOMS 919-0548 919-0548-001
FINISH:
NEXT ASSY.:

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9687

TITLE: DIGITAL UPCONVERTOR

TYPE S | SIZE D | DWG. NO. 919-0548/-001 | REV C
MODEL FSI | SCALE NONE | SHEET 3 OF 11

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

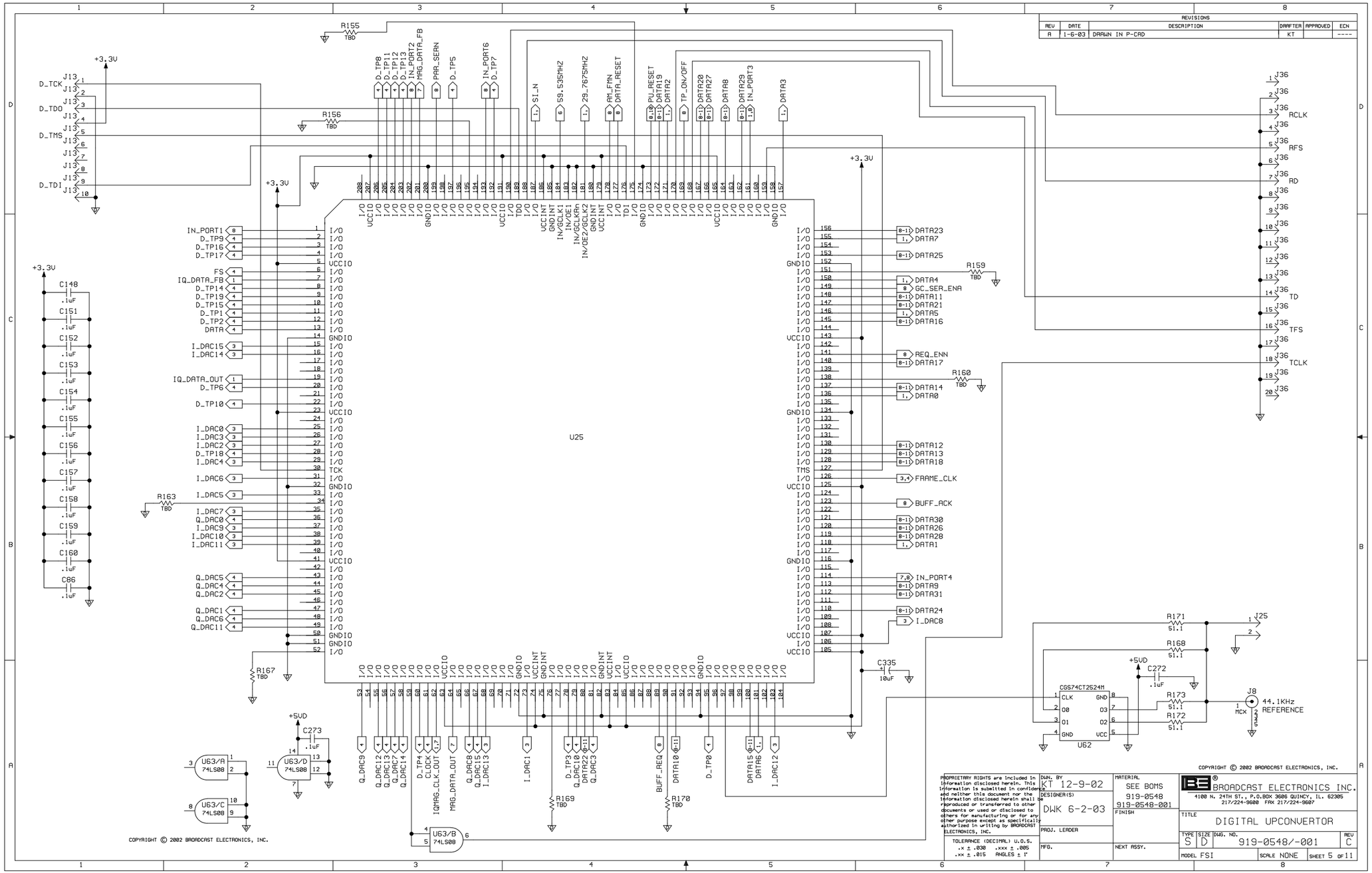
DWN. BY	KT 12-9-02
DESIGNER(S)	DWK 6-2-03
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOMS 919-0548 919-0548-001
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL UPCONVERTOR

TYPE	SIZE	DWG. NO.	REV
S	D	919-0548/-001	C

MODEL FSI | SCALE NONE | SHEET 4 OF 11



REVISIONS
REV | DATE | DESCRIPTION | DRAFTER | APPROVED | ECN
A | 1-6-03 | DRAWN IN P-CAD | KT | | ----
U25
U62
CGS74CT2524M
J8
44.1KHz REFERENCE
J25
J36
RCLK
RFS
RD
TD
TFS
TCLK
+3.3V
+5VD
U63/A 74LS08
U63/C 74LS08
U63/D 74LS08
U63/B 74LS08
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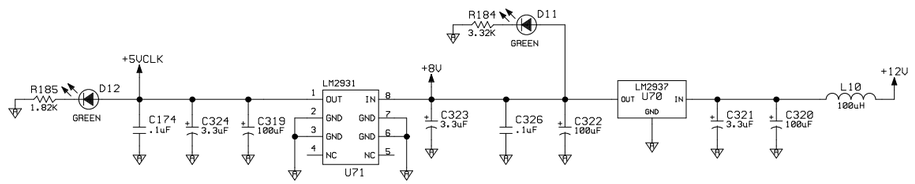
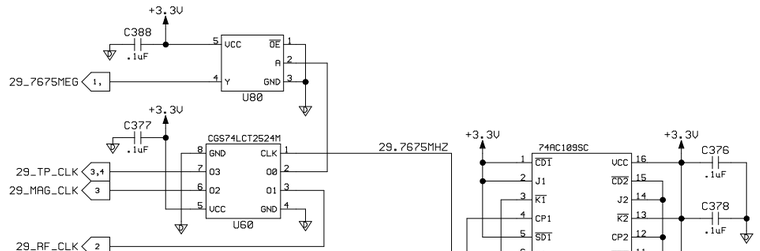
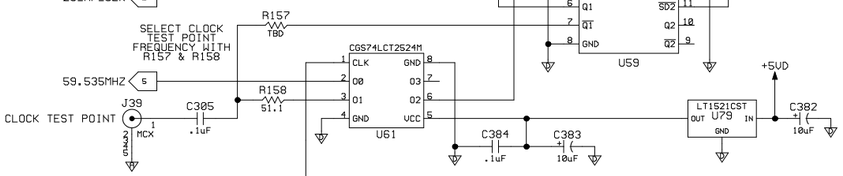
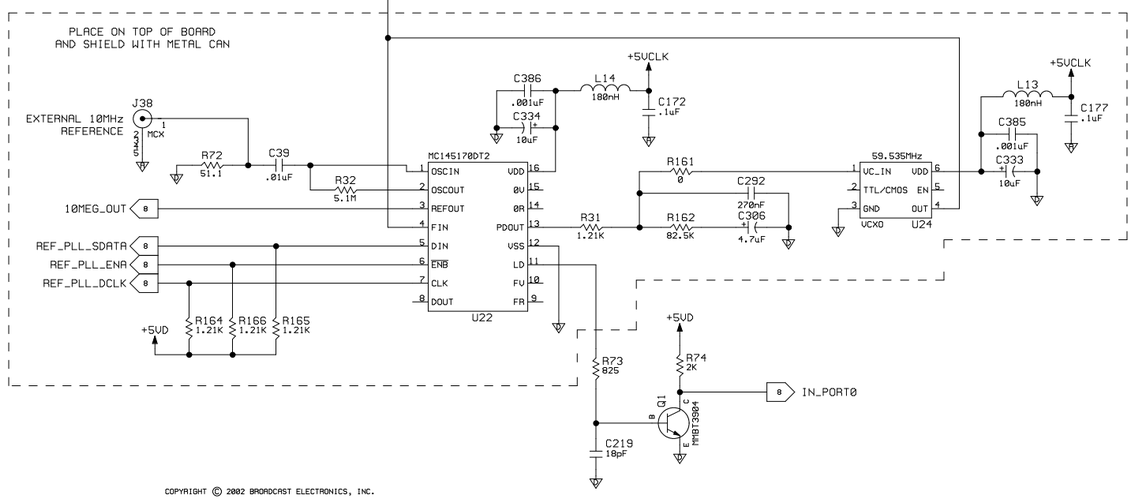
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY KT 12-9-02
DESIGNER(S) DWK 6-2-03
PROJ. LEADER
MFG.
MATERIAL SEE BOMS 919-0548 919-0548-001
FINISH
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE DIGITAL UPCONVERTOR
TYPE S SIZE D DWG. NO. 919-0548/-001 REV C
MODEL FSI SCALE NONE SHEET 5 OF 11

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----









NOTES:

1. ALL RESISTORS IN OHMS: 1/16W, 1%
   UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED:C393,D12,J43,JE1,JP1,
   L14,Q1,R204,RN13,U80
3. COMPONENTS NOT USED:C4-C11,C13-C22,C24-C31,
   C34-C38,C41-C43,C48,C49,C53-C74,C78,C79,C81,
   C83,C85,C103,C105,C106,C114,C119,C121,C122,C125,
   C126,C129,C130,C132,C135,C136,C138,C141,C142,C145,
   C146,C149,C150,C168,C170,C173,C175,C176,C179,C185-C187,
   C189,C191,C193,C195,C197,C199,C204-C210,C228-C235,C237-C240,
   C257,C263-C266,C269,C275,C277,C281,C282,C289-C291,C325,C332,
   C379,J1,J3,J5-J7,J9-J12,J14,J16-J19,J24,J27-J35,L1-L3,L12,R6,
   R9,R13,R17-R20,R24,R27-R30,R33-R35,R39,R40,R49-R51,R54,R57-R63,
   R65,R75-R85,R90-R110,R118-R120,R122,R124,R126,R127,R129,R130,
   R174-R176,R178,R192-R194,RN3-RN5,U8,U12-U15,U19-U21,U23,U26,U28,
   U33,U36,U41,U45,U46,U48-U52,U64,U76
4. SEE ASSEMBLY:AC919-0548
5. TBD IDICATES RESISTOR FOR FUTURE INPUTS: R111,R155,R156,R159,R160,
   R163,R167,R169,R170,R186,R187,R188,R189,R190,R191,R204.
6. * INDICATES PARTS NOT USED ON 919-0548-001 (C1-C3,C117,C118,C120,
   C211-C218,C236,C293-C296,C307,C359,C387,C308-C310,L6-L8,R1-R5,R7,R8,
   R36-R38,R41-R47,R52,R53,R55,R56,R64,R113,R115-R117,R131-R136,R177,
   R179-R183,R195,R196,R199-R203,U1-U7,U29-U32,U34,U35,U38,U44,U65,U73-U75

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	KT 12-9-02
DESIGNER(S)	DWK 6-2-03
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOMS 919-0548 919-0548-001
FINISH	
NEXT ASSY.	

