



Instructions for Amplifier Decks with Attenuators Models 86-38-70-X/48 and 86-57-70-X/48

Manual Part Number

7-9401



Warranty

This warranty applies for one year from shipping date.

TX RX Systems Inc. warrants its products to be free from defect in material and workmanship at the time of shipment. Our obligation under warranty is limited to replacement or repair, at our option, of any such products that shall have been defective at the time of manufacture. **TX RX Systems Inc.** reserves the right to replace with merchandise of equal performance although not identical in every way to that originally sold. **TX RX Systems Inc.** is not liable for damage caused by lightning or other natural disasters. No product will be accepted for repair or replacement without our prior written approval. The purchaser must prepay all shipping charges on returned products. **TX RX Systems Inc.** shall in no event be liable for consequential damages, installation costs or expense of any nature resulting from the purchase or use of products, whether or not they are used in accordance with instructions. This warranty is in lieu of all other warranties, either expressed or implied, including any implied warranty or merchantability of fitness. No representative is authorized to assume for **TX RX Systems Inc.** any other liability or warranty than set forth above in connection with our products or services.

TERMS AND CONDITIONS OF SALE

PRICES AND TERMS:

Prices are FOB seller's plant in Angola, NY domestic packaging only, and are subject to change without notice. Federal, State and local sales or excise taxes are not included in prices. When Net 30 terms are applicable, payment is due within 30 days of invoice date. All orders are subject to a \$100.00 net minimum.

QUOTATIONS:

Only written quotations are valid.

ACCEPTANCE OF ORDERS:

Acceptance of orders is valid only when so acknowledged in writing by the seller.

SHIPPING:

Unless otherwise agreed at the time the order is placed, seller reserves the right to make partial shipments for which payment shall be made in accordance with seller's stated terms. Shipments are made with transportation charges collect unless otherwise specified by the buyer. Seller's best judgement will be used in routing, except that buyer's routing is used where practicable. The seller is not responsible for selection of most economical or timeliest routing.

CLAIMS:

All claims for damage or loss in transit must be made promptly by the buyer against the carrier. All claims for shortages must be made within 30 days after date of shipment of material from the seller's plant.

SPECIFICATION CHANGES OR MODIFICATIONS:

All designs and specifications of seller's products are subject to change without notice provided the changes or modifications do not affect performance.

RETURN MATERIAL:

Product or material may be returned for credit only after written authorization from the seller, as to which seller shall have sole discretion. In the event of such authorization, credit given shall not exceed 80 percent of the original purchase. In no case will Seller authorize return of material more than 90 days after shipment from Seller's plant. Credit for returned material is issued by the Seller only to the original purchaser.

ORDER CANCELLATION OR ALTERATION:

Cancellation or alteration of acknowledged orders by the buyer will be accepted only on terms that protect the seller against loss.

NON WARRANTY REPAIRS AND RETURN WORK:









Consult seller's plant for pricing. Buyer must prepay all transportation charges to seller's plant. Standard shipping policy set forth above shall apply with respect to return shipment from TX RX Systems Inc. to buyer.

DISCLAIMER

Product part numbering in photographs and drawings is accurate at time of printing. Part number labels on TX RX products supersede part numbers given within this manual. Information is subject to change without notice.

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1	05/03/05
2	08/10/11

Symbols Commonly Used

	WARNING		ESD Electrostatic Discharge
	CAUTION or ATTENTION		Hot Surface
	High Voltage		Electrical Shock Hazard
	Heavy Lifting		Important Information

Changes to this Manual

We have made every effort to ensure this manual is accurate. If you discover any errors, or if you have suggestions for improving this manual, please send your comments to our Angola, New York facility to the attention of the Technical Publications Department. This manual may be periodically updated. When inquiring about updates to this manual refer to the manual part number and revision number on the revision page following the front cover.

