AMERITRON AL-80

Compact Kilowatt Amplifier

INSTRUCTION MANUAL

The Ameritron AL-80 Linear Amplifier is designed for 1500 watts PEP SSB (continuous) and 1000 watts CW QSK (full break-in) operation. The AL-80 covers the amateur radio bands 160 through 15 meters. It also features wide frequency coverage for MARS, and other services authorized a kilowatt of power.

The AL-80 uses a 3-500Z zero-bias triode in a class AB_2 grounded-grid circuit configuration. A built-in ALC circuit controls the exciter gain to allow the highest average power without peak clipping. The front panel meter indicates plate current, grid current and plate voltage.

The AL-80 operates from 117/234, 50/60 Hz primary line voltage.

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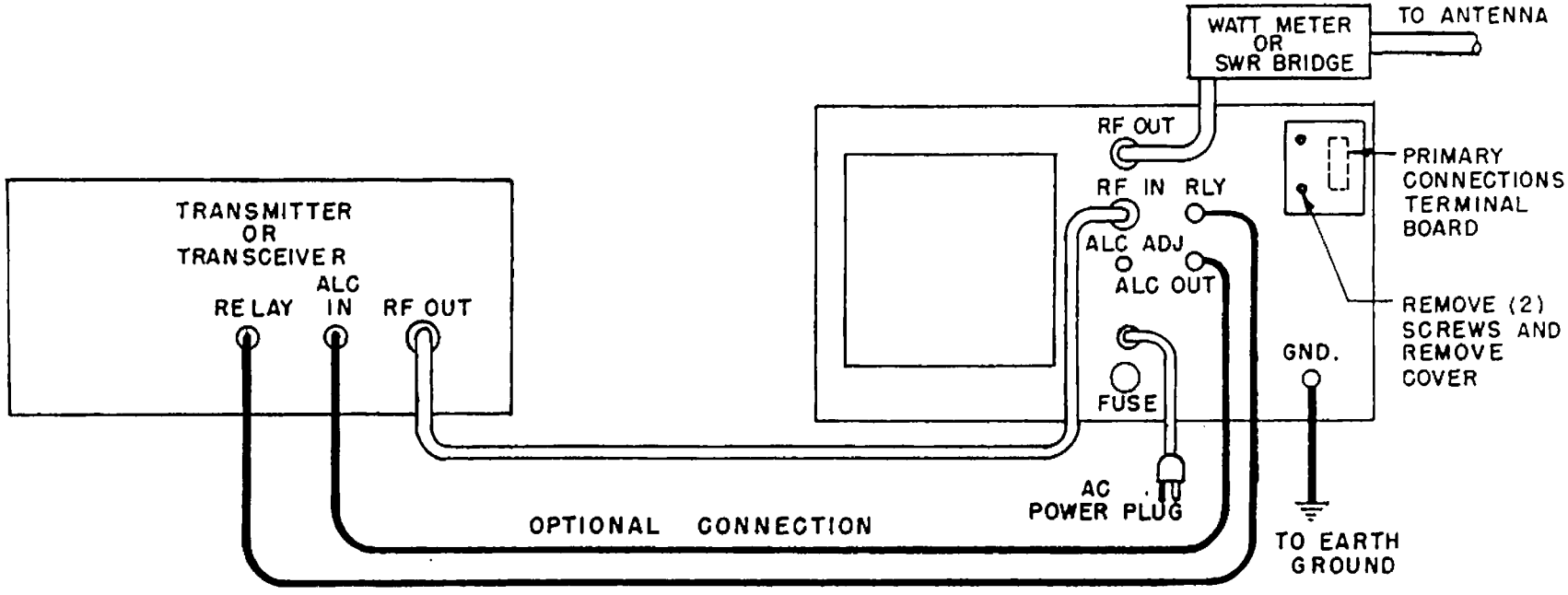
AL80 Connection Diagram



!! Warning !!