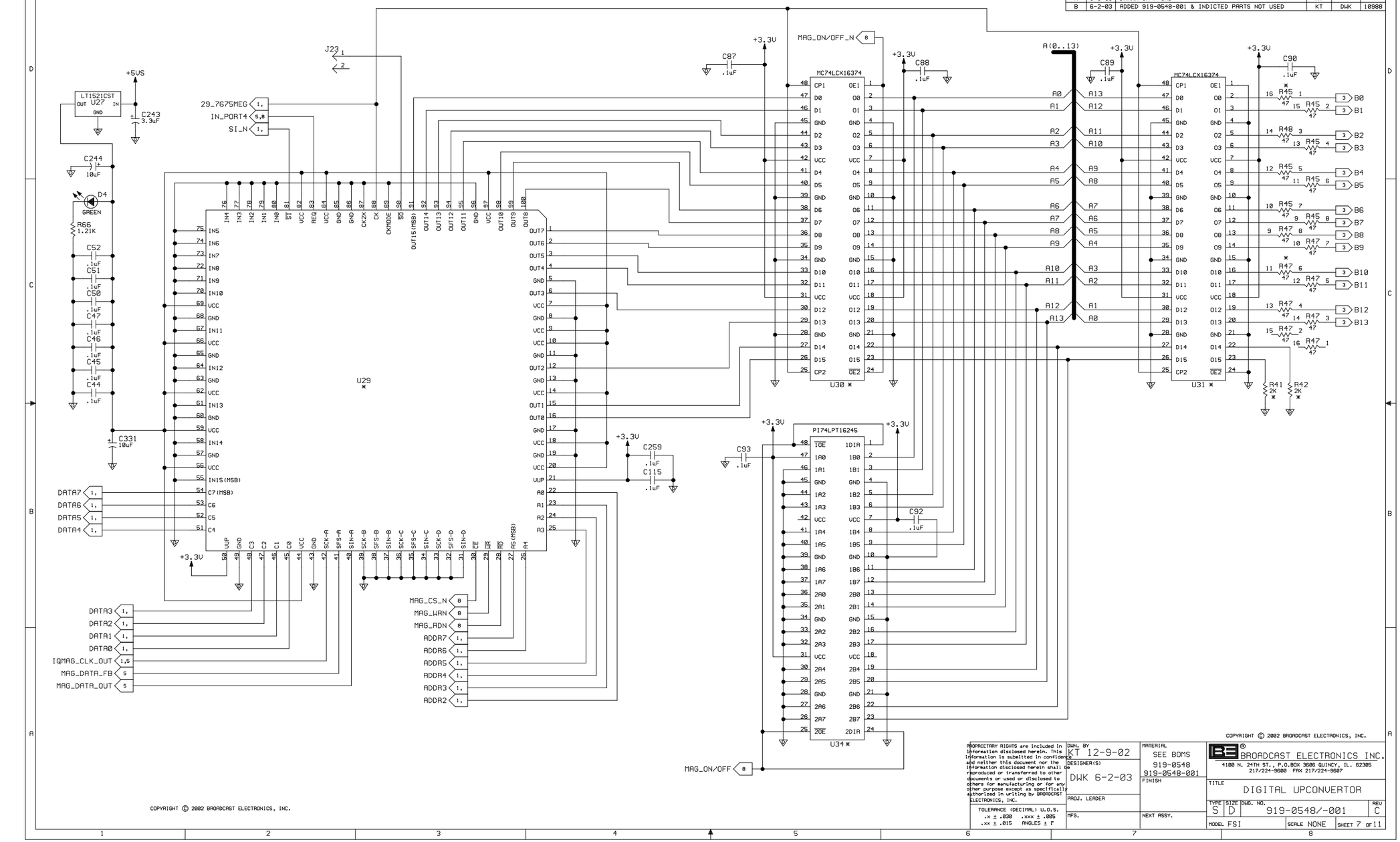
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL UPCONVERTOR

TYPE	SIZE	DWG. NO.	REV
S	D	919-0548/-001	C

MODEL FSI | SCALE NONE | SHEET 6 OF 11

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		-----
B	6-2-03	ADDED 919-0548-001 & INDICTED PARTS NOT USED	KT	DWK	10988



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	KT 12-9-02
DESIGNER(S)	DWK 6-2-03
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOMS 919-0548 919-0548-001
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL UPCONVERTOR

TYPE	SIZE	DWG. NO.	REV
S	D	919-0548/-001	C

MODEL FSI | SCALE NONE | SHEET 7 OF 11

REVISIONS				
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----

IN_PORTS CAN BE USED AS AN INTERRUPT

R197 10K

R128 51.1

J40 MCX 1Hz INPUT

+3.3V

J15 P_TCK, P_TDO, P_TMS, P_TDI

IN_PORT7
IN_PORT15
IN_PORT10

U37

ADDR6 ADDR7 ADDR8 ADDR4
PCI_CPLD1 ADDR18 ADDR19 ADDR20 ADDR21
REF_PLL_DCLK
IQ_ON/OFF IQ_ON/OFF_N SRAM_CSN BREQ SRAM_ADSPN BUFF_ACK DUC_RDN DUC_CS_N
PCI_CPLD0 REF_PLL_SDATA
R186 TBD
SRAM_OEN SRAM_ADSCN
PAR_SERN
REQ_ENN
IF_ON/OFF AM_FMN
R188 TBD

SER_OUT_ENA
IN_PORT1
IN_PORT11
IN_PORT14
IN_PORT9
IN_PORT12
IN_PORT13
IN_PORT8
BUFF_REQ
PCI_CPLD4
MAG_ON/OFF_N
MAG_ON/OFF
TP_ON/OFF
PHASE_ON/OFF
OE
DIR
DATA0

R187 TBD
R189 TBD

P_TP19 P_TP18 P_TP17 P_TP16 P_TP15 P_TP14 P_TP13 P_TP12 P_TP11 P_TP10 P_TP9 P_TP8 P_TP7 P_TP6 P_TP5 P_TP4 P_TP3 P_TP2 P_TP1 P_TP0

DATA_RESET
DATA31 DATA30 DATA29 DATA28 DATA27 SI_N GC_SER_ENA DATA26 DATA25 DATA24 DATA23 MAG_CS_N DATA22 REF_PLL_ENA DATA21 DATA20 DATA19 DATA18 DATA17 DATA16 DATA15 DATA14 DATA13 DATA12 DATA11 DATA10 DATA9 DATA8 DATA7 DATA6 DATA5 DATA4 DATA3 DATA2 DATA1

R191 TBD
R190 TBD

C329 10uF

C94 C95 C96 C97 C98 C99 C100 C101 C279 C280 C267 C268 .1uF

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 12-9-02
DESIGNER(S) DWK 6-2-03
PROJ. LEADER
MFG.

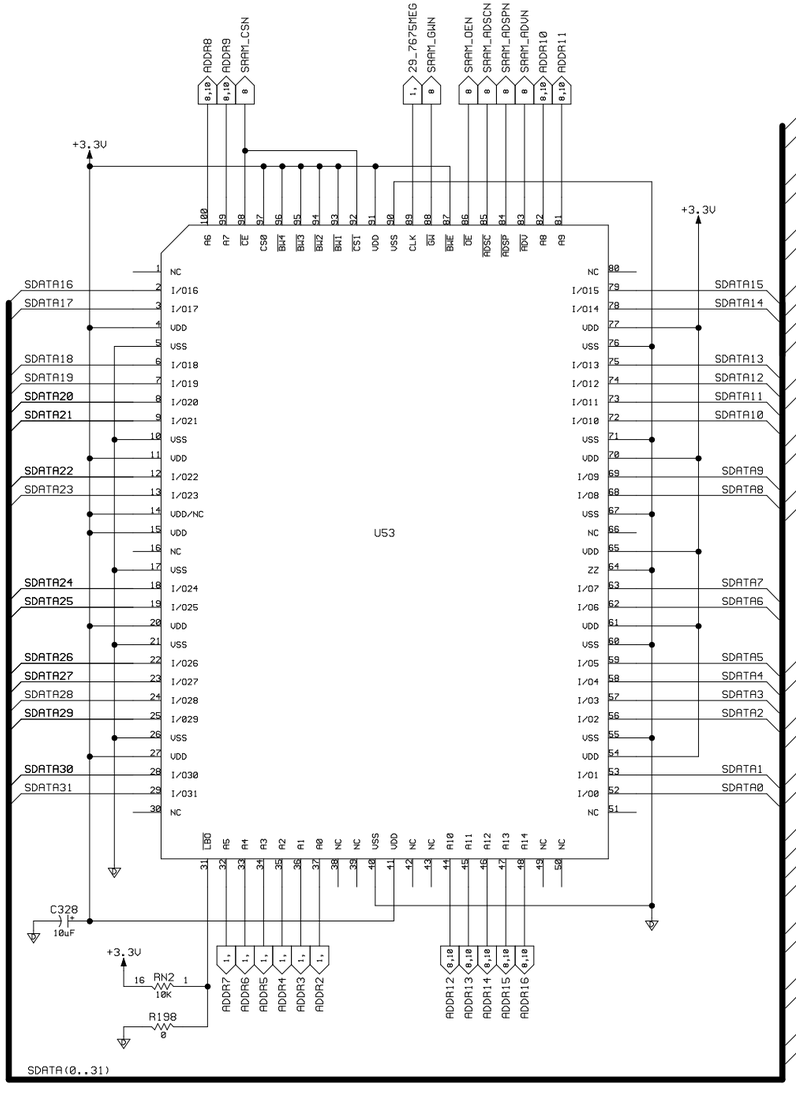
MATERIAL SEE BOMS 919-0548 919-0548-001
FINISH
NEXT ASSY.

