

OPERATIONS MANUAL

FOR

QSK 1500



INSTRUCTION MANUAL FOR QSK 1500

*** CAUTION: Read this manual before using your QSK 1500 ***

*** CAUTION: Never exceed 1500 watts of RF thru the QSK 1500 ***

*** CAUTION: Never allow the output SWR to exceed 2.0 : 1. ***

- * Carefully unpack both units from their shipping container.
- * Inspect both units and the shipping container for any signs of damage. If any damage is noted ...contact the shipping agent immediately!!!
- * Save the shipping container in case at some future date your unit must be returned to the factory.
- * Check to see that the following are packaged in the container:
 1. The RF Unit ... (An oblong box with a sloping front panel.)
 2. The Control Unit ... (A rectangular box with a switch on the front panel and two cables coming out the back.)
 3. An Instruction Manual
 4. A Warranty Card

INSTALLATION:

Step 1.

The RF unit should be placed as close to your amplifier as possible, within the following guidelines. Keep in mind that the RF Unit will have 4 coaxial cables attached to it, plus 4 shielded cables. Therefore, it would be awkward to have it on most operating tables. Most operators place it on a shelf or the floor near the amplifier. It should not be placed near a heat duct or where it can not receive adequate air circulation. During extended periods of high power operation the RF Unit will become very warm, so choose its location with care.

Step 2.

The Control Unit should be placed on the operating table within easy reach of the operator. During extended periods of operation the bottom of this unit can become warm. Do not place it on top of your transceiver, amplifier, or antenna tuner.

Step 3.

Once you have determined the location for both of your units, you are ready to construct the connecting cables. Look at FIG 1 (at the end of the manual), and use it as a guide when making these cables.

*** NOTE: If your transceiver is a TEN-TEC model immediately proceed to the section marked "USING TEN-TEC TRANSCIEVERS WITH THE QSK 1500".

Perform the TEN-TEC mods before proceeding with cable construction. Please note that after performing the TEN-TEC mods; CABLE 4S need not be constructed.

Step 4.

Make the following coaxial cables using the measurements taken between your transceiver, amplifier, keyer, RF Unit, and Control Unit. In **FIG 1** all coaxial cables will be designated with a number followed by an "C". In most cases it will not be necessary to make up 4 new cables. If the existing coaxial cables in your station (cables **1C** and **4C**) are in good shape and are long enough to reach **the** RF unit, you may use them. Maximum cable length between equipment should not exceed 6 feet.

* The following 4 cables are all for RF connections and should be made from high quality coaxial cable with properly installed and soldered **PL259** coax connectors. Do not use solderless or crimp-on type coax connectors.

CABLE 1C - RG 8 TYPE COAX (or equivalent) WITH A PL259 CONNECTOR ON EACH END
This cable runs from the coax jack on the RF unit marked "TO ANT" to your antenna, matchbox input, or multi position antenna switch. This cable carries the full output of your amplifier and therefore should be of the highest quality and construction. Keep this cable as short as possible!!!

CABLE 2C - RG 8 TYPE COAX (or equivalent) WITH A PL259 CONNECTOR ON EACH END
This cable runs from the coax jack on the RF unit marked "FROM AMP OUT" to the output jack on your linear amplifier. This cable carries the full output of your amplifier and therefore should be of the highest quality and construction. Keep this cable as short as possible!!!

CABLE 3C - RG 58 (or RG 8) COAX WITH A PL259 CONNECTOR ON EACH END
This cable runs from the coax jack on the RF unit marked "AMP IN", to the input jack on your linear amplifier. This cable carries the output of your transceiver (less than 150 watts) and therefore does not require RG 8 coax. Keep this cable as short as possible!!!

CABLE 4C - RC 58 (or RG 8) COAX WITH A PL259 CONNECTOR ON EACH END
This cable runs from the coax jack on the RF unit marked "FROM XCVR", to the output coax jack on your QSK transceiver. This cable carries the output of your transceiver (less than 150 watts) and therefore does not require RG 8 coax. Keep this cable as short as possible!!!

Step 5.

You will now need to construct the control cables for the QSK **1500**. These cables must be made from high quality shielded cable with the proper fitting soldered on each end. In most cases you may be able to use 2 of your existing cables. We suggest that you use RC 58 coax for these shielded cables, unless a higher quality shielded cable is readily available. In **FIG 1** all shielded cables will be designated with a number followed by an "S".

CABLE 1S - THIS SHIELDED CABLE WILL HAVE AN RCA PHONE PLUG ON ONE END AND A PLUG DETERMINED BY THE OUTPUT JACK OF YOUR KEYER ON THE OTHER.
The phono plug end connects to the jack on the RF unit marked "POS. KEY **IN**". The other end (with proper connector attached) will connect to the output jack of your keyer. Make sure that the shield of this cable attaches to ground on both the keyer and the RF unit. Keep this lead as short as possible!!!

CABLE 2S - THIS SHIELDED CABLE WILL HAVE AN RCA PHONO PLUG ON ONE END AND A PLUG DETERMINED BY YOUR "QSK" TRANSCEIVER'S CW KEY INPUT JACK ON THE OTHER.
The phono plug end connects to the jack on the RF unit marked "**POS. KEY OUT**". Make sure that the shield on this cable attaches to the ground on both the transceiver and the RF unit. Keep this cable as short as possible!!!

CABLE 3S - THIS SHIELDED CABLE WILL HAVE AN RCA PHONO PLUG ON ONE END AND A PLUG DETERMINED BY YOUR TRANSCEIVER'S 'AMPLIFIER RELAY JACK' ON THE OTHER. The phono plug end of this cable connects to the jack on the RF unit marked "AMP RLY IN". The other end connects to the 'amplifier relay jack' on your transceiver. NOTE: Some manufacturers call this jack "VOX RELAY", "EXTERNAL RELAY", or "T/R OUTPUT". Use the jack on your QSK transceiver that switches on your amplifier when your transceiver is keyed. Make sure that the shield of this cable is attached to the ground on both the transceiver and the RF unit. Keep this cable as short as possible!!!

CABLE 4S - THIS SHIELDED CABLE WILL HAVE A PHONE PLUG ON ONE END AND A PLUG DETERMINED BY THE 'RELAY JACK' OF YOUR AMPLIFIER ON THE OTHER. (In most cases the jack on the amplifier will be RCA phono) The phono plug end connects to the jack on the RF unit marked "AMP RLY OUT". The other end of this cable connects to the jack marked "RELAY" on your amplifier. Make sure that the shield of this cable connects to the ground on both the RF unit and amplifier. Keep this cable as short as possible!!! You are now ready for the initial check-out and operation.

*** CAUTION: Before proceeding check your cable installation and hook up against FIG 1.

*** CAUTION: DO NOT PROCEED UNLESS YOUR ANTENNA HAS A VSWR LESS THAN 1.5 - 1. To do so could result in serious damage to your amplifier, your transceiver, and your "QSK 1500". If in doubt about your antenna... CHECK IT WITH AN ACCURATE SWR METER BEFORE PROCEEDING!!!!

INITIAL CHECK-OUT:

NOTE: The "QSK 1500" has only one control ...the on/off power switch.

1. Turn on your transceiver only...NOT your amplifier OR your "QSK 1500".
2. With your transceiver on and your "QSK 1500" off, you should hear almost no signals (except for very strong ones, those over 50 microvolts). If you hear many signals and the band sounds normal with your "QSK 1500" off, do not proceed...contact Universal Amateur Radio.
3. If step #2 checked out, turn on your "QSK 1500". Both LED indicators should glow red. You should now hear all the signals on the band, as you normally would. If your transceiver sounds "dead" or one or both of the LEDs do not light, **stop...and** contact Universal Amateur Radio.
4. Again, check to see that both the 12 volt and the 500 volt LEDs are glowing red. If they are turn on your amplifier and proceed to step #5. If they are not illuminated...**stop** and contact Universal Amateur Radio.
5. Turn the output control of your QSK transceiver all the way down (no power output). Place your amplifier in the operate mode. Operate your keyer, and you should hear an initial 'click' from your amplifier as its relay closes. Approximately 1.5 seconds after you stop keying, you should hear another click from your amplifier as its relay opens.
6. If the preceding steps checked-out, tune up your amplifier in the low power position (no more than 500 watts output) as per the manufacturer's instructions. Check to see that you can hear received signals between the dots and dashes of your CW at this power level. You may now tune your amplifier to a full 1500 watts output providing that your SWR is less 1.5 to 1.

YOU ARE NOW READY TO OPERATE FULL BREAK IN CW AT THE LEGAL POWER LIMIT

USING TEN-TEC TRANSCEIVERS WITH THE "QSK 1500"

See FIG 2.

All of the TEN-TEC transceivers will work with the "QSK 1500" in CW when installed properly (see previous instructions). They will NOT work on SSB without modification. Trying to use the "QSK 1500" with SSB on any TEN-TEC transceiver will cause your amplifier to "Hot Switch" and could cause serious damage to your equipment.

In order to use your "QSK 1500" on SSB with a TEN-TEC transceiver, you must make one factory authorized modification to your transceiver and also change the control cable hook-up for your "QSK 1500". The modification for your TEN-TEC was obtained from TEN-TEC and is given here, verbatim. The accompanying drawing was also obtained from TEN-TEC and will explain both the modification and the change in the control cable installation. See FIG 2.

TEN-TEC TRANSCEIVER MODIFICATION:

"Locate the 'T/R' line where it attaches to the control board of the transceiver. Break it at this point and route it to the rear panel. Route another wire from the rear panel to the 'T/R' pin on the control board. If the 'QSK 1500' is disconnected, a jumper must be placed between the two jacks to restore normal operation. If carefully done, this will not affect the warranty."

