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AMPLIFIER FEATURES

Rugged devices. The ALS-600 uses four rugged RF power FET

Fast warm-up time. The ALS-600 has no vacuum tubes to warm

No tune operation. Tuning adjustments are not necessary. A simple one knob selector switch permits operation on frequencies between 1.5 and 22 MHz.

ALC protection. The output and reflected powers are monitored and control the exciter ALC voltage. This helps prevent damage to the amplifier.

Front panel ALC control. This unique Ameritron feature allows easy front panel adjustment of the ALC threshold to control power output.

Load Error Protection. The PA load impedance is monitored and the amplifier is bypassed if the band switch or the external load is incorrect.

Illuminated Power/SWR meter. The ALS-600 has an illuminated cross-needle peak reading RF power meter. Accurate directional coupler and peak storage circuits give simultaneous forward and reflected peak power readings and also indicates load SWR.

Operate/Standby switch. This switch allows the amplifier to be by-passed for "barefoot" operation without turning the main power switch off and on.

Transmit and ALC Indicator LED's. Front panel LED's provide an indication of amplifier keying by the exciter during operation and ALC output voltage.

12 volt auxiliary jack. This jack supplies +12v to operate low current accessories.

Thermal Overload Protection. The transmit relay in the amplifier is disabled if excessive heatsink temperatures are reached.

Compact size. The ALS-600 weighs only 12.5 pounds and measures 6"H x 9.5"W x 12"D.

POWER SUPPLY FEATURES

ALS-600PS

Multi-voltage heavy duty transformer. A unique "buck-boost" winding allows compensation for up to six different power line voltages centered on 115 and 230 volts. This versatile Ameritron feature maintains optimum voltages on the amplifier components for maximum performance and life.

Choke input filtering. The ALS-600PS standard power supply uses an input choke to provide a low power factor to the power lines. This reduces the peak currents drawn from the line and improves the voltage regulation of the supply.

ALS-600SPS

Light weight. The ALS-600SPS is a light weight switching power supply to use with the ALS-600 amplifier. The switching supply weighs 3 times less than the choke type power supply. The ALS-600 amplifier with the switching power supply is ideal for travel.

Hash free. The specially designed switching and filter circuit makes the power supply hash free.

Simple power line voltage options. The power supply will safely operate from 90-135 Vac in the 120 setting and 185-260 in the 240 Vac setting.

ALS-600PS and ALS-600SPS

Step-start circuit. This circuit uses a relay and resistor to limit the inrush current to the power supply. This circuit extends the life of the power supply components.

Current and output voltage metering. An illuminated cross needle meter monitors the output voltage and current of the 50 volt output line.

GENERAL INFORMATION

Amplifier

The Ameritron ALS-600 is a 600 nominal watt output, solid state, linear amplifier using state-of-the-art, high voltage, RF TMOS FET devices in the power output section. The ALS-600 provides continuous frequency coverage from 1.5 through 22 MHz with no tuning adjustments. Broad band 5 pole low pass filters provide output harmonic suppression in excess of all FCC requirements. Export modifications are available to extend operation up to 30 MHz with a copy of a valid amateur license.

The ALS-600 uses four MRF-150 FET's operating at 50 volts in a double ended push-pull parallel output configuration. High quality RF components combine with an accurate peak detecting directional coupler, front panel adjustable ALC circuit with automatic SWR foldback, and one switch frequency selection to make this one of the easiest to operate amplifiers available. The matching power supply, ALS-600PS or ALS-600SPS, is shipped factory wired for 120 volt, 50/60 Hz power mains and is easily converted to other supply voltages between 100 and 240 volts.

Power Supply

The ALS-600PS power supply is designed to power the ALS-600 amplifier from 50 to 60 hertz AC power mains that range from 100 to 130 and 210 to 240 volts. The ALS-600SPS has a terminal strip where the AC voltages can be 120 or 240 50/60 Hz. The power supply will safely operate from 90-135 Vac in the 120 setting and 185-260 in the 240 Vac setting. All ALS-600PS/ALS-600SPS supplies are wired for standard 120 volt systems and are shipped with a NEMA 5-15P three wire plug.