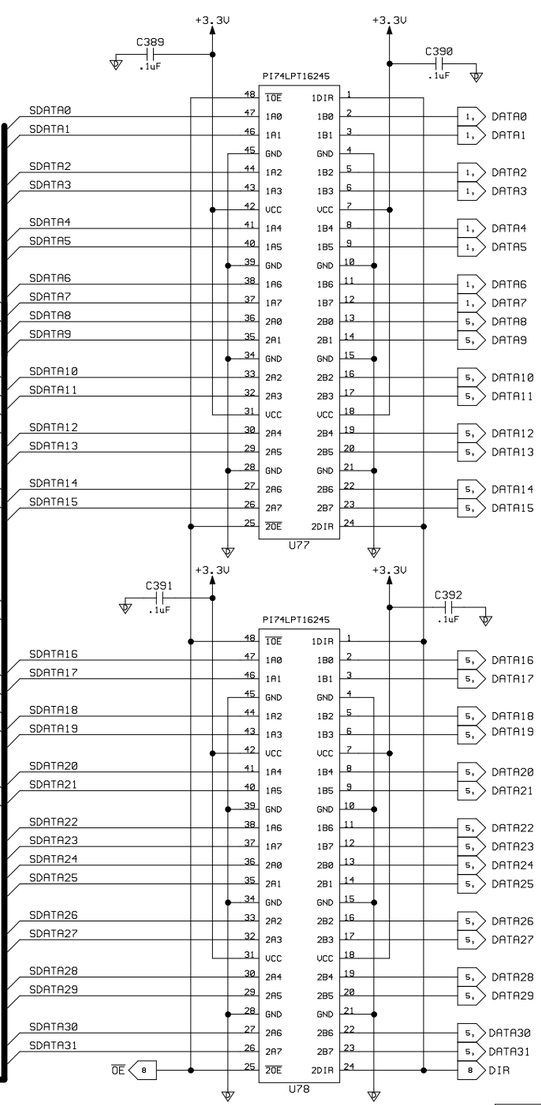
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

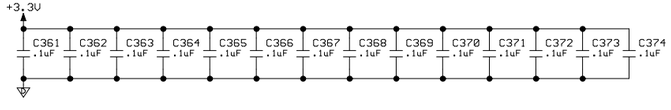
TITLE DIGITAL UPCONVERTOR

TYPE S SIZE D DWG. NO. 919-0548/-001 REV C
MODEL FSI SCALE NONE SHEET 8 OF 11

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----







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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	KT 12-9-02
DESIGNER(S)	DWK 6-2-03
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOMS 919-0548 919-0548-001
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL UPCONVERTOR

TYPE	SIZE	DWG. NO.	REV
S	D	919-0548/-001	C

MODEL FSI | SCALE NONE | SHEET 9 OF 11

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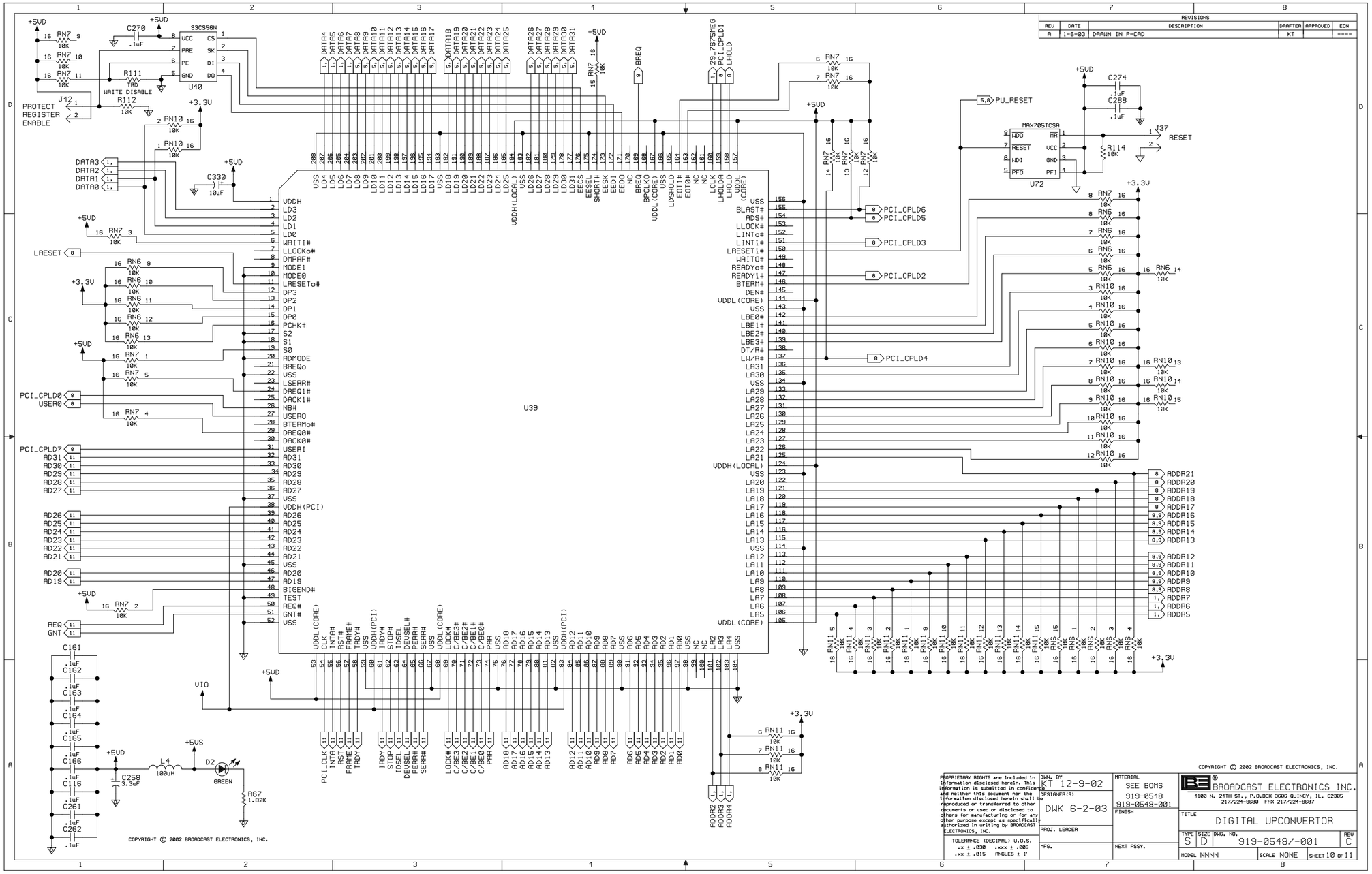

REVISIONS
REV | DATE | DESCRIPTION | DRAFTER | APPROVED | ECN
A | 1-6-03 | DRAWN IN P-CAD | KT | | ----
U39
U40
U72
93C56N
MAX705TCSA
J42
PROTECT REGISTER ENABLE
J37
RESET
PU_RESET
LRESET
PCI_CPLD0
USER0
PCI_CPLD7
PCI_CPLD6
PCI_CPLD5
PCI_CPLD3
PCI_CPLD2
PCI_CPLD4
ADDR21
ADDR20
ADDR19
ADDR18
ADDR17
ADDR16
ADDR15
ADDR14
ADDR13
ADDR12
ADDR11
ADDR10
ADDR9
ADDR8
ADDR7
ADDR6
ADDR5
ADDR2
ADDR3
ADDR4
VIO
+5VD
+5VS
+3.3V
GREEN
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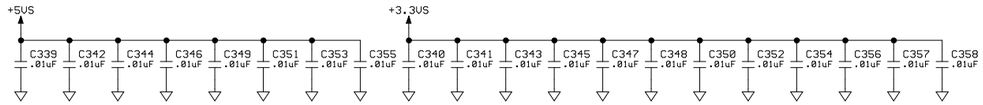
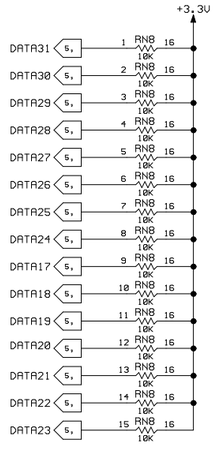
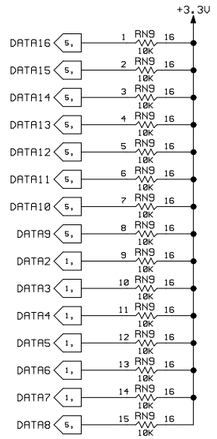
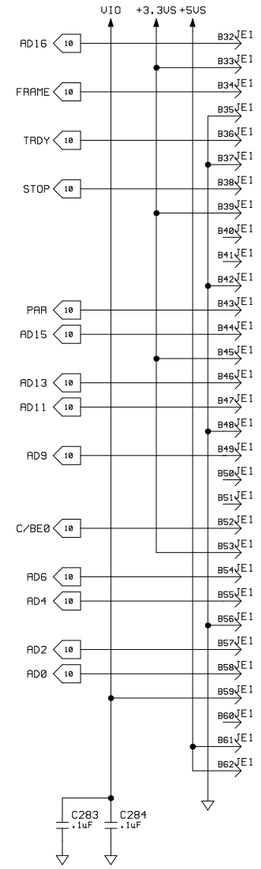
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY KT 12-9-02
DESIGNER(S) DWK 6-2-03
PROJ. LEADER
MFG.
MATERIAL SEE BOMS 919-0548 919-0548-001
FINISH
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE DIGITAL UPCONVERTOR
TYPE S SIZE D DWG. NO. 919-0548/-001 REV C
MODEL NNNN SCALE NONE SHEET 10 OF 11

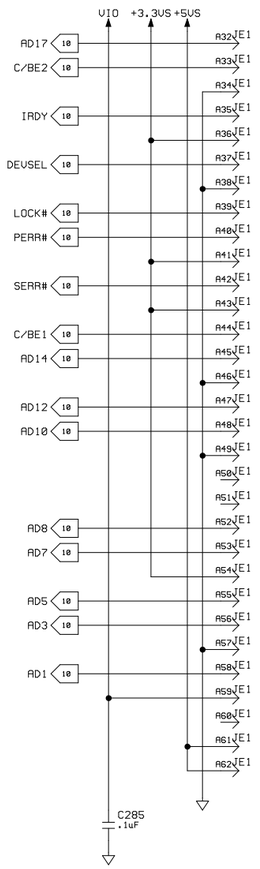
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	1-6-03	DRAWN IN P-CAD	KT		----

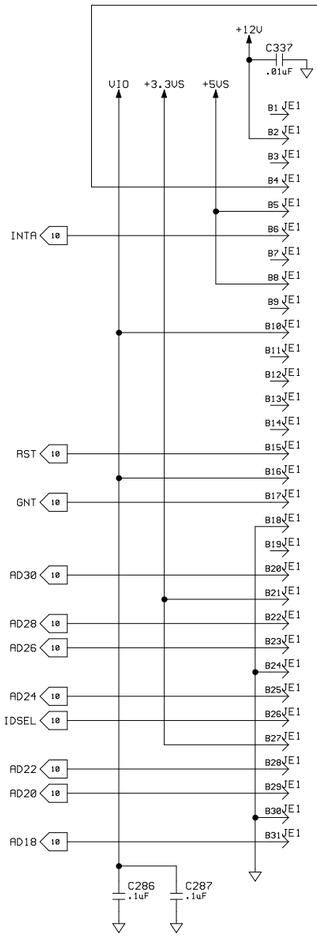


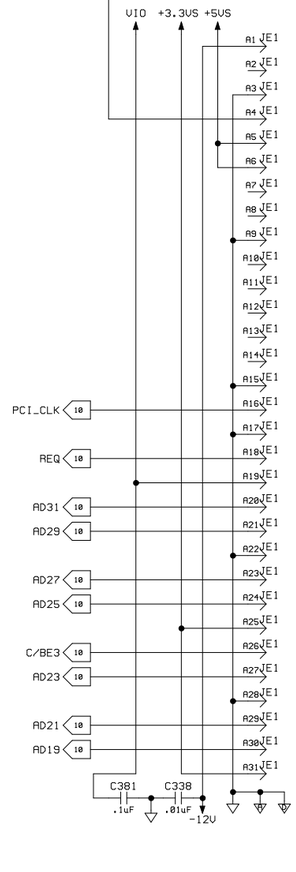












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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 12-9-02
DESIGNER(S) DWK 6-2-03
PROJ. LEADER
MFG.