Once your TEN-TEC modification is complete, you must change the way that the control cables for your "QSK 1500" are installed. Refer to FIG 2 to make these changes.

QSK 1500 control cable modifications for use with TEN-TEC Transceivers:

1. Plug the output of your keyer into the key jack on the transceiver, instead of into the RF unit of the "QSK 1500".
2. Make a shielded cable to run from the jack on the "QSK 1500" RF unit marked "POS KEY IN" to the old "T/R" jack on your transceiver. The "T/R" jack is where the cable from the RF unit marked "AMP RLY IN" went. Discard this cable as there will be no cable to connect to the RF unit of the "QSK 1500" marked "AMP RLY IN".
3. Make a shielded cable to run from the jack on the "QSK 1500" RF unit marked "POS KEY OUT" to the new (or unused) jack on the back of your transceiver.
4. Remember, with this cable configuration, you will not have a cable connected to the jack on the "QSK 1500" marked "AMP RLY IN".

Any questions on modifying the Ten-Tec series of transceivers should be directed to Mr. Dick Frey at TEN-TEC. Any questions regarding the cable hookup for this modification should be directed to Ralph Rickett at Universal Amateur Radio, Inc.

OPERATING HINTS:

1. Keep your RF power output below 1500 watts.
2. Make sure that you only operate with antennas that have an SWR of less than 1.5 - 1!!!
3. Make sure that your station is properly grounded.
4. It is good operating practice to physically disconnect your station from the antenna when not in use, if you live in an area which is subject to lightning. This will help to protect your "QSK 1500" and your entire station from lightning damage.
5. Never operate your "QSK 1500" unless both LEDs are lighted on the control unit. These are indicators of proper power supply function and are not for decoration.

TROUBLE SHOOTING SECTION:

Your "QSK 1500" has been burned in for a minimum of 24 hours. It is designed to give you many years of troublefree service. However, like any complex solid state device, it can develop minor problems. Your "QSK 1500" is a factory sealed unit, and must remain that way to insure repair under warranty. Any attempt to "inspect or adjust" the unit will void your warranty. If you experience any problems contact Mr. Ralph Rickett at Universal Amateur Radio in Reynoldsburg, Ohio. The phone number for Universal is 614 866-4267. Under certain circumstances UAR may grant you permission to open your unit. If you do experience any problem with your unit, STOP USING IT IMMEDIATELY AND CONTACT Universal Amateur Radio.

After your warranty period expires, your "QSK 1500" will be repaired for a flat rate of \$35.00 plus parts, shipping and handling. Remember, some of the parts in the "QSK 1500" are very exotic and expensive. DO NOT TRY TO FIX IT YOURSELF!

THEORY OF OPERATION

At the end of this manual you will find a block diagram (FIG 3) for the QSK 1500. This diagram will give you a general overview of how this unit operates. A schematic of the entire unit can be obtained by contacting the factory direct.

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A complete discussion of the total operational plan for the QSK 1500 is beyond the scope of this manual.

The QSK 1500 Story

Shortly after the amateur fraternity moved from "spark" to "CW", some enterprising amateurs thought it would be an advantage to be able to hear between his "dots and dashes" as he was sending. Thus was born the idea of "QSK". Over the past 50 years many schemes have been put forth to accomplish this task, including separate antennas for transmit and receive, outboard "T-R" switches using vacuum tubes, and outboard switches using vacuum relays. All these ideas had merit, but usually created more problems than they solved. The separate antenna idea was fine if you had the space, and a receiver with exceptional AGC characteristics, but was not very effective when running high power. The vacuum tube "T-R" switch worked at low power levels, but suffered from some degree of "suck-out" (signal attenuation on receive) and often caused tremendous TVI. The outboard vacuum relay switch worked well, but was complex, very expensive, and required elaborate protection to prevent "hot switching" of the vacuum relay contacts. In addition, the vacuum relay produced another "clicking" noise during transmit which was very distracting.

The first quantum leap from the stone age of "QSK" occurred with the introduction of the *Signal One* in the late 1960's. This transceiver had a usable "QSK" system which worked very well barefoot. Within a year of the introduction of the "Signal One", Dick Ehrhorn (W4ETO) introduced his Alpha series of amplifiers which allowed true high power "QSK" CW for the first time. Dick's Alpha series of amplifiers still provide the only TRUE "QSK" linear amplifier.

In the late 1970's, many more true "QSK" transceivers appeared on the market. Today there are many fine radios to choose from, including those manufactured by Ten-Tec, Kenwood, Yaesu, Icom, and Drake. All of these radios operate very well in the "QSK" mode, but all have one major drawback. Unless you own one of ETO's Alpha series amplifiers, you are limited to barefoot (low power) "QSK" operation. Attempting to use your new "QSK" transceiver with any other popular amplifiers could badly damage it due to "hot switching" of the amplifier's internal relays.

Design Electronics Ohio (DEO) saw this incompatibility problem as a true concern of the CW operators. DEO then began an intensive research and development program to solve this problem....."The QSK 1500" is the result of those efforts.

Utilizing the latest in PIN diode technology, DEO has produced the first and finest high power RF switch for 1.8 - 30 MHz. When we began this challenge we had seven goals that we hoped to meet. I am proud to say that we have met them all. These goals were as follows:

The unit must:

- * Handle the maximum legal power.
- * Easily install externally to both the "QSK" transceiver and linear amplifier.
- * Have excellent reliability.
- * Be small and attractive.
- * Not degrade either transmit or receive performance.
- * Be broadbanded and also operate both phone and CW without any knobs or switches.
- * Be reasonably priced.

The "QSK 1500" incorporates frontier state of the art devices. Many of the devices in the unit are extremely expensive, so it is essential that the absolute maximum specifications are not exceeded at any time. Except for an "act of God", the only two things that can damage your "QSK 1500" are excessive SWR (loading into no antenna or the wrong antenna) and power in excess of 1500 watts. When properly installed and operated, The "QSK 1500" will give you many trouble free years of silent, efficient "QSK" CW.

SPECIFICATIONS

TRANSMIT:

- * Power handling capability - 1500 watts RF into 50 ohm load continuous at 40 wpm CW... 800 watts RF continuous into 50 ohm load in lock key position for 1 hour.
(measured with Bird 43 wattmeter and Bird 8813 Termaline)
- * CW waveform distortion - at 1500 watts RF output into 50 ohm load, no measurable distortion at 55 wpm CW.
(measured with TEK 556 scope, TS930S transceiver, Alpha 76 amplifier, and Bird 43 with RF pickup)
- * Absolute Maximum VSWR - 2.0-1
- * No increase in harmonic distortion of transmit signal as viewed on HP Spectrum Analyzer (using Yaesu FT-980 & Collins 30S-1)

RECEIVE:

- * Receiver line insertion loss - guaranteed less than 0.6DB, typical loss = 0.2DB
(measured with HP 608D, HP attenuator, TS930S, Triplet 850, and TEK 556 scope)
- * Maximum receiver input voltage - 3800mv before protect circuit begins to activate...inline fuse lamp trips at 7.5 watts RF
- * Receive line isolation (PIN diodes off) - greater than 50DB

CONTROL LINES:

- * Keyer input - must have keyer set for positive keying only
- * CW key line - will key positive lines (cathode keying) only
- * Amplifier relay in - must be high receive and low transmit
- * Amplifier relay out - Maximum voltage = 150 volts
Maximum current = 0.750 amps
- * Amplifier relay switch time - less than 800 microseconds

GENERAL:

- * AC power requirements - 120V AC at 1 amp
- * Overload protection - 1 amp fast-blow fuse
- * Physical size - Control unit: 3.086"H X 6.275"W X 3.775"D
RF unit: 3.187"H X 6.656"W X 9.250"D
- * Weight - Control unit: 5 pounds
RF unit: 4 pounds
- * Colors - silver and charcoal grey with blue and red lettering

