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DOWNSWELL INTERNATIONAL CORPORATION  
COMMUNICATIONS DIVISION

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1.0 SCOPE

THIS PRODUCTION TEST REQUIREMENT APPLIES TO THE CEMC TYPE 315R-1, 5 kW AM TRANSMITTER, CPN 622-3262-001, AND THE 314R-2, 2.5kW AM TRANSMITTER, CPN 622-4801-001. THE 315R-1 AND 314R-2 ARE IDENTICAL EXCEPT FOR THE HIGH VOLTAGE, THE HV CIRCUIT BREAKER, AND THE FEEDBACK DIVIDER CARD. THE HIGH VOLTAGE IS REDUCED FROM 13.7 KV TO 10 KV. THIS REDUCES THE NOMINAL PLATE VOLTAGE AT HIGH POWER FROM 5.0 KV TO 3.6 KV AND THE NOMINAL PLATE CURRENT FROM 1.25A. TO 0.90A. THE HV CIRCUIT BREAKER IS REDUCED FROM 50A. TO 35A. TO ADJUST THE FEEDBACK TO ALLOW FOR THE REDUCED OPERATING VOLTAGES, THE -002 VERSION OF THE FEEDBACK DIVIDER CARD, A9A1, (636-8417-002) IS USED. THE DIVIDER RATIO IS REDUCED FROM 850 TO 595.

2.0 REFERENCE PUBLICATIONS:

315R-1 EQUIPMENT SPECIFICATION	CPN 670-5631-001
315R-1 SCHEMATIC DIAGRAM	CPN 640-3447-001
315R-1 INSTRUCTION MANUAL	523-0603031
315R-1 NETWORK TUNING CHART	FIGURE 9.3

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3.0

TEST EQUIPMENT REQUIRED:

THE FOLLOWING TEST EQUIPMENT OR ITS EQUIVALENT IS REQUIRED TO PERFORM THE ADJUSTMENTS AND TESTS DESCRIBED HEREIN:

OSCILLOSCOPE, TEKTRONIX T-922  
PROBES, TEKTRONIX (10:1) (QTY. 2)  
DISTORTION ANALYZER, SOUND TECH 1710A  
COUNTER, HP-5232A  
RF AMMETER (15A ES), CALIBRATED AT 10A  
VECTOR IMPEDANCE METER, HP-4815A  
CLAMP-ON AMMETER, AMPROBE INSTRUMENTS RS-300  
PRECISION DC AMMETER, SINGER MODEL N, 3A FS  
PRECISION DC VOLTMETER, SINGER MODEL DCHI  
10 kW, 50Ω DUMMY LOAD (CALORIMETER)  
TRIPLETT MULTIMETER, MODEL 630  
FUNCTION GENERATOR, HP-3312A  
POWER SUPPLY, 28V @ 2A ADJUSTABLE, HARRISON 6291A  
MODULE EXTENDER, CPN 640-3427-001  
FIBER OPTIC TEST SET  
AM MODULATION MONITOR, BELAR MODEL AMM-1, AMM-2 OR AMM-3  
PRECISION AC VM (IRON VANE), 7.5V FS, WESTON 904  
DIGITAL VOLTMETER, HP-3465A

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4.0 INITIAL ADJUSTMENTS (COLD):

BEFORE PROCEEDING WITH ANY ADJUSTMENTS, MAKE A MECHANICAL INSPECTION OF THE ENTIRE TRANSMITTER TO CHECK TIGHTNESS OF CONNECTIONS, LEAD DRESS (PARTICULARLY IN AREAS OF HIGH VOLTAGE AND RF) PROPER FUNCTIONING OF SHORTING SWITCHES, PROPER MATING OF CONNECTORS, AND CLEANLINESS FROM DEBRIS OR LOOSE MATERIAL THROUGHOUT THE TRANSMITTER INCLUDING THE BLOWER.

THE FOLLOWING INITIAL ADJUSTMENTS ARE TO BE MADE WITH ALL POWER DISCONNECTED FROM THE EQUIPMENT:

4.1 TRANSFORMER TAPS:

SET THE FOLLOWING TRANSFORMER PRIMARY CONNECTIONS TO THE 208 VOLT OR 210 VOLT TAPS (WHEN USED ON FACTORY 208 VOLT 4-WIRE WYE POWER SOURCE):

T1	PLATE TRANSFORMER	
A7T1	28 V TRANSFORMER	
A7T2	RF DRIVER TRANSFORMER	
A7T3	BIAS TRANSFORMER	
A10T1	LOGIC PS TRANSFORMER	
A9T4	PA FILAMENT TRANSFORMER	) SET FILAMENT TRANSFORMER TAPS ) FOR 240 V IF FILAMENT REGULATOR ) OPTION IS USED. FILAMENT ) METERING MUST REMAIN ON 208 V ) TAPS.
A9T5	MOD FILAMENT TRANSFORMER	

FOR OTHER VOLTAGES SEE CHARTS IN 315R-1 INSTRUCTION MANUAL.

4.2 INITIAL POT SETTINGS:

SET BOTH THE NEGATIVE (A2R32) AND POSITIVE (A2R33) CLIPPER ADJUSTMENTS TO THE CW POSITION AND SET THE IPL SWITCH (A2S1) TO THE "OFF" POSITION.

SET BOTH THE PA (A6R1) AND MOD (A6R2) FILAMENT ADJUST POTENTIOMETERS TO THEIR CCW POSITIONS.

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4.3 INITIAL WIRING CHECKS:

PRIOR TO CONNECTING AC POWER TO THE TRANSMITTER, PERFORM THE FOLLOWING TESTS:

4.3.1 CONTINUITY CHECKS:

VERIFY THE CORRECTNESS PER THE SCHEMATIC OF THE MAIN AC POWER WIRING, THE HIGH VOLTAGE POWER SUPPLY WIRING INCLUDING THE METERING/OVERLOAD RESISTORS, AND THE BIAS POWER SUPPLY WIRING TO THE SWITCHMOD CARD (A9A3) CONNECTOR.

4.3.2 CONTROL CIRCUIT CHECKS:

CONNECT A LAB 28 VPS (4 AMP) TO THE 28V BUSS IN THE TRANSMITTER AND THEN CHECK FOR PROPER OPERATION OF THE CONTROL CIRCUITS. JUMPER THE AIR SWITCH A9S3 TO PERMIT OPERATION OF THE FILAMENT RELAY AND THE PLATE CONTACTOR. VERIFY OPERATION OF THE INTERLOCK CIRCUITS AND THE CONTROL RELAYS ON A7A1.

ALSO VERIFY OPERATION OF THE LIGHTS IN THE CONTROL CIRCUIT PUSHBUTTONS AND CHECK THE 28V METERING CIRCUIT ON THE DC TEST METER A5M2.

FOR PROPER OPERATION OF THE CONTROL CIRCUITS THE REMOTE FIL OFF (A7A1TB1-3&4) MUST BE JUMPERED, THE REMOTE PLATE OFF (A7A1TB1-7&8) MUST BE JUMPERED, AND THE BIAS CIRCUIT BREAKER (A6CB2) MUST BE IN THE ON POSITION. IF A REMOTE INTERFACE CONTROL UNIT (CPN 627-9721-002) IS INSTALLED, THE JUMPERS ON A7A1TB1 ARE NOT REQUIRED.

WITH ONLY 28V APPLIED, AN OVERLOAD WILL BE INDICATED ON THE CONTROL CARD AND PREVENT HP ON OR LP ON OPERATION. PULL THE CONTROL CARD OUT TO DISCONNECT IT TEMPORARILY FOR THIS TEST.

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4.4 OUTPUT NETWORK TUNING:

4.4.1 INSTALLATION OF COMPONENTS:

USING THE 315R-1 OUTPUT NETWORK TUNING CHART, (FIGURE 9.3), INSTALL THE PROPER COILS AND CAPACITORS FOR THE DESIRED OPERATING FREQUENCY:

BAND		540-700	710-930	940-1230	1240-1600
NODE1	A9L1 ( $\mu$ H)	120	120	120	82
N2	A9L2 ( $\mu$ H)	120	82	82	82
CPL	A9L3A ( $\mu$ H)	150	150	150	150
CPL	A9L3B ( $\mu$ H)	150	150	NONE	NONE
N2	A9C7 (pF)	1200	1000	750	510
N3	A9C8 (pF)	1500	1200	1000	750
N4	A9C9 (pF)	2000	1200	1000	750
3RD	A9C10 (pF)	330	220	130	82
3RD	A9L7 ( $\mu$ H)	28	28	28	28

4.4.2 APPROXIMATE SETTINGS:

SET THE PA TUNING CAPACITOR TO THE APPROXIMATE CAPACITY (BY SETTING IN THE PROPER NUMBER OF TURNS FROM THE MAX C (LOW FREQUENCY) END) .. FIGURE 9.4, AND THE TAPS ON THE COILS TO THE TURN INDICATED IN THE 315R-1 OUTPUT NETWORK TUNING CHART FOR THE DESIRED OPERATING FREQUENCY.

TO ACHIEVE THE PROPER Q IN NODE 1, THE CAPACITY MEASURED FROM THE TUBE ANODE TO GROUND WITH THE CONNECTION TO THE NODE 1 COIL DISCONNECTED, SHOULD BE AS SHOWN ON THE CURVE OF FIG. 9.6.

THE CORRECT CAPACITY WILL MEASURE  $545 \Omega / -90^\circ$  AT THE OPERATING FREQUENCY ON THE VECTOR IMPEDANCE METER. (L7 MUST BE SET APPROXIMATELY CORRECT BEFORE SETTING C6)

SET THE 3RD HARMONIC RESONATOR CAPACITOR (A9C10) TO ITS CORRECT VALUE BY DISCONNECTING IT COMPLETELY FROM THE CIRCUIT AND MEASURING ITS IMPEDANCE AT THE FOLLOWING FREQUENCIES DEPENDING ON THE BAND OF OPERATION:

*short on only*

CAPACITY	OHMS AT $-90^\circ$	FREQUENCY -KHZ	BAND
82 pF	1210	1600	4(1240-1600)
130 pF	995	1230	3( 940-1230)
220 pF	778	930	2( 710- 930)
330 pF	689	700	1( 540- 700)

AT THE LOW END OF THE LOW BAND IT MAY BE NECESSARY TO USE SLIGHTLY MORE THAN 330 pF TO TUNE A9L7 TO THE 3RD HARMONIC.

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4.4.3

NETWORK FINE TUNING

WITH THE 50 OHM DUMMY LOAD CONNECTED, AND USING THE VECTOR IMPEDANCE METER TO MEASURE THE NODE IMPEDANCE, FINE TUNE THE OUTPUT NETWORK BY FINELY ADJUSTING THE TAPS ON THE COILS AS FOLLOWS (SEE FIGURE 9.1):

STEP	SHORT TO GND	MEASURE $Z _0$	ADJUST	VALUE:
1	NODE 3	NODE 4	OUTPUT COUPLING TAP	SEE FIG. 9.5 +10% -10% *
2	NODE 3	NODE 4	L5 TAP	$0^\circ \pm 10^\circ$
REPEAT STEPS 1 - 2 UNTIL BOTH VALUES ARE OBTAINED.				
3	NODE 2	NODE 3	NODE 3 - 4 COUPLING TAP	SEE FIG. 9.5 +10% -10% *
4	NODE 2	NODE 3	L4 TAP	$0^\circ \pm 10^\circ$
REPEAT STEPS 1 - 4 UNTIL ALL VALUES ARE OBTAINED.				
5	NODE 1	NODE 2	L3 TAP	SEE FIG. 9.5 +10% -10% *
6	NODE 1	NODE 2	L2 TAP	$0^\circ \pm 10^\circ$
REPEAT STEPS 1 - 6 UNTIL ALL VALUES ARE OBTAINED.				
7	NONE	PA TUBE ANODE	NODE 1 - 2 COUPLING TAP	$\approx 200\Omega$ (COVER ON) *
8	NONE	PA TUBE ANODE	L1 TAP	$0^\circ \pm 10^\circ$ *
REPEAT STEPS 1 - 8 UNTIL ALL VALUES ARE OBTAINED.				
9	ADJUST C1 FOR $0^\circ$ AT NODE 1.			
10	ADJUST L7 TAP AND C10 FOR HIGH $Z$ AND $0^\circ$ PHASE AT THE 3RD HARMONIC OF THE OPERATING FREQUENCY MEASURED AT THE PA TUBE ANODE. (SET WITHIN 10 KHz AT 3RD).			
REPEAT STEPS 9 - 10 UNTIL ALL VALUES ARE OBTAINED.				

\* NOTE: NODE 4 IS VERY LOW Q AND THEREFORE REACTS HEAVILY WITH NODE 3. IF A COMPROMISE MUST BE REACHED, FAVOR THE ACCURACY OF NODE 3 AND LET NODE 4 HAVE THE LARGEST ERROR.

FINAL PARAMETERS CHANGE WHEN REAR COVER IS INSTALLED. THIS NORMALLY DROPS THE NODE 1 MAGNITUDE ABOUT  $200\Omega$ .

AT THE LOW END OF BAND 1, THE TAP ON L1 MAY REACH THE END OF THE COIL. IF SO, USE C6 TO REACH PROPER TUNING.

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4.5

ARC GAP SETTINGS:

ADJUST THE RF ARC SENSOR ARC GAP A9E12 FOR A SPACING OF .312 INCHES.  
ADJUST THE ARC GAPS ON A9T1 TO A SPACING OF .010 INCHES EACH (A9E9 & 10).

ADJUST THE FRONT (TO GROUND) MODULATOR ARC GAP TO <sup>.312</sup>~~.250~~ INCHES (A9E11).  
ADJUST THE REAR (TO HV) MODULATOR ARC GAP TO .312 INCHES (A9E13).

5.0

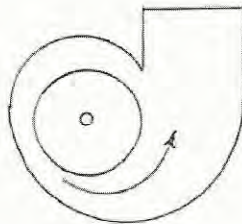
PRELIMINARY ADJUSTMENTS (FILAMENTS ON):

THE FOLLOWING ADJUSTMENTS SHOULD BE MADE WITH FILAMENT POWER APPLIED TO THE EQUIPMENT. ALL FUSES (EXCEPT THE DRIVER P.S.) SHOULD BE INSTALLED, THE LOW VOLTAGE CIRCUIT BREAKER ON, BIAS CIRCUIT BREAKER ON, AND THE HV CIRCUIT BREAKER OFF. IN THIS CONDITION THE FILAMENT OFF LIGHT AND THE PLATE OFF LIGHT SHOULD BOTH BE ON.

PRESS THE "FILAMENT ON" SWITCH. THE FILAMENT OFF LIGHT SHOULD GO OUT AND THE FILAMENT ON LIGHT SHOULD COME ON AND THE BLOWER SHOULD BE ON.

