



► P-Com, Inc.— Headquarters
3175 S. Winchester Boulevard
Campbell, CA 95008 U.S.A.
Tel: (1) 408.866.3666 Fax: (1) 408.866.3655

Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

April 24, 1998

Gentlemen:

This is your letter of authorization to accept our limited appointment of Thomas N. Cokenias as Agent for P-Com, Inc., to sign applications before the Commission and to make representations to you concerning certain products on our behalf. Thomas N. Cokenias is to receive and exchange data between our company and the Commission. This request is made pursuant to paragraph 2.911 of FCC Rules, CFR 47 and is limited to the following P-Com product:

AirPro

This authorization expires on April 25, 1999.

The accompanying data is also being filed on our behalf by Thomas N. Cokenias. Included as exhibits with the enclosed application are: a set of photographs, block diagrams and schematic diagrams of the cited unit. It is our intention to provide the Commission with a full disclosure of our process so that its merits can be evaluated fully. Indeed, we are pleased to provide any further information that the Commission might wish to see. It is not our intention, however, to make our proprietary process a matter of public record.

In view of the fact that the diagrams and associated theory of operation disclose information confidential to P-Com, we ask that these portions (block diagram, schematic diagram, and theory of operation) of our application be withheld from public inspection as provided under FCC §0.459. These details are not readily discernible - even to technically sophisticated individuals - from our hardware and constitute trade secrets. We would also like to extend this to the currently submitted documents. We request that these documents and this letter be segregated from the body of our evaluation report and withheld from public inspection.

Thank you for your attention. Please let F.W. Miller (408-328-5901) know if the Commission disagrees with our position or requires further justification.

Sincerely,

John R. Wood
Senior Vice President
Product Technologies
P-Com, Inc.

cc: F.W. Miller, Product Marketing

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To whom it may concern:

I hereby certify on behalf of P-Com, Inc, 3175 South Winchester Boulevard, Campbell, CA 95008, USA, ("Applicant"), that neither the Applicant nor any party to the application (officers, directors and 5% shareholders) is subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C.853a.

Sincerely,

John R. Wood
Senior Vice President
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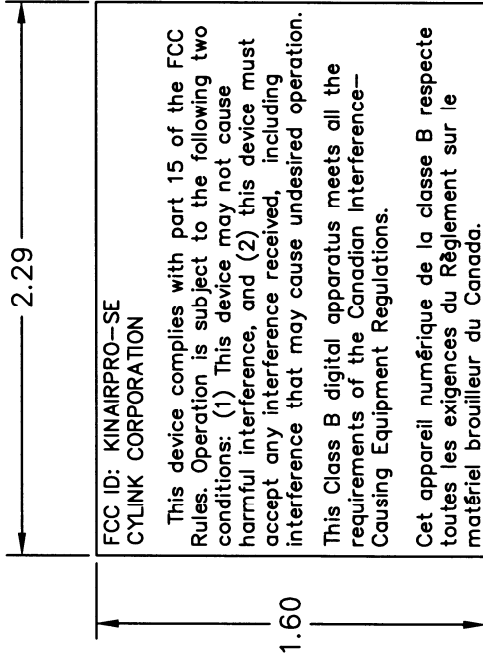
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This is a standard proprietary product developed, manufactured, and marketed by CYLINK Corp. The design is the exclusive property of Cylink Corp.



NOTES: UNLESS OTHERWISE SPECIFIED.

1

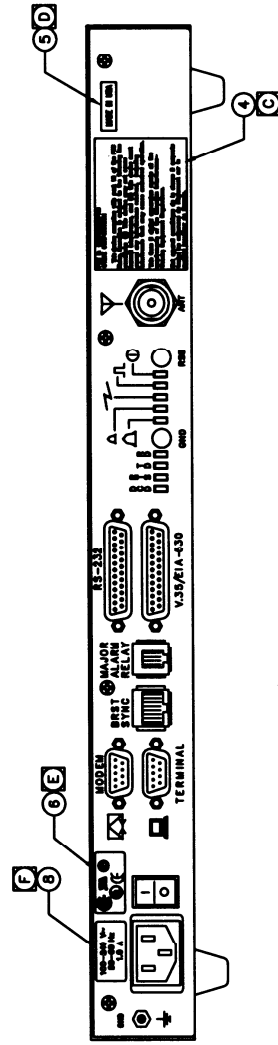
MATERIAL: .005 THICK, FINE TEXTURED POLYCARBONATE, SUBSURFACE PRINTED, COLOR OF CHARACTERS BLACK, BACKGROUND TO BE SILVER. ADHESIVE TO BE 3M 468.

