

FSK KEYLINE MODEM SYSTEM
for
REMOTE CONTROL of
TADIL A HF TRANSCEIVER SYSTEM

KY-9110 Modem Pair
and
SNR-2031

OPERATION AND MAINTENANCE
MANUAL



Revision Record

| Revision | Date | ECN | Description |
|-------------------------|-------------|------------|------------------------|
| 1 st Edition | 01/19/95 | | Release for production |
| Page Update | 03/02/95 | | |
| Page Update | 03/24/95 | | |
| 2 nd Edition | | | |
| A | 2/26/03 | 8109-0011 | See ECN |

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Conventions Used in this Manual


- Button names, screen names and key names are printed in **bold**.
- **Notes:** provide information to help you accomplish tasks efficiently or to avoid problems.
- Mouse clicks:
 - Unless otherwise specified, the left mouse button is used for all mouse actions.
 - Single-click on an item to activate a button.
 - Double-click on most other items to activate a function.
- Dialog box types and use:
 - A List Box is a control that provides a list of items from which to choose.
 - A Text Box is a control that allows you to enter or view text in a form. Usually, text boxes hold a single line of text
 - A Combo Box is a control, similar to a List Box and Text Box combined, which you enter a value or select an item from a list.
 - Some options require that you enter additional information. Additional information is typed into a Text Box (field), selected from a Drop-Down List with up or down arrows or selected by clicking on a button.
-  This symbol indicates more information is available about a subject and directs you to additional references.

TABLE of STANDARD ABBREVIATIONS

| | | | |
|-------------------|---|------------|--|
| ADDR | Address | LT | Light |
| AGC | Automatic Gain Control | LVL | Level |
| ALC | Automatic Level Control | MAN / MNL | Manual |
| AM | Amplitude Modulation | M CH | Manual Channel |
| AME | Amplitude Modulation Equivalent | MED | Medium |
| AMP/AMPL | Amplifier | MHz | MegaHertz |
| ARQ | Automatic Request | MIC | Microphone |
| AUD | Audio | MIL-STD | Military Standard |
| AUTO | Automatic | ms | Millisecond |
| AUX | Auxiliary | MTTR | Mean Time To Repair |
| BAUD | A variable unit of data transmission speed (bits per second) | MTR | Meter |
| BELL U.S. | Telephone standards | NAR | Narrow |
| BFO | Beat Frequency Oscillator | O.D. | Olive Drab |
| BITE | Built In Test Equipment | PA | Power Amplifier |
| BRD | Board | PC | Printed Circuit |
| CH /CHAN /CHL/CHN | Channel | PEP | Peak Envelope Power |
| CLR | Clear | PLL | Phase-Locked Loop |
| CMOS | Complementary Metal Oxide Semiconductor | P/N | Part Number |
| CPLR | Coupler | PNL | Panel |
| CPU | Computer | POSTSL | Post-Selector |
| CW | Carrier Wave | PRESEL | Pre-Selector |
| dB | Decibel | PSTN | Public Switched Telephone Network |
| dBm | Decibels referred to 1 milliwatt across 600 ohms | PTT | Push-To-Talk |
| DSBSC | Double Sideband Suppressed Carrier | PWR | Power |
| DSP | Display | RCV/RX | Receive |
| DUART | Dual Asynchronous Receive/Transmit | REFL / RFL | Reflected |
| EEPROM | Electrically Erasable and Programmable Read Only Memory | REV | Revision |
| EPROM | Electrically Programmable Read Only Memory | RF | Radio Frequency |
| EMI | Electromagnetic Radiation Interference | RFI | Radio Frequency Interference |
| ENTR | Enter | RMT | Remote |
| ESD | Electrostatic Discharge | RS232 | Computer control, hardwired up to 50 feet maximum |
| FAX | Facsimile | RS422 | Computer control, hardwired up to 4000 feet maximum |
| FEC | Forward Error Correction | RS485 | Computer control, hardwired for multiple users |
| FREQ | Frequency | RTTY | Radio Teletype |
| FSK | Frequency Shift Keying | SEL | Select |
| FWD | Forward | SLO | Slow |
| GRP | Group | S MTR | Signal Strength Meter |
| HF | High Frequency | SPKR | Speaker |
| Hz | Hertz | SPLX | Simplex |
| IC | Integrated Circuit | SRAM | Static Random Access Memory |
| IF | Intermediate Frequency | SSB | Single Sideband |
| I/O | Input/Output | TCXO | Temperature Controlled Crystal Oscillator |
| IONCAP | Ionospheric Communications Analysis and Prediction | TGC | Transmit Gain Control |
| ISB | Independent Sideband | THD | Total Harmonic Distortion |
| kHz | KiloHertz | TTL | Transistor Transistor Logic |
| kW | KiloWatt | TX/XMT | Transmit |
| LCD | Liquid Crystal Display | USB | Upper Sideband |
| LCL | Local | UTC | Universal Time |
| LED | Light Emitting Diode | VCO | Voltage Controlled Oscillator |
| LK | Link | VHF | Very High Frequency |
| LO | Local Oscillator | VRMS | Volts Root Mean Square |
| LP/LPX | Lincompex | VSWR | Voltage Standing Wave Ratio |
| LRU | Lowest Repairable Unit | W | Watt |
| LSB | Lower Sideband | WPM | Words Per Minute |
| | | * | Asterisk indicates function selected |

SAFETY INFORMATION

The following safety information is not necessarily related to a specific procedure in this particular document. However, the information should be reviewed, understood and applied in all phases of operation and maintenance before operating the equipment described here.

Standard practice uses hazard notices that are ranked in order of severity and designed to prevent damage, injury, or death.

- A **caution** prevents mistakes that could result in injury or equipment damage. For example, Electrostatic Discharge (ESD) sensitive devices must be handled with certain precautions to minimize the harmful effect of static build-up.
- A **warning** alerts users to potential hazards to life or limb. For example, to avoid casualties, always remove power and discharge circuits to ground before touching any circuit components.
- A **danger** identifies an immediate hazard to life or limb. For example, dangerous voltages exist in certain equipment. Before removing any cover, disconnect primary power.

Some personnel in the work place should be trained in rendering first aid. In those places where high voltages are present, they should be familiar with methods of resuscitation.

Keep Away from Live Circuits

Operating personnel must observe at all times all safety regulations. Do not replace components inside the equipment with the power supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the OFF position due to circuit design or charges retained by capacitors. Remove watches and rings before performing any maintenance procedures.

Do not service or adjust alone

Under no circumstances should any person reach into or enter the enclosure to service or adjust the equipment except in the presence of someone who is capable of rendering aid.

Resuscitation

Personnel working with or near high voltage should be familiar with methods of resuscitation.

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TABLE of CONTENTS

I GENERAL

| | | |
|-------|---|-----|
| 1.1 | SCOPE..... | 1-1 |
| 1.2 | GENERAL DESCRIPTION..... | 1-1 |
| 1.3 | TECHNICAL SPECIFICATIONS | 1-2 |
| 1.3.1 | General..... | 1-2 |
| 1.3.2 | Transmitter Keyline Signaling..... | 1-2 |
| 1.3.3 | Line Compensation Amplifiers..... | 1-2 |
| 1.3.4 | System Control Line Signaling | 1-3 |
| 1.3.5 | Environmental. | 1-3 |
| 1.4 | EQUIPMENT SUPPLIED | 1-3 |
| 1.5 | EQUIPMENT REQUIRED BUT NOT SUPPLIED | 1-3 |
| 1.6 | OPTIONS | 1-3 |

II INSTALLATION

| | | |
|---------|--|------|
| 2.1 | GENERAL | 2-1 |
| 2.2 | UNPACKING AND INSPECTION..... | 2-1 |
| 2.3 | RETURN OF EQUIPMENT TO FACTORY | 2-1 |
| 2.4 | GENERAL INSTALLATION AND MOUNTING INFORMATION..... | 2-2 |
| 2.4.1 | General Installation | 2-2 |
| 2.4.2 | Equipment Rack Installation..... | 2-3 |
| 2.4.2.1 | Equipment Rack AC Power | 2-4 |
| 2.4.2.2 | Site Specific Recommendations | 2-4 |
| 2.4.3 | Cable Installation..... | 2-6 |
| 2.4.4 | Telephone Line Connection..... | 2-6 |
| 2.4.5 | System Interface Cable | 2-6 |
| 2.5 | SYSTEM INSTALLATION ADJUSTMENTS..... | 2-15 |
| 2.5.1 | KY-9110 C Adjustments | 2-15 |
| 2.5.1.1 | Adjustment Preparation | 2-15 |
| 2.5.1.2 | Keyline AFSK Tone Transmit Line Level Adjustment | 2-15 |
| 2.5.1.3 | Transmit Audio LSB and USB Line Level Adjustment | 2-15 |
| 2.5.1.4 | Receive Audio LSB and USB Level Adjustment..... | 2-15 |

TABLE of CONTENTS (Cont...)

| | | |
|-----------|--|------|
| 2.5.1.4.1 | Line Loss Measurement | 2-16 |
| 2.5.1.5 | Adjustment Completion | 2-16 |
| 2.5.2 | KY-9110R/T Adjustments..... | 2-16 |
| 2.5.2.1 | Adjustment Preparation..... | 2-16 |
| 2.5.2.2 | Receive Audio LSB and USB Line Level Adjustments | 2-17 |
| 2.5.2.3 | Transmit Audio LSB and USB Level Adjustments..... | 2-17 |
| 2.5.2.3.1 | Line Loss Measurement | 2-18 |
| 2.5.2.4 | Adjustment Completion | 2-18 |

III OPERATION

| | | |
|-----|--------------|-----|
| 3.1 | GENERAL..... | 3-1 |
|-----|--------------|-----|

IV THEORY OF OPERATION

| | | |
|-------|--|-----|
| 4.1 | GENERAL..... | 4-1 |
| 4.2 | KEYLINE AFSK MODULATOR AND DEMODULATOR | 4-1 |
| 4.2.1 | Keyline AFSK Modulator..... | 4-1 |
| 4.2.2 | Keyline AFSK Demodulator | 4-1 |
| 4.3 | TELEPHONE LINE AMPLIFIERS | 4-3 |
| 4.4 | LINE PROTECT CIRCUITS..... | 4-3 |
| 4.5 | MICROPHONE AUDIO..... | 4-3 |
| 4.6 | CONTROL MODEM TRANSFER SWITCH | 4-4 |
| 4.7 | POWER SUPPLY | 4-4 |

V MAINTENANCE AND REPAIR

| | | |
|---------|---|-----|
| 5.1 | GENERAL..... | 5-1 |
| 5.1.1 | Technical Support..... | 5-1 |
| 5.1.2 | Preventive Maintenance | 5-1 |
| 5.1.3 | System Software Revision Level..... | 5-1 |
| 5.2 | TROUBLESHOOTING AND CORRECTIVE MAINTENANCE..... | 5-5 |
| 5.2.1 | Disassembly | 5-5 |
| 5.2.1.1 | Top Cover Removal..... | 5-5 |
| 5.2.2 | KY-9110 PC Board Alignment | 5-5 |

TABLE of CONTENTS (Cont...)

| | | |
|---------|----------------------------|------|
| 5.2.2.1 | Power Supply..... | 5-5 |
| 5.2.2.2 | AFSK Modulator | 5-5 |
| 5.2.2.3 | AFSK Demodulator..... | 5-6 |
| 5.2.2.4 | Line Amplifiers | 5-7 |
| 5.2.2.5 | Microphone Level | 5-8 |
| 5.2.3 | System Schematics | 5-10 |
| 5.2.4 | Cable Wiring Diagrams..... | 5-10 |

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LISTING of FIGURES

| <u>Fig. No.</u> | <u>Description</u> | <u>Page</u> |
|---------------------------------|--|-------------|
| II INSTALLATION | | |
| 2.4.2.1 | Top View, KY-9110 | 2-3 |
| 2.4.2.2 | Front View, KY-9110 | 2-4 |
| 2.4.2.3 | Equipment Rack Organization, KY-9110 R/T and SNR-2031..... | 2-5 |
| 2.4.3.1 | Cable Installation Chart, KY-9110 C (Control Site)..... | 2-8 |
| 2.4.3.2 | Rear Panel Illustrations, RCU-9310R(L), KY-9110 C and Terminal Board, TB-1 through TB-6 | 2-8 |
| 2.4.3.3 | System Interconnect Diagram, KY-9110 and SNR-2031..... | 2-9 |
| 2.4.3.4 | Cable Installation Chart, KY-9110 R/T Telephone Line Connections | 2-10 |
| 2.4.3.5 | Rear Panel Illustrations, KY-9110 R/T and Terminal Board, TB-1 through TB-6 | 2-10 |
| 2.4.3.6 | System Interconnect Diagram, KY-9110 and SNR-2031..... | 2-11 |
| 2.4.3.7 | Cable Installation Chart, KY-9110 R/T (Receiver/Transmitter Site)..... | 2-12 |
| 2.4.3.8 | Rear Panel Illustrations, T-9410, KY-9110 R/T, R-9210 and F-9800 | 2-12 |
| 2.4.3.9 | System Interconnect Diagram, KY-9110 and SNR-2031..... | 2-13 |
| 2.4.3.10 | System Interface Cable, TADIL Modem - KY-9110 C | 2-14 |
| 2.5.1 | System Audio Distribution Diagram, KY-9110 and SNR-2031 | 2-19 |
| 2.5.2 | Installation Adjustment and Test Point Locations, KY-9110 | 2-21 |
| 2.5.3 | Audio Test Connector Wiring..... | 2-22 |
| III OPERATION | | |
| 3.1 | Front Panel Controls, KY-9110..... | 3-1 |
| V MAINTENANCE AND REPAIR | | |
| 5.1.1 | Software Revision Record, KY-9110 and SNR-2031, (2 pages) | |
| | Page 1 - Base System | 5-3 |
| | Page 2 - Optional Equipment | 5-4 |
| 5.3.1 | PC Board Alignment and Test Point Locations, KY-9110..... | 5-9 |

LISTING of FIGURES (Cont...)

| <u>Fig. No.</u> | <u>Description</u> | <u>Page</u> |
|-----------------|---|-------------|
| 5.4.1 | KY-9110 C Chassis Assembly (2 pages) | |
| | Page 1 - Parts List..... | 5-12 |
| | Page 2 - Wiring Diagram | 5-13 |
| 5.4.2 | KY-9110 R/T Chassis Assembly (2 pages) | |
| | Page 1 - Parts List..... | 5-14 |
| | Page 2 - Wiring Diagram | 5-15 |
| 5.4.3 | KY-9110 PC Board Assembly, 1A2A2 (6 pages) | |
| | Page 1 - Parts List..... | 5-16 |
| | Page 2 - Parts List..... | 5-17 |
| | Page 3 - Parts List..... | 5-18 |
| | Page 4 - Component Location Diagram | 5-19 |
| | Page 5 - Schematic Diagram, (Part 1 of 2)..... | 5-20 |
| | Page 6 - Schematic Diagram, (Part 2 of 2)..... | 5-21 |
| 5.4.4 | KY-9110 Connector Interface Assembly, 1A2A1 | 5-22 |
| | (Parts List and Schematic Diagram) | |
| 5.5.1 | Cable Assembly, RCU-9310R(L) / KY-9110 C – REMOTE AUDIO | 5-23 |
| 5.5.2 | Cable Assembly, RCU-9310R(L) / KY-9110 C – REMOTE | 5-24 |
| 5.5.3 | Cable Assembly, RCU-9310R(L) / KY-9110 C – AUDIO | 5-25 |
| 5.5.4 | Cable Assembly, KY-9110 R/T / T-9410 – REMOTE | 5-26 |
| 5.5.5 | Cable Assembly, KY-9110 R/T / R-9210 – XCVR AUDIO..... | 5-27 |
| 5.5.6 | Cable Assembly, KY-9110 R/T / R-9210 – REMOTE..... | 5-28 |
| 5.5.7 | Cable Assembly, KY-9110 R/T / F-9800 – I/O | 5-29 |

SECTION I

GENERAL INFORMATION

1.1 SCOPE

This manual contains information necessary to install, operate and maintain the KY-9110 FSK Keyline Modem system. Information in this manual applies to all equipment configurations, unless otherwise stated in the text or illustrations.

1.2 GENERAL DESCRIPTION

The KY-9110 FSK Keyline Modem system is designed to provide remote control, audio interface and high-speed keyline facility between a TADIL A Control site and a TADIL A Receiver/Transmitter site.

NOTE: Throughout this manual, references to KY-9110 indicate the material applies to BOTH the KY-9110C (Control) AND KY-9110R/T (Receiver/Transmitter) versions. Material applying to a specific version will specify that version.

The KY-9110 modem system provides the following features and functions:

- a.) High-speed transmitter keyline
- b.) Telephone line-loss compensation amplifiers for transmit and receive audio
- c.) Convenient front panel microphone/test tone facility
- d.) Wire/cable termination panel for all radio, control head, modem and telephone line connections.

The KY-9110 High-Speed Keyline System uses an Audio Frequency Shift Key (AFSK) System to key and unkey a remote T-9410 HF/ISB Transmitter/Exciter. At the control site, the TADIL A Modem keyline connects directly to the KY-9110C, which generates an AFSK keyline signal in accordance with the TADIL A Modem keyline input. The RCU-9310R(L) Remote Control Unit (discussed later) provides additional control capability that is included in the KY-9110 control stream. The KY-9110R/T, located at the Receiver/Transmitter site, decodes the AFSK keyline signal, passes control information to the R-9210 HF/ISB Receiver, and ultimately keys or unkeys the T-9410 HF/ISB Transmitter/Exciter.

The KY-9110 telephone line compensation amplifiers make up for line level loss experienced on the transmit and receive audio channels through the telephone system. These amplifiers are internally adjustable and can compensate for a maximum 30 dB of telephone line loss. While the KY-9110 Modems compensate for expected line loss conditions, telephone line quality for the LSB and USB audio channels must be characterized such that the combination of telephone line performance and HF ISB Receiver/Transmitter performance meets or exceeds the system requirements of MIL-STD-188-203-1A.

The KY-9110 also provides a convenient front panel microphone facility that permits the operator to use voice over either of the transmitter audio channels. This capability is also suitable for injecting test tones into the transmitter audio channels for test and alignment purposes.

The KY-9110 Keyline Modem pair is designed to operate in conjunction with the RCU-9310R(L) Remote Control Unit. This unit is located at the control site and is connected to the KY-9110C. The RCU-9310R(L) provides all front panel operating functions that the R-9210 HF/ISB Receiver normally provides when operated locally. In the Sunair TADIL A system, the R-9210 HF/ISB Receiver serves as a central control point at the Receiver/Transmitter Site and passes control information to the T-9410 HF/ISB Transmitter/Exciter. Thus, by remote controlling the R-9210 HF/ISB Receiver with the RCU-9310R(L) Remote Control Unit, this system provides the same degree of control normally available at the R-9210 HF/ISB Receiver.

Remote controlled TADIL A systems are complex systems and bring together many different system components. As a minimum, these systems include remote control equipment, control and telephone cables, an HF/ISB Receiver, an HF/ISB Transmitter/Exciter and a Pre/postselector. These systems may also include Linear Power Amplifiers and/or Antenna Couplers. The KY-9110 System helps integrate all of this equipment and provides a convenient terminal point for the necessary telephone line connections.

1.3 TECHNICAL SPECIFICATIONS

Unless otherwise specified, the following specifications apply to each unit type.

1.3.1 General

Input Power: KY-9110C: 28 VDC power supplied by the RCU-9310R(L) Remote Control Unit

KY-9110R/T: 28 VDC power supplied by the T-9410 HF/ISB Transmitter/Exciter (via the R-9210 HF/ISB Receiver cable)

Audio Interface Impedance: 600-Ohm, balanced

Size: 1.75" X 19.0" X 13.0". Standard EIA rack mount. One Rack Unit (1 RU)

Weight: 5 lbs., 3 oz.

1.3.2 Transmitter Keyline Signaling

Modulation: Audio Frequency Shift Keying (AFSK)

Tone Frequencies: 1200Hz, keyed, 2200Hz unkeyed

Keyline Attack and Release Time: less than 1 ms

Maximum Allowable Line Loss : 30 dB

1.3.3 Line Compensation Amplifiers

Receive Line Loss Compensation: -30 dB maximum. Adjustable

Transmit Line Level: -9 dBm. Fixed

Telephone line for the LSB and USB audio channels must be characterized such that the combination of telephone line performance and HF ISB Receiver/Transmitter performance meets or exceeds the system requirements of MIL-STD-188-203-1A

1.3.4 System Control Line Signaling

Modulation: Audio Frequency Shift Keying (AFSK)

Transmit Line Level: -9 dBm. Fixed

Maximum Allowable Line Loss : 30 dB

Note: The above specifications are given for reference only. The technical specification for the RCU-9310R(L) Remote Control Unit and the 9000 series radio equipment it controls governs these parameters and performance.