THE DUMMY LOAD INTERLOCK SHOULD BE CONNECTED BETWEEN TERMINALS 10 AND 11 ON A7TB2.

ADJUST THE AIR SWITCH A9S3 TO ACTUATE WITH THE BLOWER ON AND THE FRONT DOOR CLOSED. BACK OFF THE ADJUSTMENT SLIGHTLY AND VERIFY THAT THE AIR SWITCH OPERATES CORRECTLY (OPENS) WHEN THE DOOR IS OPENED. IT MAY BE NECESSARY TO ADJUST THE LOCATION OF THE MICROSWITCH MOUNTING ON THE AIR SWITCH ASSEMBLY TO GET THE PROPER TRAVEL ON THE DIAPHRAM SO THE AIR SWITCH CAN BE SET CORRECTLY. BE CERTAIN THAT THE MICROSWITCH IS SECURELY FIXED IN POSITION EVEN IF NO ADJUSTMENT IS REQUIRED. ALSO VERIFY THAT THE BLOWER IS ROTATING THE RIGHT DIRECTION TO GET FULL AIR FLOW. A VERY QUIET BLOWER IS PROBABLY GOING THE WRONG WAY.



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5.1

FILAMENT VOLTAGE:

SET THE AC TEST METER SWITCH TO "PA FIL" POSITION AND ADJUST THE PA FILAMENT ADJUST (A6R1) TO OBTAIN ~~7.3V~~ <sup>7.5</sup> ON THE AC TEST METER.

SET THE AC TEST METER SWITCH TO "MOD FIL" POSITION AND ADJUST THE MODULATOR FILAMENT ADJUST (A6R2) TO OBTAIN ~~7.3V~~ <sup>7.5</sup> ON THE AC TEST METER.

VERIFY WITH IRON VANE TEST METER AT FILAMENT CONNECTIONS.

IF THE FILAMENT REGULATOR OPTION IS INSTALLED (T2) IT MUST BE CONNECTED AND THE JUMPER ON A7TB1-14 TO 15 REMOVED. MEASURE THE AC VOLTAGE OUTPUT ON TERMINALS 15 AND 16 OF A7TB1. RESET THE PA FILAMENT TRANSFORMER TAPS TO 240 V TAP (SEE PARAGRAPH 4.1).

5.2

TEST METER READINGS:

CHECK BOTH THE AC AND DC TEST METERS FOR THE FOLLOIWNNG APPROXIMATE READINGS TO VERIFY THAT THE LVPS ARE FUNCTIONING PROPERLY:

<u>METER</u>	<u>POSITION</u>	<u>READING</u>	
AC	ØA	210	THESE READINGS WILL BE A FUNCTION OF THE TEST AREA LINE VOLTAGE.
AC	ØB	210	
AC	ØC	210	
AC	PA FIL	<del>7.3</del> 7.5	
AC	MOD FIL	<del>7.3</del> 7.5	
DC	-12	12	
DC	- 6	6	
DC	+ 5	5	
DC	+12	12	
DC	+28	28	
DC	Ecc	0	
DC	Ic	0	
DC	HV	0 (PLATE OFF)	

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5.3

PLATE CURRENT METER AND HVPS OVERLOAD:

TURN THE POWER TO THE EQUIPMENT OFF AND CONNECT THE ADJUSTABLE 28 V POWER SUPPLY AS SHOWN IN FIGURE 9.2. RETURN POWER TO THE LOW VOLTAGE CONDITION.

ADJUST THE 28V POWER SUPPLY TO OBTAIN 1.25 AMPS DC AS INDICATED ON THE PRECISION AMMETER. THE FRONT PANEL PLATE CURRENT METER (A5M4) SHOULD INDICATE  $1.25 \pm 2\%$  AMPS.

WITH THE RECYCLE SWITCH (A3S2) IN THE "OFF" POSITION, SET THE 28V POWER SUPPLY TO OBTAIN 1.1 AMPS DC AS INDICATED ON THE PLATE CURRENT METER (A5M4) AND ADJUST THE HVPS O/L ADJUSTMENT (A3R1) UNTIL THE HVPS O/L INDICATOR (A3CR3) LIGHTS. REPEAT BY INCREASING THE CURRENT SLOWLY TO 1.1 AMPS TO BE SURE THE TRIP POINT IS ACCURATELY SET.

5.4

BIAS POWER SUPPLY:

**DANGER !!!**

FOR THIS TEST BE SURE THAT THE HVPS  
CIRCUIT BREAKER (A6CB3) IS IN THE  
"OFF" (DOWN) POSITION!!!

WITH THE HVPS CIRCUIT BREAKER A6CB3 OFF AND THE PLATE OFF, MEASURE THE PLUS AND MINUS 125V OUTPUT OF THE BIAS POWER SUPPLY WHEN THE BIAS CIRCUIT BREAKER IS TURNED ON. MEASURE FROM A7A3-E7 (+125V) AND A7A3-F5 (-125V) REFERENCED TO A7A2-E6. SWITCHMOD CARD SHOULD BE INSTALLED FOR THIS TEST. TURN BIAS CIRCUIT BREAKER "OFF" BETWEEN MEASUREMENTS.

5.5

SWITCH FREQUENCY:

USING A SCOPE PROBE FEEDING THE FREQUENCY COUNTER, ATTACH THE PROBE (10:1) TO A2TP5 NEAR TERMINAL 4 OF A2U5 ( $\mu$ A 710 COMPARATOR). THIS MEASURES THE TRIANGLE OUTPUT FROM THE FUNCTION GENERATOR A2U1. ADJUST THE "SWITCH FREQUENCY ADJUST" CONTROL (A2R62) TO SET THE FREQUENCY TO 70.0 kHz. COVER MUST BE REMOVED FROM AZ (PWM CARD) AND CARD PLACED ON EXTENDER FOR THIS ADJUSTMENT.

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5.6

RF EXCITER FREQUENCY:

CONNECT THE COUNTER TO THE FREQUENCY MONITOR JACK A7J1. SELECT OSCILLATOR 1. SET THE "OSCILLATOR 1 FREQUENCY ADJUST" CONTROL (A1C2) FOR THE DESIRED OUTPUT FREQUENCY. MAKE SURE A1J1 IS STRAPPED FOR THE CORRECT DIVISION (1080 KHZ OR ABOVE ÷ 2, JUMPER 1 & 3, BELOW 1080 KHZ ÷ 4, JUMPER 1 & 2 AND 3 & 4).

SELECT OSCILLATOR 2. SET THE "OSCILLATOR FREQUENCY ADJUST" CONTROL (A1C9) FOR THE DESIRED OUTPUT FREQUENCY. IF ONLY ONE CRYSTAL IS SUPPLIED, SWITCH IT FROM OSC. 1 AND THEN ADJUST OSC. 2. IF CUSTOMER HAS ORDERED A SPARE CRYSTAL, BE SURE IT IS INSTALLED AND ADJUSTED. IF ONLY ONE CRYSTAL IS USED, RETURN IT TO OSC. 1.

5.7

RF PULSE WIDTH:

CONNECT A SCOPE TO THE FREQUENCY MONITOR OUTPUT A7J1. ADJUST THE "PULSE WIDTH" CONTROL A1R20 FOR A 120° (1/3) WIDE NEGATIVE GOING PULSE. THIS CORRESPONDS TO A 120° POSITIVE GOING PULSE AT PIN 14 ON THE RF EXCITER CARD.

5.8

DC REFERENCE:

MEASURE THE DC (+) VOLTAGE TO GROUND AT TERMINAL 15 OF THE PWM MODULE. USING THE FRONT PANEL "RAISE" AND "LOWER" SWITCHES ADJUST THE VOLTAGE TO +3.0 V. NOTE THAT THE LIGHTS IN THE SWITCHES ARE TURNED ON WHEN THE BUTTON IS DEPRESSED. THIS WILL SET THE PLATE VOLTAGE TO APPROXIMATELY 3 KV FOR THE NEXT STEP IN THIS PROCEDURE. ALSO MAKE SURE THAT THE LOW POWER ADJUST (42R37) ON THE PWM CARD IS SET IN ITS MAX CCW POSITION.

*MANUALY  
A P J*

5.9

RF DRIVER OVERCURRENT: *PLT. ON.*

TURN FIL OFF, INSERT DRIVER P.S. FUSE. TURN FIL ON AND OBSERVE THE RF DRIVER  $I_c$  (3.0 AMPS) ON THE MULTIMETER. ADJUST THE OVERCURRENT TRIP ADJUSTMENT (A9A4R103) CW UNTIL THE RF DRIVER  $I_c$  SHUTS OFF. BACK OFF IN THE CCW DIRECTION 1/2 TURN.

*A*

5.10

PA NEUTRALIZING:

OBSERVE THE OUTPUT OF THE PA NETWORK AT A9J1 WITH THE DUMMY LOAD CONNECTED AND THE FILAMENTS AND RF DRIVER ON. ADJUST THE PA NEUT CAPACITOR A9C29 FOR MINIMUM SIGNAL ON THE SCOPE. IF THERE IS LESS THAN 1.5" BETWEEN THE NEUT PLATE AND THE TUBE ANODE, CHANGE THE VALUE OF A9C14 TO ACHIEVE MORE SPACING. BE SURE THAT THE HV-CIRCUIT BREAKER IS OFF AND THAT THE HV IS NOT ENERGIZED.

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**DANGER !!!**

BEFORE DISCONNECTING OR RECONNECTING ANY COMPONENT IN THE TRANSMITTER, USE THE SHORTING STICK TO BE SURE CIRCUIT IS SAFE.

THE FOLLOWING ADJUSTMENTS SHOULD BE MADE WITH ALL FUSES INSTALLED, ALL THREE CIRCUIT BREAKERS (LV, BIAS, AND HV) ON, AND THE TRANSMITTER RF OUTPUT CONNECTED INTO THE DUMMY LOAD. THE DUMMY LOAD INTERLOCK SHOULD BE CONNECTED BETWEEN TERMINALS 10 AND 11 ON A7TB2. IN THIS CONDITION THE FILAMENT OFF LIGHT AND THE PLATE OFF LIGHT SHOULD BOTH BE ON.

FOR THE INITIAL TURN ON OF HV THE FOLLOWING PROCEDURE SHOULD BE USED: REMOVE THE RF DRIVER MODULE. CONNECT THE PLATE OF THE PA TUBE TO GROUND (CHASSIS) THROUGH A SHORT (NOT LONGER THAN 6 INCHES) CLIP LEAD. CUT THE HV IN HALF (APPROXIMATELY 7KV) BY DISCONNECTING THE THREE SECONDARY LEADS ON TERMINALS 19, 20 AND 21 OF THE HVPS TRANSFORMER 11. CAREFULLY TAPE THESE DISCONNECTED LEADS SO THEY WILL NOT COME IN CONTACT WITH ANYTHING. CONNECT THE COLLECTOR OF A2Q2 ON THE PWM CARD TO GROUND WITH A CLIP LEAD TO BYPASS THE RF DRIVER CURRENT DE-KEY CIRCUIT.

PRESS THE "FIL ON" SWITCH. VERIFY THAT THE RF DRIVER IC IS ZERO. OBSERVE THE HV ON THE MULTIMETER. IT SHOULD BE ZERO. PRESS THE "LP ON" SWITCH. THE HV SHOULD COME ON TO APPROXIMATELY 7KV. THE PLATE VOLTAGE AND PLATE CURRENT SHOULD STILL READ ZERO. SLOWLY TURN THE LOW POWER ADJUSTMENT, A2R3. CW UNTIL THE PLATE VOLTAGE BEGINS TO RISE ABOVE ZERO. ADJUST IT UNTIL THE PLATE VOLTAGE READS APPROXIMATELY 1KV. AT THIS POINT THE PLATE CURRENT SHOULD BE APPROXIMATELY 250 ma. PRESS THE "HP ON" SWITCH. THE PLATE VOLTAGE SHOULD INCREASE TO ABOUT 1.5KV. USE THE RAISE/LOWER BUTTONS TO ADJUST THE PLATE VOLTAGE TO ABOUT 2.5KV. AT THIS TIME THE PLATE CURRENT SHOULD BE APPROXIMATELY 400 ma. NO RF POWER OUTPUT SHOULD BE PRESENT.

THE ABOVE PROCEDURE VERIFIES THE BASIC OPERATION OF THE 70 KHZ SWITCHING MODULATOR USING THE PA TUBE IN ITS ZERO BIAS CONDITION AS A LOAD. AFTER COMPLETION OF THIS PROCEDURE, TURN OFF THE TRANSMITTERS AND RE-INSTALL THE RF DRIVER MODULE, REMOVE THE CLIP LEAD FROM THE PLATE TO GROUND ON THE PA TUBE, RECONNECT THE LEADS TO TERMINALS 19, 20 AND 21 OF THE HVPS TRANSFORMER SECONDARY, AND REMOVE THE JUMPER TO GROUND FROM THE COLLECTOR OF A2Q2 ON THE PWM CARD.

PRESS THE "HP ON" SWITCH. THE FILAMENT OFF LIGHT SHOULD GO OUT, THE FILAMENT ON LIGHT COMES ON, THE PLATE OFF LIGHT GOES OUT, AND THE HP ON LIGHT COME ON.

THE PLATE VOLTAGE METER A5M3 SHOULD INDICATE APPROXIMATELY 5KV, AND THE PLATE CURRENT METER SHOULD READ APPROXIMATELY 1.25A. (3.6KV AND 0.9A FOR THE 314R-2).

IMMEDIATELY ADJUST THE "PA TUNING" A9C6 FOR THE PLATE CURRENT DIP.

NOTE: THE RF POWER OUTPUT BY CHECKING THE LINE CURRENT RF AMMETER. IT SHOULD READ SLIGHTLY ABOVE 10 AMPS (7 AMPS FOR THE 314R-2)

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SCALE	REV <b>A</b>	SHEET 15

6.1

PA LOADING AND RF PULSE WIDTH:

**DANGER !!!**

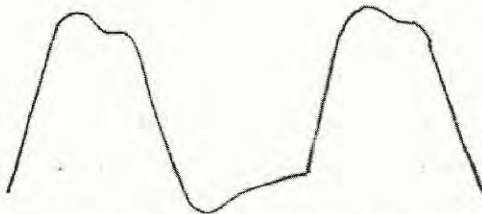
USE SHORTING STICK TO REMOVE ANY STORED ENERGY BEFORE CONNECTING OR DISCONNECTING THE HV METER.