MAKE NO ATTEMPT TO PUT THE AMPLIFIER IN SERVICE OUTSIDE OF THE CABINET!
CONTACT WITH VOLTAGES IN THIS AMPLIFIER CAN BE FATAL!

VENTILATION

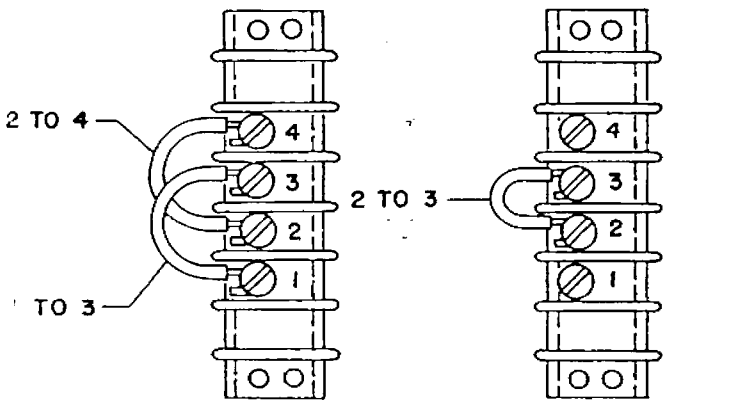
The back of the AL-80 must not be closer than 4" from a wall or other obstruction to the air outlet of the blower. This is essential for proper cooling of the 3-500Z.

IMPORTANT: The AL-80 must be on a clear flat surface to allow proper air intake.

The AL-80 has been carefully tested to maintain the tube seal temperatures safely below the manufacturers ratings during a 75% duty cycle (10 minutes on, 5 minutes off operation) at 500 watts dissipation. For longer duty cycle in high dissipation operation (SSTV, AM, etc.) a higher fan speed is recommended. Call or write the technical department for our cooling recommendations. Complete details of your anticipated operation are necessary.

POWER CONNECTIONS

The AL-80 is shipped with the transformer primary connected for 117 V.A.C. operation. If 234 V.A.C. operation is desired the primary connections must be changed on the terminal board located on the rear of the AL-80. Refer to the diagram shown below. Remove the 15 ampere fuse and replace it with a 7.5 ampere fuse.



117 VOLT OPERATION
CONNECT 1 TO 3
2 TO 4

234 VOLT OPERATION
CONNECT 2 TO 3

When the AL-80 is operated on 117 volts A.C. be sure the wiring between the fuse box and the A.C. outlet is of adequate gauge to provide the current required without a significant drop in line voltage. No. 12 wire is recommended.

INSTALLATION

Connect the RF output of the transceiver to the RF input connector on the rear of the AL-80 with 50 ohm coax. Connect the existing station antenna system to the RF output connector on the AL-80 using RG8 type cable. The station antenna system must be equipped with a watt meter or SWR bridge for proper tuning of the AL-80. A phone jack on the rear of the AL-80 is provided for connection to a pair of normally open relay contacts in the transceiver which close on transmit. Another phone jack for ALC is located on the rear of the AL-80.

Connect as short a ground lead as possible from a good earth ground to the AL-80 rear panel GND terminal.

ALC

A shielded audio type cable should be used to connect the 0-30 volt negative ALC voltage to the transceiver ALC input. Consult your transceiver manual for proper attachment details.

Proper adjustment is obtained by watching a monitor scope for flat-topping and adjusting the ALC until peak clipping does not occur with the AL-80 fully loaded into a 50 ohm load with the audio control of the transceiver on full.

A general indication that a peak clipping is being approached occurs when the grid(Ig) current reaches 50% of the single tone drive level (normally 125-150 ma) on a speech waveform.

QSK

The QSK functions with a controlled loss feedback system. Receive attenuation will be - 20 db on 10 meters and increase a few DB per octave as the frequency is reduced. A few seconds after transmitting the attenuation is removed. No special hook-up is required for use with a QSK transceiver.

