QEI MODEL 695

FM BROADCAST EXCITER

INSTRUCTION MANUAL

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QEI CORPORATION
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WARRANTY STATEMENT

All equipment designed and manufactured by QEI Corporation is warranted against defects in workmanship and material that develop under normal use within a period of one (1) year from the date of original shipment subject to the following conditions and limitations:

1. The purchaser is not in default under his contract of purchase.
2. The sole responsibility of QEI Corporation for any equipment not conforming to this warranty shall be, at QEI's option:
   (a) To repair or replace such equipment or otherwise cause it to meet the represented specifications either at the purchaser's installation or upon return thereof F.O.B. Williamstown, New Jersey, as directed by QEI Corporation; or
   (b) To demonstrate that the equipment has no defect in workmanship or material and that it meets the represented specifications, in which event all expenses reasonably incurred by QEI Corporation in so demonstrating including but not limited to cost of travel to and from the purchaser's installation, and subsistence, shall be paid by purchaser to QEI Corporation.
3. In case of any equipment thought to be defective, the purchaser must, within seven (7) days notify QEI Corporation, in writing, giving full particulars as to the defects. Upon receipt of such notice, QEI Corporation will give instructions respecting the shipment of the equipment, or such other manner as it elects to service this warranty as above provided.
4. Equipment shall not be deemed to be defective if, after examination by QEI Corporation, the equipment evidences damage from moisture, temperature, lightning, improper handling, installation, operation, accident, or abuse.
5. Equipment, accessories, tubes, and batteries not manufactured by QEI Corporation are subject to only such adjustments as QEI Corporation my obtain from the supplier thereof.
6. This warranty extends only to the original purchaser and is not assignable or transferable.
7. QEI Corporation further guarantees that any radio transmitter described herein will deliver specified radio frequency power output at the antenna lead when connected to a suitable load, but such guarantee shall not be construed as a guarantee of any definite coverage or range of said apparatus.
8. **NO OTHER WARRANTIES, EXPRESS OF IMPLIED INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL BE APPLICABLE TO ANY EQUIPMENT SOLD BY QEI CORPORATION, AND NO REPRESENTATIVE OR OTHER PERSON IS AUTHORIZED BY QEI CORPORATION TO ASSUME FOR IT ANY LIABILITY OR OBLIGATION WITH RESPECT TO THE CONDITION OR PERFORMANCE OF ANY EQUIPMENT SOLD BY IT, EXCEPT AS PROVIDED IN THIS WARRANTY. THIS WARRANTY PROVIDES FOR THE SOLE RIGHT AND REMEDY OF THE PURCHASE AND QEI CORPORATION SHALL IN NO EVENT HAVE ANY LIABILITY FOR CONSEQUENTIAL DAMAGES OR FOR LOSS, DAMAGE, OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE USE OF THE EQUIPMENT PURCHASED FROM QEI CORPORATION.**

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SECTION 1

GENERAL DESCRIPTION

1-1 DESCRIPTION

The QEI Type 695 FM Exciter is an all solid state, on carrier direct FM, phase locked, synthesized exciter designed to exceed the FCC requirements for use in the FM broadcast band (87.9 to 107.9 Mhz). The Exciter also features extensive metering, a high quality demodulator, and a microprocessor controlled modulation controller that uses the actual RF peak deviation to set the audio input level to the FMO. The Power Amplifier is broadbanded across the entire FM band and is capable of withstanding any magnitude or phase of VSWR. Power output is adjustable from less than 5 to greater than 20 watts and the amplifier is unconditionally stable regardless of power output or VSWR.

The 695 Exciter is manufactured in a standard 5.25"(133.4mm) x 19"(482.6mm) rack mount and is convection cooled.

1-2 ELECTRICAL SPECIFICATIONS

General Performance

Power Output.....5 - 20 Watts
Output Impedance.....50 Ohms
Output Connector.....'N' female
Frequency Range.....87.5 - 108 MHz
Operating Temp. Range.....0 to +50 deg C
Frequency Stability.....+ or - 200 Hz
AM Noise.....At least -65 dBc
Incidental (Synchronous) AM.....At least -60 dBc
Harmonic Suppression.....At least -80 dBc
Spurious Suppression.....At least -90 dBc
Type of Emission.....180F3 or 300F9

Wideband (Composite) Performance

Intermodulation Distortion (60 Hz/ 7 KHz; 4:1)....0.025%
Total Harmonic Distortion.....0.025%
Transient Intermod Distortion (TIM).....0.025%
Frequency Response
Amplitude.....+ or - 0.01% (30 Hz to 53 KHz)
Phase.....+ or - 0.1 deg (30 Hz to 53 KHz)
Stereo Separation Capability.....At least 60 dB
Crosstalk (Main to SCA).....Better than -70dB
Crosstalk (SCA to Main).....Better than -70dB
Input (1).....3.5Vpp across 10K (75 KHz dev)
SCA Input (3).....1Vrms across 5K (10% Injection)

Monaural Performance

Intermodulation Distortion.....0.025%
Total Harmonic Distortion.....0.025%
Transient Intermod Distortion.....0.025%
Frequency Response.....+ or - 0.5dB (30 Hz - 15KHz)
Pre-Emphasis.....75usec (50usec opt.)
Input (600 ohm balanced).....+10 dBm (75 KHz dev)
FM Noise (de-emphasized).....At least -75 dB

Features

Automatic Modulation Control
Built in Demodulator
Built in Spectrum Analyzer (requires ext. X-Y scope)
Bar Graph Peak Modulation Display
Eight Function Multimeter
Six Function Fault Annunciator
Incidental AM Detector
Digital Peaks per Minute Display
Bessel Function Calibrator

1-3 MECHANICAL SPECIFICATIONS

Dimensions.....5.25"(13.3cm)H x 19"(48.4cm)Wx 12"(31.5cm)D
Net Weight.....32 lb (14.5 Kg)
Packed Weight.....38 lb (17.3 Kg)

1-4 EQUIPMENT IDENTIFICATION

This equipment is identified by a Model number and a six digit serial number on the rear panel. All correspondence to your sales representative or the factory should reference the complete Model and Serial numbers.

SECTION 2

INSTALLATION

2-1 INITIAL INSPECTION

Check the shipping carton for external damage. If the carton exhibits evidence of abuse in handling (holes, broken corners etc.) ask the carrier agent to be present when the unit is unpacked. Carefully unpack the unit and inspect all equipment for physical damage. Immediately after unpacking, any bent or broken parts or scratches should be noted. Keep all packing material for proof of damage claim or possible future use.

2-2 PREPARATION FOR USE

The equipment is designed to be mounted in a standard 19"(48.4cm) rack. Air space should be provided above and below the equipment so that heat generated by the circuitry may be dissipated. Additional cooling must be provided if the ambient temperature exceeds 50 degrees C (122 F).

Mount the equipment to the rack using (4) #10 oval head screws and finishing washers.

The equipment requires a 105-125Vac or a 210-250Vac 50 or 60 Hz power source. A switch inside the power supply compartment is used to change the power transformer primary. Equipment shipped to the U.S. or Canada will have this switch in the 115Vac position.

2-3 ELECTRICAL CONNECTIONS

Connect a suitable 50 ohm RF load to RF OUT jack J8 using a type N connector and RG-8/U or equivalent cable.

Connect the composite stereo signal from the stereo generator or composite STL receiver to J2. The grounding lug may be disconnected if required to eliminate a "ground loop". Place S1 MONO/COMP switch in COMP position for stereo. 3.5Vpp across 10K is required for 100% modulation.

Connect the mono audio line to TB1. The outside terminals are the balanced 600 ohm connections. The center terminal is grounded. Place S1 MONO/COMP switch in MONO position for mono. This input is pre-emphasized internally. +10dBm is required for 100% modulation.

Connect SCA signals to SCA jacks J3, J4 or J5. 1 Vrms across 5K is required for 10% injection.

Connect a coaxial jumper between DEMOD IN jack J6 and RF SAMPLE jack J7. Alternatively an RF sample between 1 and 5 Vrms from the transmitter output may be connected to DEMOD IN jack J6.

Connector J1 is the interface connection to QEI Microprocessor Diagnostic equipped Transmitters.

2-4 REPACKING FOR SHIPMENT

NOTE: Before returning a unit for repair or calibration, contact the factory or your authorized representative for a RETURN AUTHORIZATION. Attach a tag showing owner"s name and address. A description of the service required should also be included. UNIT MUST BE SHIPPED PREPAID AND INSURED FOR FULL VALUE. Use the original shipping carton and packing material for shipment. If these are not available, proceed as follows:

A. Use a carton with a minimum strength of 250 lb.
B. Be sure the carton is large enough so that there is at least 4 inches clearance on all sides of the equipment.
C. Pack these 4 inches with extra firm polyurethane foam or equivalent. DO NOT USE NEWSPAPER OR FOAM "POPCORN" FOR PACKING. The vibration and shock of shipment make these materials unsuitable.
D. Use heavy reinforced shipping tape to secure the outside of the carton.
E. Use large FRAGILE labels on each surface.

SECTION 3

OPERATION

3-1 CONTROLS AND INDICATORS (Front Panel)

a) POWER switch--Push Button which controls AC power to the unit. Button is green when power is on.

b) CAL switch--Momentary push button used to verify calibration of modulation metering in the unit. Depressing this button removes thie program input from the FMO and substitutes a 32KHz sine wave. This frequency produces the first Bessel carrier null at 102.6% modulation. This corresponds to the CAL mark on the MULTIMETER.

c) PROGRAMMED FREQUENCY / 100% PEAKS PER MINUTE switch and display--Push-push switch and LED numeric display. When push button is out (black), Automatic Modulation Control is disabled and LED displays the channel frequency for which the unit is programmed. (NOTE: This indication is NOT an actual frequency count.) When push button is depressed (white), Automatic Modulation Control is enabled and LED indicates the number of 100% modulation peaks which have occurred. This indication resets to 0 once a minute, has a maximum count of 19 and flashes if the number of peaks exceeds 10 in any given minute. In keeping with the FCC's rules for ATS, one peak is counted for any modulation burst of 100% up to 5msec duration.

d) MULTIMETER switch and meter--8 position push button is used to select function displayed on meter. The color of the push button depressed corresponds to the scale color used on the meter for that function.

MOD(+)	Positive modulation
MOD(-)	Negative modulation
MOD(10%)	Modulation (13.3% FS)
PA VOLTS	Final Collector voltage
PA AMPS	Final Collector current
IPA AMPS	IPA Collector current
RF FWD	RF Output (100% = 20 W)
RF REV	Reflected power

e) PWR--Screwdriver adjustment used to set RF power output.

f) FREQ--Screwdriver adjustment used to set carrier frequency exactly. Range is approximately + or - 500 Hz.

3-1 CONTROL AND INDICATORS (continued)

g) MOD CONTROL ON--Indicator lit when Automatic Modulation Control is in operation.

h) PEAK MODULATION--Bar graph display which shows actual demodulated modulation level (not just the audio input to the FMO). The bar segment indicating the highest peak stays illuminated until automatically reset once per minute. This feature allows easy determination of dynamic range and loudness.

i) Fault Annunciator--Indicators lit under the following conditions:

1. MOD CONTROL FAULT.....Lit if modulation exceeds 100% more than 10 times per minute for 3 consecutive minutes OR if modulation falls below a preset level for 3 consecutive minutes. This level is normally set at 85%. See section 5-5.

2. AFC FAULT.....Lit if any failure occurs in the frequency control circuitry.

3. Vcc FAULT.....Lit if Final Collector supply is out of tolerance.

4. +12 FAULT.....Lit if +12 supply is out of tolerance.

5. -12 FAULT.....Lit if -12 supply is out of tolerance.

6. +5 FAULT.....Lit if +5 supply is out of tolerance.

j) RF TEST--BNC jack used to measure incidental (synchronous) AM. Ratio of AC to DC at this jack indicates level of AM on carrier.

k) MODULATION TEST--BNC jacks used for audio measurements.

1. INPUT.....Signal at this jack is the signal being fed to the FMO. This signal should be used as a reference. The OUT-WB signal will look substantially the same as the INPUT signal when the unit is operating properly.

2. OUT WB.....Signal at this jack is demodulated composite output of either the exciter or the transmitter depending upon the sample supplied to the DEMOD IN jack on the rear panel.

3. OUT-DE.....Signal at this jack is the same as OUT-WB except with 75 usec de-emphasis.

l) SPECTRUM ANALYZER--BNC Jacks used in conjunction with an X-Y Oscilloscope to generate a spectrum analyzer display. Connect the X jack to the scope horizontal input and the Y jack to the scope vertical input. Set the scope horizontal sensitivity to 0.5 volts/div and the vertical sensitivity to 0.2 volts/div. Insure that both scope inputs are DC coupled. The display generated will show the carrier frequency + or - approximately 120 KHz horizontally and approximately 10 dB per division vertically. This display can be used to show bandwidth occupied and Bessel nulls. Bessel functions can be used to accurately determine modulation levels. Information can be found in virtually any text on FM systems.

3-2 CONTROLS (Rear Panel)

a) MONO/COMP switch S1--Switch selects which input is fed to the FMO.

b) CLIP/OFF switch S2--Switch which controls built in composite clipper. Clipper is normally set to limit spikes to approximately 108%. See section 5-4 and 5-6.

3-3 INITIAL OPERATION

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* CAUTION *
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The input tuning of some transmitters can be mistuned to the point where the tube may oscillate. If this happens, enough power may be fed back into the exciter to destroy the output transistor. If there is any doubt concerning the stability of the transmitter, it is recommended that a 20 watt 3dB pad be inserted between the exciter and the transmitter.

A. Turn PWR adjustment full counterclockwise (minimum RF out).

B. Insure that the unit is connected to a proper power source and that an appropriate RF load is connected to RF OUT jack J8. See Section 2-3.

C. Depress POWER switch.

D. Verify that all FAULT Indicators are extinguished.

E. Depress RF REV Button.

F. Slowly rotate PWR adjustment Clockwise while observing transmitter power output and exciter MULTIMETER. Tune the transmitter input for minimum RF REV indication on the MULTIMETER. Continue rotating the PWR adjustment until the exciter is supplying adequate RF drive to the transmitter.

3-4 NORMAL OPERATION

For normal operation, use PWR adjustment to set RF output to the level desired. Use FREQ adjustment to fine tune exciter to the exact carrier frequency using an external counter or frequency measuring service. It is suggested that modulation be removed while performing a frequency measurement with a digital counter. Counter must have a gate time of at least 4 seconds to obtain an accurate count when modulation is present. If FREQ adjustment can not bring the exciter exactly on frequency, see Section 5-2 for coarse adjustment.

It is suggested that MULTIMETER readings be observed and logged periodically.

The MOD(+) and MOD(-) positions of the MULTIMETER and the PEAK MODULATION Bar Graph may be used to determine accurate modulation levels. These indications are derived from an actual monitor grade wide band demodulator which receives its input from the RF output of the exciter or transmitter. NOTE: An RF sample must be connected to DEMOD IN jack J6 in order for the modulation indications to function.

Depressing the PROGRAMMED FREQUENCY / 100% PEAKS PER MINUTE switch will enable the Automatic Modulation Control feature. This feature uses the demodulated output to control the level of the composite signal fed to the FMO. A microprocessor algorithm is used which maintains 4 to 9 peaks of 100% modulation per minute even if the input signal to the exciter varies as much as plus or minus 3 dB. This is accomplished without affecting stereo pilot injection or phase. This feature will automatically adjust the composite signal to compensate for SCA injection. See Section 5-4 if you wish to take advantage of the 110% rule for SCA.

An internal Composite Clipper is included to limit overshoots to a specific level. See Section 5-6. The clip level is controlled by the microprocessor when in Automatic Modulation Control. CLIP / OFF switch S2 on the rear panel is used to defeat the clipping feature if desired.

SECTION 4

THEORY OF OPERATION

4-1 GENERAL

The exciter circuitry is on six major subassemblies. A description of the functions contained on each of these follows.

a) A2 Phase Lock Loop & Modulation Control

This board contains the reference 8 MHz crystal oscillator, the reference divider, the programmable divider, phase detector and 2 stage loop filter which generates the AFC voltage for the FMO. It also contains the audio composite and SCA input amplifiers and summing networks, adigitally controlled electronic attenuator, and a composite clipper which sets the level of the modulating signal fed to the FMO.

b) A3 Display and Interface

This board contains the circuitry required to generate the various display and metering functions. It also supplies the diagnostic samples used with the QEI diagnostic equipped transmitters. In addition, it is used as a junction or "mother" board among the other subassemblies. The frequency programming plugs are also located on this board.

c) A4 Receiver and Log Amp

This board contains the crystal controlled precision wide band low noise demodulator and the circuitry required to generate the spectrum analyzer display outputs. It also contains the reference voltage generator for the composite clipper located on the A2 assembly.

d) A5 AUTOMOD and Bar Graph Driver

This board contains the microprocessor and peripheral circuitry which drives the electronic attenuator on the A2 assembly and the Peak Modulation Bar Graph on the A3 assembly.

e) A6 FMO and Buffer Amplifier

This board contains the sealed FMO and a broadband RF amplifier which drives the RF power amplifier.

f) A7 RF Power Amplifier

This assembly contains the IPA and PA stages. They are broadbanded and require no tuning to cover the entire FM band. Power output is in excess of 20 watts.

4-2 AUTOMATIC MODULATION CONTROL

There are two versions of the Automatic Modulation Control software available:

A. The first (standard) version controls the modulation fed to the composite input connector or alternately the monaural input on the rear of the exciter over a +/- 5dB range.

   The control is set for expansion (gain increase) over a total of 256 equal steps at the rate of 2 steps/second.

   When the internal receiver / detector senses a modulation peak at or in excess of the 100% modulation setpoint, the gain is set back by 8 steps for a gain reduction of approximately 1/3dB.

B. The second (Classical) version controls the modulation fed to the composite input connector or alternately the monaural input on the rear of the exciter over a +/- 2.5dB range.

   The control is set for expansion (gain increase) over a total of 256 equal steps at the rate of 1 step/second.