Contact Information

Sales Support at 716-217-3113

Customer Service at 716-217-3144

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GENERAL DESCRIPTION

The TX RX Systems Amplifier Decks with Attenuators consists of high quality low noise amplifiers with built-in programmable attenuation. The decks are available in either the VHF or UHF bands with models available in each band containing from 1 to 4 amplifiers housed on a standard 19" deck. A typical model is shown in **Figure 1**.

Programming of the amplifiers is accomplished easily through front panel dip switches, refer to **Figure 2** for a front panel view of a typical deck. The input and output of each individual amplifier assembly is conveniently available and labeled at the back of the deck, refer to **Figure 3**. In addition, decks are available which can be powered by either a 120 VAC or -48 VDC source voltage. The models available are listed in **Table 1**.

The eight VHF models utilize the 3-19896 low noise amplifier assembly, specifications are shown in **Table 2**. While the eight UHF models utilize the 3-20213 low noise amplifier assembly whose specifications are listed in **Table 3**.

Both the VHF and UHF amplifier assemblies used on these decks have a minimum gain of 26.0 dB. In each of the 16 models the amount of attenuation for each amplifier is programmable via the front panel dip switches. Each of the four switches provides 1, 2, 4, or 8 dB of attenuation when the associated switch is in the ON position. The attenuation for each amplifier is ADDITIVE so a maximum of 15 dB attenuation would be available for any amplifier assembly if all four of its attenuation switches were set to the ON position at the same time.

Adding Additional Amplifiers

The 86-38 Series and the 86-57 Series amplifier decks can be expanded in the field to a maximum of four amplifiers on a deck. There are kits available for both the VHF and UHF bands as listed in **Table 4**. The expansion kits contain the amplifier assemblies, mounting hardware, and pre-made cables required to complete the installation. The power supply or DC-DC converter that is already on the deck is capable of handling the current draw of up to four amplifier assemblies.

Model #	Band	# of Amps	Power Source
86-38-70-1	VHF	1	120 VAC
86-38-70-2	VHF	2	120 VAC
86-38-70-3	VHF	3	120 VAC
86-38-70-4	VHF	4	120 VAC
86-38-70-1-48	VHF	1	-48 VDC
86-38-70-2-48	VHF	2	-48 VDC
86-38-70-3-48	VHF	3	-48 VDC
86-38-70-4-48	VHF	4	-48 VDC
86-57-70-1	UHF	1	120 VAC
86-57-70-2	UHF	2	120 VAC
86-57-70-3	UHF	3	120 VAC
86-57-70-4	UHF	4	120 VAC
86-57-70-1-48	UHF	1	-48 VDC
86-57-70-2-48	UHF	2	-48 VDC
86-57-70-3-48	UHF	3	-48 VDC
86-57-70-4-48	UHF	4	-48 VDC
Table 1: The Amp w/Atten product family.			

Parameter	Specification
Bandwidth	132 - 174 MHz
Gain	26.0 dB min.
3OIIP	11.0 dB min.
Noise Figure	2.0 dB max.
Voltage	12 VDC
Current	480 - 700 ma
Table 2: VHF amplifier specifications.	

Parameter	Specification
Bandwidth	380 - 512 MHz
Gain	26.0 dB min.
3OIIP	11.0 dB min.
Noise Figure	2.0 dB max.
Voltage	12 VDC
Current	480 - 700 ma
Table 3: UHF amplifier specifications.	

