Raven Electronics Corporation

Raven 41610-633

Analog Orderwire

Users Manual

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(cont.)

General Information

Thank you for purchasing the 41610-633 Analog Orderwire(s) from Raven Electronics Corporation. Please contact us if you have any questions, concerns, product ideas, or suggestions on how to improve this manual. We can be contacted at:

<div align="center">

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⚠️ **Safety Warning**

*Please be Electro-Static Discharge (ESD) protected before
starting any procedures contained in this manual.*

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Raven Electronics' Warranty

This warranty expressly precludes any liability by Raven for consequential damages however arising after delivery to the purchaser of the affected equipment, and is limited to the expressed warranty, excluding all implied warranties including merchantability. All equipment manufactured by Raven is warranted against defective materials and workmanship for a period of two (2) years from the date of delivery to the original purchaser or end-user. Liability under this warranty is limited to servicing, adjusting, repairing or replacing, as necessary, any equipment returned to the factory, transportation prepaid for that purpose. Factory examination must disclose a manufacturing defect. Repaired or replaced items will be returned to the purchaser surface freight prepaid within the continental U.S.A. This warranty does not extend to any equipment which has been subjected to transportation damage, misuse, neglect, accident, improper installation, or any other circumstances reasonably beyond the control of Raven.

Beyond the warranty period, repairs will be billed to the purchaser at cost. In such cases, an estimate will be submitted for approval before repair is initiated. Repaired equipment will be returned to the purchaser with transportation charges collect, unless agreed to between the purchaser and Raven.

System Description

The Orderwire is a voice communication device used by technicians and engineers during installation of new communication equipment and during maintenance and troubleshooting of existing equipment.

The 41610-633 Analog Orderwire provides all necessary functions for voice communications on a network. This system has the added capability for selective station addressing using one to four-digit DTMF programming, with optional features of "All Call", "All Clear", and "Group Call", while on a common channel or party line. The 41610-633 also includes an internally wired 41685 4-Way/4-Wire Active Bridge in the transmit and receive paths providing two 4-wire external repeater ports wired out to the rear panel. This configuration also includes an optional 41675 Switched Network Interface (SNI) module which allows access to a 2-wire subscriber line or PBX system. The model 41610-633 designates the unit is shipped with the optional 41675 SNI module installed. The model 41610D-633-0 designates the unit is shipped without the 41675 SNI module. The SNI module can be purchased later and added to the 41610-633-0. The module simply plugs into the pre-wired slot; no soldering is required. LEG 1 of the 41685 4W/4W Bridge connects to the transmit and receive paths of the basic Orderwire. LEG 2 of the 41685 4W/4W Bridge connects to the 41675 Switched Network Interface. LEG 3 and LEG 4 of the Bridge are wired out to the rear panel terminal strips for a 600 ohms balanced "repeater" interface. The 41610D-633 operates from a -24 to –56 VDC source, while the 41610A-633 operates from a 100 to 250 VAC source.

The 41610-633 is used at repeater sites or can function as a 2-port hub site. The 41610-633 consists of the following modules: 41685 4-Way/4-Wire Active Bridge, 41632 Address Decoder, 41650 Receive Module, 41651 Transmit Module, 41620 Power Supply, and 41675 Switched Network Interface (when installed). They are all removable for easy maintenance or replacement.

41685 4-Way/4-Wire Bridge
The Raven 41685 4-Way/4-Wire Active Bridge provides a multipath interface between four ports on a 4-wire basis. An input at one of the ports is routed through to the output of all other ports, with a minimum of interchannel crosstalk. All inputs and outputs are transformer coupled and are balanced. Potentiometer adjustments on all inputs and outputs allow input level coordination and through-path gain adjustments.

41632 DTMF Address Decoder
The Raven 41632 DTMF Address Decoder monitors the 4-wire input to the Orderwire Receive module and provides detection and decoding of DTMF signals. Upon detection of the correct DTMF address code assigned to the Orderwire, the alert tone is sounded from the speaker if the Orderwire is on-hook. Upon detection of the correct DTMF address code assigned to the SNI module, the module will place the 2-wire line in the off-hook condition.

41650 Receive Module
The Raven 41650 Receive Module provides conditioning required to derive a wideband (data) port, a voice frequency output and a balanced input. Amplifiers are provided on the inputs and outputs for isolation and level control. A 3-stage low-pass filter attenuates frequencies above the voice band for the voice and speaker paths. A call alert generator provides an audible call indication through the speaker output when enabled. Relay contacts (one Form C) are available on the rear panel for an E-Lead indicator.

System Description *(cont.)*

41651 Transmit Module
The Raven 41651 Transmit Module provides the conditioning required to combine a wideband (data) port and multiple voice frequency inputs into a balanced output. Amplifiers are provided on the inputs and outputs for isolation and level control. A 3-stage low-pass filter attenuates frequencies above the voice band in the voice path.

41620 Power Supply
The Raven 41620 Regulated Power Supply provides a regulated -20 Volt DC output from an unregulated supply. The 41620-01 regulates an input voltage ranging from -24 to -56 VDC. The 41620 provides foldback current limiting at an output current of approximately 1.2 amperes. Included on the 41620 is an ON/OFF power switch and a fuse in series with the input. 41620-01 is also used in AC applications with an external AC/DC converter pack.

41675 Switched Network Interface
The Raven 41675 Switched Network Interface provides ring detection and loop current sink to interface to a 2-wire subscriber line or PBX system. The 41675 module has a 4-wire to 2-wire hybrid circuit as well as amplifiers to provide isolation and level matching. Line Build Out (LBO) is available on the rear panel to assist in hybrid balance adjustment, if required.

In normal operation, the 41675 module is reset by a momentary loss of loop or by a DTMF "#" (All Clear Code). Should these fail to reset the 41675 module, a VOX controlled time-out circuit will prevent the module from holding the 2-wire line in the off-hook condition indefinitely. The VOX circuit monitors the 4 Wire (4W) Receive (RCV) port, and if no Voice Frequency (VF) energy is detected for the user-programmed time period, the module is reset to the on-hook condition.

Note: The SNI module is optional and can be installed when the Orderwire is first purchased, or it can be added later if SNI is needed in the future.

FCC Part 68 Information
This equipment complies with Part 68 of the FCC Rules. The FCC Part 68 Label is located on the component side of the module printed circuit board. This label contains the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be provided to your telephone company.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0).

If this module causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of this equipment. If they do, you will be notified in advance in order that necessary modifications can be made to maintain uninterrupted service.

If trouble is experienced with this module, please contact Raven Electronics Corporation at the address on page 1. If the equipment is causing harm to the telephone network, the telephone company may request that the equipment be disconnected until the problem is resolved. Do not attempt to service this module. It does not contain any user serviceable components.

Equipment Needed for Installation

Rackmount Equipment (to install unit in a rack):

- Screwdrivers (Flat blade and Phillips may be necessary)
- Screws
- Washers (optional)

Audio Connections:

- 24-Gauge Twisted Pair Wire

Power Connections:

- 18-Gauge Wire

Mounting Unit in Rack

Please note, Raven supplies the hardware for the mounting on the chassis, but not on the rack. The flanges included with your Analog Orderwire are interchangeable between 19" and 23" as well as flush mount and offset mount.

1. Hold unit in place in the rack.

2. Place a washer and screw in one of the four holes and tighten it to the rack. *(Please refer to the picture below.)*

3. Repeat Step 2 until all four screws are in place.
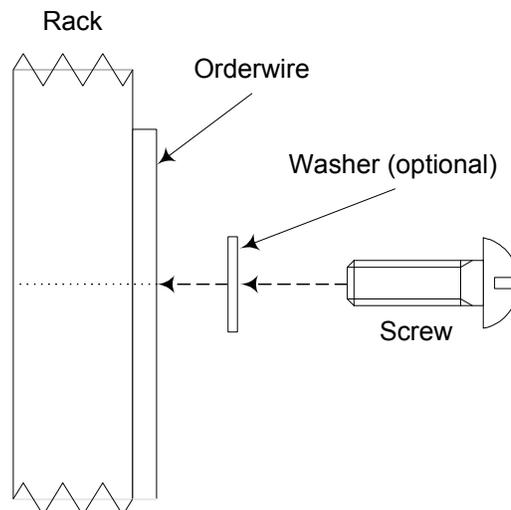
Hooking Up Connections

With the source power turned off, use the following instructions to hook up your 41610-633 Orderwire. A small (1/8" blade) flat blade screwdriver is needed to loosen and tighten the terminal screws. It is not necessary to use lugs on the wires. Strip the wire(s) about 3/8", loosen the terminal screw, insert the wire, then tighten the screw. You may refer to the chart below (*also found in Table B*). The LBO, SNI, EXT XMT IN, EXT RCV OUT, M-LEAD, and E-LEAD are not necessary to operate the Orderwire.

Be sure Power is turned OFF.