HOOKUP DIAGRAM FOR QSK1500

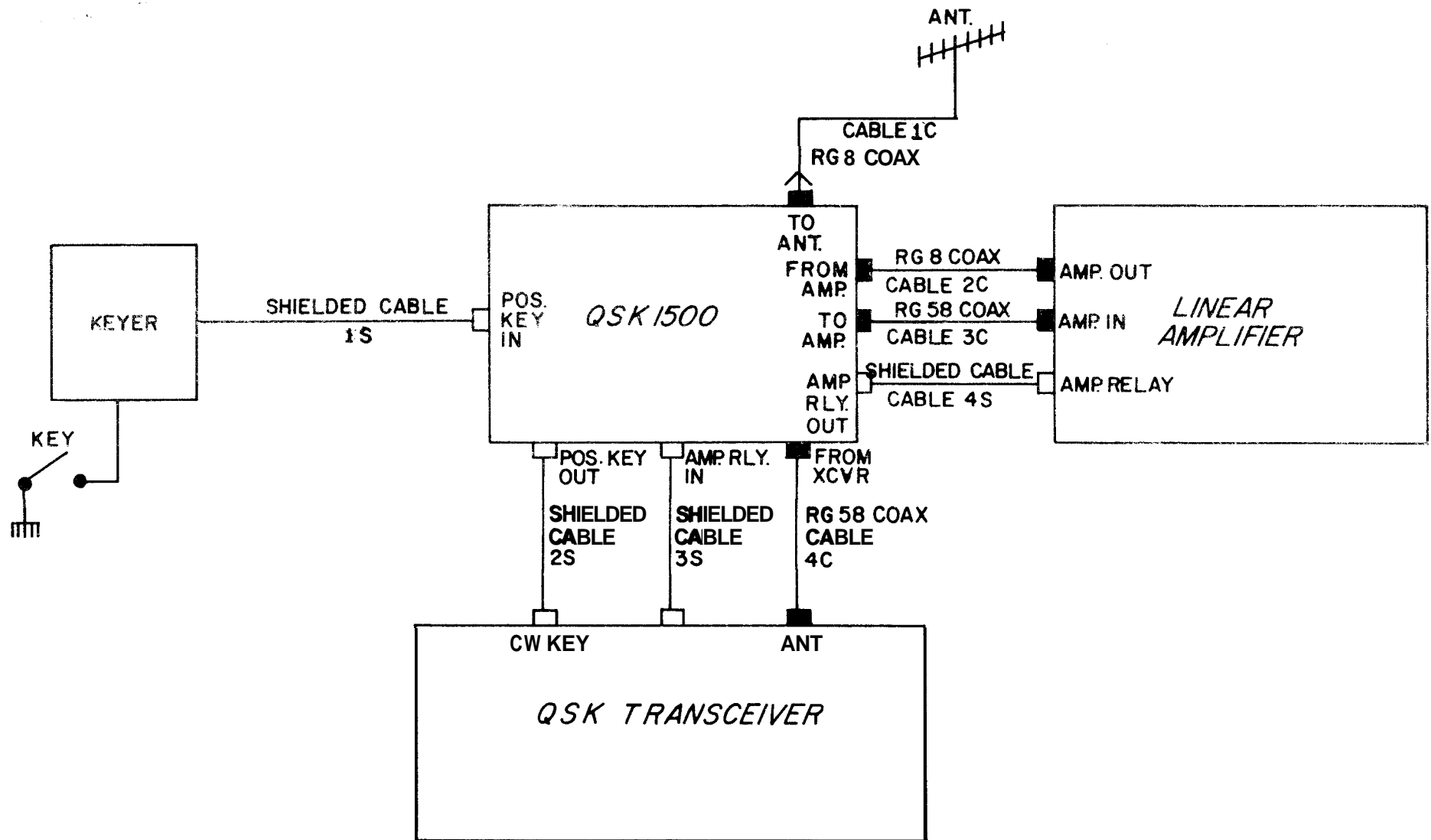


FIG 1

NO.	REVISION	DATE	DESIGN ELECTRONICS OHIO		
DRAWN	CHECKED	SCALE	DATE 1/17/84		

DRAWING FOR TEN TEC MODS

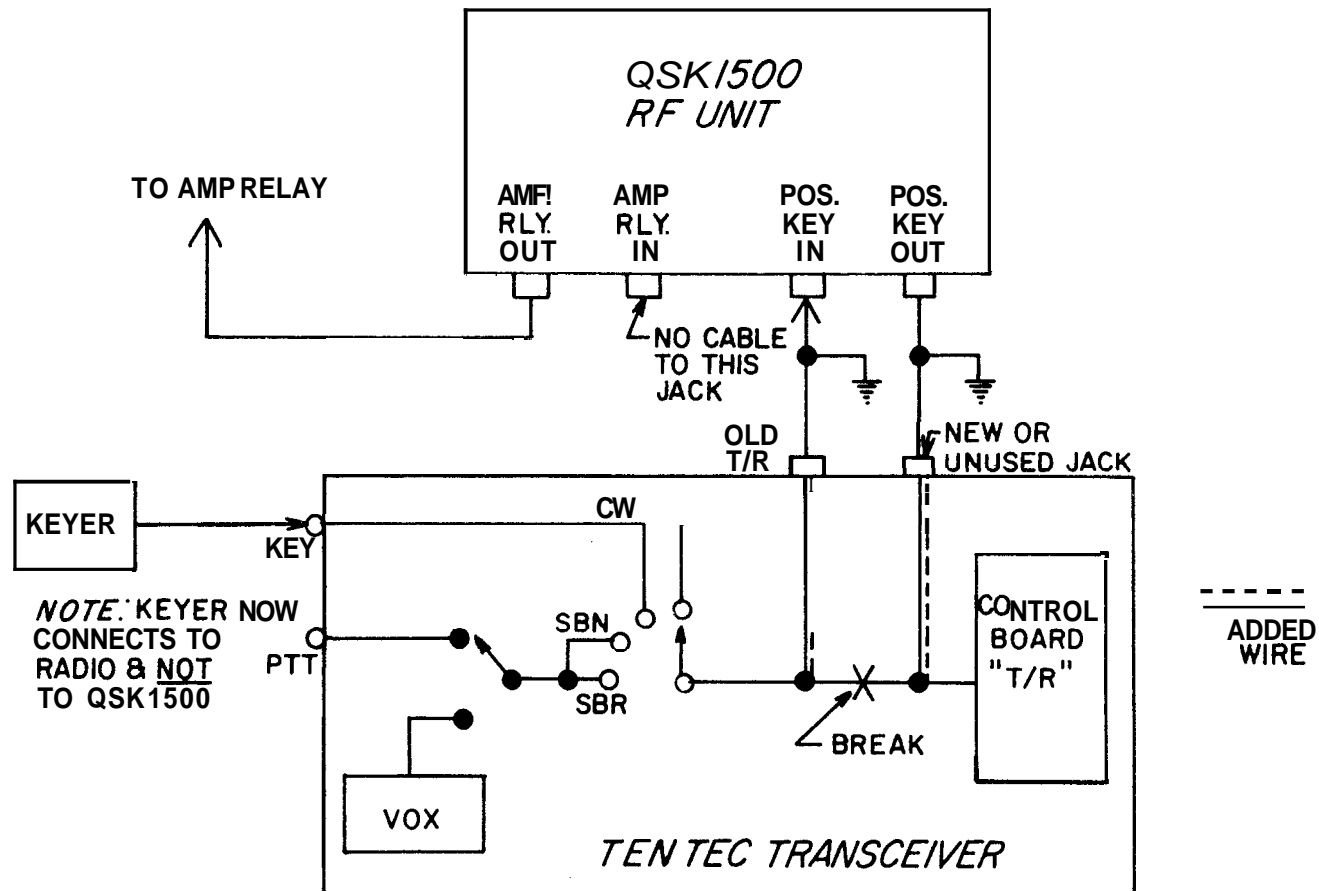


FIG 2

No.	REVISION	DATE

DESIGN ELECTRONICS OHIO

DRAWN <i>ED</i>	CHECKED <i>JS</i>	SCALE NONE	DATE 1/17/84
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BLOCK DIAGRAM QSK1500

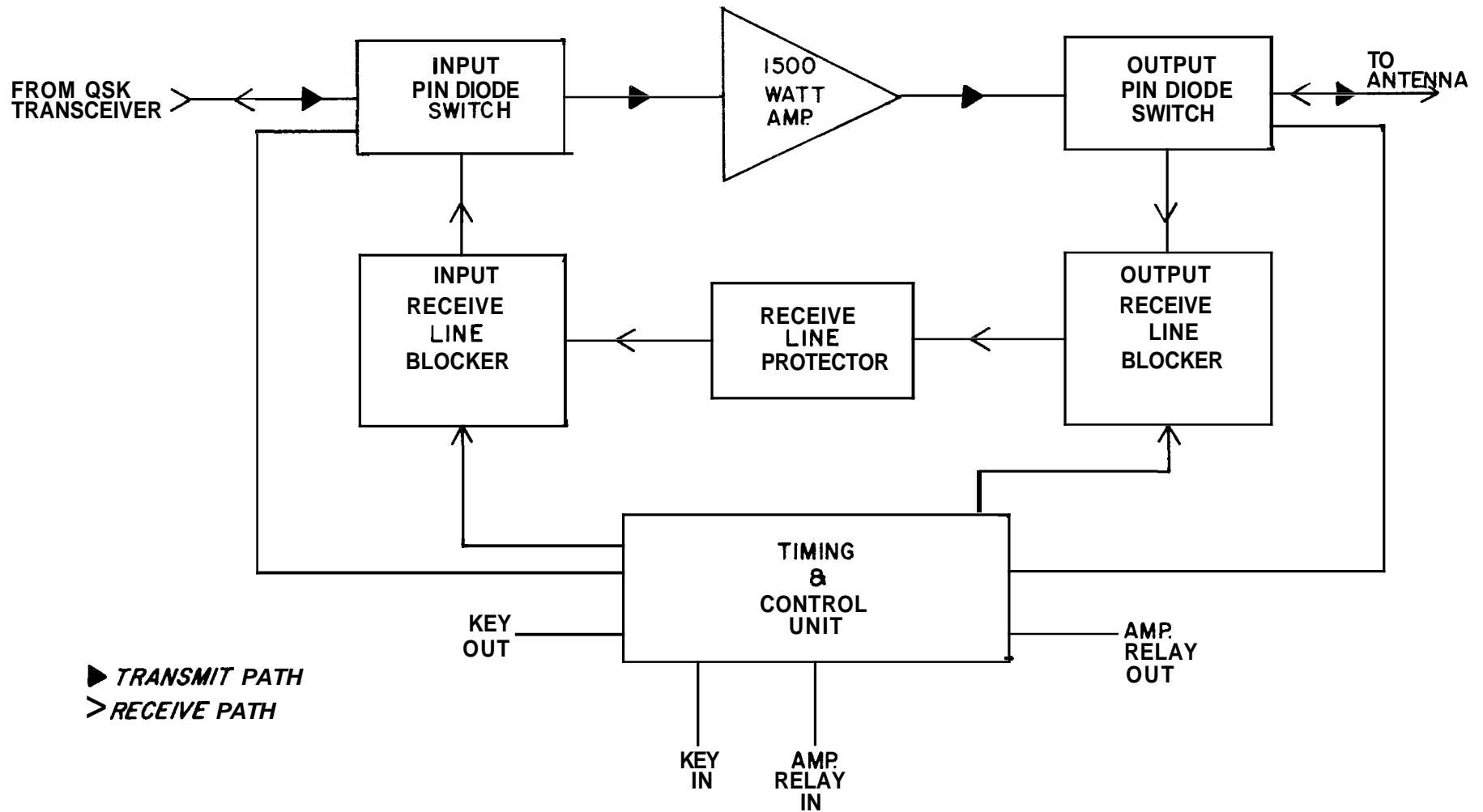


FIG 3

NO.	REVISION	DATE	DESIGN ELECTRONICS OHIO	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
DRAWN			CHECKED	SCALE
[Signature]			[Signature]	NONE
			DATE	1/17/84

COMMONLY ASKED QUESTIONS ABOUT
THE
QSK 1500

WHAT IS THE QSK 1500 ?