TURN THE TRANSMITTER OFF AND CONNECT THE PRECISION HV VOLTMETER FROM A9C24 TO GROUND (-VOLTAGE, GROUND IS+). REAPPLY POWER TO THE TRANSMITTER AND USING THE FRONT PANEL "RAISE" AND "LOWER" SWITCHES, ADJUST THE PLATE VOLTAGE TO OBTAIN 5.0 kV ON THE PRECISION PLATE VOLTAGE METER. THE FRONT PANEL VOLTMETER SHOULD READ 5.0 kV  $\pm$  2%. (3.6 kV ON THE 314R-2).

ADJUST THE "PULSE WIDTH" CONTROL (A1R20) VERY SLIGHTLY ON THE RF EXCITER MODULE (A2) FOR A PEAK IN RF POWER OUTPUT WITHOUT ALLOWING THE PLATE CURRENT TO RISE, I.E., OBTAIN THE BEST PA EFFICIENCY WITHOUT DEVIATING MORE THAN 10° FROM THE 120° PULSE WIDTH SET IN PARAGRAPH 5.7.

AT THIS LEVEL THE PLATE CURRENT SHOULD READ 1.25 AMPS  $\pm$  25 ma (0.9A FOR THE 314R-2). IF THIS PLATE CURRENT IS NOT ACHIEVED, ADJUST THE TAP ON COIL A9L3 TO EITHER INCREASE OR DECREASE THE LOADING ON THE PA AS NECESSARY TO OBTAIN THE DESIRED CURRENT AT 5.0 kV. INCREASING THE INDUCTANCE OF A9L3 INCREASES THE LOADING ON THE PA (INCREASES PA PLATE CURRENT AT 5.0 kV).

AT THIS TIME THE ANODE WAVEFORM (AT A9C46) SHOULD BE THE HIGH EFFICIENCY WAVEFORM SHOWN BELOW.



TURN THE POWER OFF AND REMOVE THE PRECISION DC VOLTMETER.

6.2

LOW POWER AND MOD MONITOR:

SWITCH TO LOW POWER. SET LOW POWER ADJUST A2R37 FOR THE DESIRED POWER OUTPUT AS SPECIFIED IN THE TRANSMITTER WORK ORDER.

ADJUST THE TAPS ON THE MOD MONITOR SAMPLE COIL A9L6 TO OBTAIN 30 Vpp OUTPUT WHEN CONNECTED TO THE SCOPE AND MOD MONITOR IN BOTH HIGH POWER AND LOW POWER.

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6.3 OVERLOAD RECYCLE:

USE A TEST LEAD TO GROUND TERMINAL 14 OF HVPS O/L RELAY A3K1. WITH THE "RECYCLE" SWITCH ON, GROUNDING THIS POINT SHOULD CAUSE THE SWITCHING MODULATOR TO STOP SWITCHING THUS REDUCING THE PLATE VOLTAGE AND RF OUTPUT TO ZERO. REMOVING THE GROUND WILL ALLOW THE OUTPUT TO RETURN TO NORMAL. A SERIES OF FOUR SIMULATED OVERLOADS SHOULD CAUSE THE HV CONTACTOR TO OPEN AND REMOVE THE HV. PUSH THE "HP ON" TO RETURN TO POWER OUTPUT. THE SEQUENCE OF FOUR OVERLOADS MUST OCCUR WITHIN FIVE SECONDS OR LESS TO REMOVE THE HV. A SINGLE SIMULATED OVERLOAD SUSTAINED FOR MORE THAN ONE SECOND SHOULD ALSO CAUSE THE HV TO BE REMOVED.

WITH THE "RECYCLE" SWITCH OFF, ANY SINGLE OVERLOAD WILL REMOVE HV.

REMOVING THE DUMMY LOAD INTERLOCK FROM A9TB2-10 SHOULD CAUSE THE SWITCHING TO STOP BUT NOT DROP THE HVPS.

6.4 AUDIO AND CLIPPING LEVELS:

THE PWM CARD (A2) MUST HAVE THE COMMON MODE AND OFFSET ADJUSTMENTS COMPLETED PRIOR TO THESE TESTS.

6.4.1 AUDIO TRACKING:

DURING THIS TEST USE A LOW POWER LEVEL OF 1 kW OR LESS. GO TO HIGH POWER AND FEED 1000 Hz TO TRANSMITTER TO GET 90% MODULATION. REDUCE POWER OUTPUT AND NOTE THAT MODULATION PERCENTAGE TRACKS WITHIN + 0.5 dB. IF NOT, RESET AUDIO TRACK A2R26 SLIGHTLY AND REPEAT PROCEDURE UNTIL POWER TRACKING IS OBTAINED. ADJUST AUDIO TRACKING IN LOW POWER AND RESET AUDIO INPUT LEVEL AS NECESSARY IN HIGH POWER. IF THE LF DIST CONTROL IS TOO FAR OFF, IT MAY HAVE TO BE ADJUSTED BEFORE SATISFACTORY AUDIO TRACKING CAN BE ACHIEVED.

6.4.2 CARRIER SHIFT:

IN HIGH POWER OPERATION, APPLY A 400 Hz TONE AT 95% MODULATION. NOTE CARRIER SHIFT WITH APPLICATION OF TONE. ADJUST A2R49 CAR REG FOR EXACTLY 0% CARRIER SHIFT AT 95% MODULATION.

6.4.3 LF DIST:

ADJUST THE LF DIST FOR MINIMUM AUDIO DISTORTION WITH 95% MODULATION IN HP AT 100 Hz. THIS SETTING CAN BE COMPROMISED LATER AT ANOTHER AUDIO FREQUENCY TO ACHIEVE THE BEST AF DISTORTION OVER THE AUDIO RANGE.

W.36 - kW

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6.4.4 AF CLAMP ADJ:

FEED 1 kHz AT 3 dB ABOVE 100% MODULATION TO TRANSMITTER WITH IPL SWITCH OFF. TRANSMITTER WILL OVERMODULATE SEVERELY ON NEGATIVE PEAK AND MAY RING ON THE POSITIVE PEAK. ADJUST CLAMP A2R58 CCW TO APPROXIMATELY 130% POSITIVE MODULATION. THIS SHOULD BE VERIFIED BY OSCILLOSCOPE OBSERVATION. THE HV MUST BE 13,700 V TO ACHIEVE 130%. SELECT TAPS ON THE HV XFMR AS REQUIRED TO GET THE NECESSARY HV.

6.4.5 AF CLIPPER ADJUSTMENTS:

SET IPL SWITCH A2S1 TO ON POSITION.

APPLY 1kHz TONE AT ONE dB ABOVE 100% MODULATION. NEGATIVE PEAK LIGHT WILL BE ON. ADJUST A2R73 NEG LIMIT FOR 95% NEGATIVE MODULATION. BE ABSOLUTELY CERTAIN THAT CARRIER LEVEL METER ON MONITOR IS AT ZERO DEVIATION FOR THIS ADJUSTMENT.

INCREASE SIGNAL LEVEL BY TWO MORE dB (THREE dB ABOVE 100% NEGATIVE MODULATION.) ADJUST A2R76 POS LIMIT TO CLIP AT 120% POSITIVE MODULATION.

THESE SETTINGS ARE APPROXIMATE. FINAL SETTINGS SHOULD BE MADE JUST PRIOR TO COMMENCING THE BURN IN TEST. WITH PROGRAM MODULATION SET THE NEGATIVE LIMITER TO GET -95% MODULATION, BUT NOT -100%. SET THE POSITIVE LIMITER TO GET +120% MODULATION, BUT NOT +125%.

6.5 RF POWER METER AND VSWR OVERLOAD:

WITH THE "NORM/REV" SWITCH A9A6S1 IN THE NORMAL POSITION (UP) OPERATE THE TRANSMITTER INTO THE DUMMY LOAD AT THE SPECIFIED HP CARRIER LEVEL. SWITCH THE RF POWER METER TO THE "REFLECTED" POSITION AND ADJUST "REF BAL" CONTROL A9A6C6 FOR A MINIMUM READING. CHANGE THE "NORM/REV" SWITCH TO THE REVERSE POSITION, REDUCE THE POWER OUTPUT TO 500 WATTS, AND SET THE RF POWER METER TO THE "FORWARD" POSITION AND ADJUST THE "FOR BAL" CONTROL A9A6C5 FOR A MINIMUM READING.

SWITCH THE RF POWER METER TO THE "REFLECTED" POSITION AND ADJUST THE "REF CAL" CONTROL A9A6R10 TO INDICATE 10% ON THE METER (12% IS FULL SCALE). ON THE CONTROL LOGIC MODULE SET THE "VSWR OVERLOAD ADJUST" TO JUST TRIP THE VSWR OVERLOAD AT THE 500 W LEVEL WITH 95% MODULATION AT 1000 HZ. RETURN THE "NORM/REV" SWITCH TO THE "NORMAL" POSITION AND SET THE POWER OUTPUT TO THE SPECIFIED HP LEVEL. PUT THE RF POWER METER IN THE "FORWARD" POSITION AND ADJUST THE "FWD CAL" CONTROL A9A6R9 TO INDICATE THE 100% ON THE RF POWER METER.

IF THE RF AMMETER OPTION IS USED, VERIFY ITS CALIBRATION AT THE SPECIFIED HP LEVEL.

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SCALE	REV <i>A</i>	SHEET 18

7.0 PERFORMANCE TESTS:

THE FOLLOWING TESTS ARE TO BE PERFORMED ON A TRANSMITTER THAT HAS BEEN ADJUSTED IN ACCORDANCE WITH PARAGRAPHS 4.0, 5.0, AND 6.0 OF THIS SPECIFICATION:

7.1 RF POWER OUTPUT:

OPERATE THE TRANSMITTER AT HP INTO THE DUMMY LOAD WITH NO MODULATION. THE POWER OUTPUT SHALL BE NOT LESS THAN 5.5 kW. THEN SET HP TO THE POWER LEVEL SPECIFIED BY THE SALES ORDER. (2.75 kW FOR THE 314R-2)

OPERATE THE TRANSMITTER AT LP INTO THE DUMMY LOAD WITH NO MODULATION. THE POWER OUTPUT SHALL BE AS SPECIFIED BY THE SALES ORDER.

RECORD BOTH THE PLATE VOLTAGE AND PLATE CURRENT REQUIRED TO ACHIEVE THE RATED POWER IN BOTH HIGH AND LOW POWER OPERATIONS.

CALCULATE THE PA EFFICIENCY AT THE HIGH POWER LEVEL SPECIFIED ON THE SALES ORDER.

$$\text{EFFICIENCY} = \frac{(I_{RF})^2 (R_{DL})}{(E_{BB}) (I_B)} \times 100$$

7.2 CARRIER SHIFT AND MODULATION CAPABILITY:

MEASURE THE CARRIER SHIFT AS INDICATED ON THE AM MODULATION MONITOR AT 95% MODULATION LEVELS OF 400 HZ IN BOTH HP AND LP OPERATION.

MODULATE THE HP CARRIER AT 1 kHz TO VERIFY THE 125% MODULATION CAPABILITY (IPL MUST BE IN THE "OFF" POSITION).

7.3 AF RESPONSE AND DISTORTION:

MEASURE THE AUDIO FREQUENCY INPUT LEVEL IN dB AND THE PERCENT TOTAL HARMONIC DISTORTION AT 95% AND 50% MODULATION OVER THE AUDIO FREQUENCY RANGE OF 20 Hz TO 10,000 Hz.

MEASURE AT THE HIGH POWER LEVEL AND AT THE LOW POWER LEVEL SPECIFIED IN THE SALES ORDER.

USE THE BELAR AMM-1 MODULATION MONITOR AND MEASURE THE INPUT LEVEL IN dB REQUIRED TO MAINTAIN A CONSTANT NEGATIVE MODULATION LEVEL.

MEASURE THE NOISE LEVEL REFERENCED TO 95% MODULATION AT 400 HZ IN BOTH HP AND LP.

IPL MUST BE IN THE "OFF" POSITION DURING THESE TESTS.

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SCALE	REV <b>A</b>	SHEET 19

7.4

BURN IN:

OPERATE THE TRANSMITTER AT 5.5 kW (2.75 kW FOR THE 314R-2) INTO THE DUMMY LOAD WITH PROGRAM MODULATION FOR A PERIOD OF 16 TO 24 HOURS.

AT THE SUCCESSFUL COMPLETION OF THE BURN IN, RECORD THE TOTAL TIME OF THE HEAT RUN AND A COMPLETE SET OF METER READINGS FOR CUSTOMER HP OUTPUT MODULATED 95% AT 1 kHz, HP CARRIER, LP OUTPUT MODULATED 95% AT 1 kHz, LP CARRIER, AND WITH FILAMENTS ON ONLY.

ALSO RECORD THE RF OUTPUT FREQUENCY READ BY THE FREQUENCY COUNTER.

SIDE PANELS AND REAR PANEL WITH FLUSHING FAN OPERATING MUST BE INSTALLED DURING BURN IN.

THE FINAL SETTINGS FOR THE NEGATIVE AND POSITIVE LIMITERS IN THE IPL CIRCUIT SHOULD BE SET WITH PROGRAM MODULATION AT THE BEGINNING OF THE BURN IN AS FOLLOWS:

WITH THE IPL SWITCH OFF, SET THE INCOMING PROGRAM AUDIO LEVEL TO JUST BARELY LIGHT THE +125% INDICATOR ON THE MOD MONITOR. TURN THE IPL SWITCH ON. SET THE NEGATIVE LIMITER TO LIGHT THE -95% INDICATOR BUT NOT THE -100% INDICATOR. SET THE POSITIVE LIMITER TO LIGHT THE +120% INDICATOR BUT NOT THE +125% INDICATOR.

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SCALE	REV <i>A</i>	SHEET 20

SH

DWG NO.

STATION \_\_\_\_\_  
FREQUENCY \_\_\_\_\_

UNIT S/N \_\_\_\_\_  
DATE \_\_\_\_\_  
TECHNICIAN \_\_\_\_\_

8.0 DATA SHEETS:

THE FOLLOWING DATA SHEETS ARE FOR THE ADJUSTMENTS AND TESTS DESCRIBED IN PARAGRAPHS 4.0, 5.0, 6.0, AND 7.0 ABOVE:

315R-1 AM TRANSMITTER, CPN 622-3262-001  
MECHANICAL INSPECTION COMPLETE

\_\_\_\_\_ OK

8.1 INITIAL ADJUSTMENTS (COLD):

8.1.1 TRANSFORMER TAPS:

PLATE TRANSFORMER	T1	_____
28V TRANSFORMER	A7T1	_____
RF DRIVER TRANSFORMER	A7T2	_____
BIAS TRANSFORMER	A7T3	_____
LOGIC PS TRANSFORMER	A10T1	_____
PA FILAMENT TRANSFORMER	A9T4	_____
MOD FILAMENT TRANSFORMER	A9T5	_____

8.1.2 INITIAL POT SETTINGS:

NEGATIVE CLIPPER	A2R32	CW	_____
POSITIVE CLIPPER	A2R33	CW	_____
IPL SWITCH	A2S1	OFF	_____
PA FILAMENT ADJ	A6R1	CCW	_____
MOD FILAMENT ADJ	A6R2	CCW	_____

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PREP	SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201	REV LTR <b>A</b>
CHK	SCALE		SHEET	21

SH

DWG NO.