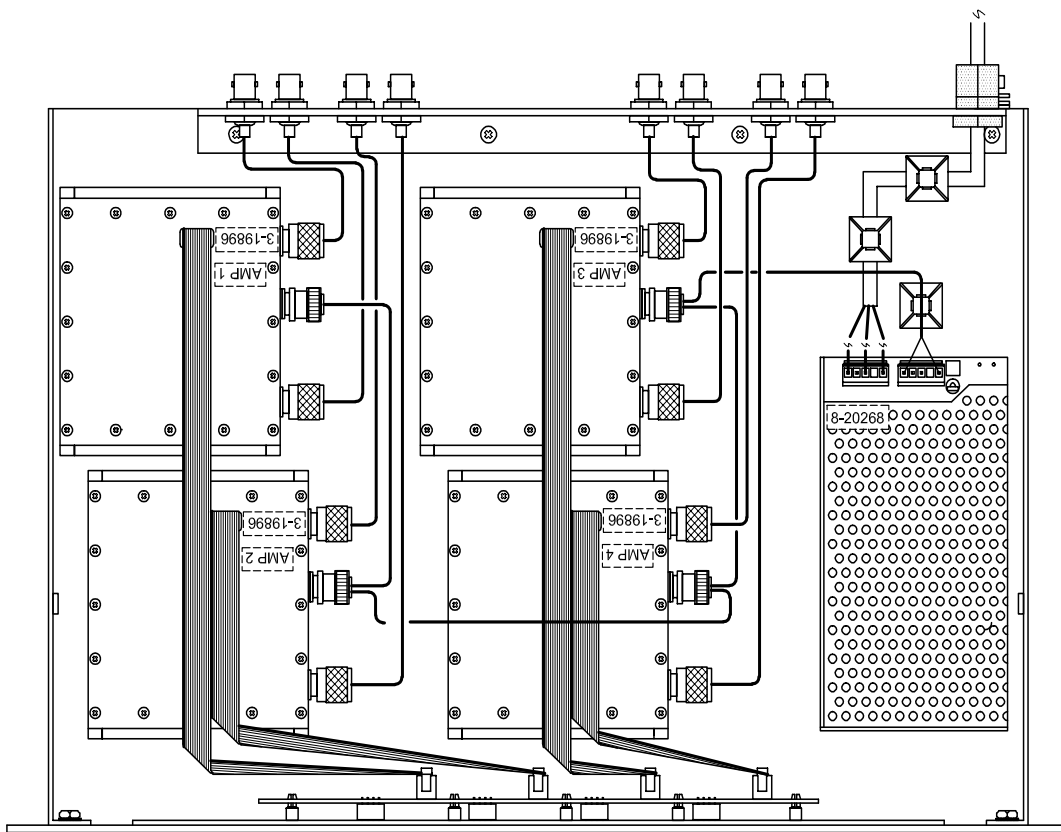


Figure 1: The Amplifier Deck w/Attenuator. Model 86-38-70-4 shown as an example.

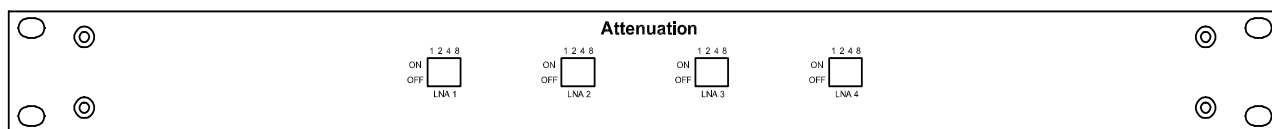


Figure 2: Front panel view.

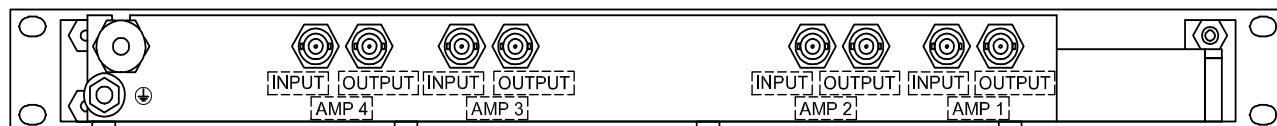


Figure 3: Rear panel view.