TUNING PROCEDURE

1. Set the AL-80 front panel switches as follows:
   PWR - OFF
   MODE - STDBY
   METER SWITCH - PLATE VOLTAGE(V)

2. Insert the AC line cord into the appropriate outlet.

3. Turn the power switch "ON". The plate voltage (V) should read approximately 2700 VDC. The grid (Ig) and plate current (Ip) must read 0 MA. The meter should light and the blower on the rear must exhaust air.

4. Set the load control at 5.

5. Set the PLATE and BAND switches to the band being used.

6. Tune your transceiver according to the manufacturers instructions into a 50 ohm load. Reduce the drive to a zero watt output point using the drive level control provided on your transceiver.

7. Move the AL-80 standby switch to the operate position (OPT). Put your transceiver in the "tune" position, the red XMIT lamp on the AL-80 should light and you should hear the relay in the AL-80 "click". The XMIT lamp should go on and off in step with switching the transceiver into and out of an active transmit (tune) mode. If the XMIT lamp does not work properly consult the trouble-shooting section of the manual. The idle current (Ip) should be just under 150 ma. with no drive when the XMIT light is on.

8. With the transceiver on tune and the AL-80 on OPT slowly advance the transceiver drive control until (in the Ip meter position) a reading of between 150 and 300 ma. occurs.

9. Adjust the Plate control for maximum output indication on the indicating device (SWR or wattmeter) used. The output power will be below 300 watts so low indications are normal at this stage of tune-up.

10. Advance the drive until the Ip goes to 350 ma. Adjust the loading and Plate controls for maximum output. It is a normal requirement to adjust the Plate and Load controls a few times to get maximum output.

11. To prevent SSB flat-topping it is necessary to load the AL-80 to the maximum output possible with the full drive (not to exceed 100 watts RF) of the transceiver.

    The normal grid current of the AL-80 (Ig) is 100-150 ma. in a CW (single tone) condition. On SSB and two-tone tests the grid current will be lower.

    On CW or RTTY tune the AL-80 to maximum output at the output level desired. Power is controlled by reducing the drive level. The proper "load" setting changes for different drive levels, rotating counter-clockwise as the drive is reduced.

NOTES:

1. Do not operate the AL-80 into a load presenting a VSWR greater than 2 to 1. The AL-80 may not function properly and damage can result.

2. Grid currents (Ig) of over 200 ma. should be avoided. Grid currents in excess of 75 MA on SSB or 150 MA on CW indicate excessive drive or improper loading.

TROUBLE-SHOOTING CHART

PROBLEM	CHECK
No dial light, H.V. or fan	Outlet dead, fuse, plug (if changed). Jumper wire connections on the 120/240 connection block. Interlock switch, OFF-ON Switch.
2700 V O.K. but no dial light and will not key when jack is grounded	Problem is in +12V supply, check solder connections on yellow XFMR leads, ground screws on PS board should be tight. D-11, C-13
No operation, fuse blows	Shorted rectifiers, HV short, defective tube
No 2700V, no Ip when keyed fuse O.K., dial light O.K.	Open filter capacitor C open on power supply board
Relay won't key and XMIT light not lit.	Check transceiver relay and wiring. Check XMIT relay jack connection and S4
Meter pins backwards on Ig	HV short or open meter shunt (R2)
Ip idle current on standby. Ip backwards deflection	Filament to ground short, socket, tube
No drive, transceive SWR high	No power (+12V) to FP-108 RL-1, QSK module, coax.
No output, won't load, but drive appears normal	RL-1, QSK module, output coax, tank lead dress
No transceiver output, transceiver O.K. without amplifier on.	ALC too high, try unpluging ALC. See ALC section of manual