8.1.3 INITIAL WIRING CHECKS:

8.1.3.1 CONTINUITY CHECKS:

AC POWER WIRING	_____	OK
HIGH VOLTAGE PS WIRING	_____	OK
BIAS POWER SUPPLY WIRING	_____	OK

8.1.3.2 CONTROL CIRCUIT CHECKS:

FILAMENT ON CIRCUIT	_____	OK
LP ON CIRCUIT	_____	OK
HP ON CIRCUIT	_____	OK
CONTROL RELAYS (A7A1)	_____	OK
INTERLOCKS	_____	OK
PUSHBUTTON LIGHTS	_____	OK
28V METER	_____	OK

8.1.4 OUTPUT NETWORK TUNING:

8.1.4.1 INSTALLATION OF COMPONENTS:

FREQUENCY	_____	kHz
NODE 1 COIL A9L1	_____	μH
NODE 2 COIL A9L2	_____	μH
COUPLING COIL A9L3	_____	μH
NODE 2 CAP A9C7A	_____	pF
NODE 2 CAP A9C7B	_____	pF
NODE 3 CAP A9C8A	_____	pF
NODE 3 CAP A9C8B	_____	pF
NODE 4 CAP A9C9	_____	pF
RESONATOR CAP A9C10	_____	pF
RESONATOR COIL A9L7	_____	μH

PREP	SIZE <b>A</b>	CODE IDENT NO <b>52151</b>	DWG NO. 669-8201	REV LTR
CHK	SCALE		SHEET 22	<b>A</b>



8.1.4.2 APPROXIMATE SETTINGS:

PA TUNING AND COILS SET \_\_\_\_\_ OK

8.1.4.3 FINAL SETTINGS:

PA TUNING	A9C6	_____	pF
NODE 1 TUNING	A9L1	_____	ACTIVE TURNS
NODE 1-2 COUPLING	A9L1	_____	ACTIVE TURNS
NODE 2 TUNING	A9L1	_____	ACTIVE TURNS
NODE 2-3 TUNING	A9L3A	_____	ACTIVE TURNS
NODE 2-3 COUPLING	A9L3B	_____	ACTIVE TURNS
NODE 3 TUNING	A9L4	_____	ACTIVE TURNS
NODE 3-4 COUPLING	A9L5	_____	ACTIVE TURNS
NODE 4 TUNING	A9L5	_____	ACTIVE TURNS
OUTPUT COUPLING	A9L5	_____	ACTIVE TURNS
RESONATOR	A9C10	_____	pF
RESONATOR	A9L7	_____	ACTIVE TURNS

8.1.5 ARC GAP SETTING:

RF ARC SENSOR GAP SET TO .312 INCHES	_____	CHECK
A9T1 GAPS SET TO .010 INCHES	_____	CHECK
FRONT MODULATOR GAP SET TO .250 INCHES	_____	CHECK
REAR MODULATOR GAP SET TO .312 INCHES	_____	CHECK

8.2 PRELIMINARY ADJUSTMENTS (FIL ON):

DUMMY LOAD CONNECTED	_____	CHECK
DUMMY LOAD INTERLOCKS	_____	CHECK
AIR SWITCH SET AND ADJUSTED PROPERLY	_____	OK

8.2.1 FILAMENT VOLTAGE:

	PANEL METER		PRECISION METER
PA FILAMENT	_____ V		_____ V (7.3 ±.1V)
MOD FILAMENT	_____ V		_____ V (7.3 ±.1V)
FIL REG VOLTAGE			_____ V

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SCALE	REV <b>A</b>	SHEET 23



SH  
DWG NO.

8.2.2

TEST METER READINGS:

TYPICAL READING

AC TEST METER

Ø A

\_\_\_\_\_ V

Ø B

\_\_\_\_\_ V

Ø C

\_\_\_\_\_ V

PA FIL

\_\_\_\_\_ V

MOD FIL

\_\_\_\_\_ V

DEPENDS ON TEST  
STATION LINE  
VOLTAGE

(7.3 V)

(7.3 V)

DC TEST METER

-12

\_\_\_\_\_ V

( 12 V)

- 6

\_\_\_\_\_ V

( 6 V)

+ 5

\_\_\_\_\_ V

( 5 V)

+12

\_\_\_\_\_ V

( 12 V)

+28

\_\_\_\_\_ V

( 28 V)

Ecc

\_\_\_\_\_ V

(200 V)

Ic

\_\_\_\_\_ A

(2.4 A)

HV

\_\_\_\_\_ V

( 0 V)

8.2.3

PLATE CURRENT METER AND HVPS OVERLOAD:

PRECISION AMMETER

1.25

PLATE CURRENT METER

\_\_\_\_\_ (1.25 ± 2%)

HVPS O/L SET FOR 1.10 AMPS

\_\_\_\_\_ OK

8.2.4

BIAS POWER SUPPLY:

+125V

\_\_\_\_\_ OK

-125 V

\_\_\_\_\_ OK

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CHK	SCALE		SHEET	24

8.2.5 SWITCH FREQUENCY:  
 SWITCH FREQUENCY \_\_\_\_\_ kHz  
 (70.0 ± 0.5 kHz)

8.2.6 RF EXCITER FREQUENCY:  
 OSCILLATOR 1 FREQUENCY \_\_\_\_\_ kHz  
 ( $f_0 \pm 1$  Hz)  
 OSCILLATOR 2 FREQUENCY \_\_\_\_\_ kHz  
 ( $f_0 \pm 1$  Hz)  
 SPARE CRYSTAL INSTALLED \_\_\_\_\_ OK

8.2.7 RF PULSE WIDTH:  
 RF PULSE WIDTH SET TO 120° \_\_\_\_\_ OK

8.2.8 DC REFERENCE:  
 DC REFERENCE SET TO 3V \_\_\_\_\_ OK

8.2.9 RF DRIVER OVERCURRENT:  
 SET 1/2T CCW FROM TRIP POINT \_\_\_\_\_ OK

8.2.10 PA NEUTRALIZING:  
 PA NEUTRALIZING ADJUSTED \_\_\_\_\_ OK

8.3 FINAL ADJUSTMENTS:  
 DUMMY LOAD CONNECTED \_\_\_\_\_ CHECK  
 CARRIER INTERLOCK OK \_\_\_\_\_ CHECK  
 "FILAMENT OFF" LIGHT OK \_\_\_\_\_ CHECK  
 "PLATE OFF" LIGHT OK \_\_\_\_\_ CHECK  
 "FILAMENT ON" LIGHT OK \_\_\_\_\_ CHECK  
 "HP ON" LIGHT OK \_\_\_\_\_ CHECK  
 PLATE VOLTAGE \_\_\_\_\_ CHECK  
 PLATE CURRENT \_\_\_\_\_ CHECK  
 PLATE TUNING DIP OK \_\_\_\_\_ CHECK

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SCALE	REV <b>A</b>	SHEET 25



8.3.1

PA LOADING:

PRECISION VOLTMETER	5.0 kV	_____	CHECK
FRONT PANEL VOLTMETER		_____	kV
		(5.0 ± 2%)	
PULSE WIDTH SET		_____	OK
		(120° ± 10°)	
PLATE CURRENT		_____	AMPS
		(1.25±0.025)	
WAVE FORMS		_____	OK

8.3.2

LOW POWER AND MOD MONITOR:

LOW POWER	_____	PLATE VOLTS	_____	WATTS
MOD MONITOR SET TO 30 Vpp (HP & LP) ± 5V			_____	OK

8.3.3

OVERLOAD RECYCLE:

RECYCLE OK	_____	CHECK
1 SECOND OVERLOAD OK	_____	CHECK
SINGLE OVERLOAD OK	_____	CHECK
DUMMY LOAD INTERLOCK	_____	CHECK

8.3.4

AUDIO AND CLIPPING LEVELS:

AUDIO TRACKING SET	_____	dB
	(± 0.5)	
CARRIER SHIFT SET	_____	%
	(0)	
LF DISTORTION SET	_____	OK
AF CLAMP SET	_____	%
	(+130)	
NEGATIVE CLIPPER SET	_____	%
	(-95)	
POSITIVE CLIPPER SET	_____	%
	(+120)	

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SCALE	REV <b>A</b>	SHEET 26

8.3.5 RF POWER METER AND VSWR OVERLOAD:

REFLECTED POWER BALANCE \_\_\_\_\_ OK

FORWARD POWER BALANCE \_\_\_\_\_ OK

REFLECTED POWER CALIBRATE (F.S. = 12%) \_\_\_\_\_ OK  
(500W=10%)

REFLECTED POWER OVERLOAD AT 95% MOD \_\_\_\_\_ OK  
(10 ± 1)

FORWARD POWER CALIBRATE 100% = \_\_\_\_\_ kW

RF AMMETER \_\_\_\_\_ AMPS

RL = \_\_\_\_\_

8.4 PERFORMANCE TESTS:

8.4.1 RF POWER OUTPUT:

HP RF OUTPUT  $E_{BB}$  \_\_\_\_\_ kV  $I_B$  \_\_\_\_\_ A \_\_\_\_\_ kW  
(2.75kW FOR 314R-2)

$E_{BB}$  \_\_\_\_\_ kV  $I_B$  \_\_\_\_\_ A \_\_\_\_\_ kW  
(CUSTOMER HP)

PA EFFICIENCY \_\_\_\_\_ % =  $\frac{\text{WATTS}}{(E_{BB})(I_B)}$

LP RF OUTPUT  $E_{BB}$  \_\_\_\_\_ kV  $I_B$  \_\_\_\_\_ A \_\_\_\_\_ WATTS  
(CUSTOMER LP)

8.4.2 CARRIER SHIFT AND MODULATION CAPABILITY:

<u>% MODULATION</u>	_____ HP	_____ LP
95	_____ (NMT 2%)	_____
	+125% MODULATION	_____ OK

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SCALE	REV <i>A</i>	SHEET 27

SH

DWG NO.

8.4.3

AF RESPONSE AND DISTORTION:

HIGH POWER

FREQ Hz	95%		50%	
	LEVEL-dBm	THD-%	LEVEL-dBm	THD-%
20	_____	_____	_____	_____
50	_____	_____	_____	_____
100	_____	_____	_____	_____
400	_____	_____	_____	_____
1K (REF)	_____	_____	_____	_____
3K	_____	_____	_____	_____
5K	_____	_____	_____	_____
7.5K	_____	_____	_____	_____
10K	_____	_____	_____	_____
NOISE LEVEL	(NMT + 1 dB) (NMT 2%)			
	dB			
	(NLT 60)			

LOW POWER

20	_____	_____	_____	_____
50	_____	_____	_____	_____
100	_____	_____	_____	_____
400	_____	_____	_____	_____
1K (REF)	_____	_____	_____	_____
3K	_____	_____	_____	_____
5K	_____	_____	_____	_____
7.5K	_____	_____	_____	_____
10K	_____	_____	_____	_____
NOISE	_____ dB			

PREP	SIZE <b>A</b>	CODE IDENT NO <b>52151</b>	DWG NO. 660-8201	REV LTR <b>A</b>
CHK	SCALE		SHEET 28	

8.4.4

BURN IN:

TIME \_\_\_\_\_ HRS

FREQUENCY OSC 1 \_\_\_\_\_ kHz )

FREQUENCY OSC 2 \_\_\_\_\_ kHz )

( $f_0 \pm 1$  Hz)

IPL SET WITH PROGRAM \_\_\_\_\_ OK

METER	FIL ON	CARRIER		95% MOD	
		HP	LP	HP	LP
ØA - V					
ØB - V					
ØC - V					
PA FIL - V					
MOD FIL - V					
-12 - V					
- 6 - V					
+ 5 - V					
+12 - V					
+28 - V					
Ecc - V					
Ic - A					
HV - kV	_____				
EBB - kV	_____				
I <sub>B</sub> - A	_____				
P <sub>F</sub> - %	_____				
P <sub>R</sub> - %	_____				
I <sub>RF</sub> - A	_____				

SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201
SCALE	REV <b>A</b>	SHEET 29

9.0 DIAGRAMS AND TEST SETUPS:

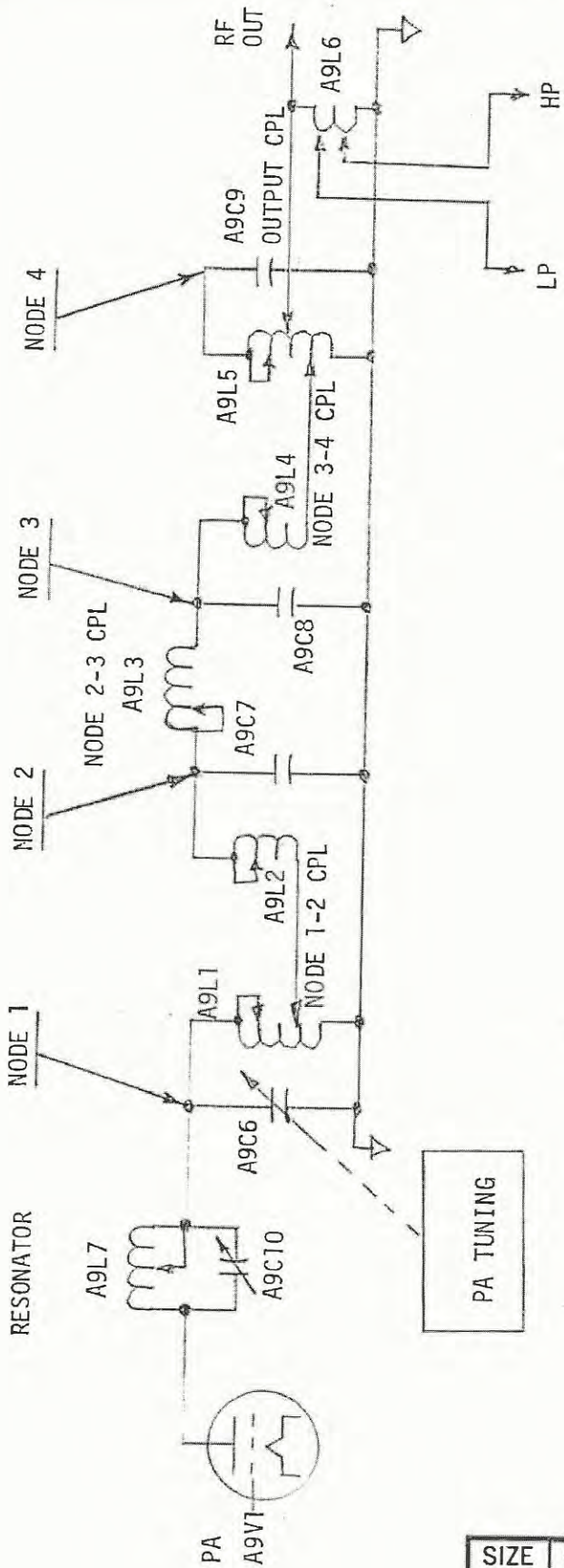


FIGURE 9.1 OUTPUT NETWORK SIMPLIFIED SCHEMATIC

SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201
SCALE	REV <b>A</b>	SHEET 30