   When the internal receiver / detector senses a modulation peak at or in excess of the 100% modulation setpoint, the gain is set back by 8 steps for a gain reduction of approximately 1/6dB.

The modulation control circuitry in the QEI 695 Exciter is designed to control the stereo modulating signal without variations in the level of the 19KHz pilot signal. The insertion of subcarrier signals connected to any of the three subcarrier input connectors on the exciter is after the modulation control circuitry. The composite input circuitry is designed for differential operation and a wide input frequency response. In the case where a composite baseband signal (including SCA Subcarriers) is fed into the composite input of the exciter, the level of the subcarrier injection will vary with the action of the exciter to control total modulation.

Automatic Modulation Control within the exciter is enabled by one of two means. It may be enabled at the exciter by means of the "Prog Fcy / 100% PPM" button on the front of the exciter. It may also be controlled remotely by the optional transmitter control package. If it is enabled (on) locally, it will not be over-ridden (off) remotely. If it is not enabled at the exciter, it may be controlled (on/off) from the remote terminal.

The modulation level is controlled by varying the gain of U19 on the PLL and MOD CONTROL ASSY (A2) of the exciter. The gain of the amplifier is controlled by the action of the analog switches U20, U21 (DG-202's). These switches are controlled by the data lines D0-D7 which originate at U11 (74LS374) on the AUTOMOD (A5) assembly. Nine resistors connect to the inverting input of U19. One of the resistors (R44, 2.49K) is used as part of the feedback circuit for this amplifier. This resistor (R44) is connected to R68 & R69. R68 (620 ohm) is an amplifier buildout resistor and R69 (1K ohm) provides isolation from the FMO audio input line. An absolute peak clipper circuit is also connected to this junction.

The other end of each of the remaining (eight) resistors used to control the gain of U19 connect to one of the individual analog switches in U20 or U21. The other end of the analog switches connect to a ground reference point. In this circuit, however, the reference point is one end of a tuned circuit consisting of L1,C23 tuned to 19,000Hz. The other end of this tuned circuit is connected to circuit common. The tuned circuit provides a high impedance at 19KHz and a (near) short at all other frequencies. This has the effect of providing a fixed gain at 19KHz with the ability to vary (control) the gain at all other frequencies. The fixed gain at 19KHz is relatively low. The gain at the other frequencies is much higher. The circuit compensates for this by making this same point the reference for resistive divider on the input signal. At 19KHz, the signal on the non-inverting input to U19 is higher than at all other frequencies. This is due to the added impedance of the tuned circuit shifting the value of the divider at 19KHz.

The 19KHz tuned circuit MUST be adjusted for best 38KHz phase response through the exciter.

The input circuit is a differentially connected Opamp (NE5532) using only the internal compensation of the IC. The resultant circuit is very broadbanded and readily passes a full composite signal (subcarriers included). The input is terminated into a 10Kohm pot and reflects a constant 10Kohm load to the input connector. As this input is differentially connected, the composite input connector is installed with the outer shell isolated from the exciter chassis (floating). A switch is provided to allow the user to connect this point to chassis ground if it is required.

The exciter also has a transformer isolated monaural input. A switch (double pole, double throw) is provided to select between the composite and mono inputs. When the mono input is selected, the 19KHz tuned circuit is shorted and the gain control reference is connected to circuit ground.

After the switch is a resistively isolated output that connects to a front panel test point labeled "mod test input". This point is connected prior to any modulation control circuitry and available to view or test the incoming signal.

While the control of the modulation is under the control of the microprocessor in the exciter, there are a number of other circuits necessary for proper operation of the Automatic Modulation control in the exciter.

The Receiver / Log Amp (A4) assembly is used to receive / demodulate a signal either from the exciter test point or from a transmitter or transmission line test point. The assembly also contains the circuitry for the spectrum analysis display portion of the exciter. Of primary importance to the automatic modulation control is the composite output of the unit. The composite level control (A4R49) on this board directly effects the action of the AMC circuits. The composite signal leaves this assembly via J409-1.

The Automod (A5) assembly receives the composite signal from the Receiver / Log Amp (A4) via J509-1. The signal then is connected to both the comparator circuitry for the automod and to the driving circuitry for the bargraph display. The circuitry on this assy. allows the comparison of both positive and negative peaks to a preset reference. If a peak is present, the circuitry then provides the proper signal to drive a fixed length "one-shot" pulse that provides the Z80 Microprocessor/Controller with a "interrupt" signal. The gain control action is taken in software and the processor changes the gain control signals to the analog switches on the Mod Control (A2) assembly. These signals leave the assembly via connector J506.

The processor also provides the signals used to drive the "Peaks Per Minute" (PPM) indicator on the front of the Exciter. These signals leave the assembly via connector J506.

There is an overmodulation alarm contained in the AMC software. It will trigger an alarm if there are three continuous minutes in which there are ten or more overmodulation peaks. The alarm signal leaves this assembly via J509-16.

Also contained on this assembly is circuitry for setting the low modulation alarm point of the Exciter. The Low Mod control R2 is used to set the Low Mod alarm point. It has a nominal range of 30% modulation to 70% modulation. The software limits are set so that the Low Mod alarm will be triggered when the low modulation detector remains below its preset alarm point for three continuous minutes. The alarm signal leaves this assembly via J509-15.

There is also a summary "mod fault" alarm that leaves the board via J509-10.

Automodulation control into this assembly is via a signal brought in on J509-9. This signal is brought into an interface IC U14-13 (8286).

The AMC signal is brought to this assy. from the Display and Interface (A3) assy. This signal when pulled low indicates that the AMC has been enabled. This signal is pulled low by A3Q5. The drive for this transistor is derived from the PPM selector on the front of the exciter. When the signal is high it also switches U3, U4 (74157) to cause the Pulse Per Minute to be displayed on the front panel. This High signal is isolated from the transistor by a series resistor. The same signal also drives Q6 which causes the "Auto Mod On" indicator on the front of the exciter to be illuminated.

There is another connector on this assembly (J308) that carries the signals to/from the optional (01) transmitter controller. This signal will control the AMC if the PPM switch on the front panel has not been set.

SECTION 5

ALIGNMENT

5-1 EQUIPMENT REQUIRED BUT NOT SUPPLIED

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* CAUTION *
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DO NOT ATTEMPT TROUBLESHOOTING OR ALIGNMENT OF THIS EQUIPMENT WITHOUT ADEQUATE TOOLS AND TEST EQUIPMENT

a) RF Dummy Load (50 ohms @ 88-108MHz--25 Watts minimum)

b) RF Wattmeter (Bird 43 or equivalent)

c) Dual Trace DC coupled Oscilloscope with X-Y function and 10 MHz minimum bandwidth

d) Audio Generator (less than 0.01% THD)

e) Distortion Analyzer or Audio Spectrum Analyzer capable of measuring less than 0.01% THD and 80dB S/N

f) 110 MHz Frequency Counter (Stability better than 1 part per million)

g) FM Modulation Monitor (QEI 691 or equivalent-- if required to check operation of A4 assembly)

h) RF Spectrum Analyzer

i) Digital Voltmeter (3 1/2 digits min.)

j) Stereo Generator

NOTE: BEFORE STARTING ALIGNMENT OR TROUBLESHOOTING, VERIFY THAT ALL SUPPLY VOLTAGES ARE PRESENT AND CORRECT. MAKE SURE THAT THE EXCITER IS CONNECTED TO A PROPER RF LOAD.

NOTE: THE ALIGNMENT OF THIS UNIT SHOULD BE DONE WITH THE MODULATION CONTROL (AUTOMOD) OFF AND THE CLIPPER SWITCH S2 OFF UNLESS OTHERWISE NOTED.

5-2 A2 PLL & MODULATION CONTROL

A. Mono Input Level Adjustment

1. Place S1 MONO/COMP switch in MONO position
2. Connect the 600 ohm output of the audio generator to TB1 (Mono Input)
3. Set the generator to produce 100 Hz at a level of +10 dBm

4. Adjust A2R54 for 100% modulation

B. Composite Input Level Adjustment

1. Place S1 MONO/COMP switch in COMP position
2. Connect the output of the audio generator to J2 COMP IN jack
3. Set the generator to produce 400 Hz at a level of 3.5 Vpp
4. Adjust A2R59 for 100% modulation

C. SCA Input Level Adjustment

1. Connect the output of the audio generator to J3 SCA #1 IN jack
2. Set the generator to produce a frequency between 53kHz and 99kHz at a level of 1 Vrms
3. Adjust A2R83 for 10% modulation
4. Repeat steps 1 through 3 for J4 SCA #2 jack and A2R84 and for J5 SCA #3 jack and A2R85

D. Pilot Phase Adjustment

1. Connect the output of a stereo generator to J2 COMP IN jack and to channel A of an oscilloscope
2. Place S1 MONO/COMP switch in COMP position
3. Set the stereo generator to produce a 90% L=-R signal at 400 Hz with 10% pilot
4. Connect channel B of the oscilloscope to the MODULATION TEST INPUT jack on the front panel
5. NOTE: Do Not use an attenuator probe on either scope input. Unless these probes are exactly matched, they can cause apparent phase errors. Verify that both channels are DC coupled. Trigger the scope externally with 400 Hz and set the gain and time controls so that the pilot phase crossover or "diamond" may be observed.
6. Adjust A2L1 until the crossover on channel B matches channel A

E. Coarse Frequency Adjustment

1. Connect a frequency counter to J7 RF SAMPLE jack on the rear panel
2. Center the FREQ adjustment screw on the front panel
3. Remove modulation from the exciter
4. Adjust A2C17 until carrier frequency is exact

5-3 A3 DISPLAY AND INTERFACE (Initial Set Up)

A. Diagnostic Current Zero

1. Remove RF drive to the A6 Assembly by removing the FMO connector A11J1
2. Adjust A3R99 until J1 pin (Diagnostic connector on rear panel) reads 0.00 volts
3. Adjust A3R98 until J1 pin reads 0.00 volts
4. Reconnect A11J1

B. Modulation Meter Zero

1. Allow approximately 30 seconds settling time if exciter has just been turned on
2. Verify that no modulation is applied to the exciter
3. Depress MOD(+) button on the MULTIMETER switch
4. Adjust A3R38 until meter reads zero

C. Power Leveling Adjustment

1. Connect a calibrated wattmeter and dummy load to the RF OUT jack J8
2. Depress POWER switch
3. Depress RF FWD button on the MULTIMETER switch
4. Alternately adjust PWR adjust screw on the front panel and the A3R73 until 100% on the MULTIMETER equals 20 watts as read on the wattmeter
5. Set A3R74 to the same position as A3R73

5-4 A4 RECEIVER AND LOG AMP (Initial Set Up)

A. Local Oscillator Adjustment

1. Connect a coax cable from the junction of A4L1 and A4C29 to a frequency counter
2. Adjust A4T1 until LO stabilizes at your operating frequency plus 10.7 MHz

NOTE: The oscillator should "snap" on and off as the adjustment is varied. The frequency should not be able to be moved more than a few hundred Hz from the crystal frequency.

3. Turn the exciter off and on a few times to insure that the LO starts and locks

B. Distortion and Output Level Adjustments

1. Connect a coaxial cable from RF SAMPLE jack J7 to DEMOD IN jack J6
2. Connect a distortion analyzer or audio spectrum analyzer to the OUTPUT-DE connector on the front panel
3. Connect an audio generator to the composite jack J2. Set the generator for 400 Hz at 3.5 Vpp
4. Carefully adjust A4C18 and A4C21 for minimum distortion

5-4 A4 RECEIVER AND LOG AMP (continued)

5. Connect the analyzer to MODULATION TEST-INPUT jack. Distortion level here should be substantially the same as that measured at OUTPUT-DE thus verifying the transparency of the exciter
6. Connect an oscilloscope to the OUTPUT-WB jack and adjust A4R49 for 6 Vpp

C. Swept Oscillator Adjustment

1. Connect a frequency counter to the junction of A4C38 and A4Z2
2. Short A4U3b-5 to ground. Adjust A4L10 for 11.155 MHz
3. Remove short and disconnect frequency counter
4. Connect an oscilloscope to the SPECTRUM ANALYZER X jack. Set the scope for DC coupled, 1 volt/div
5. Adjust A4R8 so that the positive peak of the sawtooth is equal to + 3 V
6. Adjust A4R14 so that the negative peak of the sawtooth is equal to - 3 V

D. Log Amplifier Adjustment

1. Connect the SPECTRUM ANALYZER X jack to the horizontal input of an oscilloscope. Set the horizontal sensitivity for external, 0.5 volts/div, DC coupled
2. Connect the SPECTRUM ANALYZER Y jack to the vertical input of the oscilloscope. Set the vertical sensitivity for 0.2 volts/div, DC coupled
3. Connect a coaxial cable from RF SAMPLE jack J7 to DEMOD IN jack J6 through an RF step attenuator (0 to 50dB)
4. Depress CAL pushbutton
5. Adjust A10R1 (located on Power Switch assembly) until carrier nulls on scope display
6. Adjust A4R18, A4R20, A4R28 and A4L10 until four symmetrically spaced sidebands appear on either side of the carrier
7. Adjust A4C37 for maximum amplitude of the display
8. Adjust A4R69 so that a 10dB decrease in RF sample will produce a 0.2 volt drop in the display

5-5 A5 AUTOMOD AND BAR GRAPH DRIVER

A. Low Modulation Adjustment

1. Connect an oscilloscope to A5U1c-13
2. Modulate the exciter with a 400 Hz tone to the level desired for the low modulation alarm
3. Adjust A5R2 until pulses just appear on the scope

B. Bar Graph Alignment

1. Modulate the exciter with a 400 Hz tone to 100%. Adjust A5R20 until the 100% bar graph segment just lights

5-6 FINAL AUTOMOD AND RECEIVER SET UP

1. Connect an oscilloscope to the exciter so as to produce a spectrum analyzer display (See Section 3-1 (1)
2. Modulate the exciter with a 13586 Hz tone
3. Adjust the input level for the 2nd carrier null on the spectrum analyzer display
4. Depress the MOD (-) pushbutton on the MULTIMETER switch. Adjust A3R48 until the meter reads 100%
5. Depress the MOD (+) pushbutton on the MULTIMETER switch. Adjust A3R46 until the meter reads 100%
6. Depress the PROGRAMMED FREQUENCY/100% PEAKS PER MINUTE switch. Verify that MOD CONTROL ON indicator lights
7. Watch the modulation level and note the point where it "kicks back". This is the point where the modulation control circuitry thinks the 100% modulation level is. Alternately adjust A4R49 and A3R48 until the "kick back", 2nd carrier null, and 100% modulation indication coincide
8. Adjust A5R20 if necessary until the 100% bar graph segment just lights
9. Release the PROGRAMMED FREQUENCY/100% PEAKS PER MINUTE switch. Verify that MOD CONTROL ON indicator is extinguished
10. Connect the oscilloscope to the OUT-WB connector on the front panel
11. Turn the CLIPPER switch S2 on the rear panel ON
12. Modulate the exciter with a 400 Hz tone to 108%. Adjust A4R83 until the signal viewed on the scope just starts to clip

5-7 FREQUENCY PROGRAMMING

A. The carrier frequency of the 695 Exciter can be changed by moving the switches on JU1 and JU2 on the A3 Display and Interface Assembly. To program a new frequency proceed as follows:

NOTE: The 695 may be programmed for increments other than 100 KHz. Contact the factory for information.

1. To program from 87.9 to 89.9 MHz, switch JU2 as follows:
   a. JU2-3 ON
   b. JU2-7 ON
   c. JU2-8 ON

2. To program from 90.0 to 99.9 MHz, switch JU2 as follows:
   a. JU2-3 ON
   b. JU2-7 ON

3. To program from 100.0 to 107.9 MHz, switch JU2 as follows:
   a. JU2-3 ON
   b. JU2-8 ON

4. Write the BCD code for the megahertz and kilohertz digits of the new frequency. EXAMPLE- 97.3 , write 0111 (7) and 0011 (3)

5. Close the switches on JU1 per the BCD code you wrote in step 4 above. Refer to drawing 695300 for pin identification on JU1 and J301. NOTE: True BCD code is used in the switches, i.e., "0" means turn switch on, "1" means leave off.

6. Turn exciter on and place PROGRAMMED FREQUENCY/100% PEAKS PER MINUTE switch in PROGRAMMED FREQUENCY position. Verify that frequency displayed is as required and that AFC FAULT indicator is extinguished.