1.3.5 Environmental

Temperature Range: -10°C to +50°C

Humidity: 95% at +50°C

Shock and Vibration: MIL-STD-810F, Procedure II

1.4 EQUIPMENT SUPPLIED

| <u>Description</u> | <u>Sunair Part No.</u> |
|--|------------------------|
| Keyline Modem, KY-9110C, Control | 8109506305 |
| Keyline Modem, KY-9110R/T, Receiver/Transmitter | 8109506313 |
| Manual, <i>Operation and Maintenance, FSK Keyline Modem System for Remote Control of TADIL A HF Transceiver System</i> | 8109500501 |

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

The following equipment is required but supplied separately from the KY-9110 Keyline Modem System.

| <u>Description</u> | <u>Sunair Part No.</u> |
|-----------------------------------|------------------------|
| Remote Control Unit, RCU-9310R(L) | 8109506402 |

1.6 OPTIONS

| <u>Description</u> | <u>Sunair Part No.</u> |
|---------------------------------|------------------------|
| Hand-held Microphone Assembly | 8076000602 |
| Audio Connector, 5-pin, U-229/U | 1003300014 |
| Terminal, Spade, Tongue #2 | 1013370007 |

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SECTION II INSTALLATION

2.1 GENERAL

This section contains all necessary instructions for unpacking, inspection, and, if required, reshipment of the equipment or parts. Information regarding location and mounting considerations, power requirements, and equipment interconnection is also provided.

2.2 UNPACKING AND INSPECTION

As soon as you have received your unit(s), unpack and inspect all components and accessories. Check the packing list to be sure you have received all items ordered, and that all items necessary for operation have been ordered.

NOTE: Be sure to retain the carton and its associated packing materials should it be necessary to reship the equipment.

Do not accept a shipment when there are visible signs of damage to the cartons until a complete inspection is made. If there is a shortage of items or any evidence of damage, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier. If concealed damage is discovered after the shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment. A full report should also be forwarded to Sunair's Customer Services Department. Please be sure to include the following information for prompt service:

- a) ORDER NUMBER.
- b) MODEL AND SERIAL NUMBER.
- c) NAME OF TRANSPORTATION AGENCY.
- d) APPLICABLE DATES.

Upon receipt of this information, Sunair will make arrangements for repair or replacement.

2.3 RETURN OF EQUIPMENT TO FACTORY

The shipping carton for the equipment has been designed to protect it during shipment. The container and its associated packing material should be used to reship the unit.

When necessary to return equipment to Sunair for warranty or non-warranty repair, a Return Material Authorization number (RMA) is required. This number can be obtained from our Customer Services Department using the contact information on Page iv or as directed by contractual requirements.

The Return Material Authorization process may also be initiated by obtaining a RMA Form by visiting our website at www.sunairhf.com. Click on the "Customer Services" tab and then the "RMA-Authorization" link. The form can be submitted on-line and will be directed to our Customer Services Department.

If the original shipping carton is not available, be sure to carefully pack each unit separately, using suitable cushioning material where necessary. Very special attention should be given to providing enough packing material around connectors and other protrusions from the unit. Rigid cardboard should be placed at the corners of the equipment to protect against denting. DO NOT USE DUNNAGE (e.g., STYROFOAM PEANUTS) FOR PACKING PROTECTION; they may allow the unit to shift while being shipped, and, therefore, become damaged. Sunair, for a fee, can provide a packaging material kit. The kit cost and contents are tailored for specific equipment models.

When returning subassemblies or components for repair or replacement, be sure to pack each separately, using suitable cushioning material.

Shipment to be made PREPAID consigned to:

Sunair Electronics, Inc.
Customer Services Department
3005 Southwest Third Avenue
Fort Lauderdale, Florida 33315-3312
U.S.A.

Clearly mark with indelible ink all mailing documents as follows:

US Goods Returned for Repair
Value For Customs - \$ (Amt.)

Mark ALL SIDES of the package:

FRAGILE - ELECTRONIC EQUIPMENT!

NOTE: Before shipping, carefully inspect the package to be sure it is marked properly and is securely wrapped.

2.4 GENERAL INSTALLATION AND MOUNTING INFORMATION

Satisfactory operation of this equipment will depend upon the care and thoroughness taken during installation.

2.4.1 General Installation

Install the KY-9110C Modem and RCU-9310R(L) Remote Control Unit at the Control Site. Install the KY-9110R/T Modem, R-9210 Receiver, T-9410 Transmitter/Exciter, and F-9800 Pre/postselector at the Receiver/Transmitter Site. Use this manual in conjunction with all other system equipment manuals for the most complete installation information.

The KY-9110 FSK Keyline Modem System is an optional control system to a considerably larger system, the SNR-2031 TADIL A Transceiver System. Unless an existing SNR-2031 system is being upgraded to remote site control capabilities, the KY-9110 system will normally be installed at the same time as the SNR-2031 system. As such, some duplication of (and possible conflict with) references to certain SNR-2031 cables and

other installation details may occur. This KY-9110 Operation and Maintenance manual takes precedence over any installation instructions or recommendations appearing in the SNR-2031 Operation and Maintenance manual.

Before starting installation, carefully plan equipment locations to ensure that the operating environment is suitable and that adequate access for maintenance is provided.

2.4.2 Equipment Rack Installation

The KY-9110 units are designed for mounting in an EIA standard nineteen-inch (19") equipment rack. The equipment is 1.75 inches high, requiring one Rack Unit (1 RU) of vertical space. Figures 2.4.2.1 and 2.4.2.2 show the KY-9110 Top View with dimensions and Front Views, respectively.

To install the unit, simply bolt it into place in the rack using the front panel mounting holes and four #10-32 screws. Mounting hardware is supplied with the units.

M038a

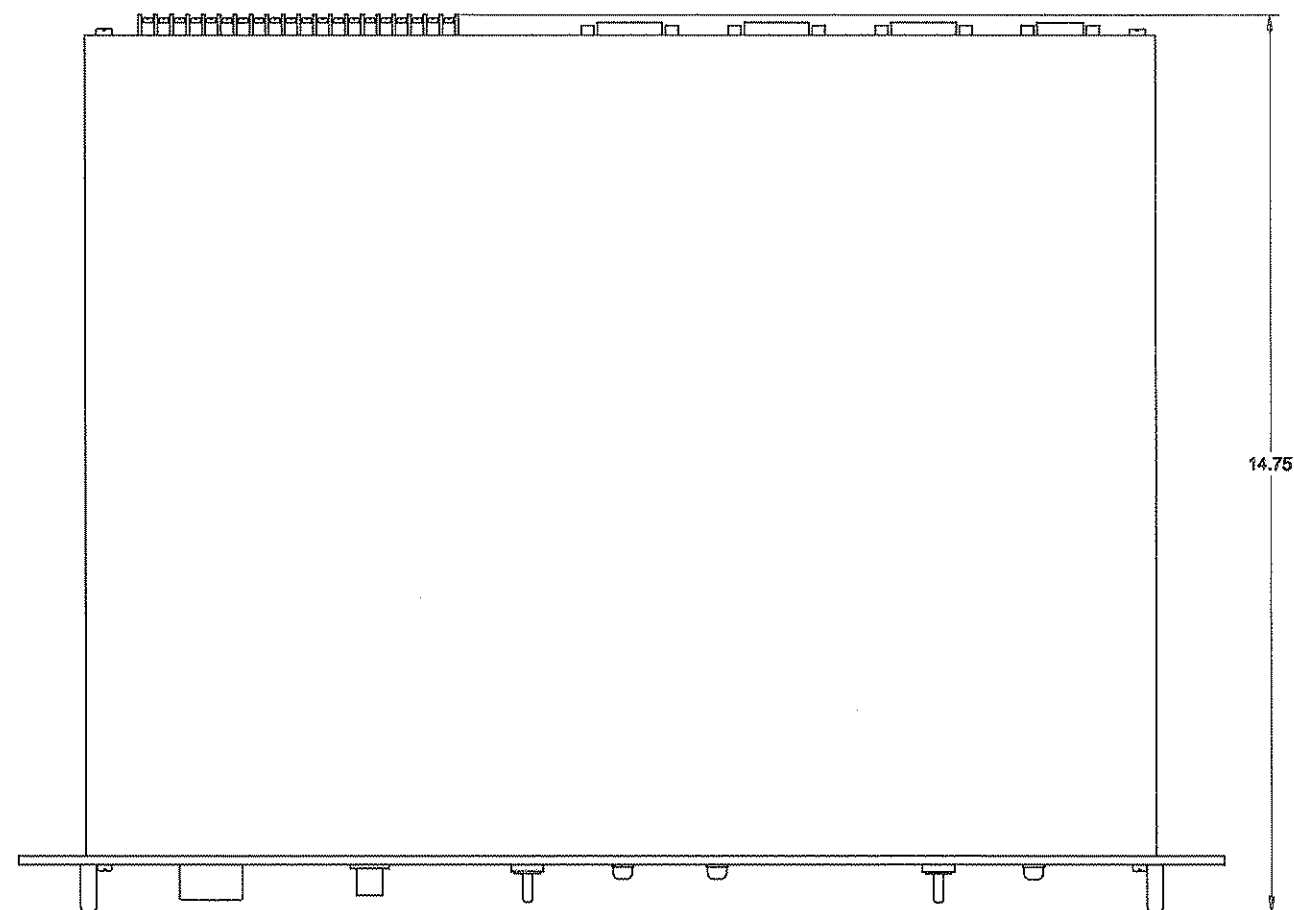


Figure 2.4.2.1 Top View, KY-9110

M035A



Figure 2.4.2.2 Front View, KY-9110

2.4.2.1 Equipment Rack AC Power

Equipment or systems factory-supplied in equipment racks have internal AC power configured per Customer Specification. All rack-mounted equipment is powered from this source except for either of the optional Linear RF Power Amplifiers (LPA-9500 or LPA-9600). A three-conductor power cord is supplied. The customer must furnish a suitable power connector for the termination.

Both optional Linear RF Power Amplifiers are also configured per Customer Specification, however the 230 VAC input connection is preferred. A three-conductor power cord is supplied with the unit. The customer must also furnish a suitable power connector for the termination.

NOTE: Sunair 9000 Series equipment is designed for installation in EIA 19 inch equipment racks. Chassis slide kits are designed for Emcor® ESQ Series racks. Use in other manufacturers' racks may require custom integration or modification.

2.4.2.2 Site Specific Recommendations

Control Site

The KY-9110C Keyline Modem should be physically located immediately next to the RCU-9310R(L) Remote Control Unit. As a practical matter, both units exercise some degree of control over the remote Receiver/Transmitter and, as such, should logically be located together. Just as important, the KY-9110C is powered by 28 Volts DC supplied by the RCU-9310R(L), which suggests the two units should be mounted near one another.

Receiver/Transmitter Site

Equipment located at the Receiver/Transmitter Site should be rack mounted. Refer to Figure 2.4.2.2 Equipment Rack Organization, KY-9110R/T and SNR-2031 for location of the KY-9110R/T Keyline Modem and SNR-2031 system components (R-9210 HF/ISB Receiver, F-9800 Pre/postselector and T-9410 HF/ISB Transmitter/Exciter). The figure also shows the recommended placement of optional LPA-9500 or LPA-9600 Linear RF Power Amplifiers, when present. All necessary equipment rack slides are installed in the equipment rack and on the radio equipment. All necessary installation and mounting hardware is supplied.

P2134C

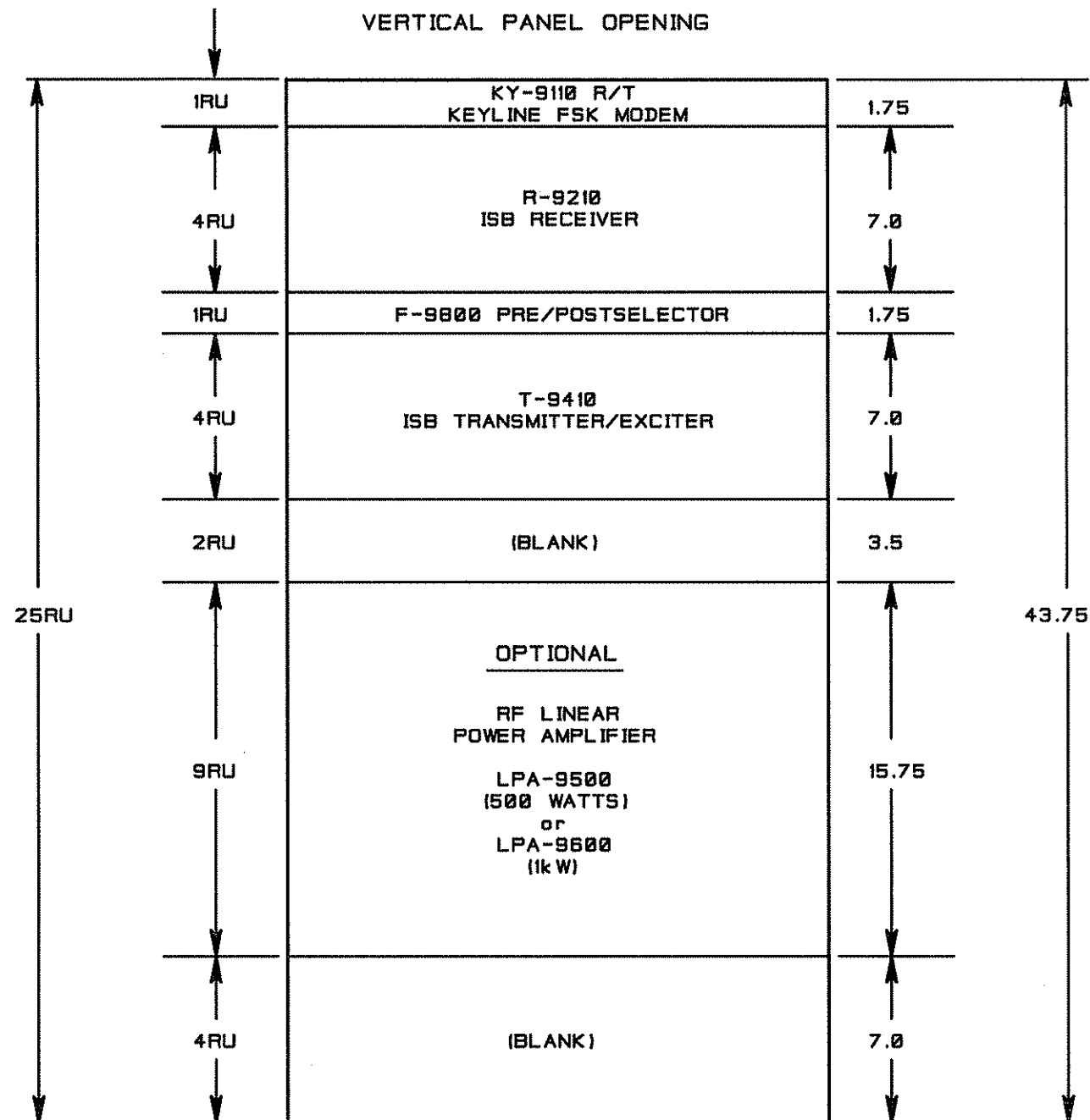


Figure 2.4.2.3 Equipment Rack Organization, KY-9110 R/T and SNR-2031

2.4.3 Cable Installation

Refer to Figures 2.4.3.1, 2.4.3.4 and 2.4.3.7, Cable Installation Charts for the KY-9110 Keyline Modem system and SNR-2031 TADIL A Transceiver System. These charts list all cables used in the system, where they are connected and other useful identification information. Figures 2.4.3.2, 2.4.3.5 and 2.4.3.8, Rear Panel Illustrations, indicate all rear panel locations and labeling. Figures 2.4.3.3 and 2.4.3.6, KY-9110 and SNR-2031 System Interconnection Diagrams, are on the opposite pages and show the interconnection of all system components and optional equipment. The preceding figures are identical to one another and are repeated to eliminate needless page turning and possible confusion during the installation process. Their overall objective is to give the installer (and probable maintenance personnel) a sense of system perspective during installation rather than simply mechanically putting pieces together and connecting cables.

All above figures are placed in this manual so they can be viewed simultaneously by folding out both opposing pages at once. It is suggested the Cable Installation Charts is used as the primary tool to accomplish this task. As each individual cable (or connection) is located and installed, check in PENCIL the "DONE" box on the chart. Continue until all cables are installed and/or accounted for. Observe any information in the "Notes" column as it applies to your specific system.

NOTE: Sunair strongly recommends the cable installation sequence described in the Cable Installation Charts be followed. The cabling and connectors in certain locations can easily become congested and make installation needlessly difficult if this precaution is ignored.

2.4.4 Telephone Line Installation

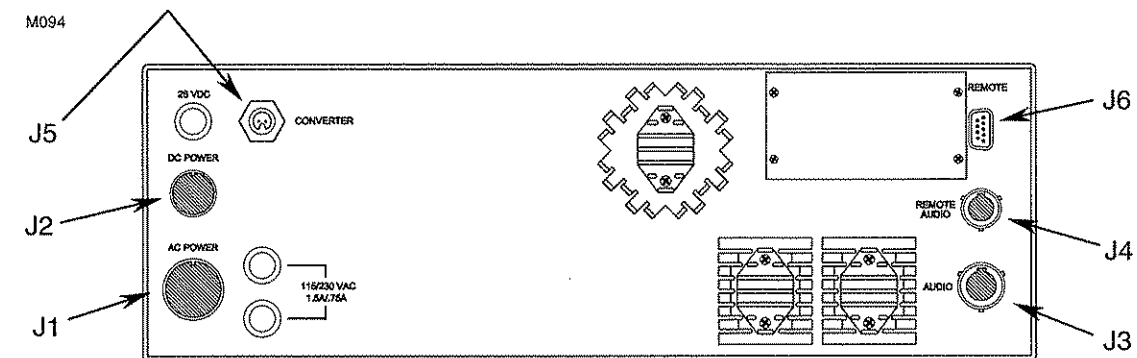
Both the KY-9110C and KY-9110R/T use a rear-mounted eighteen (18) position terminal strip as the telephone line interface point. Each of the required six (6) telephone line circuits connects to the terminal board segments, labeled TB-1 through TB-6. Each terminal board segment has three (3) terminals designated for the telephone line, "Tip", "Ring" and safety ground connections. Refer to Figures 2.4.3.1 and 2.4.3.7 for telephone line connection details and Installation Charts. Ensure that each telephone line circuit is connected to the same terminal board "TB" number for both the KY-9110C and KY-9110R/T units. Failure to observe this precaution will result in improper system operation.

NOTE: Unscrew terminal block screws to their maximum extension to facilitate wire terminal installation.

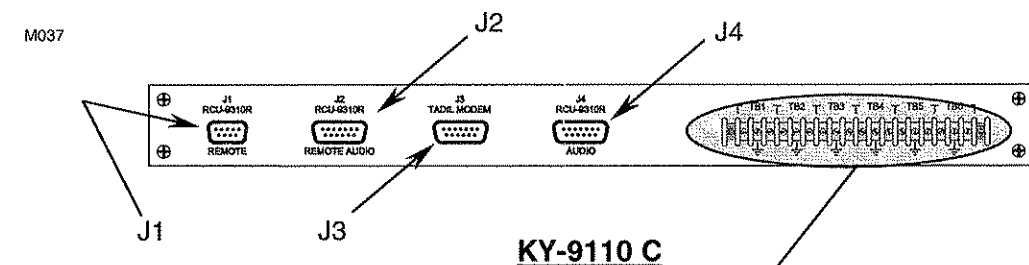
2.4.5 System Interface Cable

Customer interface with the KY-9110C Keyline Modem at the Control Site is accomplished using the "TADIL Modem Audio/Keyline" cable assembly provided. This cable has installed at one end the mating connector to the KY-9110C rear panel connector **J3 TADIL MODEM**. The other end of this 12-foot cable is completely unterminated and allows the end user to shorten and connect it to their system as they see fit. Refer to Figure 2.4.3.10 System Interface Cable, TADIL Modem / KY-9110C for signal names, connector pin assignments and cable conductor color-coding information.