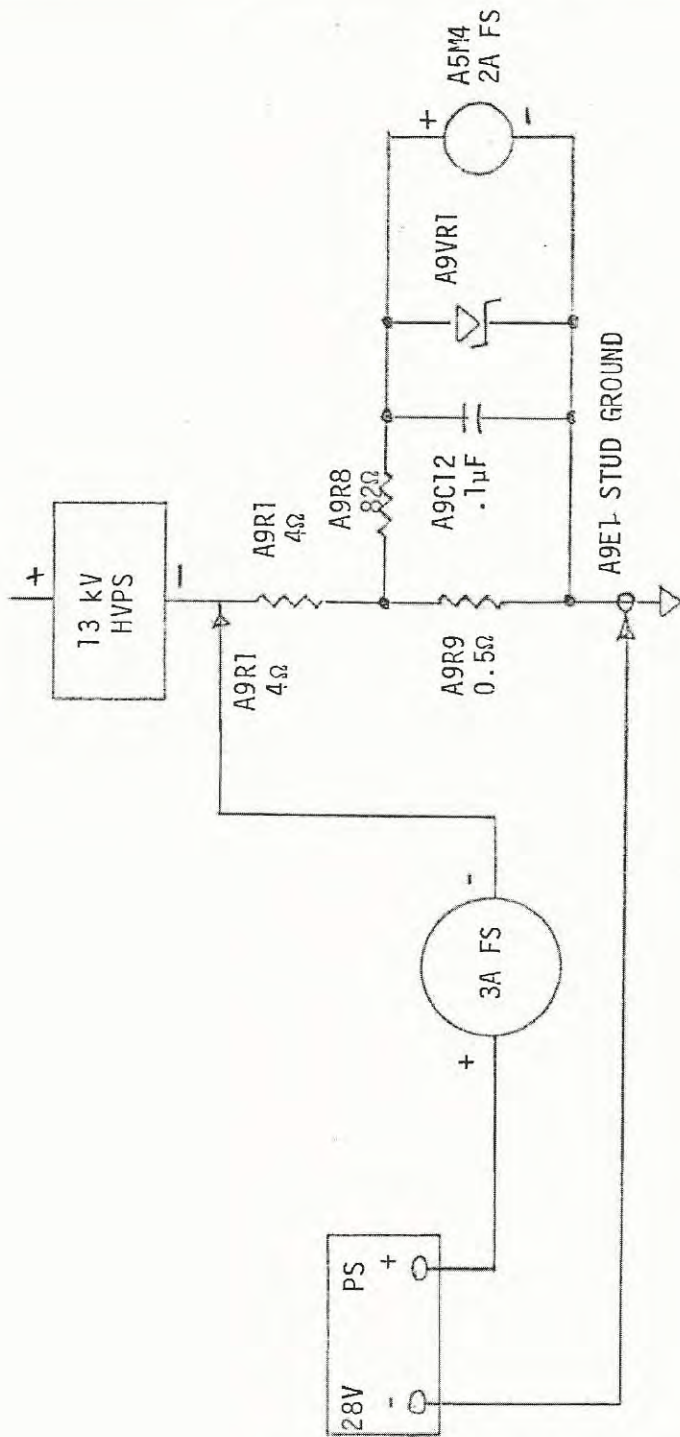


FIGURE 9.2 METER CALIBRATION AND HVPS OVERLOAD

SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201
SCALE	REV <i>A</i>	SHEET 31

9.3

315R -1 NETWORK TUNING CHART

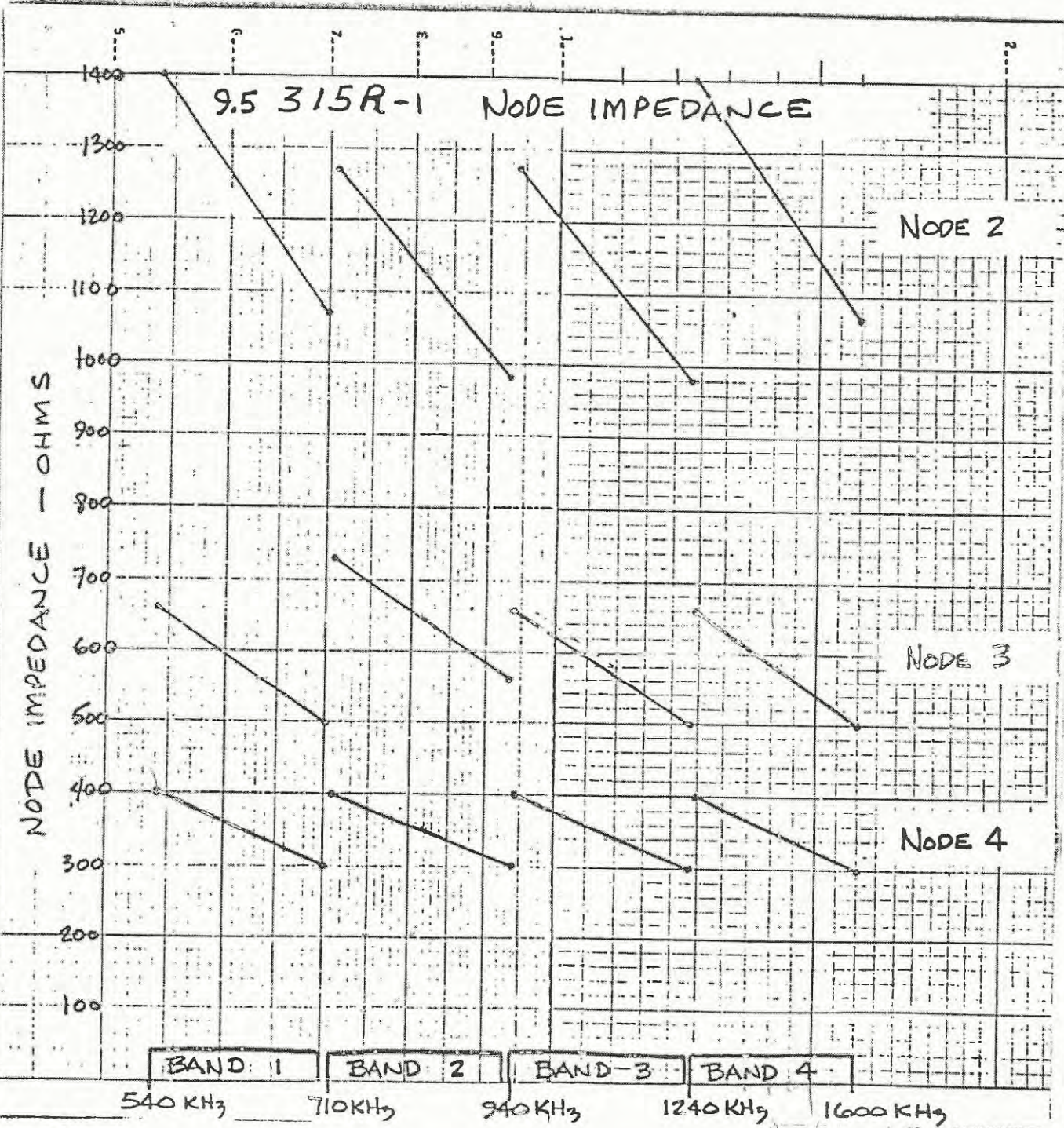
NOM. R <sub>NN</sub>	BAND FREQ.	1			2			3			4		
		540	620	700	710	820	930	940	1080	1230	1240	1400	1600
3000 *	C10	330pF	330pF	330pF	220pF	220pF	220pF	130pF	130pF	130pF	82pF	82pF	82pF
	L7	20t	16t	13t	18t	13t	9t	16t	12t	9t	14t	11t	8t
	R11	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	C6	541pF	471pF	417pF	411pF	356pF	314pF	311pF	270pF	237pF	236pF	209pF	183pF
	L1	120μH	120μH	120μH	120μH	120μH	120μH	120μH	120μH	120μH	120μH	82μH	82μH
	L2T	45t	42t	36t	44t	34t	28t	46t	37t	33t	38t	30t	25t
1250	R22	1400	1240	1070	1270	1110	980	1270	1110	980	1400	1240	1070
	C7	1200pF	1200pF	1200pF	1000pF	1000pF	1000pF	750pF	750pF	750pF	510pF	510pF	510pF
	L2	120μH	120μH	120μH	82μH	82μH	82μH	82μH	82μH	82μH	82μH	82μH	82μH
	L3A	35t	28t	23t	35t	28t	23t	28t	23t	19t	25t	20t	17t
	L3B	56t	42t	30t	32t	16t	6t	56t	50t	42t	51t	43t	39t
	L3B	56t	56t	56t	56t	56t	56t	0	0	0	0	0	0
625	R44	660	580	500	730	640	560	660	570	500	660	580	500
	C8	1500pF	1500pF	1500pF	1200pF	1200pF	1200pF	1000pF	1000pF	1000pF	750pF	750pF	750pF
	L4	44t	36t	28t	34t	27t	22t	24t	19t	15t	21t	16t	13t
400	R55	400	350	300	400	350	300	400	350	300	400	350	300
	C9	2000pF	2000pF	2000pF	1200pF	1200pF	1200pF	1000pF	1000pF	1000pF	750pF	750pF	750pF
	L5	50t	35t	23t	36t	30t	21t	31t	22t	15t	26t	20t	13t
	L4T	35t	23t	12t	24t	19t	11t	18t	11t	6t	15t	9t	4t
	50ΩT	29t	19t	12t	20t	16t	11t	16t	11t	7t	14t	9t	6t

\*C6 CAN BE SET FOR 545Ω TOTAL REACTANCE AT THE PA ANODE AT THE OPERATING FREQUENCY WITH L1 DISCONNECTED AND THE 3RD HARMONIC RESONATOR TUNED APPROXIMATELY.

CHK	PREP	SCALE	SIZE <b>A</b>	CODE IDENT NO <b>52151</b>	DWG NO. 669-8201	REV LTR <b>A</b>
					SHEET 32	







PREP	SIZE A	CODE IDENT NO. 52151	DWG NO. 669-8201	REV LTR A
CHK	SCALE	SHEET 34		

# 9.6 315R-1 TUNING CAPACITY

CAPACITY  
PF.

1000  
900  
800  
700  
600  
500  
400  
300  
200  
100

$$Q_1 = \frac{3000}{545} = 55$$

$X_C = 545 \Omega$

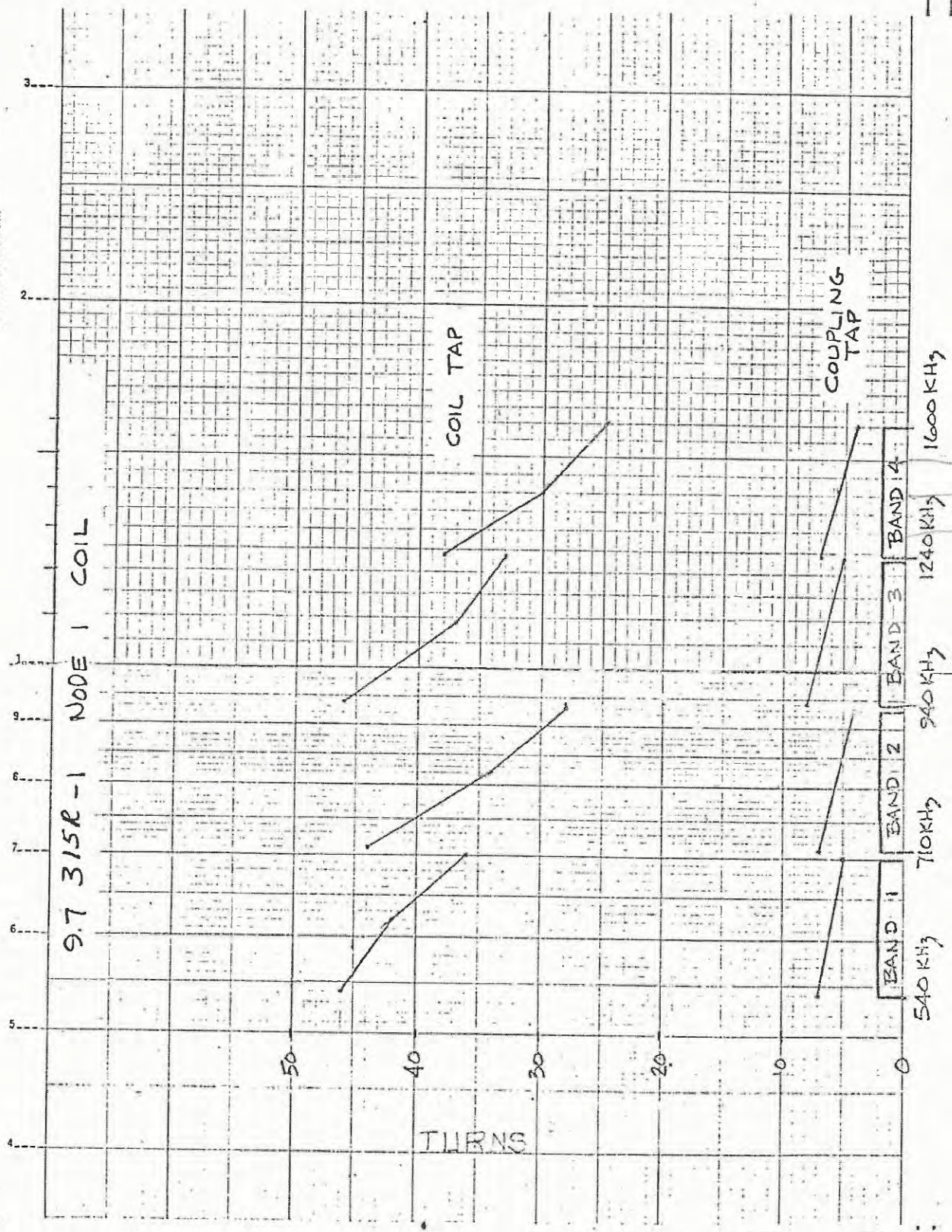
BAND 1	BAND 2	BAND 3	BAND 4
540 KHz	710 KHz	940 KHz	1240 KHz
			1600 KHz

3000  
650  $\Omega$

PREP	SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201	REV LTR <b>A</b>
CHK	SCALE		SHEET 35	

DWG NO. SH

KUHFEL R15-PR-EG.

