COM 1000B

OPERATOR'S MANUAL

intech

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SANTA CLARA, CA 95050 U.S.A.

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1. GENERAL INFORMATION

1.1 Introduction

The COM 1000B is a solid state linear MOS FET amplifier capable of delivering a power output of 1000 watts in the frequency range of 1.6 to 30 MHz.

The COM 1000B is operated as the final power amplifier in a 1000 watt HF transmitter in conjunction with the COM 3648 receiver/exciter.

The COM 1000B is modularized for ease of maintenance. Adjustments are easily accessible and internal LED indicators monitor performance of critical circuitry.

1.2 Specifications:

Frequency Range:	1.6 to 30 MHz
Power Output:	1000 watts AVG. and PEP
Power Gain:	14dB +/-2dB*
Gain Flatness:	+/-0.7dB over 1.6 to 30MHz (850-1150 watts)
Linearity:	3rd order IM products 25dB below PEP or better. Harmonics attenuated more than 73dB
Switching Speed:	Rise and Fall Time less than 1.5 milliseconds
Input/Output Impedance:	50 ohms
Load Mismatch:	Unit capable of operating into 2:1 vswr (reduced output) and survive open and shorted load. Stable at any load.
Operating Modes:	Class AB for voice and high speed data operation. Class C for FSK and CW operation.
Cooling:	Forced Air
Physical Characteristics:	HxDxW = 10.5"x19"x19" Weight = 75 lbs.
Power Requirements:	48V DC, 55A max. (PS 248)
Features:	Front Panel metering of forward and reflected power. VSWR indication and protection. Overtemperature indication and protection. Internal transistor balance indicator.
Environment Temperature:	-20 to +50 degree C. operating** -40 to 70 degree C. storage
Relative Humidity:	0 to 95% operating

* Class AB

** Power output may be reduced at elevated temperatures by the Thermal Protection circuit.

2.0 PREPARATION

2.1 Initial Inspection

Exercise care when unpacking the unit. Inspect it for damage which may have been incurred in shipping. If there is damage or if any parts are missing, notify your Intech dealer prior to disposing of the packaging material.

The package should include the following items:

1 COM 1000B Linear Power Amplifier

1 DC Power Cord

1 Control cable, 21 pin, RFI shielded

1 Manual

2.2 Preparing For Use

2.2.1 Power Supply

The COM 1000B is normally used with the PS248 Power Supply. When the PS 248 is wired for 220 VAC operation, the line voltage will be clearly marked with an orange lable located at the AC power input connector.

The AC outlet current requirements are as follows:

110 VAC : 30 A

220 VAC : 15 A

2.2.2 RF Power Cable

In order to handle the 1000 watt RF output power, Intech recommends using RG-8A/U cable between the COM 1000B and the load.

2.2.3 Location

In locating the COM 1000B, it is required that sufficient space be allowed for air circulation. The air-intake is at the front and the exhaust on the rear. For both intake and exhaust, Intech recommends "free space" in excess of 30cm (12").

3.0 OPERATION

3.1 Controls, Indicators and Connectors

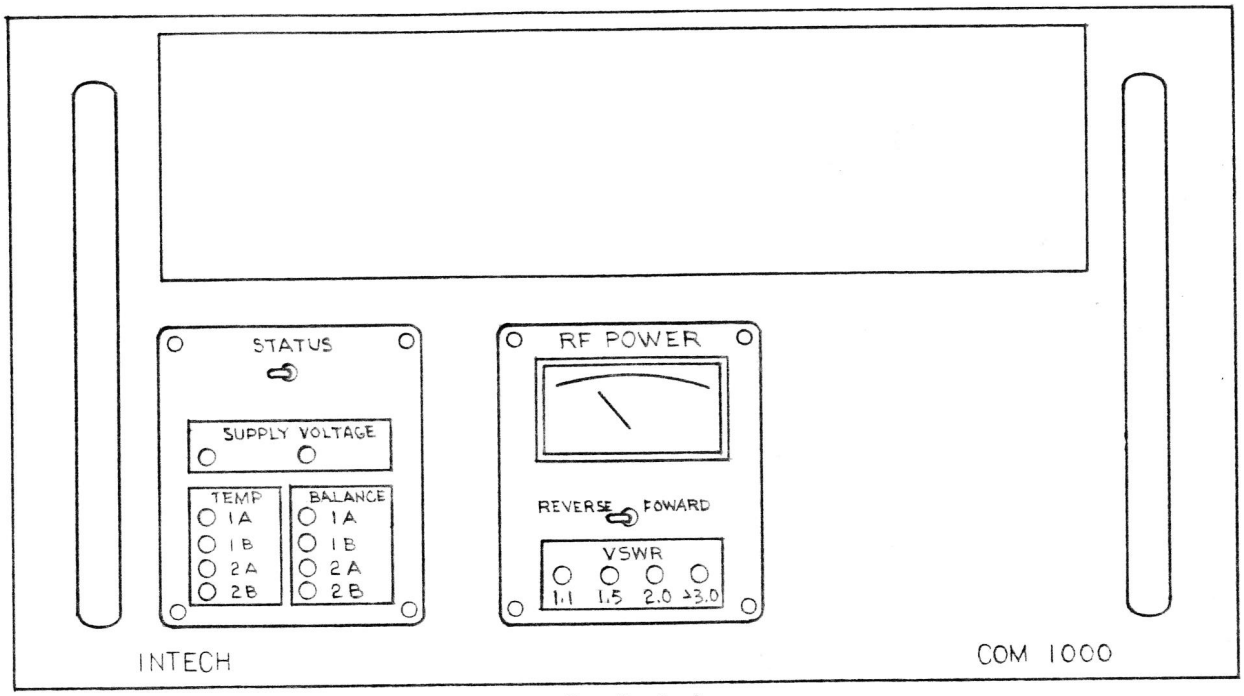


FIG. 3.1.1
FRONT PANEL

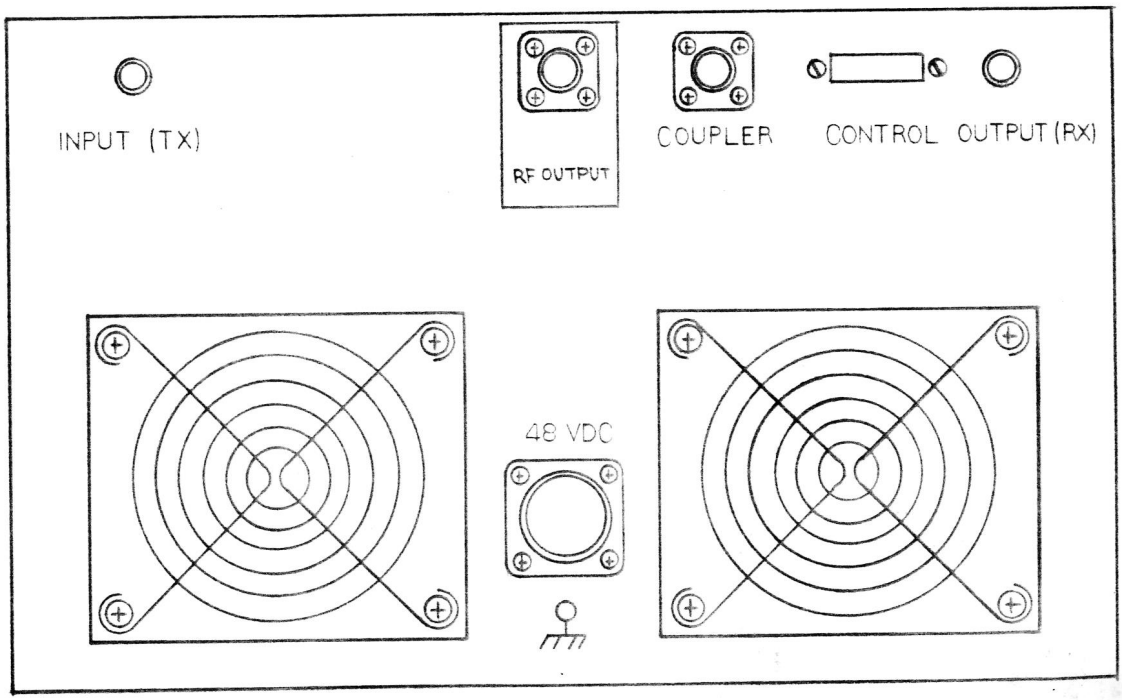


FIG. 3.1.2
REAR PANEL

3.1.1 Front Panel

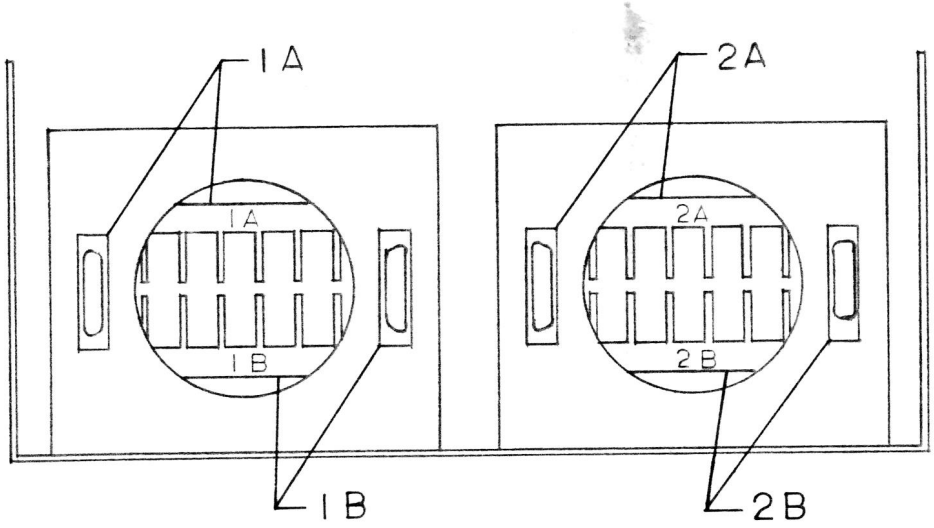
Figure 3.1.1 shows the COM 1000B Front Panel.

The functions of controls and indicators are:

ON/OFF SWITCH:	Turns DC power ON and OFF
RF POWER:	Indicates forward or reverse power in accordance with switch setting.
VSWR:	LED lit, indicates approximate VSWR. When RED LED is lit, power is reduced due to excessive VSWR.
STATUS SWITCH:	Balance test switch (momentary)
SUPPLY VOLTAGE:*	LED lit indicates DC voltage present at appropriate 500 W module.
TEMPERATURE:*	LED lit indicates overtemperature of appropriate 300 W module. Power is reduced to safe operating level when one or more LEDs are lit.
BALANCE:*	LED lit indicates problem in appropriate 300 W module (soft fail). Operation can continue though output power is reduced to a level corresponding to the severity of the failure. To perform balance test, proceed as follows: a) Select a frequency between 4 and 20 MHz. b) Apply drive signal corresponding to a power output of approximately 600 watts. When used with the COM 3648, whistling into the microphone should suffice. c) Activate the STATUS SWITCH while observing the BALANCE LEDs. Any LED lit continuously while power is applied signals a problem. If the BALANCE test is performed by whistling into the microphone, the LED(s) might flash momentarily, especially at lower frequencies.