AL-80 PARTS LIST

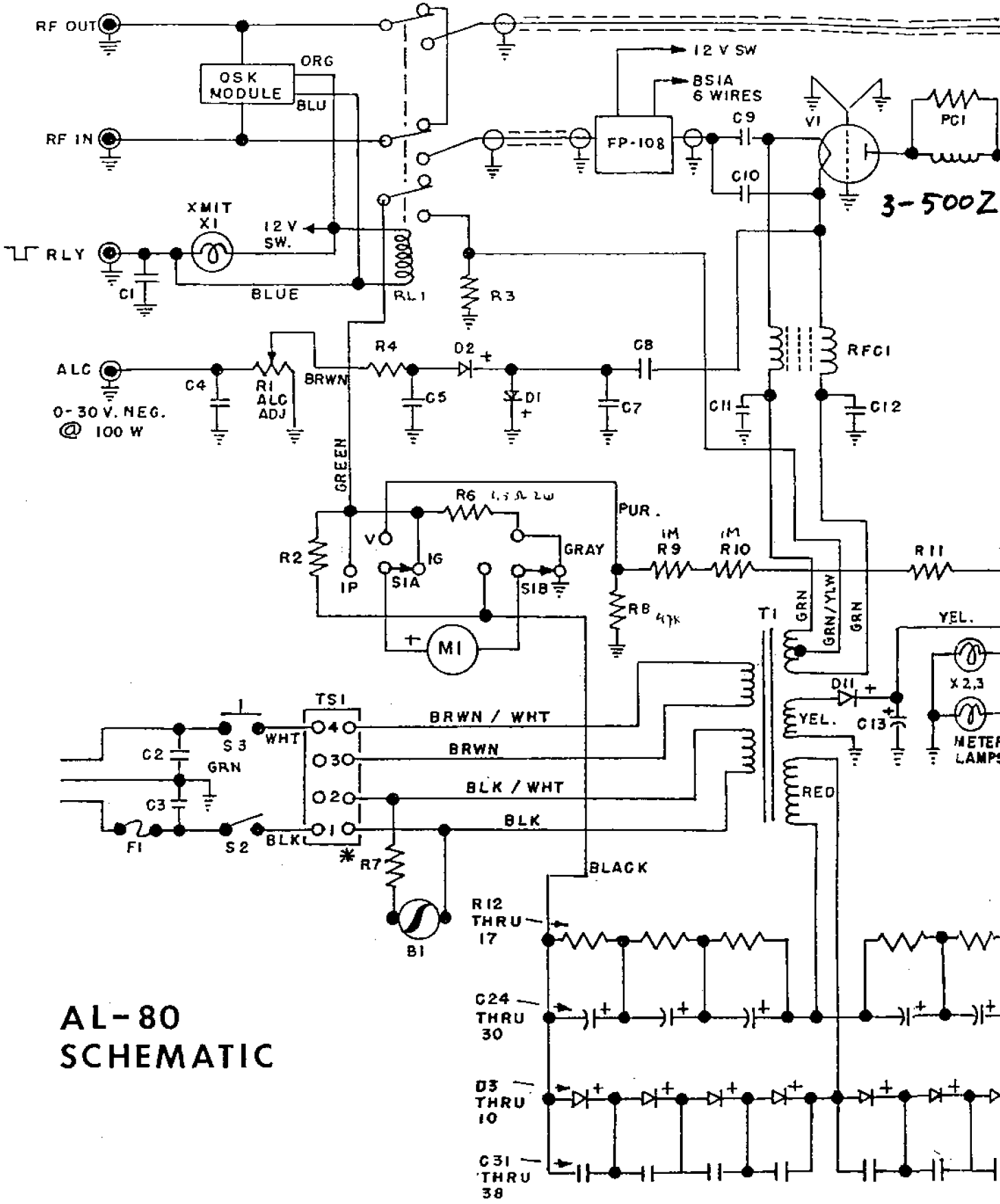
B 1	AR-138	TA450S Fan #A30390-10
C 1,4,5,	AR-416	.01mfd 50V disc, Z5U
C 2,3,	AR-122	.005 or .01mfd 150VAC disc, Z5U
C 9-12,31-38	AR-121	.01mfd 1KV disc, Z5U
C 7	AR-396	150pf 500V silver mica
C 8	AR-404	27pf 500V silver mica
C 13	AR-149	1000mfd 25VDC P.C. mount
C 14,15,16	AR-224	.001mfd 7.5VK disc
C 17	AR-112	250pf .075" spacing variable
C 18,19,23	AR-155	200pf 850 series transmitting door knob
C 20	AR-113	1100pf, 3 gang variable
C 21	AR-176/ AR-177	1000pf and 1300pf capacitors (DM19) in parallel
C 22	AR-157	500pf 850 series transmitting door knob
C 24-30	AR-140	125mfd 500VDC P.C. mount electrolytic
D 1,2	AR-346	IN34A or equiv. small signal diode
D 3-10	AR-145	M4G5 (3amp, 1000VDC) avalanche rectifier
D 11	AR-266	IN4005, 6 or 7 1 amp silicon rectifier
L 2	FP-113	(10), 15 and 20 meter coil