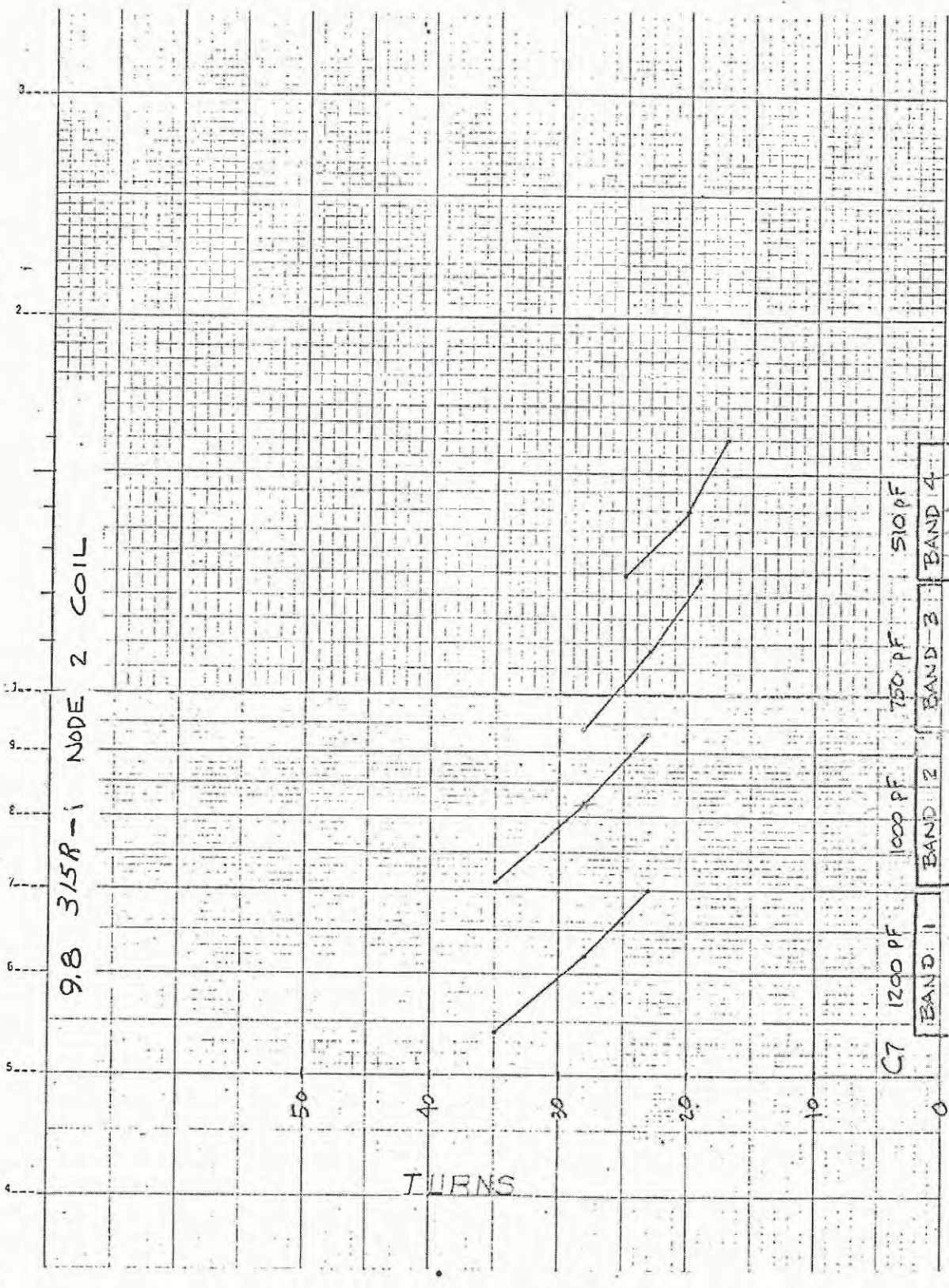


PREP	SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201	REV LTR <b>A</b>
CHK	SCALE		SHEET 36	

074-5225-081

DWG NO. SH

REPTILL NEEDED



PREP	SIZE <b>A</b>	CODE IDENT NO. <b>52151</b>	DWG NO. 669-8201	REV LTR <b>A</b>
CHK	SCALE	SHEET 37		

074-5225-081



10 Jan 78

D. Mefford

J. Camp

636-9690-001, P.A. Assembly (Compartment "B") 828E-1 (MODIFICATION)

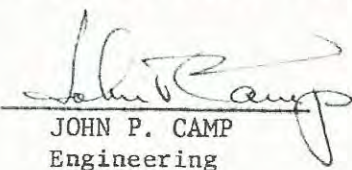
Please rework all above noted assemblies, including those in test, in accordance with the following instructions.

PARTS REQUIRED

1 Each	919-0293-060, Capacitor, UCS-400-15S	Item 196
1 "	139-0317-000, Flange, FM2	" 236
1 "	640-9733-001, Bracket	" 238
1 "	139-0736-000, Flange, FMOB	" 237
1 "	640-9732-001, Bracket	" 235
4 "	190-0026-000, Ceramic Post, 1.5"	" 72
8 "	302-0034-000, Washer, Cork	" 79
10 "	343-0344-000, Screw, 10-32 x 5/16 NPB	" 118
4 "	334-0046-000, Cap Nut, 10-32	" 107
4 "	310-0100-000, Washer, lock, #10 PB	" 93
1 "	139-1403-000, Flange, FM2B	" 234

MODIFICATION PROCEDURE

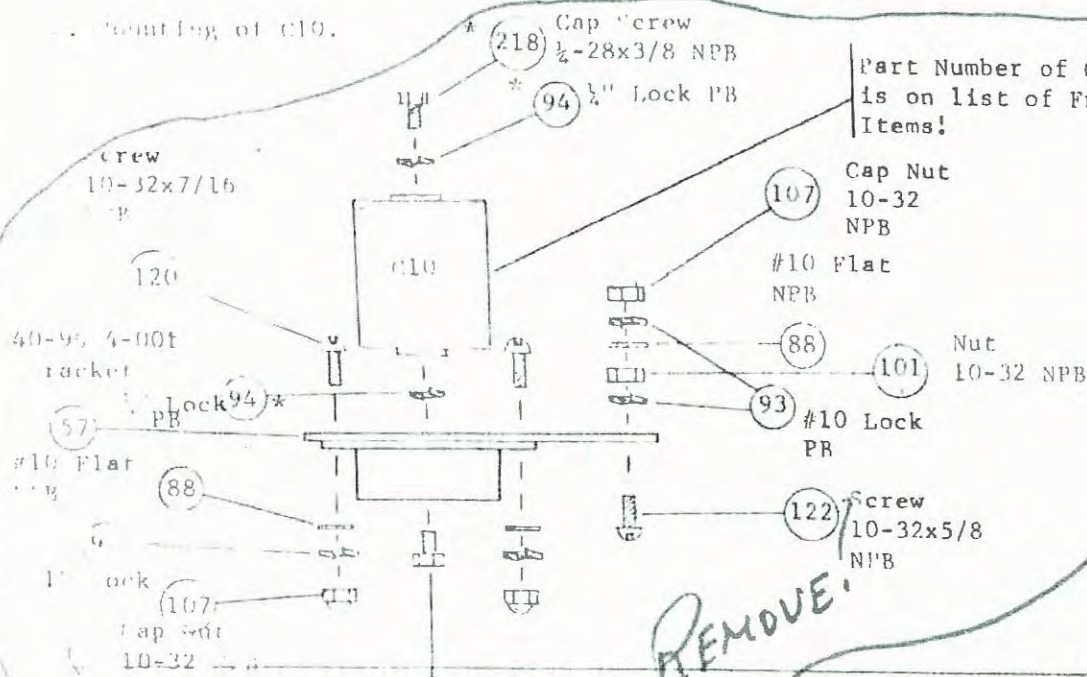
1. See Marked up Drawing Attachment #1.
2. Remove old Capacitor C10 and associated mounting components and connecting straps.
3. See Drawing Attachment #2.
4. Assemble new Vacuum Capacitor assembly and install on upper left/top wall of Compartment "B" as shown.
5. See Drawing Attachment #3.
6. Affix new Flange, Item 234, to top of Plate Tuning Capacitor C6 as shown.
7. At this time, see Jim Wisdom for proper connecting straps to finish installation. (Part Numbers will be available for these items at a later date. "
8. This is a part of Revision "L".

  
 JOHN P. CAMP  
 Engineering

Compartment "B"

1. Mounting of Capacitor, C6, P.A. Tuning Capacitor.

2. Mounting of C10.



Part Number of C10 is on list of Frequency Select Items!

*REMOVE!*

NOTE:

Items marked "\*" shall be put in a small plastic bag and attached to Item 57 if Capacitor C10 is not installed at this time!

*ATCH #1*

**ROCKWELL INTERNATIONAL CORPORATION  
COLLINS DIVISIONS**

DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406

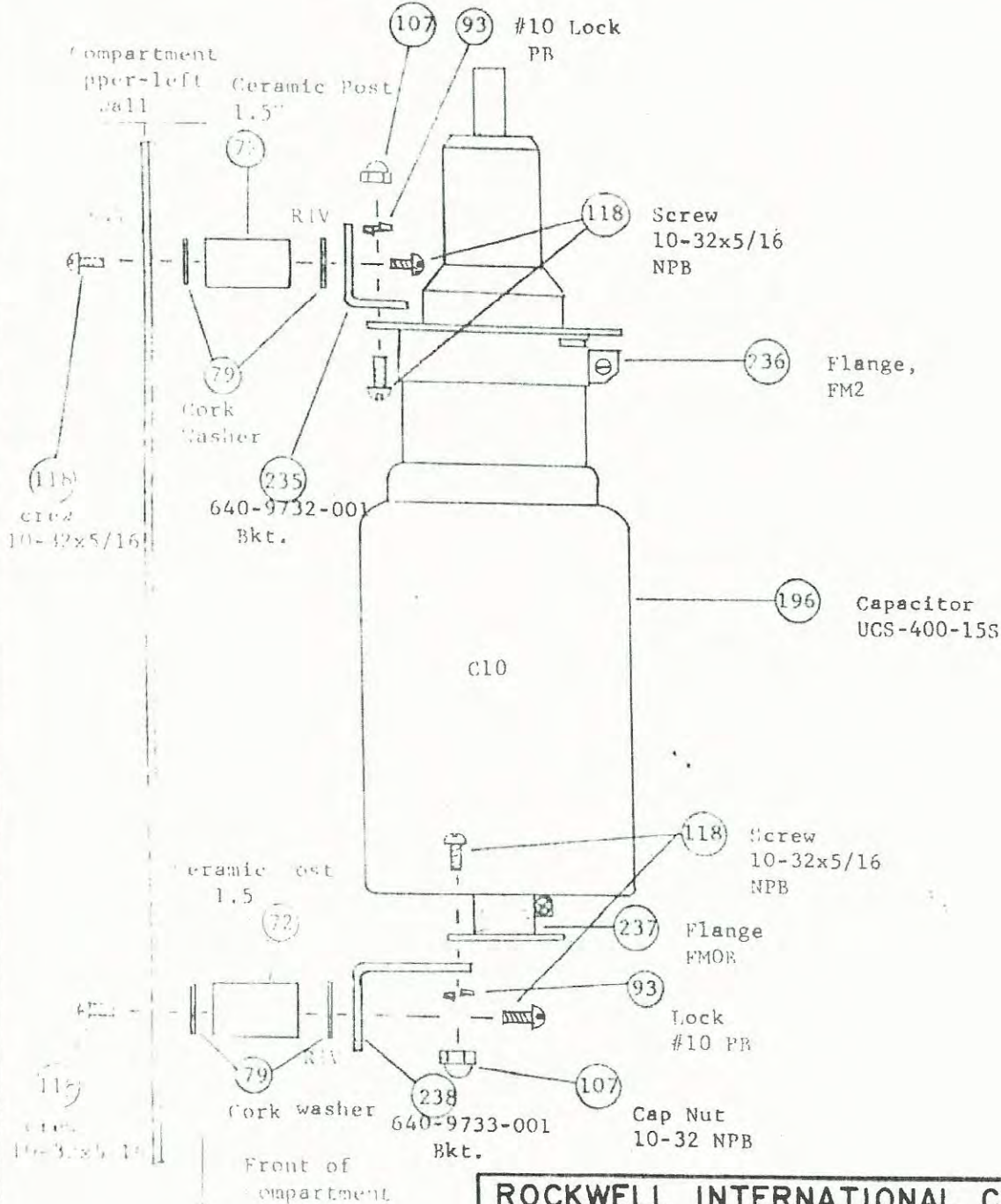
PREP	SIZE <b>A</b>	FSCM <b>13499</b>	DWG NO. 636-9690-001	REV LTR
CHK	SCALE		SHEET	

Compartment "B"