FREQUENCY PROGRAMMING CHART
QEI 695 EXCITER

FREQUENCY PROGRAMMING STEPS				.1M	.2M	.4M	.8M	1M	2M	4M	8Mhz
JU2-3to JU2-14	JU2-7to JU2-10	JU2-8to JU2-9	JU1 JU1	1to 16	2to 15	3to 14	4to 13	5to 12	6to 11	7to 10	8to 9
NON COMMERCIAL			FREQUENCY								
X	X	X	87.9	X			X	X	X	X	
X	X	X	88.1	X							X
X	X	X	88.3	X	X						X
X	X	X	88.5	X		X					X
X	X	X	88.7	X	X	X					X
X	X	X	88.9	X			X				X
X	X	X	89.1	X				X			X
X	X	X	89.3	X	X			X			X
X	X	X	89.5	X		X		X			X
X	X	X	89.7	X	X	X		X			X
X	X	X	89.9	X			X	X			X
X	X		90.1	X							
X	X		90.3	X	X						
X	X		90.5	X		X					
X	X		90.7	X	X	X					
X	X		90.9	X			X				
X	X		91.1	X				X			
X	X		91.3	X	X			X			
X	X		91.5	X		X		X			
X	X		91.7	X	X	X		X			
X	X		91.9	X			X	X			

X = 1

X = 0

Note: Logic Reverses on Jumpers

FREQUENCY PROGRAMMING CHART
QEI 695 EXCITER

FREQUENCY PROGRAMMING STEPS				.1M	.2M	.4M	.8M	1M	2M	4M	8Mhz
JU2-3to JU2-14	JU2-7to JU2-10	JU2-8to JU2-9	JU1 JU1	1to 16	2to 15	3to 14	4to 13	5to 12	6to 11	7to 10	8to 9
COMMERCIAL		FREQUENCY									
X	X	92.1		X					X		
X	X	92.3		X	X				X		
X	X	92.5		X		X			X		
X	X	92.7		X	X	X			X		
X	X	92.9		X			X		X		
X	X	93.1		X				X	X		
X	X	93.3		X	X			X	X		
X	X	93.5		X		X		X	X		
X	X	93.7		X	X	X		X	X		
X	X	93.9		X			X	X	X		
X	X	94.1		X						X	
X	X	94.3		X	X					X	
X	X	94.5		X		X				X	
X	X	94.7		X	X	X				X	
X	X	94.9		X			X			X	
X	X	95.1		X				X		X	
X	X	95.3		X	X			X		X	
X	X	95.5		X		X		X		X	
X	X	95.7		X	X	X		X		X	
X	X	95.9		X			X	X		X	
X	X	96.1		X					X	X	
X	X	96.3		X	X				X	X	
X	X	96.5		X		X			X	X	
X	X	96.7		X	X	X			X	X	
X	X	96.9		X			X		X	X	
X	X	97.1		X				X	X	X	
X	X	97.3		X	X			X	X	X	
X	X	97.5		X		X		X	X	X	
X	X	97.7		X	X	X		X	X	X	
X	X	97.9		X			X	X	X	X	
X	X	98.1		X							X
X	X	98.3		X	X						X
X	X	98.5		X		X					X
X	X	98.7		X	X	X					X
X	X	98.9		X			X				X
X	X	99.1		X				X			X
X	X	99.3		X	X			X			X
X	X	99.5		X		X		X			X
X	X	99.7		X	X	X		X			X
X	X	99.9		X			X	X			X

FREQUENCY PROGRAMMING CHART
QEI 695 EXCITER

FREQUENCY PROGRAMMING STEPS				.1M	.2M	.4M	.8M	1M	2M	4M	8Mhz
JU2-3to JU2-14	JU2-7to JU2-10	JU2-8to JU2-9	JU1 JU1	1to 16	2to 15	3to 14	4to 13	5to 12	6to 11	7to 10	8to 9
COMMERCIAL			FREQUENCY								
X		X	100.1	X							
X		X	100.3	X	X						
X		X	100.5	X		X					
X		X	100.7	X	X	X					
X		X	100.9	X			X				
X		X	101.1	X				X			
X		X	101.3	X	X			X			
X		X	101.5	X		X		X			
X		X	101.7	X	X	X		X			
X		X	101.9	X			X	X			
X		X	102.1	X					X		
X		X	102.3	X	X				X		
X		X	102.5	X		X			X		
X		X	102.7	X	X	X			X		
X		X	102.9	X			X		X		
X		X	103.1	X				X	X		
X		X	103.3	X	X			X	X		
X		X	103.5	X		X		X	X		
X		X	103.7	X	X	X		X	X		
X		X	103.9	X			X	X	X		
X		X	104.1	X						X	
X		X	104.3	X	X					X	
X		X	104.5	X		X				X	
X		X	104.7	X	X	X				X	
X		X	104.9	X			X			X	
X		X	105.1	X				X		X	
X		X	105.3	X	X			X		X	
X		X	105.5	X		X		X		X	
X		X	105.7	X	X	X		X		X	
X		X	105.9	X			X	X		X	
X		X	106.1	X					X	X	
X		X	106.3	X	X				X	X	
X		X	106.5	X		X			X	X	
X		X	106.7	X	X	X			X	X	
X		X	106.9	X			X		X	X	
X		X	107.1	X				X	X	X	
X		X	107.3	X	X			X	X	X	
X		X	107.5	X		X		X	X	X	
X		X	107.7	X	X	X		X	X	X	
X		X	107.9	X			X	X	X	X	

SECTION 6

PARTS LISTS

6-1 ORDERING INFORMATION

A. To order parts for the 695 Exciter, write:

QEI Corporation
P.O. Box 805
Williamstown, NJ 08094

or call:

1-609-728-2020

B. Provide the following information:

1. Station Call
2. Exciter Serial No.
3. QEI Part No.
4. Shipping Address
5. Billing Address
6. Desired method of shipment

A1 CHASSIS ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
C1,C2	Cap., Cer., .01uf, 1KV	110-0103-K
C3	Cap., Elect., 4900uf	110-3498
C4,C5	Cap., Cer., .05uf, 100V	110-0503-100
C6,C7	Cap., Elect., 5000uf, 25V	110-3508-25
C8,C10	Cap., Elect., 100uf, 25V	110-3107
C9	Cap., Elect., 500uf, 50V	110-3507-50
CR1,CR4,CR5	Diode, Bridge Rectifier	113-1960-1
CR2,CR5	Diode, Silicon, 1N4001	113-04001
F1	Fuse, 1A	120-0002
J1	Connector, BNC	130-0038
J2-J5	Connector, BNC	130-0001
J6	Connector, "N" Female	130-0004
J7-J11	Connector, BNC	130-0001
M1	Meter	145-0015
P1	Line Cord	130-5004
Q1,Q2	Transistor, NPN, 2N4401	160-04401
R1	Resistor, Carb., 270 ohm	RC20GF271J
R2	Resistor, Carb., 1.5K	RC20GF152J
R3	Resistor, Carb., 330 ohm	RC20GF331J
R4	Resistor, Carb., 820 ohm	RC20GF821J
R5	Resistor, Carb., 4.7K	RC20GF472J
R6	Resistor, Var., 5K	RV4NAYSK502A
R7,R8	Resistor, WW, 0.27 ohm 5W	166-0027
R9	Resistor, WW, 33 ohm, 10W	166-0340
R10	Resistor, Carb., 82 ohm 2W	RC42GF820J
S1,S3	Switch, DPDT	175-0003-F
S2	Switch, SPDT	175-0006
T1	Transformer, Power	180-3140
T2	Transformer, Power	180-340X
TB1	Terminal Board, 3 pt.	181-0003
U1	I.C., Voltage Reg., LM350	182-0350
U2	I.C., Voltage Reg., LM323	182-323K
U3	I.C., Voltage Reg., LM340T-12	182-340T-12
U4	I.C., Voltage Reg., LM320T-12	182-320T

A2 PLL & MOD CONTROL ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A2	Circuit Board	100-6950022
C1,C12,C18,C19,C31	Cap., Mica, 470 pf	110-1471
C2,C5,C25-C27	Cap., Cer., .01 uf	110-0103
C3,C9	Cap., Cer., .001 uf	110-0102
C4,C13	Cap., Mica, 1000 pf	110-1102
C6,C22,C32	Cap.,Tant., .22 uf	110-3224T
C7	Cap., Mica, 620 pf	110-1621
C8,C14,C24,C34-C36	Cap., Cer., .1 uf	110-0104
C10,C20,C21	Cap., Elect., 5 uf	110-3505
C11	Cap., Elect., 15 uf	110-3156
C15	Cap., Mica, 10 pf	110-1100
C16	Cap., Mica, 22 pf	110-1220
C17	Cap., Var., 1-10 pf	110-6110
C23	Cap., Film, .027 uf	110-5273
C28,C29,C37,C38	Cap., Tant., 1 uf	110-3105T
C30	Cap., Poly., 2200 pf	110-4222
C33	Cap., Poly., .01 uf	110-4103
J1-J3	Connector, Phono	130-0010
J201,J202,J203	Connector, 16 Pin DIP	130-0316-1
Q1,Q6	Transistor, NPN, 2N5179	160-05179
Q2-Q4,Q8-Q10,Q13,Q14,	Transistor, NPN, 2N4401	160-04401
Q5	FET, 2N5345	160-13819
Q7,Q11,Q12	Transistor, DNP, 2N4403	160-04403
R1,R38	Resistor, Carb., 100 ohms	RC20GF101J
R2	Resistor, Carb., 390 ohms	RC20GF391J
R3,R4	Resistor, Carb., 270 ohms	RC20GF271J
R5	Resistor, Carb., 620 ohms	RC20GF621J
R6,R56,R57	Resistor, Carb., 330 ohms	RC20GF331J
R8-R17	Resistor, Carb., 1k, 1/4W	RC07GF102J
R18,R19,R37, R49-R51,R66,R70	Resistor, Carb., 4.7K	RC20GF472J
R20,R40,R53	Resistor, Carb., 1.5K	RC20GF152J
R21,R28,R35,R47	Resistor, Carb., 33K	RC20GF333J
R22	Resistor, Carb., 6.8K	RC20GF682J
R23	Resistor, Carb., 150K	RC20GF154J
R24	Resistor, Carb., 56K	RC20GF563J
R25	Resistor, Carb., 47K	RC20GF473J
R26,R41,R60,R61	Resistor, Carb., 100K	RC20GF104J
R27,R30-R32	Resistor, Carb., 3.3K	RC20GF332J
R29,R33,R42,R43,R58	Resistor, Carb., 10K	RC20GF103J
R34,R36	Resistor, Carb., 330K	RC20GF334J
R39	Resistor, Carb., 510 ohms	RC20GF511J

A2 PLL & MOD CONTROL ASSEMBLY (continued)

REF.DES.	DESCRIPTION	QEI PART NO.
R45,R69,R79-R81	Resistor, Carb., 1K	RC20GF102J
R46	Resistor, Carb., 4.7K, 1/4W	RC07GF472J
R48	Resistor, Carb., 15K	RC20GF153J
R52	Resistor, Carb., 82 ohms	RC20GF820J
R54,R83-R85	Resistor, Var., 1K	167-3102
R55	Resistor, Film, 7.87K 1%	165-7871
R59	Resistor, Var., 10K	167-3103
R62,R63	Resistor, Carb., 180K	RC20GF184J
R64,R65,R67,R68	Resistor, Carb., 2.2K	RC20GF222J
R44,R78	Resistor, Film., 2.49K, 1%	165-2491
R71	Resistor, Film., 470K,1%	165-4703
R72	Resistor, Film., 200K, 1%	165-2003
R73	Resistor, Film., 100K, 1%	165-1003
R74	Resistor, Film., 49.9K, 1%	165-4992
R75	Resistor, Film., 23.7K, 1%	165-2372
R76	Resistor, Film., 11K, 1%	165-1102
R77	Resistor, Film., 5.11K, 1%	165-5111
R82	Resistor, Carb., 51 ohms	RC20GF510J
R86-R88	Resistor, Carb., 2.2K, 1/4W	RC07GF222J
T1	Transformer, Bifilor	180-Q9002
T2	Transformer, Audio	180-2001
U1	I.C., ECL, 10131	182-10131
U2	I.C., Counter, 745196	182-8290
U3,U9,U10	I.C., Gate, 7400	182-7400
U4,U8	I.C., Filp-Flop, 7474	182-7474
U5,U7	I.C., Counter, 74192	182-4192
U11	I.C., Dual op-amp,NE532	182-0532
U12-U15	I.C., Counter, 7490	182-7490
U16	I.C., Gate, 7440	182-7440
U17	I.C., Dual one-shot, 74123	182-4123
U18,U19	I.C., Dual op-amp, NE5532	182-5532
U20,U21	I.C., Analog Switch,DG202	182-0202
Y1	Crystal, 8MHz	198-0800

PARTS LIST

A3 INTERFACE ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A3	Circuit Board	100-695002
C1,C15,C17	Cap., Elect., 100 uf	110-3107
C2	Cap., Tant., .47 uf	110-3474T
C3,C4,C6-C10	Cap., Cer., .01 uf	110-0103
C5,C18-C20	Cap., Cer., .1 uf	110-0104
C11	Cap., Tant., 1 uf	110-3105T
C12-C14	Cap., Mica, 1000 pf	110-1102
CR1-CR3	Diode, Silicon, 1N4446	113-04446
CR4	Diode, Zener, 1N5230	113-25230
DS1,DS2	Display, Led, MAN6710	192-16710
DS3-DS8,DS13	Display, Led, Red, HLMP-2685	113-3003
DS9,DS10	Display, Led, Yellow,HLMP-2720	113-3008
DS11	Display, Led, Green,HLMP-2820	113-3006
DS12	Display, Led, Red, HLMP-2620	113-3007
J301-J309,JU1,JU2	Connector, 16 Pin, DIP	130-0316-1
L1,L2	Inductor, Wideband	140-2008
Q1-Q6	Transistor, NPN, 2N4401	160-04401
Q7,Q8,Q11,Q12	Transistor, DNP, 2N4403	160-04403
Q9,Q10,Q13	Transistor, DNP, 2N5401	160-05401
R1-R15,R17-R24,R40	Resistor, Carb., 270ohms, 1/4W	RC07GF271J
R16,R25-R28	Resistor, Carb., 4.7K, 1/4W	RC07GF472J
R29,R32,R69,R94	Resistor, Carb., 1K	RC20GF102J
R30,R36,R54,R78	Resistor, Carb., 22 ohms	RC20GF220J
R31,R51,R76	Resistor, Carb., 1.5K	RC20GF152J
R33-R35,R61,R82,R86	Resistor, Carb., 4.7K	RC20GF472J
R37	Resistor, Carb., 27K	RC20GF273J
R38,R46,R73,R74	Resistor, Var., 10K	167-3103
R39,R43	Resistor, Carb., 100K	RC20GF104J
R41	Resistor, Carb., 10K	RC20GF103J
R42	Resistor, Carb., 8.2K	RC20GF822J
R44	Resistor, Carb., 3.3M	RC20GF335J
R45	Resistor, Film., 2.67K, 1%	165-2671
R47	Resistor, Film., 7.5K, 1%	165-7501
R48,R98,R99	Resistor, Var., 1K	167-3102
R49	Resistor, Film., 2.21K, 1%	165-2211
R50,R63	Resistor, Film., 6.81K, 1%	165-6811
R52,R62,R84,R89,R91	Resistor, Film., 499 ohms	165-4990

PARTS LIST (Cont'd)

A3 INTERFACE ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
R55	Resistor, Film., 20K, 1%	165-2002
R56,R80	Resistor, Film., 1.5K, 1%	165-1501
R57,R59,R87	Resistor, Film., 2.0K, 1%	165-2001
R58,R104	Resistor, Film., 110 ohms,1%	165-1100
R60,R70,R75, R103,R107	Resistor, Film., 1K, 1%	165-1001
R64	Resistor, Carb., 270 ohms	RC20GF271J
R65,R68	Resistor, Carb., 3.3K	RC20GF332J
R66,R67	Resistor, Film., 2.55K, 1%	165-2551
R71,R72	Resistor, Film., 5.11K, 1%	165-5111
R79	Resistor, Film., 8.25K, 1%	165-8251
R81	Resistor, Film., 750 ohms, 1%	165-7500
R83	Resistor, Film., 5.62K, 1%	165-5621
R85	Resistor, Film., 3.92K, 1%	165-3921
R88,R105,R106	Resistor, Film., 221 ohms, 1%	165-2210
R90,R92,R97	Resistor, Film., 2.49K, 1%	165-2491
R93,R95	Resistor, Carb., 6.8K	RC20GF682J
R96	Resistor, Carb., 2.2K	RC20GF222J
R100	Resistor, Film., 4.99K,1%	165-4991
R101,R102	Resistor, Carb., 62 ohms	RC20GF620J
U1,U2	I.C., Decoder, Driver 7447	182-7447
U3,U4	I.C., Multiplexer, 74157	182-4157
U5	I.C., Dual op-amp, 5532	182-5532
U6	I.C., Op-Amp, 741	182-1741
U7,U8	I.C., Quad Comparator,1M339	182-0339
U9,U10	I.C., Dual op-amp, 532	182-0532

PARTS LIST

A4 RECEIVER/LOG AMPLIFIER ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A4	Circuit Board	100-6950024
C1,C5,C24,C27, C38,C42,C43	Cap., Cer., .01 uf	110-0103
C2	Cap., Mica, 470 pf	110-1471
C3,C9,C11,C23, C26,C35,C46,C49- C51,C56,C57,C62-C64	Cap., Cer., .1 uf	110-0104
C4,C31,C33, C36,C40,C41	Cap., Mica, 1000 pf	110-1102
C6,C29,C55	Cap., Mica, 27 pf	110-1270
C7	Cap., Mica, 22 pf	110-1220
C8	Cap., Mica, 39 pf	110-1390
C10	Cap., Elect., 5 uf	110-3505
C12,C13,C44	Cap., Cer., .05 uf	110-0503
C14,C22	Cap., Tant., 1 uf	110-3105T
C15,C34,C60,C65	Cap., Elect., 100 uf	110-3107
C16	Cap., Tant., 2.2 uf	110-3225T
C17,C20,C25	Cap., Mica 68 pf	110-1680
C18,C21	Cap., Var., 2-22 pf	110-6518
C19,C54	Cap., Mica, 10 pf	110-1100
C28,C61	Cap., Mica, 120 pf	110-1121
C30	Cap., Mica, 300 pf	110-1301
C32	Cap., Mica, 270 pf	110-1271
C37	Cap., Var., 5-65 pf	110-6565
C39	Cap., Mica, 500 pf	110-1501
C45	Cap., Mica, 620 pf	110-1621
C47	Cap., Mica, 220 pf	110-1221
C48	Cap., Cer., .001 uf	110-0102
C52,C53,C58,C59	Cap., Cer., 1 uf	110-0105
C66	Cap., Mica, 51 pf	110-1510
CR1-CR4,CR6, CR10,CR15	Diode, Silicon 1N4446	113-04446
CR5	SCR, 2N5061	113-45061
CR7	Diode, Zener, 4.7V, 1N5230	113-25230
CR8,CR9	Diode, Varicap, MV1650	113-5650
CR11,CR12	Diode, Germanium, 1N34	113-0034
CR13,CR14	Diode, Zener, 5.2V, 1N5234	113-25234
FL1	Filter, Ceramic, 455KHz	146-455KI
J1	Connector	130-0010
J409	Connector, 16 Pin DIP	130-0316-1

A4 RECEIVER/LOG AMPLIFIER ASSY. (cont.)