L 3	FP-114	40, 80 and 160 meter coil
M 1	PM-860-144	0-1 MA 450ohm meter
P C 1	FP-117	parasitic choke and plate cap assembly
R 1	AR-274	100K ohm 1 watt control, IRC 6154897 100K525
R 2	AR-399	.6 ohm, 2 watt, 1% (Ip)
R 3,4,8	AR-402	47K ohm 1/2 watt carbon
R 6	AR-400	1.5 ohm, 2 watt, 1% (Ig)
R 9,10,11	AR-223	1 meg ohm, 2 watt, metal film resistor 1%
R 12-17	AR-181	100K ohm, 2 watt metal film resistor
RFC 1	FP-115	30amp filament choke
RFC 2	AR-117	plate choke assembly
RFC 3	AR-162	2.5 MH 175 ma R.F. choke
RL 1	AR-139	3PDT 12 VDC relay
S 1	AR-130	2P3T rotary switch
S 2,3	AR-147	15amp rocker switch
B S 1	AR-136	band switch
T 1	AR-109	Power transformer Primaries 1) 117 volts 2) 117 volts Secondaries 1) 5 volt 15 amp CT 2) 9 volt 2 amp 3) 950 volt .7 amp
V 1	AR-167	3-500Z tube
X 1	AR-398	16 volt transmit lamp
X 2,3,	AR-164	16 volt meter lamp