FUNCTION	REAR TERMINAL CONNECTIONS	SUGGESTED WIRE
Power (PWR)	A10 or SJ1 SLEEVE, -24 TO -56 VDC A9 or SJ1 CENTER GROUND	18 GA
External Transmit In (EXT XMT IN) *	A6, A7	24 GA
External Receive Out (EXT RCV OUT) *	B6, B7	24 GA
2-Wire SNI (2W SNI)	B1, B2 or SJ2 pins 3 & 4 or MODULAR JACK	24 GA
Line Build Out (LBO SNI) *	B3, B4	24 GA
LEG 3 IN LEG 3 OUT	C1, C2 D1, D2	24 GA
LEG 4 IN LEG 4 OUT	C3, C4 D3, D4	24 GA
RCV RELAY (E-LEAD) *	B8, B9, B10	24 GA
XMT RELAY (M-LEAD) *	A1, A2, A3	24 GA

* These connections are not necessary for communication.
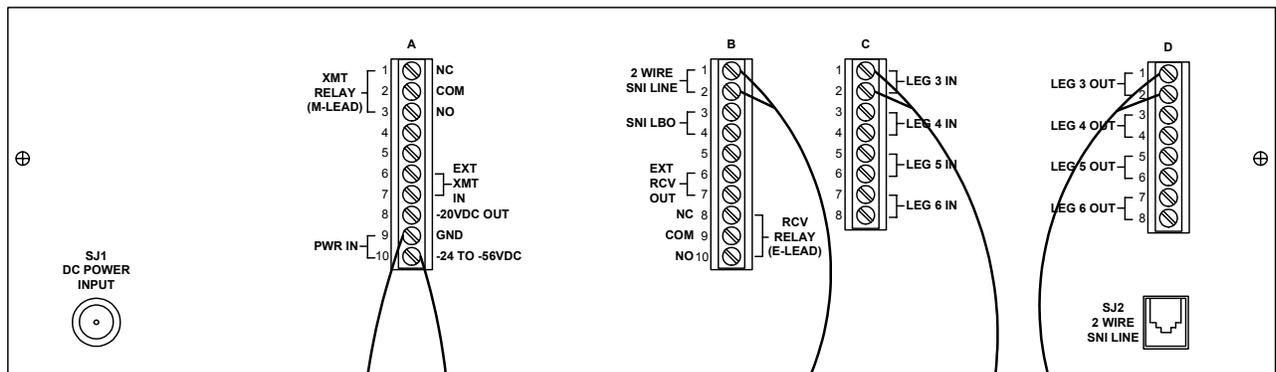
The SJ1 DC Power Input is used with an optional AC Power Pack.

NC: Normally Closed
COM: Common
NO: Normally Open

Not drawn to scale.

SNI connection can be made via terminal blocks or RJ connector.

Rear Panel View
41610-633

Hooking Up Connections (cont.)

Line Build Out (LBO SNI)
The Line Build Out, along with the onboard potentiometer adjustment, is provided for hybrid balance adjustments.

EXT XMT IN and EXT RCV OUT
These functions are used to send FSK data to and from external customer provided equipment. Any kind of data above the voice range or frequency can be used. RS-232 data will not work. If used, the EXT XMT IN would need to connect to the FSK Transmit connector and the EXT RCV OUT would need to connect to the FSK Receive connector. Sample Applications: low-rate, voice frequency data; FSK data; cable break locator equipment.

-20 VDC OUT
This connection allows the user to power equipment via this unit as long as no more than –20 VDC is required. Example: the Raven 40100 Bridge Shelf can run off of the –20 VDC OUT from this unit. ***Please do NOT hook up power to the unit via this connection!***

XMT Relay (M-LEAD)
This relay is energized when "off-hook" with either the Orderwire or the SNI line. The three connections listed are: NC (normally closed), COM (common), and NO (normally open). Example: While communicating with a microwave network, it may be necessary to use this connection. When making an outgoing call to a microwave network, this connection will turn on a channel to provide a ringback tone so the user knows the call made it through, even if the end-user does not answer.

RCV Relay (E-LEAD)
The RCV Relay is turned on while alerting the user of the call when the unit receives its own address. The three connections listed are NC (normally closed), COM (common), and NO (normally open). Example: if a speaker, bell, light, or other external equipment is connected to the RCV Relay, that equipment will be turned on as well.

Programming the DTMF Address Decoder

To program the 41632 DTMF Address Decoder, perform the following steps. *A unique DTMF code must be assigned to the Orderwire so only that Orderwire responds to the call.*

1.   Switch, SW-5, should be set for the number of digits in your code for the Orderwire (i.e., 1, 2, or 3 digits). Be sure you have only one setting selected.

2.   Switches SW1 through SW4 correspond to digits 1-4 of your code. *SW1 through SW4 are found on the module from right to left, when viewing the board from the front. Digits 1 – 4 on the switch are labeled from left to right, corresponding to switch positions 1 – 4.* You will need to refer to the chart below to program the correct codes.

Desired DTMF Digit	Switch Positions 1 = on, 0 = off			
	1	2	3	4
0	0	1	0	1
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
All Call (*)	1	1	0	1
All Clear (#)	0	0	1	1
A	1	0	1	1
B	0	1	1	1
C	1	1	1	1
D	0	0	0	0

Example:

The code chosen for this unit is 180.

1. Set SW1 to "1" (on-off-off-off)

2. Set SW2 to "8" (off-off-off-on)

3. Set SW3 to "0" (off-on-off-on)

Example Drawing:

3-digits   Null / Off   "0"   "8"   "1"

SW5 TIMED CA   SW4 DIGIT 4   SW3 DIGIT 3   SW2 DIGIT 2   SW1 DIGIT 1
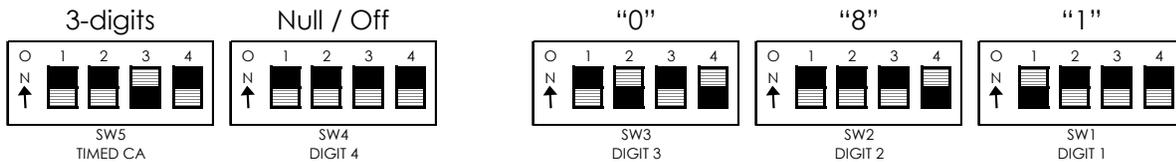
Programming the DTMF Address Decoder (cont.)

To program the 41632 DTMF Address Decoder for the switched network interface (SNI) access, perform the following steps. A different number of digits need to be programmed in order for the Orderwire to ring without activating the SNI. Perform the steps listed on the previous page to program the Orderwire and then follow the steps below to program the SNI.

1. Strap ST5, if it has not already been done.

2. In order for the SNI to activate separately from the Orderwire, you must have a different number of digits for the SNI. To add an additional digit, the digit would need to be added to the end of the handset DTMF code. For instance, as shown in the previous example, the Orderwire code is set to 180. The SNI could then be set to 1805 (one additional digit).

3. Remove the 41632 DTMF Address Decoder from the chassis.

4. Determine the number of digits for the SNI. In this example, it would be four (one more digit).

5. Because of a four digit address, strap CA 2 next to "4". (If there were only 2 digits, the 2 would need to be strapped.)
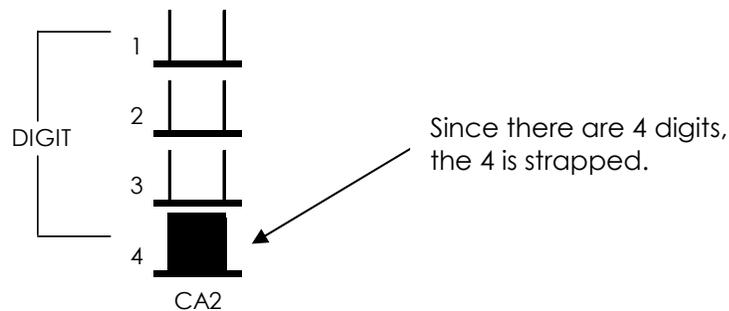
6. SW4 (Digit 4) would now need to be set for the number "5" (on-off-on-off), according to our example.

7. Reinstall the 41632 DTMF Address Decoder into the chassis.

Powering Up the Orderwire

Reinstall the 41632 card, if previously removed, before performing the following steps. Also, make sure the source power supply is turned off.

1. Open the front panel.

2. Verify the toggle switch is in the "off" position (to the right).

3. Turn on the external power source.

4. Flip the toggle switch to the "on" position (to the left).

5. The green light on the 41620 card (Power Supply) should be illuminated. If not, please refer to Chapter 5, Troubleshooting and Alignment.

6. Close the front panel.

7. The green light on the front panel should be illuminated while the unit is on.

Orderwire Network Operation

Outgoing Calls
1. Set volume control to approximately mid-range. Verify that the Orderwire circuit is not in use. Lift the handset from the cradle. The "OFF HOOK" indicator will illuminate and the speaker will be muted.
2. Dial (using the keypad) the one to four digit address code for the station desired and wait for an answer. (A ringback tone will be heard indicating the called station is ringing.) Call indications will cease when the call is answered or when the ring period (typically 19 seconds) times out.
3. Upon completion of the call, place the handset on the cradle. The "OFF HOOK" indicator will go off.

Incoming Calls
1. Incoming calls are indicated by an audible alert through the speaker (not affected by the volume control), and by the "Alert" indicator being lit.
2. When the call alert tone is heard, set the volume control to approximately mid-range. Lift the handset from the cradle and answer the calling party. The "OFF HOOK" indicator will light and the speaker will be muted.
3. Upon completion of the call, place the handset on the cradle. The "OFF HOOK" indicator will go off.