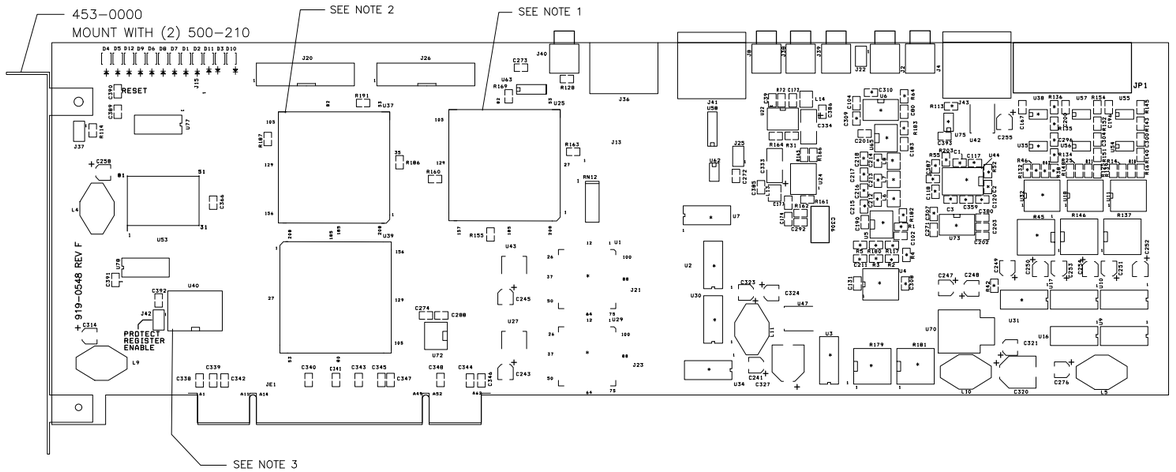
MATERIAL SEE BOMS 919-0548 919-0548-001
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE DIGITAL UPCONVERTOR

TYPE S SIZE D DWG. NO. 919-0548/-001 REV C
MODEL NNNN SCALE NONE SHEET 11 OF 11

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-30-02	MODEL RELEASE	KT	DWK	----
B	10-1-02	ADDED 453-0000 & 2 500-210 & CHGD R199 TO A 198-0203	KT	DWK	10797
C	11-7-02	ADDED SOFTWARE NUMBERS	KT	DWK	10822
D	6-2-03	ADDED 919-0548-001; INDICATED PARTS NOT STUFFED	KT	DWK	10988
E	6-2-03	MOVED VIA NEXT TO U42	KT	DWK	10989
F	2-20-04	MARKED C1-C3,C117,C118,C120,C307,C359,C387,R52,R55,R113,R203, U44,U73,U75 AS NOT STUFFED	KT		11089
G	11-3-05	CHG'D D1-D12 TO P/N 320-1371	ELP	DWK	11346



NOTES:

1) INSTALL 979-0548-U25 VER 1.0
2) INSTALL 979-0548-U37 VER 1.0
3) INSTALL 979-0548-U40 VER 1.0
4) ADD LABELS TO U25, U37 & U40 WITH U# AND VERSION #
5) * INDICATES PARTS NOT STUFFED ON 919-0548-001 (C1-C3,C117,C118,C120,C211-C218,C296,C307-C310,C359, C387,L6-L8,R1-R5,R7,R8,R38,R41-R43,R45,R46,R52,R55, R64,R113,R117,R132,R134-R136,R179-R183,R203,U1-U7, U29-U32,U34,U35,U38,U44,U65,U73, U75)

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1 °

DWN. BY KWT 5-30-02
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE BOM 919-0548
FINISH
NEXT ASSY.

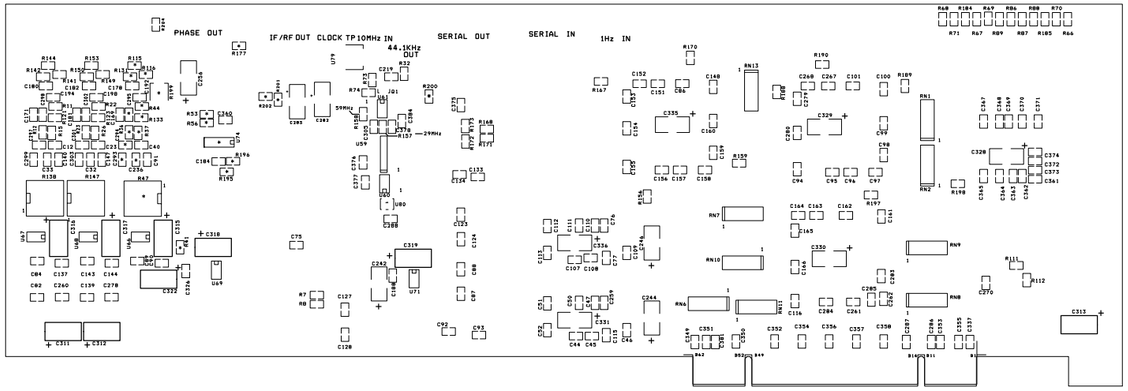
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL UP CONVERTOR

TYPE	SIZE	DWG No.	REV
A	C	919-0548/-001	G

MODEL NNNN SCALE 1/1 SHEET 1 OF 2

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-30-02	MODEL RELEASE	KT	DWK	----
B	10-1-02	ADDED 453-0000 & 2 500-210 & CHGD R199 TO A 198-0203	KT	DWK	10797
C	11-7-02	ADDED SOFTWARE NUMBERS	KT	DWK	10822
D	6-2-03	ADDED SHEET & 919-0548-001: INDICATED PARTS NOT STUFFED	KT	DWK	10988
F	2-20-04	MARKED R53,R56,R177,R195,R196,R200,U74 NOT STUFFED	KT		11089
G	11-3-05	CHG'D D1-D12 TO P/N 320-1371	ELP	DWK	11346



NOTES:
1) * INDICATES PARTS NOT STUFFED ON 919-0548-001
(C236,C293-C295, R36,R37,R41,R44,R47,R53,R56,R115,
R116,R131,R133,R177,R195,R196,R199-R202,U74)

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY KWT 5-30-02
DESIGNER(S)
PROJ. LEADER
MFG.

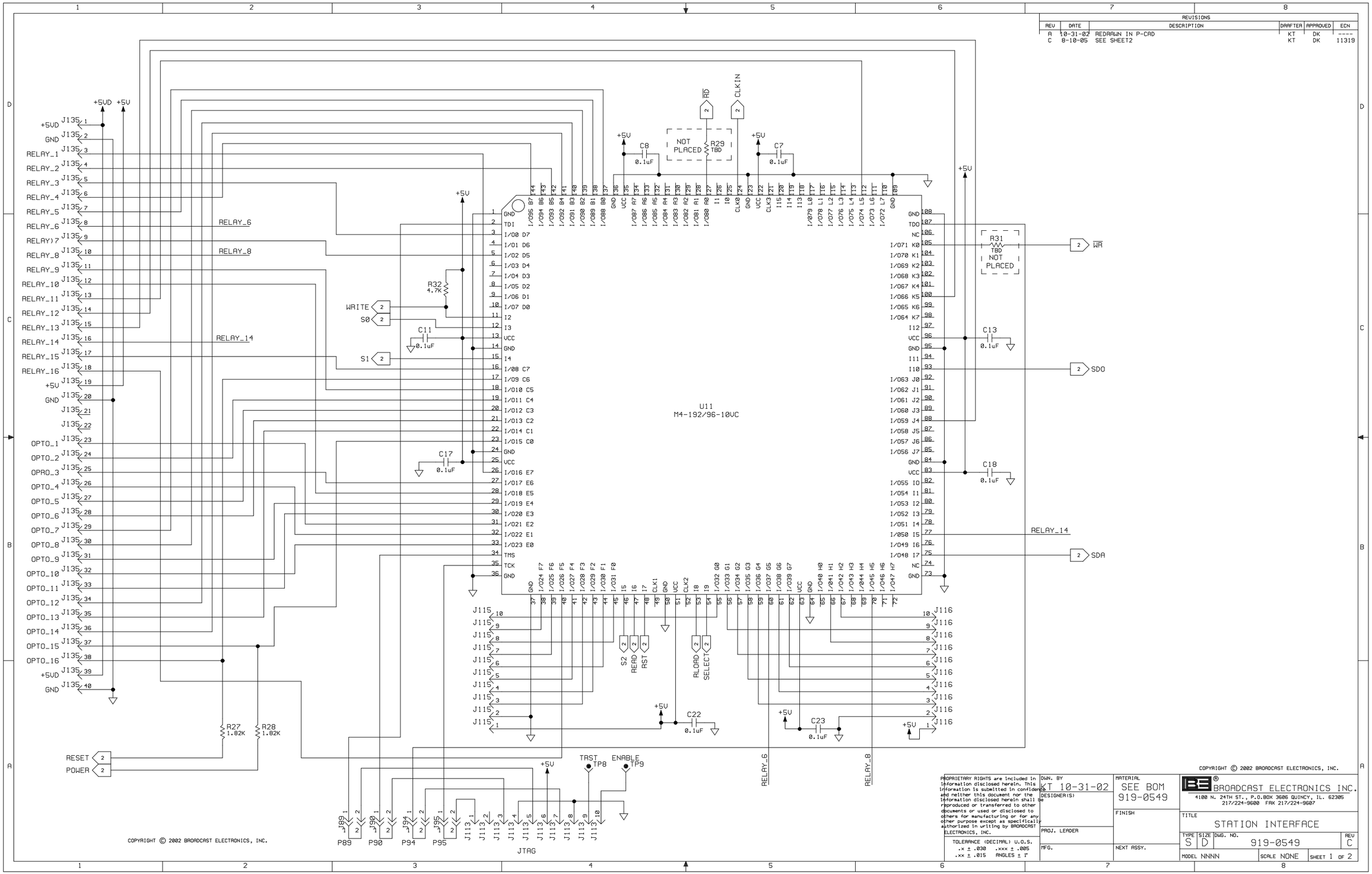
MATERIAL SEE BOM 919-0548
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL UP CONVERTOR

TYPE	SIZE	DWG No.	REV
A	C	919-0548/-001	G

MODEL NNNN | SCALE 1/1 | SHEET 2 OF 2



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REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	10-31-02	REDRAWN IN P-CAD	KT	DK	----
C	8-10-05	SEE SHEET2	KT	DK	11319

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 10-31-02
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE BOM 919-0549
FINISH
NEXT ASSY.