REF. DES.	DESCRIPTION	QEI PART NO.
L1,L2	Inductor	140-Q8019
L3,L4	Inductor	140-Q8020
L5	Inductor, Wideband Choke	140-2008
L6	Inductor	140-Q8021
L7,L8	Inductor	140-Q8022
L9	Inductor	140-Q8023
L10	Inductor	140-8024
Q1,Q4,Q5	Transistor, NPN, 2N5179	160-05179
Q2,Q6	Transistor, NPN, 2N4401	160-04401
Q3	Transistor, JFET, 2N5245	160-13819
R1	Resistor, Carb., 47k	RC20GF473J
R2,R45	Resistor, Carb., 22 ohms	RC20GF220J
R3,R21,R34,R43	Resistor, Carb., 51 ohms	RC20GF510J
R4,R5,R23,R25,R27	Resistor, Carb., 10k	RC20GF103J
R6,R46	Resistor, Carb., 620 ohms	RC20GF621J
R7,R24	Resistor, Carb., 820 ohms	RC20GF821J
R8,R14,R83	Resistor, Var., 1k	167-3102
R9,R12,R35	Resistor, Carb., 220 ohms	RC20GF221J
R10,R58	Resistor, Carb., 180k	RC20GF184J
R11,R38	Resistor, Carb., 2.7k	RC20GF272J
R13,R71-R74	Resistor, Carb., 1k, 1/4W	RC07GF102J
R15,R55-R57, R66,R67,R82,R85	Resistor, Carb., 4.7k, 1/4W	RC07GF472J
R16	Resistor, Carb., 1k	RC20GF102J
R17,R54,R63,R65, R68,R70,R86-R88	Resistor, Carb., 10k, 1/4W	RC07GF103J
R18,R20, R28,R49,R69	Resistor, Var., 10k	167-3103
R19,R22	Resistor, Carb., 4.7k	RC20GF472J
R26,R30	Resistor, Carb., 100k	RC20GF104J
R29	Resistor, Carb., 33k	RC20GF333J
R31	Resistor, Carb., 56k	RC20GF563J
R32,R41	Resistor, Carb., 3.3k	RC20GF332J
R33	Resistor, Carb., 180 ohms	RC20GF181J
R36,R52	Resistor, Carb., 15k	RC20GF153J
R37	Resistor, Carb., 1M	RC20GF105J
R39,R40	Resistor, Film, 11k, 1%	165-1102

A4 RECEIVER/LOG AMPLIFIER ASSY.(cont)

REF.DES.	DESCRIPTION	QEI PART NO.
R42,R50,R51, R59,R61,R80	Resistor, Carb., 2.2k	RC20GF222J
R44	Resistor, Film, 768 ohms, 1%	165-7680
R47,R48	Resistor, Carb., 22k	RC20GF223J
R53	Resistor, Carb., 82k	RC20GF823J
R60	Resistor, Carb., 7.5k	RC20GF752J
R62	Resistor, Carb., 1.2k	RC20GF122J
R64,R75	Resistor, Carb., 330 ohms	RC20GF331J
R76	Resistor, Carb., 82 ohms, 2W	RC42GF820J
R78	Resistor, Carb., 100 ohms, 2W	RC42GF101J
R81	Resistor, Carb., 6.8k	RC20GF682J
R84	Resistor, Film, 2.49k, 1%	165-2491
T1	Transformer, L.O.	180-Q9001
T2	Transformer, Bifilor	180-Q9002
U1	I.C., Demodulator, LA1235	182-1235
U2-U5,U9,U10	I.C., Dual op-amp, 5532	182-5532
U6,U7	I.C., Diff. Amp., UA733	182-0733
U8	I.C., Log Amp., TL441	182-0441
Y1	Crystal, Fc+10.7 MHz	
Z1,Z2	Mixer	179-0021

PARTS LIST

A5 AUTOMOD ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A5	Circuit Board	100-6950023
C1,C2,C4, C7,C11-C13	Cap., Cer., .1uf	110-0104
C3	Cap., Tant., .22uf	110-3224T
C5	Cap., Tant., .1uf	110-3104T
C6	Cap., Tant., .47uf	110-3474T
C8	Cap., Poly., 3000pf	110-4302
C9	Cap., Elect., 5uf	110-3505
C10	Cap., Elect., 100uf	110-3107
CR1-CR3	Diode, Germanium, 1N34	113-0034
CR4-CR9	Diode, Silicon, 1N4446	113-04446
J506,J507,J509	Connector, 16 Pin DIP	130-0316-1
Q1	Transistor, JFET, 2N5245	160-13819
R1,R6	Resistor, Carb., 1k, 1/4W	RC07GF102J
R2	Resistor, Var., 1k	167-3102
R3-R5,R7, R8,R10,R16	Resistor, Carb., 10k, 1/4W	RC07GF103J
R9,R14,R25	Resistor, Carb., 100k, 1/4W	RC07GF104J
R11,R12,R13,R18, R21-R24,R26,R29	Resistor, Carb., 4.7k, 1/4W	RC07GF472J
R15,R27,R47,R48	Resistor, Carb., 2.2k, 1/4W	RC07GF222J
R17	Resistor, Carb., 12M	RC20GF126J
R19	Resistor, Carb., 150k	RC20GF154J
R20	Resistor, Var., 100k	167-3104
R28	Resistor, Carb., 560k	RC20GF564J
R30	Resistor, Carb., 330 ohms	RC20GF331J
R31-R46	Resistor, Carb.,270ohms,1/4W	RC07GF271J
U1,U2	I.C., Quad Comparator, LM339	182-0339
U3	I.C., Dual op-amp, 5532	182-5532
U4	I.C., One Shoe, 74121	182-4121
U5	I.C., Decoder, 74LS138	182-74LS138
U6	I.C., CPU, Z80	182-0Z80
U7	I.C., EPROM, 2732	182-2732
U8	I.C., RAM, 6116	182-6116
U9	I.C., Timer, 8253	182-8253
U10-U13	I.C., Octal Latch, 74LS374	182-74LS374
U14	I.C., Bus Tranciever, 8286	182-8286

PARTS LIST

A6 BUFFER AMP ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A6	Circuit Board	100-6950025
C1-C4	Cap., Mica, 1000pf	110-1102
C5-C7	Cap., UC Mica, 1000pf	110-2102
C8,C9	Cap., Mica, 27pf	110-1270
C10	Cap., UC Mica, 470pf	110-2471
P1	Plug, Male, Phono	130-0011
Q1,Q2	Transistor, NPN, 2N5179	160-05179
Q3	Transistor, NPN, 2N3866	160-03866
R1,R2,R12	Resistor, Carb., 10 ohms	RC20GF100J
R3	Resistor, Carb., 120 ohms	RC20GF121J
R4,R5	Resistor, Carb., 1.5k	RC20GF152J
R6,R7	Resistor, Carb., 510 ohms	RC20GF511J
R8,R9	Resistor, Carb., 100 ohms	RC20GF101J
R10	Resistor, Carb., 10k	RC20GF103J
R11	Resistor, Carb., 470 ohms	RC20GF471J
R13	Resistor, Carb., 270 ohms	RC20GF271J
T1-T3	Transformer, Bifilor	180-Q9002

PARTS LIST

A7 POWER AMP ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A7	Circuit Board	100-695003
C1	Cap., Var., 16-100pf	110-6610
C2,C8,C9,C14	Cap., Var., 16-150pf	110-6615
C3,C4	Cap., UC Mica, 120pf	110-2121
C5,C11	Cap., Cer., .01uf	110-0103
C6,C12	Cap., Elect., 5uf	110-3505
C7,C13	Cap., UC Mica, 1000pf	110-2102
C10	Cap., UC Mica, 470pf	110-2471
C15	Cap., UC Mica, 270pf	110-2271
L1,L9	Inductor	
L2,L7	Inductor	
L3,L6	Inductor, Widebank Choke	140-2016
L4,L8	Inductor	
L5	Inductor	
Q1	Transistor, NPN, 2N5641	160-05641
Q2	Transistor, NPN, 2N5643	160-05643
R1,R2,R4	Resistor, Carb., 10 ohms	RC20GF100J
R3	Resistor, Carb., 180 ohms	RC20GF181J
R5	Resistor, Carb., 10 ohms, 2W	RC42GF100J

PARTS LIST

A8 DIRECTIONAL COUPLER & LPF ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A8	Circuit Board	100-6950026
C1,C6	Cap., Mica, 27pf	110-1270
C2,C4	Cap., Mica, 51pf	110-1510
C3,C5	Cap., Mica, 5pf	110-1050
C7,C8	Cap., Cer., .001uf	110-0102
CR1,CR2	Diode, Silicon, HPA2800	113-0005
L1-L3	Inductor	140-Q8019
R1,R3	Resistor, Carb., 130 ohms	RC20GF131J
R2,R4	Resistor, Carb., 4.7k	RC20GF472J

PARTS LIST

A9 METER SWITCH ASSEMBLY

REF.DES.	DESCRIPTION	QEI PART NO.
A9	Circuit Board	100-695002A
J904	Connector, 16 Pin DIP	130-0316-1
R1	Resistor, Carb., 10k	RC20GF103J
R2	Resistor, Film, 7.87k, 1%	165-7871
R3	Resistor, Film, 28.7k, 1%	165-7872
R4,R5	Resistor, Film, 120 ohms, 1%	165-1200
S1	Switch, 8 Position	175-0033

PARTS LIST

A10 POWER SWITCH ASSEMBLY

REF. DES.	DESCRIPTION	QEI PART NO.
A10	Circuit Board	100-695002B
C1,C2	Cap., Cer., .01uf	110-0103
C3	Cap., Cer., .1uf	110-0104
J10	Connector, 16 Pin DIP	130-0316-1
L1	Inductor	140-Q8025
R1	Resistor, Carb., 820 ohms	RC20GF821J
R2	Resistor, Var., 250 ohms	167-3251
S1	Switch, 3 Position	175-0032

SECTION 7

SCHEMATICS

DATE	SYM	REVISION RECORD	DR	CK.

4 5 5 6 6 7 7 8 8 9 9 0 0 1 1 1 1 2
5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0 5 0

MOD CONTROL ON

MOD CONTROL FAULT . AFC FAULT . VCC FAULT . +12 FAULT . -12 FAULT . +15 FAULT

PEAK MODULATION

MULTIMETER

QEI -TRANSPARENT PLUS-

TYPE 695 FM EXCITER

PROGRAMMED FREQUENCY ●
100% PEAKS PER MINUTE ○

PWR

FREQ

MOD(+) MOD(-) MOD(10%) PA VOLTS PA AMPS IPA AMPS RF FWD RF REV

MODULATION TEST
INPUT OUT-WB OUT-DE

SPECTRUM ANALYZER
X Y

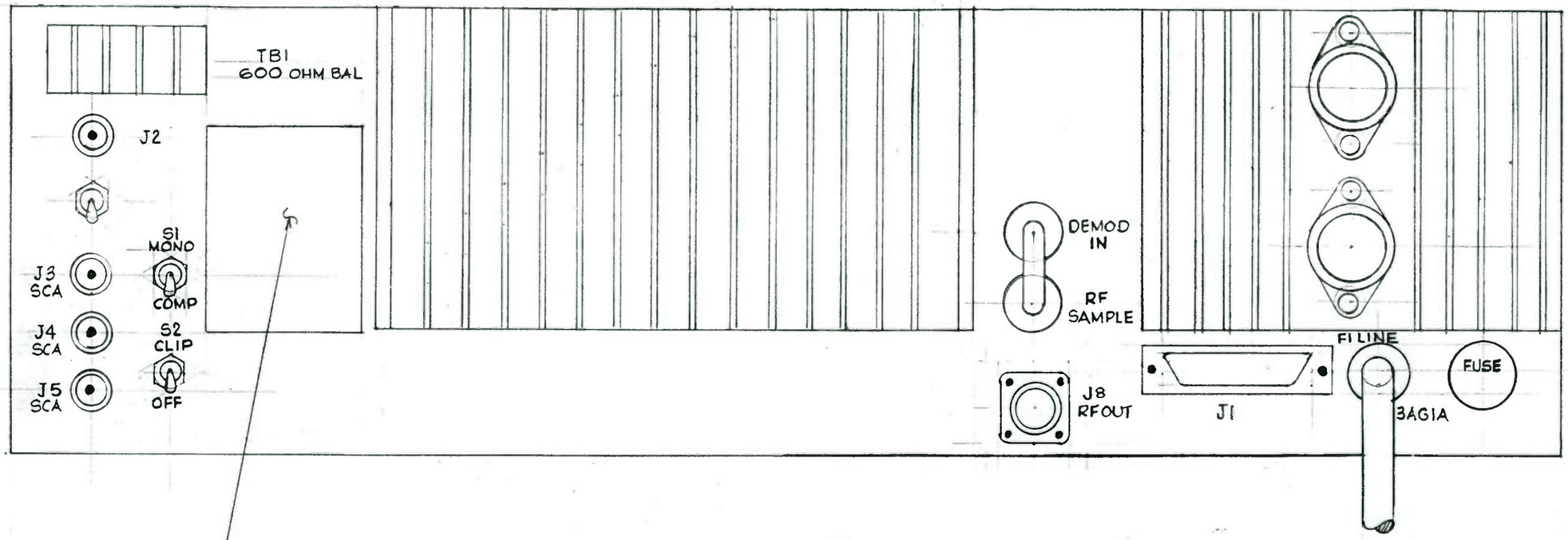
CAL (102.6%)

POWER

TOLERANCES (EXCEPT AS NOTED)	QEI CORPORATION WILLIAMSTOWN, NJ		
DECIMAL ± X		SCALE 3/4 SIZE	DRAWN BY DCP
			APPROVED BY
FRACTIONAL ± X	TITLE FRONT PANEL DRAWING - 695 FM EXCITER -		
ANGULAR ±	DATE 12/16/86	DRAWING NUMBER 695207	

IDENT. NO. 121686-1

DATE	SYM	REVISION RECORD	DR.	CK



TOLERANCES (EXCEPT AS NOTED)	QEI CORPORATION WILLIAMSTOWN, NJ		
DECIMAL ± X		SCALE 3/4 SIZE	DRAWN BY DCP
			APPROVED BY
FRACTIONAL ± X	TITLE REAR PANEL 695 FM EXCITER		
ANGULAR ± X	DATE 12/17/86	DRAWING NUMBER 695208	

IDENT NO. 121786-1

FMO PLL ASSY (A2)
(INC. INPUT AMP & MOD. CONTROLLER)
(SEE DWG. 695302 & 695201 FOR DETAILS)

P201 / J201 — P301 / J301
1 2T
2 .2T
3 .1T
4 8T
5 4T
6 5ØKO
7 +5V
8 +5V
9 5ØKO
10 .8T
11 4T
12 GND
13 GND
14 1T
15 HØT
16 BØG

P202 / J202 — P302 / J302
1 +12V
2 +12V
3 (-)12V
4 (-)12V
5 AFC(6)
6 5K(REF)
7 AFC FAULT(6)
8 FREQ ADJ
9 1.6MHz
10 AFC FAULT
11 32K CAL
12 CAL SW
13 (-)12V
14 (-)12V
15 +12V
16 +12V

P208 / J208 — P308 / J308
1 D5
2 DØ
3
4 (-)12V
5
6
7 D2
8 D7
9 D3
10 D6
11
12 (-) REF
13 (+)12V
14 (+) REF
15 D4
16 D1

MONO AITBI
UI MP
AIJ2 SCA#1
J3 SCA#2
J4 SCA#3
AISI MONO/ST
J3 AUDIO
J2 AFC
J1 RF SAMPLE

(A3) INTERFACE ASSEMBLY
(INC. FAULT DETECTOR - PPM DISPLAY - BAR GRAPH - METER DRIVE - FREQ PROGRAM)
(SEE DWG. # 695500 & 695200 FOR DETAIL)

P809 / J309
1 COMP
3 (+)15V
4 (+)15V
5 (+)12V
6 (+) REF
7 (-) REF
8 (-)15V
9 A/M
10 MOD FAULT
11 CAL SW
12 GND
13 AFC
14 AFC(6)
15 LO MOD
16 Ø MOD

P307 / J307
1 50
2 80
3 115
4 100
5 95
6 85
7 105
8 110
9 120
10 115
11 70
12 90
13 65
14 60
15 45
16 65

P306 / J306
1 D7
2 D8
3 D9
4 D6
5 P2
6 P4
7 P1
8 GND
9 DØ
10 D4
11 P8
12 P10
13 FLASH
14 D11
15 D5
16 1.6MHz

P305 / J305
1 GND
11 CAL SW
3 GND
4 PPM SIG
16 32K CAL
14 GND
15 DIG 1ℓ2
13 +5V

P304 / J304
1 GND
2 SIG
14 MOD
15 AMP(-)
16 AMP(+)
4 (+)
19 MTR(-)
3 VCC
11 MTR(+)
12 PA(-)
8 IPA(-)
9 GND
10 RF FWD
RF REV
GND

P502 / J507
50 80 115 100 95 85 105 110 120 115 70 90 65 60 45 65

(A5) AUTOMOD ASSEMBLY

P506 / J506
D7 D8 D9 D6 P2 P4 P1 GND DØ D4 P8 P10 FLASH D11 D5 1.6MHz

P509 / J509
COMP (+)12 V. (+) REF. (-) REF. (-)12 V. GND. Ø MOD

RECEIVER/LOG AMPLIFIER (A4)
(SEE DWG. # 695301 & 695204 FOR DETAIL)

AIJ11 RF TEST
AIS2 CLIPPER SWITCH
AIJ10 "X" SPEC ANAL.
AIJ9 "Y" SPEC ANAL.
AIJ8 MOD TEST OUT WB
AIJ7 MOD TEST OUT DE

P904 / J904
MTR(+) MTR(-) GND SIG MOD AMP(-) AMP(+) (+)MOD VCC PA(-) IPA(-) GND RF FWD RF REV. GND

(A9) METER SWITCH ASSY

P1005 / J1005
GND 32K CAL GND PPM SIG SERIAL GND DIG 1ℓ2 +5V

(A10) POWER SWITCH ASSY

AC SWITCH

(A10) FMO ASSY

AIR1 .27Ω, 5W
AIR2 .27Ω, 5W
AIR3 82Ω, 2W
AIR4 33Ω, 10W

POWER SUPPLY P/O A1 CHASSIS
+18V +12V -12V GND

PA(6) IPA(6) VCC

RF FWD RF REV.