A SOLID STATE RF SWITCH UTILIZING PIN DIODES, WHICH ALLOWS OWNERS OF THE NEW "QSK" TRANSCEIVERS TO RUN TRUE HIGH POWER "FULL BREAK-IN CW" WITH ANY AMPLIFIER.

WHICH OF THE NEW TRANSCEIVERS ARE "QSK" ?

ALL TEN-TEC MODELS, DRAKE TR5, KENWOOD TS930S, YASEU FT1..FT980..FT757, ICOM 751 AND SIGNAL ONE CX11 & MIL SPEC 1030

WHY CAN'T I USE MY NEW "QSK" TRANSCEIVER WITH MY PRESENT AMPLIFIER ?
UNLESS YOUR AMPLIFIER IS ONE OF ETO'S ALPHA SERIES (70,77,78), YOU CANNOT USE IT IN THE "QSK" MODE. IF YOU ATTEMPT TO DO SO, YOU WILL "HOT SWITCH" THE RELAY IN YOUR LINEAR AND POSSIBLY DESTROY IT. THE QSK 1500 WILL SOLVE THIS PROBLEM.

DO I HAVE TO GET "INSIDE" MY PRESENT AMPLIFIER OR TRANSCEIVER AND MODIFY IT TO USE THE QSK 1500 ?

NO. WITH ONE EXCEPTION. THE QSK 1500 IS PLACED IN LINE BETWEEN THE "QSK" TRANSCEIVER AND THE AMPLIFIER. YOU WILL NEED TO MAKE UP 2 NEW COAXIAL CABLES (RG8 WITH PL259's) PLUS 2 SHIELDED CABLES (RG 58 IS A GOOD CHOICE) WITH RCA TYPE PHONO PLUGS. ON ALL TEN TEC TRANSCEIVERS YOU WILL NEED TO MAKE A VERY SIMPLE INTERNAL MODIFICATION TO THE RADIO IF YOU PLAN TO USE IT ON SSB. AN EXPLANATION OF THIS MODIFICATION IS INCLUDED IN THE INSTRUCTION MANUAL FOR THE QSK 1500 OR CAN BE OBTAINED FROM MR. DICK FRY AT TEN TEC.

CAN I USE MY QSK 1500 ON SSB ?

YES. AS LONG AS YOU OBSERVE THE 1500 WATT POWER LIMITATION AND THE NOTE ON ALL TEN TEC TRANSCEIVERS MENTIONED IN THE PREVIOUS QUESTION.

CAN I USE THE QSK 1500 WITH MY HOMEBREW AMPLIFIER ?

YES, PROVIDING THAT YOU OBSERVE THE 1500 WATT POWER LIMITATION AND THAT YOUR AMPLIFIER RELAY LINE VOLTAGE AND CURRENT DO NOT EXCEED THE LIMITS FOR THE QSK 1500...SEE SPECIFICATION SHEET

Q: CAN I USE THE QSK 1500 ON SLOW SCAN TV ?

A: YES. . BUT IT IS NOT RECOMMENDED. THE 1500 POWER LIMIT IS FOR CW OPERATION AT 40 WPM AND NOT FOR KEY DOWN CONTINUOUS OPERATION AS USED IN SLOW SCAN TV. THERE IS NO ADVANTAGE TO USING THE QSK 1500 FOR SLOW SCAN OPERATION, AS SWITCHING TIME IS NOT A PROBLEM.

Q: CAN I USE THE QSK 1500 ON RTTY ?

A: YES. . BUT AGAIN YOU MUST OBSERVE THE KEY DOWN POWER LIMITATIONS AND REDUCE POWER TO 800 WATTS OUTPUT. THE QSK 1500 WILL PROVIDE RTTY OPERATORS WHO USE AMTOR THE ADVANTAGE OF USING HIGH POWER.

Q: HOW CAN THE QSK 1500 BENEFIT ME IF I AM USING AMTOR ?

A: AMTOR OPERATION REQUIRES VERY FAST SWITCHING TIMES BETWEEN TRANSMIT AND RECEIVE IN ORDER FOR THE 'GO. .NO GO' CODES TO BE SENT AND RECEIVED. THE APPEAL OF AMTOR LIES IN ITS ABILITY TO PRODUCE ALMOST ERROR FREE COMMUNICATIONS. THE QSK 1500 WILL NOW ALLOW THE AMTOR OPERATOR TO USE HIS LINEAR AMPLIFIER FOR THIS STATE OF THE ART COMMUNICATION METHOD. YOU MUST STILL OBSERVE THE 800 WATT POWER OUTPUT LIMITATION.

Q: WHEN USING THE QSK 1500. WILL I HAVE ANOTHER SET OF CONTROLS TO ADJUST EVERY TIME I CHANGE BANDS ?

A: NO. . THE QSK 1500 IS A BROADBAND SWITCH. THERE IS ONLY ONE CONTROLTHE ON-OFF SWITCH.

Q: CAN I USE THE QSK 1500 WITH MY SEPARATE TRANSMITTER AND RECEIVER ?

A: NO. . AT THE PRESENT TIME DEO IS ONLY MAKING A UNIT FOR "QSK" TRANSCEIVERS. HOWEVER, IF ENOUGH INTEREST IS SHOWN IN A "SEPARATES" VERSION, DEO WILL BRING OUT SUCH A UNIT.

Q: CAN I OBTAIN A QSK 1500 FROM MY LOCAL DEALER ?

A: AT THE PRESENT TIME. . .NO. UNIVERSAL AMATEUR RADIO INC. IS THE EXCLUSIVE DISTRIBUTOR FOR THE QSK 1500. CONTACT.

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QSK 1500

SERVICE
AND
TECHNICAL MANUAL

DEO

DESIGN ELECTRONICS OHIO
GROVEPORT, OHIO
NOV. 1984

SERVICING THE QSK 1500

INTRODUCTION:

The QSK 1500 is a very simple device to service and repair. It is composed of two units...the POWER SUPPLY and the RF SWITCHING UNIT. In this manual each unit will be discussed individually, and in depth. The construction of the units is similar, in that the majority of components are mounted on PC boards, which may be removed for repair or service. The mechanical layout is such that either unit can be totally disassembled in less than 5 minutes.

To date (November 1984), we have over 50 units in the field, and have had the following service problems.

**** SIX FUSE LAMP FAILURES

2	FROM LIGHTNING
3	FROM OPERATOR ERROR
1	UNKNOWN

**** ONE 12V. 1.5 AMP VOLTAGE REGULATOR

CAUSE UNKNOWN

**** ONE LINE FUSE FAILURE IN POWER SUPPLY

CAUSE UNKNOWN

The most common failure is the FUSE LAMP in the RECEIVER PROTECTOR CIRCUIT of the RF SWITCH. This is as it should be. This FUSE LAMP is designed to protect the front end of the QSK transceiver from damage, in the event that EF exceeding 3.2volts attempts to flow..(refer to BLOCK DIAGRAM) This protective device can be triggered by any of the following: lightning, failure of diodes 06 or 07 on the EF BOARD, failure of PIN diodes D3,D4 or D5, excessive VSWR, excessive power output, improper timing sequence of PIN diodes, failure of power supply or VERY HIGH POWER near field RF signals. AGAIN, THE MAIN PURPOSE OF THE # 12 FUSE LAMP IS TO PROTECT THE RECEIVER PORTION OF THE QSK TRANSCEIVER, AND TO ALSO PREVENT "FEEDBACK" TO THE INPUT OF THE LINEAR AMPLIFIER. Any fed back to the amplifier, would cause it to become a VERY HIGH POWER OSCILLATOR.

The #12 fuse lamp is easily replaced in the field by the owner. Failure of this lamp, however, indicates that something is probably wrong. The cause for the failure should be determined as soon as possible.

The POWER LINE FUSE is the other likely failure point. This fuse is a 1 AMP "fast blow" model, which we use in both the 115 and 230 volt models. Replacement is done in the POWER SUPPLY. The fuse is a little hard to get to, but a pair of small "needle nose pliers" or "hemostats" make it very easy.