Switched Network Interface Operation (If Installed)

From Local Orderwire
1. Set volume control to approximately mid-range. Verify that the Orderwire circuit is not in use. Lift the handset from the cradle. The "OFF HOOK" indicator will illuminate and the speaker will be muted.
2. Flip the toggle switch (mounted on the front panel) to the ON position to manually enable the 41675 SNI module.
3. When dial tone is heard, dial (using the keypad) the desired phone number with the front panel keypad and wait for an answer. (A ringback tone will be heard indicating the called number is ringing.)
4. Upon completion of the call, flip the SNI toggle switch to the OFF position, and place the handset on the cradle. The "OFF HOOK" indicator will go off.

From Remote Orderwires
1. Set volume control to approximately mid-range. Verify that the Orderwire circuit is not in use. Lift the handset from the cradle. The "OFF HOOK" indicator will illuminate and the speaker will be muted.
2. Dial the DTMF code assigned to the 41675 SNI as programmed on the Address Decoder.
3. When dial tone is heard, dial (using the keypad) the desired phone number with the front panel keypad and wait for an answer. (A ringback tone will be heard indicating the called number is ringing.)
4. Upon completion of the call, press the "#" on the keypad, then place the handset on the cradle. The "OFF HOOK" indicator will go off.

Switched Network Interface Operation *(cont.)*

From 2-Wire Line (PSTN)

1. From a 2-wire line, dial the number of the 2-wire line connected to the –638 Orderwire with the SNI access. The 41675 SNI will detect ring voltage on the 2-wire line and automatically activate (go off-hook). At least one cycle of ringback will be heard before the 41675 SNI activates.

2. When the 41675 module has answered the call, a confirmation tone will be heard. Dial the DTMF code for the desired Orderwire site.

3. Upon completion of the call, press the "#" digit.

Orderwire Features

Initiating an All Call

An All Call feature is provided on all DTMF Selective Calling Orderwire Terminals, which alerts all stations in the network from any location. The following operating instructions apply.

1. Verify that the Orderwire circuit is not in use. Lift the handset from the cradle. The "OFF HOOK" indicator will light and the speaker will be muted.

2. Depress the all call button (∗) for approximately four (4) seconds. Make your announcement or request. No ringback is provided to the originating station. All Call does not activate the 41675 SNI module.

All Clear Feature

The All Clear feature causes the Orderwire to clear digits previously entered upon the receipt of a DTMF All Clear tone. The All Clear tone is initiated by pressing the "#" button on the keypad. For example, while trying to dial station 1-3-5, the user accidentally dials 1-2 and realizes the mistake. The user needs to begin again, by pressing "#" and dialing 1-3-5 correctly.

NOTE: Pressing the "#" button on the keypad will cause the 41675 SNI module to go on-hook (if it was off-hook).

Initiating a Group Call

The Group Call feature allows the asterisk (*) digit to function as a "wild card" to call Orderwire terminals with similar address codes simultaneously. For instance, dialing "1-2-*" would cause all the sites with three digit address codes beginning with "1-2" to ring. Dialing "5-*-*-8" would cause all address codes with four digits that begin with a five and end with an eight to ring. The following steps will initiate the Group Call feature.

1. Verify that the Orderwire circuit is not in use. Lift the handset from the cradle. The "OFF HOOK" indicator will light and the speaker will be muted.

2. Dial (using the keypad) the digits of the address code for the group of Orderwires desired with an "*" in place of the desired wild card digit(s) and wait for an answer.

3. Upon completion of the call, place the handset on the cradle. The "OFF HOOK" indicator will go off.

4. The "*" key cannot be used as a wildcard when calling a PSTN number.

NOTE: When a headset is plugged in to the jacks on the front panel, the unit is always "Off-Hook".

Troubleshooting and Alignment Procedures

Equipment Needed for Troubleshooting and Alignment:

- 42067 Extender Card (optional, but easier to align with)
- AC Voltmeter
- DC Ammeter
- Alignment Tool
- Signal Generator

Every Orderwire has been carefully aligned and tested at the factory. Please try the unit first before attempting the alignment procedures. No adjustment should be necessary since levels are set at the factory per customer's specifications at time of order. If the unit is not working, it may need to be aligned. Attachment A lists all levels and impedances for the system. The Attachment A can be located inside the Orderwire chassis.

Caution must be exercised during level alignment to insure that proper test levels and impedances are maintained.

A signal generator may double terminate a port causing a reduced signal level. When injecting a test tone into a port, bridge the port with an AC voltmeter and set the signal generator output according to the AC voltmeter reading.

When taking output level readings, the AC voltmeter will be either terminated or bridged. If it is unknown whether an output reading should be a terminated or bridged measurement, compare the two readings. If a 3.5 dBm difference is noted, the bridged measurement is correct. If a 6 dBm difference is noted, the terminated measurement is correct.

41632 DTMF Address Decoder Alignment Procedure

The DTMF Address Decoder does not require alignment. If the 41632 DTMF Address Decoder does not appear to function, double check strapping and switch settings as detailed in Attachment A.

41620 Power Supply Alignment Procedure

1. Turn power ON and verify LED CR7 illuminates.
2. Connect a DC voltmeter to test points TP1 and GND on the 41620 Power Supply and read –20.0 VDC.
3. Adjust R15 on the 41620 module, if required.

Troubleshooting and Alignment Procedures *(cont.)*

NOTE: This Orderwire has already been aligned and tested in our factory per customer's specifications and it should function with little or no adjustments necessary. The 41650 and 41651 are internally wired and aligned to the bridge. Please contact a Raven technician before making any adjustments suggested on this page.

41650 Receive Module

VF Receive Level

1.   Insert a 1KHz test tone from a signal generator into the RCV jacks. Set the level as specified by Attachment A.

2.   Connect an AC voltmeter (terminate with 600 ohms) to the 4W OUT jacks. Read a level of +7 dBm. Adjust R40 on the 41650 Receive, if required.

Data Receive Level

1.   Insert a 1KHz test tone from a signal generator into the RCV jacks. Set the level as specified by Attachment A.

2.   Connect an AC voltmeter (terminate, if required) to the EXT RCV OUT jacks. Read the level specified by Attachment A. Adjust R43 on the 41650 Receive, if required.

41651 Transmit Module

VF Transmit Level

1.   Insert a 1KHz test tone from a signal generator into the TEST TONE jacks at a level of –16 dBm.

2.   Connect an AC voltmeter to the XMT jacks. Read the level specified by Attachment A. Adjust R58 (coarse) or R59 (fine) on the 41651 Transmit, if required.

Data Transmit Level

1.   Insert a 1KHz test tone from a signal generator into the EXT XMT IN jacks. Set the level as specified by Attachment A.

2.   Connect an AC voltmeter to the XMT jacks. Read the level specified by Attachment A. Adjust R65 on the 41651 Transmit, if required.

416-111 Front Motherboard

Transmit Signaling Level

1.   Connect an AC voltmeter (terminate, if required) to the XMT jacks.

2.   Go off-hook and select digit "1" on the keyboard. Read the level specified on Attachment A. Adjust R8 on the 416-111 Front Motherboard on the front panel, if required.

Troubleshooting and Alignment Procedures *(cont.)*

NOTE: *This Orderwire has already been aligned and tested in our factory per customer's specifications and it should function with little or no adjustments necessary. The 41650 and 41651 are internally wired and aligned to the bridge. Please contact a Raven technician before making any adjustments suggested on this page.*

41685 4W/4W Bridge Level

1.   Turn power off. Remove the 41685 4W/4W Bridge module and insert a 42067 Extender Card into the module position. Insert the 41685 4W/4W Bridge into the Extender Card. Turn power on.

2.   Connect the signal generator to pins 21 and 22 (LEG 1 IN) on the Extender Card. Set the signal generator frequency to 1KHz at the level specified by Attachment A. Connect the AC voltmeter (terminate, if required) to pins F and H (LEG 2 OUT) on the Extender Card. Read the level specified by Attachment A. Adjust R2 on the 41685 4W/4W Active Bridge, if required.

3.   Connect the AC voltmeter (terminate, if required) to pins K and L (LEG 3 OUT). Read the level specified by Attachment A. Adjust R3 on the 41685 4W/4W Active Bridge, if required.

4.   Connect the AC voltmeter (terminate, if required) to pins M and N (LEG 4 OUT). Read the level specified by Attachment A. Adjust R4 on the 41685 4W/4W Active Bridge, if required.

5.   Connect the signal generator to pins 19 and 20 (LEG 2 IN). Set the signal generator frequency to 1KHz at the level specified by Attachment A for LEG 2 IN.

6.   With the AC voltmeter still connected to pins T and U, read the same level as in step 6. Adjust R8 on the 41685 4W/4W Active Bridge, if required.

7.   Connect the AC voltmeter (bridging) to pins D and E (LEG 1 OUT). Read the level specified by Attachment A. Adjust R1 on the 41685 4W/4W Active Bridge, if required.

8.   Connect the signal generator to pins 16 and 17 (LEG 3 IN). Set the signal generator level as specified by Attachment A. Read the same level on the AC voltmeter as in step 9. Adjust R9 on the 41685 4W/4W Active Bridge, if required.

9.   Connect the signal generator to pins 14 and 15 (LEG 4 IN). Set the signal generator level as specified by Attachment A. Read the same level on the AC voltmeter as in step 9. Adjust R10 on the 41685 4W/4W Active Bridge, if required.