These supplies will safely provide the power required to operate the ALS-600 in typical continuous amateur service at 600 watt output levels. The ALS-600PS/SPS power supply supplies the three DC voltages required by the amplifier unit. The high voltage section supplies approximately 50 volts at a load current of 20 amperes.

Export Modifications

A simple modification will allow operation on frequencies up to 30 MHz. A parts kit to make this modification is available by sending a written request for the export modification kit, item no. MOD-10MB, along with a copy of your valid amateur license to Ameritron. There is charge for this kit. Export models are shipped with this modification installed. The ALS-600(S)Y is the export for 115-130vac operation and the ALS-600(S)X is the export model for 220-240 operation.

Technical Assistance

Technical assistance is available by calling (662) 323-8211 during our normal business hours (8:00 to 4:30 Central Time on weekdays) for questions that are not answered by the technical information sheets. We are happy to provide personal assistance if you need more detailed help. Please have the following information available so that we can accurately assist you with any problems:

1. The model and serial number of the unit.
2. The date of purchase and the dealer.
3. A brief description of the station equipment and antenna system.
4. A complete description of the problem along with any abnormal meter readings.

Written assistance is also available. Due to time delays in processing mail, please allow at least three weeks for a written reply. See warranty page for mailing address.

AMERITRON
116 Willow Road
Starkville, MS 39759
Tel: (662) 323-8211
Fax: (662) 323-6551

AMPLIFIER CIRCUITRY

Wattmeter Circuits

The BIAS/WM/ALC board contains the peak power detector circuits. The rear panel directional coupler connects to IC101D/C. IC101D/C drives Q101/102 to charge C103/106 to the peak voltage from the directional coupler. C103/106 is lightly loaded by IC101A/B and R103/107. This allows enough "hang" time for the meter to accurately indicate peak power levels.

Accurate forward peak power reading are obtained under mismatched load conditions when the reflected power is deducted from the forward power readings.

The average and peak envelope power values are EQUAL on CW, FSK and FM (modes that do not have amplitude changes in the carrier). The average power level of voice or other complex waveform signals has NO SET RATIO of peak to average power.

ALC (Automatic Level Control)

The ALC circuit functions by using a comparator (IC103A) to reduce the exciter drive power if the output power of the ALS-600 exceeds a preset value. The ALC circuit also reduces the drive power if the SWR increases while operating with the ALC controlling the amplifier output power level. The ALS-600 ALC output should be connected to the proper exciter external ALC connection point with a shielded audio type cable. Consult the exciter manual for the proper exciter connection details.

Operation at high audio gain levels on SSB with ALC has the same effect as an RF speech compressor. RF compression increases SSB "talk power". Background noise pickup also increases when the exciter gain is operated at high levels to increase compression. Audio distortion does not normally occur with this type of speech processing if the ALC circuit in the exciter is properly designed.

Do not attempt to limit the CW power more than a few percent solely with the amplifier ALC circuit. Using the amplifier ALC to reduce CW power levels may result in pumping of the output power during dots and dashes. The "ALC SET" control will be correctly adjusted when the "ALC" LED gives a small flash while transmitting on CW. This can be accomplished by adjusting the "ALC SET" control on the front panel so that the "ALC" LED just barely lights when the desired power level (below 400 watts) is reached with a steady carrier.

The ALC circuit can be used to reduce power by any amount on constant amplitude carrier modes such as RTTY or FM. The ALC cannot cause modulation distortion or pumping on these modes.

Never use the ALC to control the level of AM transmissions. Using the amplifier's ALC circuit to control AM output power will cause pumping of carrier amplitude on AM transmissions during modulation.

The ALC indicator on the front panel of the ALS-600 is driven by comparator IC3B. Resistors R24 and R25 set the turn-on level of the front panel "ALC" indicator. Factory selected resistor values cause the "ALC" LED to illuminate as soon as negative ALC voltage begins to appear at the ALC output jack.