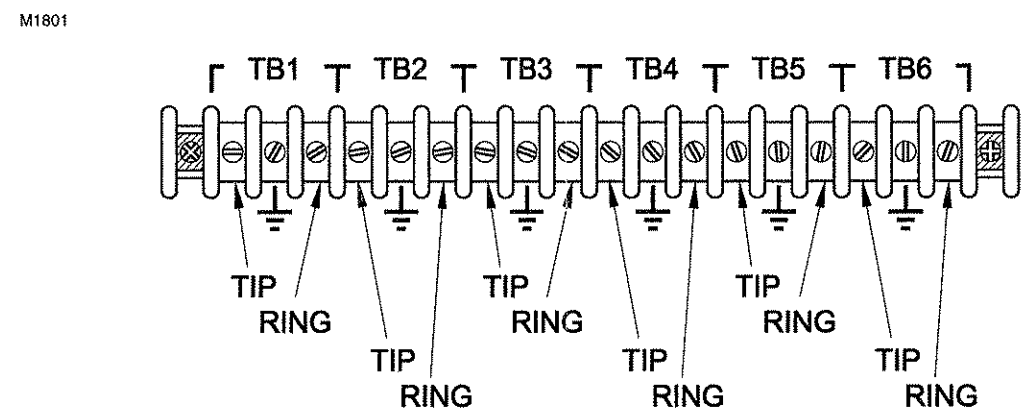
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RCU-9310 R(L)



KY-9110 C



TB-1 through TB-6 Telephone Line Connections

Figure 2.4.3.2 Rear Panel Illustrations, RCU-9310R(L), KY-9110 C And Terminal Board TB-1 through TB-6

KY-9110 & SNR-2031


| CABLE INSTALLATION CHART | | | | | KY-9110 C FSK Keyline Modem (Control Site) | | | | | | | |
|---|------|-----------------|---|--------|---|---|--------------|-------------|-----------------------------|---|-------|---|
| 1. Use this chart as an installation aid along with "System Interconnect Diagram" on opposite page. 2. As each individual cable or connection is located and installed, check the "Done" box on the chart. 3. Continue until cables are installed and/or accounted for. Observe all information in the "Notes" column as it applies to your specific system | | | | | | Related drawing | | | | | | |
| Item No. | Done | Sunair Part No. | Description | | From | | | To | | | Notes | |
| | | | Cable Termination - End 1 | Length | Equipment | Connector | Equipment | Connector | | | | |
| | | | Cable Termination - End 2 | | | | | | | | | |
| 1 | | 8109556094 | Remote Audio 10 pin circular - male 15 pin DB - female | | 6 ft. | RCU-9310 R (L) Remote Control Unit | REMOTE AUDIO | J 4 | KY-9110 C FSK Keyline Modem | REMOTE AUDIO | J 2 | |
| 2 | | 8101003291 | Remote 9 pin DB - female 9 pin DB - female | | 6 ft. | RCU-9310 R (L) Remote Control Unit | REMOTE | J 6 | KY-9110 C FSK Keyline Modem | REMOTE | J 1 | |
| 3 | | 8109557091 | Audio 19 pin circular - male 15 pin DB - female | | 6 ft. | RCU-9310 R (L) Remote Control Unit | AUDIO | J 3 | KY-9110 C FSK Keyline Modem | AUDIO | J 4 | |
| 4 | | n/a | Control AFSK Barrier Terminal Board #2 screw or 3/16" lug (max.) To Customer Furnished Equipment | | n/a | KY-9110 C FSK Keyline Modem | TB-1 | Tip Ring | Tip (lead) Ring (lead) | Telephone Wire Pair (Customer Furnished Equipment) | | 2 |
| 5 | | n/a | RX Audio USB Barrier Terminal Board #2 screw or 3/16" lug (max.) To Customer Furnished Equipment | | n/a | KY-9110 C FSK Keyline Modem | TB-2 | Tip Ring | Tip (lead) Ring (lead) | Telephone Wire Pair (Customer Furnished Equipment) | | 2 |
| 6 | | n/a | RX Audio LSB Barrier Terminal Board #2 screw or 3/16" lug (max.) To Customer Furnished Equipment | | n/a | KY-9110 C FSK Keyline Modem | TB-3 | Tip Ring | Tip (lead) Ring (lead) | Telephone Wire Pair (Customer Furnished Equipment) | | 2 |
| 7 | | n/a | TX Audio USB Barrier Terminal Board #2 screw or 3/16" lug (max.) To Customer Furnished Equipment | | n/a | KY-9110 C FSK Keyline Modem | TB-4 | Tip Ring | Tip (lead) Ring (lead) | Telephone Wire Pair (Customer Furnished Equipment) | | 2 |
| 8 | | n/a | TX Audio LSB Barrier Terminal Board #2 screw or 3/16" lug (max.) To Customer Furnished Equipment | | n/a | KY-9110 C FSK Keyline Modem | TB-5 | Tip Ring | Tip (lead) Ring (lead) | Telephone Wire Pair (Customer Furnished Equipment) | | 2 |
| 9 | | n/a | Keyline AFSK Barrier Terminal Board #2 screw or 3/16" lug (max.) To Customer Furnished Equipment | | n/a | KY-9110 C FSK Keyline Modem | TB-6 | Tip Ring | Tip (lead) Ring (lead) | Telephone Wire Pair (Customer Furnished Equipment) | | 2 |
| 10 | | 8109558097 | TADIL Modem Audio/Keyline 19 conductor cable (unterminated) 15 pin DB - female | | 12 ft. | TADIL A Modem (Customer Furnished Equipment) | | | KY-9110 C FSK Keyline Modem | TADIL MODEM | J 3 | |
| Notes: 1.  = Customer Furnished Equipment (CFE) 2. Recommended terminal lugs for connection to Barrier Terminal Board (others may be used) Spade Terminal, # 2 longue Sunair Part No. 1013370007 | | | | | | | | | | | | |

Figure 2.4.3.1 Cable Installation Chart, KY-9110 C (Control Site)

P2443C

Install these cables per Cable Installation Chart on Page 2-8. Refer to Figures 2.4.3.1 & 2.4.3.2.

Install these cables per Cable Installation Chart on Page 2-10. Refer to Figures 2.4.3.4 & 2.4.3.5.

Install these cables per Cable Installation Chart on Page 2-12. Refer to Figures 2.4.3.7 & 2.4.3.8.

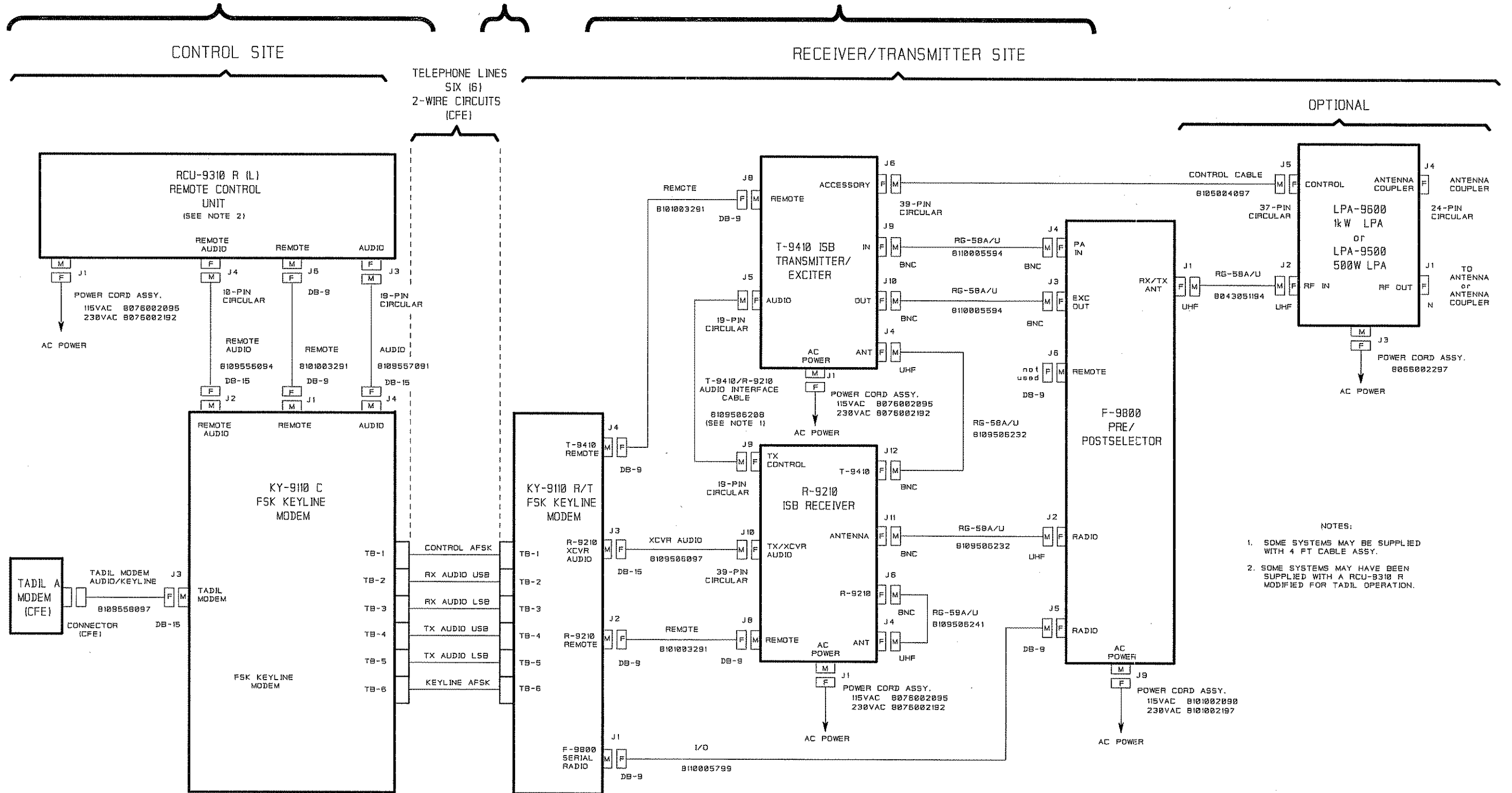


Figure 2.4.3.3 System Interconnect Diagram, KY-9110 and SNR-2031

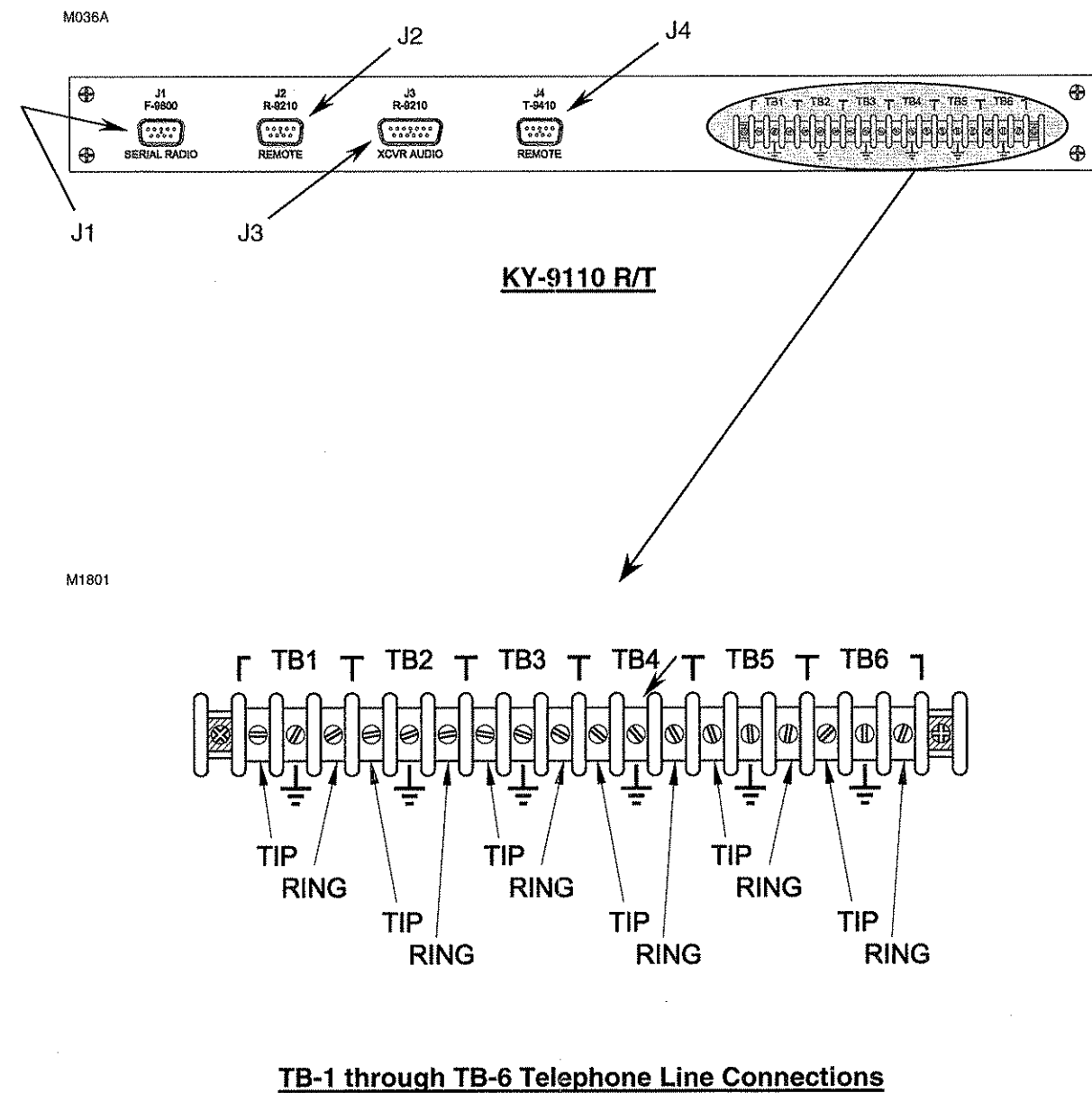


Figure 2.4.3.5 Rear Panel Illustrations, KY-9110 R/T and Terminal Board TB-1 through TB-6

| CABLE INSTALLATION CHART | | | | | KY-9110 R/T FSK Keyline Modem (Receiver / Transmitter Site) | | | | | | | | |
|---|------|-----------------|---|-----------|--|------------|---|-----------------------------|------|-------|---|-------------|------|
| | | | | | Telephone Line connection | | | | | | | | |
| 1. Use this chart as an installation aid along with "System Interconnect Diagram" on opposite page. 2. As each individual cable or connection is located and installed, check the "Done" box on the chart. 3. Continue until cables are installed and/or accounted for. Observe all information in the "Notes" column as it applies to your specific system | | | | | Related drawing | | | | | | | | |
| Item No. | Done | Sunair Part No. | Description | | Length | From | | To | | Notes | | | |
| | | | Cable Termination - End 1 | Connector | | Equipment | Equipment | Connector | | | | | |
| | | | Cable Termination - End 2 | | | | | | | | | | |
| 1 | | n/a | Control AFSK | | n/a | Tip (lead) | Telephone Wire Pair (Customer Furnished Equipment) | KY-9110 C FSK Keyline Modem | TB-1 | Tip | 2 | | |
| | | | From Customer Furnished Equipment | | | | | | | | | Ring (lead) | Ring |
| | | | Barrier Terminal Board #2 screw or 3/16" lug (max.) | | | | | | | | | | |
| 2 | | n/a | RX Audio USB | | n/a | Tip (lead) | Telephone Wire Pair (Customer Furnished Equipment) | KY-9110 C FSK Keyline Modem | TB-2 | Tip | 2 | | |
| | | | From Customer Furnished Equipment | | | | | | | | | Ring (lead) | Ring |
| | | | Barrier Terminal Board #2 screw or 3/16" lug (max.) | | | | | | | | | | |
| 3 | | n/a | RX Audio LSB | | n/a | Tip (lead) | Telephone Wire Pair (Customer Furnished Equipment) | KY-9110 C FSK Keyline Modem | TB-3 | Tip | 2 | | |
| | | | From Customer Furnished Equipment | | | | | | | | | Ring (lead) | Ring |
| | | | Barrier Terminal Board #2 screw or 3/16" lug (max.) | | | | | | | | | | |
| 4 | | n/a | TX Audio USB | | n/a | Tip (lead) | Telephone Wire Pair (Customer Furnished Equipment) | KY-9110 C FSK Keyline Modem | TB-4 | Tip | 2 | | |
| | | | From Customer Furnished Equipment | | | | | | | | | Ring (lead) | Ring |
| | | | Barrier Terminal Board #2 screw or 3/16" lug (max.) | | | | | | | | | | |
| 5 | | n/a | TX Audio LSB | | n/a | Tip (lead) | Telephone Wire Pair (Customer Furnished Equipment) | KY-9110 C FSK Keyline Modem | TB-5 | Tip | 2 | | |
| | | | From Customer Furnished Equipment | | | | | | | | | Ring (lead) | Ring |
| | | | Barrier Terminal Board #2 screw or 3/16" lug (max.) | | | | | | | | | | |
| 6 | | n/a | Keyline AFSK | | n/a | Tip (lead) | Telephone Wire Pair (Customer Furnished Equipment) | KY-9110 C FSK Keyline Modem | TB-6 | Tip | 2 | | |
| | | | From Customer Furnished Equipment | | | | | | | | | Ring (lead) | Ring |
| | | | Barrier Terminal Board #2 screw or 3/16" lug (max.) | | | | | | | | | | |
| Notes: | | | | | | | | | | | | | |
| 1. = Customer Furnished Equipment (CFE) | | | | | | | | | | | | | |
| 2. Recommended terminal lugs for connection to Barrier Terminal Board (others may be used) Spade Terminal, # 2 tongue Sunair Part No. 1013370007 | | | | | | | | | | | | | |

Figure 2.4.3.4 Cable Installation Chart, KY-9110 R/T Telephone Line Connections

P2443C

Install these cables per Cable Installation Chart on Page 2-8. Refer to Figures 2.4.3.1 & 2.4.3.2.

Install these cables per Cable Installation Chart on Page 2-10. Refer to Figures 2.4.3.4 & 2.4.3.5.

Install these cables per Cable Installation Chart on Page 2-12. Refer to Figures 2.4.3.7 & 2.4.3.8.

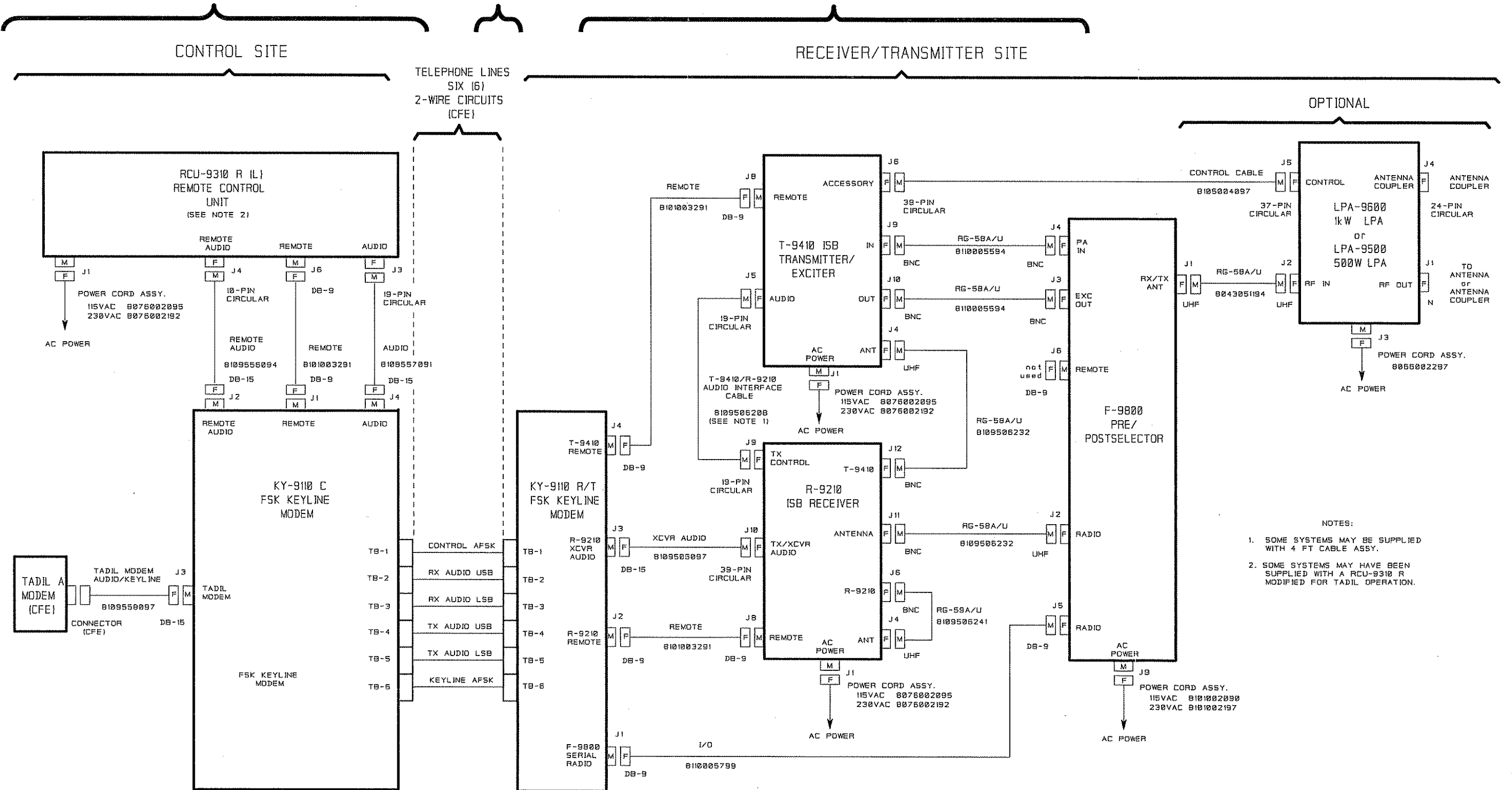
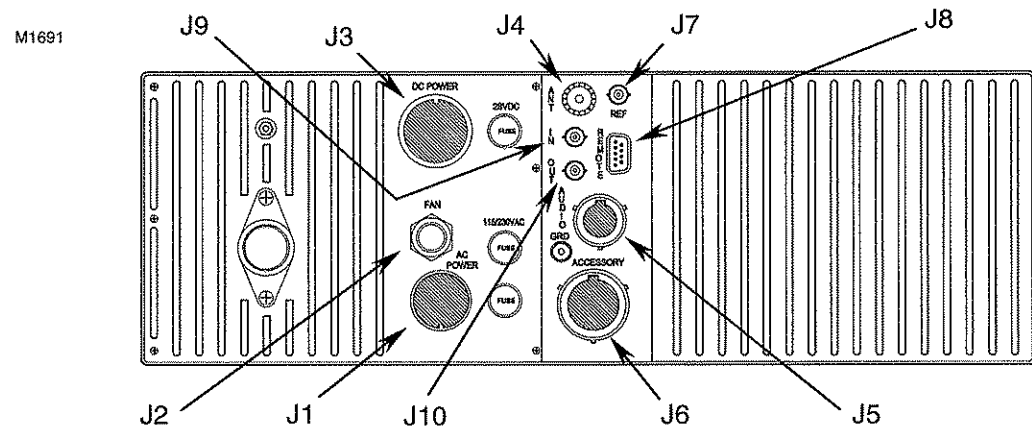
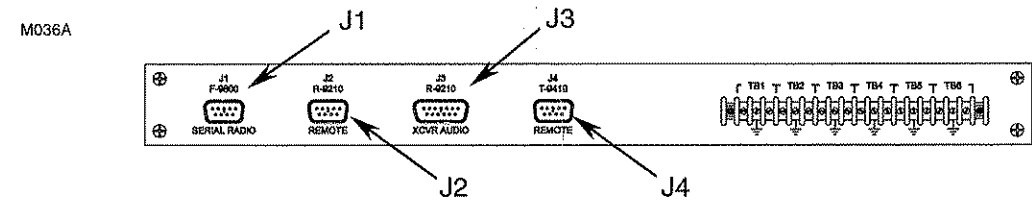