10. Disconnect all test equipment and turn power off. Remove the Extender Card and install the 41685 4W/4W Active Bridge in its position.

Troubleshooting and Alignment Procedures *(cont.)*

NOTE: *This Orderwire has already been aligned and tested in our factory per customer's specifications. Please contact a Raven technician before making any adjustments suggested on this page.*

41675 Switched Network Interface Alignment Procedure

1.   Remove front panel.

2.   Turn power OFF (flip the toggle switch to the right).

3.   Remove 41675 Switched Network Interface module and insert the 42067 Extender Card in its place.

4.   Set Switch SW1 so that only Position 4 is closed for the time-out period of 8 minutes.

```
O   1   2   3   4
N
↑  ▓   ▓   ▓   ░
   ░   ░   ░   ▓
      SW1
```
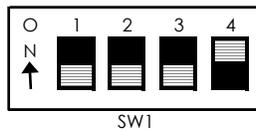
5.   Insert the 41675 SNI module into the Extender Card.

6.   Turn power ON (flip the toggle switch to the left).

7.   Establish a call over the 2-wire line to eliminate dial-tone.

8.   Connect a signal generator to pins P and R on the 42067 Extender Card.

9.   Set the signal generator frequency to 1KHz at the level specified by Attachment A.

10. Connect a "floating" AC voltmeter (earth ground isolated at the AC supply) to pins 'M' and 'N' (2-wire SNI) on the 42067 Extender Card. *The signal ground side of the AC voltmeter must be isolated from loop current through a 2μf capacitor.*

11. Read the level specified by Attachment A for the 2-wire SNI (OUT). Adjust R63 on the 41675 SNI module, if required.

12. With the AC voltmeter still connected, connect a "floating" signal generator (earth ground isolated at the AC supply) to pins 'M' and 'N' (2-wire SNI) on the 42067 Extender Card.

13. The signal ground side of the signal generator must be isolated from loop current through a 2μf capacitor. Adjust the signal generator frequency to 1KHz at the level specified by Attachment A for 2-wire SNI (IN) as read on the AC voltmeter.

14. Connect the AC voltmeter (terminate, if required, and not "floating") to pins 'U' and 'V' on the 42067 Extender Card. Read the level specified by Attachment A. Adjust R35 on the 41675 SNI module, if required.

Troubleshooting and Alignment Procedures (cont.)

NOTE: *This Orderwire has already been aligned and tested in our factory per customer's specifications.   Please contact a Raven technician before making any adjustments suggested on this page.*

41675 Switched Network Interface Alignment Procedure *(cont.)*

15.   Connect the signal generator (not "floating") to pins 'P' and 'R' on the 42067 Extender Card. Set the frequency to 1KHz at the level specified by Attachment A. Adjust R24 and switch in various capacitance values with SW2 on the 41675 SNI module for a minimum reading on the AC voltmeter.

NOTE: It may become necessary to utilize the Line Build Out (LBO) if a satisfactory hybrid null cannot be obtained (a reading of –25 dBm0 or less on pins 'U' and 'V'). Adjust R24 and SW2 on the 41675 SNI module for the lowest possible reading, then add capacitance to the LBO and readjust R24 until a satisfactory null is obtained.

16.   Turn power OFF (flip the toggle switch to the right).

17.   Remove the 41675 Switched Network Interface module and the 42067 Extender Card.

18.   Set Switch SW1 for the desired VOX time-out period. The factory default is "1".

SW1 SWITCH ON	TIME-OUT PERIOD
1	1 minute
2	2 minutes
3	4 minutes
4	8 minutes

19.   Reinstall the 41675 SNI module in its position.

20.   Turn power ON (flip the toggle switch to the left).

Troubleshooting and Alignment Procedures *(cont.)*

Symptoms	Possible Causes	Remedy
Power LED Off	1. Toggle switch on 41620 Power Supply in "OFF" position. 2. Fuse blown on 41620 Power Supply. 3. 41620 Power Supply not firmly seated in the chassis. 4. Unit not connected to Power Source or user's power source is down. 5. Failed power supply.	1. Switch to "ON" position. 2. Replace fuse. 3. Re-seat power supply module in its slot. *Note: Make sure toggle switch on the 41620 power supply module is in the "OFF" position before removing and re-inserting the power supply.* 4. Confirm unit is connected properly to the power source and that the power source is functioning. 5. Replace with a spare or return for repair.
Alert tone will not sound when called.	1. 41632 DTMF Decoder not programmed correctly. 2. Audio paths not wired correctly. 3. Improper audio levels. 4. Failed DTMF Decoder. 5. Failure of user's transmission equipment (e.g. modem).	1. Confirm that the DTMF address code is programmed correctly. Refer to Programming the DTMF Address Decoder in Chapter 2 of this manual. *Note: If you are using a zero (0) in your address code, pay attention to the dip switch settings for zero. Occasionally, some users will set all of the dip switches positions to "OFF" assuming this is the code for a zero. The actual code for a zero corresponds to a ten (10).* 2. Refer to Chapter 2 "Hooking up Connections" and Table B. Check the integrity of the wiring and cables. 3. Refer to Chapter 5 "Troubleshooting and Alignment". 4. Replace with a spare or return for repair. 5. Check and repair.
Other problems, e.g., degraded or complete loss of audio (transmit or receive)	1. Audio paths not wired correctly or wiring/cables are faulty. 2. Improper audio levels. 3. Failed 41650 Receive Module. 4. Failed 41651 Transmit Module. 5. Failure of user's transmission equipment (e.g. modem).	1. Refer to Chapter 2 "Hooking up Connections" and Table B. Check the integrity of the wiring and cables. 2. Refer to Chapter 5 "Troubleshooting and Alignment" 3. Replace with a spare or return for repair. 4. Replace with a spare or return for repair. 5. Check and repair.

Specifications

41610-633 Analog Orderwire

POWER REQUIREMENT	-24 to -56 VDC input power or 100 to 250 VAC, 47-63 Hz
AC POWER SAFETY APPROVALS	UL1950, CSA950, TUV/IEC950, Approved for Australia, MITI *(when the external AC-DC adapter is used)*

4-WIRE INTERFACE
  * **Line Impedance (XMT & RCV)**   600, 75 ohms or customer specified
  * **Levels (XMT & RCV)**   -16 to +7 dBm, adjustable
  † **Crosstalk (RCV & XMT)**   Less than –70 dB

2-WIRE PORT   0 dBm nominal

WIDEBAND DATA INTERFACE (Tx & Rx)
    Impedance   600 ohms balanced
  * **Levels**   +7 dBm maximum, adjustable
  † **Frequency Response**   ±1 dB, 300 Hz to 40 KHz
  † **Signal/Noise Ratio**   Greater than 70 dB
    Harmonic Distortion   Less than 1.0%
    Intermodulation Distortion   Greater than 60 dB below signal level

VF INTERFACE (Tx & Rx)
 †* **Frequency Response**   +1, -3 dB, 300 Hz to F_c Hz
    (Greater than 55 dB down at ¼ octave above F_c)
    Speaker Level   1W, maximum, adjustable
    Harmonic Distortion   Less than 1.0%

SIGNALING
    Frequency   DTMF calling 12 button format, 20 Hz ringing for off-hook condition
    "E" Relay Contacts   Single Form "C" rated 1 amps at 28 VDC or 115 VAC
    "M" Relay Contacts   Single Form "C" rated 1 amps at 28 VDC or 115 VAC
    Receive Bandwidth   ± 2.0% nominal
    Transmit Frequency Accuracy   ± 0.5%

ENVIRONMENTAL
    Operating Temperature   0°C to +50°C
    Storage Temperature   -50°C to +80°C
    Relative Humidity   0 to 95% non-condensing
    Operating Altitude   15,000 ft max (4572 meters)

DIMENSIONS
    Width   (Standard)   19.00 inches rackmount (48.30 cm)
    **   (Optional)**   23.00 inches rackmount (58.40 cm)
    Depth   13.03 inches (33.10 cm)
    Height   3.50 inches (8.89 cm) (2 ru)

WEIGHT (max)   22 pounds   (9.90 kg)

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*   *Customer Specified*
†   4-Wire and Data Interface set for 0 dBM 600 ohms IN and OUT @ 1 KHz
F_c = -3 dB frequency