This is normal. Only a continuous lit LED indicates a problem. During this test, care should be taken not to overdrive the COM 1000B (> 1200 Watts). When overdriven, saturation occurs and one or more LEDs might turn ON.

* MODULE location is shown below:



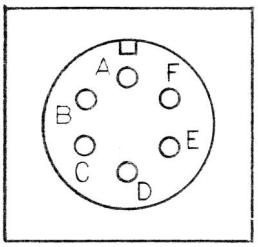
FRONT VIEW

3.1.2 REAR PANEL

Figure 3.1.2 shows the rear panel.

The functions of the connectors are:

48VDC:	Connector for DC power cord.
INPUT (TX):	BNC connector for the drive signal. NOMINAL DRIVE LEVEL IS -3 dBm (50mW) for "stand alone" amplifier and +46dBm (40W) when operated with the COM 3648.
OUTPUT (TX):	Type N connector for the output signal. NOMINAL OUTPUT LEVEL IS +60dBm/1000W
OUTPUT (RX):	BNC connector for receive signal to COM 3648
COUPLER	Connector for Antenna Coupler, COM 1005

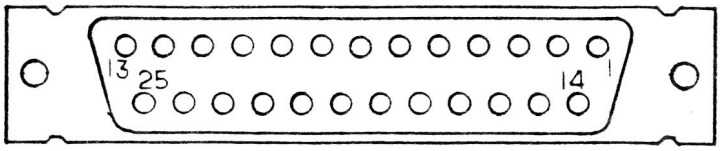


VIEW FROM REAR

The pin assignment for the antenna coupler is shown below:

Pin #		
	A	+13.8V
	B	GND
	C	KEY
	D	START
	E	SPARE
	F	SPARE

CONTROL — DB 25 connector for COM 1000B/COM 3648 control interface



VIEW FROM REAR

The pin assignment for the CONTROL connector is shown below:

Pin #		
	1	GND
	2	FREQ O.C. From COM 1000B. Low when freq. < 4MHz.
	3	PTT (Key) From COM 3648.
	4	TEMP O.C. From COM 1000B. Low when heatsink temp. is excessive.
	5	FS1 From COM 3648, filter selection information.
	6	FS3 From COM 3648, filter selection information.
	7	VFØ From COM 1000B. DC voltage proportional to Pout.
	8	
	9	
	10	
	11	
	12	Start from COM 3648. Tuner start pulse.
	13	KEY from Tuner. Tune keying (PTT).
	14	SSB From COM 3648. Selects Class AB Bias.
	15	TTY/CW From COM 3648. Selects Class C Bias.
	16	VSWR O.C. From COM 1000B. Low when VSWR excessive.
	17	SCAN From COM 3648. Selects 30MHz Filter in Scan operation.
	18	FS2 From COM 3648. Filter selection information.
	19	FS4 From COM 3648. Filter selection information.
	20	
	21	
	22	
	23	
	24	
	25	GND

NOTE: O.C. = Open Collector

4.0 THEORY OF OPERATION

4.1 GENERAL

The block diagram, Fig. 4.1, illustrates the operation of the COM 1000B.

The RF input signal from the COM 3648 Exciter is applied to the INPUT POWER SPLITTER in which the signal is split into four signals (approximately 10W) that each drive one of the four 300W power amps in the two 500W power modules (#1 and #2).

Each 300 W power amp contains circuitry to monitor temperature. In case of overtemperature a signal (TEMP) is applied to the COM 3648 and the drive power is reduced. This reduces the final output power to a safe operating level. Overtemperature is indicated on the front panel status display. Each 300 W power amp also contains circuitry to monitor the gain balance of a transistor pair. In case of an unbalance, information is routed to the front panel where LED's pinpoint the faulty module on the STATUS display.

Two different BIAS circuits can be chosen dependent upon the particular transmission mode. All Bias current adjustments are located on the 300 W power amps.

The output from each 300 W power amp is combined to yield the 1000 W output power in the OUTPUT POWER COMBINER.

From the OUTPUT COMBINER, the signal is routed through a Transmit/Receive (T/R) switch to a "bank" of 13 low pass filters. Selection of a particular filter is controlled by information from the COM 3648 which is decoded in the FILTER CONTROLLER.

Frequency information from the FILTER CONTROLLER is routed to the COM 3648 in order to comply with the FCC requirement of 150 W maximum power output when operating below 4 MHz.

A VSWR DETECTOR measures forward and reflected power. In the P.A. controller, the measured power is compared and display information is routed to the front panel. In case of excessive VSWR, the power is reduced to a safe level.

4.2 INPUT POWER SPLITTER

The schematic of the Input Power Splitter is shown in Figure 4.2.

The power splitter converts the input signal into two equal out of phase signal pairs. The input signal is the output from the COM3648 and is applied to transformer T1 through connector J5.

T1 is a broadband balanced to unbalanced transmission line transformer.

T2 is a hybrid splitter with 50 ohm output impedances at connectors J12,3,4. R1,2,3,4 are balancing resistors.

The output from J1,2,3,4 are each applied to one of the four 300 watt power amplifiers that comprise the two 500 watt power modules with J1,2 applied to module # 1 and J3,4 applied to module #2.

4.3 300 WATT POWER AMPLIFIER

The schematic of the 300 Watt power amplifier is shown in Figure 4.3.

The amplifier consists of 4 MOS FET transistors, Q11, 12, 13, 14. The transistors are combined to form two push/pull pairs (Q11, 12 and Q13, 14) that are driven in parallel.

The input signal is split into two 180 degree out-of-phase signals in the Input Power Splitter comprised of T1 and T2. The two transformers form a 4:1 broadband transformation network with balanced outputs.

In the gate of each FET is a resistive/capacitive matching network consisting of two parallel connected 4.7 ohm, 1/2 watt resistors, a 10 ohm 2 W shunt resistor and a 1000pF series capacitor. The matching network assures that T1 and T2 are correctly terminated over the entire frequency range and that the input signal to each gate is compensated for high frequency roll-off due to the large input capacitance of the FET. The output from each FET in a push/pull pair is combined in a push/pull combiner (T3, 5 and T5, 6). The supply current is fed to the centertap of T3 and T4 through drain chokes L1 and L2. R70, 71, 72, 73 are part of the push/pull combiners and serve the purpose of dissipating power in case of unbalance between transistor in a push/pull pair. During normal operation only minor unbalance occurs and little power is dissipated. If, however, one FET in a push/pull pair fails, one half of the power output from the other FET will be dissipated in the resistors. At 300 watt total output, or 75 Watt per FET, the maximum dissipation will be 37.5 Watt.

THE ADVANTAGE OF A CONFIGURATION DESCRIBED ABOVE IS THAT THE SYSTEM DOES NOT FAIL DUE TO FAILURE OF ONE OR SEVERAL FETs BUT CAN CONTINUE TO OPERATE AT A REDUCED OUTPUT POWER LEVEL INDEFINITELY.

Failure indication is accomplished by rectifying the voltage across the resistors (VT1 and VT3) and turning on Q16. "On Board" failure indication is done using LEDs (CR13,16) that are turned on by voltage rectification in CR11, 15.

The output from each push/pull pair of FETs (Q11, 12 and Q13, 14) is combined in the output power combiner T7, T8. Combining the 150 watt output from each push/pull pair results in a maximum of 75 watt being dissipated in R78 in case one whole pair fails. Imbalance is detected in CR17 (VT2).

Each FET is biased by applying a dc voltage to its gate. This dc voltage is derived from an 8 V regulated supply (U1, Bias Regulator). Following the Bias Regulator is an emitterfollower, Q15. The output voltage of Q15 can be adjusted over a small range to compensate for gain differences between 300 watt amplifiers. Adjusting the gain by adjusting the bias current is effective only at low bias current levels (Class B or C) and is done when combining two 300 watt amplifiers into a 500 watt module. The output voltage from Q15 is applied to a bias switching and adjustment network. Each FET gate is controlled by an identical network comprised of two potentiometers (R22, 23, R25, 26, R28,29, R31,32) and two transistor switches (Q3,4, Q5,6, Q7,8, Q9,10). The switches permit two bias currents to be independently selected, usually SSB is Class AB with 500 to 800 mA quiescent current per FET and TTY,CW bias is Class B or C with 200 to 250 mA quiescing current per FET. A particular bias is selected by grounding the appropriate input (P7 or P8) - open collector interface being the normal configuration.

Thermal protection is accomplished by a thermistor (R4) mounted underneath the PC board in contact with the heatsink. The thermistor is part of a voltage divider network at the noninverting input to the comparator U2. Increased temperature decreases the resistance of R4 thus decreasing the voltage at U2A,2. When this voltage falls below the voltage at U2A,3, the ouput of U2 goes high and turns on Q1 and Q2 which in turn forced reduction of power output to a safe level. R7 provides hysterisis.

4.4 OUTPUT COMBINER/FILTER

The schematic of the output combiner/filter is shown in Figure 4.4.

The output from Module #1 is combined in the in-phase combiner T1 while the output from Module #2 is combined in the in-phase combiner T3.

The resulting signal is combined, out-of-phase in combiner T2,4. K27,28 form a Transmit/Receive signal switch. The receive signal path is normally open. The transmit signal path is normally opened when PTT is activated.

Both transmit and receive signals are routed through one of 13 bidirectional low pass filters selected by the exciter. A detector at the output connector serves to monitor RF output voltage.

4.5 VSWR DETECTOR

The schematic of the VSWR Detector is shown in Figure 4.5.

The signal from the filter is routed through the VSWR detector before being applied to the load. T1 is the pick-up transformer that creates a voltage across R1 proportional to the forward and reflected power. Balance adjustment is performed using C4 with a pure resistive 50 ohm load connected to the output. CR1 and CR2 are detectors. The

absolute values of the forward (VF) and reflected (VR) voltage are adjusted in the factory under controlled test conditions using R4 and R5 respectively.

4.6 FILTER CONTROLLER

The schematic of the Filter Controller is shown in Figure 4.6.

The Filter Controller decodes 4 bit binary information (FS1,2,3,4) into one of sixteen possible filter control lines. On the output combiner/filter board, the first 6 lines are paired (F1,2 and F3, 4 and F5,6) since only 13 out of the total 16 filters possible are used. The paired combinations cover the frequency range of 1.6 to 4 MHz approximately. U3 is the decoder (4 line to 16 line) U4,5,6 are relay drivers (inverting). A logical "1" on the input turns on the particular relay.

Q1 and CR2,3,4,5,6 form a simple decoder to detect frequencies < 4MHz. Freqency information is used to reduce the power to 150 watt when operating below 4MHz.