Kit #	Band	# of Amps
75-38-70-1-2	VHF	from 1 to 2
75-38-70-1-3	VHF	from 1 to 3
75-38-70-1-4	VHF	from 1 to 4
75-38-70-2-3	VHF	from 2 to 3
75-38-70-2-4	VHF	from 2 to 4
75-38-70-3-4	VHF	from 3 to 4
75-57-70-1-2	UHF	from 1 to 2
75-57-70-1-3	UHF	from 1 to 3
75-57-70-1-4	UHF	from 1 to 4
75-57-70-2-3	UHF	from 2 to 3
75-57-70-2-4	UHF	from 2 to 4
75-57-70-3-4	UHF	from 3 to 4
Table 4: Available expansion kits.		

Installation Procedure

The front panel, rear panel and mounting plate of your amplifier deck were pre-drilled to accommodate up to four amplifier assemblies so adding additional amplifiers is an easy process of installing the parts from the expansion kit. To add additional amplifiers to your existing deck perform the following in a step-by-step fashion.

- 1) Disconnect the deck from its power source. Either 120 VAC or -48 VDC depending on which model you have.
- 2) Remove the existing DC distribution cable from your deck. This cable runs between the output of the power supply/DC-DC converter and the existing amplifiers on the deck. This is a daisy-chain style cable.
- 3) Place the new amplifier assembly on the deck in the correct location as shown in **Figures 4, 5, or 6**. There are specific locations on the deck for amps 1, 2, 3, and 4 as shown in figure 1.
- 4) While holding the amplifier assembly in place stand the deck up on its front face so you will have access to the bottom of the deck. Install

two 4-40 screws through the bottom of the deck into the new amplifier assembly to secure the assembly into place.

- 5) Lay the deck down flat and install the new DC power cable. The new power cable will run from the power supply/DC-DC converter to each amplifier on the deck in a daisy-chain fashion.
- 6) Connect a ribbon cable from the amplifier to the front panel board.
- 7) Connect an RF Input cable from the back panel to the amplifier. The BNC end of the cable needs to be attached to the back panel of the deck.
- 8) Connect an RF Output cable from the back panel to the amplifier. The BNC end of the cable needs to be attached to the back panel of the deck.
- 9) Set the front panel attenuator switches for the new amplifier assembly.
- 10) Reapply the source voltage to the deck and verify correct operation of your system.