41610-633 Front Panel with Descriptions
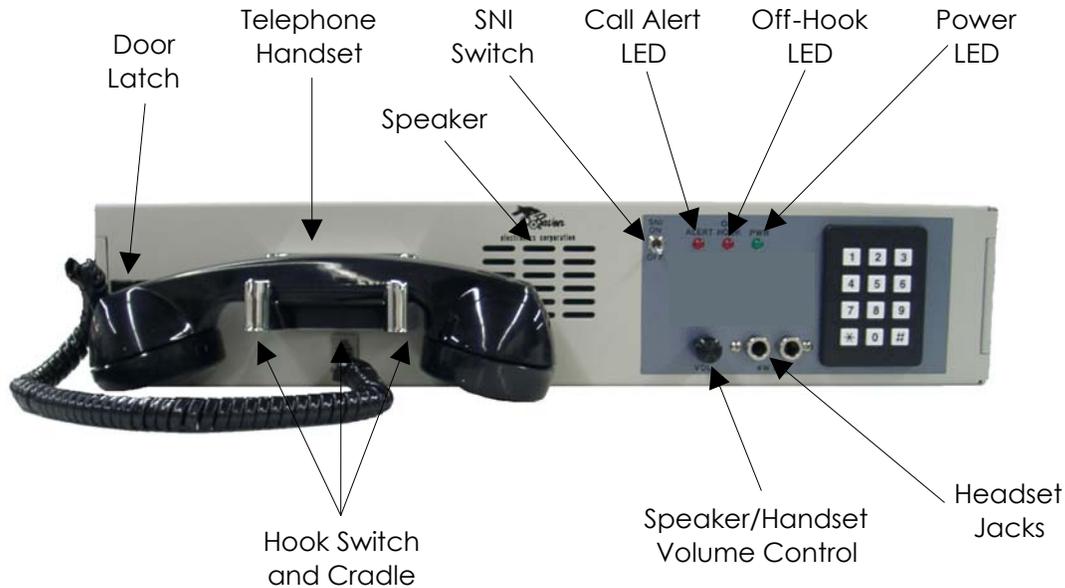

41610-633 Back Panel Diagram
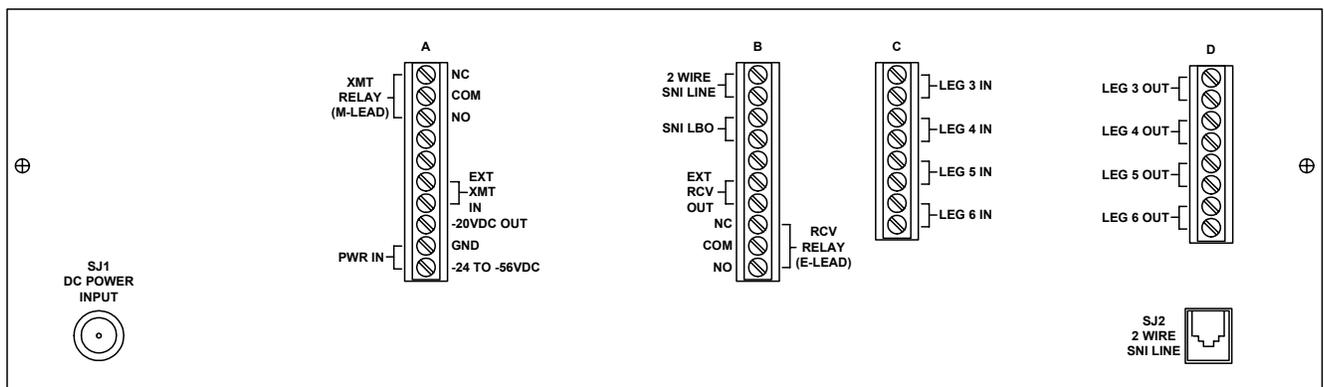
The SJ1 DC Power Input is used
with an optional AC Power Pack.

41610-633 Analog Orderwire
(Rear View)

Not drawn to scale.
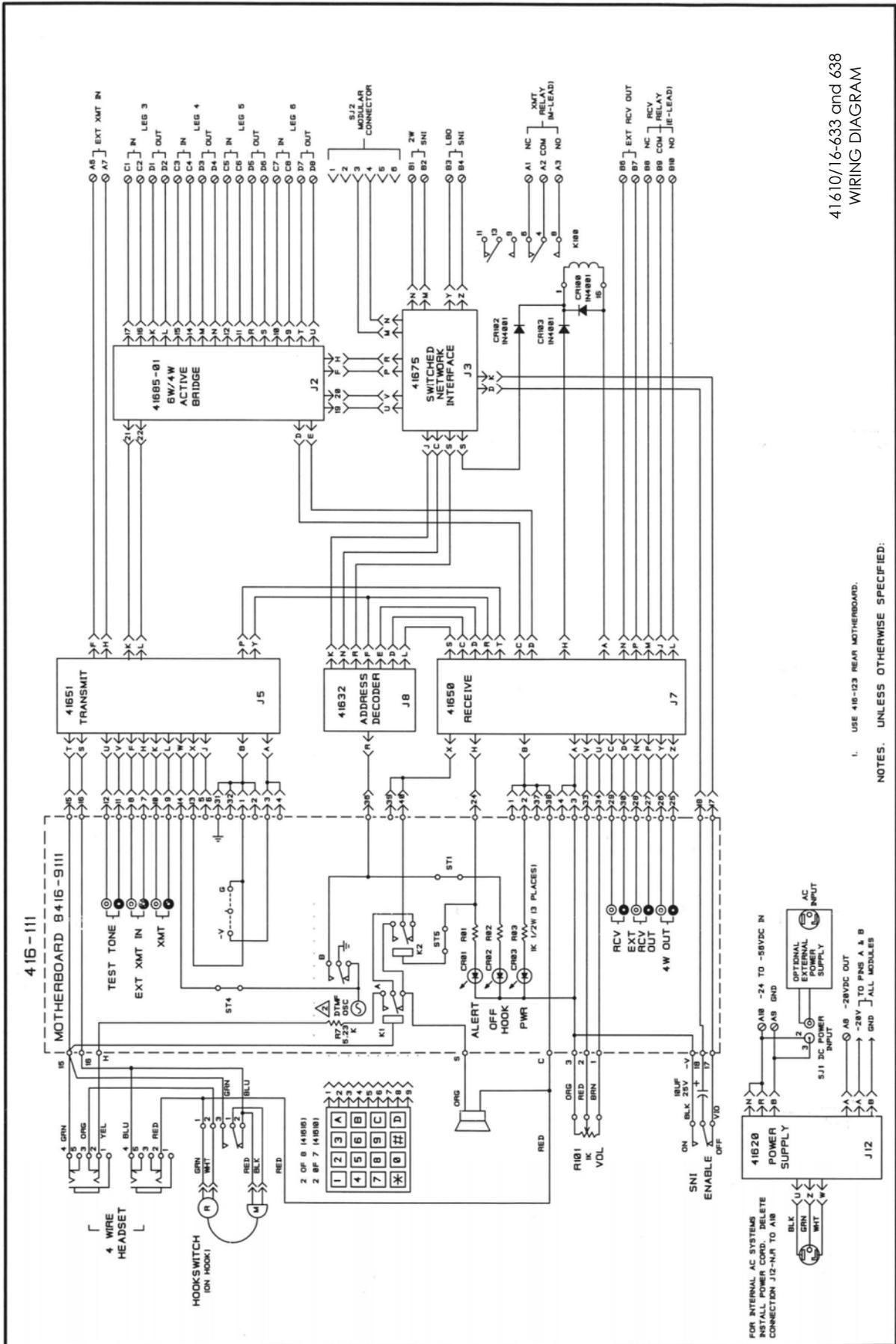
NOTES. UNLESS OTHERWISE SPECIFIED:

1. USE 416-123 REAR MOTHERBOARD.
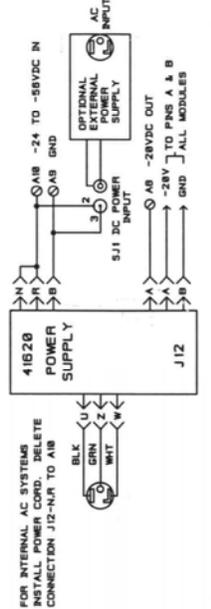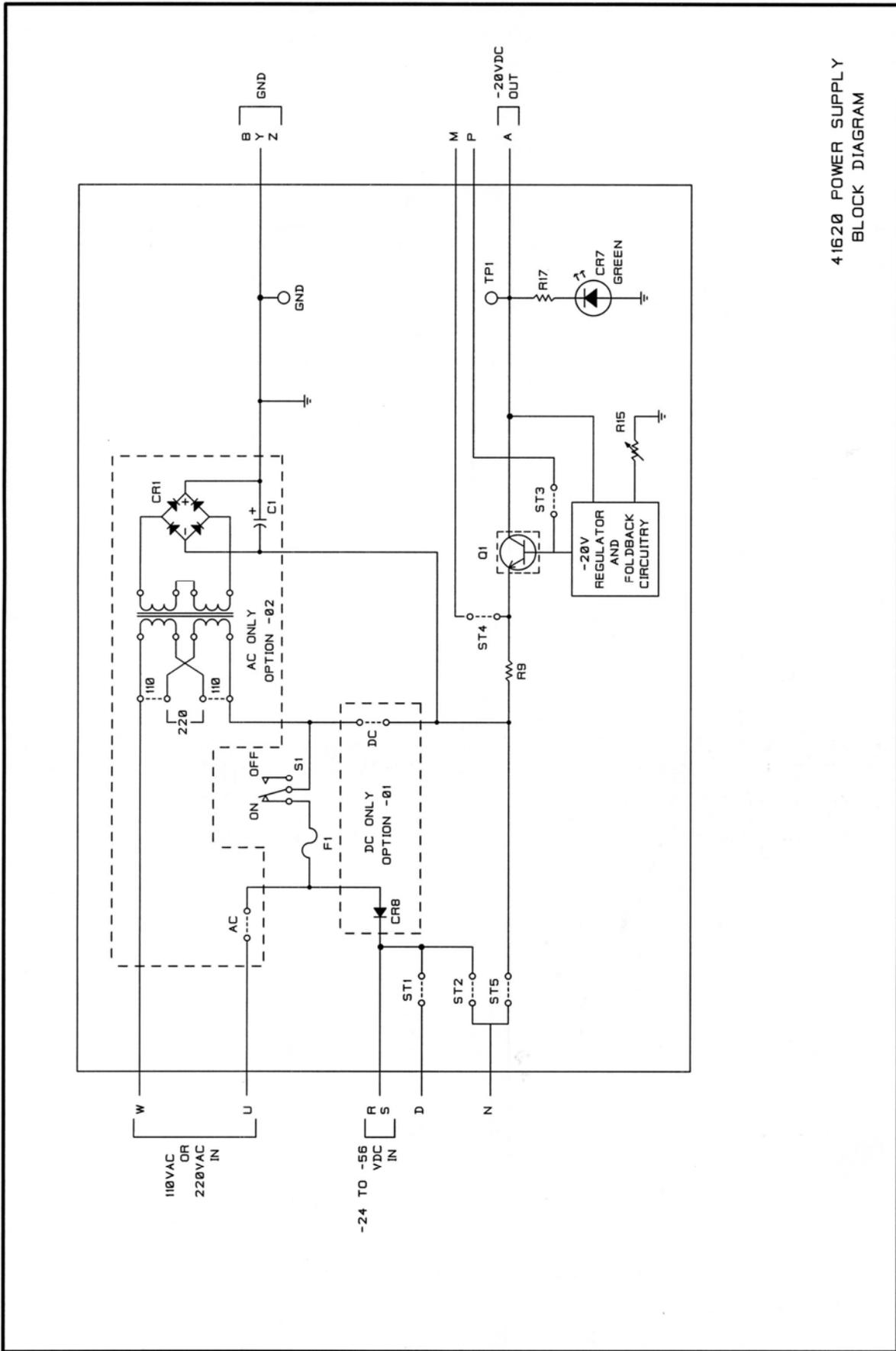
41620 POWER SUPPLY
BLOCK DIAGRAM