FP-108 PARTS LIST

RL 1-6 AR-135 DPST 12VDC relay

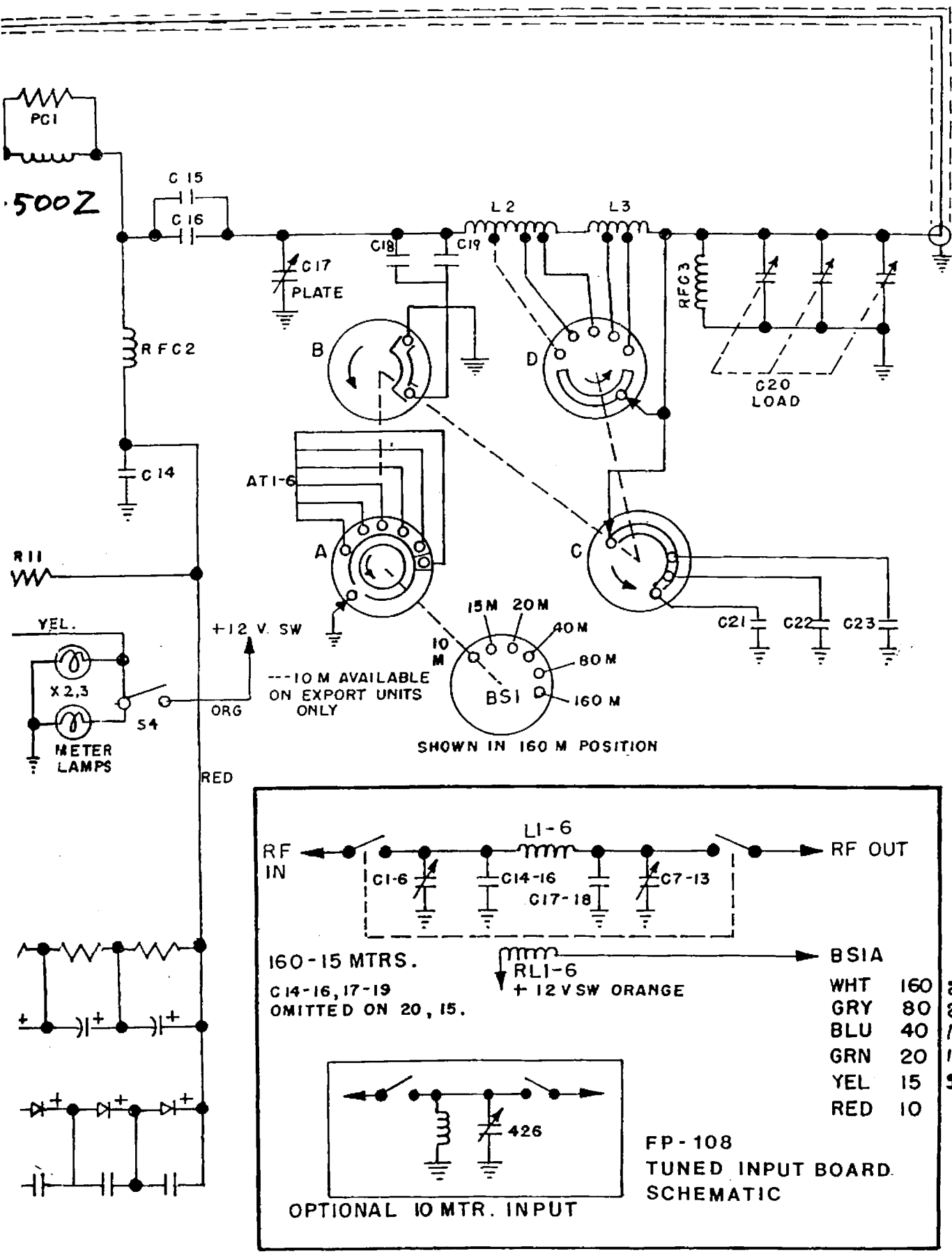
BAND	L 1-6		C 14-16		C 17-18		C 1-6	C 7-13
160	28t.	FP-124	1500pf	AR-382	1500pf	AR-382	427 Arco	427 Arco
80	20t.	FP-125	1500pf	AR-382	1000pf	AR-176	427 Arco	427 Arco
40	16t.	FP-126	220pf	AR-175	100pf	AR-174	427 Arco	427 Arco
20	10t.	FP-127					426 Arco	426 Arco
15	9t.	FP-128					426 Arco	426 Arco
10*	7t.	FP-129					426 Arco	426 Arco

* EXPORT MODELS ONLY



AL-80 SCHEMATIC

* R7 OMITTED ON MODELS WITH T. 220V FAN.


PC1
500Z
C15
C16
C17
PLATE
C18
C19
L2
L3
RFC3
C20
LOAD
RFC2
B
D
C14
AT1-6
A
C
R11
YEL.
+12 V. SW
15M 20M
40M
10 M
80M
BS1
160 M
C21
C22
C23
X2,3
S4
ORG
---10 M AVAILABLE ON EXPORT UNITS ONLY
METER LAMPS
SHOWN IN 160 M POSITION
RED
RF IN
L1-6
RF OUT
C1-6
C14-16
C17-18
C7-13
160-15 MTRS.
C14-16, 17-19
OMITTED ON 20, 15.
RL1-6
+12 V SW ORANGE
BSIA
WHT 160 28 W
GRY 80 20 W
BLU 40 16 W
GRN 20 10 W
YEL 15 9 W
RED 10 7 W
426
OPTIONAL 10 MTR. INPUT
FP-108
TUNED INPUT BOARD
SCHEMATIC