PHASE ONE TROUBLE SHOOTING

SYMPTOM	CAUSE
'receiver doesn't hear'	1. fuse lamp blown 2. power supply inoperable 3. cables hooked up wrong 4. unit locked in TRANSMIT
'linear locked in transmit'	1. relay contacts 'fused' 2. 'key line in' shorted 3. 'key line out' shorted 4. 'amp relay in' shorted 5. 'amp relay out' shorted 6. U1 556 timer damaged 7. U2,U3 or 144 damaged 8. tantalum 05 damaged
'unit buzzs and does not key properly on transmit'	1. voltage regulator U1 in power supply damaged..ck with scope under 1 AMP load
'unit will not key'	1. ck that keyer being used is set for POSITIVE keying NOT negative
'11Hear will not key properly'	1. ck that R8 is 10 OHM 2. ck that owner does not another resistor in series with the 'amp relay out' line
'12 volt or 500 volt LEDS do not light'	1. ck 12V or 525V supplies 2. ck LEDS 3. ck Q1 in POWER SUPPLY

PHASE TWO TESTING

**** VOLTAGE CHECKS ****

Refer to the "voltage checking" diagram. Check the voltages an the 'bulkhead' in the RF SWITCH UNIT first. The QSK 1500 does NOT need to have the coaxial cables and control lines hooked up for these tests. To switch from RECEIVE to TRANSMIT, short the "pos. key line in" jack to ground. The voltages should be read from the "feedthru" capacitors to ground. THE STANDARD COLOR CODING FOLLOWS:

BLACK:	GROUND
RED:	12 V POS DC BUSS LINE
ORANGE:	500 V POS DC LINE IN TRANSMIT
GRAY:	CONTROL LINE..TO SWITCHING TRANSISTORS

THE POWER CABLE FROM THE POWER SUPPLY TO THE RF UNIT USE THE FOLLOWING COLOR CODE:

BLUE:	500 V POS DC LINE
WHITE/CLEAR:	12 V POS DC LINE
BARE:	GROUND

THE TRANSFORMER COLOR CODING FOLLOWS:

BLACK	ALL THESE ARE PRIMARYS..FOR 230V
BLACK/WHITE	OPERATION..BLK/WHT & ERN ARE TIED
BROWN	TOGETHER..FOR 115V BLK & BLK/WHT ARE
BROWN/WHITE	USED BRN & BRN/WHT ARE NOT USED
RED:	400 V AC SECONDARY
YELLOW:	18 V AC SECONDARY

LINE CORD COLOR CODING FOLLOWS:

BLACK:	115V (ONE SIDE OF 230 FOR EXPORT)
WHITE:	NEUTRAL (ONE SIDE OF 230V FOR EXPORT)
GREEN:	GROUND

PHASE THREE SERVICING:

**** POWER SUPPLY ****

To disassemble the POWER SUPPLY perform the following in order.

1. remove gray cover (1 machine screw on each side)
2. remove transformer (2 #6 machine screws2 ,. the leads on the transformer are long enough to allow it to be place out side the cabinet..DO NOT UNSOLDER ANY WIRES AT THIS TIME
3. remove the machine screw which mounts the VOLTAGE REGULATOR to the case...
4. CAREFULLY remove the 'dress nut' on the "ON/OFF" switch
5. **** TO REMOVE CIRCUIT BOARD..remove the 4 #6 screws that attach the BOARD TO THE SPACERS...DO NOT.. I repeat DO NOT remove the 4 screws on the FRONT panel
6. The POWER SUPPLY BOARD can now be serviced.
7. to reinstall the PC board in the POWER SUPPLY, reverse the above procedure. MAKE SURE THE SPACERS ARE TIGHT AGAINST THE CABINET FRONT. IF THEY NEED TIGHTENED, HOLD THE SCREW ON THE FRONT PANEL AND TIGHTEN THE SPACER WITH A 1/4" WRENCH.
8. NEVER TIGHTEN THE FRONT PANEL SCREWS..DOING SO WILL WRINKLE THE MYLAR LABEL!!!!

PHASE FOUR SERVICING

**** RF SWITCH UNIT ****

**** REMOVE THE GRAY COVER ON THE RF SWITCH UNIT WHICH IS HELD IN PLACE BY 6 SCREWS...4 SHEET METAL SCREWS ON THE BOTTOM AND 2 #6 MACHINGE SCREWS ON THE SIDES..USE A 3/16" HEX DRIVER ON THE 4 METAL SCREWS ON THE BOTTOM

REMOVING THE CONTROL BOARD

1. carefully unsolder the 4 wires from the control board to the 'feedthru capacitors' on the bulkhead..there are 2 GRAY, 1 RED & 1 ORANGE
2. remove the 4 #6 screws holding the CONTROL BOARD TO THE SPACERS.DO NOT REMOVE THE 4 SCREWS ON THE LABEL SIDE OF THE CABINET! lift board out and forward.. it is NEVER necessary to unsolder the GRAY wires connected to the phono jacks or the three wires connected to the POWER PLUG
3. the CONTROL BOARD is now read, for servicing..
4. to reinstall..reverse the above procedure..NOTE!! DO NOT TIGHTEN THE FRONT (LABEL SIDE SCREWS)..HOLD THEM AND TIGHTEN THE 1/4" HEX SPACERS!!! DO NOT FORGET TO PLACE THE LOCKWASHERS BETWEEN THE PC BOARD AND THE SPACERS..
5. ,if it is necessary to replace the need relay on the CONTROL BOARD...make sure that you RECONNECT the transient supressor on the bottom of the board UNDER THE RELAY

RF BOARD

1. carefully remove the 4 large nuts. on the rear of the RF UNIT which hold the COAX connectors in place
2. carefully remove the 2 NUTS & screws which hold the bulkhead (shield) in place. DO NOT TRY TO UNSCREW THE SCREWS..REMOVE THE NUTS WHILE HOLDING THE SCREW HEADS!!
3. the ENTIRE RF BOARD, LARGE EF CHOKES & BULKHEAD can now be removed as ONE unit.. NOTE: in certain units it may be necessary to FIRST have removed the CONTROL BOARD IT IS NEVER NECESSARY TO UNSOLDER THE COAX CONNECTORS FROM THE RF PC BOARD!!!
4. DO NOT SET THIS ASSEMBLY DOWN ON THE RF PC BOARD..TO DO SO MAY DAMAGE THE HIGH POWER PIN DIODE!!!!

5. REMOVAL OF OR CHANGING PIN DIODE D2 (HIGH POWER)

- a. carefully unsolder the ribbon leads using solder wick
- b. remove the two #6 machine screws holding the heat sink to the board
- c. carefully bend the leads of the PIN diode together so that it will feed thru the hole in the PC board as you remove the heat sink and PIN diode as a unit..
- d. to remove the PIN diode from the heat sink, you MUST hold the hex portion of the PIN diode with a 3/16" wrench WHILE removing the nut holding it to the heat sink..
- e. when reinstalling a HIGH POWER PIN diode USE heat sink compound. HOLD the HEX portion of the PIN diode with the 3/16" wrench while tightening the nut. DO NOT OVER TIGHTEN!!
- f. MAKE SURE THE PIN DIODE IS PROPERLY ALIGNED BEFORE MOUNTING THE HEATSINK... the ribbon lead CLOSEST to the PC board is the CATHODE and is soldered TOWARD the BLUE CAPACITORS..the lead on the end of the PIN diode is the ANODE and is soldered toward the MIDDLE of the board.

***** NOTE: THIS PIN DIODE IS VERY VERY FRAGILE ..USE EXTREME CAUTION WHEN WORKING WITH IT!!!

- g. carefully bend the leads of the PIN diode together so it can be inserted thru the board..make sure the leads are positioned correctly..then re-mount the heatsink to the PC board... ONLY when the heat sink is properly mounted to the PC board and the leads in their proper position should soldering of the PIN diode leads begin..

6. REMOVING OR CHANGING PIN DIODES D1,D3,D4,D5

- a. PIN diodes D3,D4 & D5 are identical
- b. these diodes are mounted on silver plated slotted standoffs.. use solder wick to remove solder.. it may be necessary to "spread the fork%" of the stand off to remove the diode..
- c. install the new diode carefully.. make sure the cathode is in the correct position..the component side of the board is marked with a 'C' to indicate cathode location
- d. PIN diodes D3,D4 & D5 are epoxy cased and are very rugged...PIN diode D1 is glass encased and should be handled with care!! PIN diode D1 is changed in the same manner as D3, D4 & D5.

7. TO REASSEMBLE THE RF UNIT. REVERSE THE ABOVE PROCEDURE

SERVICE NOTES

The QSK 1500 is a very straight forward unit. No failures have occurred in any of the major components such as transformer, high power capacitors, RF chokes or PIN diodes. ALWAYS CHECK THE OBVIOUS FIRST!!!!

SEVERAL OF THESE UNITS HAVE BEEN THRU 48HRS OF NON STOP CONTESTING AT POWER LEVELS IN EXCESS OF 1500 WATTS WITH NO FAILURES.