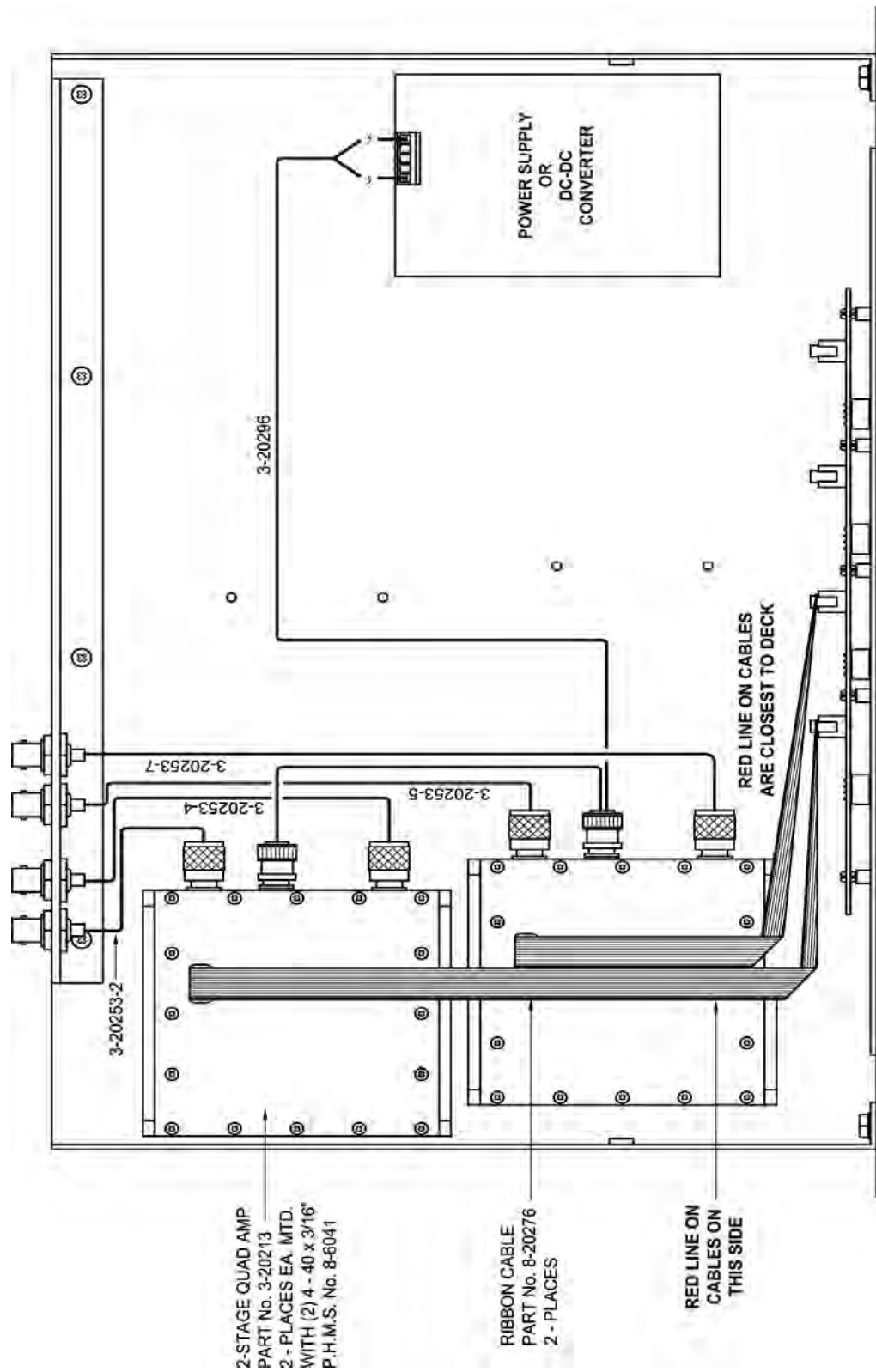


Figure 4: Expanding from 1 amp to 2 amps.