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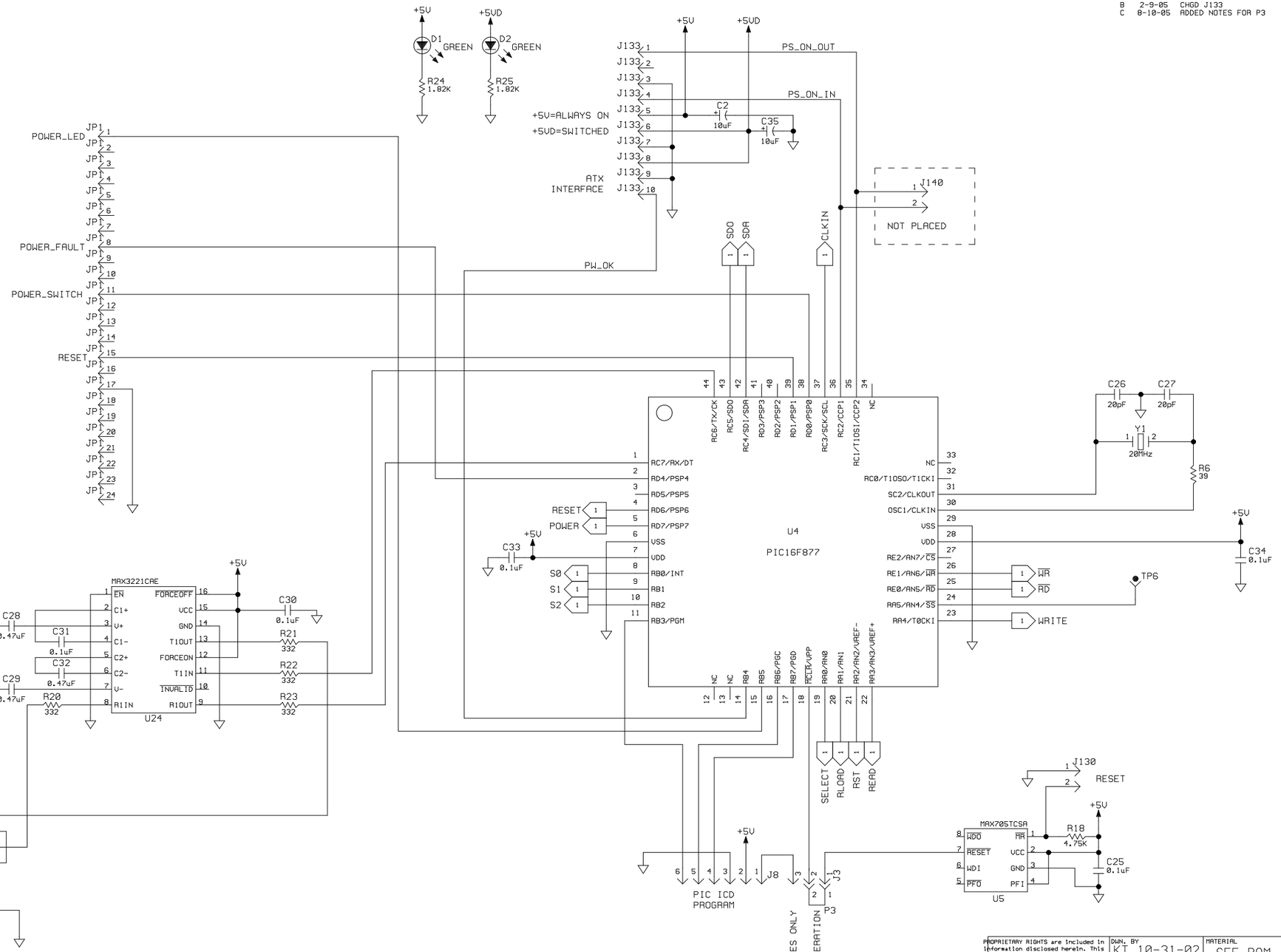
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE STATION INTERFACE

TYPE S | SIZE D | DWG. NO. 919-0549 | REV C

MODEL NNNN | SCALE NONE | SHEET 1 OF 2

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	10-31-02	REDRAWN IN P-CAD	KT	DK	----
B	2-9-05	CHGD J133	KT	DK	11250
C	8-10-05	ADDED NOTES FOR P3	KT	DK	11319



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 10-31-02
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE BOM 919-0549
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: STATION INTERFACE

TYPE S | SIZE D | DWG. NO. 919-0549 | REV C

MODEL NNNN | SCALE NONE | SHEET 2 OF 2

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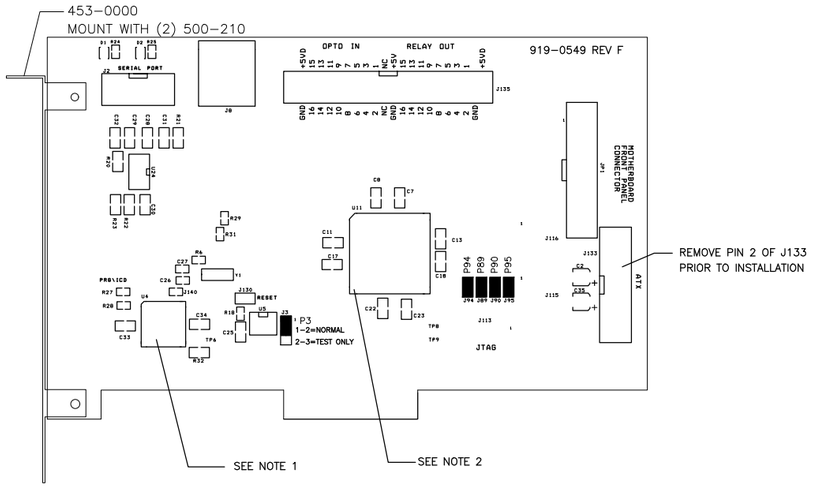
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-31-02	MODEL RELEASE	KT	DWK	----
B	10-1-02	ADDED 453-0000 & 2 500-210	KT	DWK	10797
C	10-29-02	ADDED P3,P89,P90,P94 & P95	KT	DWK	10809
D	11-8-02	ADDED SOFTWARE NOTES	KT	DWK	10823
E	2-3-03	ADDED NOTE TO REMOVE PIN 2 OF J133	KT	DWK	10895
F	2-9-05	CHGD TAB & J133, MOVED JP1	KT		11250
G	8-10-05	ADDED JUMPER TABLE & ADDED NOTES TO P3			



NOTES:
1) INSTALL 979-0549-U4 VER 1.0
2) INSTALL 979-0549-U11 VER 1.0
3) ADD LABELS TO U4 & U11 INDICATING U# AND VER#.

JUMPER TABLE		
	NORMAL OPERATION	TEST PUPOSES ONLY
P3	1-2	2-3
P89	INSTALLED	N/A
P90	INSTALLED	N/A
P94	INSTALLED	N/A
P95	INSTALLED	N/A

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY KT 5-31-02
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE BOM 919-0549
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: STATION INTERFACE BOARD

TYPE A | SIZE C | DWG No. 919-0549 | REV G
MODEL NNNN | SCALE 1/1 | SHEET 1 OF 1

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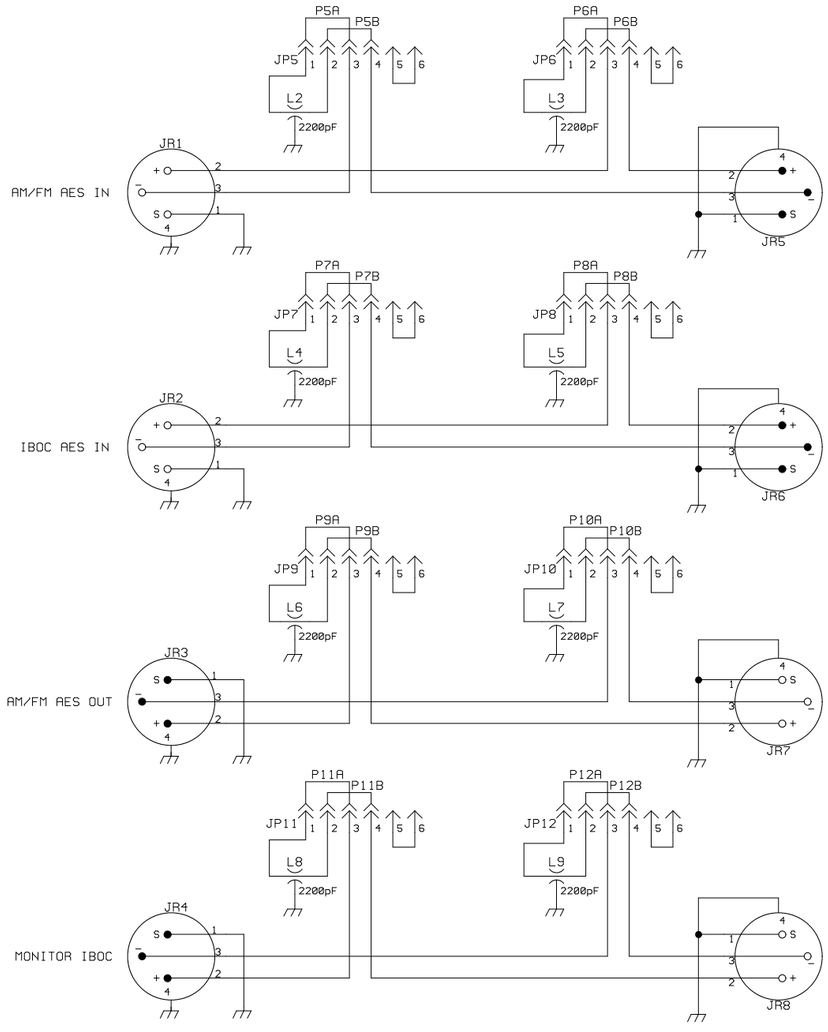
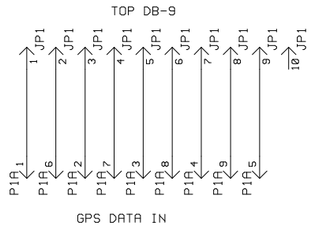
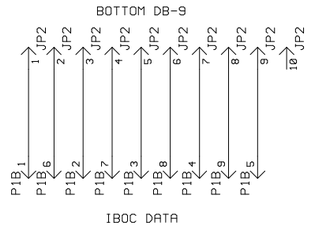
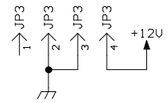
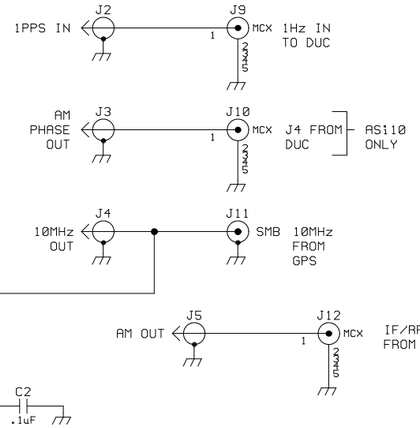
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-31-02	MODEL RELEASE	KT		----
B	10-3-02	TIED J4 & J11 TO T1 PIN 1; CHGD J11 TO A 417-1701	KT	JW	10799
C	10-29-02	ADDED NOTES & P5A-P12B & CLEANED UP TO MATCH BOARD	KT	DK	10811
D	1-28-03	DEL R10 & R15	KT	DK	10870
E	5-16-05	CHGD JR1-JR8	KT	KS	11285