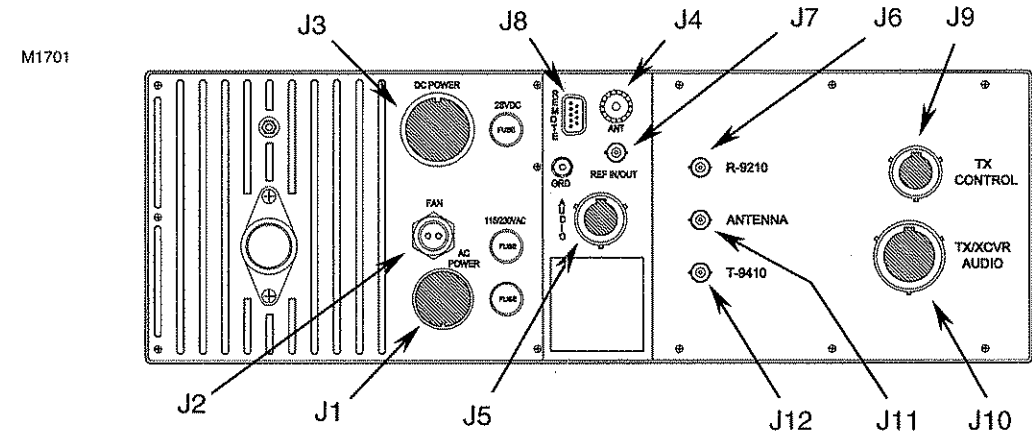
Figure 2.4.3.6 System Interconnect Diagram, KY-9110 and SNR-2031



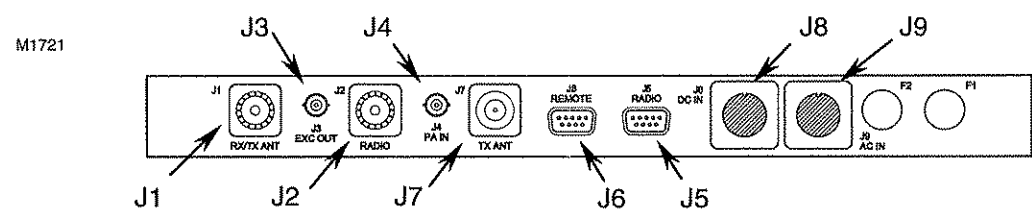
T-9410



KY-9110 R/T



R-9210



F-9800

Figure 2.4.3.8 Rear Panel Illustrations, T-9410, KY-9110 R/T, R-9210 and F-9800

| CABLE INSTALLATION CHART | | | | | KY-9110 R/T FSK Keyline Modem (Receiver / Transmitter Site) | | | | | | | |
|---|------|-----------------|---------------------------------|---------------------------|--|-------------------------------|---------------------|------|-------------------------|-----------------|------|-------|
| 1. Use this chart as an installation aid along with "System Interconnect Diagram" on opposite page. 2. As each individual cable or connection is located and installed, check the "Done" box on the chart. 3. Continue until cables are installed and/or accounted for. Observe all information in the "Notes" column as it applies to your specific system | | | | | Related drawing | | | | | | | |
| Item No. | Done | Sunair Part No. | Description | | Length | From | | | To | | | Notes |
| | | | Cable Termination - End 1 | Cable Termination - End 2 | | Equipment | Connector | | Equipment | Connector | | |
| 1 | | 8109506208 | T-9410 - R-9210 Audio Interface | | 6 ft. | T-9410 Transmitter | AUDIO | J 5 | R-9210 Receiver | TX CONTROL | J 9 | 1 |
| | | | 19-pin circular - male | | | | | | | | | |
| | | | 19-pin circular - male | | | | | | | | | |
| 2 | | 8101003291 | Remote | | 6 ft. | KY-9110 R/T FSK Keyline Modem | T-9410 REMOTE | J 4 | T-9410 Transmitter | REMOTE | J 8 | |
| | | | 9 pin DB - female | | | | | | | | | |
| | | | 9 pin DB - female | | | | | | | | | |
| 3 | | 8110005594 | RG - 58A/U coax cable assy | | 8 ft. | T-9410 Transmitter | IN | J 9 | F-9800 Pre/postselector | PA IN | J 4 | |
| | | | BNC - male | | | | | | | | | |
| | | | BNC - male | | | | | | | | | |
| 4 | | 8110005594 | RG - 58A/U coax cable assy | | 8 ft. | T-9410 Transmitter | OUT | J 10 | F-9800 Pre/postselector | EXC OUT | J 3 | |
| | | | BNC - male | | | | | | | | | |
| | | | BNC - male | | | | | | | | | |
| 5 | | 8109506232 | RG - 58A/U coax cable assy | | 6 ft. | T-9410 Transmitter | ANT | J 4 | R-9210 Receiver | T-9410 | J 12 | |
| | | | UHF - male | | | | | | | | | |
| | | | BNC - male | | | | | | | | | |
| 6 | | 8109506241 | RG - 58A/U coax cable assy | | 6 inches | R-9210 Receiver | R-9210 | J 6 | R-9210 Receiver | ANT | J 4 | |
| | | | BNC - male | | | | | | | | | |
| | | | UHF - male | | | | | | | | | |
| 7 | | 8101003291 | Remote | | 6 ft. | KY-9110 R/T FSK Keyline Modem | R-9210 REMOTE | J 2 | R-9210 Receiver | REMOTE | J 8 | |
| | | | 9 pin DB - female | | | | | | | | | |
| | | | 9 pin DB - female | | | | | | | | | |
| 8 | | 8109506232 | RG - 58A/U coax cable assy | | 6 ft. | R-9210 Receiver | ANTENNA | J 11 | F-9800 Pre/postselector | RADIO | J 2 | |
| | | | BNC - male | | | | | | | | | |
| | | | UHF - male | | | | | | | | | |
| 9 | | 8110005799 | I/O | | 6 ft. | KY-9110 R/T FSK Keyline Modem | F-9800 SERIAL RADIO | J 1 | F-9800 Pre/postselector | RADIO | J 5 | |
| | | | 9 pin DB - female | | | | | | | | | |
| | | | 9 pin DB - female | | | | | | | | | |
| 10 | | 8109506097 | XCVR Audio | | 6 ft. | KY-9110 R/T FSK Keyline Modem | R-9210 XCVR AUDIO | J 3 | R-9210 Receiver | TX / XCVR AUDIO | J 10 | |
| | | | 15-pin DB - female | | | | | | | | | |
| | | | 39-pin circular - male | | | | | | | | | |
| Notes: 1. Some systems may be supplied with 4 ft cable assemblies. | | | | | | | | | | | | |

Figure 2.4.3.7 Cable Installation Chart, KY-9110 R/T (Receiver/Transmitter Site)

P2443C

Install these cables per Cable
Installation Chart on Page 2-8.
Refer to Figures 2.4.3.1 & 2.4.3.2.

Install these cables per Cable
Installation Chart on Page 2-10.
Refer to Figures 2.4.3.4 & 2.4.3.5.

Install these cables per Cable
Installation Chart on Page 2-12.
Refer to Figures 2.4.3.7 & 2.4.3.8.

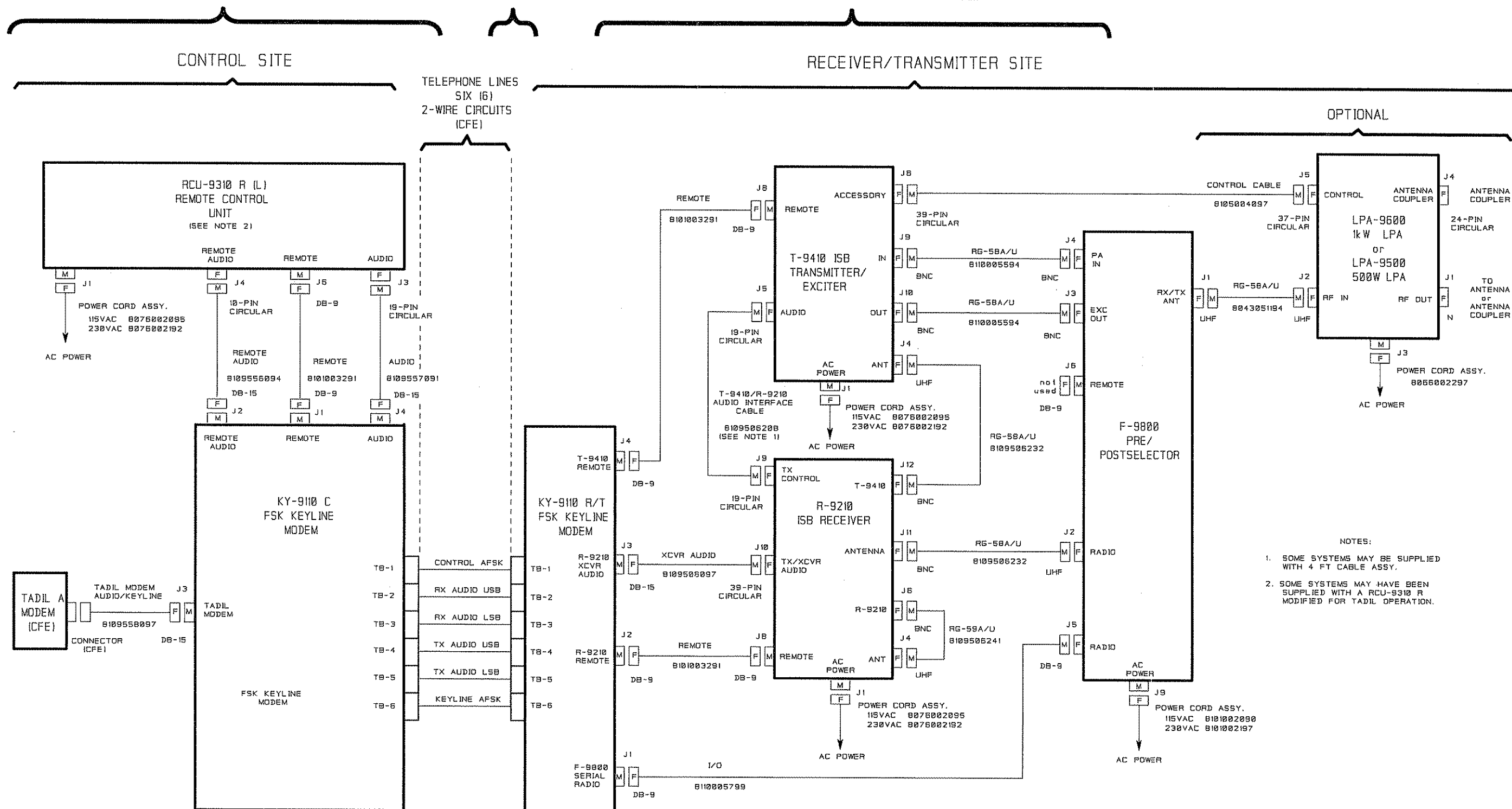
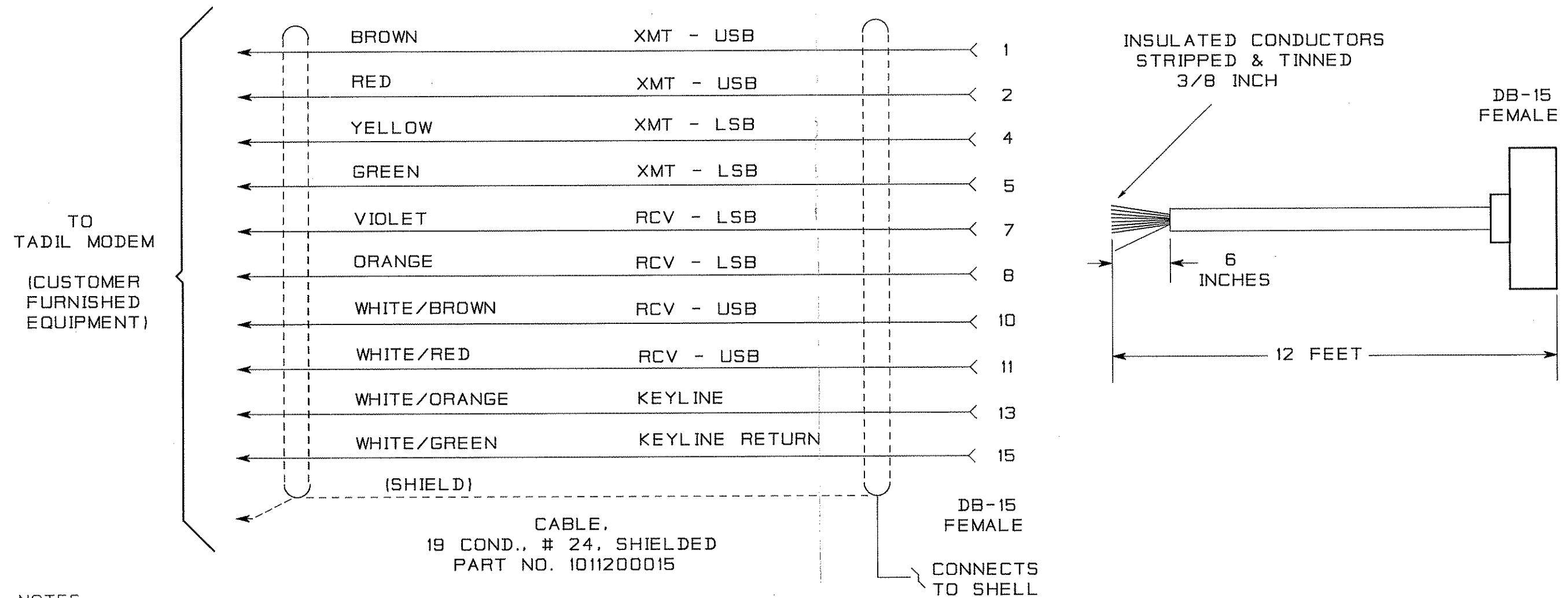


Figure 2.4.3.9 System Interconnect Diagram,
KY-9110 and SNR-2031

P2439B

CABLE ASSEMBLY
TADIL A MODEM / KY-9110 C SYSTEM INTERFACE
SUNAIR PART NO. 8109558097
LENGTH = 12 FOOT

CONNECTS TO:
KY-9110 C, J3
TADIL MODEM



NOTES:

1. ALL TRANSMIT AND RECEIVE AUDIO LINES ARE 600-OHM BALANCED.
2. TO KEY TRANSMITTER: CONNECT KEYLINE TO KEYLINE RETURN.
3. DB-15 CONNECTOR - SUNAIR PART NUMBERS

DB-15 FEMALE - 1012720007

DB-15 HOOD - 1012740005

Figure 2.4.3.10 System Interface Cable, TADIL Modem - KY-9110 C

2.5 SYSTEM INSTALLATION ADJUSTMENTS

Figure 2.5.1 System Audio Distribution Diagram, KY-9110 and SNR-2031 illustrates the Transmit/Receive Audio, Keyline AFSK and Control AFSK relationships. Typical audio levels are shown at each equipment input and output port. The KY-9110 Modems are designed to compensate for expected line-losses from the telephone lines. When properly configured, the KY-9110 Keyline Modem pair will deliver or accept 0 dBm signal levels between Control and Receiver/Transmitter Sites.

2.5.1 KY-9110C Adjustments

The KY-9110C has been factory adjusted to compensate for a -10dB line loss on the Receive Audio channels and generate a -9 dBm output level on the Transmit Audio channels, Keyline AFSK and Control AFSK channels. If these levels are not satisfactory, perform the following adjustment procedures. Refer to Figure 2.5.2 Installation Adjustment and Test Point Locations, KY-9110.

2.5.1.1 Adjustment Preparation

- a) Remove the KY-9110C top cover.
- b) Turn the KY-9110C power on. See section III for location and operation of the front panel controls. The **POWER** and **CARRIER** lamps must illuminate.

2.5.1.2 Keyline AFSK Tone Transmit Line Level Adjustment

Monitor Test Point TP1 **XMT FSK AUDIO** with an Oscilloscope or AC VTVM. Place the KY-9110C front panel **KEY** switch in the "UP" position (KEY) position. The **KEYLINE** lamp must illuminate. Adjust Potentiometer R31 **XMT FSK LINE LEVEL** for the desired level.

Note: The maximum line level over commercial telephone lines is -9 dBm.

2.5.1.3 Transmit Audio LSB and USB Line Level Adjustment

No internal Transmit Audio Line Level adjustments are provided. Output levels from the KY-9110C are fixed-pad determined. With a 0 dBm input signal from the TADIL A Modem applied to the KY-9110C rear panel connector, the Transmit Audio Line Level is -9dBm. If other line levels are required, consult Sunair for H-pad component values.

2.5.1.4 Receive Audio LSB and USB Level Adjustment

At the Receiver/Transmitter Site

- a) Fabricate an Audio Test Connector as described in Figure 2.5.3. Connect Audio Test Connector to the KY-9110R/T front panel **MIC** microphone connector.
- b) Inject a 1 kHz test tone at a level of -20 dBm (77 mV rms) into the Audio Test Connector. Place the KY-9110R/T front panel **MIC SELECT** switch in the **USB** position.

At the Control Site

- c) Monitor the Receive Audio USB channel at Test Point TP6 **LINE 1 AUDIO** with an Oscilloscope or VTVM.

- d) Adjust Potentiometer R61 **LINE AMP 1 LEVEL** for 0 dBm (2.2 Volts peak-to-peak).

At the Receiver/Transmitter Site

- e) Place the KY-9110R/T front panel **MIC SELECT** switch in the **LSB** position. Continue to inject the test tone input as previously described.

At the Control Site

- f) Monitor the Receive Audio LSB channel at Test Point TP8 **LINE 2 AUDIO** with an Oscilloscope or VTVM.
- g) Adjust Potentiometer R67 **LINE AMP 2 LEVEL** for 0 dBm (2.2 Volts peak-to-peak).

NOTE: The Receiver Audio output line levels delivered to the TADIL Modem can be monitored at the RCU-9310R(L) Remote Control Unit front panel. From the feature menu, select **LINE AUD**, then the active channel, and **END** to finish the selection. From the feature menu, select **METER**, then **LINE**, and **END** to finish the selection. The front panel meter displays the audio line level in dBm.

2.5.1.4.1 Line Loss Measurement

Use the following method to determine total line loss of the telephone lines:

At the Control Site, monitor the Receive Audio USB channel at Test Point TP7 **LINE 1 LEVEL** with an Oscilloscope or VTVM. Subtract the measured level in dBm from the -9 dBm line transmission level leaving the Receiver/Transmitter Site. The difference between the measured Receive Audio level and the line transmission level is the Line Loss in dB.

Line Loss for the Receive Audio LSB channel telephone line can be measured by repeating the above procedure except monitoring and measuring audio levels at Test Point TP9 **LINE 2 LEVEL** at the Control Site.

2.5.1.5 Adjustment Completion

- a) Turn the KY-9110C power off.
- b) Disconnect all test equipment and replace the KY-9110C top cover.

2.5.2 KY-9110R/T Adjustments

The KY-9110R/T has been factory adjusted to compensate for a -10dB line loss on the Transmit Audio channels and generate a -9 dBm output level on the Receive Audio channels. If these levels are not satisfactory, perform the following adjustment procedures. Refer to Figure 2.5.2 Installation Adjustment and Test Point Locations, KY-9110.

2.5.2.1 Adjustment Preparation

- a) Remove the top cover of the KY-9110R/T.

- b) Turn the KY-9110R/T power on. See section III for location and operation of the front panel controls. The **POWER** and **CARRIER** lamps must illuminate.

NOTE: The KY-9110 C at the Control Site must be connected to the telephone lines and be operating for the "CARRIER" lamp to be illuminated.

2.5.2.2 Receive Audio LSB and USB Line Level Adjustments

- a) No internal Receive Audio line level adjustments are provided. Output levels from the KY-9110R/T are fixed-pad determined. With a 0 dBm signal from the R-9210 HF/ISB Receiver, Receive Audio Line Level at the rear panel connector is -9 dBm. If other levels are required, consult Sunair for H-Pad component values.