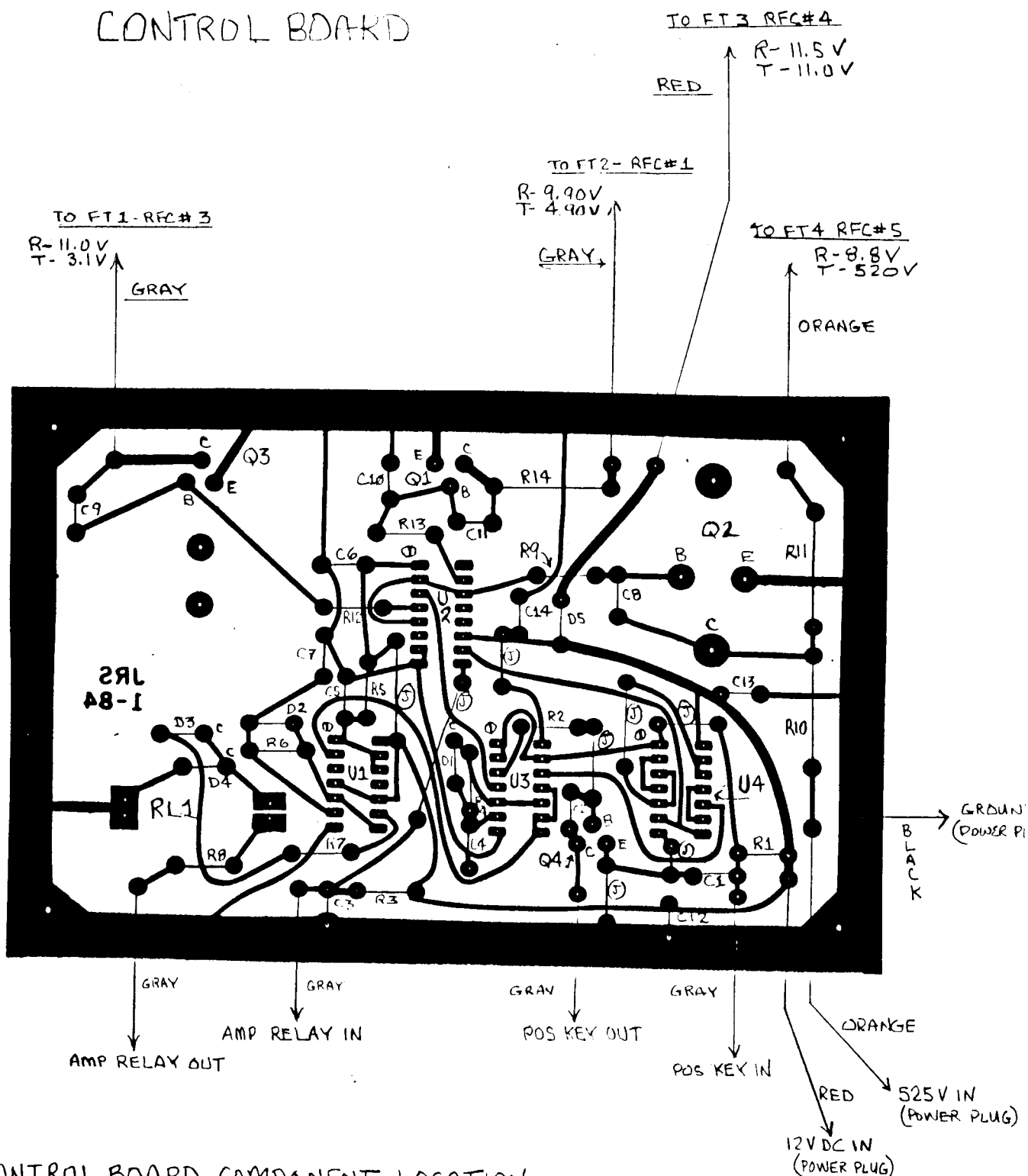
in most cases, component values have been selected for a DEFINITE reason..DO NOT substitute components unless the new component has specifications EQUAL to OR GREATER than the component it is replacing.

3 NOVEMBER, 1984

DESIGN ELECTRONICS OHIO
4925 SOUTH HAMILTON RD.
GROVEPORT, OHIO 43125
UNITED STATES OF AMERICA

COMPONENT SIDE VIEW

CONTROL BOARD



CONTROL BOARD COMPONENT LOCATION

1. \odot INDICATES PIN #1 OF IC
2. HIGHEST IC # = IC#4
3. HIGHEST RESISTOR # = R15
4. HIGHEST CAPACITOR # = C15
5. HIGHEST TRANS. # = Q4
6. HIGHEST DIODE # = D4
7. C INDICATES CATHODE OF DIODES

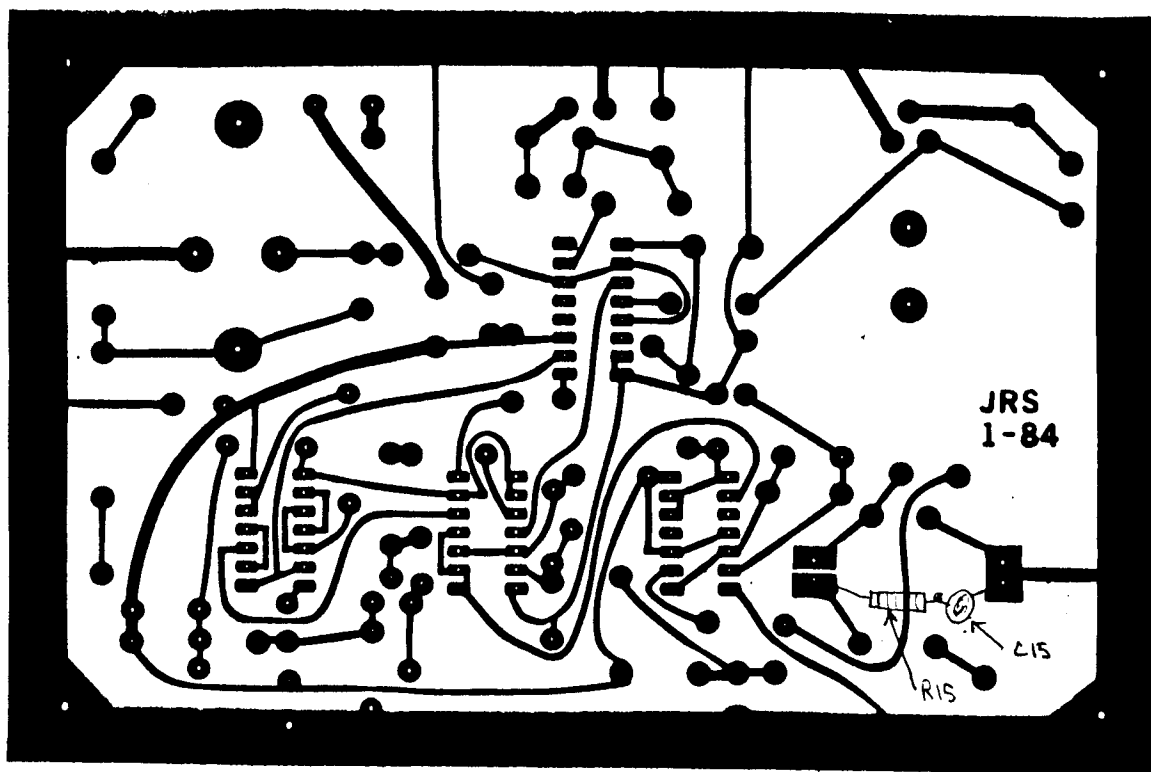
NOTE:

- * ALL VOLTAGES DVM TO GROUND $\pm 10\%$
- * R15-C15 MOUNTED UNDER RL1 ON FOIL SIDE

Q3K-1500

DEO/JRS NOV 1984

FOIL SIDE VIEW
CONTROL BOARD

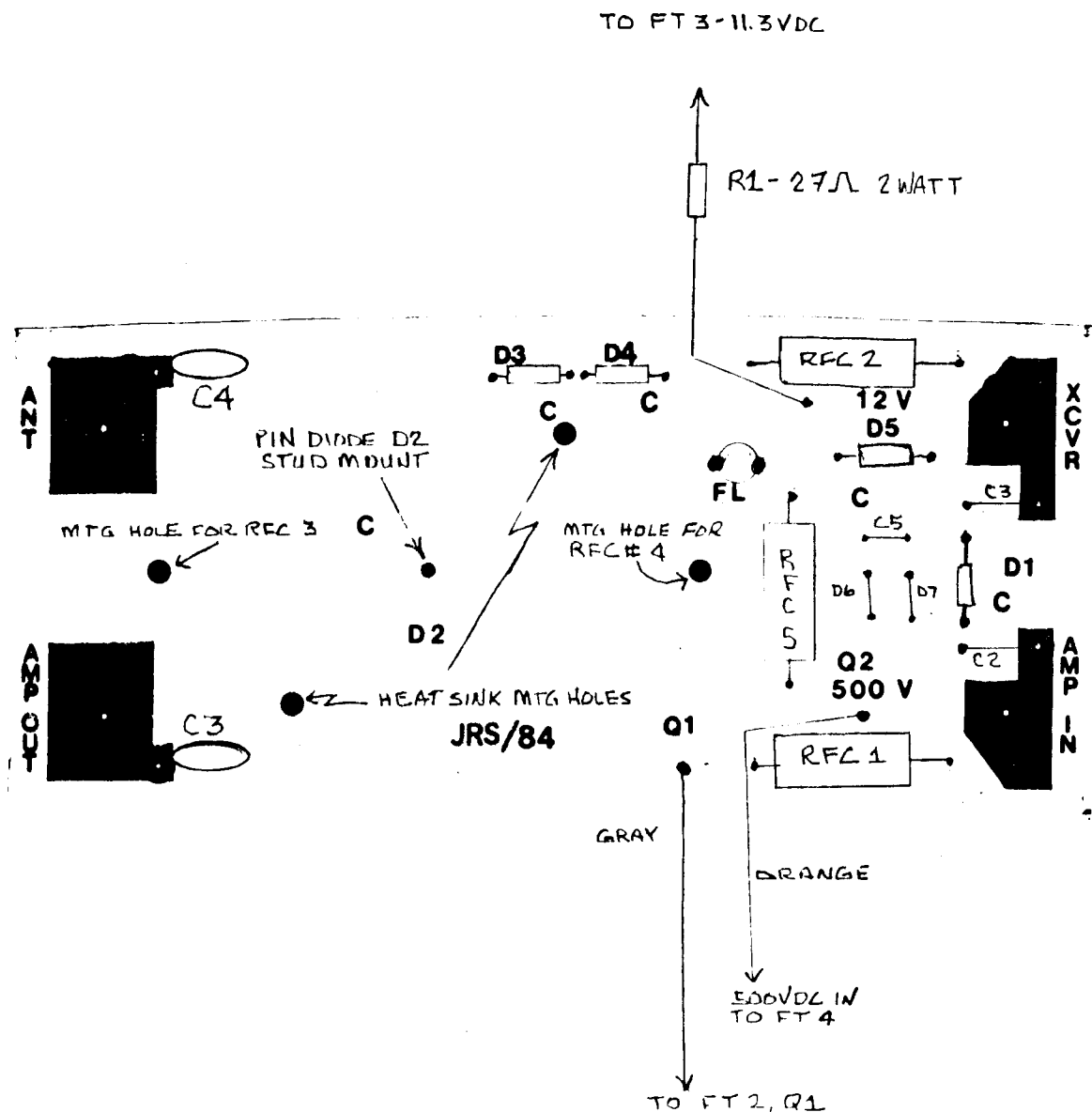


LOCATION OF C15 & R15

QSK-1500

DEO/JRS NOV 1984

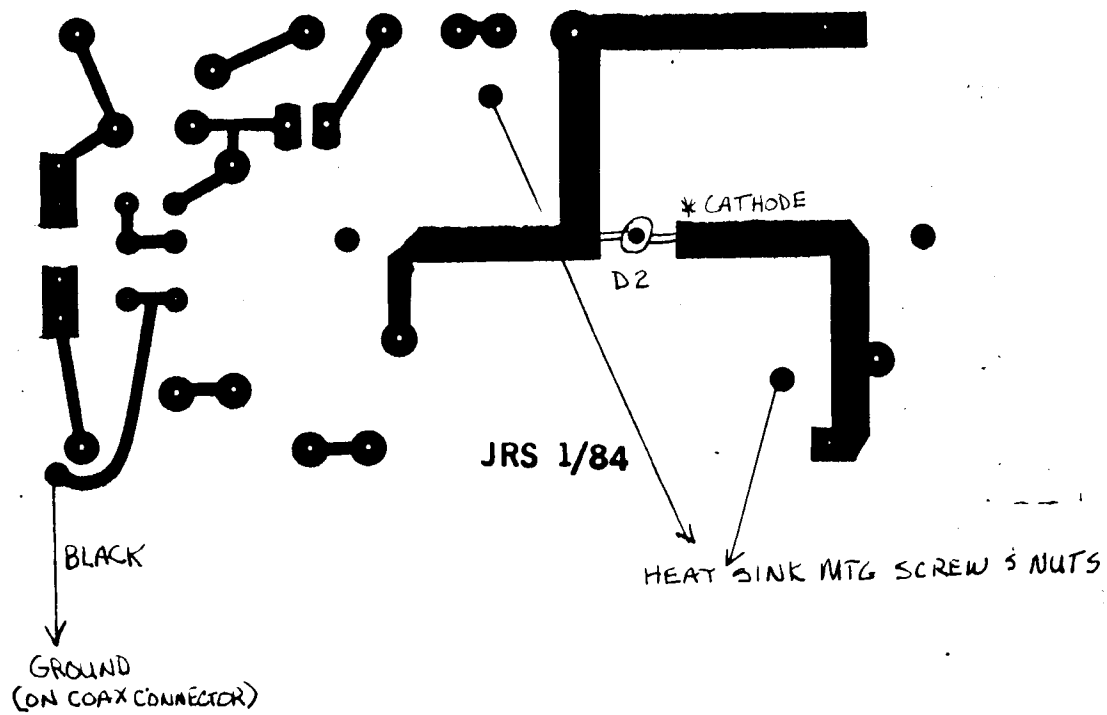
COMPONENT SIDE VIEW RF BOARD



NOTES:

1. RF BOARD : BULKHEAD SHIELD SHOULD ONLY BE REMOVED AS A UNIT.
2. FUSE LAMP FL1 SHOULD BE REMOVE AND REPLACED WITH GREAT CARE --- IT MAY BE NECESSARY TO GENTLY BEND THE PINS TO OBTAIN PROPER INSERTION