DIGNOSTIC CONNECTOR
+5(6) +12(6) -12(6) VCC(6) PA IPA(6) REV FWD AFC LOW MOD Ø MOD AUTOMOD GATE AUTOMOD GND

AC SWITCH

(A6) BUFFER AMP
E8 E3 E4 E2 E1
RF OUT

(A7) POWER AMP.

(A8) DIRECTIONAL COUPLER & LPF
E6 E7

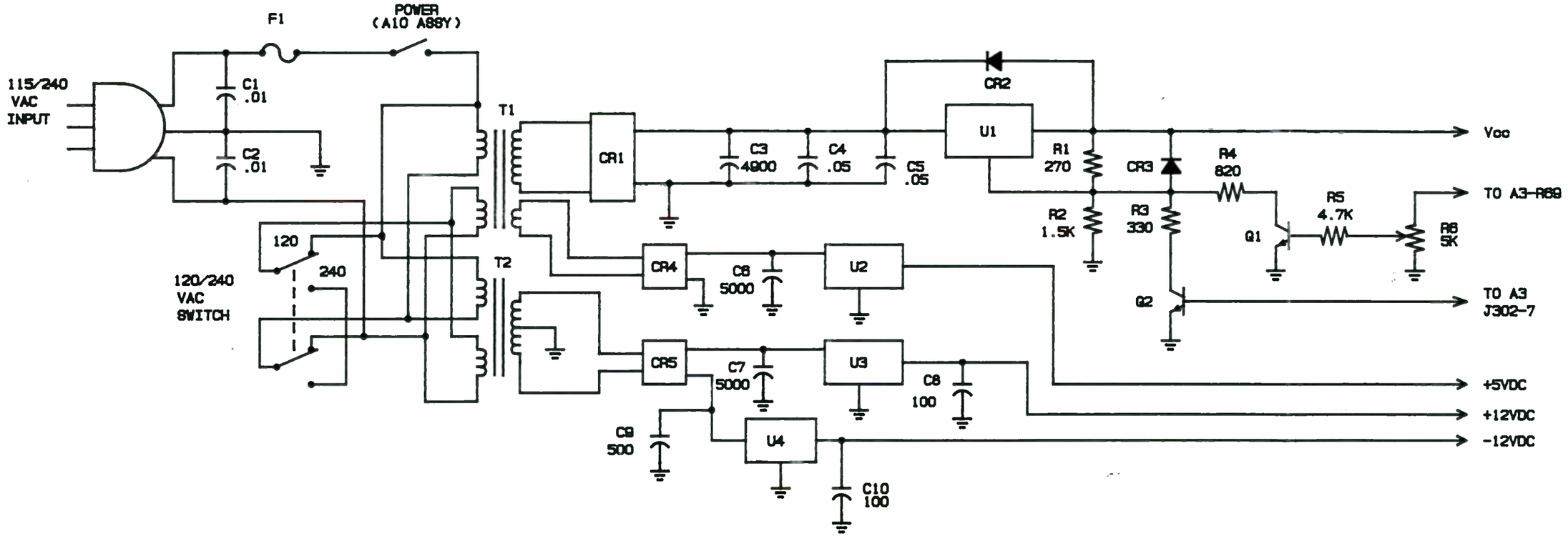
AIC1 15pf
AIJ5 RF SAMPLE
AIJ6 RF OUT

TOLERANCES	REVISIONS		
DECIMAL ±	NO.	DATE	BY
FRACTIONAL ±			
ANGULAR ±			

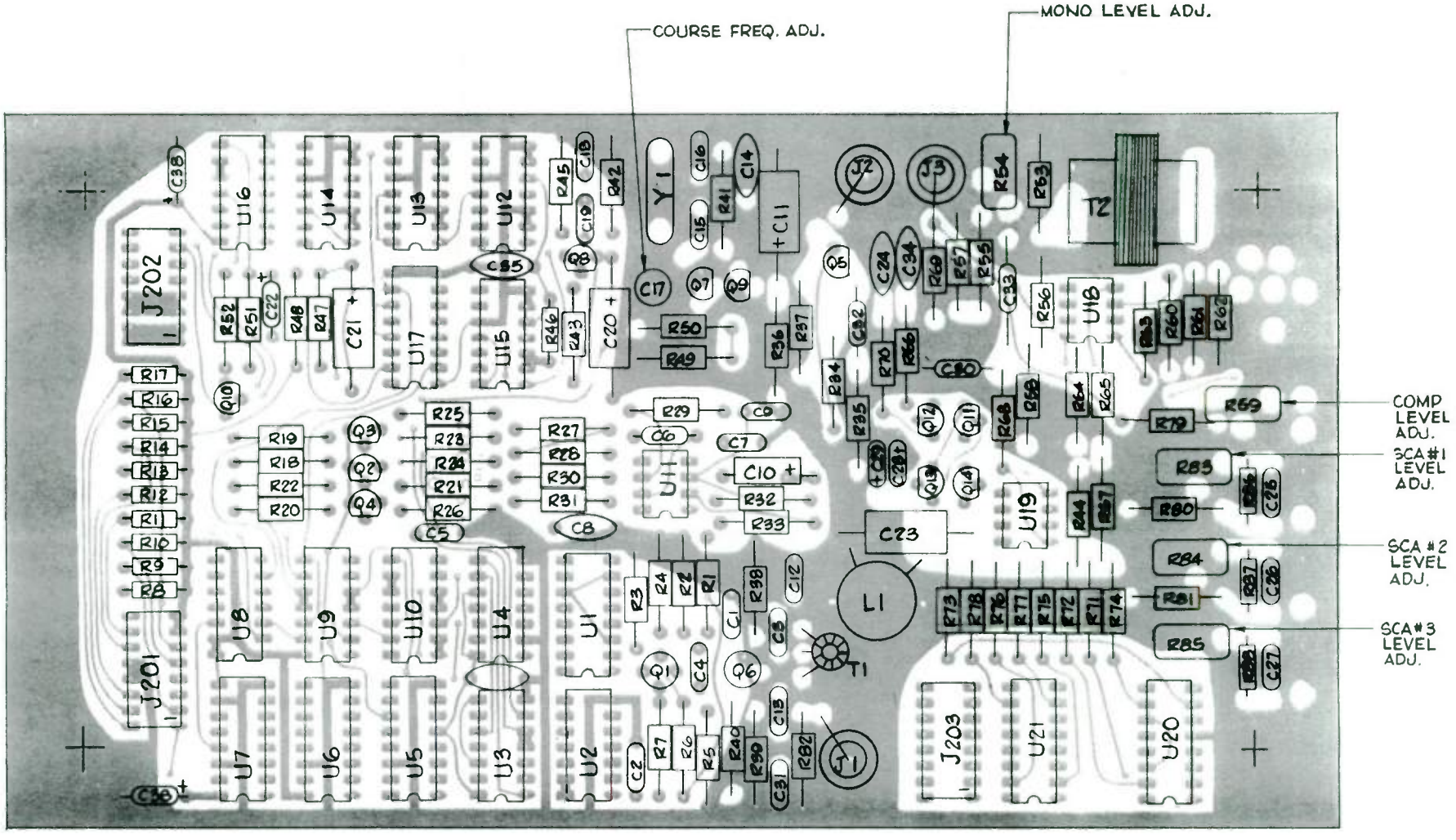
- 695 CHASSIS -
INTERCONNECTION DIAGRAM

DRAWN BY DEP 3/10/84
SCALE NONE
DATE
MATERIAL
DRAWING NO. 695309
SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	APPROVED	DATE



DRAWN BY WJH		DATE 3/29/88		QEI CORPORATION WILLIAMSTOWN NJ	
CHECKED BY		DATE		TITLE POWER SUPPLY 695 EXCITER	
APPROVED BY		DATE			
SIZE B	SCALE N/A	REV A	PLOT 1/2.5	SHEET	DWG NO. 695311



TOLERANCES	REVISIONS				
DECIMAL	NO	DATE	BY		
FRACTIONAL	1				
ANGULAR	2				
	3				
	4				
	5				

esi CORPORATION

COMPONENT LAYOUT
- 695 A2 ASS'Y -

DRAWN BY	SCALE	MATERIAL
DCP	FULL SIZE	
CHK'D	DATE 11/8/84	DRAWING NO 695201
TRACED	APP'D	

R(8,9,10,11) 1K 1/4 W

R(12,13,14,15) 1K 1/4 W

J201-10 .8T
J201-5 .4T
J201-2 .2T
J201-3 .1T

J201-4 .8T
J201-11 .4T
J201-1 .2T
J201-14 .1T

J201-16 80C
J201-15 10T

+5V.

+12V.

-12V.

J202-1,16

J202-6

J201-6

J202-9 1.6 MHz

J201-9

J202-11 32K CAL

J202-12 CAL SW

J202-10 (AFC FAULT)

J202-7

J202-5

J202-8 FREQ ADJ.

J1 RF IN

J2 AFC

J3 AUDIO (FMO)

MOD IN

MONO INPUT

COMP IN

MONO/COMP SW

MONO

COMP

S1A

S1B

D7 J203-8
D6 J203-10
D5 J203-1
D4 J203-15
D3 J203-9
D2 J203-7
D1 J203-16
D0 J203-2

-12V. J203-4

SCA NO. 1. J4

SCA NO2. J5

SCA NO3. J6

R1 100
R2 390
R3 270
R4 270
R5 620
R6 3.3K
R7 330
R17 1K
R16 1K
R18 4.7K
R19 4.7K
R24 56K
R22 6.8K
R20 1.5K
R23 150K
R21 33K
R25 47K
R26 100K
R27 3.3K
R28 33K
R29 10K
R30 3.3K
R31 3.3K
R32 3.3K
R33 10K
R34 390K
R35 33K
R36 330K
R37 4.7K
R38 100
R39 510
R40 1.5K
R41 100K
R42 10K
R43 10K
R45 1K
R46 4.7K
R47 33K
R48 15K
R49 4.7K
R50 4.7K
R52 82
R51 4.7K
R53 1.5K
R54 1K
R55 7.87K
R56 10K
R57 330
R58 180K
R59 10K
R60 100K
R61 100K
R62 180K
R63 1K
R64 2.2K
R65 2.2K
R66 4.7K
R67 2.2K
R68 820
R69 1K
R70 4.7K
R71 470K
R44 2.49K
R72 200K
R73 100K
R74 49.8K
R75 23.7K
R76 11K
R77 5.11K
R78 2.49K
R79 1K
R80 1K
R81 1K
R82 1K
R83 1K
R84 1K
R85 1K
R86 2.2K
R87 2.2K
R88 2.2K

C1 470 pf
C2 .01
C3 .001
C4 1000 pf
C5 .01
C6 .22
C7 620
C8 .1
C9 .001
C10 5 µf
C11 15µf
C12 470 pf
C13 470pf
C14 .1
C15 10pf
C16 27 pf
C17 1-10
C18 470pf
C19 1000pf
C20 5µf
C21 5µf
C22 .22µf
C23 .22µf
C24 .1
C25 .01
C26 .01
C27 .01
C28 .1
C29 1µf
C30 2200pf
C31 470pf
C32 .22µf
C33 .01
C34 .1
C35 .1
C36 .1
C37 1µf
C38 1µf
C39 .027µf

Q1 2N5179
Q2 2N4401
Q3 2N4401
Q4 2N4401
Q5 2N3819
Q6 2N5179
Q7 2N4403
Q8 2N4401
Q9 2N4401
Q10 2N4401
Q11 2N4403
Q12 2N4403
Q13 2N4401
Q14 2N4401

T1
T2
L1
Y1

U1 10131
U2 74196
U3 7400
U4 7474
U5 74192
U6 74192
U7 74192
U8 7474
U9 7400
U10 7400
U11 532
U12 7490
U13 7490
U14 7493
U15 7400
U16 7440
U17 74123
U18 5532
U19 5532
U20 DG 202
U21 DG 202

TOLERANCES	REVISIONS			695 CORPORATION	
DECIMAL ±	NO.	DATE	BY	695 PLL & MOD CONTROL A2 ASSY	
FRACTIONAL ±	1	6/24/87	EE		
ANGULAR ±				DRAWN BY RCF 8/2/84	SCALE —
				CHK'D	DATE
				TRACED	APP'D
					MATERIAL
					DRAWING NO. 695302

METER ZERO

METER CAL.

POS. ADJ.

E9 W/ORG.

E10 W/BRN.

REV. PWR ADJ.

FWD. PWR ADJ.

E8 W/GRN.

E6 GRN

E4 RED

E5 VIO

E2 W/ORG

E1 W/

E3 W/YEL.

TOLERANCES (EXCEPT AS NOTED)	REVISIONS				
DECIMAL ±	NO	DATE	BY		
FRACTIONAL ±	1				
ANGULAR ±	2				
	3				
	4				
	5				

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC.

COMPONENT LAYOUT, -A3 DISPLAY & INTERFACE ASSY

DRAWN BY	SCALE	MATERIAL
DCP 10/9/84	FULL SIZE	
CHK'D	DATE	DRAWING NO
TRACED	APP'D	695200

DS1 MAN. 6710

DS2 MAN. 6710

DS8 MOD FAULT | DS7 AFC FAULT | DS5 +12V FAULT | DS4 -12V. FAULT | DS3 +5V. FAULT | DS6 Vcc FAULT

P/O J308

U1 7447 | U2 7447 | U3 74157 | U4 74157

R1 R2 R3 R4 R5 R6 R7 ALL 270Ω 1/4 W

R8 R9 R10 R11 R12 R13 R14 ALL 270Ω 1/4 W

R15 270 1/4W

R16 4.7K 1/4W

R17 R18 R19 R20 R21 R22 ALL 270 1/4 W

R23 270 1/4W | R24 270 1/4W | R40 270 1/4W

R25 4.7K 1/4W | R26 4.7K 1/4W | R27 4.7K 1/4W | R28 4.7K 1/4W | R29 1K

Q1 2N4401 | Q2 2N4401 | Q3 2N4401

J301 — TO PLL ASSY J201

.1T .2T .4T .8T 1T 2T 4T 8T GND 1ØT 80C 5ØKO 5ØKI +5V

JU1 FREQ PROG. 9-16

JU2 FREQ PROG.

C1 100 UF

J308 — TO FUNCTION SW. J501

(+)5V. DPMSEL DISLEE GND GND GND 32KCAL CAL SW

J303 — TO PLL ASSY J203

D5 DØ (-)12V. D2 D7 D3 D6 (-)REF. (+)12V. (+)REF. D4 D1

J306

D5 DØ D2 D7 D3 D6 D4 D1 GND P1 P2 P4 P8 P10 1.64MHZ

TO AUTOMOD ASSY J506

FREQ. ADJ. E8

TO PST:- PINS 1,4,6,8.

J302

AFC (S) | (-)12V. | CAL. SW 32K CAL | (+)12V. | FREQ. ADJ. | AFC FAULT 1.6M HZ

TO PLL ASSY J202

(+) REF. | (-) REF. | CAL. SW. | +12V. | -12V.

J309

MOD FAULT | LO MOD | O MOD | (+)REF. | (+)5V. | (-)REF. | CAL. SW. | (+)12V. | (-)12V. | AFC(S) | AUTO MOD COMP APC

LO MOD | O MOD | AFC(S) | GND | AUTO MOD | AUTO MOD CONTROL — P/O J308

R30 22 | Q4 2N4401 | RB1 1.5K

R94 1K | R32 1K | R96 2.2K

U5b 5532 | R33 4.7K | Q5 2N4401 | R34 4.7K | Q6 2N4401 | R35 4.7K | R64 270

M1 | BIG. (+)ADJ | AMP(+) | AMP(-) | MOD — P/O J304

D613 AUTO MOD ON — UNREG 8V.

R36 20 | R37 27K | R41 10K | R42 8.2K | R43 100K

U6 741 | CR1 IN4446 | C2 .47 | CR2 IN4446 | U5a 5532

R38 10K METER ZERO | R39 100K | R44 3.3MEG | R45 2.67K 1% | R46 10K POS. ADJ.

BAR GRAPH

45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 — DS9 TO DS12

J307 — TO AUTOMOD ASSY

80 75 70 65 60 55 50 45 — 85 90 95 100 105 110 115 120

BAR GRAPH WIRING

JUMPER 10,11,14,#15 - CONNECT TO UNREGULATED 8V
JUMPER 16-2
JUMPER 13-3
JUMPER 12-6
JUMPER 9-7

R54 22 | R78 22

R50 6.81K 1% | R51 1.5K | R52 499 1% | R56 110 1% | R59 2K 1% | R60 1K 1% | C5 .01

U7b 339 | U7a 339 | Q7 2N4403

R65 20K 1% | R66 1.5K 1% | R67 2.0K 1% | R76 1.5K | Q8 2N4403

U7d 339 | U7c 339 | C4 .01

R61 4.7K | R62 499 1% | CR3 IN4446 | R63 6.81K 1%

P/O J304 — REV. | FWD. | GND | PA(-) | IPA(-) | VCC

R82 4.7K | R83 5.6K 1% | R93 6.8K | C20 .1 | R101 62

U8b 339 | C6 .01 | Q11 2N4403

R84 499 1% | R85 2.9K 1%

U8a 339 | U8d 339 | R95 6.8K | R102 62

R79 8.2K 1% | R80 1.5K 1% | R81 750 1% | Q12 2N4403

U8c 339 | C7 .01 | R86 4.7K | R87 2K 1% | R88 221 1%

R103 1K 1% | R104 110 1% | R105 220 1% | R106 220 1%

R108 1K 1% | R107 110 1%

P/O J308 — +12(S) | +5(S) | (-)12(S) | VCC(S) | REV. | FWD. | PA(S) | IPA(S)

R75 1K, 1% | R71 5.11K 1% | R89 499 1% | U10b 5532 | C8 .01 | Q9 2N5401 | R90 2.49K 1% | CR4 IN5230 | C11 1.0UF | R97 2.49K | Q13 2N5401

R70 1K 1% | R72 5.11K 1% | U10a 5532 | R91 499 1% | C10 .01 | Q10 2N5401 | R92 2.49K 1% | R98 1K | R99 1K | C9 .01 | R100 4.99K 1% | R53 2.2K

R68 2.2K | R67 2.55K | R69 1K | R66 2.55K | R65 2.2K | R47 7.5K 1% | R48 1K | R49 2.21K 1%

U9a 5532 | R73 10K | C18 .1 | E10 FWD. PWR.