PTT information is used to control the T/R relay. CR1, C1 and R8 causes a fast turn on and a delayed turn off of the relays. This is done to assure that relay switching does not occur while RF power is present. Scan information is used to override any filter selection and activate only the 30 MHz filter. This prevents the constant switching of relays while scanning across frequency bands.

A filter disable input is also provided. When pulled low, all filter relays are open.

4.7 P.A. CONTROLLER

The schematic of the PA Controller is shown in Figure 4.7.

The P.A. Controller combines various inputs to generate control signals used for display or for control of the driver and 300W power amps.

Forward (VF) and Reverse (VR) voltage from the VSWR detector is buffered - (U1) and routed to a detector (U2, CR1, 2).

The output from U2 are fast rising but slow delaying in voltages (VFO,VRO) that are representative of the forward and reflected power levels. Decay times are controlled by C22,24. The outputs from U2 are used for different purposes.

VFO and VRO are routed to the METER to display forward/reflected power. VFO and VRO are also fed to the VSWR Indicator, U5. The inverting input to U5 is a selected ratio of VFO while the noninverting input is VRO. Whenever a particular ratio of VFO is exceeded by VRO the corresponding output of U5 goes high and turns on

U13. The front panel LED indicating the particular VSWR being exceeded is lit.

VSWR output A through C corresponds to increasing VSWR ratios. VSWR output is normally used to control the output power (excessive VSWR). The VSWR at which the output power is reduced can be adjusted by R44.

R54, U11 and CR10,11,12,13 form a clamp to prevent flickering of the VSWR LED's when RF power is not present.

In certain applications, VFO is used for ALC purposes. U4 forms the ALC amplifier. The ALC threshold can be changed by 3 potentiometers that together with U12 form the ALC Control. Thus 3 separate power output levels can be independently controlled (U9). (TUNE, LOW POWER, HI POWER).

NOTE: ALC control of the final power output is in conflict with the soft fail concept used on the COM1000. It is rarely used and then only when certain safety measures are implemented.

Overtemperature and balance information from the four 300 Watt power amplifiers are combined in U7. The combined signal is then applied to a logic circuit (U8, U6) that also receives VSWR (excessive) information from U5. Any fault condition results in the STATUS output being pulled low (Q1). Q2 is pulled low when overtemperature is encountered in one or more 300 W power amplifiers.

Bias selection and PTT switching is combined in the PTT SWITCHING circuitry (U8, 9, 11). A particular bias (SSB = Class AB or TTY/CW = Class C) is selected by a low on the corresponding input. The Bias is not turned on until PTT is pulled low. CR6, 7, R20, 21 and C26, 27 form a slow on, fast off circuit in order to delay RF power turn on until the T/R relay has switched.

5.0 TROUBLESHOOTING

5.1 GENERAL

The need for troubleshooting can arise from failure to meet specifications as measured during performance test or from outright failure to operate.

Failure to meet a specification can usually be traced down to a misadjustment and can be corrected following readjustment (7.3 - 7.5).

An operational failure requires monitoring of a number of test points in order to first locate the faulty subassembly and later the faulty component.

The COM 1000B is controlled by the COM 3648 Exciter and powered by the PS248. Therefore, before any troubleshooting is attempted on the COM 1000B, certain inputs should be checked in order to verify that the problem actually is on the COM 1000B. The interconnect wiring diagram, Figure 5.1, identifies useful test points, for example on the terminal strip, where supply voltages or control signals can be observed.

Status LED's on the front panel of the COM 1000B help locate serious problems. A TEMP or BALANCE LED lit points to a problem in a particular 300 Watt module.

Except in very rare cases, the STATUS LED's are activated only by operating the COM 1000B - in the case of the TEMP LED's usually following prolonged operation. A TEMP LED lit under normal ambient temperature conditions usually points towards a faulty fan or severly restricted or blocked air intakes.

Under extreme ambient temperatures a TEMP LED lit does not constitute a problem, but is a safety measure by reducing the output to a safe high ambient temperature operating level.

5.2 INPUT POWER SPLITTER

The input power splitter is easily checked by applying a signal to the input and observing the outputs on a dual trace oscilloscope. All outputs should be terminated in 50 ohm.

The ouputs must be of identical level. A convenient way of testing this is to subtract the two oscilloscope signals, of a pair or to add two out of phase signals from different pairs, the result should be close to zero, not equal to zero, since there will always be some unbalance.

For phase relationships of the four output signals, see Figure 4.2.

5.3 500 WATT MODULE

A 500 Watt module is tested by removing the cover plate and exposing the top and/or bottom 300 Watt power amplifier.

NOTE: Do not operate at full power for a long period of time. Removing the cover disrupts the airflow and causes overheating at full power operation.

If a BALANCE LED has pinpointed the faulty 300 Watt power amplifier, a visual inspection of the amplifier - operated with normal drive signal applied - will further localize the problem. This is done by checking whether one, both or neither one of LED's CR13 or CR16 is lit. The test frequency must be 12-15 MHz since the LEDs will be lit during normal operation at low frequencies.

Each LED points toward a particular push-pull pair and its assiciate circuitry indicating a lack of balance caused by:

A) Difference in input (gate) signal level to an FET caused by the INPUT POWER SPLITTER.

B) Difference in output (drain) signal level form an FET caused by the OUTPUT POWER COMBINER, by a faulty FET or by the Bias circuitry.

C) If neither one of the LED's are lit, the problem is lack of output from or input to a push-pull pair - possible lack of Bias or supply voltage (fuse). Or, though less likely, a problem in the OUTPUT POWER COMBINER.

CR13 is associated with Q13, 14
CR16 is associated with Q11, 12

A problem with the Bias circuitry can be found by DC voltage measurements.

DO NOT PERFORM DC VOLTAGE CHECK WITH DRIVE SIGNAL APPLIED.

Measure the voltage on the collector of Q15 to verify that U1 is operative and regulated voltage is present. The voltage should be 7.5V +/- .5V. Trace the voltage throught the Bias switches Q3, 4, Q5, 6, Q7, 8 and Q9, 10. Verify that the correct bias pots are selected when pulling SSB or TTY/CW low.

Check that Bias voltage is present at the FET gates. Values will vary between devices and depends upon Bias mode (SSB or TTY/CW).

Check that 48V is present at the FET drains. Check fuses.

5.4 OUTPUT COMBINER/FILTER

If the forward power output as observed on the METER is low (or zero) and the current drain as observed on the PS248 Ampere Meters is high, a problem in the Output Combiner/Filter is likely.

Testing the output combiner/filter can be conveniently done by feeding a signal **through the filter** and observing the signal pairs **out of the combiner** on a dual trace oscilloscope (opposite the normal signal flow). As with the Input Power Splitter, the four signals must be terminated.

Selecting a particular filter and varying the frequency across the entire frequency band will test the filter response. Make sure, though, that the oscilloscope bandwidth is sufficiently high to permit such measurement.

5.5 VSWR DETECTOR

The VSWR detector is most conveniently tested in place and at a low power output level starting with an output power of 50 watts into 50 ohm, the following voltages must be measured:

CONDITION	VF	VR	Pout
Load = 50 ohm	1-3V	< .2V	50 watt
Load = OPEN*	2-4V	2 - 4V	N.A.
Load = SHORT*	2-4V	2 - 4V	N.A.

*VF and VR should be approximately equal voltages. Absolute values of VF and VR depend upon test frequency.

5.6 FILTER CONTROLLER

Checking the Filter Controller is most conveniently done by removing the front panel and placing the Filter Controller board on an extender card to gain access to the inputs.

The logic table below will aid in troubleshooting:

PIN #:	6	C	3	B			
INPUT:	FS1	FS2	FS3	FS4	SELECT FILTER #	TEST PIN # (="0")	TEST PIN # 22
	0	0	0	0	1	S,15	0
	1	0	0	0	2	T,16	0
	0	1	0	0	3	U,17	0
	1	1	0	0	4	V,18	0
	0	0	1	0	5	W,19	0
	1	0	1	0	6	X,20	1
	0	1	1	0	7	Y,21	1
	1	1	1	0	8	J,6	1
	0	0	0	1	9	K,9	1
	1	0	0	1	10	L,10	1
	0	1	0	1	11	M,11	1
	1	1	0	1	12	N,12	1
	0	0	1	1	13	P,13	1
	1	0	1	1	14	R,14	1
	0	1	1	1	15	D,4	1
	1	1	1	1	16	E,5	1

NOTE: Filter is selected when TEST pin = "0" (< .5V).
All other pins = "1" (48V).

SCAN (Pin #2) = "0" selects filter #16

PTT = "0" sets pin #F = "0"

To generate the control code (FS1,2,3,4), the DDM 3848 should be connected.

5.7 PA CONTROLLER

As with the Filter Controller, the PA Controller is most conveniently tested by removing the front panel and placing the PA controller on an extender card, although a considerable degree of troubleshooting can be done by grounding certain terminals on the terminal strips while observing the Front Panel LED's. This holds true for the TEMP LED's and the BALANCE LED's which should be turned on by grounding the appropriate terminals on the terminal strips (see interconnect wiring diagram, Fig. 5.1).

The VSWR Indicator circuit can only be fully tested in a complete COM3648/COM1000 system operating into a 50 ohm load. The 50 ohm load is required to correctly check the METER reading at various power levels.

Note that the METER reading is dependent upon frequency. Accuracy should be within 10% full scale.

A 25 ohm or a 100 ohm load can be used to test the 2-1 VSWR indicator. Full power operation is not required.

PTT switching requires a particular Bias (SSB or TTY/CW) to be selected by applying a low to the appropriate input (Pin #N or P). A low on the PTT input must result in a low on the appropriate Bias output (Pin #W or U).

6.0 REPAIR AND ALIGNMENT

6.1 GENERAL

Replacing a component on the FILTER CONTROLLER or the PA CONTROLLER is easily done since the boards are plug-in.

The FILTER CONTROLLER requires no alignment. The PA CONTROLLER may require adjustment of the VSWR at which output power is reduced and in case the ALC circuit is used, R13, 14, 15, may need to be adjusted.

Replacing a component on the 300 Watt power amplifier requires disassembly of the 500 Watt module. Alignment of a 300 Watt power amplifier can be done in the COM 1000B. Access is easy and requires only removal of the cover plate on the 500 Watt module.

6.2 DISASSEMBLY INSTRUCTIONS

Figure 6.2 shows the procedure for disassembling the 500 Watt power amplifier module and the 300 watt amplifier.

PROCEDURE:

STEP 1 Unscrew six #6-32 x 3/8 lg., BHD screws and remove top panel/bottom panel.

STEP 2 Locate and unsolder the fan wires, unscrew the four #6-32 x 1/4 RHD screws and remove the rear panel.

STEP 3 Disconnect the wire harness set unit on back and unscrew the four #6-32 x 1/4 RHD screws, remove the front panel.

STEP 4 Lay the unit on it's side and unscrew the eight #6-32 x 3/8 BHD screws. Remove the side panel.

Follow the same instructions for the other side panel.