2.5.2.3 Transmit Audio LSB and USB Level Adjustments

At the Control Site

- a) Fabricate an Audio Test Connector as described in Figure 2.5.3. Connect Audio Test Connector to the KY-9110C front panel **MIC** microphone connector.
- b) Inject a 1 kHz test tone at a level of -20 dBm (77 mV rms) into the Audio Test Connector. Place the KY-9110C front panel **MIC SELECT** switch in the **USB** position.

At the Receiver / Transmitter Site

- c) Monitor the Transmit Audio USB channel at Test Point TP6 **LINE 1 AUDIO** with an Oscilloscope or VTVM.
- d) Adjust Potentiometer R61 **LINE AMP 1 LEVEL** for 0 dBm (2.2 Volts peak-to-peak).

At the Control Site

- e) Place the KY-9110C front panel **MIC SELECT** switch in the **LSB** position. Continue to inject the test tone input as previously described.

At the Receiver / Transmitter Site

- f) Monitor the Transmit Audio LSB channel at Test Point TP8 **LINE 2 AUDIO** with an Oscilloscope or VTVM.
- g) Adjust Potentiometer R67 **LINE AMP 2 LEVEL** for 0 dBm (2.2 Volts peak-to-peak).

NOTE: T-9410 HF/ISB Transmitter/Exciter Audio input line levels can be monitored at its front panel. From the feature menu, select **LINE AUD**, then the active channel, and **END** to finish the selection. From the feature menu, select **METER**, then **LINE**, and **END** to finish the selection. Audio line levels to be monitored are then selected from the feature menu as follows: **L-MTR** or **U-MTR**, for Lower Sideband or Upper Sideband, respectively. The front panel meter displays the selected line level in dBm.

2.5.2.3.1 Line Loss Measurement

Use the following method to determine total line loss of the telephone lines:

At the Receiver/Transmitter Site, monitor the Transmit Audio USB channel at Test Point TP7 **LINE 1 LEVEL** with an Oscilloscope or VTVM. Subtract the measured level in dBm from the -9 dBm line transmission level leaving the Control Site. The difference between the measured Transmit Audio level and the line transmission level is the Line Loss in dB.

Line Loss for the Transmit Audio LSB channel telephone line can be measured by repeating the above procedure except monitoring and measuring audio levels at Test Point TP9 **LINE 2 LEVEL** at the Receiver/Transmitter Site.

2.5.2.4 Adjustment Completion

- a) Turn the KY-9110R/T power off.
- b) Disconnect all test equipment and replace the KY-9110R/T top cover.

- This concludes the System Installation Adjustments -

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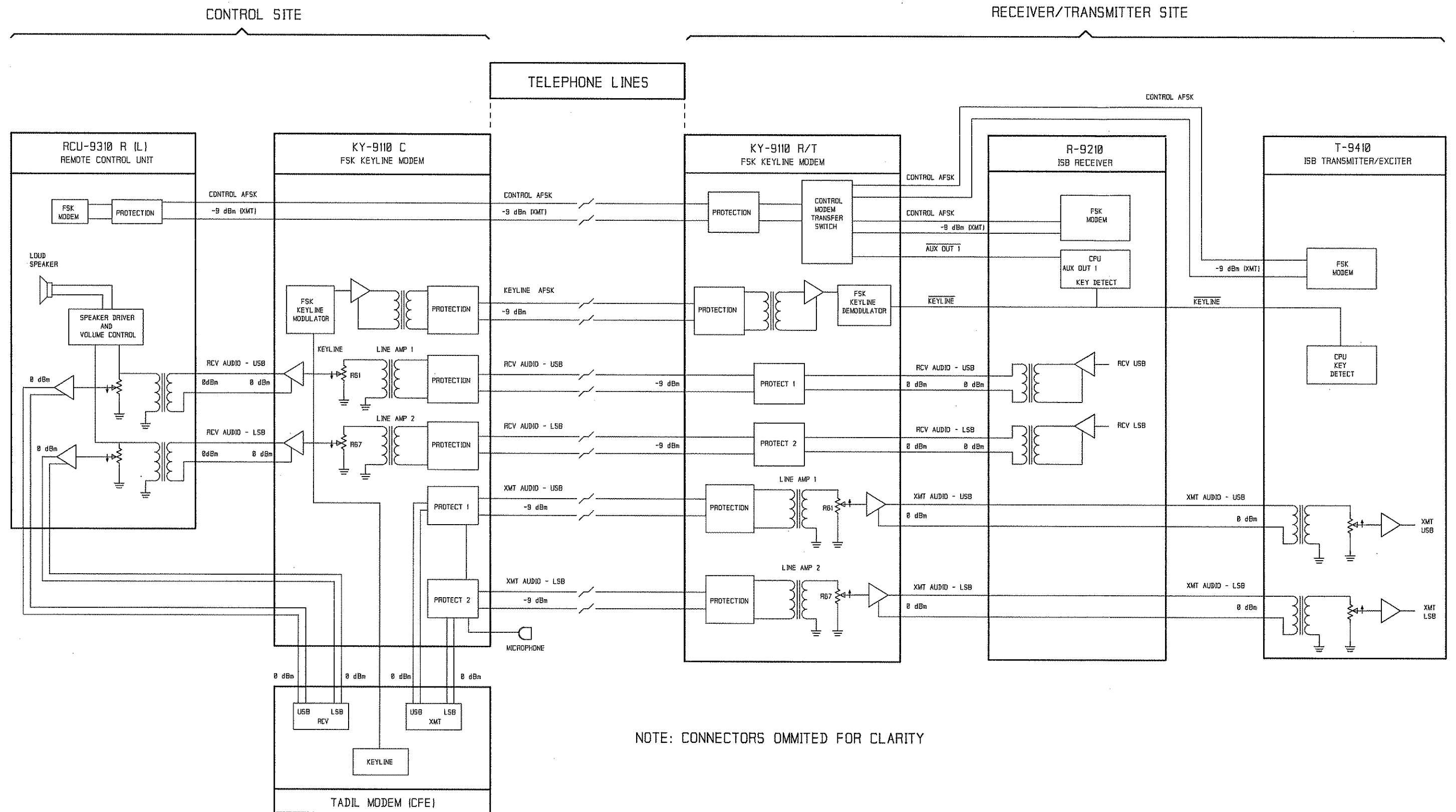


Figure 2.5.1 System Audio Distribution Diagram, KY-9110 and SNR-2031

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P2423B

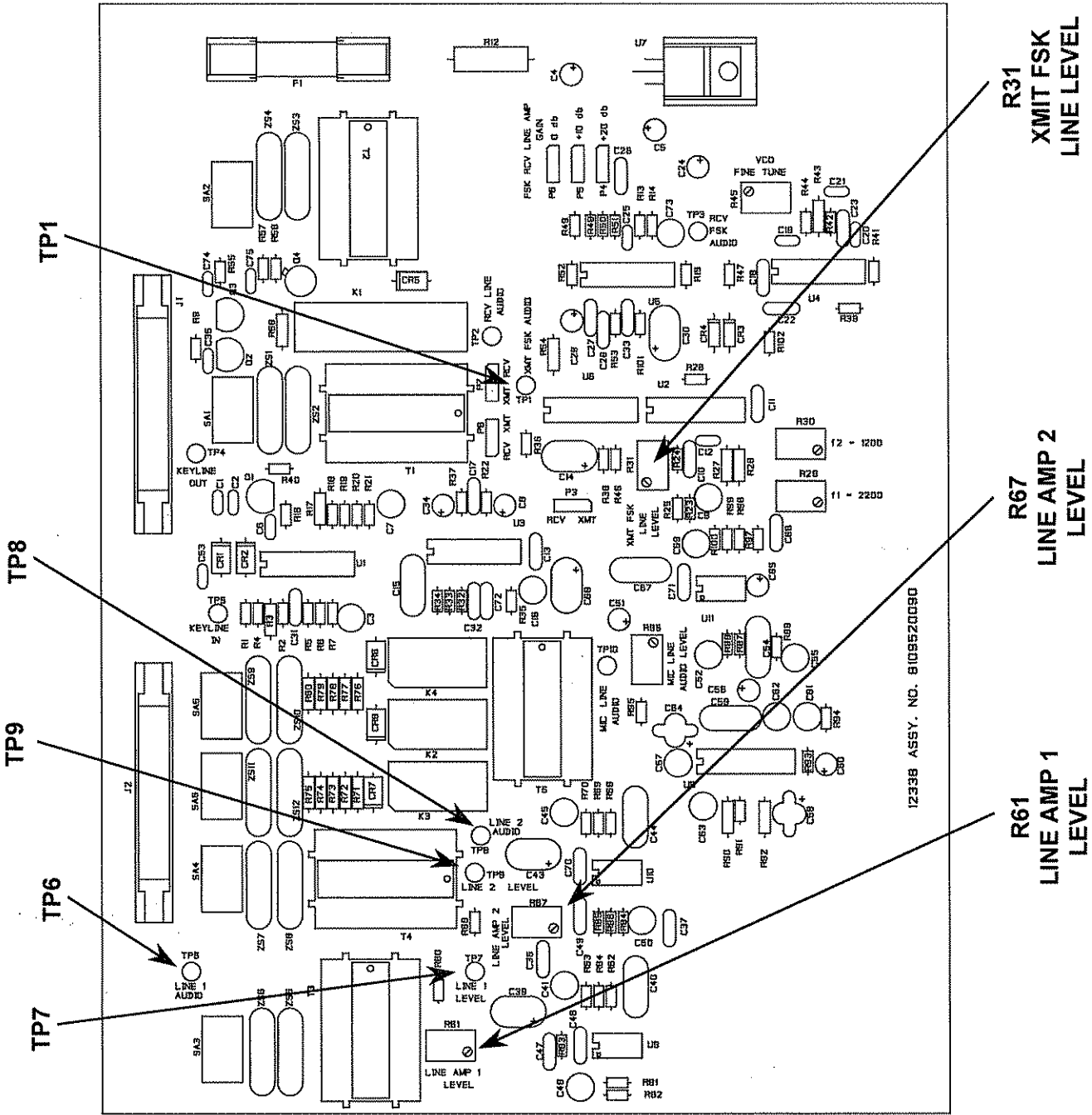
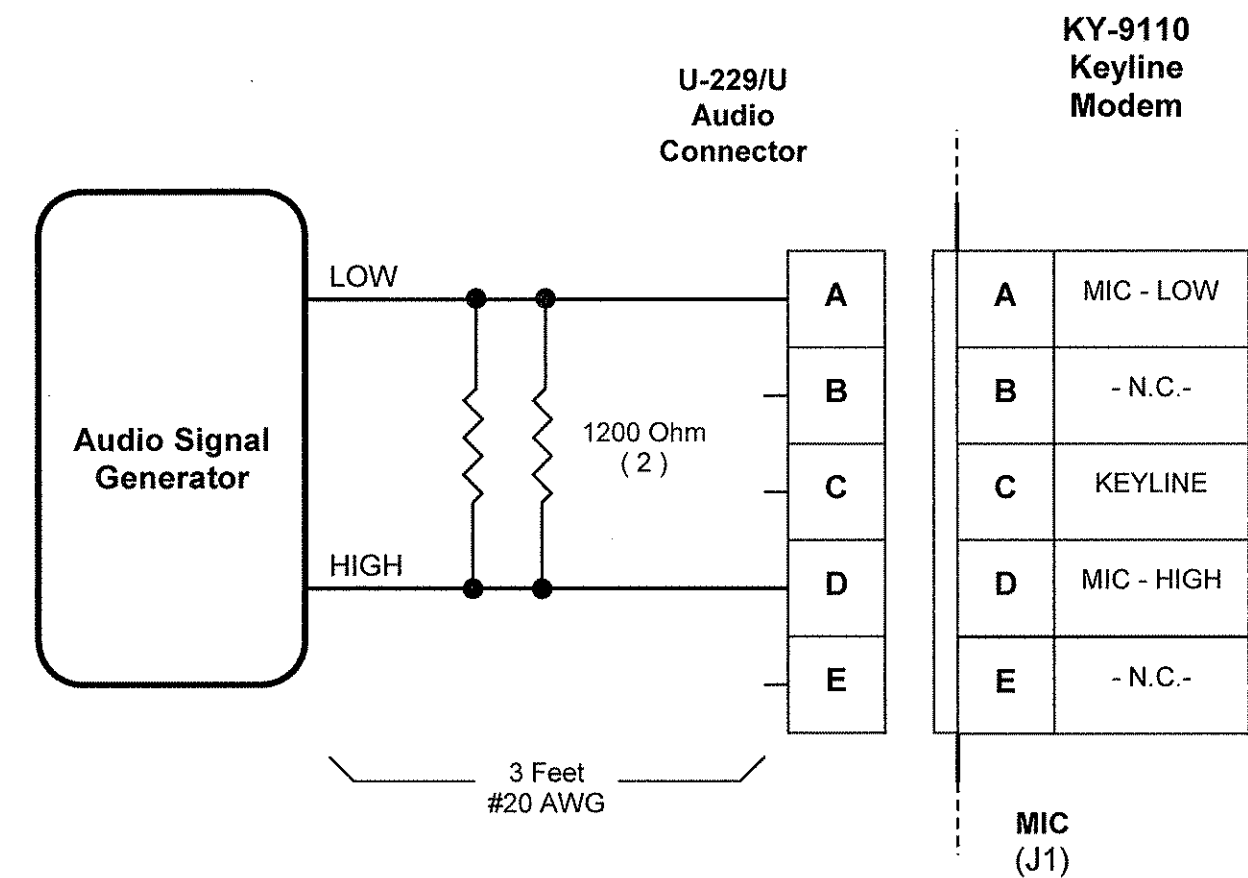


Figure 2.5.2 Installation Adjustment and Test Point Locations, KY-9110



Notes

1. Set Audio Generator Output per below:
Frequency = 1.0 kHz
Level = -20 dBm (77 mV rms)
2. Above KY-9110 **MIC** connector pin-out is the standard U-183/U pin-out. This permits the use of common MIL-SPEC microphones.
3. Above 1200-Ohm Audio Signal Generator termination resistors may be any 1/8, 1/4 or 1/2 Watt resistor type EXCEPT wire-wound.
4. N.C. = No Connection

Figure 2.5.3 Audio Test Connector Wiring

SECTION III OPERATION

3.1 GENERAL

This section describes the location and use of the KY-9110 front panel controls and indicators. Refer to Figure 3.1 below.

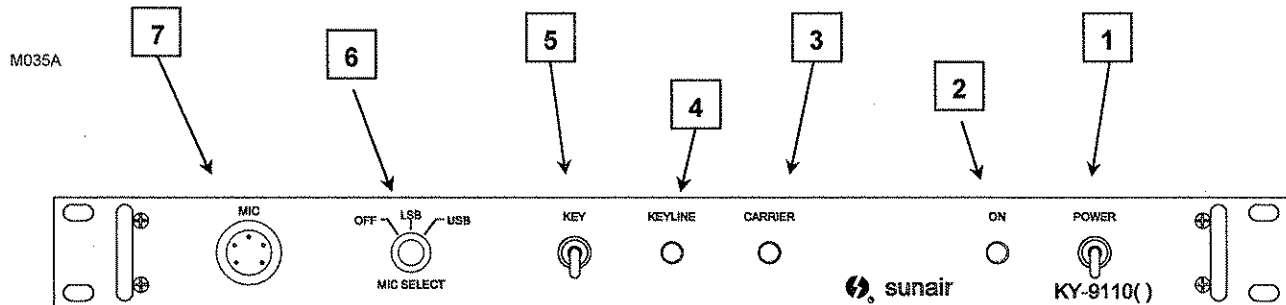


Figure 3.1 Front Panel Controls, KY-9110

1 **POWER** switch

Placing the **POWER** switch in the "UP" (ON) position turns on unit power. DC power for the KY-9110C is supplied by the RCU-9310R(L) Remote Control Unit. DC power for the KY-9110R/T is supplied by the T-9410 HF/ISB Transmitter/Exciter (via the R-9210 Receiver cabling).

2 **ON** lamp

The amber **ON** lamp illuminates when the **POWER** switch is in the "UP" (ON) position.

3 **CARRIER** lamp

The green **CARRIER** lamp illuminates when an AFSK keyline carrier is detected.

KY-9110C The **CARRIER** lamp illuminates when the **POWER** switch is in the "UP" (ON) position and the AFSK Demodulator detects that an AFSK carrier is being generated by the AFSK Modulator. Telephone line connection is not required for the KY-9110C **CARRIER** lamp to illuminate.

KY-9110R/T The **CARRIER** lamp illuminates when the AFSK Demodulator detects an AFSK carrier on the telephone link. The KY-9110C, at the Control Site, must have its **POWER** switch in the "UP" (ON) position.

4 KEYLINE lamp

The red **KEYLINE** lamp illuminates when the front panel **KEY** switch is in the "UP" (KEY) position or the TADIL A Modem line entering the rear panel connector is keying the transmitter.

5 KEY switch

Placing the **KEY** switch in the "UP" (KEY) position manually keys the transmitter. The transmitter can either be remotely keyed from the KY-9110C or locally keyed from the KY-9110R/T. The **KEYLINE** lamp will illuminate when this switch is operated.

6 MIC SELECT switch

KY-9110C Placing the **MIC SELECT** switch in the **OFF** position connects both TADIL A Modem audio channels to the transmitter. This is the normal switch position for standard system operation.

Selecting **LSB** or **USB** switch positions connects operator voice audio from the microphone to the LSB or USB transmitter audio circuits, respectively. TADIL A modem audio input is automatically disconnected from the selected transmitter audio channel.

NOTE: The MIC and MIC SELECT capabilities can also be used to inject test tones over the transmit audio telephone lines as an aid to system alignment. Refer to Section 2 - Installation & System Alignment for details.

KY-9110R/T The microphone position injects test tones on the receive audio telephone circuits for system alignment purposes.

NOTE: While the KY-9110R/T microphone position can key the T-9410 Transmitter, audio from the MIC and MIC SELECT function is NOT available to the T-9410 Transmitter/Exciter. Use the local T-9410 microphone position for transmitter voice operation.

7 MIC connector

The **MIC** connector is used as a convenient microphone connection point for operator audio and keyline input. It can also serve as a useful input point for system alignment tone injection. Refer to Section 2 for details.

The KY-9110 front panel **MIC** connector is wired to be compatible with the standard U-183/U pin-out and permits the use of common MIL-SPEC microphones. Handheld microphone assembly, Sunair Part No. 8076000602 is suitable for this purpose.

SECTION IV

THEORY OF OPERATION

4.1 GENERAL

The KY-9110C and KY-9110R/T utilize a common PC Board assembly for each unit type. The PC Board assembly is configured at chassis installation by Programming Shunts for AFSK keyline transmit (KY-9110C) or AFSK keyline receive (KY-9110R/T) modes of operation.

Refer to Chassis Schematics diagrams for the KY-9110C and KY-9110R/T units and common PC Board Schematic diagram for circuit details. See Figures 5.4.1 through 5.4.4.

4.2 KEYLINE AFSK MODULATOR AND DEMODULATOR

The KY-9110 High-Speed Keyline System uses an Audio Frequency Shift Key (AFSK) system to key and unkey a remote T-9410 HF/ISB Transmitter/Exciter. At the control site, the TADIL A Modem keyline connects directly to the KY-9110C. The KY-9110C generates a keyline AFSK signal in accordance with the TADIL A Modem keyline input. The KY-9110R/T, located at the Receiver/Transmitter site, decodes the keyline AFSK signal and keys or unkeys the T-9410 HF/ISB Transmitter/Exciter.

4.2.1 Keyline AFSK Modulator

At the KY-9110C site, the keyline is conditioned and buffered by the non-inverting keyline comparator U11-B. A

600-ohm resistor R54. The terminated output of T1 is coupled to line buffer amplifier U5-B. The output of U5-B is switched by CMOS switch U6-A. The output of U6-A is buffered by U5-A and amplified by FSK RCV Line Amplifier U5-D. The output of U5-D is summed with Monitor Buffer Amplifier U3-D. The summed output is supplied to the input of AFSK Demodulator U4.

The AFSK Demodulator U4, pin-7 Data Output generates a LOW state when receiving the 2200 Hz tone (unkeyed) and a HIGH state when receiving the 1200 Hz tone, (keyed). This output is supplied to the Keyline FET Q2 that controls the T-9410 HF/ISB Transmitter/Exciter keyline. Also connected to U4, pin-7 Data Output is Keyline lamp FET Q3 that enables the KY-9110R/T front panel **KEYLINE** lamp during transmitter keying.

AFSK Demodulator U4, pin-6 provides a HIGH output signal when a carrier signal is detected, i.e. when either one of the two AFSK tones is present. This signal is supplied to a low-pass filter consisting of R22, C8 and U3-C. The filtered output of U3-C is supplied to level detector U1-C. If carrier is present and the level is above the U1-C 6 VDC reference voltage, the output of U1-C will turn on carrier lamp FET Q1 and illuminate the KY-9110R/T front panel **CARRIER** lamp.

Programming Shunts P3, P7 and P8 and CMOS switches U6-A, -B and -C control the demodulator receive input path. Programming Shunts P3, P7 and P8 are installed in the **RCV** position and configure the PC Board assembly for keyline AFSK receive operation.

The Programming Shunts have unique configurations for the KY-9110C and KY-9110R/T version. The following summarizes these differences:

KY-9110C

- The KY-9110C is configured for transmit operation.