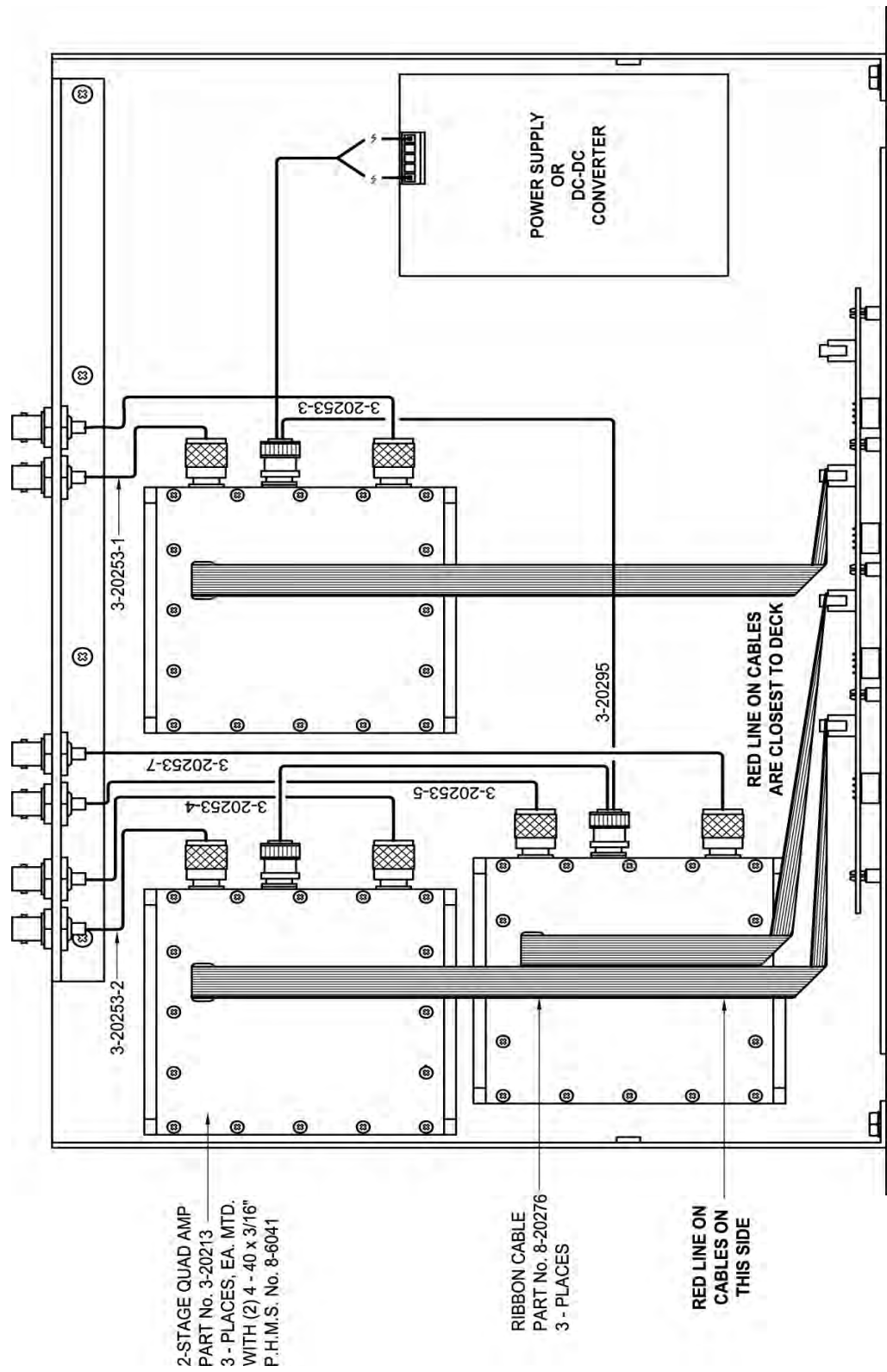


Figure 5: Expanding from 2 amps to 3 amps.