STEP 5 To disassemble the 300 Watt Power Amp., proceed as follows:

STEP 6 Remove Threaded Thermal Switch.

STEP 7 Remove eight #4-40 x 1/2 socket head screws from Q11 to Q14.

STEP 8 Remove the #6-32 x 3/8 socket head screw from R78.

STEP 9 Remove eight #4-40 x 1/2 BHD and remove the PC board.

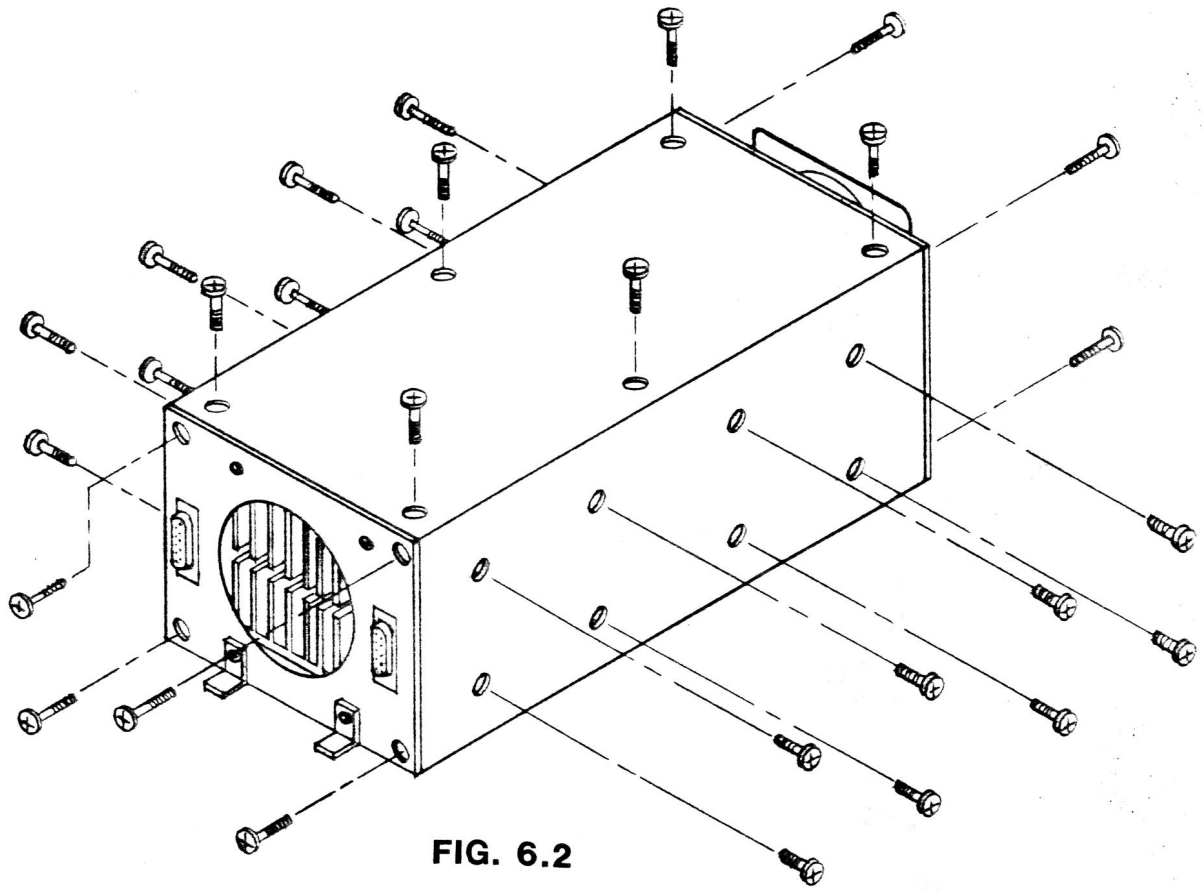


FIG. 6.2

6.3 ALIGNMENT, 300 WATT POWER AMPLIFIER

6.3.1 General

The 300 watt power amplifier can be adjusted in the COM 1000B as part of the complete system. Adjustments to perform are bias current and gain (individual transistor gain and overall gain).

6.3.2 Bias Current

Bias current is factory set and needs only to be readjusted following replacement of a MOS FET transistor. Bias current is measured **without** drive signal applied.

Always start with the Bias Control set fully CCW (No bias voltage)

The normal bias currents are listed below.

Q11 - 14 : 200mA, Class C
500mA, Class B
800mA, Class AB

The location of the Bias control is shown below:

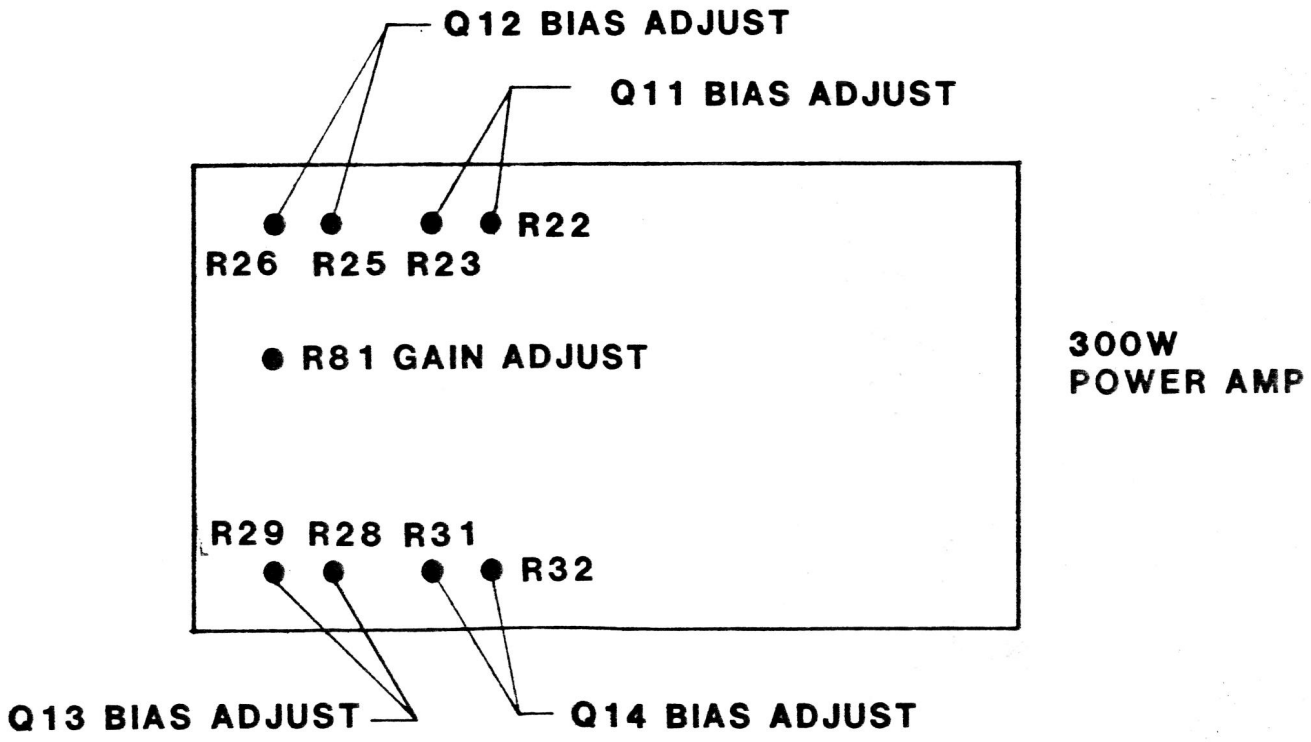


FIG. 6.3

To set Bias Current for Q13 and Q14:

1. Connect amperemeter in place of jumper E1 (between J3 and J4).
2. Select the desired class of operation by grounding P7 or P8.
3. Adjust for desired current using potentiometers indicated below:

	Q13	Q14
P7 Grounded -->	R29	R32
P8 Grounded -->	R28	R31

To set Bias Current for Q11 and Q12

1. Connect amperemeter in series with 48V supply wire.
2. Connect jumper E1 between 48V supply wire and J3 (48V needs to be applied to J3 in order to power U1 and associated circuitry).
3. Select the desired class of operation by grounding P7 or P8.
4. Adjust for desired current using potentiometers indicated below:

	Q11	Q12
P7 Grounded -->	R23	R26
P8 Grounded -->	R22	R25

6.3.3 Gain Adjustment (Each MOS FET)

Following adjustment of bias current a slight gain adjustment (by changing bias current) may be performed. **This adjustment is only needed for Class C Bias operation.**

To equalize the gain of each MOS FET:

1. Apply a low frequency drive signal (4MHz for example) for a power output of 30 - 50 watts.
2. Using an oscilloscope, observe the signal on the drain of Q11 - 14.
3. Select the **lowest** signal as reference and adjust the bias current of the remaining 3 MOS FETs so that the signal levels match in amplitude.

NOTE: Exact level match is not necessary and may not be possible due to variations in gate drive level due to the input power splitter. Matching within 10% is usually OK.

Be careful with the oscilloscope probe and ground clip. **AVOID PROBING THE GATE. MOS FET GATES ARE EXTREMELY HIGH IMPEDANCE** AND STRAY PICK-UP CAN CAUSE OSCILLATION AND DAMAGE THE TRANSISTORS.

6.3.4 Gain Adjustment (Overall)

The gain adjustment serves the purpose of correcting for minor gain differences between 300 watt power amplifiers. Any difference in power output is dissipated in the output combiner. Optimum efficiency requires minimum difference in output power.

To perform gain adjustment (each 500 Watt module):

1. Terminate both 300 watt amplifiers in a 50 ohm load.
2. Adjust the input drive level for a power output of approximately 100 watts at the desired operating frequency (from each 300 watt power amplifier). If the output power is measured simultaneously using two wattmeters, make sure the wattmeters are matched reasonably well.
3. **Reduce** the power on the 300 watt power amplifier with the **highest** output power to match the other amplifier output using R81.

If the power cannot be reduced sufficiently, **increase** the power on the **other** 300 watt amplifier.

NOTE: The gain adjust is most effective with Class C biasing. The range has deliberately been kept small to avoid drastic differences in bias currents between 300 watt power amplifiers in case R81 gets adjusted incorrectly.

Power output differences of 5-10% are OK. If optimum matching is desired, the bias adjustment of the individual MOS FETs should be repeated for both amplifiers, and if necessary, each MOS FET in the **highest** output amplifier should be biased at slightly lower currents.

6.4 ALIGNMENT, P.A. CONTROLLER

6.4.1 GENERAL

The PA Controller must be aligned in the COM 1000B while the COM 1000B is operating as part of a complete system.

6.4.2 VSWR CIRCUITRY

Adjustment of R54 is performed first. R54 is adjusted to prevent the FRONT PANEL VSWR LED's from flickering when no signal is transmitted.

Adjust as follows:

Apply drive for a power output of approximately 30 Watts. Starting with R54 in its fully CCW position, turn R54 clockwise until the VSWR

LED turns off. Increase the power output until the VSWR LED turns on again. The power output must be less than 50 watts.