41632 DTMF ADDRESS DECODER MODULE   ISSUE 08

CAD 83200BP1

23

41650 RECEIVE ISSUE 09

24

41651 TRANSMIT MODULE

ISSUE 09
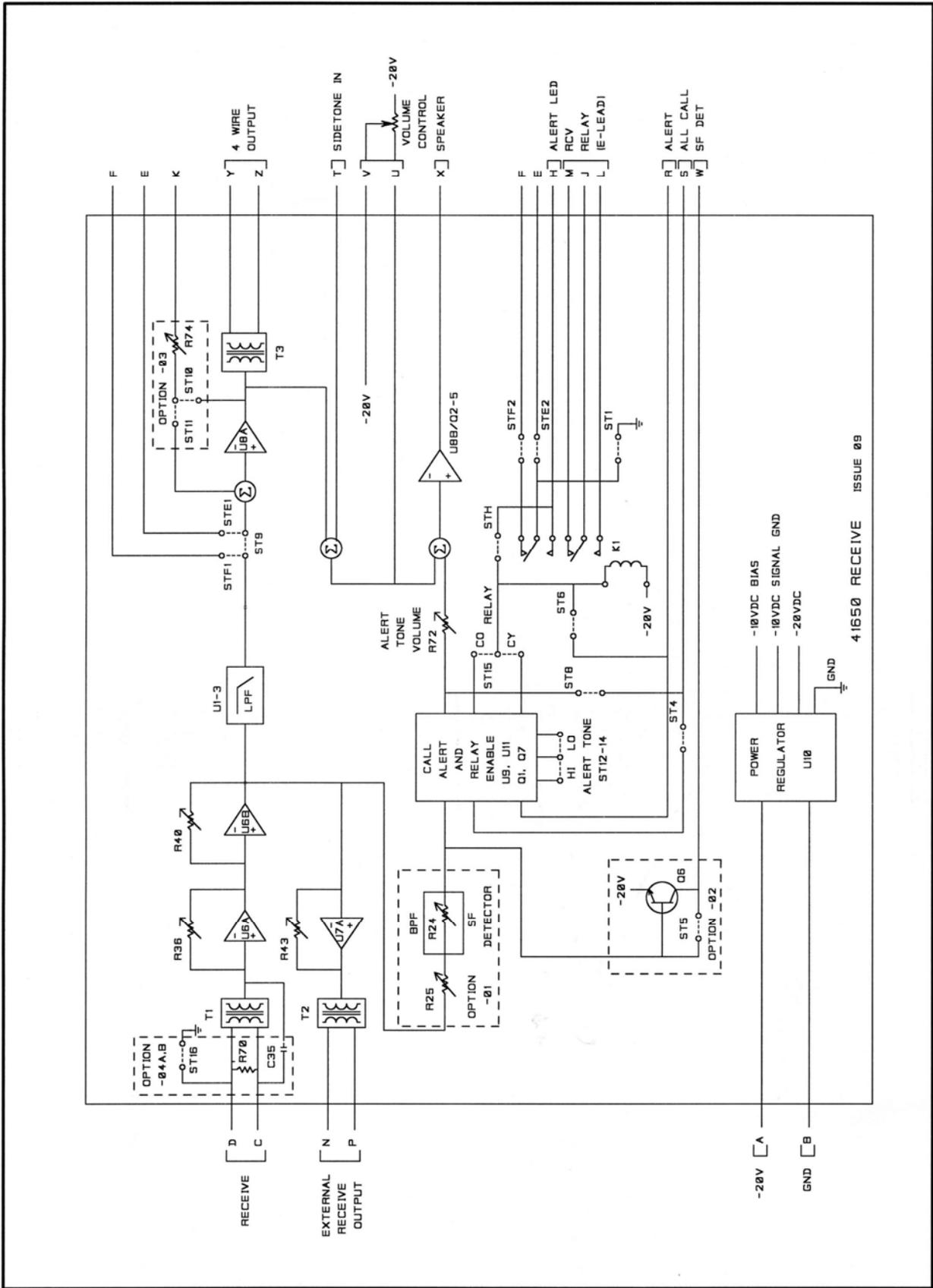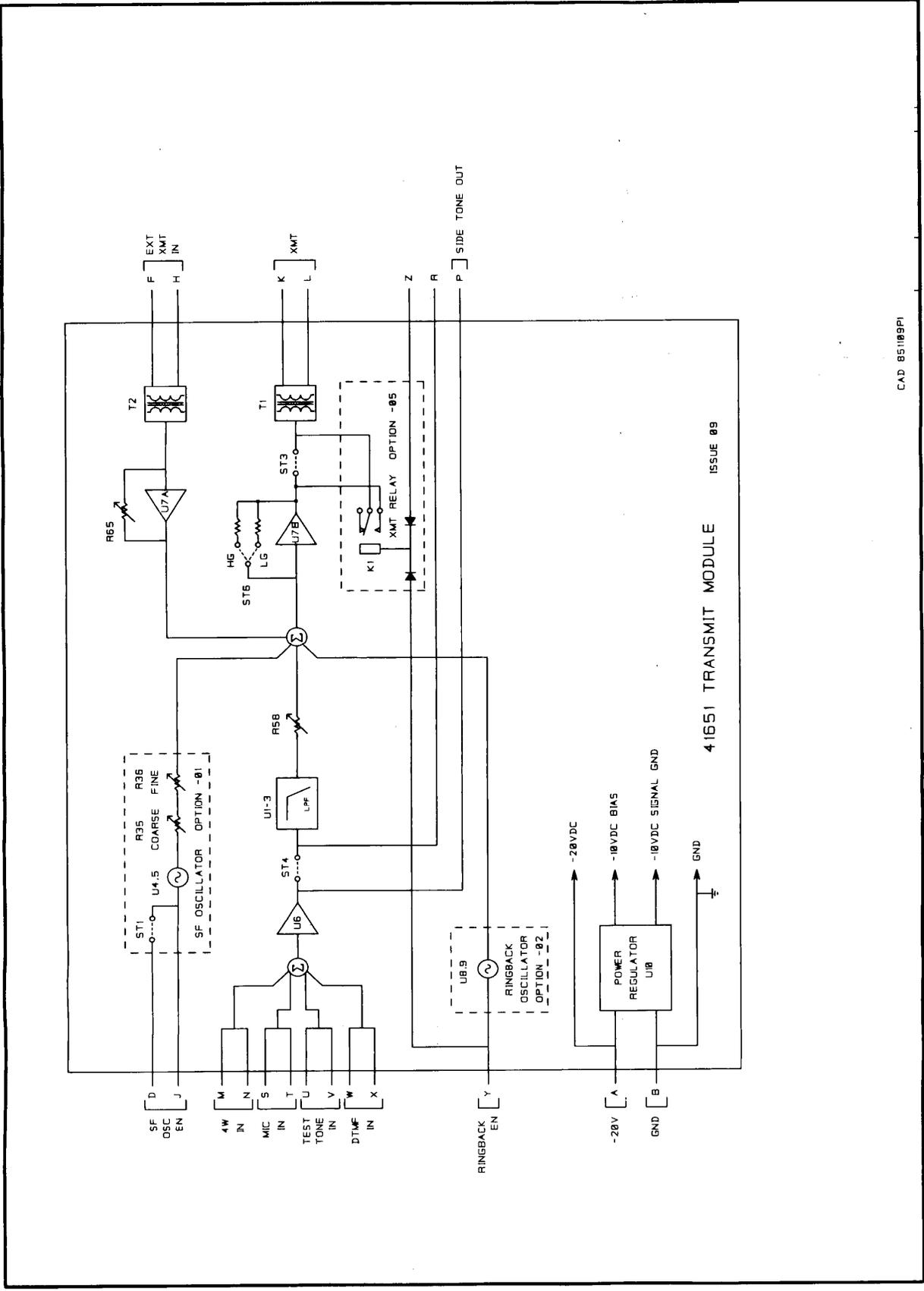
CAD 851189PI
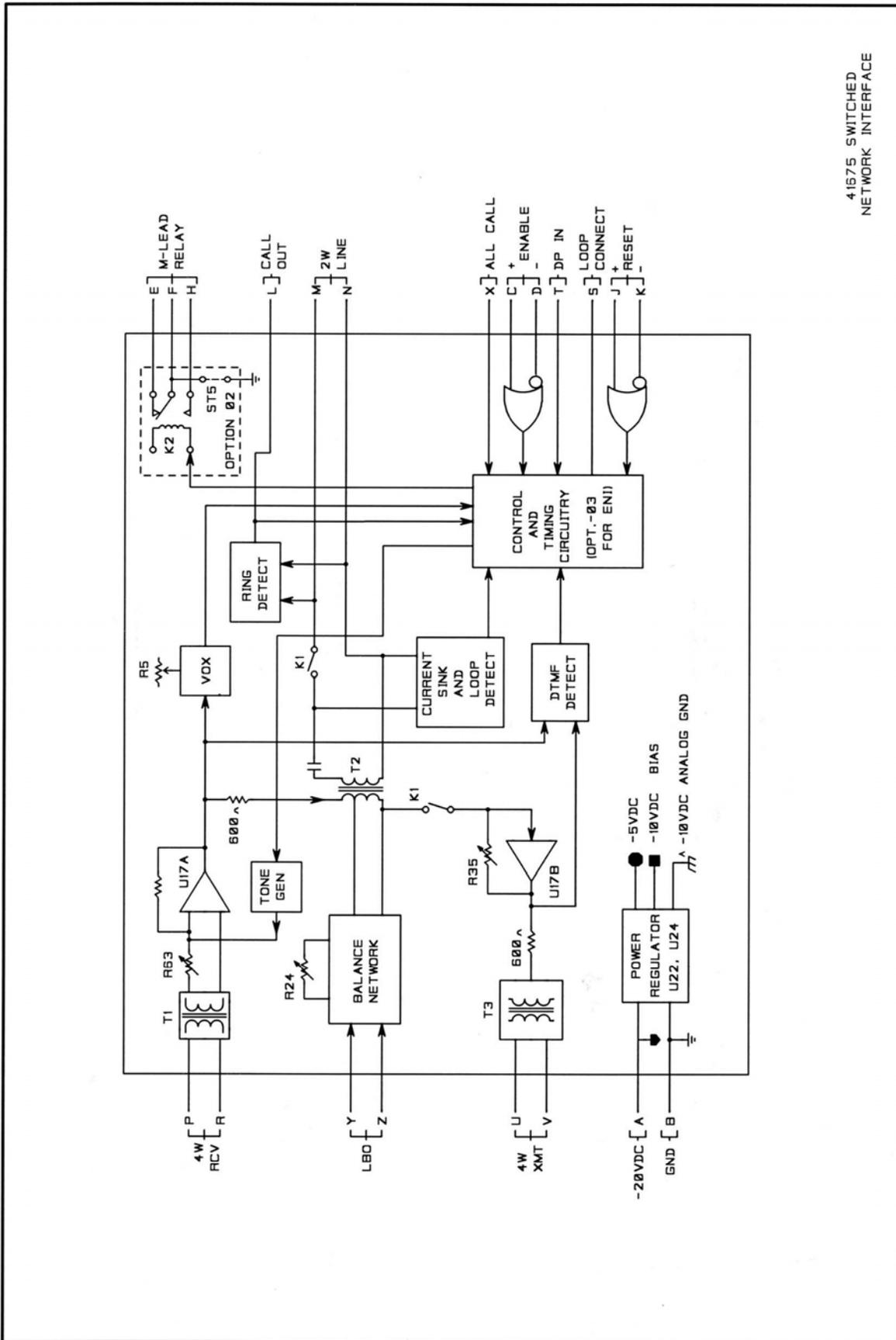
41675 SWITCHED
NETWORK INTERFACE
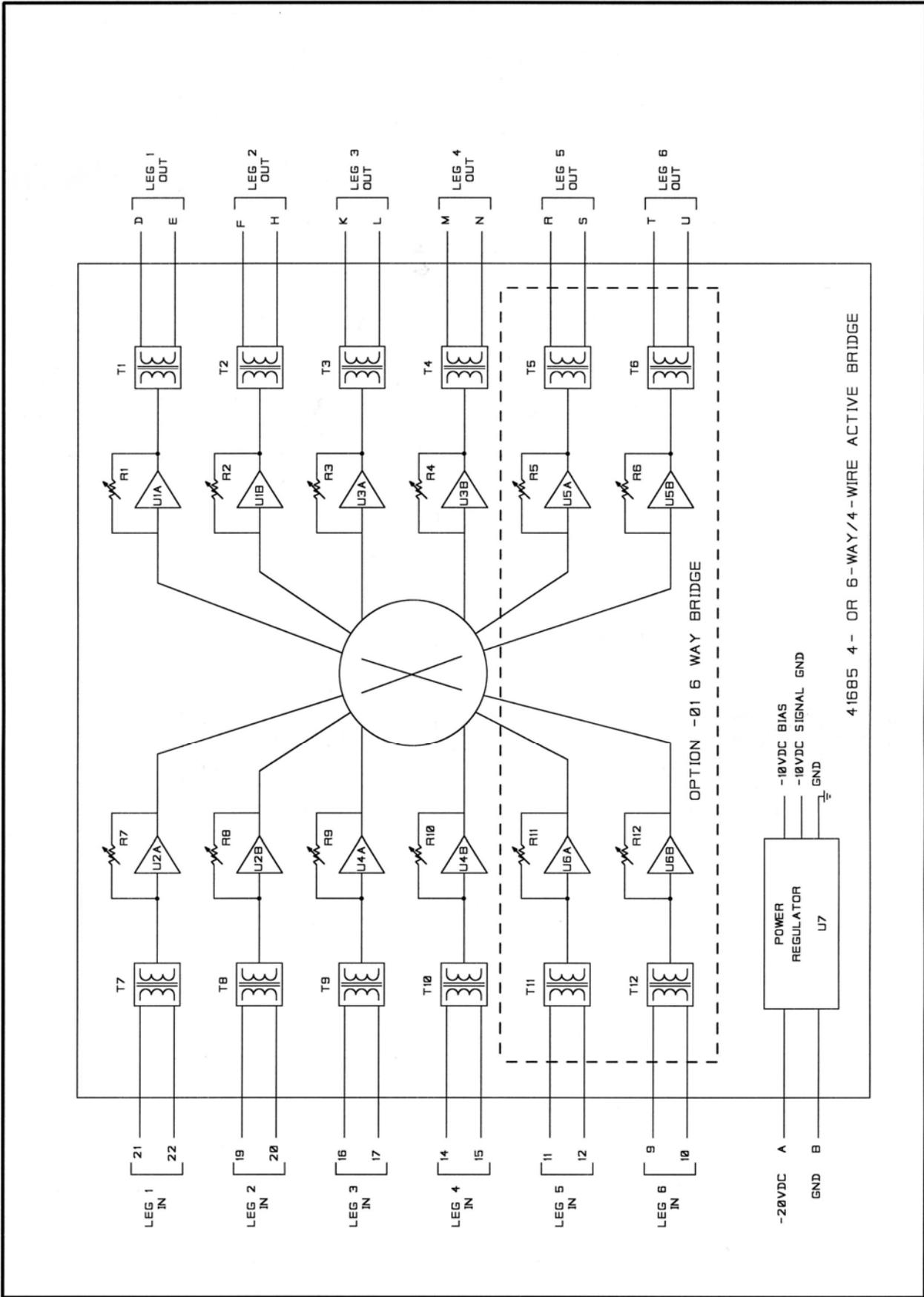
41685 4- OR 6-WAY/4-WIRE ACTIVE BRIDGE

41610-633 Installer Connections

FUNCTION	REAR TERMINAL CONNECTIONS	SUGGESTED WIRE
Power (PWR)	A10 or SJ1 SLEEVE -24 TO -56VDC A9 or SJ1 CENTER GROUND	18 GA
External Transmit In (EXT XMT IN)	A6, A7	24 GA
External Receive Out (EXT RCV OUT)	B6, B7	24 GA
2-WIRE SNI	B1, B2 or SJ2 pins 3 & 4	24 GA
LBO SNI	B3, B4	24 GA
Leg 3 In Leg 3 Out	C1, C2 D1, D2	24 GA
Leg 4 In Leg 4 Out	C3, C4 D3, D4	24 GA
Leg 5 In Leg 5 Out	C5, C6 D5, D6	24 GA
Leg 6 In Leg 6 Out	C7, C8 D7, D8	24 GA
XMT RELAY (M-LEAD)	A1, A2, A3	24 GA
RCV RELAY (E-LEAD)	B8, B9, B10	24 GA