If the exciter used with this amplifier does not "fold back" until appreciable ALC voltage is developed, the "ALC" LED may become fully lit even under operating conditions that are producing very light ALC action.

Caution: There are no industry standards for transceiver or exciter ALC input voltage levels, input resistance, or attack and decay times. While every attempt has been made to make the ALC circuit in this amplifier compatible with various exciters, the exact operation of the ALC circuit will vary with the exciters response to external ALC control voltages. This ALC circuit will function with negative voltage ALC control systems requiring less than 10 volts.

Thermal Overload

The ALS-600 has a built in thermal cut-out that by-passes the amplifier if excessive heat sink temperature is produced. This circuit minimizes the risk of excessive temperature damage to the FET's and other components.

If the amplifier "XMT" LED remains lit while the amplifier suddenly stops transmitting the thermal overload has probably tripped. If the thermal overload has tripped full exciter power will appear on the RF output meter.

The thermal overload resets automatically and all amplifier functions are restored when heat sink temperature returns to a safe value. The usual cause of thermal overload is excessive heat buildup during a transmission period longer than a few minutes. To correct this condition be sure that the power level and duty cycle limits are being followed, that the SWR is as low as possible, and that the cooling is not being hampered by air flow restriction or excessive inlet air temperatures.

Load Fault Indicator

The "LOAD FAULT" LED indicator will light and the amplifier will not go into a transmit mode if the band switch is set on the wrong frequency range, if the load SWR is excessive, or if the output power level is excessive.

To reset a "LOAD FAULT" indication:

1. Determine and correct the cause of the problem.
2. Place the amplifier "STANDBY-OPERATE" switch to "STANDBY" and then back to "OPERATE".

The load fault detector circuit is located on the output filter board and measures the reflected power presented by the output filter network and the SWR directional coupler. The sensitivity of the circuit is adjusted by R304 and R601. C324 is a factory adjustment that controls the impedance of the detector circuit. This capacitor is adjusted for minimum detector voltage on 7 MHz with a 50 ohm load. Do not adjust any components in this circuit without consulting the factory.

SWR Considerations

A high SWR (Standing Wave Ratio) causes higher voltages and/or currents to appear at the output connector of the amplifier. This problem occurs with all amplifiers regardless of whether tubes or semiconductors are used in the output stage.

Vacuum tube amplifiers have the reputation of handling high SWR's quite well. This reputation probably exists for two reasons. First, most vacuum tube amplifiers use adjustable output networks. Second, nearly all vacuum tubes handle momentary overloads extremely well.

In tube amplifiers that have tunable Pi or Pi-L networks, the only components affected by a high load SWR are those between the loading adjustment capacitor and the output connector. When the output network is properly adjusted the SWR cannot affect tube life.

The TMOS FET devices used in the ALS-600 have nearly the same momentary overload tolerance as vacuum tubes. The low pass output network in the ALS-600 is much broader in bandwidth and less sensitive to load changes than the networks used in tube type amplifiers.

This makes the ALS-600 much less sensitive to frequency and SWR changes than the best "no-tune" tube amplifiers but not as good as adjustable pi-networks. The ALS-600's multiple section output network and push-pull output configuration offers much better harmonic suppression than most tube amplifiers regardless of load SWR.

The only danger presented by a high SWR in this amplifier is that the current and power dissipation in the output devices may exceed safe limits. Lengthy operation with high SWR at high power levels can result in heat damage and failure of the FET devices. If the reflected power exceeds 50 watts the power level should be reduced until the reflected power indicated on the internal meter is 50 watts or less on peaks. At approximately 75 watts of reflected power the internal safety circuitry will disable the amplifier.

ALS-600PS POWER SUPPLY CIRCUITRY (ALS-600PS)

Line Voltage Modifications

The line input voltage of the ALS-600PS can be changed by moving jumper wires on the power supply printed circuit board to new locations. The ALS-600PS is wired for standard 120 Vac operation unless otherwise indicated.