Adjustment of R44 is done to select the VSWR at which power is reduced. Clockwise rotation of R44 decreases the VSWR (from, for example, 4:1 to 3:1) at which the power is reduced. Unless absolutely required, this adjustment should not be performed "in the field".

Without a load that presents the correct VSWR (for example, 4:1) at which power should be reduced, the correct adjustment cannot be performed. However, the system can be tested by applying drive for a power output of approximately 100 Watt and then remove the load. Excessive VSWR should be indicated.

Increasing the drive to the equivalent of 1000 Watt output power should result in a minor increase in supply current up to a certain point, indicating that power reduction takes place.

If, during actual operation, a VSWR of 3:1 or worse is encountered, adjustment can, of course, be performed.

6.4.3 ALC CIRCUITRY

In the case where the ALC circuitry is used, the 3 different power levels need adjustment.

The controls, R13, 14, 15 are activated as follows:

TUNE input (Pin #12) low --> R13 (TUNE POWER)

LO power input (Pin #13) low --> R14 (LOW POWER)

TUNE and LOW Power input hight --> R15 (NORMAL POWER)

The adjustment is performed by applying the drive level required for 1000 watt output power into a 50 ohm load.

First adjust R15 to the point where the power drops approximately 100 watts. Increase the drive level by 6dB and verify that the output power does not exceed 1000 watts. If necessary, readjust for 1000 watts. Reduce the drive level by 6dB, back to normal drive level.

Activate the LOW PWR control R14 and adjust for desired LOW power output level.

Finally, activate the TUNE control R13 and adjust for desired TUNE power.

SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
		VTS			

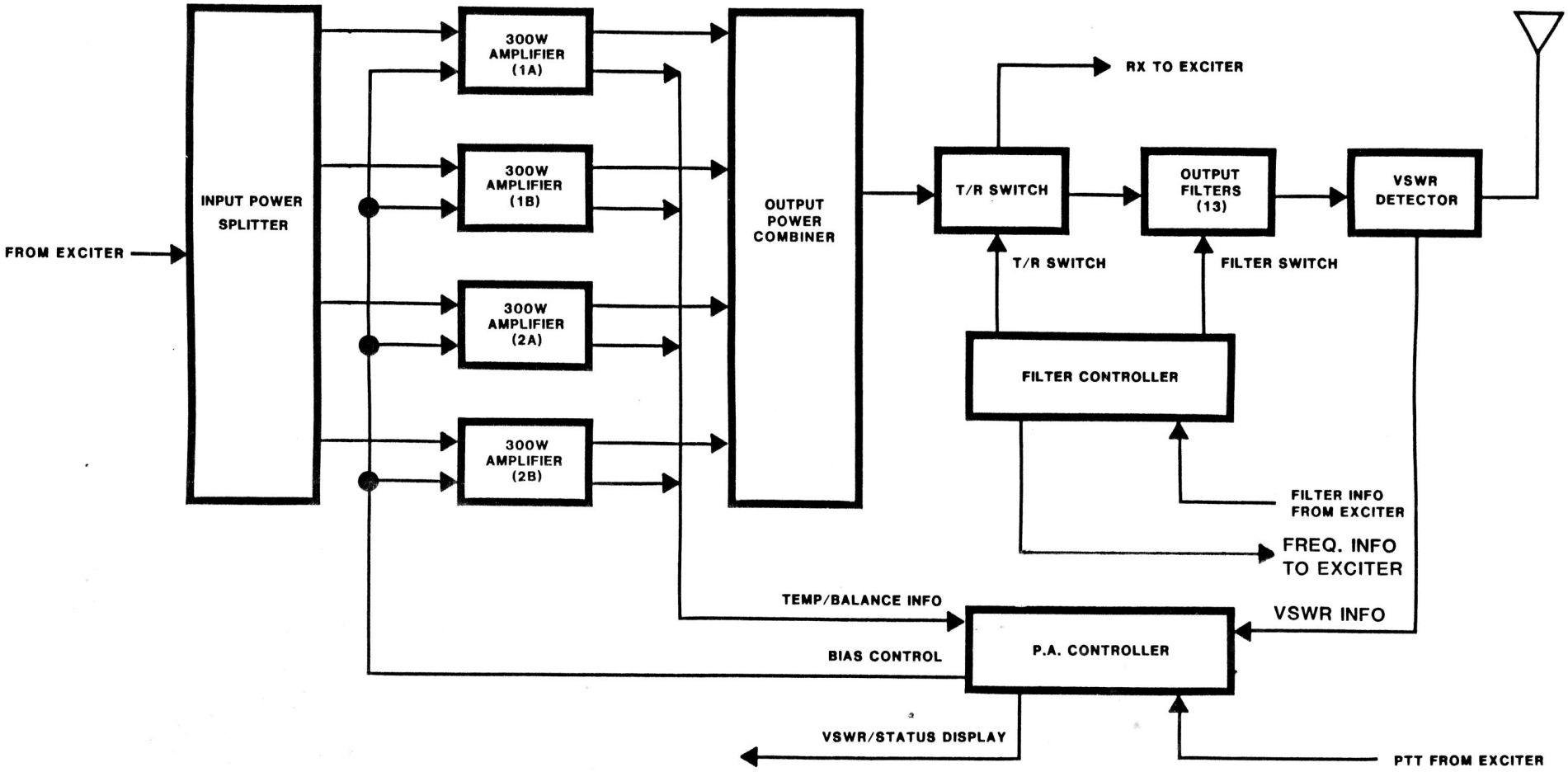


FIG. 4.1

QTY	NEXT ASSY.	USED ON

DRAWN Tony 7-23-84
CHECKED 7/23-84
APPROVALS
MFG
QA

intech INTECH INCORPORATED SANTA CLARA CALIFORNIA, 95050

TITLE: COM 1000 BLOCK DIAGRAM

SIZE	CODE IDENT NO	DRAWING NO	REV
C	33967	9-159138	A

SCALE | SHEET 1 OF 1

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

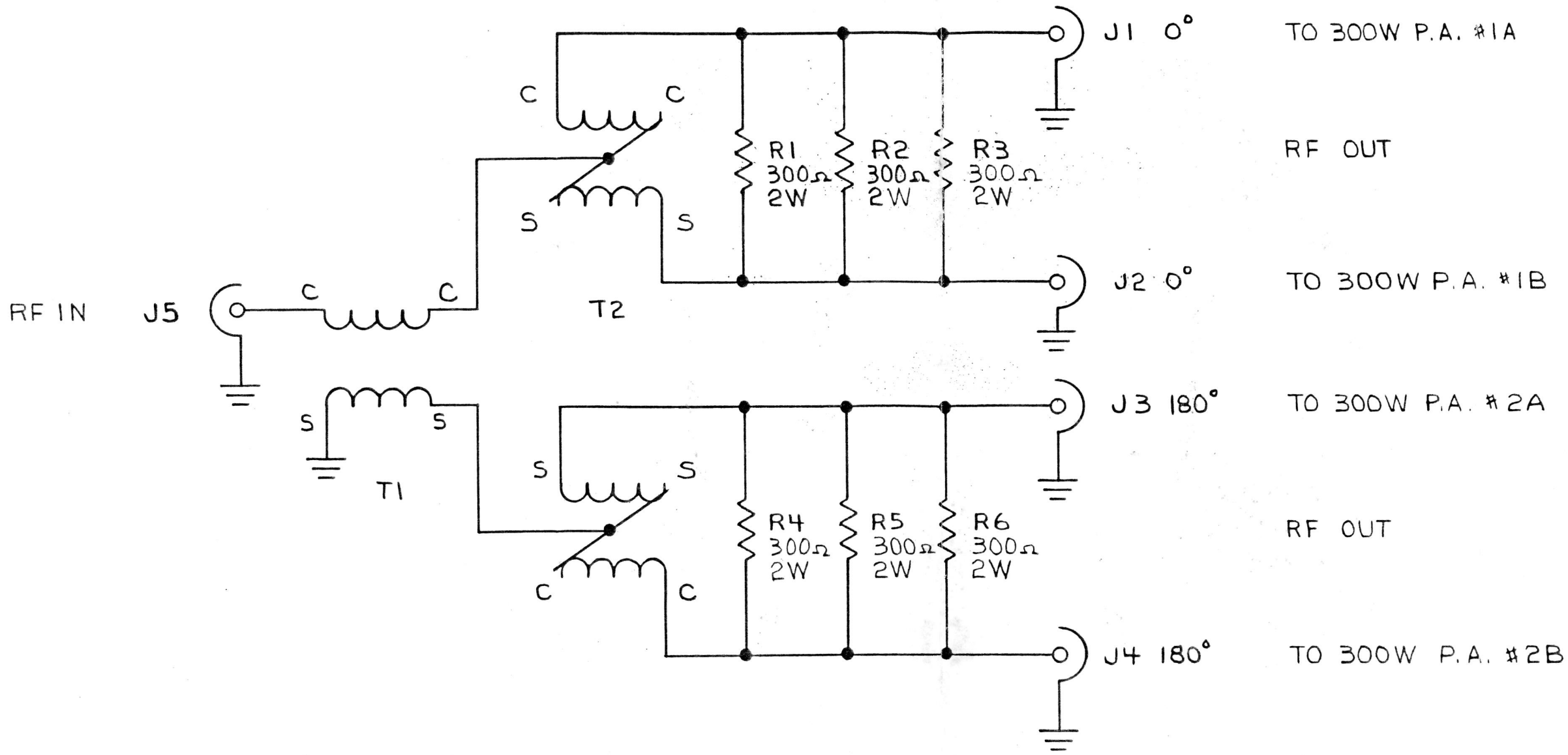


FIG. 4.2

QTY	NEXT ASSY	USED ON
1		COM 1000

DRAWN P. Tong - 5-24-84
CHECKED [illegible] 5/29/84
APPROVALS: ENG [illegible]; MFG; QA

intech
INTECH INCORPORATED
SANTA CLARA
CALIFORNIA, 95050

TITLE
INPUT POWER SPLITTER
SCHEMATIC

SIZE	CODE IDENT NO	DRAWING NO	REV
B	33967	1-159098	A

SCALE | SHEET 1 OF 1

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
C	7/02/84	Eng UPDATE			
D	11/15/84	ECO # 2607			

VDD2
R5 10K
R8 10K
R10 82K
R11 82K
CR1 IN4148
BIAS REGULATOR
C2 .015
IN
U1 LM317 ADJ
OUT
8V(NOM)
Q15 2N2222
CR2 IN4148
R9 240
R11 1.2K
R80 5.6K
CR18 IN4148
C31 .015
C6 .1
R6 1.2K
GAIN ADJUST
R81 1K CW
E7 ①
P10
R2 10K
R3 1.0K
C7 .1
LM358
Q1 2N2222
C1 .015
R1 10K
U2A
R12 10K
THERMAL PROTECTION
R14 10K
R16 33
C8 .015
R7 470K
C3 .015
R4 10K
R13 10K
TEMP P9
Q2 2N2222
R15 10K
48VDC P4
VDD 1
GND P5
E8
+C4 1000µf
48VDC P3
VDD 2
GND P6
+C5 1000µf
TTY/CW P8
SSB P7
5
6
U2B ①
7