Orderwire Options

Model #	Description

41610D-633   **DTMF Selective Call Orderwire (DC Power)**
Includes 6 modules:
> *41632 Address Decoder,*
> *41650 Receive Module,*
> *41651 Transmit Module,*
> *41675 Switched Network Interface,*
> *41685 4-Way/4-Wire Active Bridge,*
> *41620-01 DC Power Supply (-24 to -56 VDC input power)*

41610A-633   **DTMF Selective Call Orderwire (AC Power)**
> *Same as above, however the power supply is:*
> *41620-01 DC Power Supply with an AC External Power Pack (100 to 250 VAC input power)*

Test and Alignment Aide:

Part #	Description

42067   **Extender Card**
Aids in servicing modules by extending plug-in length

General Conditions of Sales
RAVEN ELECTRONICS CORPORATION
400 EDISON WAY, RENO, NEVADA 89502
TELEPHONE 775-858-2400   FAX: 775-858-2410

1. CONTRACT – The following general conditions of sale apply to this contract and all purchases from Raven Electronics Corporation (hereinafter referred to as Raven). No changes, deletions or additions shall be binding on Raven, unless expressly agreed to in writing and signed by an authorized representative of Raven. Any terms or condition of the Purchaser inconsistent herewith, or in addition hereto, shall be of no force and effect, and Purchasers order shall be governed only by terms and conditions appearing herein. A definite and reasonable expression of acceptance or a written confirmation, which is sent within the time specified in the Raven proposal or sales order, operates as an acceptance of the terms specified herein, even though it states terms different from or additional to those specified herein.

2. PROPOSALS – Raven proposals, when accepted, and any subsequent orders placed as a result of such proposals, are not subject to cancellation changes, reduction in amount or suspension of deliveries except with Raven's written consent and upon terms which indemnify Raven against loss. Information contained in Raven's proposal is valid for a period of sixty (60) days from the date of proposal, unless specified to the contrary in the proposal. Stenographic and clerical errors are subject to correction. Verbal quotations expire, unless accepted, the same day they are made.

3. PRICES (are in United States dollars) – All prices and discounts are subject to change without notice. In the event of price change, the price of equipment on order but not shipped will be the price in effect at the time of acceptance of the order. Equipment already shipped is not subject to a price change. In addition to prices specified herein, purchaser shall pay for all extra components, parts, equipment, materials or services (each or all hereafter called "equipment") requested by the purchaser or made necessary by incompleteness of or inaccuracy in plans, specifications, or other information submitted by the purchaser.

4. TAXES AND TRANSPORTATION – Unless otherwise specified, the prices do not include any applicable taxes (sales, use, ad valorem, property, etc.) for the sale, use, licenses, or delivery of the equipment, software, or services supplied. The purchaser agrees to pay all taxes, licenses and transportation charges.

5. TERMS OF PAYMENT – Terms of payment to Purchasers of satisfactory credit is thirty (30) days from the date of shipment. The same terms are applicable to partial shipment. If in the judgment of Raven, the financial conditions of the Purchaser at any time does not justify continuance of production or shipment on the terms of payment specified, the company may require full or partial payment in advance before shipment. Raven may ship the equipment in installments, and pro rata payments of purchase price are due as shipments are made. If shipments are delayed by Purchaser, payments shall be made based on the contract price and percent completed. Delinquent charges of 1½% per month (18% per annum) will be added to all past due invoices.

6. DELIVERY – Raven shall not be liable for any damages or penalty for delays in delivery and/or completion due to acts of God, acts of omissions of the Purchaser, acts of civil or military authorities, government regulations or priorities, fires, floods, epidemics, quarantine, inability to obtain necessary labor, war, riots, strikes, differences with workmen, accidents to machinery, delays in transportation, failure of or delay in furnishing correct or complete information by Purchaser, impossibility or impracticability of performance or any other cause or causes beyond the control of Raven.

7. SHIPMENT – Unless otherwise specified in this or other documents forming a part of this contract, all shipments will be F.O.B. Raven manufacturing facility. Property of and title to the equipment shall pass to the purchaser upon delivery thereof by Raven to the carrier, and risk of loss, damage or deterioration to the equipment shall thereafter be on the purchaser. If the purchaser requests Raven to postpone shipment beyond the time Raven would be required to ship in order to comply with the delivery dates agreed upon between Raven and the purchaser elsewhere in this or other documents forming a part of this contract, (a) the purchaser shall pay Raven for the expense of storing the equipment, (b) the risk of loss, damage or deterioration to the equipment shall be on the purchaser on and from the date Raven receives the purchasers request to postpone shipment.

8. SHORTAGES – Claims for shortages, damaged, or incorrect material must be made within ten (10) days after receipt of goods.

9. MINIMUM BILLING CHARGE – Orders amounting to less than $50.00 will be billed at $50.00.

10. ACCEPTANCE OF ORDER – All orders are subject to acceptance and approval by a principle officer of Raven.

11. TITLE (Risk of loss) – The purchaser agrees that Raven shall have a security interest in the equipment purchased until paid in full. The purchaser agrees to perform all acts necessary to protect the interests of Raven in the product until such interests are discharged by payment in full. Risk of loss of equipment or any part of the same shall pass to the purchaser upon delivery of such equipment or parts, F.O.B. Raven's manufacturing facility.

12. CANCELLATIONS – An order once placed with and accepted by Raven can be canceled only with Raven's consent and upon terms which indemnify Raven against loss.

13. WARRANTY – This warranty expressly precludes any liability by Raven for consequential damages however arising after delivery to the purchaser of the affected equipment, and is limited to the expressed warranty, excluding all implied warranties including merchantability. All equipment manufactured by Raven is warranted against defective materials and workmanship for a period of two (2) years from the date of delivery to the original purchaser. Liability under this warranty is limited to servicing, adjusting, repairing or replacing, as necessary, any equipment returned to the factory, transportation prepaid for that purpose. Factory examination must disclose a manufacturing defect. Repaired or replaced items will be returned to the purchaser surface freight prepaid within the continental U.S.A.

This warranty does not extend to any equipment which has been subjected to transportation damage, misuse, neglect, accident, improper installation, or any other circumstances reasonably beyond the control of Raven. Repairs will be billed to the purchaser at cost. In such cases, an estimate will be submitted for approval before repair is initiated. Repaired equipment will be returned to the purchaser with transportation charges collect, unless otherwise agreed to between the purchaser and Raven.

14. RETURN FOR CREDIT – No equipment may be returned for credit until the company has obtained Raven's written approval for return authorization. Materials accepted for return is subject to a re-stocking charge of 15% of the current list price. All transportation charges will be borne by the purchaser. Orders for special non-stock equipment or items become non-cancelable upon initiation of production and are not returnable for credit.

15. RETURNS FOR REPAIR – Equipment returned for repair should be identified with a tag indicating the problem, and returned to Raven's repair service department. Special instructions, i.e., desired modifications, should be noted on the packing slip. Any equipment returned must be packaged to insure safe arrival at Raven. Items modified and/or programmed by customer for special features will be returned to standard Raven configuration, with time billed accordingly, unless modification and/or program instructions or documentation is provided and repairs have been agreed to by Raven.

16. SERVICE – Engineering assistance will be provided on request for permanently installed equipment, and billed at a nominal fee as agreed upon between Raven and the purchaser.

17. APPLICABLE LAW – The validity, performance, construction and interpretation of these terms and conditions shall be governed by the laws of the state of Nevada, United States of America and any litigation must take place in the state of Nevada.

18. PROPRIETARY DATA – Raven retains ownership and rights in all proprietary data disclosed to the purchaser by Raven in connection with this contract. Proprietary samples, software documents and/or drawings shall not be disclosed, reproduced, manufactured or made available to unauthorized persons in whole or in part or used to prepare the same or similar materials without the expressed written permission from Raven. Proprietary data includes all design, engineering, and technical information (whether patentable or not) and other information concerning Raven trade secrets not disclosed by inspection or analysis of the equipment itself.

19. GOVERNMENT REQUIREMENTS – Raven agrees to comply with all applicable state and federal laws, rules and regulations, and all obligations hereunder are subject to applicable government regulation, including those affecting or limiting prices (except price redetermination), production, purchases, sales, use or inventory of materials. If the equipment to be furnished is to the United States government, Raven agrees to comply with applicable requirements for such contracts, with respect to secrecy, use of convict labor, employment of aliens, non-discrimination, plant protection, espionage, sabotage, fair labor standards act of 1938, as amended, the service contract act of 1965 as amended and other provisions relative to hours and conditions of work, if and when applicable.

20. MODIFICATION AND SUBSTITUTION – Raven reserves the right to modify equipment of Raven design sold hereunder, and/or the drawings and specification related thereto, or to substitute equipment of later design to fulfill this contract, providing the modification or substitution will not materially affect the performance of the equipment or lessen in any way the utility of the equipment to the purchaser.

21. DESIGN CHANGES – Raven reserves the right to make design changes at any time without incurring any obligation to modify equipment previously sold.

22. TERMS AND CONDITIONS – The terms and conditions specified herein shall be in addition to those set out in the Raven proposal.