2. USE ARTWORK AW-16181-001.

3. BAG AND TAG THE LOT WITH PART NO. 16181-001, CURRENT REV OF THIS DRAWING AND MANUFACTURER'S IDENT.

DWG. NO.	SHT	REV	DESCRIPTION	DATE	APPROVED
FD-16181-001	1	2	PROTOTYPE	11/18/96	
		2	UPDATE	4/29/98	

QTY REQD	FSM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO.
PARTS LIST					
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGLES 1/16 .0625 30 30 1/32 .03125 15 15 1/64 .015625 7 7 1/8 .125 45 45 1/4 .25 90 90 3/8 .375 135 135 1/2 .5 180 180 3/4 .75 225 225 1 1.0 270 270 1 1/4 1.25 315 315 1 1/2 1.5 360 360 2 2.0 450 450 3 3.0 540 540 4 4.0 630 630 5 5.0 720 720 6 6.0 810 810 8 8.0 1080 1080 10 10.0 1350 1350 12 12.0 1620 1620 14 14.0 1890 1890 16 16.0 2160 2160 18 18.0 2430 2430 20 20.0 2700 2700 24 24.0 3240 3240 30 30.0 3780 3780 36 36.0 4320 4320 48 48.0 5760 5760 60 60.0 7200 7200 72 72.0 8640 8640 96 96.0 11520 11520 120 120.0 14400 14400 144 144.0 17280 17280 180 180.0 21600 21600 216 216.0 25920 25920 240 240.0 28800 28800 288 288.0 34560 34560 360 360.0 43200 43200 480 480.0 57600 57600 600 600.0 72000 72000 720 720.0 86400 86400 960 960.0 115200 115200 1200 1200.0 144000 144000 1440 1440.0 172800 172800 1800 1800.0 216000 216000 2160 2160.0 259200 259200 2400 2400.0 288000 288000 2880 2880.0 345600 345600 3600 3600.0 432000 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REAR VIEW OF ASSEMBLY

January 23, 1994

AirLink VF Processing Gain Measurement

1. Set-up

The Set-up shown in Figure 1 was Used. The Unit Under Test - An Airlink VF Wireless Modem has been connected as shown. The Modems were running in Simplex while the receiving modem is being interfered with by the CW signal. The transmit section of the BER Tester generated a pseudo-random sequence with a period of $2^{20}-1$ (arbitrary).

Both Airlink Modems were set to channel 5: 913.682 MHz.

The Signal Generator [SG] operated as a CW source with power resolution of 0.1 dB. It was set for frequency increment of 25 KHz. Fifty frequency steps below and 50 frequency steps above the center frequency of the receiver cover the RF bandwidth of the receiver of the Modem.

1.1 Calibration

The Adjustable attenuator was set to 25 dB. The received signal power was then -69.4 dBm. It was found that to obtain equal Signal and Jammer power, (i.e. J/S=0 dB), as measured by the Power Meter, the SG had to be set to -45.6 dBm.

1.2 Procedure

The SG frequency has then been incremented between 913.682 MHz minus 50×0.025 MHz and 913.682 MHz plus 50×0.025 MHz. For each frequency step the power of the SG was set to produce exactly $BER=10^{-4}$. The deviation of the SG setting from -45.6 dB has been recorded as the J/S for that frequency.

1.3 Measured Results

The measurements are shown in Figure 2 and the attached list.

2. Processing Gain Derivation

Deleting the worst 20% of the measurements, i.e. 20 measurements, (marked in the attached list) we find that the worst remaining measurement is J/s=-1 dB.

The Processing Gain is now calculated from the formula:

$$\text{Jamming Margin} = G_p - (S/N)_{\text{out}} - L_{\text{sys}} \quad 1$$

where:

* Jamming Margin is the maximum ratio of Jammer to Signal power, which still allows the receiver to deliver the prescribed BER.