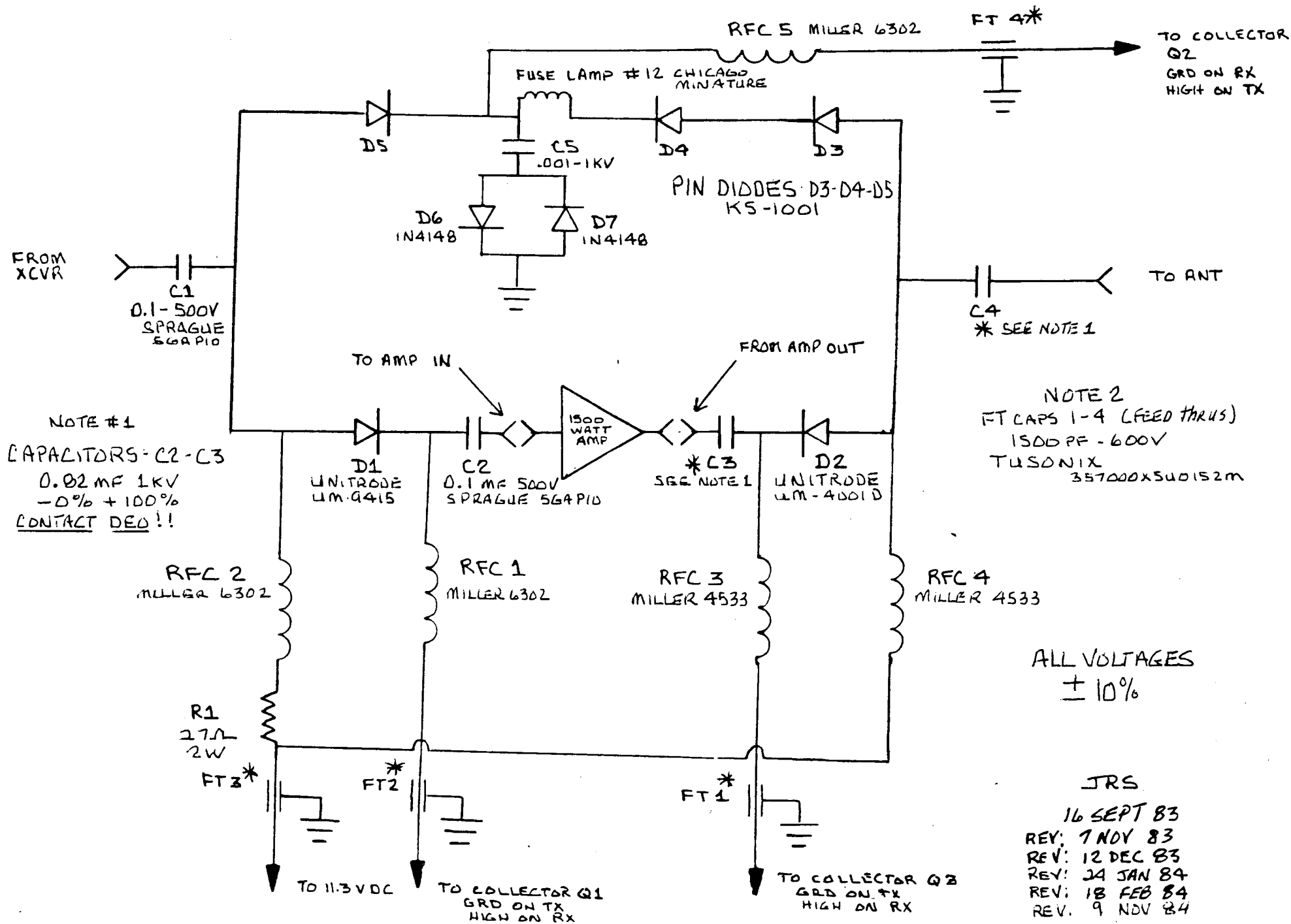
FOIL SIDE VIEW
RF BOARD



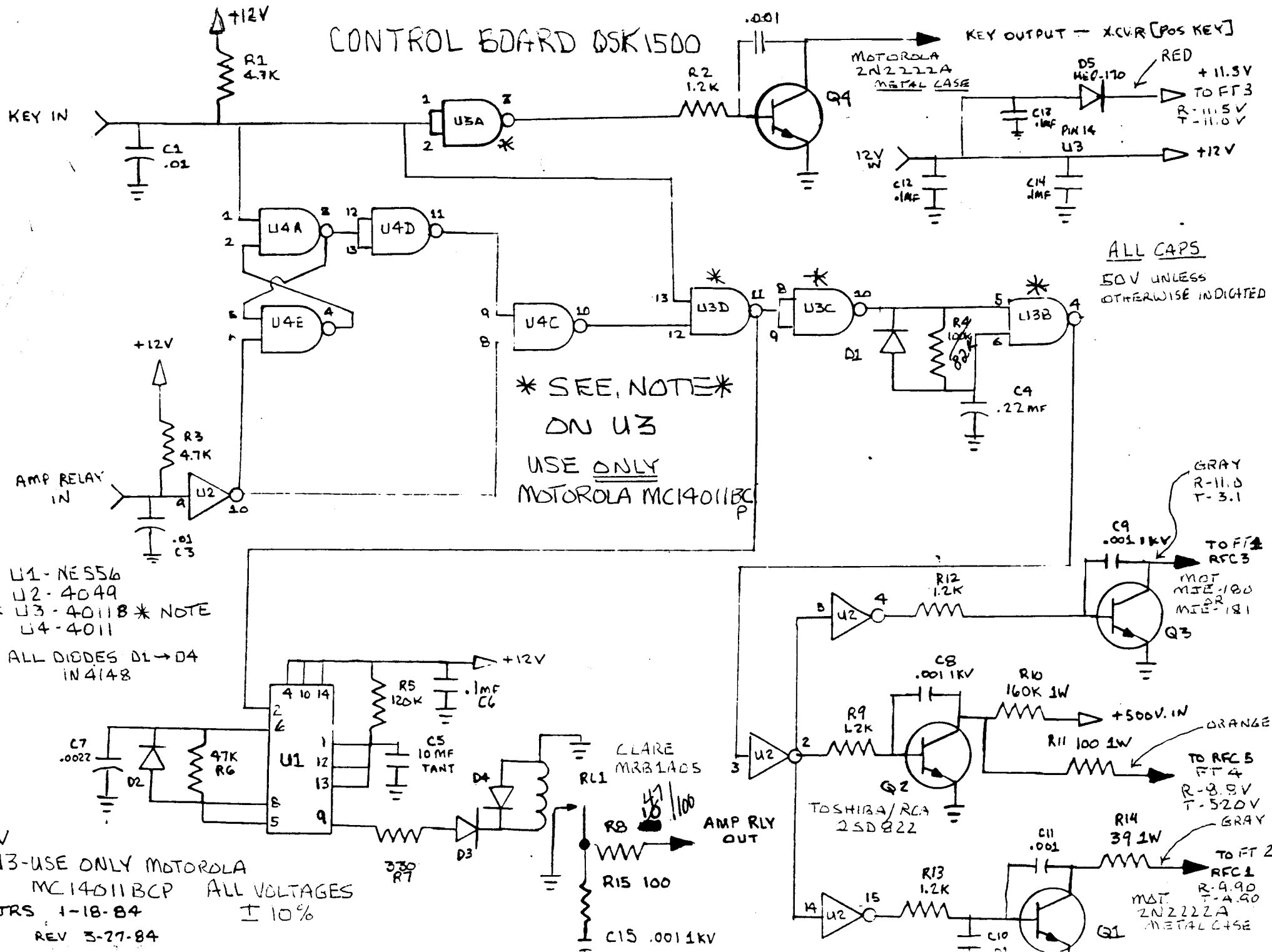
QSK-1500

DEO/JRS NOV 1984

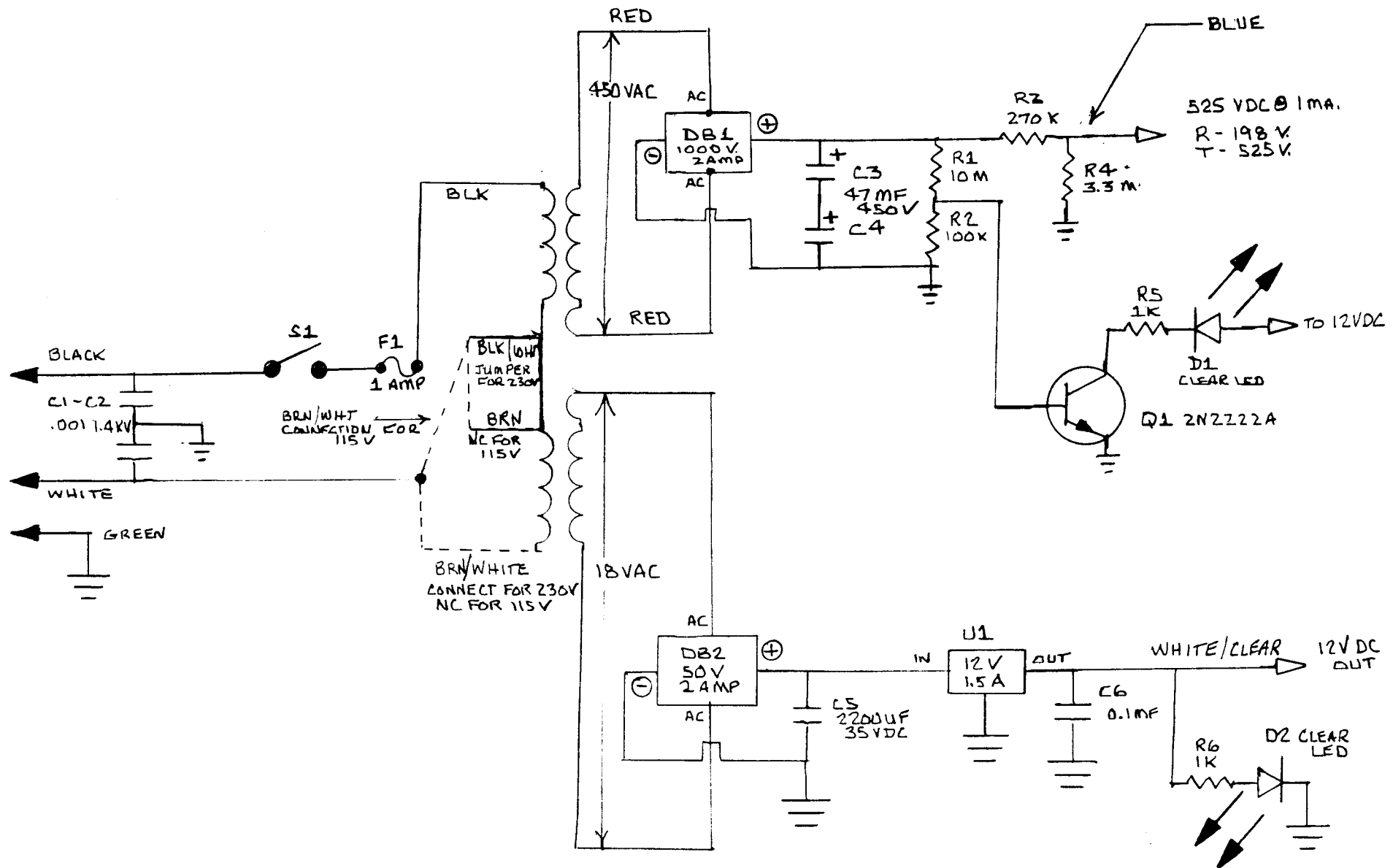
QSK 1500 RF SECTION



CONTROL BOARD DSK1500



QSK-1500 POWER SUPPLY



DEO/JRS

1-18-84

REV. 3-27-84

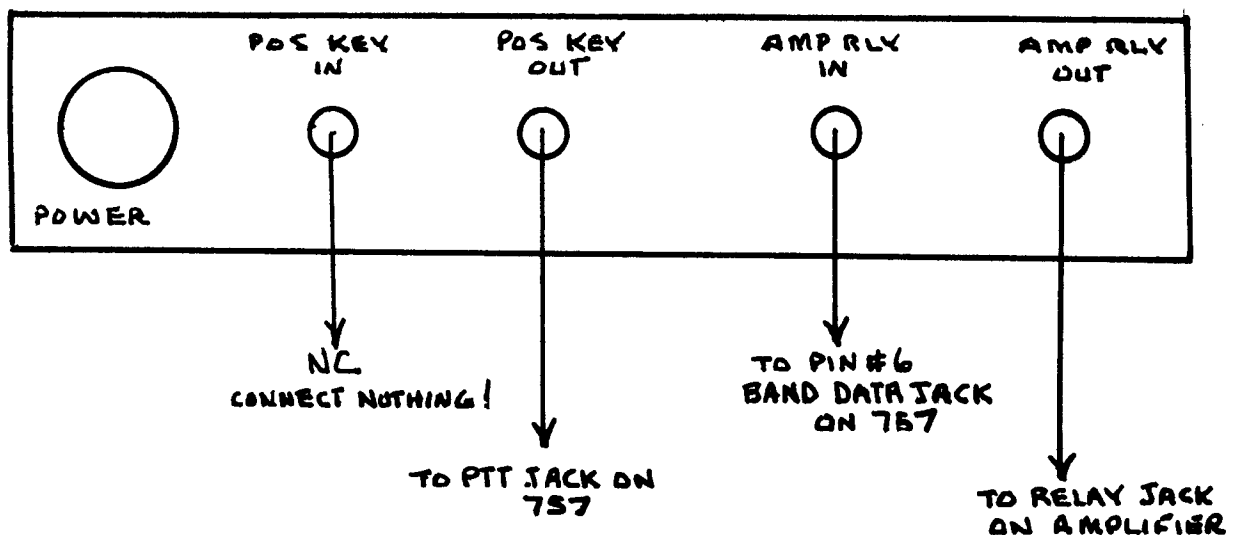
REV. 11-8-84

IMPORTANT

FT 757 OWNERS

IGNORE THE HOOKUP DIAG.
IN THE QSK 1500 MANUAL
→ HOOKUP AS FOLLOWS:

* YOU MUST USE THE INTERNAL
KEYER---DO NOT USE ANY
EXTERNAL KEYER!!



ALL COAX HOOKUPS ARE THE SAME

IRS/DEB NOV 84

Suggested improvements for the DEO QSK-1500 from Roy Koeppe, K6XK

One common minor problem is the high value resistor feeding the HV LED driver transistor base monitoring the 500V supply goes super high in resistance because it is not rated for 500 V. Replace it with a string of series resistors totaling the original value.

In fact, replace all resistors with 500 V bias on them with series strings.

The LV bridge is troublesome too. Many were defective and go open.

Replace with a better quality LV bridge rectifier.

73, Roy K6XK

Roy and Joy Koeppe

P.O. Box 43

Rolfe, IA 50581

"Simplicity is Ingenuity"