U9b 5532 | R74 10K | C19 .1 | E9 REV. PWR.

C12 1000 L1 | C13 1000 L2 | C14 1000 — E1 VCC | E2 PA | E3 IPA

C15 100UF — E4 +12V.

C16 100UF — E5 -12V.

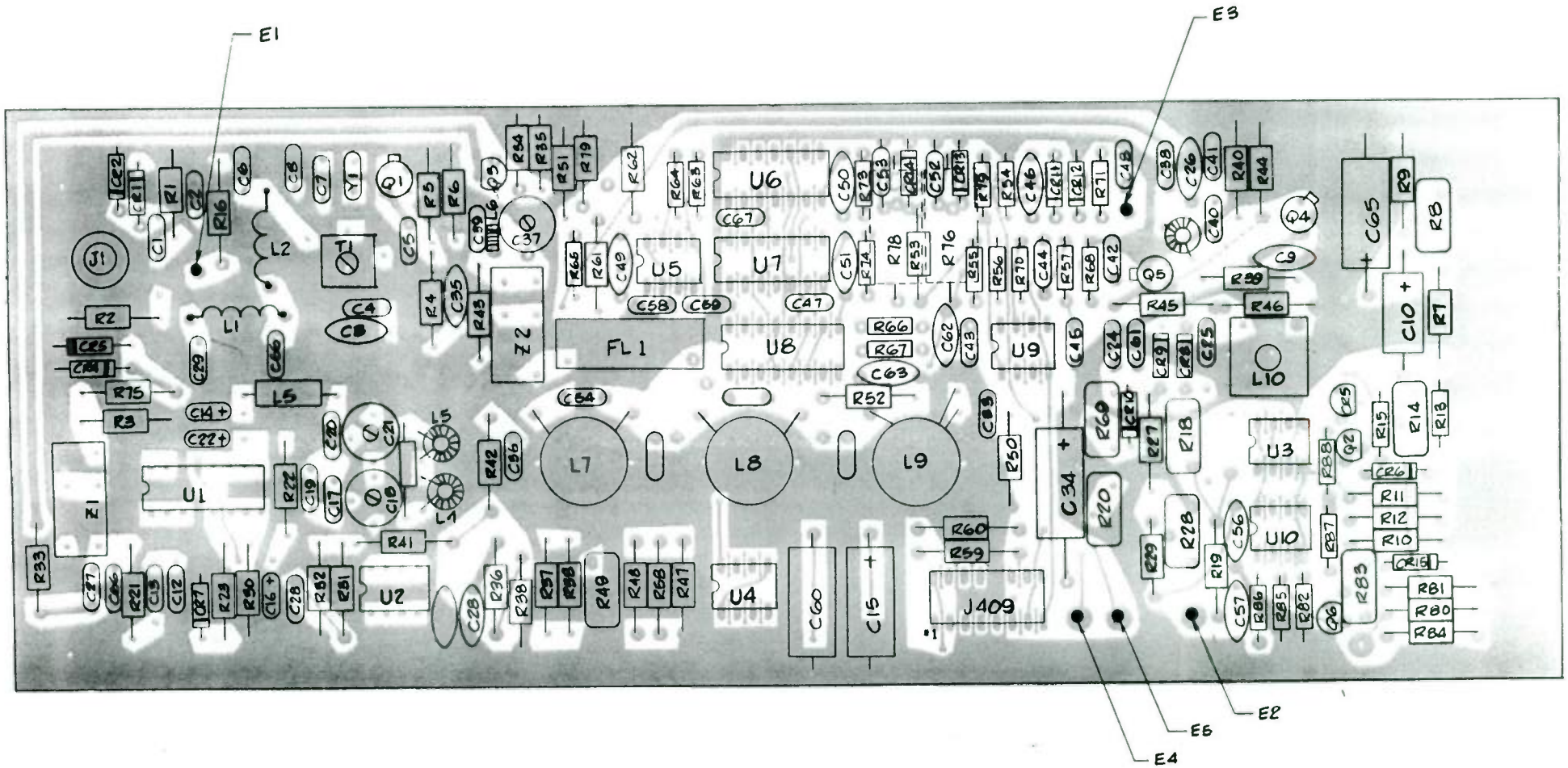
C17 100UF — E6 +5V. | E7 GND

TOLERANCES	REVISIONS			
DECIMAL ±	NO	DATE	BY	
FRACTIONAL ±	1			
ANGULAR ±	2			
	3			
	4			
	5			

dsi CORPORATION

A3 ASSY
695 DISPLAY & INTERFACE ASSY

DRAWN BY DCD 8/13/84 | SCALE None | MATERIAL
CHK'D | DATE | DRAWING NO. 695300
TRACED | APP'D



TOLERANCES (EXCEPT AS NOTED)	REVISIONS			ESI CORPORATION
DECIMAL ±	NO	DATE	BY	COMPONENT LAYOUT - A4 RECEIVER/LOG AMPLIFIER ASSY
FRACTIONAL ±				DRAWN BY DP 4/26/89 · CHK'D
ANGULAR				SCALE FULL SIZE · DATE · MATERIAL · DRAWING NO

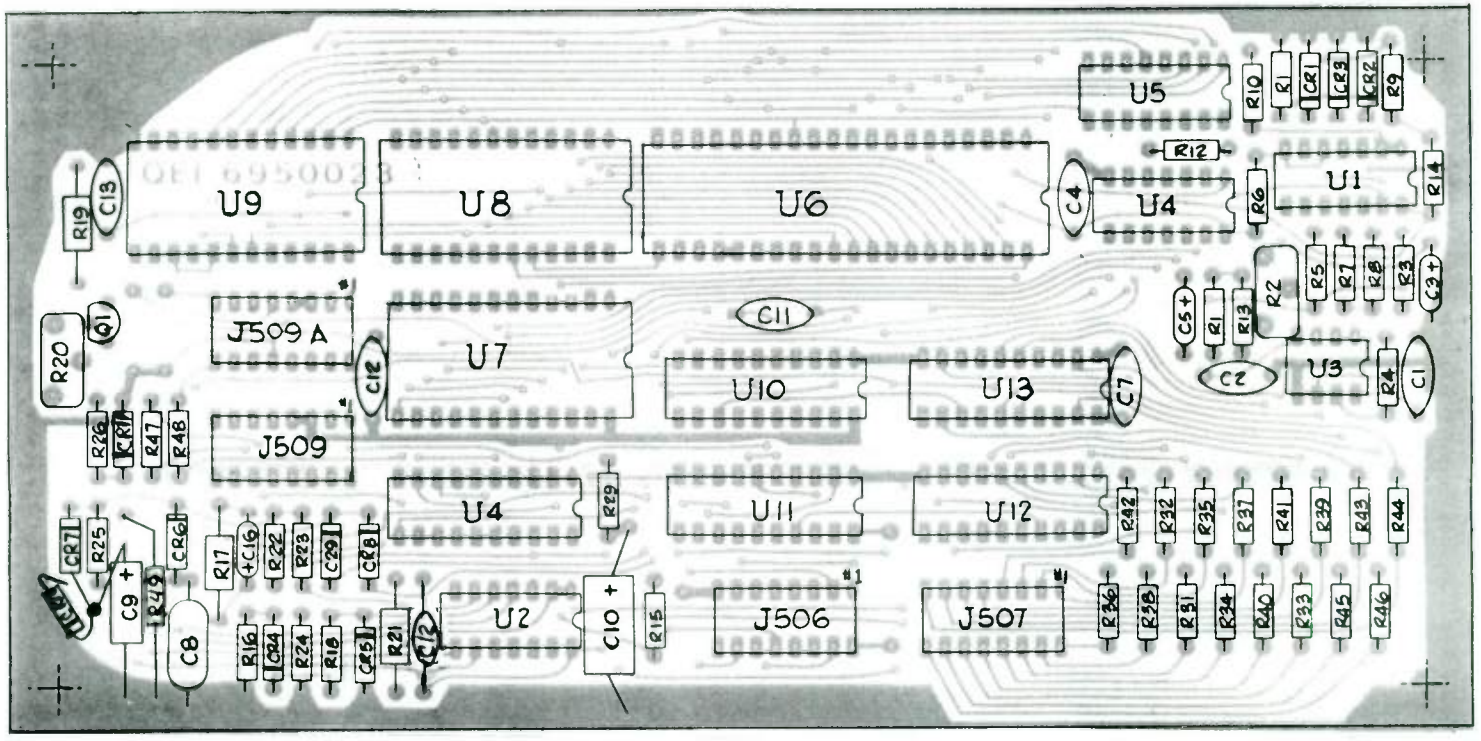
E1 AM NOISE
E2 HORIZ OUT.
E3 VERT OUT
E4 COMP
E5 DE-EMP
E6 CLIPPER SWITCH

SYMBOLS NOT USED
R77

TOLERANCES	REVISIONS				
DECIMAL	NO	DATE	BY		
FRACTIONAL	1	11/19/84	E.E.		
ANGULAR					

DRAWN BY	DCP 7/25/84
CHK'D	
TRACED	
SCALE	NTS
DATE	
APP'D	
MATERIAL	—
DRAWING NO	695301

695 RECEIVER/LOG AMPLIFIER SCHEMATIC A4 ASSY



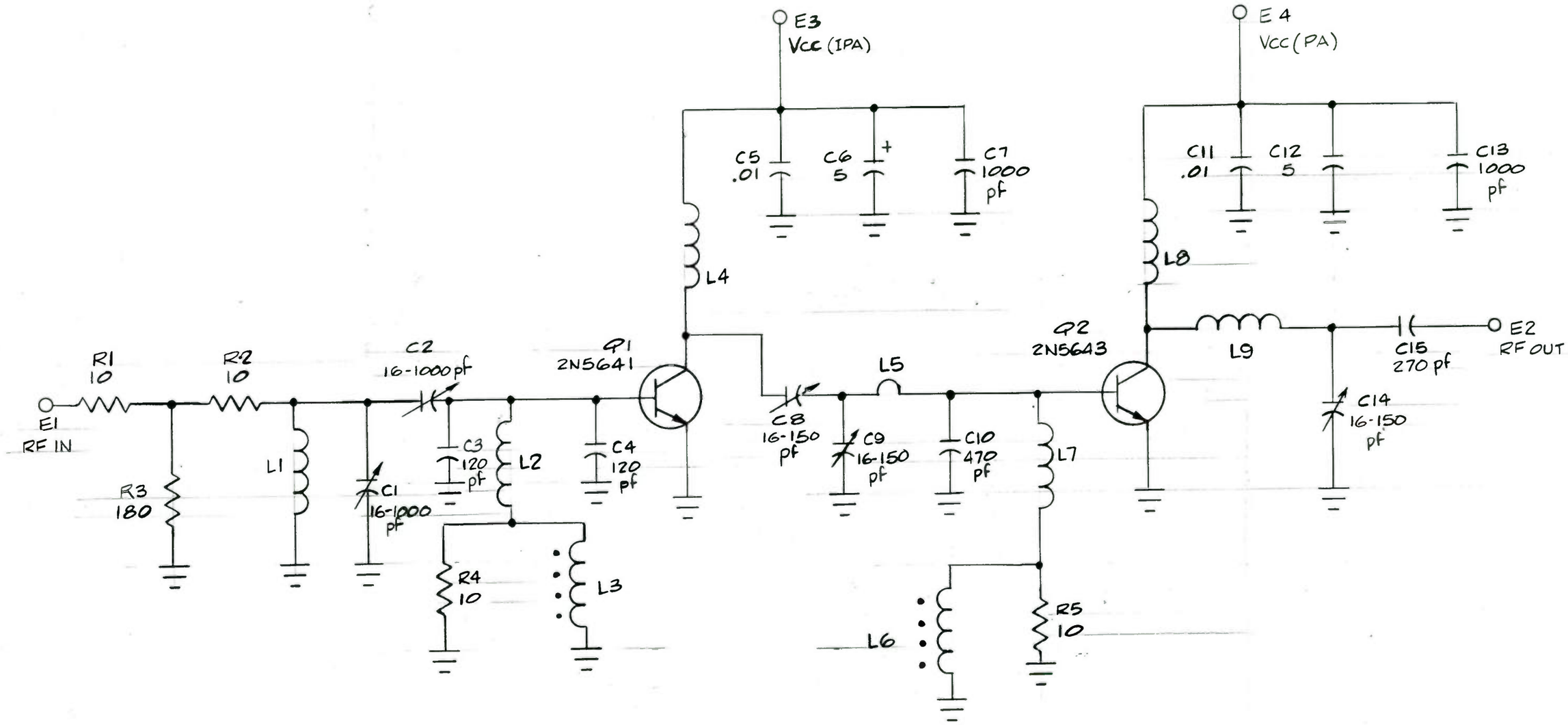
REV 1 - REVISED RESET PER SB695-8501

TOLERANCES (EXCEPT AS NOTED)	REVISIONS				
DECIMAL ±	NO	DATE	BY		
FRACTIONAL ±	1	6/15/85	CH		
ANGULAR ±	A				
	B				
	C				
	D				

esi CORPORATION

COMPONENT LAYOUT
- 695 A5 ASSY -

DRAWN BY DP 11/6/84 | CHK'D | SCALE FULL SIZE | DATE | MATERIAL | DRAWING NO 952

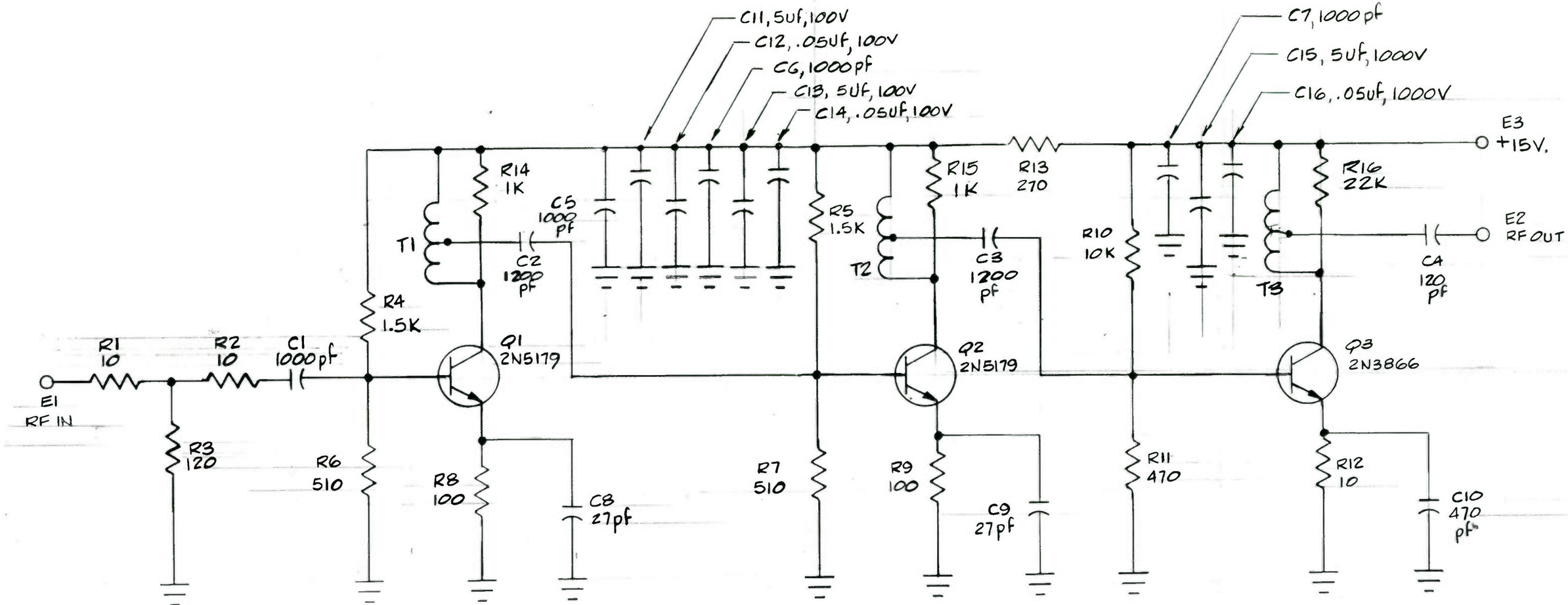


TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
DECIMAL ±	NO.	DATE	BY
FRACTIONAL ±	1		
ANGULAR ±	2		
	3		
	4		
	5		

QEI CORPORATION
WILLIAMSTOWN, NJ

695 POWER AMP A7 ASSY

DRAWN BY	SCALE	MATERIAL
DCD 8/20/84	—	
CHK'D	DATE	DRAWING NO.
TRACED	APP'D	695305



TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
DECIMAL ±	NO.	DATE	BY
FRACTIONAL ±	1		
ANGULAR ±	2		
	3		
	4		
	5		

CORPORATION
WILLIAMSTOWN, NJ

695 BUFFER AMP. A6 ASSY

DRAWN BY	SCALE	MATERIAL
DCP 8/20/84	NTS	
CHK'D	DATE	DRAWING NO.
TRACED	APP'D	695304

ETB-12X18

NOTE: J509 & J509A HAVE SAME PINNING EXCEPT FOR 16 AS SHOWN. J509A CONNECTS TO J409.