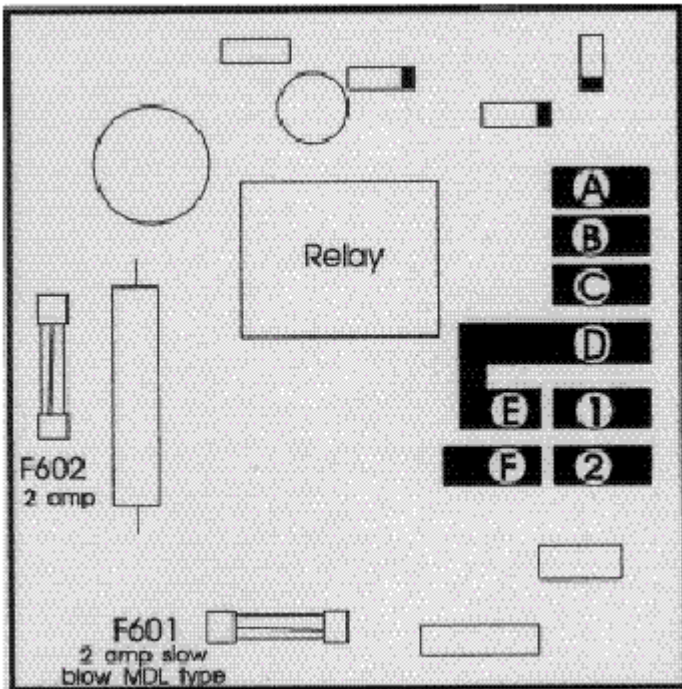
Warning: *Never remove the cover of this unit while it is connected to the power line. Never solder or unsolder without eye protection.*

Refer to the following chart for the proper location of the primary wiring. This chart lists the proper jumper connections for different ranges of MAXIMUM line voltage.

The standard line voltage in the USA is NOT 110 and 220 volts. It is almost ALWAYS above 120 volts or 240 volts.

Caution: *Never exceed the voltage in this chart for each wiring configuration. If the output voltage of this supply exceeds 65 volts damage to the amplifier may occur.*

ALS-600PS Power Supply Board
Jumper Pad Diagram



For the following line voltages
jumper the correct pads.

| AC LINE VOLTAGE RANGE | PRIMARY | BUCK BOOST |
|-----------------------|---------------|---------------|
| 95-110 | A TO B C TO D | E TO 2 F TO 1 |
| 105-120 | A TO B C TO D | E TO F |
| 115-130 | A TO B C TO D | E TO 1 F TO 2 |
| 200-220 | B TO C | E TO 2 F TO 1 |
| 210-230 | B TO C | E TO F |
| 220-240 | B TO C | E TO 1 F TO 2 |

High Voltage Section

The high voltage section of the ALS-600PS uses a full wave bridge rectifier. DC filtering is accomplished with a large swinging choke (T1) and a high quality computer grade capacitor (C5). A pair of 100 ohm resistors (R5,6) absorb enough bleeder current to prevent the output voltage from soaring under low load currents. The output voltage and current of this section are monitored by a illuminated dual needle meter (M2a/2b).

Primary Circuit

10 ohm resistor (R602) limits the line current during the filter capacitor charge time to lower the stress on the power supply components. When the 14 volt control line approaches full voltage relay (RLY601) bypasses the 10 ohm resistor (R602) and applies full line voltage to the transformer primary. The 10 ohm resistor is protected from supply shorts by a 2 amp slow-blow fuse (F601) during the start-up.

A separate 10 volt transformer winding can be connected to either oppose or add to the power line voltage. This allows the 115 volt maximum voltage primary windings to be adjusted to provide the proper voltage. Use of the buck-boost winding allows maximum primary voltages of either 100, 110, and 120 volts maximum voltage or 210, 220, and 230 volts maximum voltage at either 50 or 60 hertz.