* $(S/N)_{out}$ is the signal to noise ratio required at the input of that part of an ideal receiver (of the same type), which accomplishes data demodulation, in order to obtain a prescribed BER.

* L_{sys} is the total losses of the tested receive system in comparison with an ideal (theoretical) system having the same type of Modulation/Demodulation. In our case the basic modulation scheme is Noncoherent Orthogonal Signalling. Cylink estimates that the total system losses of the Airlink VF are in access of 1.5 dB. This figure includes losses in the transmitter and the receiver. The major contributor to this total loss are the nonideal analog filters/equalizers and "corner cutting" in the Base-band Digital Processor.

* G_p is the Processing Gain.

For an explanation see: Robert C. Dixon "Spread Spectrum Systems", John Wiley & Sons, 1984 (second edition), page 10.

2.1 Calculation

The theoretical performance of noncoherent reception of orthogonal signals is given, for instance, by A. J. Viterbi, McGraw-Hill Book Company, 1966 page 207:

$$P_e = (1/2) \exp\{-E/2N_0\} \quad 2$$

where E/N_0 should be replaced for our purpose by $(S/N)_{out}$.

For $BER=10^{-4}$ this formula requires $(S/N) = 12.3$ dB.

As said above we will take: $L_{sys} = 1.5$ dB

As said above, the worst remaining Jammer to Signal Power Ratio in Table 1 after omitting the "worst" 20 measurements, is -1 dB.

From formula 1 we obtain:

$$G_p = (J/S) + (S/N)_{out} + L_{sys} \quad 3$$

Substituting the numerical values we obtain:

$$G_p = -1 + 12.3 + 1.5 = \underline{12.8 \text{ dB}}$$

Table 1: Jammer Power to Signal Power Ratio for BER=10⁻⁴
Signal Power Constant at - 69.4 dBm.

	Frequency	J/S	
1	912.432	7.7	
2	912.457	8.2	
3	912.482	7.5	
4	912.507	7.6	
5	912.532	6.9	
6	912.557	6.8	
7	912.582	6.3	
8	912.607	6.5	
9	912.632	5.8	
10	912.657	4.5	
11	912.682	5.3	
12	912.707	5.3	
13	912.732	5.1	
14	912.757	4.6	
15	912.782	3.9	
16	912.807	3.8	
17	912.832	3.1	
18	912.857	3.3	
19	912.882	2.9	
20	912.907	3.3	
21	912.932	2.6	
22	912.957	2.0	
23	912.982	2.1	
24	913.007	1.9	
25	913.032	1.6	
26	913.057	1.1	
27	913.082	0.7	
28	913.107	1.0	
29	913.132	0.5	
30	913.157	0.1	
31	913.182	0.0	
32	913.207	-0.9	
33	913.232	-0.4	
34	913.257	-0.3	
35	913.282	-0.8	
36	913.307	-0.1	
37	913.332	-0.3	
38	913.357	-0.4	
39	913.382	-1.0	*
40	913.407	-2.6	*
41	913.432	-2.0	*
42	913.457	-1.5	*
43	913.482	-1.2	*
44	913.507	-2.4	*
45	913.532	-2.5	*
46	913.557	-2.0	*
47	913.582	-2.6	*
48	913.607	-3.3	*
49	913.632	-1.0	

50	913.657	2.5	
51	913.682	34.1	
52	913.707	2.8	
53	913.732	-0.3	
54	913.757	-2.1	*
55	913.782	-2.1	*
56	913.807	-1.7	*
57	913.832	-1.9	*
58	913.857	-2.0	*
59	913.882	-1.2	*
60	913.907	-1.1	*
61	913.932	-1.6	*
62	913.957	-2.0	*
63	913.982	-1.4	*
64	914.007	-0.6	
65	914.032	-0.2	
66	914.057	-0.7	
67	914.082	-0.7	
68	914.107	-0.2	
69	914.132	-0.2	
70	914.157	-0.2	
71	914.182	0.0	
72	914.207	-0.1	
73	914.232	0.7	
74	914.257	1.4	
75	914.282	0.7	
76	914.307	1.5	
77	914.332	0.4	
78	914.357	2.2	
79	914.382	3.0	
80	914.407	2.5	
81	914.432	2.8	
82	914.457	4.0	
83	914.482	3.3	
84	914.507	3.3	
85	914.532	3.4	
86	914.557	3.8	
87	914.582	4.5	
88	914.607	4.9	
89	914.632	5.3	
90	914.657	5.2	
91	914.682	4.8	
92	914.707	5.0	
93	914.732	6.0	
94	914.757	6.8	
95	914.782	6.6	
96	914.807	6.8	
97	914.832	7.0	
98	914.857	8.0	
99	914.882	7.6	
100	914.907	8.3	
101	914.932	8.0	