R18, 10Ω
Q11 BIAS ADJ.
R22 10K CW
R23 10K CW
R34 10K
CR3 IN4148
R50 10K
CR4 IN4148
C9 .015
R35 10K
Q3 2N2222
Q4 2N2222
R24 47K
R51 47K
R36 47K
R46 47K
Q11,G

R19 10Ω
Q12 BIAS ADJ.
R25 10K CW
R26 10K CW
R37 10K
CR5 IN4148
R52 10K
CR6 IN4148
C10 .015
R38 10K
Q5 2N2222
Q6 2N2222
R27 47K
R53 47K
R39 47K
R47 47K
Q12,G

R20 10Ω
Q13 BIAS ADJ.
R28 10K CW
R29 10K CW
R40 10K
CR7 IN4148
R54 10K
CR8 IN4148
C11 .015
R41 10K
Q7 2N2222
Q8 2N2222
R30 47K
R55 47K
R42 47K
R48 47K
Q13,G

R21 10Ω
Q14 BIAS ADJ.
R31 10K CW
R32 10K CW
R43 10K
CR9 IN4148
R56 10K
CR10 IN4148
C12 .015
R44 10K
Q9 2N2222
Q10 2N2222
R33 47K
R57 47K
R45 47K
R49 47K
Q14,G

8V
R95 10K
C32 .015
8V
R96 10K
C33 .015

RF IN
C39 68PF
INPUT PWR SPLITTER
T1
T2
E1
E2
R58 4.7, ½W
R60 4.7, ½W
R62 4.7, ½W
R64 4.7, ½W
R59 4.7, ½W
R61 4.7, ½W
R63 4.7, ½W
R65 4.7, ½W
R82 10 2W
C13 .001
R86 10 2W
C14 .001
R87 10 2W
C15 .001
R88 10 2W
C16 .001
R68 100K
R66 100K
R69 100K
R67 100K
Q11 MRF 150
Q12 MRF 150
Q13 MRF 150
Q14 MRF 150
RF AMP

VDD1
F1, 10A
C17 .015
C19 .001
CR 15 IN4148
CR16
R83 470
R84 10K
L1
R70 24Ω 2W
R72 24Ω 2W
C38 .47
R74 24Ω 2W
R76 24Ω 2W
C28 .001
C26 10pf
CR12 IN4148
VT1
R85 10K
C29 .001
C34 ①
C21 .01
T3
T5
C22 .01
C35 ①
OUTPUT PWR COMB.
R78 10PF
12.5Ω, 75W
T7
T8
RF OUT
C36 ①
C23 .01
CR17 IN4148
VT2
R89 10K
C41 .001
T4
T6
C24 .01
C37 ①
C27 10pf
CR14 IN4148
VT3
CR11 IN4148
CR 13
R90 10K
R91 470
L2
R71 24Ω 2W
R73 24Ω 2W
R75 24Ω 2W
R77 24Ω 2W
R92 10K
C30 .001
VDD2
F2 10A
C18 .015
C20 .001
C42 .47
C25 .001

VT1
VT2
VT3
R93 10K
Q16 2N2222
R94 10K
P11 BALANCE

REFERENCE DESIGNATIONS	
USED	DELETED
C1-42	
CR1-18	
E1-2, 8, 7	E3-6
F1-2	
U1-2	
L1-2	
P1-10	
Q1-16	
R1-96	R17
T1-8	

NOTES: U.O.S
① NOT USED
② FOR STANDARD USAGE
R70 & R72 REPLACE BY ONE RES. 12.5Ω, 20W INTECH P/N 2550-0333.
R74 & R76 REPLACE BY ONE RES. 12.5Ω, 20W INTECH P/N 2550-0333.
R71 & R73 REPLACE BY ONE RES. 12.5Ω, 20W, INTECH P/N 2550-0333.
R75 & R77 REPLACE BY ONE RES. 12.5Ω, 20W, INTECH P/N 2550-0333.

FIG. 4.3

QTY	NEXT ASSY	USED ON
2		COM500
4		COM1000

UNLESS OTHERWISE SPECIFIED: ALL CAPACITORS ARE IN MICROFARADS; ALL RESISTORS ARE 1/4W ±5% AND ARE IN OHMS; Ø - INDICATES VALUE SHOWN OPTIMUM VALUE SELECTED AT FACTORY TEST; (XXX) TYPICAL SIGNAL LEVEL; XX - P.C. BOARD PIN CONNECTOR DESIGNATION; P.C. BOARD MTG. TERMINAL DESIGNATION; COMPONENT LEAD DESIGNATION; ADJUSTABLE ADJUST

	DRAWN	DATE
	CHECKED	3/01/84
	ENG	
	MFG	
	QA	

intech INTECH INCORPORATED SANTA CLARA CALIFORNIA, 95050

TITLE: SCHEMATIC, 300W.POW.AMP-COM1000B

SIZE	CODE IDENT NO	DRAWING NO	REV
D	33967	1-158995	E

SCALE N/A SHEET 1 OF 1

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
B	11-14-84	ENG. UPDATE			

RF IN 300W P.A. #1A — J3
RF IN 300W P.A. #1B — J4
RF IN 300W P.A. #2A — J5
RF IN 300W P.A. #2B — J6

R1 100 250W
R2 12.5 250W
R3 100 250W

T1 T2 T3 T4

OUTPUT COMBINER

48V T/R

CR15 IN4002
R4 470 2W
K27 K28

N.C. N.O.

T/R RELAY

J2 RECEIVE OUTPUT

48V
C355 .015μf
L67
C356 .015μf

	K26	K24	K22	K20	K18	K16	K14	K12	K10	K8	K6	K4	K2
TO	K25	K23	K21	K19	K17	K15	K13	K11	K9	K7	K5	K3	K1
	C325 15	C300 18	C275 33	C250 56	C225 82	C200 120	C175 270	C150 180	C125 82	C100 56	C75 33	C50 15
	C324 15	C299 18	C274 33	C249 56	C224 82	C199 120	C174 270	C149 180	C124 82	C99 56	C74 33	C49 15	C24 22
	C323 15	C298 18	C273 33	C248 56	C223 82	C198 120	C173 270	C148 180	C123 82	C98 56	C73 33	C48 15	C23 22
	C322 N.U	C297 N.U	C272 10	C247 47	C222 82	C197 120	C172 270	C147 180	C122 82	C97 56	C72 33	C47 15	C22 N.U
	C321 N.U	C296 N.U	C271 N.U	C246 N.U	C221 N.U	C196 N.U	C171 N.U	C146 10	C121 47	C96 27	C71 15	C46 15	C21 N.U
	L52 5T .37	L48 6T .54	L44 6T .78	L40 8T 1.25	L36 10T 1.73	L32 13T 2.4	L28 19T 5.04	L24 15T 3.5	L20 11T 1.95	L16 9T 1.4	L12 7T .95	L8 7T .64	L4 5T .45
	C320 47	C295 56	C270 82	C245 120	C220 180	C195 270	C362 470	C359 330	C120 220	C95 150	C70 100	C45 68	C20 56
	C319 47	C294 56	C269 82	C244 120	C219 180	C194 270	C170 470	C145 330	C119 220	C94 150	C69 100	C44 68	C19 56
	C318 47	C293 56	C268 82	C243 120	C218 180	C193 270	C169 470	C144 330	C118 220	C93 150	C68 100	C43 68	C18 56
	C317 39	C292 56	C267 82	C242 120	C217 180	C192 220	C168 470	C143 330	C117 220	C92 150	C67 100	C42 68	C17 56
	C316 N/U	C291 47	C266 68	C241 150	C216 150	C191 180	C167 330	C142 330	C116 100	C91 100	C66 68	C41 47	C16 N/U
	L51 6T .45	L47 7T .65	L43 7T .94	L39 9T 1.5	L35 11T 2.07	L31 14T 2.9	C361 470	C141 120	L19 12T 2.34	L15 10T 1.67	L11 8T 1.13	L7 6T .76	L3 6T .53
	C315 47	C290 56	C265 100	C240 150	C215 180	C190 270	C166 330	C140 330	C115 220	C90 150	C65 100	C40 68	C15 56
	C314 47	C289 56	C264 100	C239 150	C214 180	C189 270	C165 470	C139 330	C114 220	C89 150	C64 100	C39 68	C14 56
	C313 47	C288 56	C263 100	C238 150	C213 180	C188 270	C164 470	C138 330	C113 220	C88 150	C63 100	C38 68	C13 56
	C312 47	C287 56	C262 100	C237 150	C212 180	C187 270	C163 470	C137 330	C112 220	C87 150	C62 100	C37 68	C12 56
	C311 10	C286 68	C261 18	C236 56	C211 180	C186 220	C162 470	C136 220	C111 150	C86 150	C61 100	C36 68	C11 15
	L50 6T .45	L46 7T .65	L42 7T .94	L38 9T 1.5	L34 11T 2.07	L30 14T 2.9	L26 21T 6.04	L22 16T 4.2	L18 12T 2.34	L14 10T 1.67	L10 8T 1.13	L6 6T .76	L2 6T .53
	A1 A2	B1 B2	C1 C2	D1 D2	E1 E2	F1 F2	G1 G2	H1 H2	J1 J2	K1 K2	L1 L2	M1 M2	N1 N2

FL 16	FL 14	FL 12	FL 10	FL 8	FL 5,6	FL 1,2	FL 3,4	FL 7	FL 9	FL 11	FL 13	FL 15
24.69 - 30.0 MHz	17.51 - 20.53 MHz	11.77 - 14.17 MHz	7.95 - 8.91 MHz	5.71 - 6.67 MHz	3.17 - 4.61 MHz	1.89 - 2.21 MHz	2.21 - 3.17 MHz	4.61 - 5.71 MHz	6.67 - 7.95 MHz	8.91 - 11.77 MHz	14.17 - 17.51 MHz	20.53 24.69 MHz

TO SHEET 2 OF 2

FIG. 4.4

UNLESS OTHERWISE SPECIFIED:
ALL CAPACITORS ARE IN PICOFARADS
ALL RESISTORS ARE 1/4 W, 5% AND ARE IN OHMS
X = AVERAGE VALUE SHOWN, OPTIMUM VALUE SELECTED AT FACTORY TEST
TP = TYPICAL SIGNAL LEVEL
P1 = P.C. BOARD PIN CONNECTOR NUMBER
P2 = P.C. BOARD WIRING TERMINAL NUMBER
C = COMPONENT LEAD DESIGNATION
DO NOT INSTALL