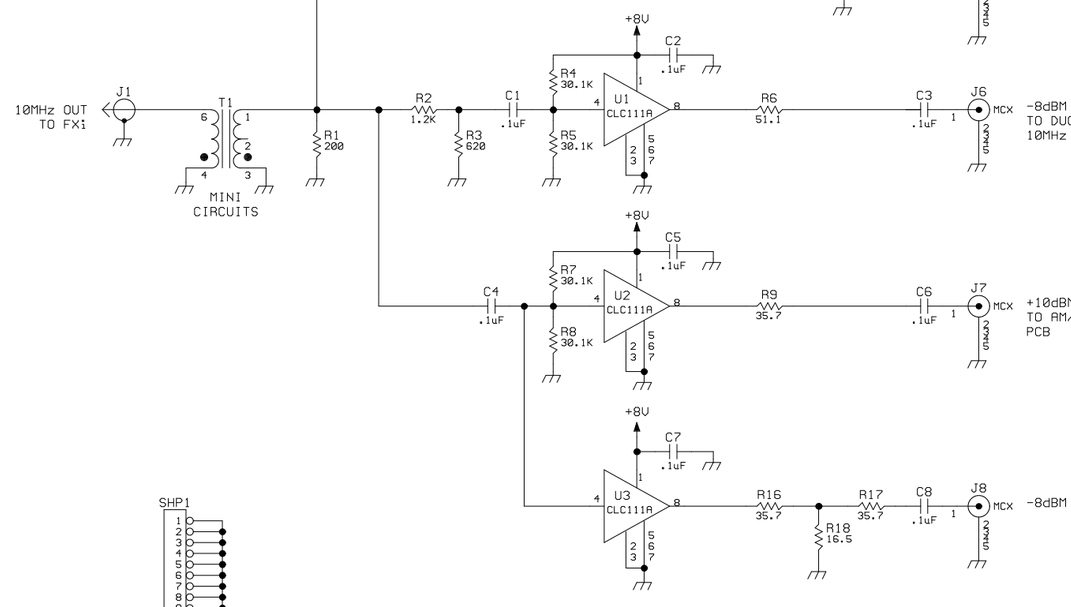


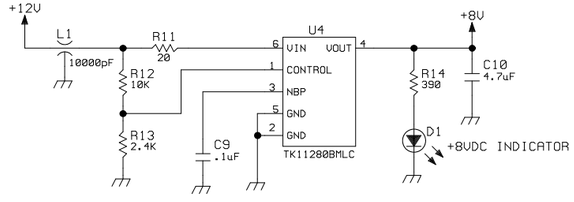


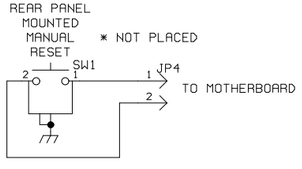


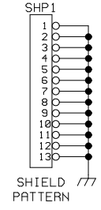












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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	KT 5-31-02
DESIGNER(S)	
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOM 919-0551
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: XLR-BNC I/O INTERFACE

TYPE	SIZE	DWG. NO.	REV
S	D	919-0551	E

MODEL NNNN | SCALE NONE | SHEET 1 OF 1

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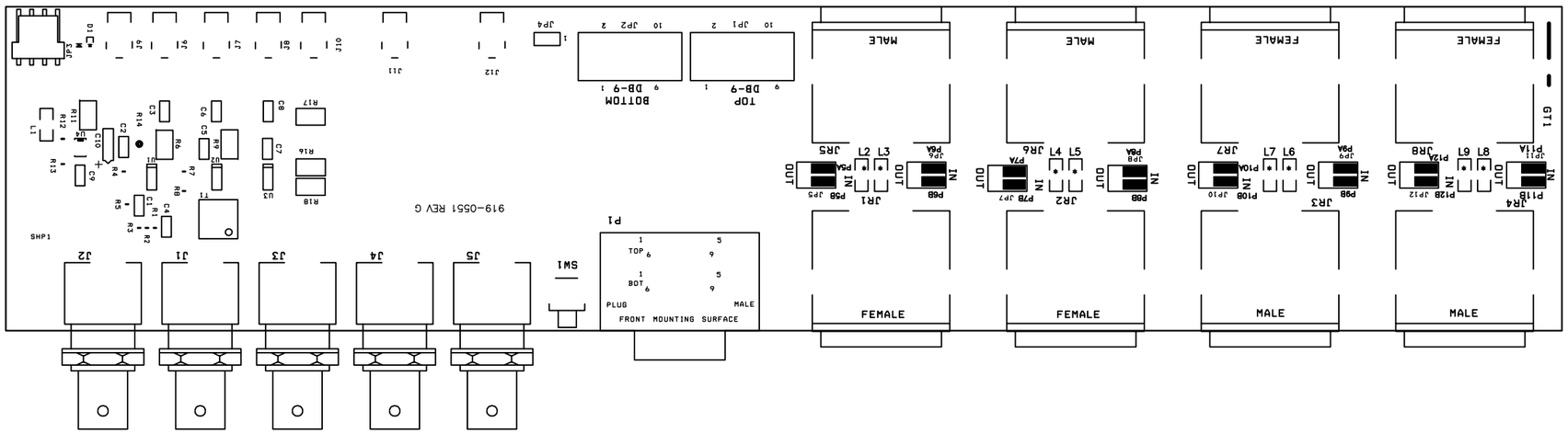
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5–30–02	MODEL RELEASE	KT	JW	–––
B	10–3–02	ADDED 4 .028 HOLES & TRACE : CHANGED J11 TO A 417–1701	KT	JW	10799
C	10–29–02	ADDED P5A–P12B; INDICATED L2–L9 & ADDED NOTES	KT	DK	10811
D	1–29–03	DEL R10 & R15	KT	DK	10870
E	5–16–03	CHGD JP5–JP12 TO 417–2600	KT	DK	10965
F	3–15–05	ADDED 4 0.171 HOLES	KT	DK	11265
G	5–16–05	CHGD JR1–JR8	KT		11285



NOTES:
1) * INDICATES COMPONENT STUFFED ON SOLDER SIDE (L2–L9)

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY KT 5–31–02
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE BOM 919–0551
FINISH
NEXT ASSY.

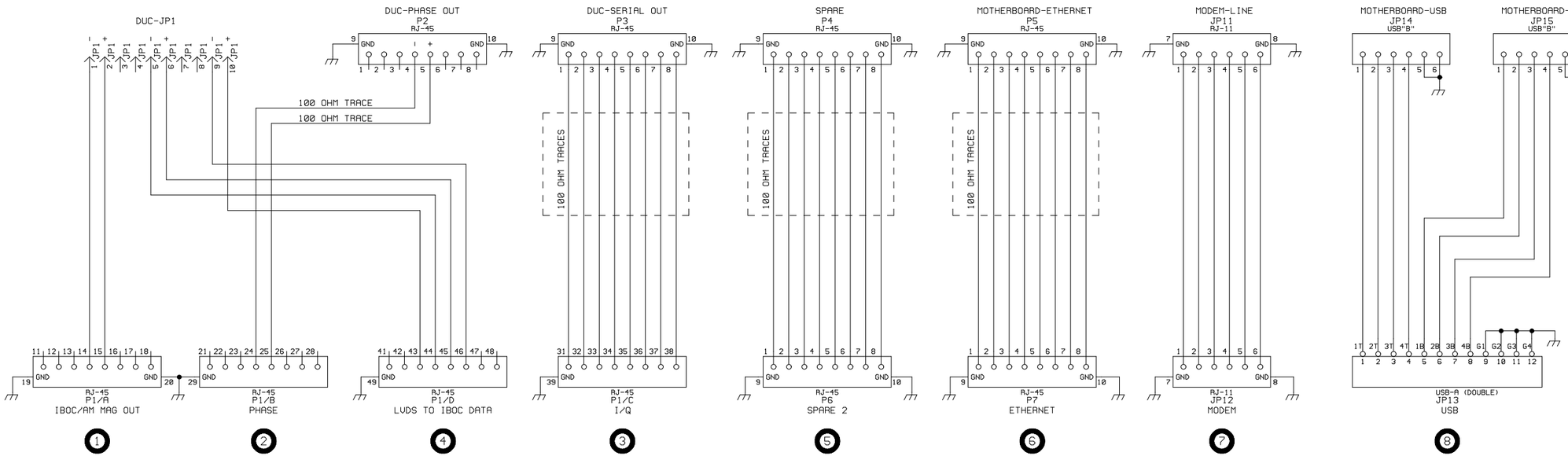
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: BNC XLR BOARD

TYPE	SIZE	DWG No.	REV
A	B	919–0551	G

MODEL NNNN | SCALE 1/1 | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	10-24-02	REDRAWN IN P-CAD; ENGINEERING RELEASE	KT		----



#2 MOUNTING HOLES

MH1 MH2 MH3 MH4

= PCB/PANEL SEQUENCE LOCATION

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY: KT 10-24-02
DESIGNER(S):
PROJ. LEADER:
MFG.:

MATERIAL: SEE BOM 919-0552
FINISH:
NEXT ASSY.:

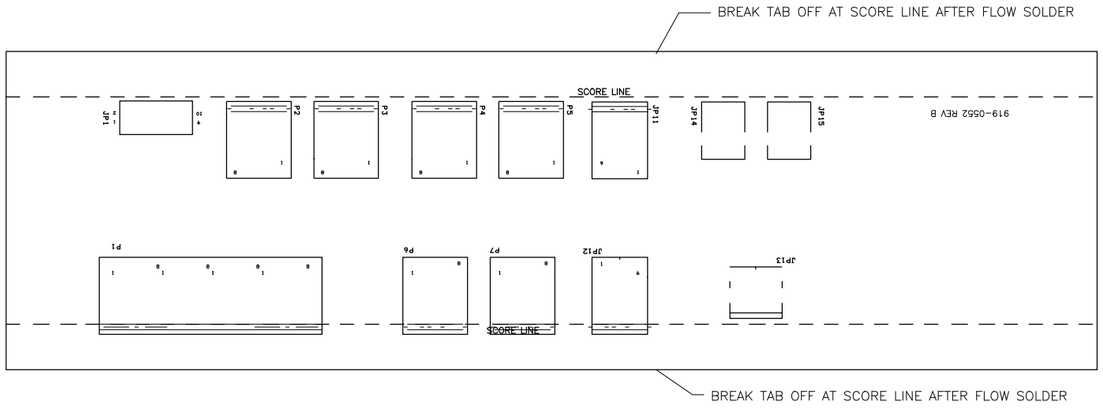
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: RJ-45/USB/DB-9 I/O INTERFACE

TYPE	SIZE	DWG. NO.	REV
S	D	919-0552	A

MODEL NNNN | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-29-02	MODEL RELEASE	KT	DK	----
B	3-2-05	ADDED 2 0.500 INCH BREAKAWAY TABS	KT	DK	11263



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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY KT 5-29-02

DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL SEE BOM 919-0552

FINISH

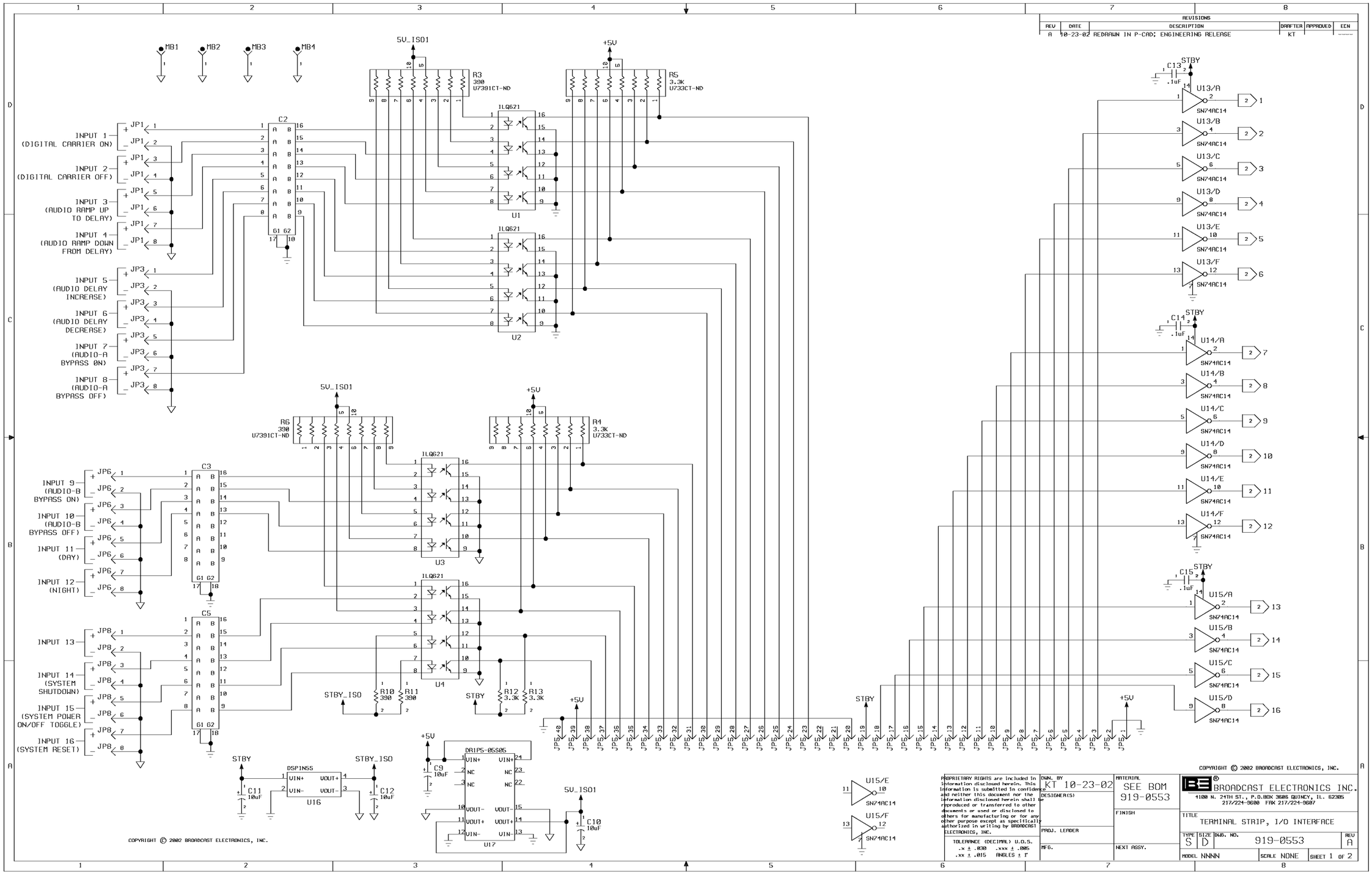
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE RJ USB

TYPE	SIZE	DWG No.	REV
A	C	919-0552	B

MODEL NNNN | SCALE 1/1 | SHEET 1 OF 1



REVISIONS
REV | DATE | DESCRIPTION | DRAFTER | APPROVED | ECN
A | 10-23-02 | REDRAWN IN P-CAD; ENGINEERING RELEASE | KT
MB1
MB2
MB3
MB4
5V_ISO1
+5V
R3 390 U7391CT-ND
R5 3.3K U733CT-ND
R6 390 U7391CT-ND
R4 3.3K U733CT-ND
ILQ621
U1
U2
U3
U4
C2
C3
C5
INPUT 1 (DIGITAL CARRIER ON)
INPUT 2 (DIGITAL CARRIER OFF)
INPUT 3 (AUDIO RAMP UP TO DELAY)
INPUT 4 (AUDIO RAMP DOWN FROM DELAY)
INPUT 5 (AUDIO DELAY INCREASE)
INPUT 6 (AUDIO DELAY DECREASE)
INPUT 7 (AUDIO-A BYPASS ON)
INPUT 8 (AUDIO-A BYPASS OFF)
INPUT 9 (AUDIO-B BYPASS ON)
INPUT 10 (AUDIO-B BYPASS OFF)
INPUT 11 (DAY)
INPUT 12 (NIGHT)
INPUT 13
INPUT 14 (SYSTEM SHUTDOWN)
INPUT 15 (SYSTEM POWER ON/OFF TOGGLE)
INPUT 16 (SYSTEM RESET)
STBY_ISO
STBY
R10 390
R11 390
R12 3.3K
R13 3.3K
DSPIN55
U16
C11 10uF
C12 10uF
DRIP5-05S05
U17
C9 10uF
C10 10uF
U13/A
U13/B
U13/C
U13/D
U13/E
U13/F
U14/A
U14/B
U14/C
U14/D
U14/E
U14/F
U15/A
U15/B
U15/C
U15/D
U15/E
U15/F
SN74AC14
C13 .1uF
C14 .1uF
C15 .1uF
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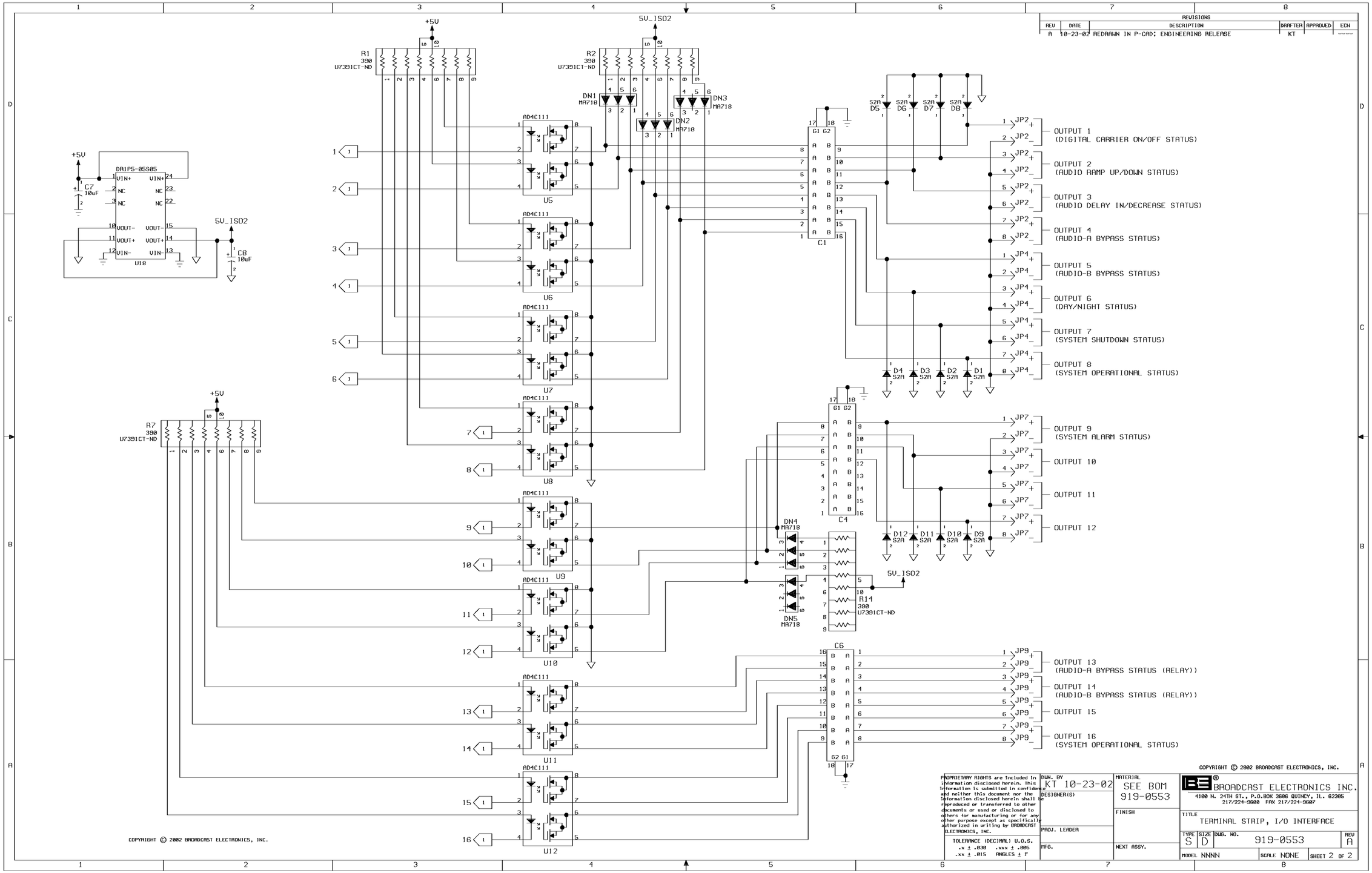
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY KT 10-23-02
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL SEE BOM 919-0553
FINISH
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE TERMINAL STRIP, I/O INTERFACE
TYPE S SIZE D DWG. NO. 919-0553 REV A
MODEL NNNN SCALE NONE SHEET 1 OF 2