1. Counting of Capacitor C10.

2. Fill all Air Voids in Ceramic Posts, Item 72, with RTV, Item 199, as shown.

10-32 Cap Nut, NPB



**ROCKWELL INTERNATIONAL CORPORATION  
COLLINS DIVISIONS**

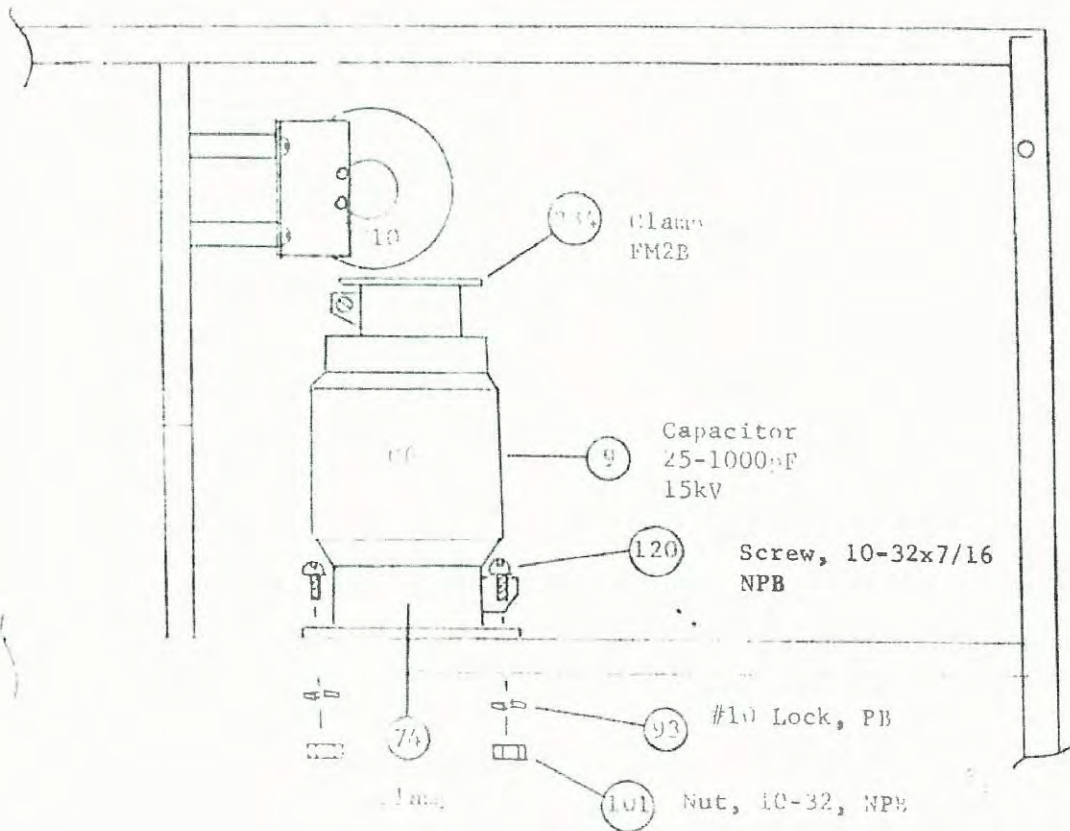
DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406

ATCH #2  
PREP  
CHK

SIZE <b>A</b>	FSCM <b>13499</b>	DWG NO. 636-9690-001	REV LTR
SCALE		SHEET	

Compartment "B"

- Mount capacitor, P.A. Tuning Capacitor.
- Clamps are shown below to mount Capacitor to Chassis.
- Mount Clam, Item 74, to Top of Capacitor.



*47ch #3*

**ROCKWELL INTERNATIONAL CORPORATION  
COLLINS DIVISIONS**

DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406

PREP	SIZE <b>A</b>	FSCM <b>13499</b>	DWG NO. 636-2690-001	REV LTR
CHK	SCALE		SHEET	



## PA NEUTRALIZATION AND THIRD HARMONIC TUNING MODIFICATION

### 315R-1/828E-1 AM Transmitter

1. This modification adds extension rods on A9C29 neutralizing capacitor (paddle) and A9C10 third harmonic resonator to allow adjustment under operating condition. This has become particularly important for transmitters operating in stereo mode.
2. Materials
  - a. 1 ea. 1/2 x 16" phenolic rod with threaded stud for A9C29.
  - b. 1 ea. 1/2 x 6" phenolic extension rod for item "a".
  - c. 2 ea. Support post for items "a" and "b".
  - d. 1 ea. 1/2 x 11 3/16" phenolic rod with 1" coupling for A9C10.
  - e. 1 ea. Support post for item "d".
3. Procedure
  - a. Remove third harmonic coil A9L7 to make room for drill. Mark strap position on L7 so it will not be changed.
  - b. Drill holes for two support posts shown in Figure 1A to hold A9C29. The front post is mounted on the aluminum compartment floor just off the PA tube platform.
  - c. The completed A9C29 tuning control will be shown in Figure 2B, and the small pin on the 16" rod will hit the rear support post to prevent the A9C10 paddle from getting closer than approximately 1" to the PA tube.
  - d. Mount the 113/16" rod for A9C10 as shown in Figure 2A and 2B. The support bracket is mounted under the lip of the compartment after drilling two countersunk holes.
  - e. When the rod installation is completed and with the neutralization adjustment 6" extension stowed, hold the RF Compartment rear cover in place and from the front, sight and mark the center for two approximately 1" diameter holes to be cut so that adjustments can be made with the cover in place.
  - f. Reinstall A9L7.

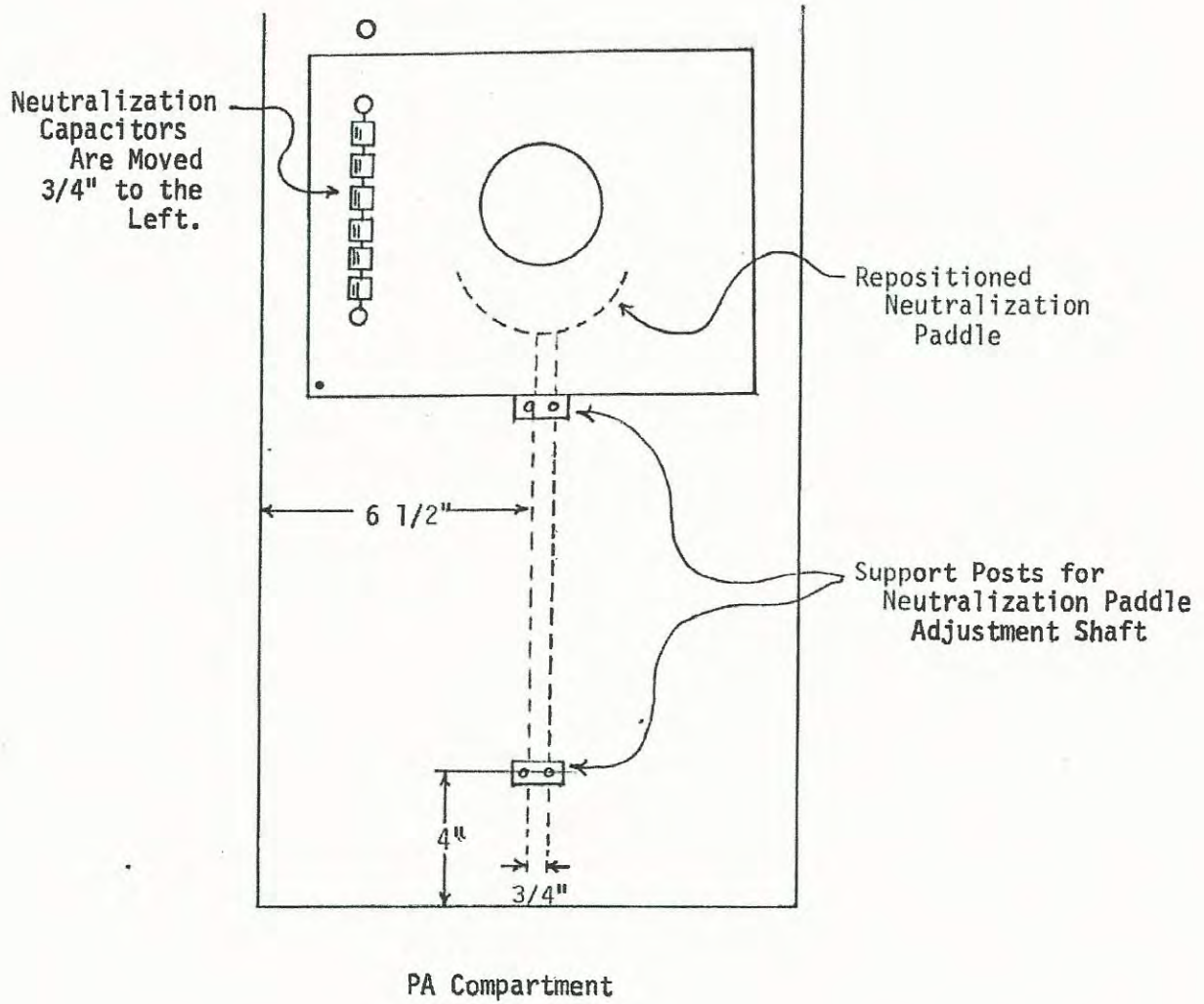


Figure 1A

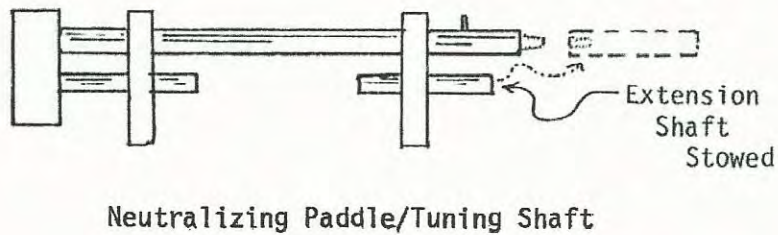


Figure 1B

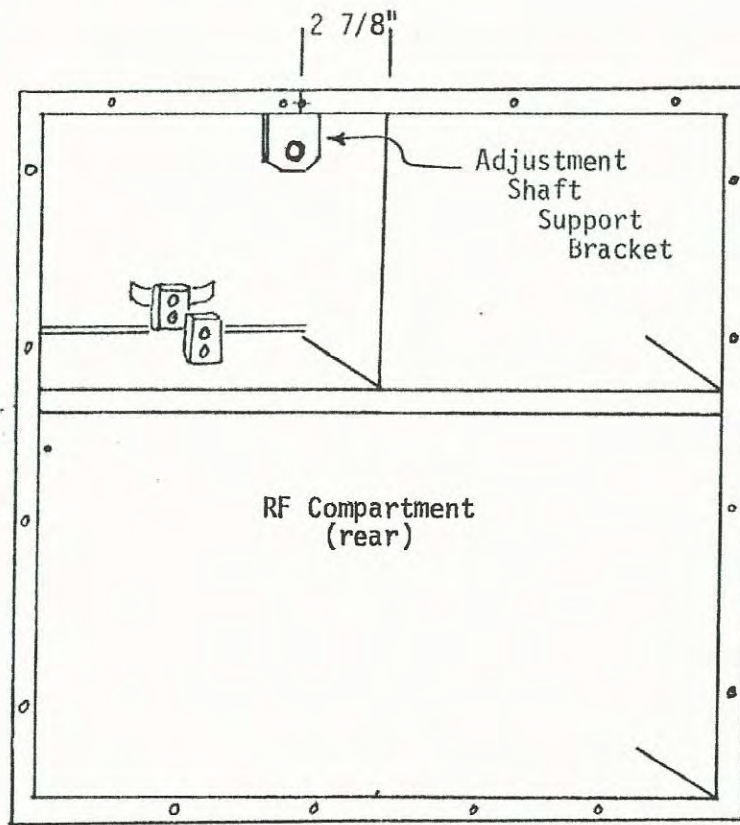


Figure 2A

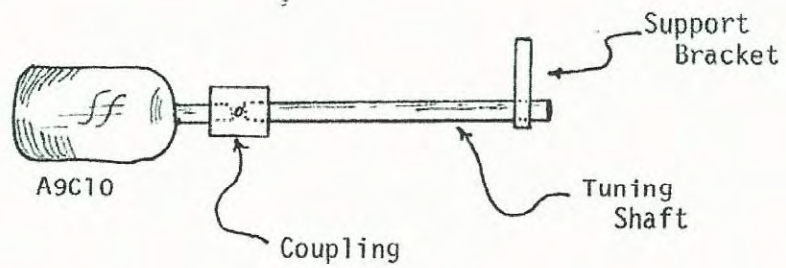


Figure 2B



# Continental Electronics Corporation

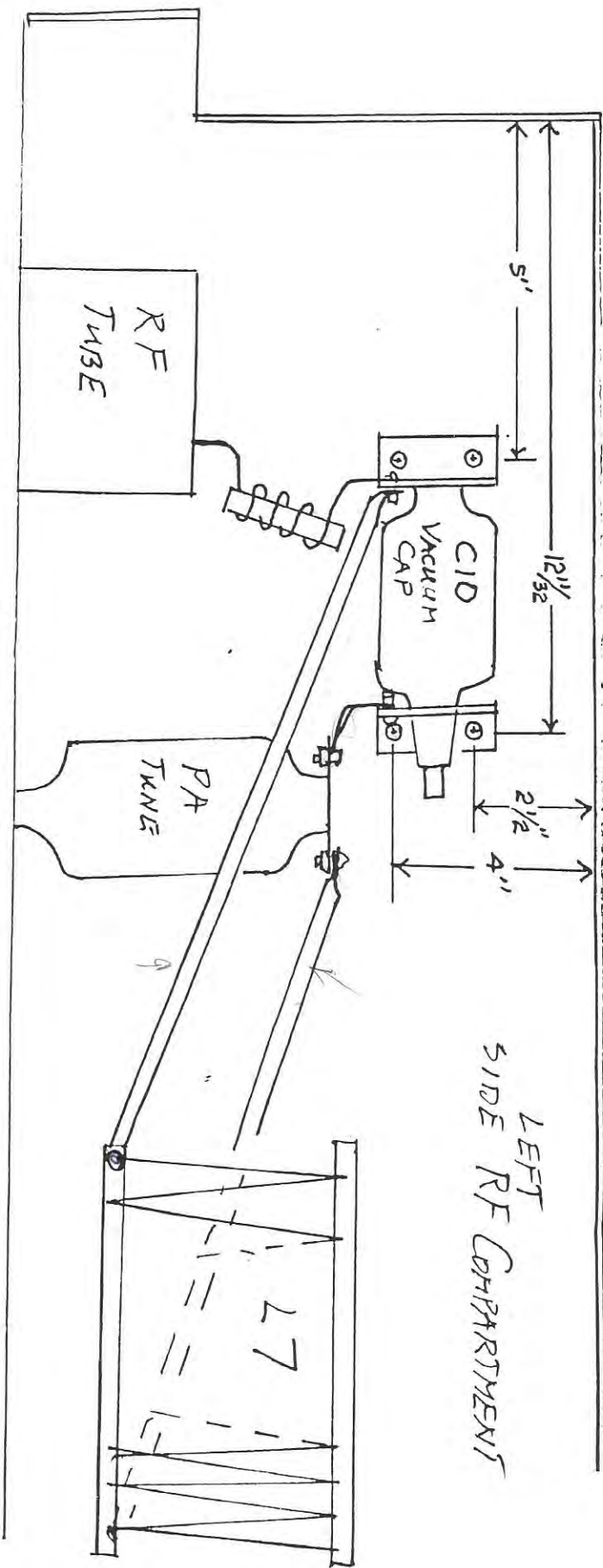
## 636-9690-001, P.A. Assembly (Compartment "B") 828E-1/315R-1 (Modification)

### PARTS REQUIRED

- ✓ 1 Each 919-0293-060, Capacitor, UCS-400-15S
- 1 Each 139-1405-000, Flange FM2
- ✓ 1 each 643-7373-001, Bracket
- ✓ 1 each 139-0736-000, Flange, FM0B
- ✓ 1 each 643-7372-001, Bracket
- ✓ 4 each NL523W03-012, Ceramic Post, 1.5"
- 8 each 302-0034-000, Washer, Cork
- 10 each 343-0344-000, Screw, 10-32 x 5/16 NPB ←
- 4 each 334-0046-000, Cap Nut, 10-32
- 4 each 310-0100-000, Washer, Lock, #10 PB
- ✓ 1 each 139-1403-000, Flange, FM2B

### MODIFICATION PROCEDURE

1. See marked up drawing, attachment #1.
2. Remove old capacitor C10 and associated mounting components and connecting straps.
3. See drawing, attachment #2.
4. Assemble new vacuum capacitor assembly and install on upper left/top wall of compartment "b" as shown.
5. See drawing, attachment #3,
6. Affix new flange, FM2B, to top of plate tuning capacitor C6 as shown.