ALL INDUCTOR ARE IN uH

QTY	NEXT ASSY	USED ON

DRAWN P. Terry 5-31-84
CHECKED [illegible] 11/84
ENG
APPROVALS
MFG
QA

intech INTECH-INCORPORATED SANTA CLARA CALIFORNIA, 95050

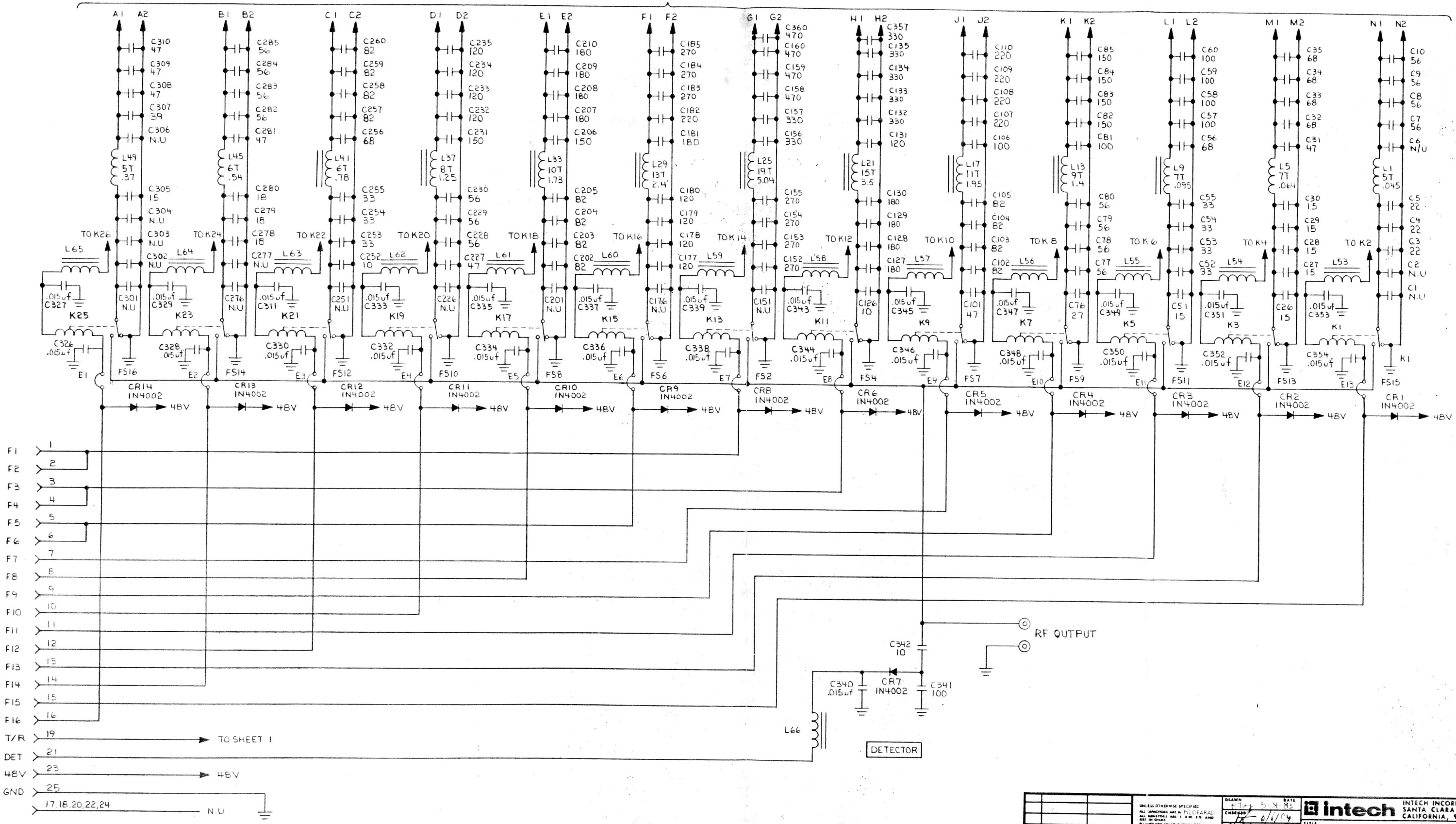
TITLE: FILTER BOARD - SCHEMATIC COM 1000

SIZE	CODE IDENT NO	DRAWING NO	REV
D	33967	1-159101	B

SCALE — SHEET 1 OF 2

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

FROM SHEET 1 OF 2



QTY	NEXT ASSY	USED ON
1	B-159101	COM 1000

UNLESS OTHERWISE SPECIFIED
ALL CAPACITORS ARE IN PICOFARADS
ALL RESISTORS ARE 1/4W ±5% AND ARE IN OHMS
R = EIA/ABC VALUE SHOWN, OPTIMUM VALUE SELECTED AT PACKOUT TEST
(SX) TYPICAL SIGNAL LEVEL
(PC) P.C. BOARD PIN CONNECTOR NUMBER
P.C. BOARD WIRING TERMINAL NUMBER
COMPONENT LEAD DESIGNATION
SCREWDRIVER ADJUST

	DRAWN	DATE
	[illegible]	5-31-85
CHECKED		6/1/84
		7/09/84
MFG		
QA		

APPROVALS

intech INTECH INCORPORATED SANTA CLARA CALIFORNIA, 95050

TITLE: FILTER BOARD - SCHEMATIC COM 1000

SIZE	CODE IDENT NO	DRAWING NO	REV
D	33967	1-159101	B

SCALE | SHEET 2 OF 2

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

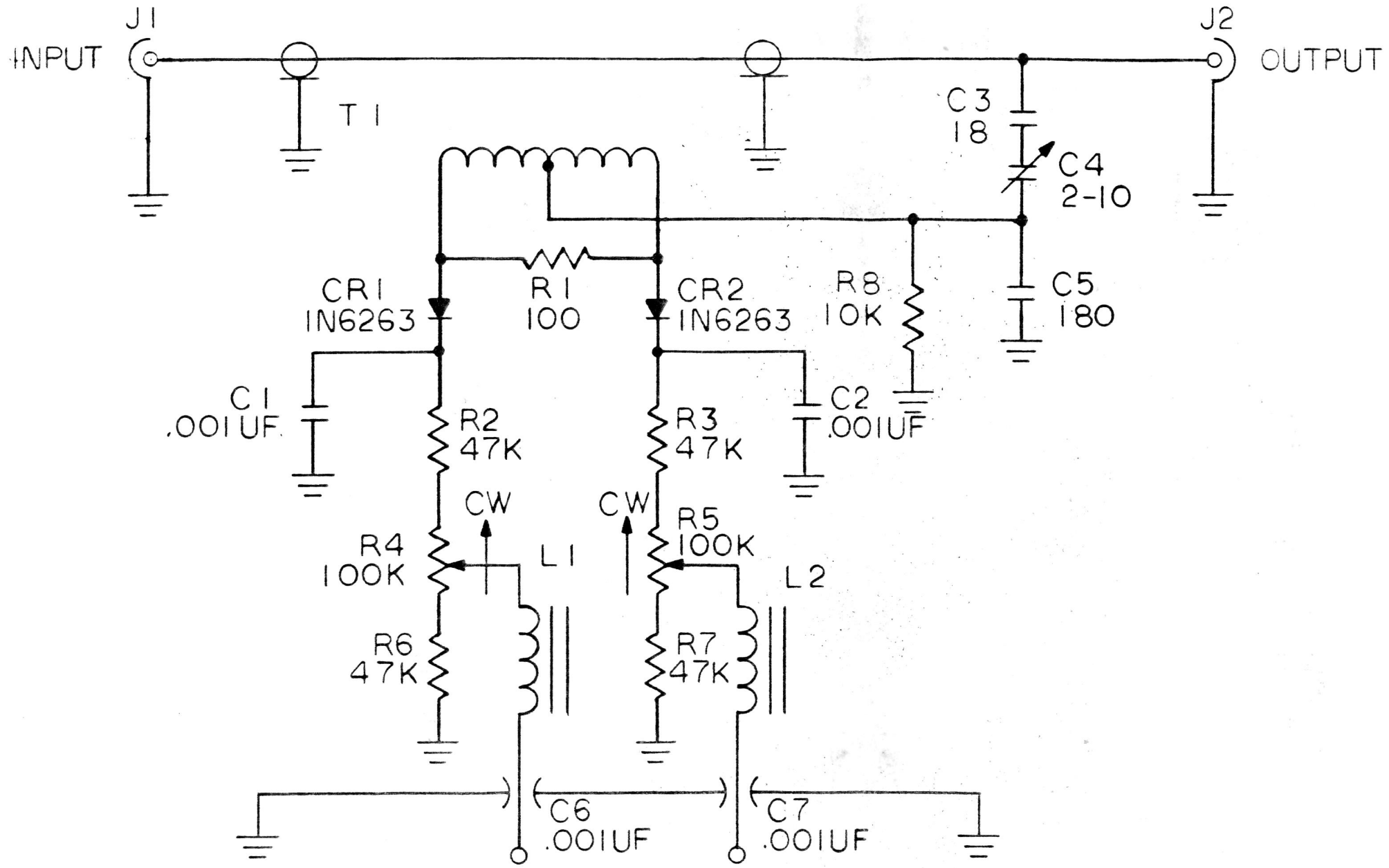


FIG. 4.5

QTY	NEXT ASSY	USED ON
1		COM500
1		COM1000

UNLESS OTHERWISE SPECIFIED
ALL CAPACITORS ARE IN P.C.O FARADS
ALL RESISTORS ARE 1 4W, 5%, AND ARE IN OHMS.