- AFSK receive audio is controlled by CMOS switch U6-A.
 - If the local keyline at the KY-9110 R/T is NOT enabled, CMOS Switch U6-A is closed and the incoming AFSK receive audio appears at the input of the FSK Receive Line Amplifier U5-D. The AFSK audio passes through the AFSK Demodulator, which generates drive signals to key the transmitter and operate the front panel **KEYLINE** and **CARRIER** status lamps.
 - If the local key line IS enabled, CMOS Switch U6-A is opened and AFSK receive audio is removed from the FSK Receive Line Amplifier U5-D. The local key line also causes CMOS Switch U6-C to open, which then closes CMOS Switch U6-B. U6-B then supplies the Monitor Buffer amplifier U3-D with AFSK audio generated by the AFSK Modulator (instead of the received AFSK audio from telephone lines). The AFSK audio passes through the AFSK Demodulator, generating drive signals to key the transmitter and operate the front panel **KEYLINE** and **CARRIER** status lamps. The above actions describe the "override" effect of the KY-9110 R/T local **KEY** switch on normal unit function.

4.3 TELEPHONE LINE AMPLIFIERS

The telephone line amplifiers provide compensation for signal loss that occurs over the telephone lines. Each line amplifier gain is independently adjustable and can compensate for a maximum line loss of 30 dB.

The telephone line input is protected by transient protection devices SA3, ZS5, and ZS6 on the USB channel and SA4, ZS7, and ZS8 on the LSB channel.

Each channel is transformer-coupled to the line and is resistively terminated with a 600-Ohm resistor. Non-

Microphone audio is amplified by Mic Amp U11-A. The amplified microphone level is supplied to the Mic Audio Compressor U8 that maintains a constant output level over an operating input range of 30 dB. The output of U8 is adjusted by Potentiometer R96 **MIC LINE AUDIO LEVEL**. The compressed Mic line audio is amplified by line driver U11-B. The output of U11-B is routed to other circuitry by relays K2, K3 and K4.

When the front panel **MIC SELECT** switch is placed in the **OFF** position, modem audio appears on the LSB and USB lines. When the microphone selector switch is placed in the **LSB** position, LSB mode relays K2 and K3 are energized and microphone audio appears on the "LSB" channel. When the microphone selector switch is placed in the **USB** position, USB mode relay K4 is energized and microphone audio appears on the "USB" channel.

4.6 CONTROL MODEM TRANSFER SWITCH

The Control Modem Transfer Switch connects the Control AFSK telephone line to the R-9210 HF/ISB Receiver during receiver control operation or connects the R-9210 HF/ISB Receiver to the T-9410 HF/ISB Transmitter/Exciter during transmitter control operation.

The telephone side of the Control AFSK Line transformer T2 is protected by transient protection devices SA2, ZS3 and ZS4.

The equipment side of transformer T2 is connected to the R-9210 HF/ISB Receiver during normal receive mode and receiver control operation. During transmitter control operation, the receiver switches the transfer relay to the Transmitter Remote FSK position by relay K1. K1 also terminates the telephone line during this condition by switching in Resistor R58, 600-Ohms. When communications with the transmitter is complete, the receiver returns control to the telephone Control AFSK line.

SECTION V

MAINTENANCE / FAULT ISOLATION / REPAIR

5.1 GENERAL

This section provides the procedures for maintenance, fault isolation and repair to the Lowest Repairable Unit (LRU) level.

5.1.1 Technical Support

For technical support on the equipment, contact the Sunair Customer Services Department at:

Sunair Electronics, Inc.
Attention: Customer Services Department
3005 Southwest Third Avenue
Fort Lauderdale, Florida 33315-3312
USA

Telephone: 954-525-1505
Fax: 954-765-1322
E-mail: techsupport@sunairhf.com

5.1.2 Preventive Maintenance

Scheduled preventive maintenance ensures reliable operation of the KY-9110 FSK Keyline Modem and SNR-2031 HF ISB Diversity TADIL Systems.

KY-9110C Keyline Modem: None

KY-9110B/T Keyline Modem: None

After all recommended installation steps have been completed and the system successfully passes all initial power-up tests, Sunair strongly recommends the user access and record the software revision levels of all system components that contain revision-controlled software. Consult the specific Operation and Maintenance manuals for procedures detailing how to determine installed software revision levels from the unit front panels. These manuals also make additional recommendations about documenting software revision level history. Sunair strongly recommends these actions be reviewed, implemented and maintained.

A "Software Revision Record" form has been provided to help the user to accomplish this and can be found in Section V of this manual. Sunair also recommends after the user completes the form that a copy be Faxed to: Sunair – Customer Services at the number shown on the form.

| Software Revision Record | | | | Complete this form after installation or upgrade and FAX to Sunair at : 954-765-1322 | | | | | | |
|--|----------------|--------------------------------|-----------------|---|----------------|------------|--------------------------|------------|----------------|--|
| Page 1 of 2 | | Customer | | | P.O. | | System Installation Date | | | |
| Standard Equipment | | | | | | | | | | |
| R-9210 Receiver | | | | Serial No. | | | | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered Rev. Level | Upgrades | | | | | |
| | | | | | 1st | | 2nd | | 3rd | |
| Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| CPU | 1A2A1 | U13 | 8109273297 | | | | | | | |
| | | U14 | 8109272291 | | | | | | | |
| I/O | 1A2A8 | U20 | 8109113290 | | | | | | | |
| T-9410 Transmitter / Exciter | | | | Serial No. | | | | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered Rev. Level | Upgrades | | | | | |
| | | | | | 1st | | 2nd | | 3rd | |
| Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| CPU | 1A2A1 | U13 | 8109473296 | | | | | | | |
| | | U14 | 8109472290 | | | | | | | |
| I/O | 1A2A8 | U20 | 8109113290 | | | | | | | |
| F-9800 Pre/postselector | | | | Serial No. | | | | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered Rev. Level | Upgrades | | | | | |
| | | | | | 1st | | 2nd | | 3rd | |
| Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| (Software Revision Level - Not Applicable) | | | | | | | | | | |
| RCU-9310 R (L) Remote Control Unit | | | | Serial No. | | | | | | |

KY-9110 & SNR-2031

| Software Revision Record | | | | Complete this form after installation or upgrade and FAX to Sunair at : 954-765-1322 | | | | | | | |
|---------------------------|------------|--------------------------------|-----------------|--|------------|----------------|------------|--------------------------|------------|----------------|--|
| Page 2 of 2 | | Customer | | | | P.O. | | System Installation Date | | | |
| Optional Equipment | | | | | | | | | | | |
| RF Linear Power Amplifier | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| Antenna Coupler | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | Component Reference Designator | Sunair Part No. | As Delivered | Upgrades | | | | | | |
| | | | | | 1st | | 2nd | | 3rd | | |
| | | | | Rev. Level | Rev. Level | Date Installed | Rev. Level | Date Installed | Rev. Level | Date Installed | |
| | | | | | | | | | | | |
| | | | | Model No. | | | | Serial No. | | | |
| Assembly / Subassembly | | | | Customer Software Revision History | | | | | | | |
| Name | Designator | | | | | | | | | | |

5.2 TROUBLESHOOTING AND CORRECTIVE MAINTENANCE

The following information provides the procedures for fault isolation and repair to the Lowest Repairable Unit (LRU) level for the KY-9110 Keyline Modem System. The following adjustments can be accomplished with or without the KY-9110 units connected to the telephone lines.

For other associated components of the Remote Control or TADIL A Transceiver Systems, refer to the specific Operation and Maintenance manuals for troubleshooting and corrective maintenance activities.

5.2.1 Disassembly

Procedures for the disassembly of the KY-9110 units are given in the following paragraph. For reassembly, reverse these steps.

5.2.1.1 Top Cover Removal

- a) Place **POWER** switch in the "DOWN" position (OFF), remove DC power source (or power cable).
- b) Remove the six (6) #6-32 flat head top cover screws.
- c) Lift off top cover.

5.2.2 KY-9110 PC Board Alignment

Refer to Figure 5.3.1 for the location of controls and adjustments. Unless otherwise noted, all voltage measurements are referenced to Chassis ground. All of the following tests and adjustments are intended to be performed at the bench level and away from system environment.

5.2.2.1 Power Supply

- a) Measure the power supply DC input voltage at the junction of Resistor R12 and Fuse F1. The measured value must be between +25 and +28 Volts DC.
- b) Measure the regulated output voltage at IC U7, terminal-3 (out). The measured value must be 12.0

- c) Connect an Oscilloscope probe and Frequency Counter to Test Point TP1 **XMT FSK AUDIO**. Place the KY-9110 front panel **KEY** switch in the "DOWN" position (UNKEYED). Adjust Potentiometer R31 **XMT FSK LINE LEVEL** for 1.0 Volts, peak-to-peak at Test Point TP1. This level corresponds to a -9 dBm signal level delivered to the telephone line. If a different line level is required, adjust Potentiometer R31 accordingly.
- d) Adjust Potentiometer R29 **F1=2200 Hz** for 2200 Hz \pm 2 Hz as read on the Frequency Counter. Place the KY-9110 front panel **KEY** switch in the "UP" position (KEYED). Adjust Potentiometer R30 **F2=1200 Hz** for 1200 Hz \pm 2 Hz as read on the Frequency Counter.

5.2.2.3 AFSK Demodulator

- a) Place Programming Shunts P3, P7 and P8 in the **RCV** configuration.
- b) Ensure the KY-9110 front panel **POWER** switch is in the "DOWN" position (OFF).
- c) Connect an Ohmmeter to Potentiometer R45, (wiper) **VCO FINE TUNE**. Adjust R45 for a measured value of 4000-Ohms with respect to ground.
- d) Disconnect the Ohmmeter. Place the KY-9110 front panel **POWER** switch in the "UP" position (ON).
- e) Connect an Audio Signal Generator to Terminal Block TB-6 (Keyline AFSK). Adjust the Audio Signal Generator output level to 20 dB below the programmed gain of the **FSK RCV LINE AMP**. Adjust the output level as follows:
 - 1. Determine the Programmed Gain setting (in dB) of the **FSK RCV LINE AMP** by noting which pair of connector posts the Programming Shunt is installed on (P4, P5 or P6). For reference, the "Shunt Position vs. **FSK RCV LINE AMP** Gain" setting information is given in the below table.
 - 2. Add +20 dB to the above noted Programmed Gain setting. The sum of these levels, when referred to 0 dBm yields the required Audio Signal Generator output level to use when verifying **FSK RCV LINE AMP** performance. For convenience, the required Audio Signal Generator output level is given in the below table in the "Test Signal Input Level" column.

1. Adjust the Audio Signal Generator output frequency to 1200 Hz, \pm 10 Hz. The KY-9110 front panel **CARRIER** lamp DS2 and the **KEYLINE** lamp DS3 must be illuminated.
 2. Slowly increase the Audio Signal Generator output frequency until the measured voltage level at Test Point TP4 transitions to the HIGH state. As soon as this condition is met, STOP increasing the Audio Signal Generator output frequency. Note the output frequency. The output frequency must be equal to or less than 1850 Hz.
- h) Readjust the Audio Signal Generator output frequency to 2200 Hz, \pm 10 Hz. The KY-9110 front panel **KEYLINE** lamp DS3 must extinguish. The **CARRIER** lamp DS2 must remain illuminated.
1. Slowly decrease the Audio Signal Generator output frequency until the measured voltage level at Test Point TP4 transitions to the LOW state. As soon as this condition is met, STOP decreasing the Audio Signal Generator output frequency. Note the output frequency. The output frequency must be equal to or greater than 1400 Hz.
- i) If the KY-9110 does not meet the above test criteria in steps g) and h), troubleshooting will be required to identify the cause or defective component. The unit must meet the above criteria before continuing.
- j) Disconnect all test equipment. Return the Programming Shunts to the original positions when the equipment was received from the factory. The following summarizes these configurations

KY-9110C Shunts P3, 7 and 8 in the **XMT** position.

KY-9110R/T Shunts P3, 7 and 8 in the **RCV** position.

NOTE: Failure to observe proper Programming Shunt Reconfiguration will result in system malfunction.

5.2.2.4 Line Amplifiers

KY-9110C

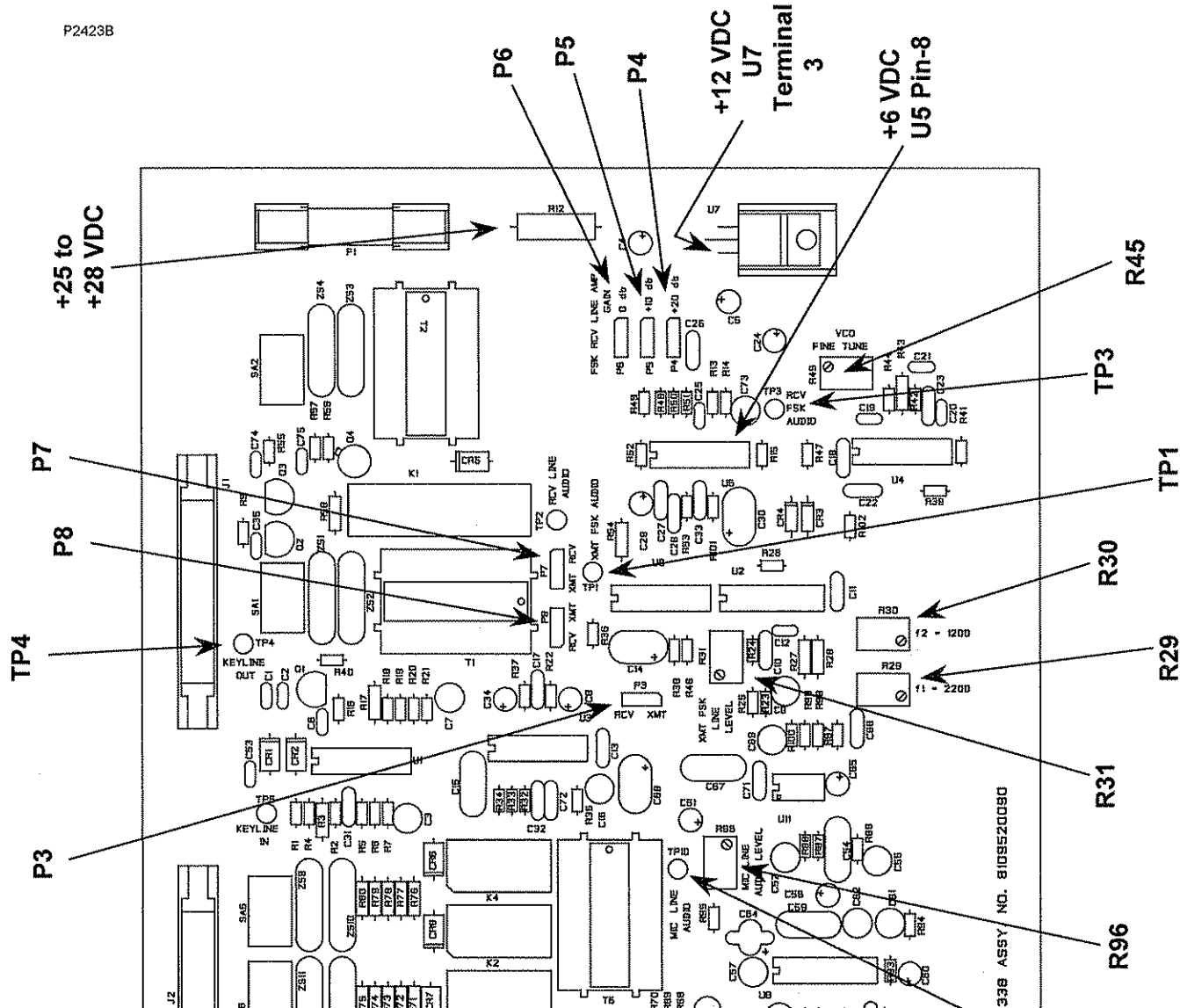
- a) Connect an Audio Signal Generator to Terminal Block TB-2 (RCV AUDIO-USB). Adjust the Audio Signal Generator output frequency for 1 kHz. Furthermore, adjust the Generator output level for a level that represents the nominal received signal level and accounts for the expected telephone line loss. Adjust Potentiometer R61 **LINE AMP 1 LEVEL** for 0 dBm at Test Point TP6 **LINE 1 AUDIO**.

5.2.2.5 Microphone Level

- a) Fabricate an Audio Test Connector as described in Figure 2.5.3. Connect Audio Test Connector to the KY-9110 front panel **MIC** microphone connector.
- b) Inject a 1 kHz test tone at a -20 dBm (77 mV rms) level into the Audio Test Connector. Ensure Audio Signal Generator is properly terminated with 600-Ohms (per Figure 2.5.3).
- c) Monitor Test Point TP10 **MIC LINE AUDIO** with an Oscilloscope or VTVM.
- d) Adjust Potentiometer R96 **MIC LINE AUDIO LEVEL** for 0 dBm.

- This completes the PC Board Alignment –

P2423B



5.2.3 System Schematics

Schematics for assemblies and subassemblies unique to the KY-9110 Keyline Modem System are listed below and appear at the end of this section.

| <u>Assembly/Subassembly Name</u> | <u>Figure No.</u> |
|--|-------------------|
| 1. KY-9110 C Chassis Assembly (Parts List and Wiring Diagram) | 5.4.1 |
| 2. KY-9110 R/T Chassis Assembly (Parts List and Wiring Diagram) | 5.4.2 |
| 3. KY-9110 PC Board Assembly, 1A2A2 (Parts List, Component Location Diagram, and Schematic Diagram) | 5.4.3 |
| 4. KY-9110 Connector Interface Assembly, 1A2A1 (Parts List and Schematic Diagram) | 5.4.4 |

5.2.4 Cable Wiring Diagrams

Wiring Diagrams for cable assemblies unique to the KY-9110 Keyline Modem System are listed below and appear at the end of this section. For information regarding all other cable assemblies used in the SNR-2031 Remote Controlled TADIL A HF Transceiver System, refer to the SNR-2031 TADIL A System Operation and Maintenance manual and/or any optional equipment manuals.

| <u>Cable Assembly Name</u> | <u>Figure No.</u> |
|--|-------------------|
| 1. Cable Assembly, RCU-9310R(L) / KY-9110 C – REMOTE AUDIO | 5.5.1 |
| 2. Cable Assembly, RCU-9310R(L) / KY-9110 C – REMOTE | 5.5.2 |
| 3. Cable Assembly, RCU-9310R(L) / KY-9110 C – AUDIO | 5.5.3 |
| 4. Cable Assembly, KY-9110 R/T / T-9410 – REMOTE | 5.5.4 |
| 5. Cable Assembly, KY-9110 R/T / R-9210 – XCVR AUDIO | 5.5.5 |