AIRL VK VF

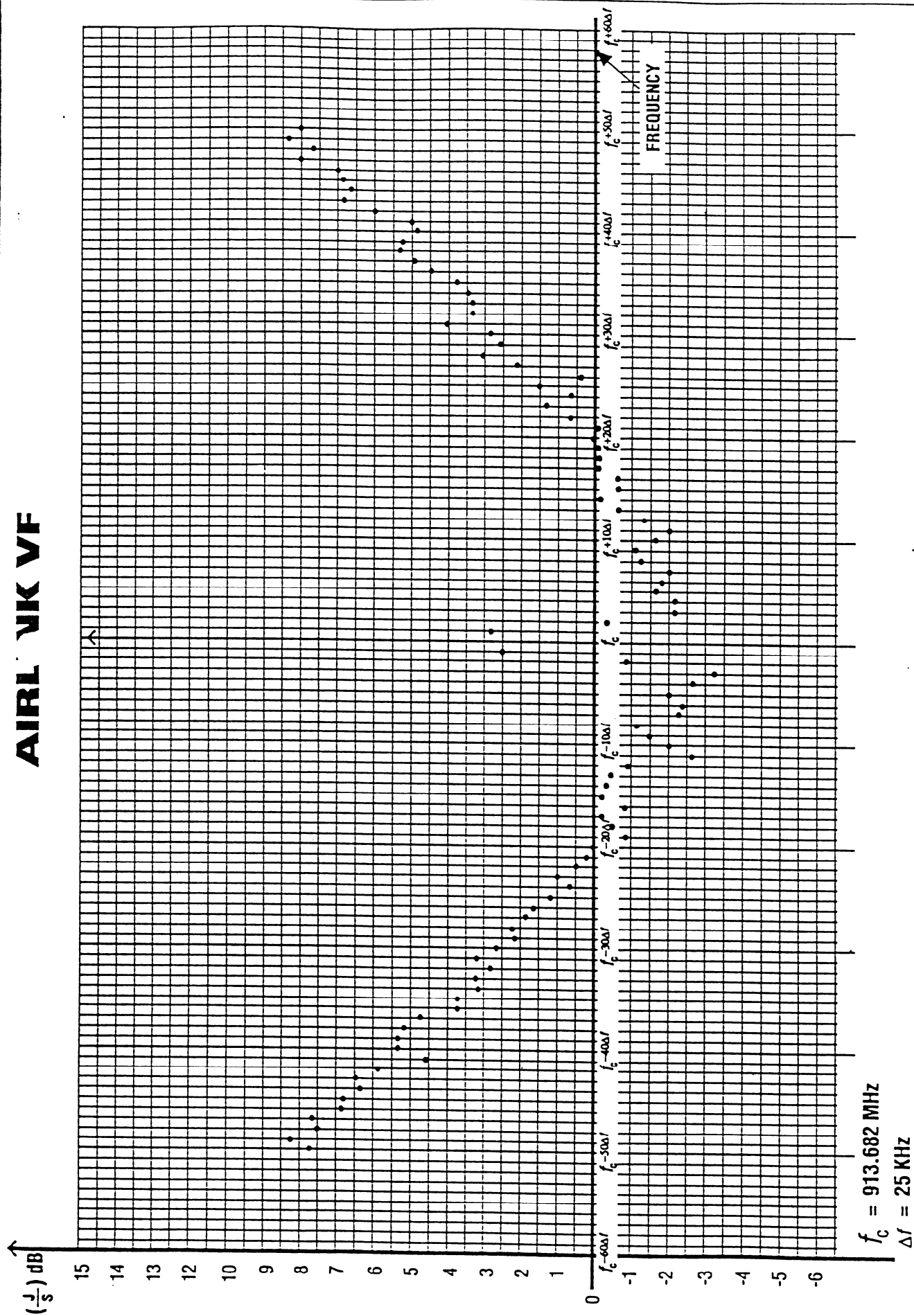
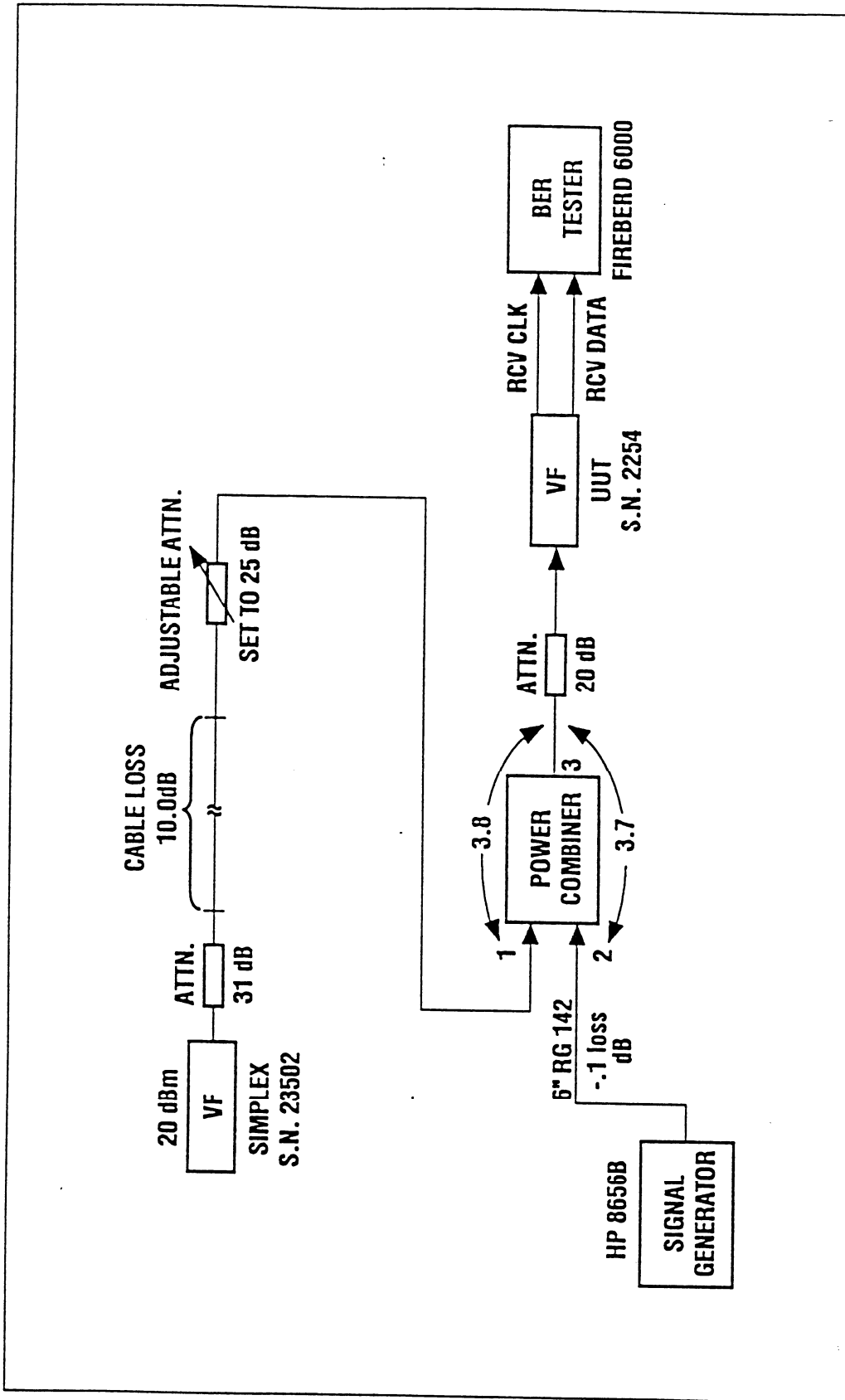


FIGURE : $(\frac{J}{s})$ dB REQUIRED FOR BER = 10^{-4}



E0096-0003

FIGURE 1: Set-up for BER versus J/S measurement. Modems running in simplex.