The primary circuits are fused by two fuses (F1,2) that are rated at 15 amperes at 100 volts, 12 amperes from 110 to 120 volts or 8 amperes from 220 to 240 volts. Since the current demand and the power factor of this supply are so low Ameritron does not recommend operating this supply on the higher voltage lines (210 to 240 volts) unless lower voltages are unavailable.

Low Voltage Circuits

The low voltage power supply sections supply 14 volts positive at 2 amperes maximum with a full wave grounded center tap supply for control, lights and also to power the bias voltage regulator and the circuitry of the Bias/Wattmeter board in the ALS-600. This low voltage circuit is protected by a 2 ampere fuse (F602) located on the power supply printed circuit board.

A separate half wave rectifier supplies the low current necessary to operate the ALC circuitry in the ALS-600. This circuit is protected by a 10 ohm 1/4 watt resistor (R601).

SWITCHING POWER SUPPLY CIRCUITRY (ALS-600SPS)

Line Voltage

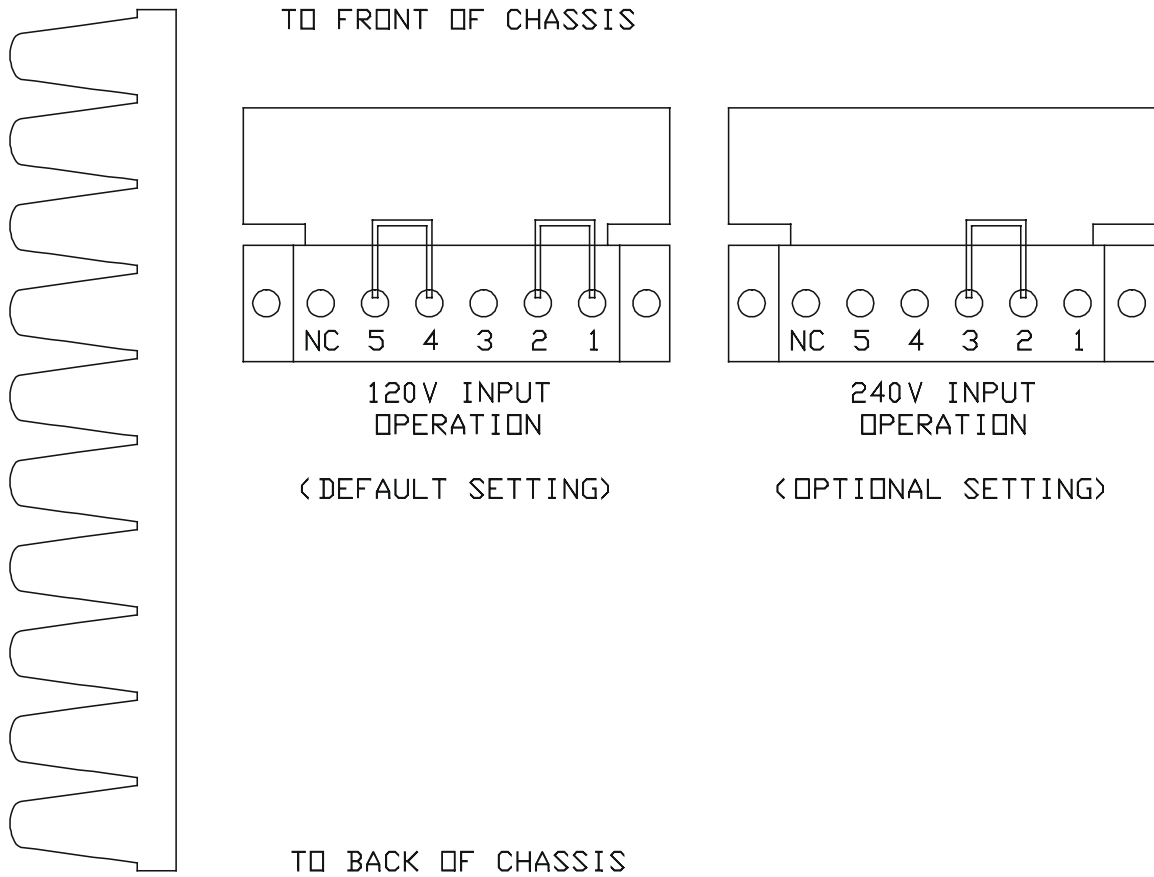
The input AC line for the ALS-600SPS can be change by moving jumpers on the AC input terminal block. The ALS-600SPS is factory wired for 120 Vac operation unless otherwise indicated.