KY-9110 & SNR-2031

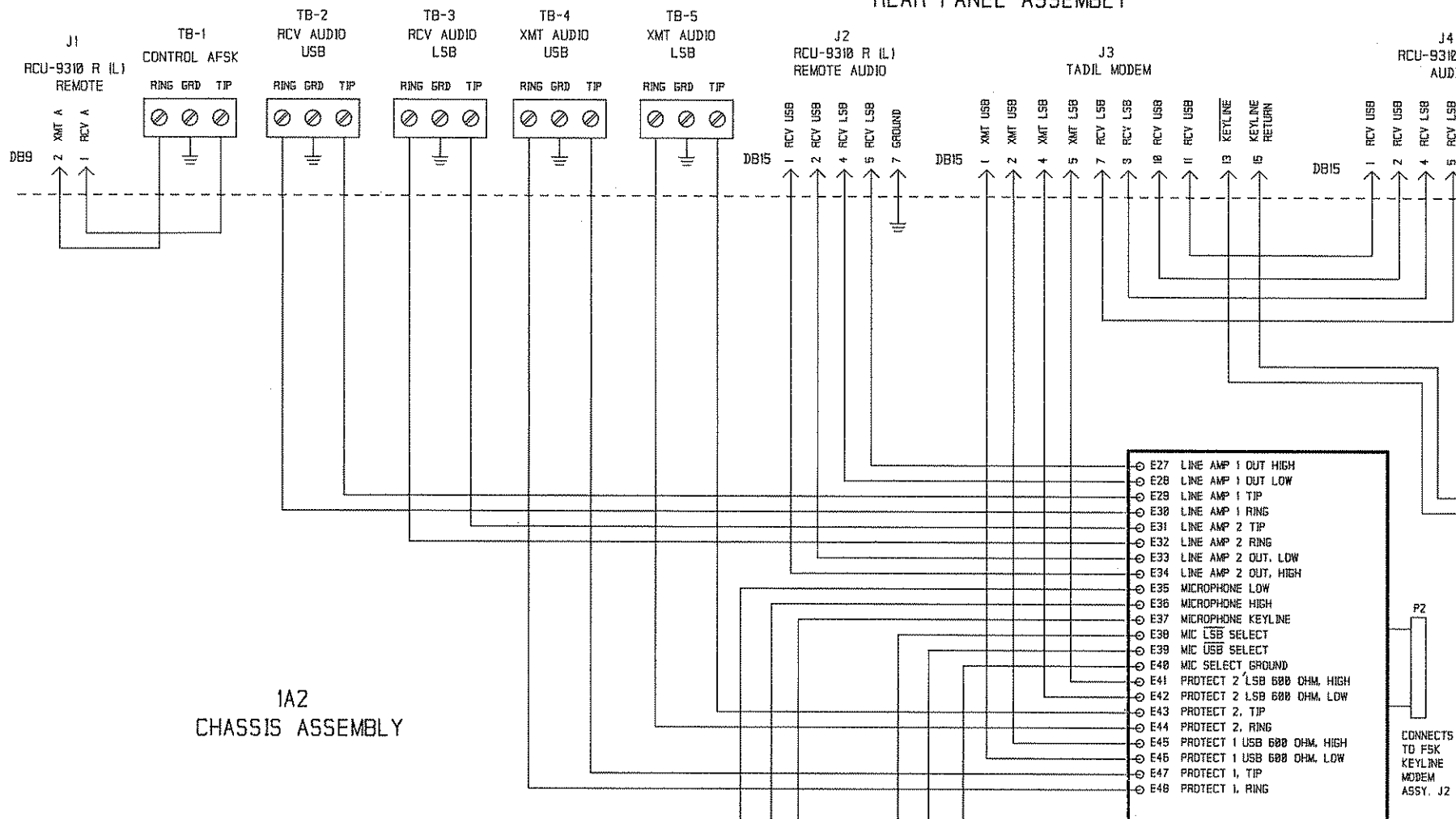
| Sunair Part No. |
|--------------------|
| 095100XX |
| 09510094 |
| 09525091 |
| 09520090 |
| 095100XX |

| FRONT PANEL ASSEMBLY, 1A1 | | Panel 1 of 1 |
|---------------------------|--------------------------------|--------------------|
| Ref Symbol | Description | Sunair Part No. |
| | FRONT PANEL ASSEMBLY, 1A1 | 81095600XX |
| C1 | CAP. 0.01UF, 50V, X7R, 20% | 0281730008 |
| DS1 | LAMP ASSY AMBER INCANDESCENT | 6032072207 |
| DS2 | LAMP ASSY RED INCANDESCENT | 6032072304 |
| DS3 | LAMP ASSY GREEN INCANDESCENT | 6032072100 |
| J1 | CONNECTOR, AUDIO, 5 PIN | 1003300022 |
| S1 | SWITCH, TOGGLE, DPST | 0346430003 |
| S2 | SWITCH, TOGGLE, DPST | 0346430003 |
| S3 | SWITCH, ROTARY, 10 POS | 1012300030 |
| XDS1 | SOCKET, CARTRIDGE LAMP | 1003322000 |
| XDS2 | SOCKET, CARTRIDGE LAMP | 1003322000 |
| XDS3 | SOCKET, CARTRIDGE LAMP | 1003322000 |
| | KNOB, .70D, BLK, W/D, W/L | 1005480010 |
| | HANDLE, ROUND, 1/4DIA, 1-1/4LG | 1012470024 |
| | PANEL, FRONT, KY-9110 | 8109512119 |

| CHASSIS ASSEMBLY, KY-9110 C, 1A2 | | Panel 1 of 1 |
|----------------------------------|----------------------------------|--------------------|
| Ref Symbol | Description | Sunair Part No. |
| | CHASSIS ASSY, KY-9110 C, 1A2 | 8109560094 |
| 1A1 | FRONT PANEL ASSEMBLY | 81095100XX |
| 1A2A1 | PC ASSEMBLY, CONNECTOR INTERFACE | 8109525091 |
| 1A2A2 | PC ASSY, FSK KEYLINE MODEM | 8109520090 |
| 1A3 | REAR PANEL ASSEMBLY, KY-9110 C | 81095600XX |
| | PANEL, SIDE, L/R, KY-9110 | 8076511305 |
| | COVER, TOP, KY-9110 | 8076511704 |
| | COVER, BOTTOM, KY-9110 | 8109511503 |

B2128C

1A3 REAR PANEL ASSEMBLY



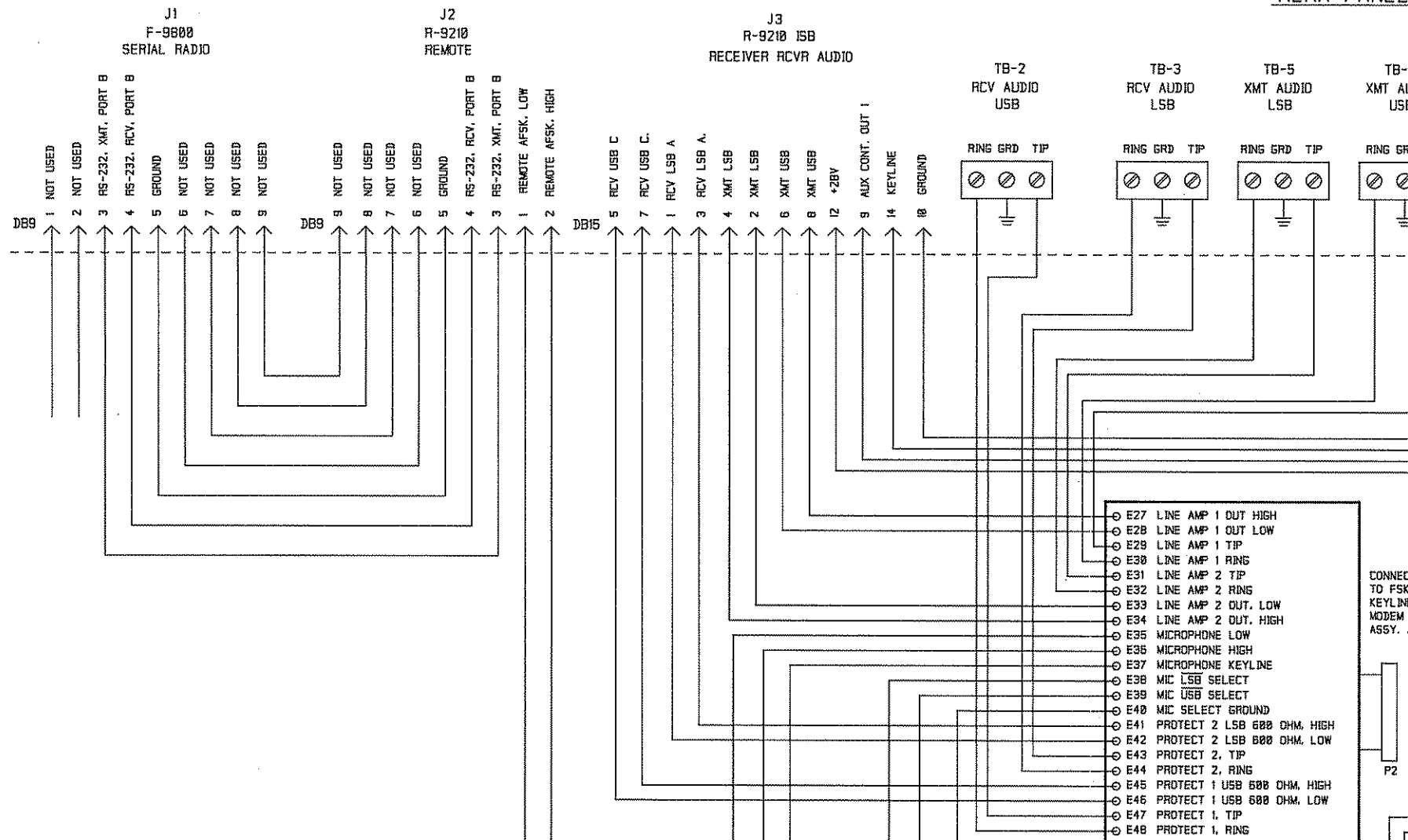
KY-9110 & SNR-2031

| Sunair Part No. |
|--------------------|
| 81095600XX |
| 8109560091 |
| 8109525091 |
| 8109520090 |
| 81095600XX |

| FRONT PANEL ASSEMBLY, 1A1 | | Panel 1 of 1 |
|---------------------------|--------------------------------|--------------------|
| Ref Symbol | Description | Sunair Part No. |
| | FRONT PANEL ASSEMBLY, 1A1 | 81095600XX |
| C1 | CAP. 0.01UF, 50V, X7R, 20% | 0281730008 |
| DS1 | LAMP ASSY AMBER INCANDESCENT | 6032072207 |
| DS2 | LAMP ASSY RED INCANDESCENT | 6032072304 |
| DS3 | LAMP ASSY GREEN INCANDESCENT | 6032072100 |
| J1 | CONNECTOR, AUDIO, 5 PIN | 1003300022 |
| S1 | SWITCH, TOGGLE, DPST | 0346430003 |
| S2 | SWITCH, TOGGLE, DPST | 0346430003 |
| S3 | SWITCH, ROTARY, 10 POS | 1012300030 |
| XDS1 | SOCKET, CARTRIDGE LAMP | 1003322000 |
| XDS2 | SOCKET, CARTRIDGE LAMP | 1003322000 |
| XDS3 | SOCKET, CARTRIDGE LAMP | 1003322000 |
| | KNOB, .70D, BLK, W/D, W/L | 1005480010 |
| | HANDLE, ROUND, 1/4DIA, 1-1/4LG | 1012470024 |
| | PANEL, FRONT, KY-9110 | 8109512119 |

| CHASSIS ASSEMBLY, KY-9110 R/T, 1A2 | | Panel 1 of 1 |
|------------------------------------|--------------------------------|--------------------|
| Ref Symbol | Description | Sunair Part No. |
| | CHASSIS ASSY, KY-9110 R/T, 1A2 | 8109560091 |
| 1A1 | FRONT PANEL ASSEMBLY | 81095100XX |
| 1A2A1 | PC ASSY, CONNECTOR INTERFACE | 8109525091 |
| 1A2A2 | PC ASSY, FSK KEYLINE MODEM | 8109520090 |
| 1A3 | REAR PANEL ASSY, KY-9110 R/T | 81095600XX |
| | PANEL, SIDE, L/R, KY-9110 | 8076511305 |
| | COVER, TOP, KY-9110 | 8076511704 |
| | COVER, BOTTOM, KY-9110 | 8109511503 |

A21Z8C



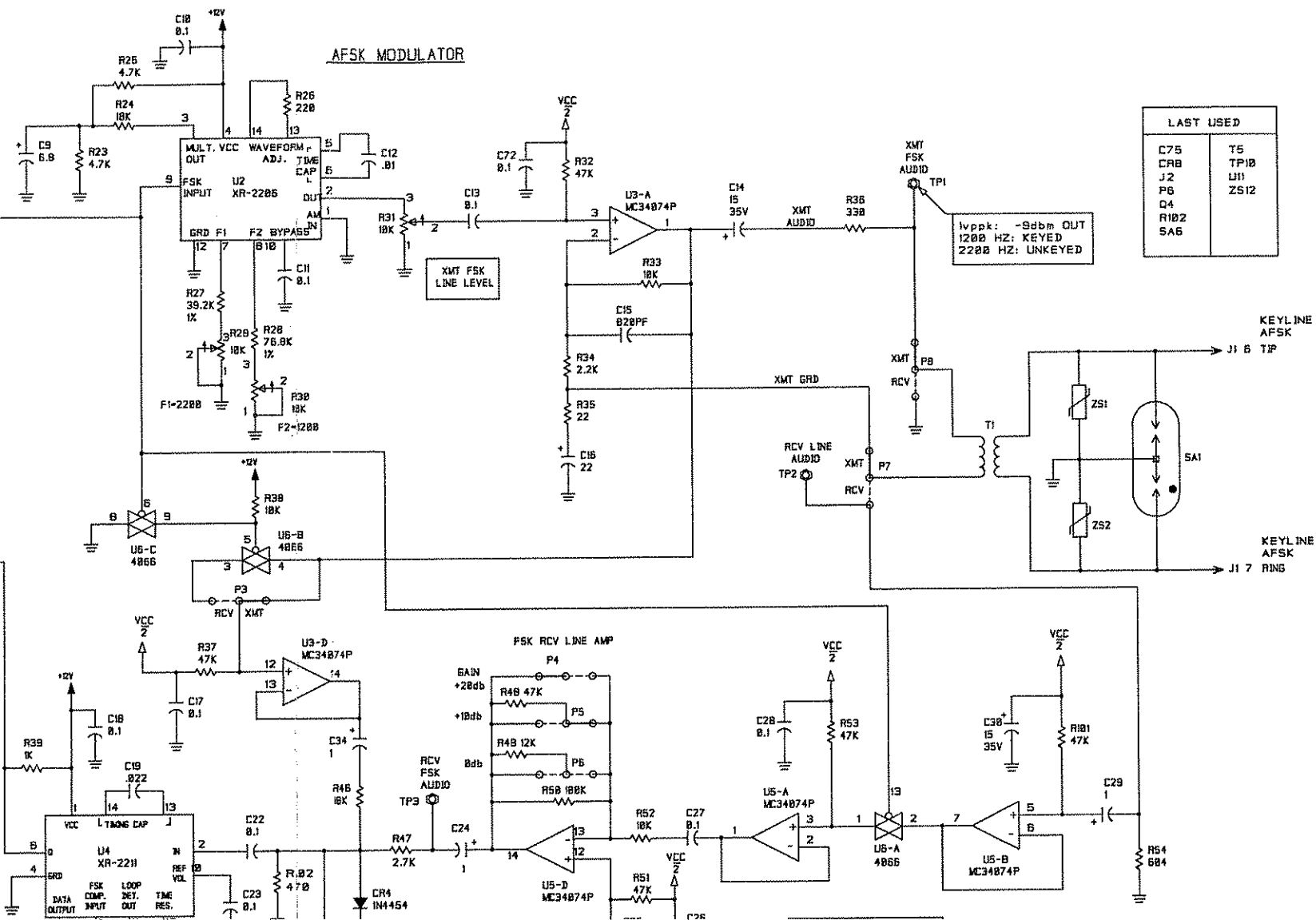
| PC ASSEMBLY, FSK KEYLINE MODEM, 1A2A2 | | Panel 2 of 6 |
|---------------------------------------|------------------------------|--------------------|
| Ref Symbol | Description | Sunair Part No. |
| C43 | CAP. 15UF, 35V | 0282240004 |
| C44 | CAP. 820PF, 300V, DM15, 5% | 0288750004 |
| C45 | CAP. 22UF, 15V | 0296660001 |
| C46 | CAP. 0.1UF, 50V, X7R | 1011180014 |
| C47 | CAP. 0.1UF, 50V, X7R | 1011180014 |
| C48 | CAP. 22UF, 15V | 0296660001 |
| C49 | CAP. 0.1UF, 50V, X7R | 1011180014 |
| C50 | CAP. 22UF, 15V | 0296660001 |
| C51 | CAP. 1UF, 35V | 0281660000 |
| C52 | CAP. 22UF, 15V | 0296660001 |
| C53 | CAP. 0.001UF, 100V, X7R, 20% | 0281630003 |
| C54 | CAP. 820PF, 300V, DM15, 5% | 0288750004 |
| C55 | CAP. 2.2UF, 35V | 0273950002 |
| C56 | CAP. 1UF, 35V | 0281660000 |
| C57 | CAP. 22UF, 15V | 0296660001 |
| C58 | CAP. 3.3UF, 35V | 0281680001 |
| C59 | CAP. 150PF, 500V, DM15, 5% | 0274980002 |
| C60 | CAP. 1UF, 35V | 0281660000 |
| C61 | CAP. 2.2UF, 35V | 0273950002 |
| C62 | CAP. 6.8UF, 20V | 0296780006 |
| C63 | CAP. 6.8UF, 20V | 0296780006 |
| C64 | CAP. 3.3UF, 35V | 0281680001 |
| C65 | CAP. 1UF, 35V | 0281660000 |
| C66 | CAP. 0.1UF, 50V, X7R | 1011180014 |
| C67 | CAP. 820PF, 300V, DM15, 5% | 0288750004 |
| C68 | CAP. 15UF, 35V | 0282240004 |
| C69 | CAP. 22UF, 15V | 0296660001 |
| C70 | CAP. 0.1UF, 50V, X7R | 1011180014 |
| C71 | CAP. 0.1UF, 50V, X7R | 1011180014 |

| | | |
|---------------------------------------|--|--------------|
| PC ASSEMBLY, FSK KEYLINE MODEM, 1A2A2 | | Panel 3 of 6 |
|---------------------------------------|--|--------------|

| Ref Symbol | Description | Sunair Part No. |
|---------------|--------------------------------|--------------------|
| F1 | FUSE, MDL, 1/2 AMP, 250V | 0841310009 |
| J1 | CONNECTOR, HEADER, 26 PIN MALE | 1011200261 |
| J2 | CONNECTOR, HEADER, 26 PIN MALE | 1011200261 |
| K1 | RELAY, 4PDT, 12V, PC MT | 1009380001 |
| K2 | RELAY, DPDT, 28V, .3A | 1013120001 |
| K3 | RELAY, DPDT, 28V, .3A | 1013120001 |
| K4 | RELAY, DPDT, 28V, .3A | 1013120001 |
| P1 | HEADER, PIN STRIP, 3 PIN | 1011230020 |
| P2 | HEADER, PIN STRIP, 3 PIN | 1011230020 |
| P3 | HEADER, PIN STRIP, 3 PIN | 1011230020 |
| P4 | HEADER, PIN STRIP, 3 PIN | 1011230020 |
| P5 | HEADER, PIN STRIP, 3 PIN | 1011230020 |
| P6 | HEADER, PIN STRIP, 3 PIN | 1011230020 |
| Q1 | TRANSISTOR, N-CH, FET 2N7000 | 1011050013 |
| Q2 | TRANSISTOR, N-CH, FET 2N7000 | 1011050013 |
| Q3 | TRANSISTOR, N-CH, FET 2N7000 | 1011050013 |
| Q4 | TRANSISTOR, PNP, SI. 2N2907A | 0448390001 |
| R1 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R2 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R3 | RESISTOR 1M, 10%, 1/4W | 0170650006 |
| R4 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R5 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R6 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R7 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R9 | RESISTOR 47K, 5%, 1/8W | 1010804731 |
| R12 | RESISTOR 75, 5%, 3W | 0169440001 |
| R13 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R14 | RESISTOR 10K, 5%, 1/8W | 1010801031 |
| R15 | RESISTOR 10, 5%, 1/8W | 1010801007 |

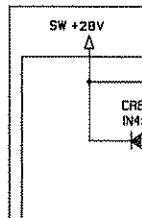
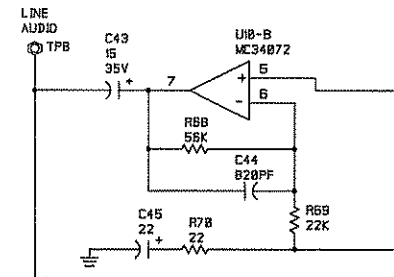
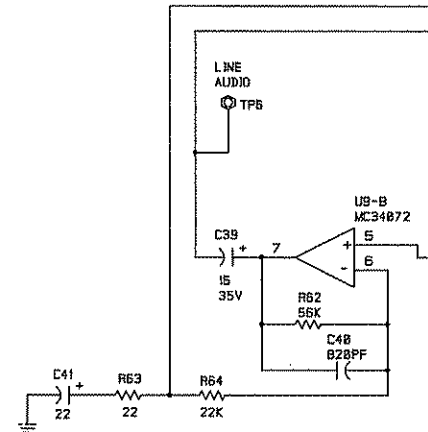
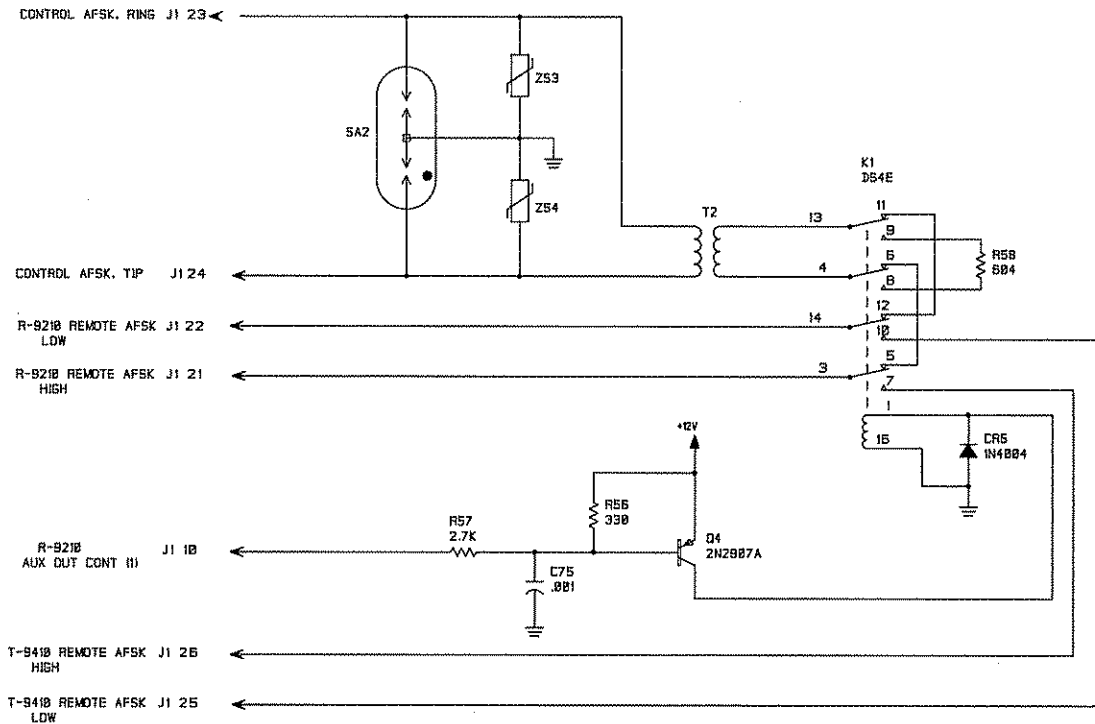
| PC ASSEMBLY, FSK KEYLINE MODEM, 1A2A2 | | Panel 6 of 6 |
|---------------------------------------|--------------------------------|--------------------|
| Ref Symbol | Description | Sunair Part No. |
| T4 | TRANSFORMER, MODEM | 1011340011 |
| T5 | TRANSFORMER, MODEM | 1011340011 |
| TP1 | TEST POINT, RED | 1011130033 |
| TP2 | TEST POINT, RED | 1011130033 |
| TP3 | TEST POINT, RED | 1011130033 |
| TP4 | TEST POINT, RED | 1011130033 |
| TP5 | TEST POINT, RED | 1011130033 |
| TP6 | TEST POINT, RED | 1011130033 |
| TP7 | TEST POINT, RED | 1011130033 |
| TP8 | TEST POINT, RED | 1011130033 |
| TP9 | TEST POINT, RED | 1011130033 |
| TP10 | TEST POINT, RED | 1011130033 |
| U1 | IC. LINEAR LM339N | 1003970028 |
| U2 | IC. DIGITAL XR-2206 | 1013240006 |
| U3 | IC. LINEAR MC34074 | 1011430037 |
| U4 | IC. DIGITAL XR-2211 | 1013250001 |
| U5 | IC. LINEAR MC34074 | 1011430037 |
| U6 | IC. DIGITAL 4066BC | 1004460023 |
| U7 | IC. LINEAR LM340/7812 | 1003410022 |
| U8 | IC. LINEAR LC403 | 1010850008 |
| U9 | IC. LINEAR MC34072 | 1011440032 |
| U10 | IC. LINEAR MC34072 | 1011440032 |
| U11 | IC. LINEAR MC34072 | 1011440032 |
| XF1A | FUSECLIP, PC MOUNT | 0534610005 |
| XF1B | FUSECLIP, PC MOUNT | 0534610005 |
| XU7 | HEATSINK, T0-220, .520W, .500H | 1013230001 |
| ZS1 | VARISTOR, MOV Z150LA10B | 1010950029 |
| ZS2 | VARISTOR, MOV Z150LA10B | 1010950029 |
| ZS3 | VARISTOR, MOV Z150LA10B | 1010950029 |