J509

J509A-16 MOD8

10 MOD FAULT

16 0 MOD

15 LO MOD

12 10'S

7 5 6 11 DIGIT

PPM

J506

8

GAIN CONTROL

J507

BARGRAPH LO

BARGRAPH HI

R(24,32,33,34,35,36,37,38) 270Ω 1/4W

R(39,40,41,42,43,44,45,46) 270Ω 1/4W

R47 2.2K CAL. → J509-11

R48 2.2K AUTO → J509-9

LO MOD

NC

J509-3,4

J509-1 COMP.

J509-5 +12V.

J509-8 -12V.

J506-16

COMP

R1 1K 1/4W

R2 1K

R3 10K 1/4W

R4 10K 1/4W

R5 10K 1/4W

R6 1K

R7 10K 1/4W

R8 10K 1/4W

R9 100K

R10 4.7K 1/4W

R11 4.7K

R12 4.7K

R13 4.7K

R14 100K

R15 2.2K

R16 10K

R17 1ZM

R18 4.7K

R19 150K

R20 100K

R21 4.7K

R22 4.7K

R23 4.7K

R24 4.7K

R25 4.7K

R26 470

R29 4.7K

R30 330

C1 .1

C2 .1

C3 .1

C4 .1

C5 .1 uf

C6 .47uf

C7 .1

C8 300pf

C9 .22uf

C10 100uf

C11 .1

C12 .01

C12 .1

C13 .1

C9 5uf

CR1 IN34

CR2 IN34

CR3 IN34

CR4 IN4446

CR5 IN4446

CR6 IN4446

CR7 IN4446

CR8 IN4446

CR9 IN4446

CR10 IN4446

CR11 IN5229A

Q1 2N6245

U1a 339

U1b 339

U1c 339

U1d 339

U2a 339

U2b 339

U2c 339

U2d 339

U3 5832

U4 74121

U5 74LS138

U6 Z80

U7 2732

U8 6116

U9 8253

U10 74LS374

U11 74LS374

U12 74LS374

U13 74LS374

U14 8286

+12V.

+5V.

-12V.

+6V.

NMI

INT

WREQ

BUS REQ

WAIT

VCC

RD

WR

RESET

CLK 1.8MHZ

ROM

RAM

320HZ

DATA BUS

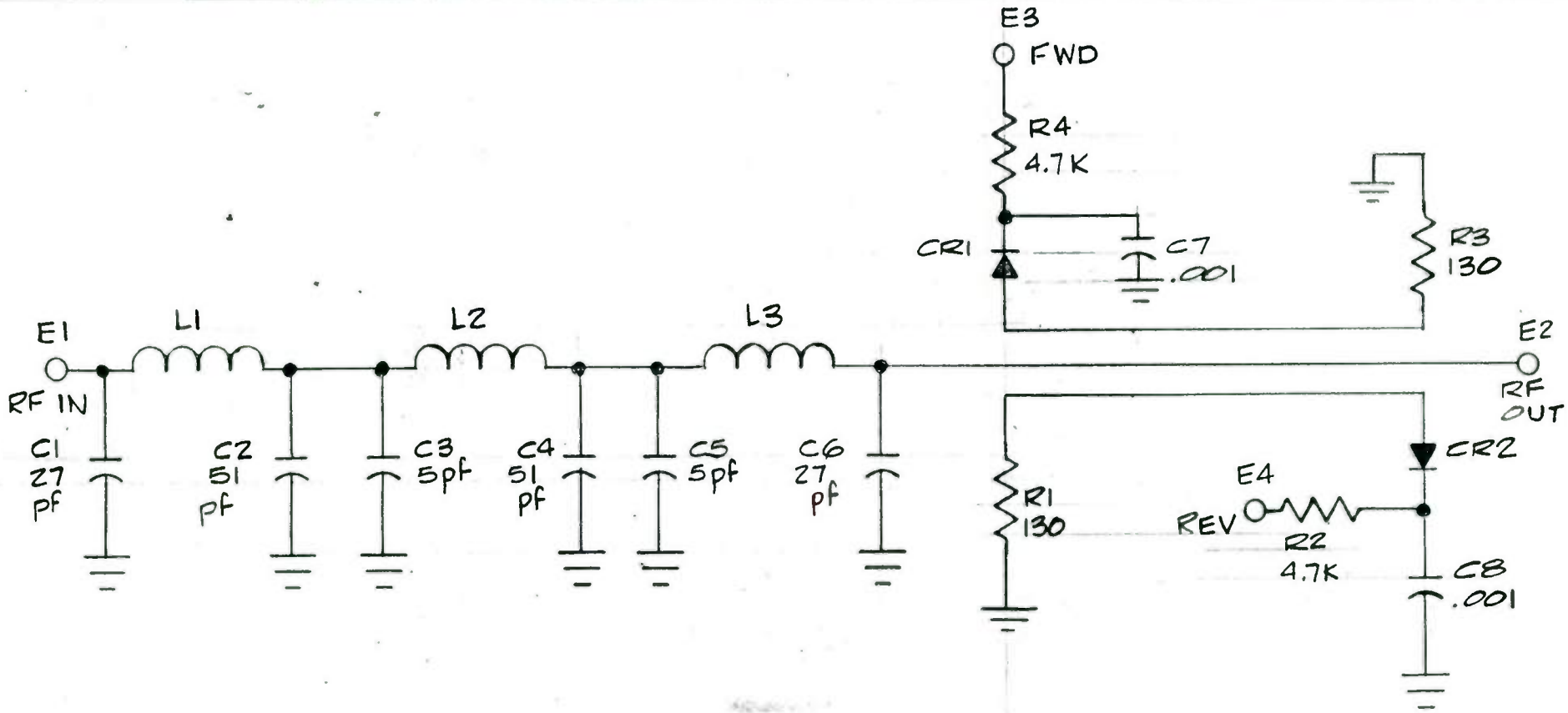
ADDRESS BUS

REV 1 -- REVISED RESET PER SB695-8501

TOLERANCES	REVISIONS				GSI CORPORATION	
DECIMAL ±	NO	DATE	BY		695 AUTO MOD - A5 ASSY -	
FRACTIONAL ±	1	6/15/84	CH			
ANGULAR ±					DRAWN BY DCD 8/6/84	SCALE
					CHK'D	DATE
					TRACED	APP'D

MATERIAL

DRAWING NO 695303

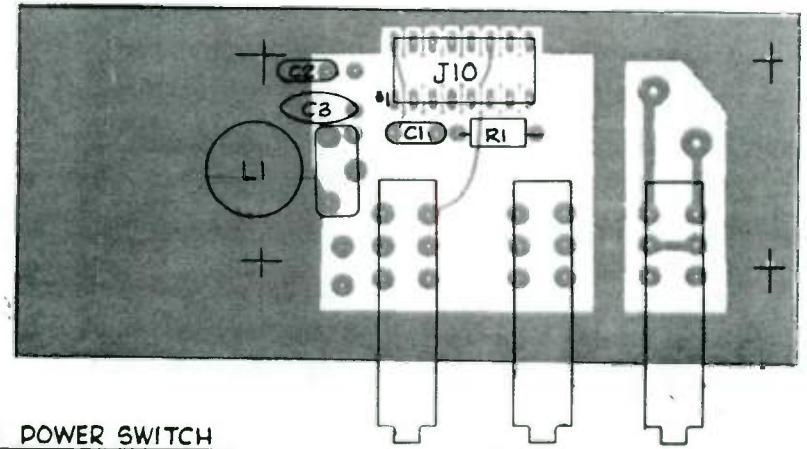


TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
DECIMAL ±	NO.	DATE	BY
FRACTIONAL ±	1		
ANGULAR ±	2		
	3		
	4		
	5		

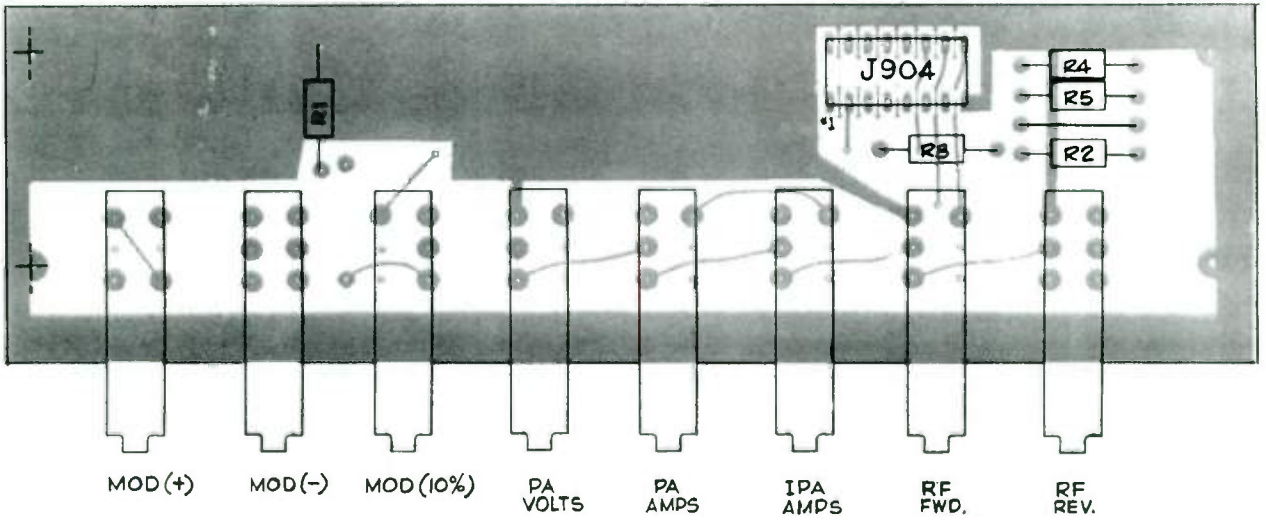
QEI CORPORATION WILLIAMSTOWN, NJ

695 DIRECTIONAL COUPLER & LPF A8 ASSY

DRAWN BY	SCALE	MATERIAL
DCP 8/20/84	NTS	
CHK'D	DATE	DRAWING NO.
TRACED	APP'D	695307



A10 POWER SWITCH

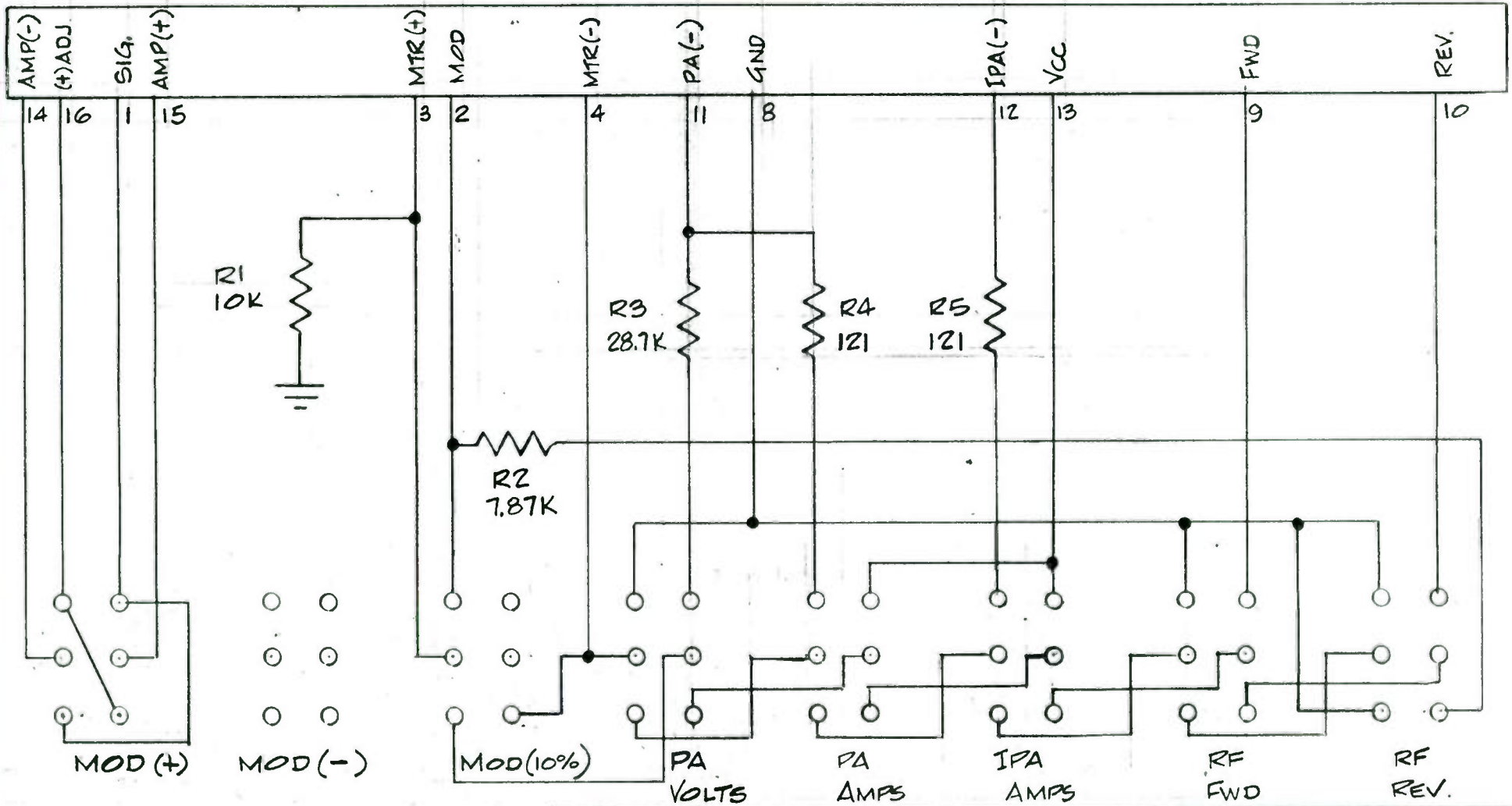


A9 METER SWITCH

TOLERANCES (UNLESS AS NOTED)	REVISIONS				
DECIMAL ±	NO	DATE	BY	COMPONENT LAYOUTS A9 & A10 ASS'YS	
FRACTIONAL ±	1				
ANGULAR ±	2				
	3				
	4				
	5				

DRAWN BY	SCALE	MATERIAL
DCD	FULL SIZE	
CHK'D	DATE 11/8/84	DRAWING NO 695203
TRACED	APP'D	

J904

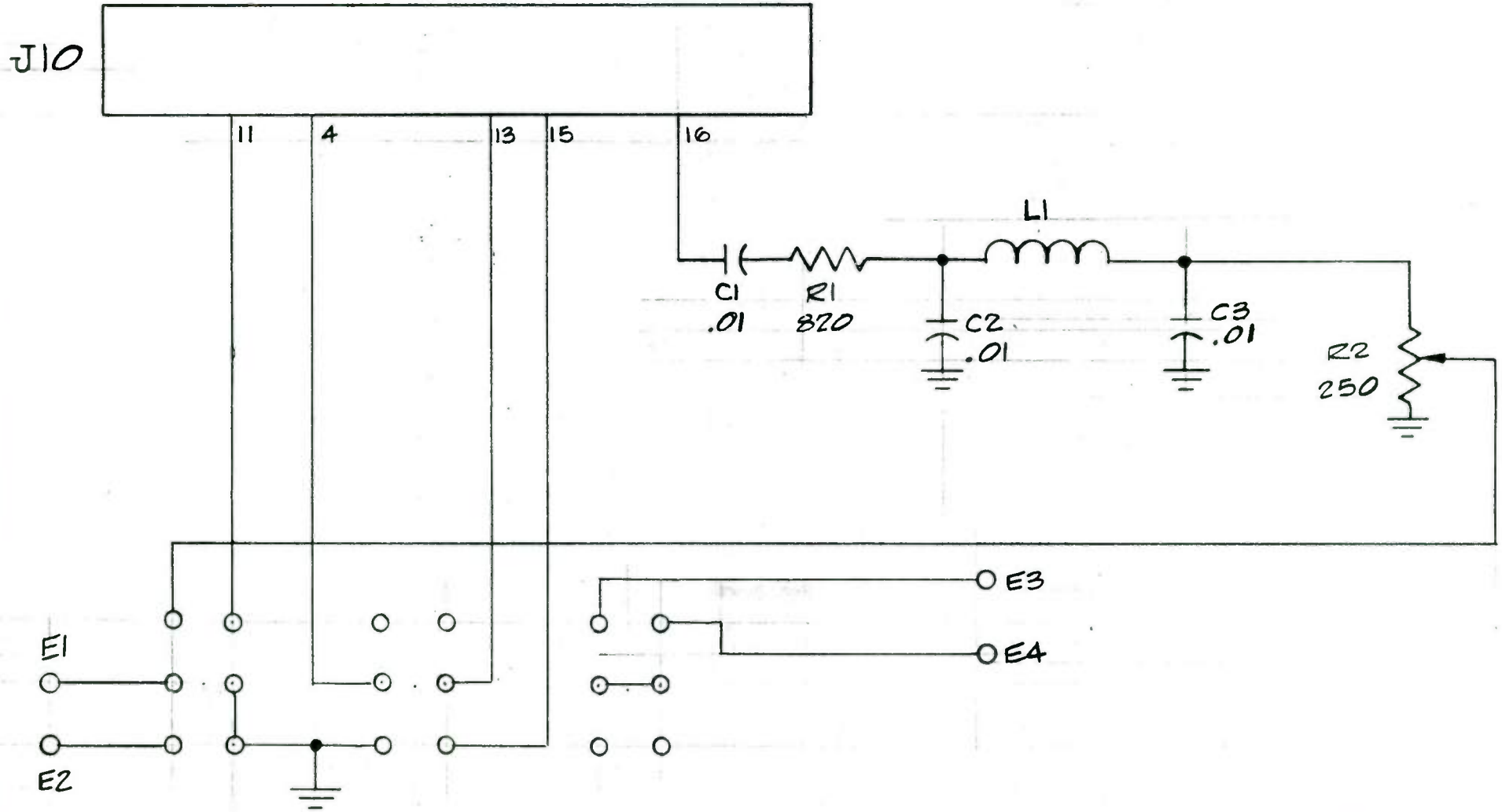


TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
DECIMAL ±	NO.	DATE	BY
FRACTIONAL ±	1		
ANGULAR ±	2		
	3		
	4		
	5		

QEI CORPORATION WILLIAMSTOWN, NJ

695 METER SWITCH A9 ASSY

DRAWN BY	SCALE	MATERIAL
DCP 8/20/84	NONE	
CHK'D	DATE	DRAWING NO.
TRACED	APP'D	695305



TOLERANCES (EXCEPT AS NOTED)	REVISIONS		
	NO.	DATE	BY
DECIMAL ±	1		
	2		
FRACTIONAL ±	3		
	4		
ANGULAR ±	5		

695 POWER SWITCH A10 ASSY

DRAWN BY	SCALE	MATERIAL
DCP 8/20/84	NTS	
CHK'D	DATE	DRAWING NO.
TRACED	APP'D	695306

695 A4 RECEIVER ASSEMBLY TEST PROCEDURE

1. VISUAL INSPECTION OF CIRCUIT BOARD.

   INSTALL CHRYSTAL FOR UNIT.