Warning: *Never remove the cover of this unit while it is connected to the power line.*

Refer to the drawing of the terminal block for the proper location of the primary wiring.

The 120 position will allow the power supply to work between 90 to 135 Vac.

The 240 position will allow the power supply to work between 185 to 260 Vac.



High Voltage Section

The High voltage section of the ALS-600SPS uses high current switching circuit with superior filtering to produce a high current DC voltage. This line is protected by F1 on the printed circuit board.

Primary Circuit

A 10 ohm resistor limits the line current during the start-up time to lower the stress on the power supply components. When the -14 volt control line approaches full voltage a relay bypasses the 10 ohm resistor and applies full line voltage to the primary. The 10 ohm resistor is protected from supply shorts by a 2 amp slow blow fuse during start-up.

The primary circuits are fuse by two fuses located on the back panel of the switching power supply. The fuses are rated at 15 amps on 120 volts, or 8 amps on 240 volts.

Low Voltage Circuits

The low voltage power supply sections supply 14 volts positive at 2 amperes maximum for control of lights, bias voltage regulator and the Bias/Wattmeter board in the ALS-600.

A separate 12 volts negative supply is used to operate inrush relay and the ALC circuit of the ALS-600.

INSTALLATION

Amplifier Location

Do not locate this amplifier in excessively warm locations, near heating vents or near radiators. Be sure that air can circulate freely around and through the amplifier cabinet. Do not obstruct the air inlets at the rear of the amplifier and the outlet air holes on the lower right side of the amplifier cabinet.

The best location for the amplifier is one that allows the meters to be easily read and the controls accessed during operation. The length of interconnecting control cables are not critical. The control leads should be made from good quality shielded cables. Low level audio cables sold for use with stereo and VCR equipment are ideal. The RF cables should be kept as short as possible.

Power Supply Location

The best location for this power supply is one that is away from devices that are sensitive to magnetic fields. The meter and fuses should be accessible for service. Do not obstruct the air inlets at the rear of the power supply and the outlet air holes on the upper right corner power supply cabinet.

Caution: The choke in the power supply emits strong magnetic fields. Never place magnetic tapes, computer disks or other magnetic sensitive devices within 18 inches of the cabinet of the ALS-600PS.

Grounding

The station ground buss should be connected to a good earth and RF ground. Use the heaviest and shortest connections possible. The best ground leads are smooth and have a large surface area. Braiding (including standard coaxial cable shield) has a high RF resistance and should be avoided unless the lead needs to flex. The best conductors for ground connections are copper flashing or copper foil. Solid copper wire can be used and will closely approximate copper flashing if multiple ground leads are used and separated at least a few inches apart.

Water pipes can be used for an earth connection if the plumbing is *all* metallic pipes. The water meter or any other insulated junction should be bypassed with a jumper wire clamped to the pipe at both sides of the meter.

Multiple ground connections are superior to a single ground connection. Ameritron has a technical information sheet with addition suggestions for grounding. No grounding terminal is provided for the power supply since it does not generate any RF signals. A safety ground is provided by the power line neutral ground through the line cord and plug.