DRAWN P. Tong DATE 7-24-84
CHECKED 7/27/84
APPROVALS
ENG
MFG
QA

intech
INTECH INCORPORATED
SANTA CLARA
CALIFORNIA, 95050

TITLE
VSWR DETECTOR
SCHEMATIC

SIZE	CODE IDENT NO	DRAWING NO	REV
B	33967	1-159139	A

SCALE | SHEET 1 OF 1

REVISIONS					
STA	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
B	11-2-84	ENG UPDATE	PJ		

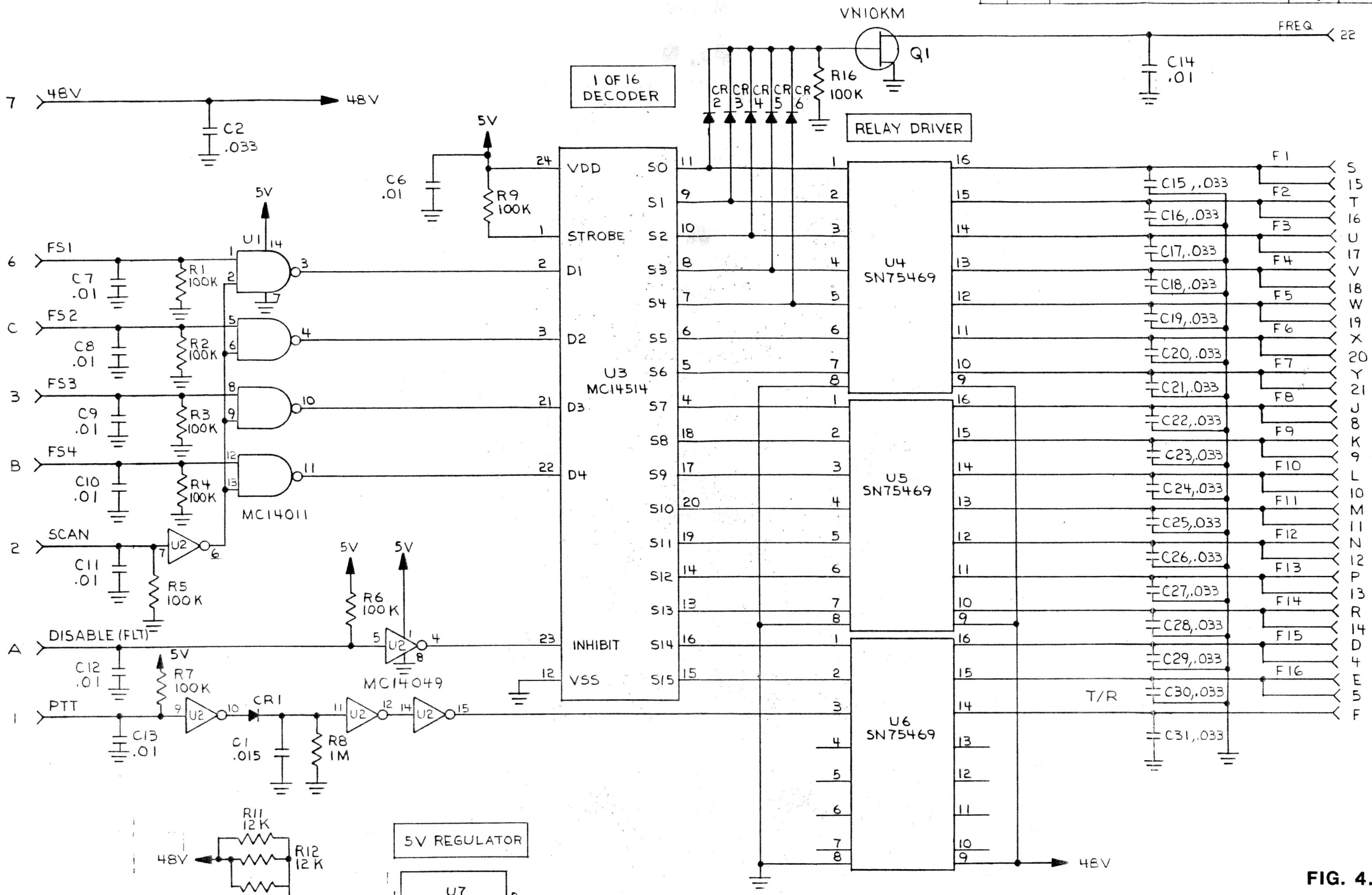


FIG. 4.6

QTY	NEXT ASSY	USED ON
1	3-159094	Com 1000

UNLESS OTHERWISE SPECIFIED
ALL CAPACITORS ARE IN MICROFARADS
ALL RESISTORS ARE 1 4W, 5%, AND ARE IN OHMS
ALL DIODES ARE IN4148

APPROVALS		DATE
DRAWN	PJ	5-17-84
CHECKED		5-25-84
ENG		6/1/84
MFG		
QA		

intech
INTECH INCORPORATED
SANTA CLARA
CALIFORNIA, 95050

TITLE: FILTER CONTROLLER

SIZE	CODE IDENT NO	DRAWING NO	REV
C	33967	1-159094	B

SCALE | SHEET | OF

84708
NORTHWEST DESIGN PRODUCTS INC
REORDER NO. 1000C

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
B	11-2-84	ENG UPDATE			

ALC CONTROL

ALC SWITCHING

PTT SWITCHING

ALC AMP

VSWR INDICATOR

LED SUPPLY

REFERENCE DESIGNATIONS	
USED	DELETED
C1-47	
CR1-15	1,2,14
R1-70	
Q1-2	
U1-14	

NOTES: U.O.S
1. NOT USED
2. TO BE SELECTED

FIG. 4.7

UNLESS OTHERWISE SPECIFIED
ALL RESISTORS ARE IN OHMS 1/4W 5% AND ALL CAPACITORS ARE IN MFD 50V
R & C VALUE SHOWN OPTIMUM VALUE SELECTED AT FACTORY TEST
TYPICAL SIGNAL LEVEL
P.C. BOARD PIN CONNECTION DESIGNATION
P.C. BOARD WIRING TERMINAL DESIGNATION
COMPONENT LEAD IDENTIFICATION (CATHODE/ANODE ARROW)

QTY	NEXT ASSY	USED ON

DRAWN	P. Ng	DATE 7-12-84
CHECKED	[illegible]	7-27-84
ENG	[signature]	
MFG		
QA		

intech — INTECH INCORPORATED, SANTA CLARA, CALIFORNIA, 95050

TITLE: P. A. CONTROLLER COM 1000

SIZE	CODE IDENT NO	DRAWING NO	REV
D	33967	1-159126	C

SCALE | SHEET | OF

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
B	11-84	ENG. UPDATE, REDRAW SH 2	P Tong	JR.	

FRONT PANEL

REAR PANEL

TO PA CONTROLLER ON SHEET 2

BALANCE 1A
BALANCE 1B
BALANCE 2A
BALANCE 2B
SSB
TTY/CW
TEMP 1A
TEMP 1B
TEMP 2A
TEMP 2B
LOW PWR
BIAS SW

TS1A
TS1B
TS2A
TS2B
TS3

(GRY)
(VIO)
(WHT/BLU)
(YEL)
(RED)

SSB
TTY/CW
TEMP 1A
BALANCE 1A
48V-1

SSB
TTY/CW
TEMP 1B
BALANCE 1B
48V-1

SSB
TTY/CW
TEMP 2A
BALANCE 2A
48V-2

SSB
TTY/CW
TEMP 2B
BALANCE 2B
48V-2

500W P.A. (#1) [2]
500W P.A. (#2) [2]

1A
1B
2A
2B

P3A
P3B
FAN
THERMAL SWITCH
S1A
S1B
S2A
S2B

TO FILTER CONTROLLER ON SHEET 2

OUTPUT COMBINER FILTERS

TO PA CONTROLLER ON SHEET 2

VR
VF
GND

VSWR DETECTOR

TX OUT

RX OUT J2

TX IN J1

POWER J3

(RED)
(RED)
48V-1
48V-2
(BLK) GND
(BLK) GND

40W DRIVER [1]

22 ○○○○○○○○○○ 12
11 ○○○○○○○○○○ 1
RF IN
LOW PWR
BIAS SW
15V
48V
RF OUT

INPUT COMBINER

15V REGULATOR
C1 68
15V
48V-3
C2 .68
CR1 IN2979
R1 16 25W
R3 510 2W
CR2 MR501
CR3 MR501
S1
(RED)
(RED)
48V-1
48V-2
K1
CR4 MR501
R2 270 10W
CR5 MR501
CR6 MR501

FIG. 5.1

QTY	NEXT ASSY	USED ON
1		COM1000

DRAWN T.H. 5-21-84
CHECKED J.R. 5.25.84
ENG
MFG
QA
APPROVALS

intech INTECH INCORPORATED SANTA CLARA CALIFORNIA, 95050

TITLE: WIRING DIAGRAM COM1000

SIZE	CODE IDENT NO	DRAWING NO	REV
D	33967	5-159097	B

SCALE | SHEET 1 OF 2

REVISIONS					
SYM	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

FRONT PANEL

REAR PANEL

FILTER CONTROLLER

48-3 → NOT CONNECTED

F1	7
F2	S
F3	T
F4	U
F5	V
F6	W
F7	X
F8	Y
F9	J
F10	K
F11	L
F12	M
F13	N
F14	P
F15	R
F16	D
N.U	E
GND	H
	Z

15	F1
16	F2
17	F3
18	F4
19	F5
20	F6
21	F7
8	F8
9	F9
10	F10
11	F11
12	F12
13	F13
14	F14
4	F15
5	F16
F	T/R
22	FREQ
2	SCAN
6	FS1
C	FS2
3	FS3
B	FS4
A	DISABLE (FLT) N.C
1	

FROM OUTPUT COMBINER / FILTERS ON SHEET 1

PTT

P.A. CONTROLLER

15V → 5V

BALANCE 1A	D
BALANCE 1B	4
BALANCE 2A	5
BALANCE 2B	C
TEMP 1A	L
TEMP 1B	10
TEMP 2A	J
TEMP 2B	K
VSWR 1.1	Y
VSWR 1.5	21
VSWR 2.0	X
VSWR 5.0	20
STATUS	B
5V	T
VRo	19
VFo	V
N.U	1
N.U	7
N.U	16
N.U	17
N.U	22
N.U	S
	A
	Z

48V-3

M	SSB
N	TTY/CW
P	PTT
11	TEMP
3	
20	
V	

14	VF
15	VR
A	GND

FROM VSWR DETECTOR ON SHEET 1

6	BALANCE 1A	(GRY)
9	BALANCE 1B	(GRY)
E	BALANCE 2A	(GRY)
B	BALANCE 2B	(GRY)
L	TEMP 1A	(YEL)
10	TEMP 1B	(YEL)
J	TEMP 2A	(YEL)
K	TEMP 2B	(YEL)
W	SSB (PA BIAS)	(VIO)
U	TTY/CW (PA BIAS)	(WHT/VIO)

TO SHEET 1 PA #1 AND PA #2

18	DRIVER BIAS

13	LO POWER	N.C
F	TEMP	N.C
12	TUNE	N.C
R	PTT ENABLE	N.C
2	KW ALC	N.C

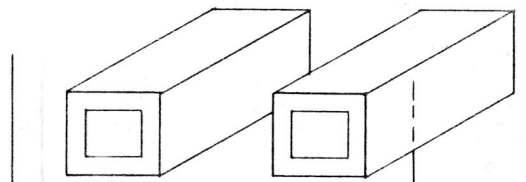
ACC

1	
SSB	14
FREQ	
TTY/CW	
PTT	
VSWR	
TEMP	
SCAN	
FS1	
FS2	
FS3	
FS4	
VFo	
	25
	13

24

NOTES: U.O.S.

1. 40W DRIVER AND ASSOCIATE CONNECTIONS ARE OPTIONAL
2. THE 500W MODULES ARE LOCATED AS SHOWN :



COM 1000, FRONT VIEW

TOP AMPLIFIER IS "A" BOTTOM AMPLIFIER IS "B".

QTY	NEXT ASSY	USED ON
1		COM 1000

DRAWN F. Ford 11/10/84 | CHECKED | ENG | MFG | QA

intech INTECH INCORPORATED SANTA CLARA CALIFORNIA, 95050

TITLE: WIRING DIAGRAM

SIZE	CODE IDENT NO	DRAWING NO	REV
D	33967	5-159097	B

SCALE | SHEET 2 OF 2