REVISIONS
REV DATE DESCRIPTION DRAFTER APPROVED ECN
A 10-23-02 REDRAWN IN P-CAD; ENGINEERING RELEASE KT
+5V
5V_ISO2
R1 390 U7391CT-ND
R2 390 U7391CT-ND
R7 390 U7391CT-ND
DN1 MA718
DN2 MA718
DN3 MA718
DN4 MA718
DN5 MA718
R14 390 U7391CT-ND
DR1P5-05S05
U18
C7 10uF
C8 10uF
AD4C111
U5
U6
U7
U8
U9
U10
U11
U12
C1
C4
C6
S2A D5 S2A D6 S2A D7 S2A D8
D4 S2A D3 S2A D2 S2A D1 S2A
D12 S2A D11 S2A D10 S2A D9 S2A
JP2
JP4
JP7
JP9
OUTPUT 1 (DIGITAL CARRIER ON/OFF STATUS)
OUTPUT 2 (AUDIO RAMP UP/DOWN STATUS)
OUTPUT 3 (AUDIO DELAY IN/DECREASE STATUS)
OUTPUT 4 (AUDIO-A BYPASS STATUS)
OUTPUT 5 (AUDIO-B BYPASS STATUS)
OUTPUT 6 (DAY/NIGHT STATUS)
OUTPUT 7 (SYSTEM SHUTDOWN STATUS)
OUTPUT 8 (SYSTEM OPERATIONAL STATUS)
OUTPUT 9 (SYSTEM ALARM STATUS)
OUTPUT 10
OUTPUT 11
OUTPUT 12
OUTPUT 13 (AUDIO-A BYPASS STATUS (RELAY))
OUTPUT 14 (AUDIO-B BYPASS STATUS (RELAY))
OUTPUT 15
OUTPUT 16 (SYSTEM OPERATIONAL STATUS)
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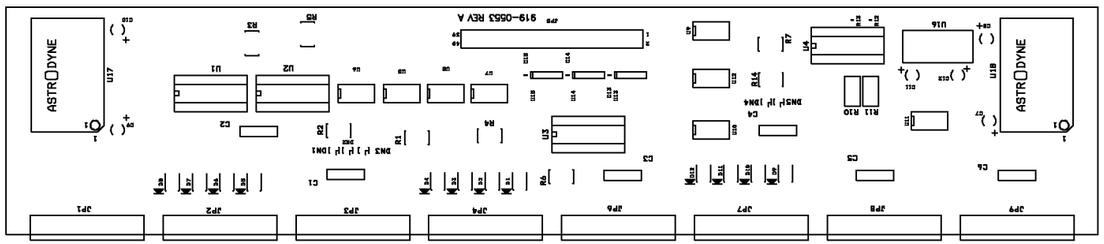
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY KT 10-23-02
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL SEE BOM 919-0553
FINISH
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE TERMINAL STRIP, I/O INTERFACE
TYPE S SIZE D DWG. NO. 919-0553 REV A
MODEL NNNN SCALE NONE SHEET 2 OF 2

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-29-02	MODEL RELEASE	KT		----



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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY	KT 5-28-02
DESIGNER(S)	
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOM 919-0553
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE			
PHOENIX BOARD			
TYPE	SIZE	DWG No.	REV
A	C	919-0553	A
MODEL NNNN	SCALE 1/1	SHEET 1 OF 1	

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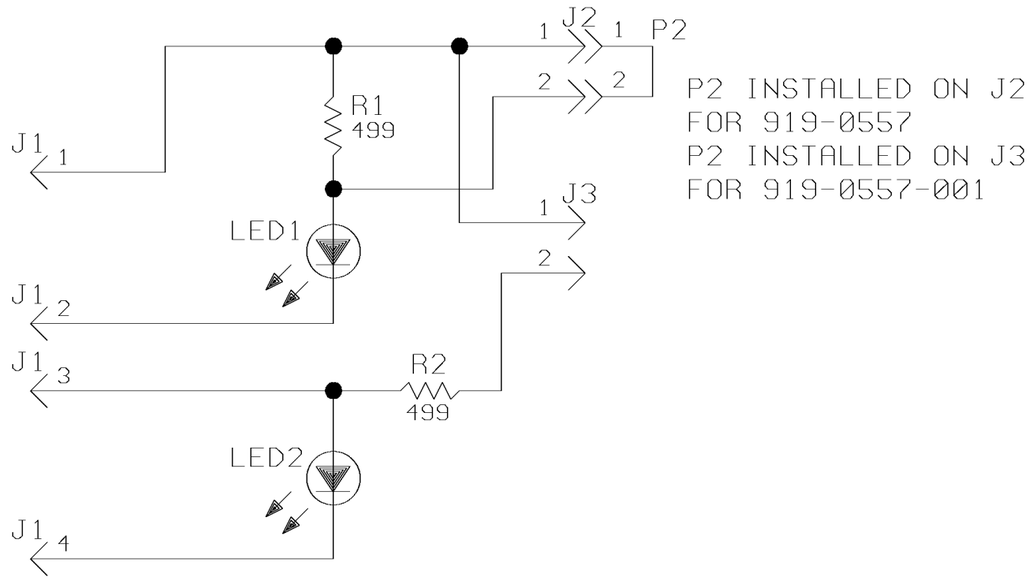
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-23-02	MODEL RELEASE	KT	RH	----
B	9-18-02	ADDED R1,R2,P2,J2 & J3; ENGINEERING RELEASE	KT		10782



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 5-23-02

DESIGNER(S) RH 5-23-02

PROJ. LEADER

MFG.

MATERIAL SEE BOMS
919-0557
919-0557-001

FINISH

NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE
FRONT PANEL LED BOARD

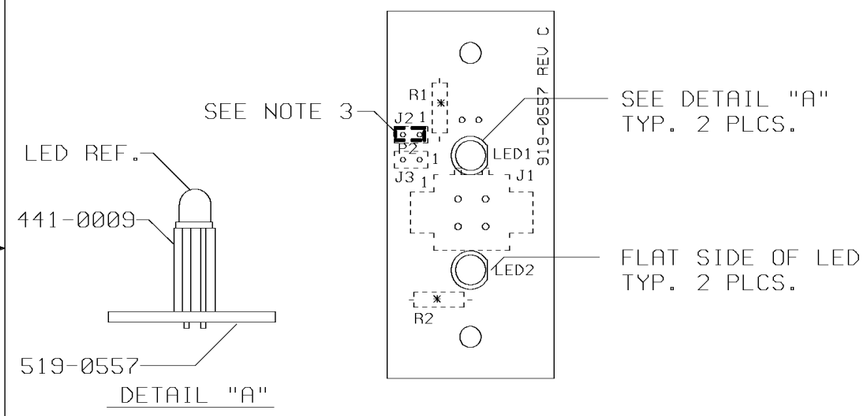
TYPE	SIZE	DWG. NO.	REV
S	A	919-0557/-001	B

MODEL FM-IBOC | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	5-23-02	MODEL RELEASE	KT		----
B	8-15-02	CORRECTED DETAIL	KT		----
C	9-18-02	ADDED R1,R2,J2,J3,P2; ENGINEERING RELEASE	KT		10782

NOTES:

1: J1,J2,J3,R1,R2 ARE MOUNTED ON THE SOLDER SIDE.
2: * INDICATES R1,R2 ARE NOT MOUNTED ON 919-0557.
3: P2 IS INSTALLED ON J2 FOR 919-0557.
P2 IS INSTALLED ON J3 FOR 919-0557-001.



COMPONENT	919-0557	919-0557-001
LED1	323-9224	323-9224
LED2	323-9217	323-9224

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY KT 5-23-02
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE BOMS
919-0557
919-0557-001
FINISH
NEXT ASSY.

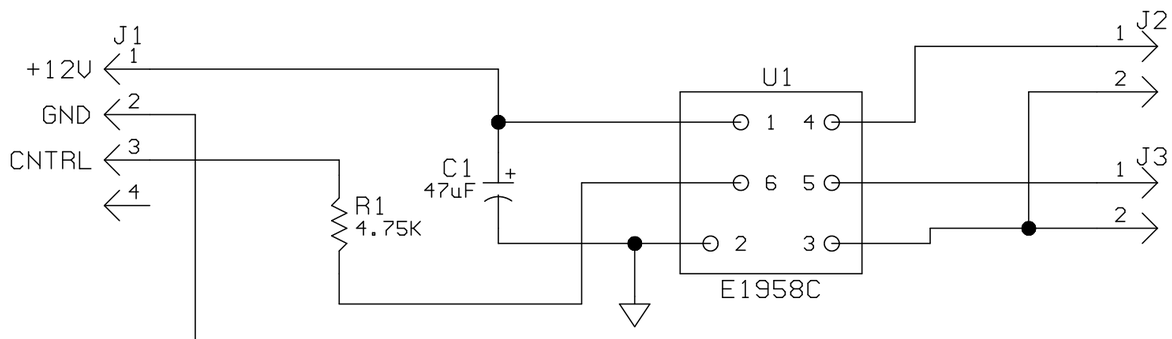
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE
FRONT PANEL LED BOARD

TYPE	SIZE	DWG No.	REV
A	A	919-0557/-001	C

MODEL NNNN SCALE 1/1 SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	7-2-02	PROTOTYPE RELEASE/MODEL RELEASE	KT	JT	----
B	2-9-05	ADDED R1	KT		11251



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY KT 7-2-02

DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL SEE BOM 919-0558

FINISH

NEXT ASSY.

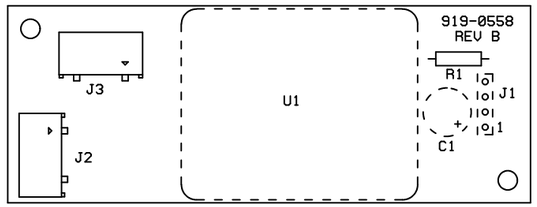
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE LCD POWER

TYPE	SIZE	DWG. NO.	REV
S	A	919-0558	B

MODEL NNNN | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	7-3-02	MODEL RELEASE	KT		----
B	2-10-05	ADDED R1	KT		11251



NOTES:

1) DASHED OUTLINE COMPONENTS PLACED ON SOLDER SIDE: (C1,J1,U1)

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY KT 7-3-02

DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL SEE BOM 919-0558

FINISH

NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE LCD POWER SUPPLY

TYPE	SIZE	DWG No.	REV
A	A	919-0558	B

MODEL NNNN SCALE 1/1 SHEET 1 OF 1