KY-9110 & SNR-2031



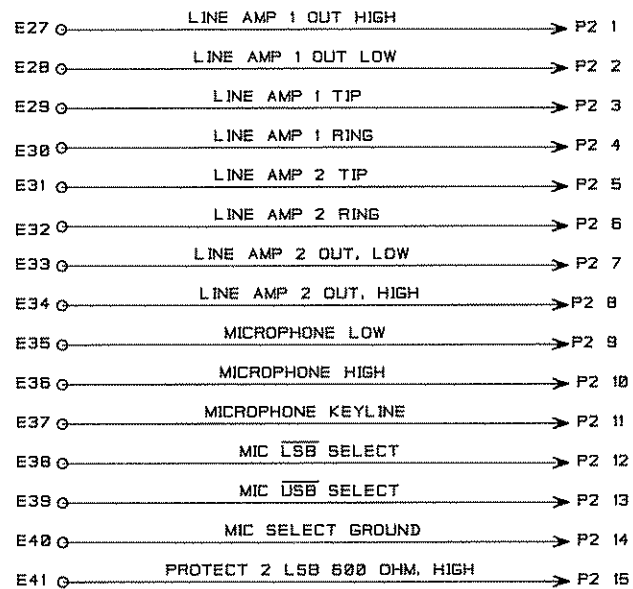
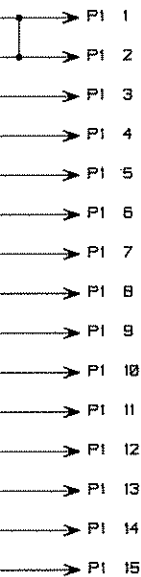
B2423C

CONTROL MODEM TRANSFER SWITCH



MIC AUDIO COMPRESSOR

MIC AMP



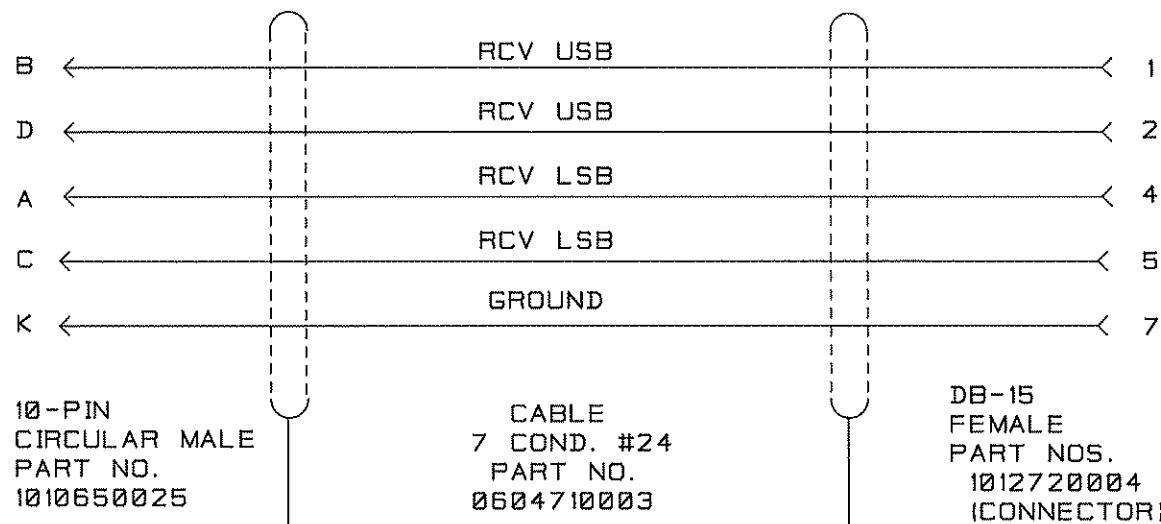
P2132C

CABLE ASSEMBLY
RCU-9310R(L) / KY-9110C REMOTE AUDIO
SUNAIR PART NO. 8109556094

CONNECTS TO:
RCU-9310 R (L), J4
REMOTE AUDIO

LENGTH = 6 FOOT

CONNECTS TO:
KY-9110 C, J2
REMOTE AUDIO



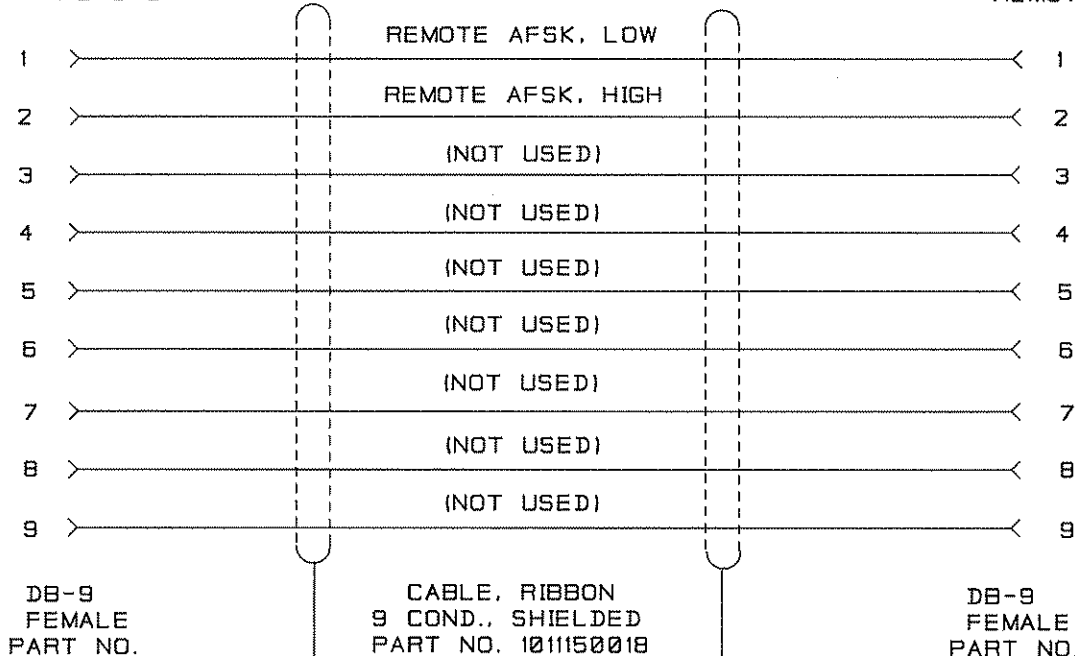
P2446B

CABLE ASSEMBLY
RCU-9310R(L) / KY-9110C REMOTE
SUNAIR PART NO. 8101003291

CONNECTS TO:
RCU-9310 R (L), J6
REMOTE

LENGTH = 6 FOOT

CONNECTS TO:
KY-9110 C, J1
REMOTE



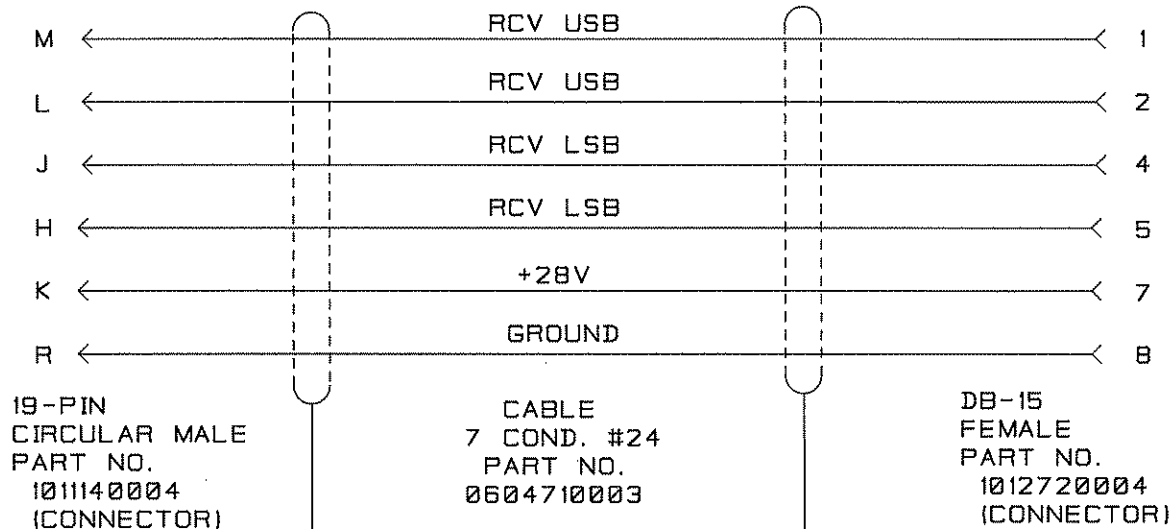
P2131B

CABLE ASSEMBLY
RCU-9310R(L) / KY-9110C AUDIO
SUNAIR PART NO. 8109557091

CONNECTS TO:
RCU-9310 R (L), J3
AUDIO

LENGTH = 6 FOOT

CONNECTS TO:
KY-9110 C, J4
AUDIO



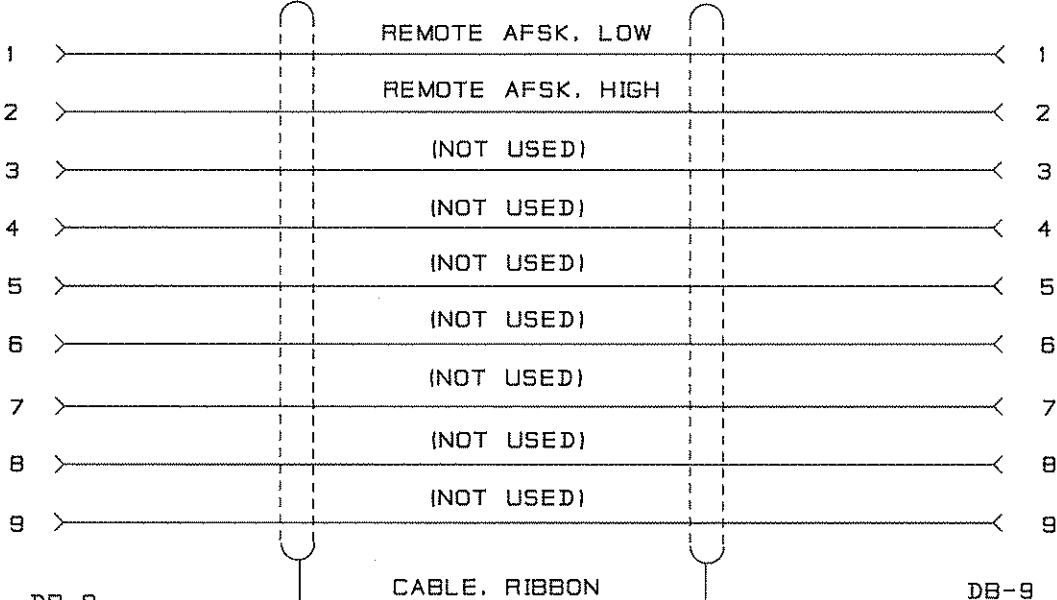
CABLE ASSEMBLY
KY-9110R/T / T-9410 - REMOTE
SUNAIR PART NO. 8101003291

P2447B

CONNECTS TO:
KY-9110 R/T, J4
T-9410 REMOTE

LENGTH = 6 FOOT

CONNECTS TO:
T-9410, JB
REMOTE



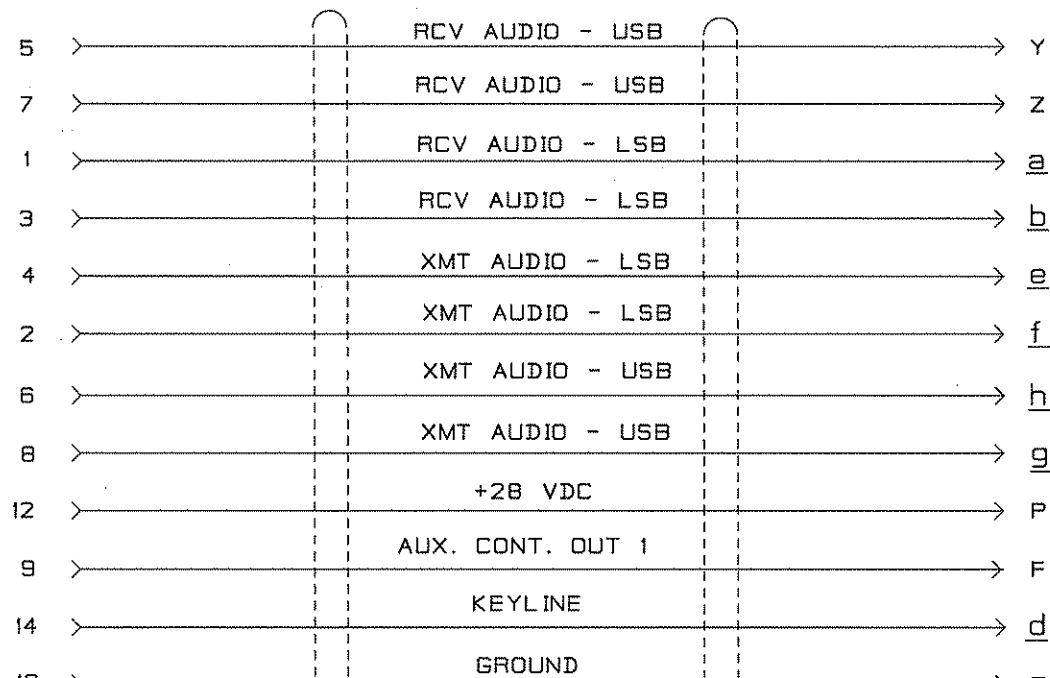
P2130B

CABLE ASSEMBLY
KY-9110R/T / R-9210 – XCVR AUDIO
SUNAIR PART NO. 8109506097

CONNECTS TO:
KY-9110 R/T, J3
XCVR AUDIO

LENGTH = 6 FOOT

CONNECTS TO:
R-9210, J10
TX/XCVR AUDIO



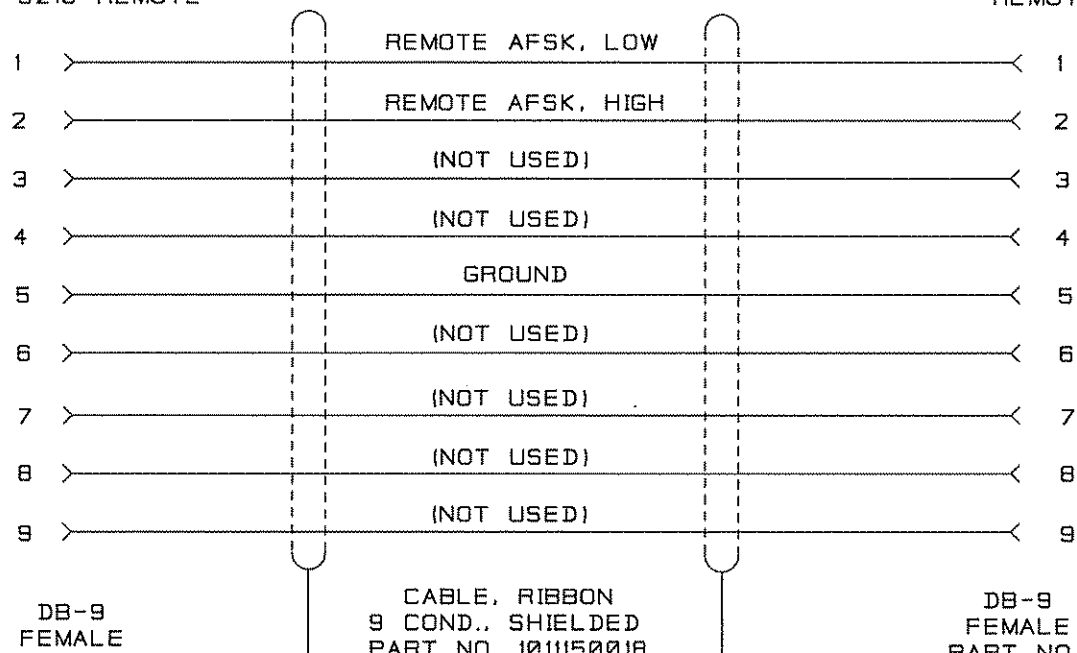
P2448B

CABLE ASSEMBLY
KY-9110R/T / R-9210 - REMOTE
SUNAIR PART NO. 8101003291

CONNECTS TO:
KY-9110 R/T, J2
R-9210 REMOTE

LENGTH = 6 FOOT

CONNECTS TO:
R-9210, J8
REMOTE



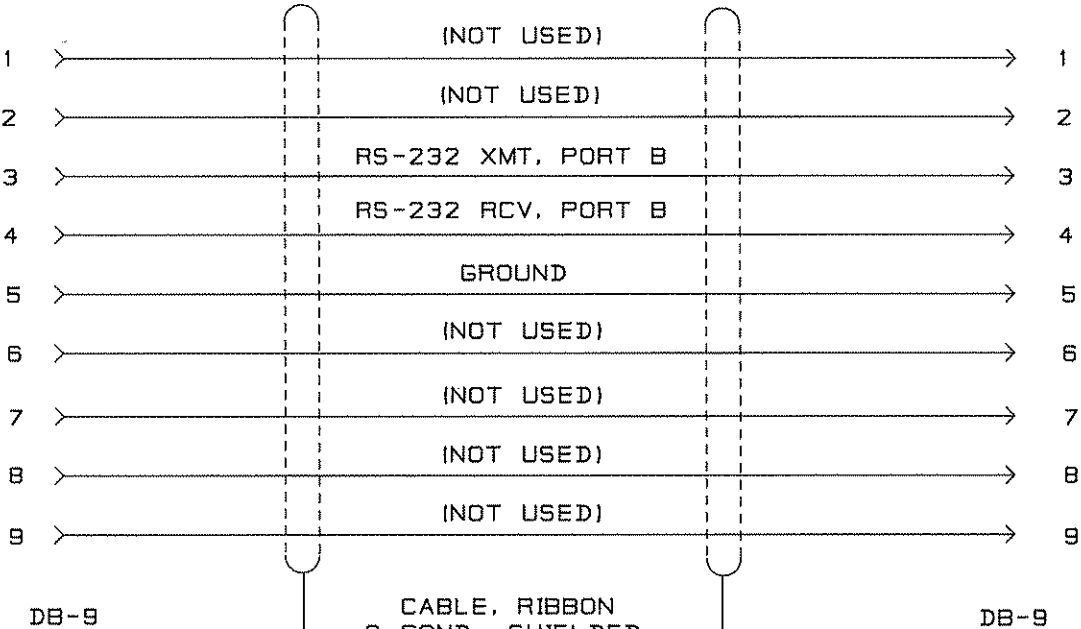
P2449B

CABLE ASSEMBLY
KY-9110R/T / F-9800 I/O
SUNAIR PART NO. 8110005799

CONNECTS TO:
KY-9110 R/T, J1
F-9800 SERIAL RADIO

LENGTH = 6 FOOT

CONNECTS TO:
F-9800, J5
RADIO



KY-9110 & SNR-2031

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