CID NEW  
 all measurement are from inside of cabinet.

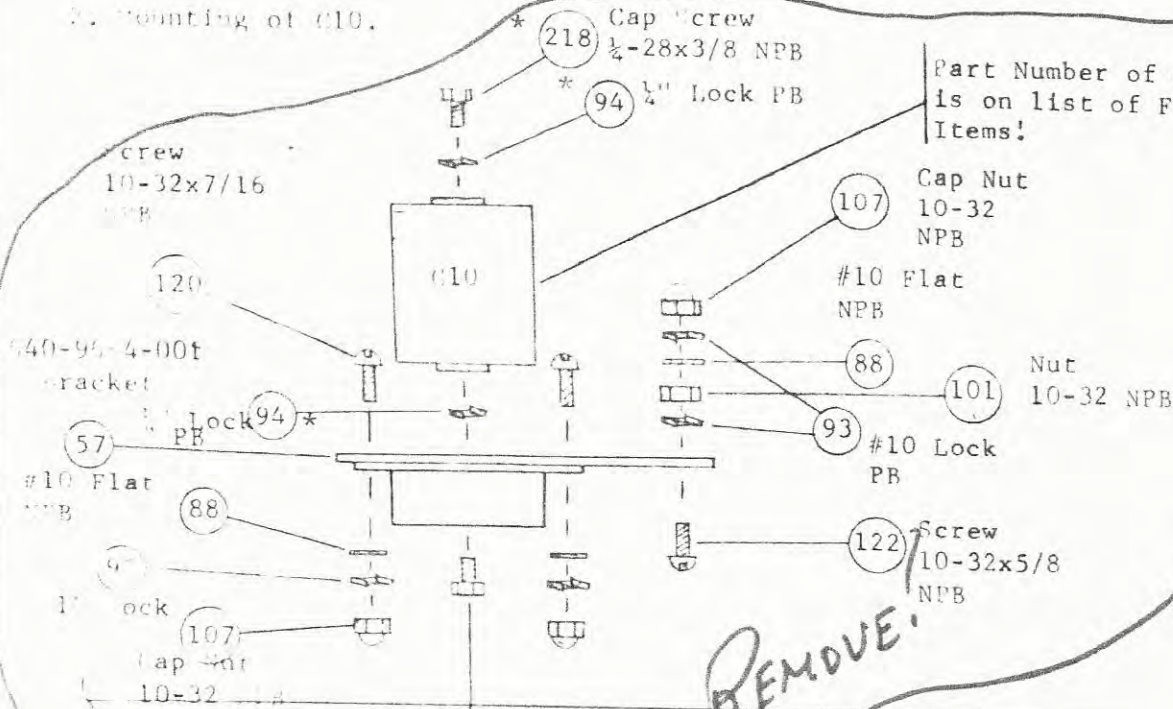
3<sup>RD</sup> HARMONIC RESONATOR MOD

627

Compartment "B"

1. Mounting of Capacitor, C6, P.A. Tuning Capacitor.

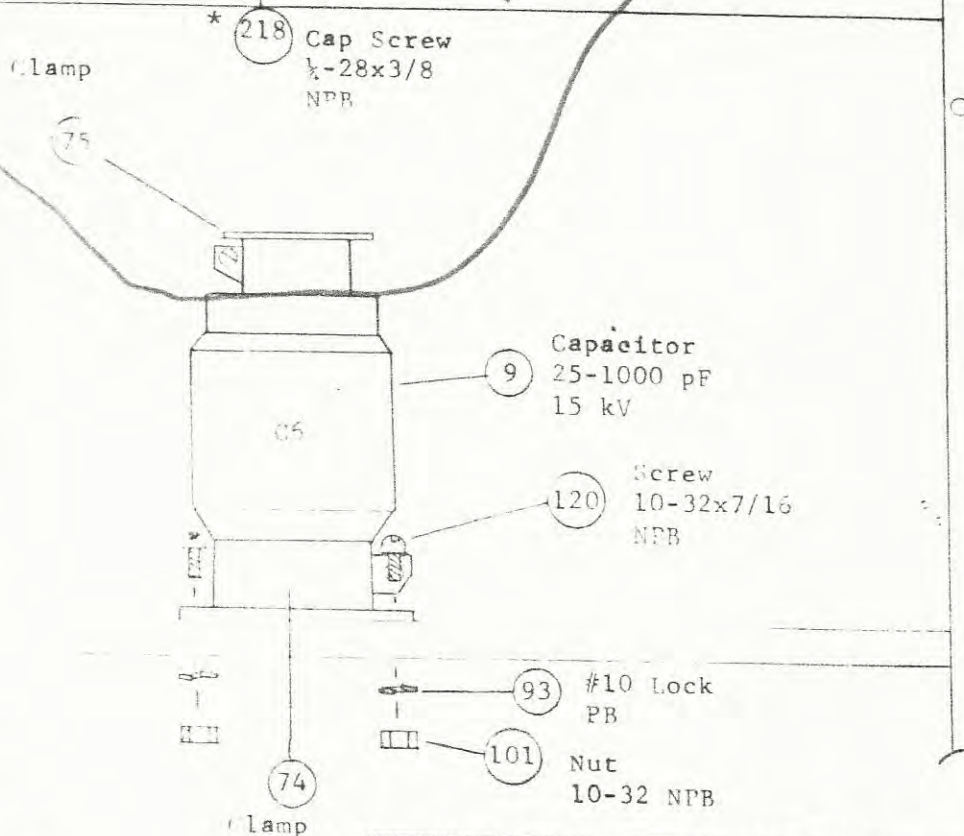
2. Mounting of C10.



*REMOVE!*

NOTE:

Items marked "\*" shall be put in a small plastic bag and attached to Item 57 if Capacitor C10 is not installed at this time!



*ATCH #1*

ROCKWELL INTERNATIONAL CORPORATION  
COLLINS DIVISIONS

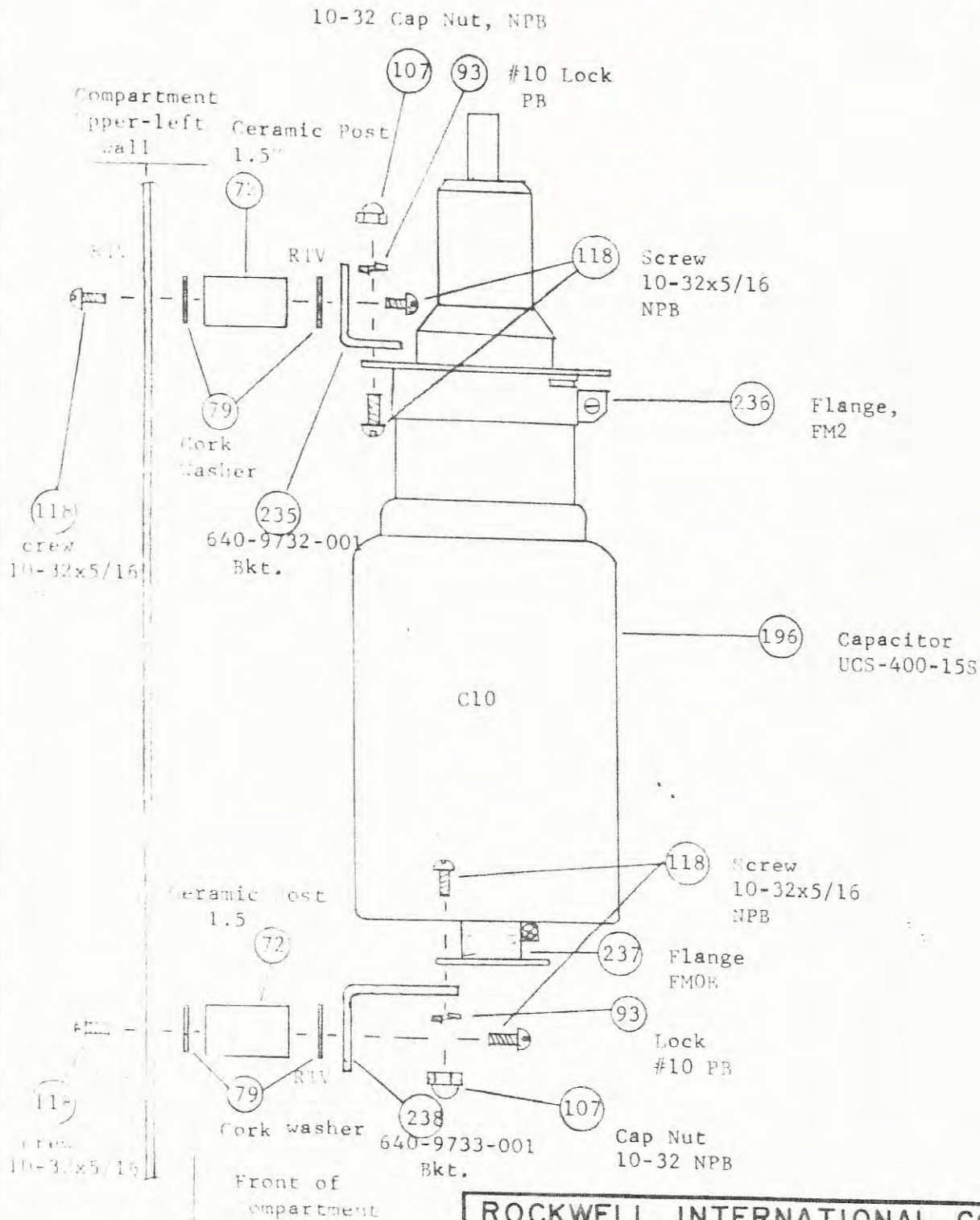
DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406

PREP	SIZE A	FSCM 13499	DWG NO. 636-9690-001	REV LTR
CHK	SCALE			

Compartment "B"

1. Mounting of Capacitor C10.

2. Fill all Air Voids in Ceramic Posts, Item 72, with RTV, Item 199, as shown.



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**COLLINS DIVISIONS**

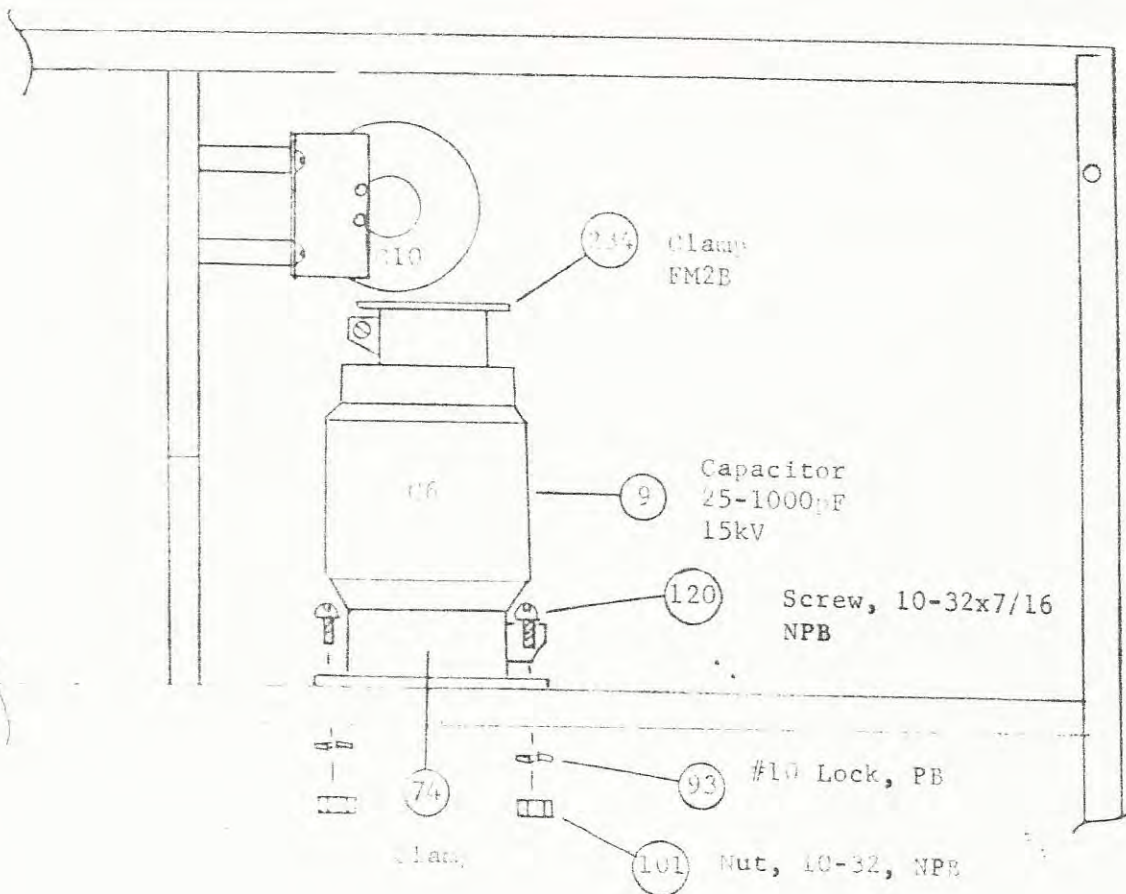
DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406

SIZE <b>A</b>	FSCM <b>13499</b>	DWG NO. 636-9690-001	REV LTR
SCALE			

ATTACH #2  
 PREP  
 CHK

Compartment "B"

- Mounting of capacitor is, P.A. Tuning Capacitor.
- Details are shown below to mount Capacitor to Chassis.
- Mount Clamp, Item 236, to Top of Capacitor.



*Text #3*

ROCKWELL INTERNATIONAL CORPORATION  
 COLLINS DIVISIONS  
 DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406

PREP	SIZE A	FSCM 13499	DWG NO. 636-9690-001	REV LTR
CHK	SCALE		SHEET	