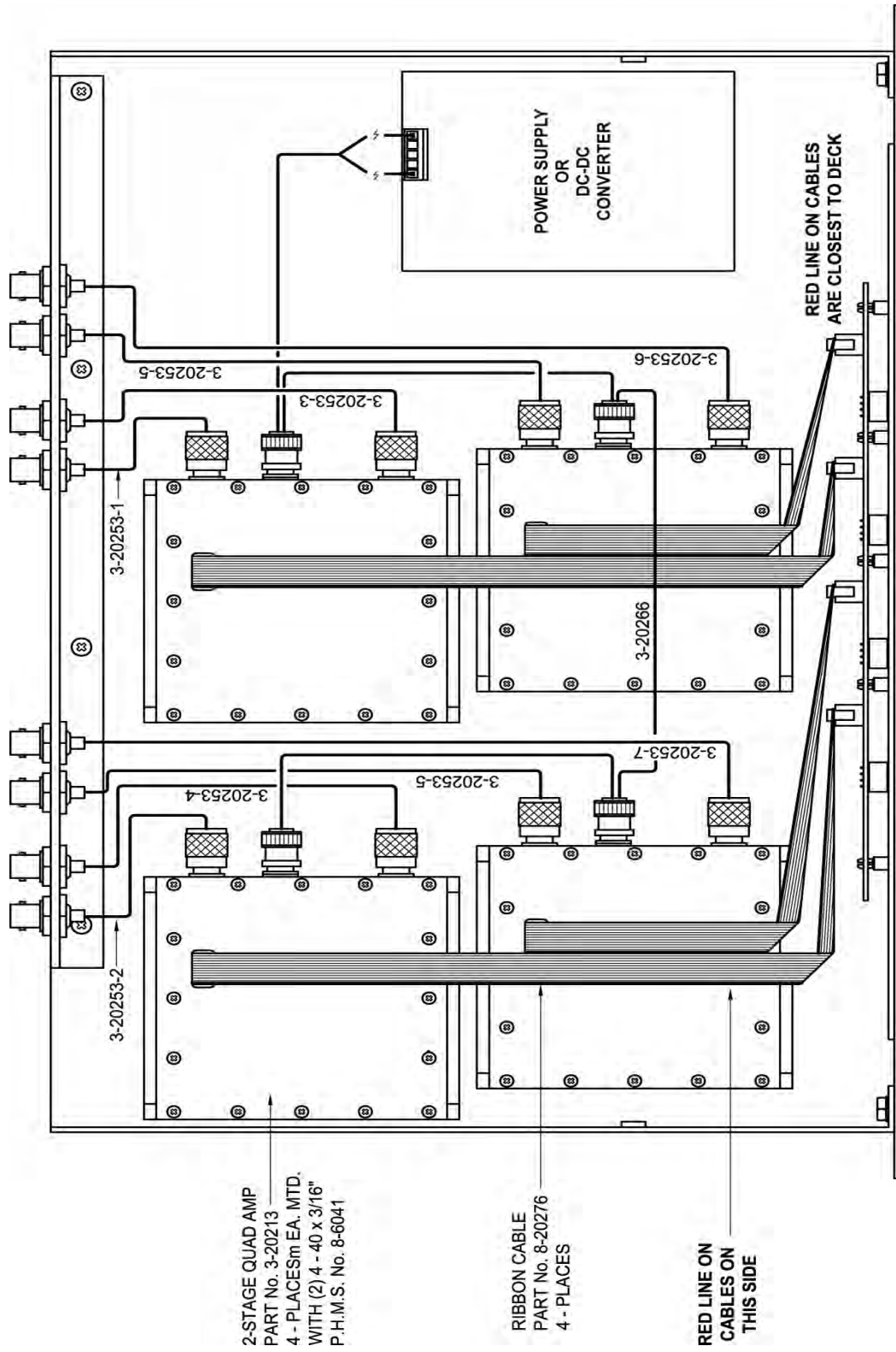


Figure 6: Expanding from 3 amps to 4 amps.

Return Loss vs. VSWR

Return Loss	VSWR
30	1.06
25	1.11
20	1.20
19	1.25
18	1.28
17	1.33
16	1.37
15	1.43
14	1.50
13	1.57
12	1.67
11	1.78
10	1.92
9	2.10

Watts to dBm

Watts	dBm
300	54.8
250	54.0
200	53.0
150	51.8
100	50.0
75	48.8
50	47.0
25	44.0
20	43.0
15	41.8
10	40.0
5	37.0
4	36.0
3	34.8
2	33.0
1	30.0

dBm = $10\log P/1\text{mW}$
Where P = power (Watt)

Insertion Loss

Input Power (Watts)

		50	75	100	125	150	200	250	300
Insertion Loss	3	25	38	50	63	75	100	125	150
	2.5	28	42	56	70	84	112	141	169
	2	32	47	63	79	95	126	158	189
	1.5	35	53	71	88	106	142	177	212
	1	40	60	79	99	119	159	199	238
	.5	45	67	89	111	134	178	223	267

Output Power (Watts)

Free Space Loss

Distance (miles)

		.25	.50	.75	1	2	5	10	15
Frequency (MHz)	150	68	74	78	80	86	94	100	104
	220	71	77	81	83	89	97	103	107
	460	78	84	87	90	96	104	110	113
	860	83	89	93	95	101	109	115	119
	940	84	90	94	96	102	110	116	120
	1920	90	96	100	102	108	116	122	126

Free Space Loss (dB)

Free space loss = $36.6 + 20\log D + 20\log F$
Where D = distance in miles and F = frequency in MHz