   APPLY +12V, -12V, AND RF FROM A SIGNAL SOURCE AT THE PRESCRIBED FREQUENCY. RF LEVEL SHOULD BE APPROX. 1 VOLT. MEASURE VOLTAGE AT CR13 (+6V) AND CR14 (-6V).

4. WITH A PICK-UP LOOP AROUND T1 AND CONNECTED TO A COUNTER, TURN UNIT ON AND ADJUST T1 UNTIL L.O. LOCKS ON CHRYSTAL FREQUENCY. TURN POWER SUPPLY ON AND OFF A FEW TIMES TO INSURE L.O. LOCKS UP.

5. WITH A D.C. VOLTMETER, MEASURE THE VOLTAGE AT U1-13, THIS SHOULD BE APPROX 2.7V. THIS INDICATES SIGNAL INTO U1.

6. MEASURE VOLTAGE AT U2-3, THIS SHOULD BE ABOUT 1.8V.

7. MEASURE VOLTAGE AT U1-5, THIS SHOULD BE ABOUT -.7V. NOW REDUCE RF SIGNAL LEVEL IN 10 DB STEPS. AT -30 DB INPUT, U1-5 SHOULD CHANGE TO ABOUT +4.5V.

8. MEASURE VOLTAGE ON U10-7, ADJUST R83 UNTIL THIS VOLTAGE IS ABOUT 3.0 V. MEASURE VOLTAGE ON U3-1, THIS SHOULD BE EQUAL IN MAGNITUDE AND OPPOSITE IN PHASE TO THE VOLTAGE AT U10-7.

9. MEASURE VOLTAGE AT E1 (AM NOISE). VOLTAGE SHOULD INCREASE AS RF LEVEL IS INCREASED ABOVE 1V.

   CONNECT A 10,000 PF CAPACITOR FROM E5 (DE-EMP) TO GROUND. CONNECT E5 TO A DISTORTION ANALYSER. SET RF INPUT LEVEL FOR 1V. MODULATE RF WITH 400 HZ, 75 KHZ DEVIATION. ADJUST C18 & C21 FOR MAXIMUM AUDIO AT E5. MEASURE DISTORTION AND ADJUST C18 &C21 FOR MINIMUM DISTORTION (ABOUT .03%).

11. MEASURE FM NOISE. SHOULD BE ABOUT -75 DB.

12. CONNECT A SCOPE TO E4 (COMP). MODULATE RF SOURCE WITH A 100% STEREO SIGNAL WITH 10% PILOT AT 400 HZ. CHECK SEPARATIONTO INSURE THERE IS NO DEGREDATION THROUGH THE DEMODULATOR.

13. CONNECT A DISTORTION ANALYSER TO E4. MODULATE WITH A 400 HZ, 100% SIGNAL. ADJUST R49 FOR AN OUTPUT LEVEL OF 6 Vp-p (ABOUT 2 Vrms).

14. INCREASE MODULATION LEVEL BY 6 DB AND INSURE OUTPUT IS NOT CLIPPED.

15. REDUCE MODULATION BACK TO 100%. RAISE FREQUENCY AND CHECK FLATNESS. SHOULD BE LESS THAN 0.75 DB DOWN AT 100 KHZ.

16. REMOVE RF INPUT SIGNAL AND INSURE THAT THE OUTPUT MUTES.

17. CONNECT A D.C. COUPLED SCOPE TO E2 (HORIZ. OUT). ADJUST R8 & R14 FOR 8 Vp-p SAWTOOTH WAVE SYMMETRICAL AROUND GROUND.

18. CONNECT A COUNTER TO C38. SHORT U3-5 TO GROUND. ADJUST L10 UNTIL FREQ. IS ABOUT 11.145 MHZ. REMOVE SHORT FROM U3-5.

    CONNECT SCOPE TO E3 (VERT. OUT). SET SCOPE UP FOR X-Y OPERATION TO GET SPECTRUM ANALYSER DISPLAY (SECTION 5-4 D OF INSTRUCTION MANUAL).

20. MODULATE RF SOURCE WITH 100 KHZ AT 100%. ADJUST R18, R20, R28, AND L10 UNTIL CARRIER AND EACH SIDEBAND ARE SYMMETRICALLY SPACED AND CENTERED. SCREEN SHOULD BE 120 KHZ WIDE EITHER SIDE OF CARRIER.

21. ADJUST C37 FOR MAXIMUM AMPLITUDE OF DISPLAY AND EQUAL AMPLITUDE OF SIDEBANDS.

22. CHECK DISPLAY AT LOWER FREQUENCIES TOINSURE IT IS SYMMETRICAL.

23. ADJUST R69 SO THAT A 10 DB DECREASE IN RF INPUT PRODUCES A 0.2 VOLT DROP IN DISPLAY.

24. CHECK ANYTHING ELSE I MAY HAVE MISSED IN WRITING THIS PROCEDURE.

695 EXCITER TEST PROCEDURE

1. Visual Inspection

2. Be sure proper crystal is installed and install software.

3. Turn unit on and check power supply.

Vcc (unreg.)	approx.	38V
+18 (unreg.)	approx.	16.5V
-18 (unreg.)	approx.	-18V
+10 (unreg.)	approx.	10V
+12		
-12		
+5V		

4. Install thumbwheel switch in frequency program connectors A3JU1 and A3JU2. Flip through thumbwheels to insure program frequency indication works properly.

5. Check to Fault Annunciator trip points on the A3 Assy.

U7 pin 2	= 1.22V	U8 pin 7	= 5.25
4	= 1.18V	4	= 4.75
8	= 3.66V	9	= .86
11	= 3.93V	11	= 2.58

6. Connect a power meter and dummy load to the unit. Tune L.O. for best lock range. Tune Power Amplifier as per prescribed procedure.

7. Install proper frequency programming jumpers into A3JU1 & JU2.

8. Alternately adjust A3R73 and the power adjust control until the RF FWD meter position read 100% for 20 watts output.

9. Adjust A3R74 for the same resistance of A3R73.

10. Assure that there is a jumper cable between the Sample Out and Demod In jacks. Assure that the A4 Receiver L.O. is locked on frequency. Modulate the exciter at 13,586 at 100% (use Spectrum Analyzer for accuracy).

11. Depress the MOD(-) pushbutton and be sure the Receiver is demodulating and has an audio output to meter circuit. Remove modulation and adjust A3R38 to zero the meter.

12. Turn modulation back on to 100% as in step 10. Put a D.C. coupled scope (1V/CM) on A5U4-1. Adjust A4R49 until negative going pulses just appear.

13. Adjust A3R48 so the meter reads 100%. Depress MOD(+) pushbutton and adjust A3R46 for 100%.

14. Turn "AUTOMOD" circuit on and watch for proper operation. Should reduce modulation @ 100%. Modulation should be reduced by approximately 3%. With a count of 4 or greater on PPM readout, the modulation should not release (increase).

15. Apply a fully modulated L-R stereo signal (10% pilot). Connect a 691 Modulation Monitor to the exciter and observe the TOTAL modulation and PILOT level. Set TOTAL modulation to 120%. Turn "AUTOMOD" on and immediately tune A2L1 for maximum pilot level as indicated on the 691. Set total modulation to 80% with "AUTOMOD" off. Turn "AUTOMOD" on. As modulation increases to 100%, pilot level should not move more than .2%.

16. With a fully modulated Left or Right only signal, check to be sure there is no stereo degregation in the exciter or demod.

17. Remove Stereo. Apply a 400 Hz sine wave and modulate exciter to 100%. Connect a scope to the Wideband Output of the exciter. Increase modulation to 108%. Turn clipper on. Adjust A4R83 until clipping just occurs.

18. Turn 'Automod' on and overmodulate exciter until PPM reads 8 or greater. Clipping should occur @ 98%. Anjust A4R83 is necessary.

19. Apply a 100 Hz sine wave to the Composite input. Set input level to 3.5 Vp-p. Anjust A2R59 for 100% modulation.

20. Put 100 Hz sine wave into "Mono" input. Set input to +10 dBm. Adjust A2R54 for 100% modulation.

21. Put a 67 kHz sine wave at 1Vrms into SCA #1 input. Adjust A2R83 for 10% with the MOD (10%) pushbutton depressed.

22. Repeat step 21 for SCA#2 and SCA#3.

23. Check Spectrum Analyzer function. If not functioning properly, refer to A4 Receiver test procedure.

24. Depress CAL button. Adjust A10R2 for a null. Meter should read 102.6% with MOD (-) or MOD (+) depressed.

25. Check other meter function for accuracy.

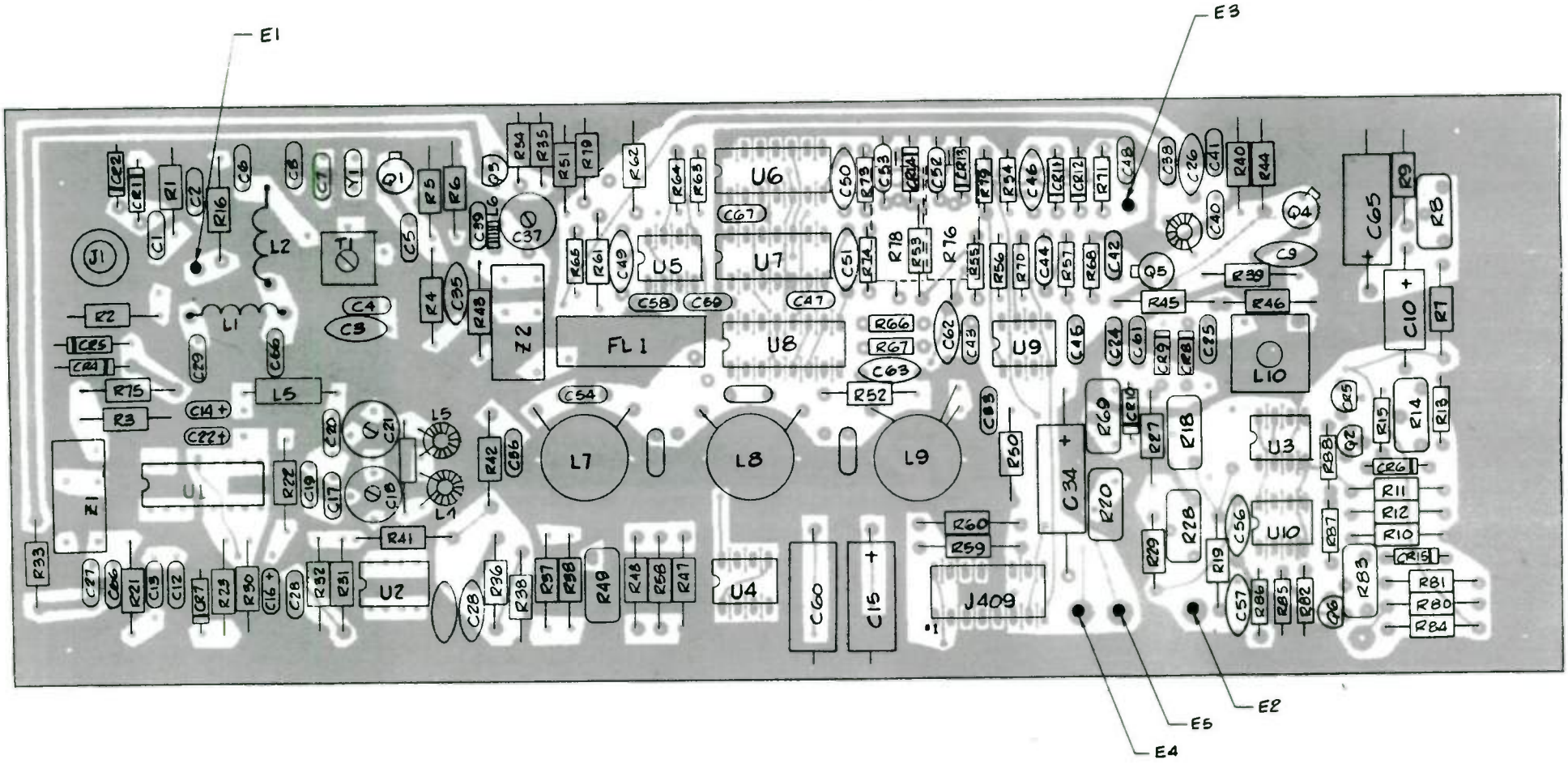
26. After burn in period, run proof.

27. CHECK UNIT FOR 220VAC. OPERATION.

CR1 IN4446
R16 1K
E1 AM NOISE
+12V.
L5
C15 100uf
C14 10uf
R41 3.3K
C54 10pf
C55 27pf
R58 180K
R59 2.2K
E4 COMP
R60 1.5K
E5 DE-EMP
C1 .01
J1 RF IN
R75 330
CR2 IN4446
R1 47K
C2 470pf
CR3 IN4446
CR4 IN4446
R2 22
R3 51
Z1
R21 51
U1 LA1235
C13 .05
C12 .05
L1
C29 27pf
L2
C66 51pf
T1
C3 .1
C4 1000pf
R4 10K
Q1 2NE179
C5 .01
R5 10K
R6 620
Y1
C7 22pf
C8 39pf
C66 68pf
CR7 IN5230
R23 10K
4.7K R22
C16 2.2uf
L3
C17 68pf
C18 2-22pf
C19 10pf
L4
C20 68pf
C21 2-22pf
R24 820
C22 1uf
C23 .1
C9 .1
R30 100K
C28 120pf
R31 56K
R32 3.3K
U2a 5532
R42 2.2K
L7
L8
L9
C30 300pf
C31 1000pf
C32 270pf
C33 1000pf
C34 100uf
R50 2.2K
R47 22K
R48 22K
R49 10K
U4a 5532
U4b 5532
+12V.
-12V.
+6V.
-6V.
C64 .1
R76 82 2W
R78 100 2W
C58 1uf
C59 1uf
C52 1uf
CR13 IN5232
CR14 IN5232
C53 1uf
U5b 5532
U6 733
U7 733
C50 .1
C51 .1
FL.1
R61 2.2K
C49 .1
R62 1.2K
R63 10K
R64 330
R72 1K
R73 1K
R74 1K
C67 270pf
+12V.
R43 51
L6
Z2
C35 .1
R33 180
C27 .01
Q3 2N5245
R34 51
R35 220
C37 5-65pf
C39 500pf
C36 1000 pf
R79 51
U5a 5532
R65 10K
R51 2.2K
R52 15K
U8 TL 441
C62 .1
C63 .1
-6V
+6V
R66 4.7K
C47 220pf
R67 4.7K
R68 10K
U9a 5532
R69 10K
R70 4.7K
CR12 IN34
CR11 IN34
C46 .1
E6 CLIPPER SWITCH
R80 2.2K
R82 4.7K
R83 25K
R84 10K
CR15 IN4446
R81 6.8K
+12V.
-12V.
C56 .1
U10a 5532
R87 10K
R88 10K
C57 .1
U10b 5532
(+)REF
(-)REF
J409
MOD
GND
C60 .001
R53 82K
R54 10K
R55 4.7K
R56 4.7K
C44 .05
R57 4.7K
C43 .01
C45 620pf
R10 10K
U9b 5532
R71 1K
-12V
C48 .001
E3 VERT OUT
C9 .1
+12V.
R7 820
R8 1K
R9 220
C65 100uf
C10 5uf
CR5 2N5961
U3b 532
R17 10K
R18 10K
Q2 2N4401
R13 1K
R14 1K
R15 4.7K
R10 220K
CR6 IN4446
R11 2.7K
R12 220
C11 .1
-12V.
R25 10K
R36 15K
U2b 5532
R37 1MEG
R38 2.7K
-12V.
C38 .01
C26 .1
CR8 MV1650
R26 100K
C61 120 pf
CR9 MV1650
CR10 IN4446
C24 .01
R19 4.7K
E2 HORIZ OUT.
R20 10K
R27 10K
R28 10K
R29 33K
R39 11K 1%
C25 68pf
L10
R40 11K 1%
Q4 2N5179
C40 1000pf
C41 1000pf
R44 768 1%
T2
Q5 2N5179
R45 22
R46 620
C42 .01
C38 .01

SYMBOLS NOT USED
R77

TOLERANCES	REVISIONS				CORPORATION	
DECIMAL	NO	DATE	BY		805 RECEIVER/LOG AMPLIFIER SCHEMATIC A4 ASSY	
FRACTIONAL	1	11/19/84	E.E.			
ANGULAR	DRAWN BY DCP 11/25/84		SCALE NTS	MATERIAL —		
	CHK'D		DATE	DRAWING NO 695301		
	TRACED		APP'D			



TOLERANCES (EXCEPT AS NOTED)	REVISIONS				CORPORATION
DECIMAL ±	NO	DATE	BY		COMPONENT LAYOUT -A4 RECEIVER/LOG AMPLIFIER ASSY
FRACTIONAL ±	1				
ANGULAR ±	2				
	3				
	4				
	5				
	6				

DRAWN BY	SCALE	MATERIAL
DP 4/16/84	FULL SIZE	
CHK'D	DATE	DRAWING NO.
TRACED	APP'D	695204