Warning: *Never remove or defeat the electrical safety ground connection on the plug of this supply or a shock hazard may develop.*

Power Requirements

Caution: *The ALS-600 is not designed for operation for 12 Vdc operation.*

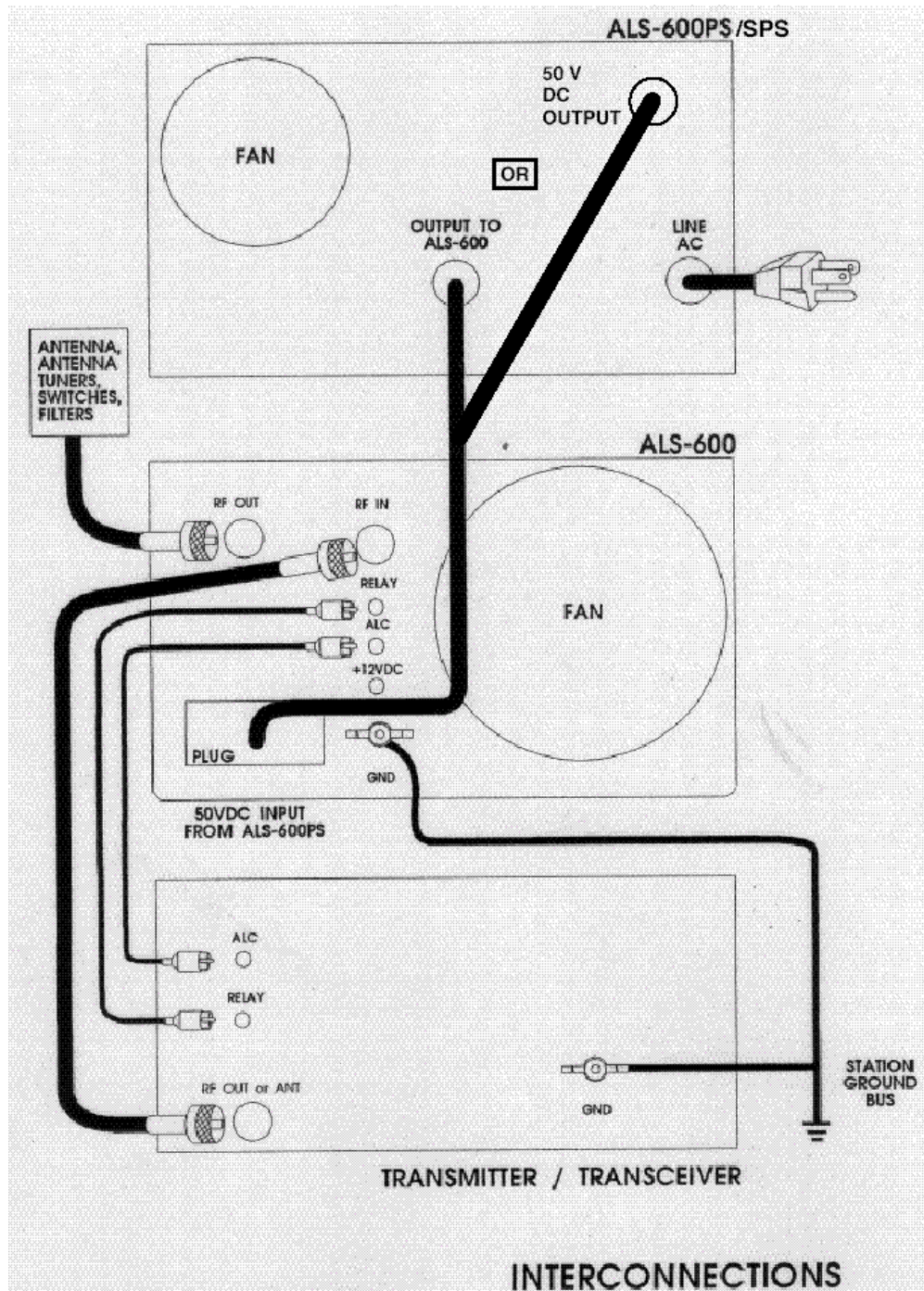
The ALS-600PS power supply is designed to match the ALS-600 amplifier. The ALS-600PS/SPS provides 50 volts DC at 25 amperes along with 12 volts positive and negative at low current for the control and bias circuits of the amplifier.

The power supply requires less than 12 amps at 120 Vac or 6 amps for 240 Vac. The output voltage of the supply should be kept below 65 Vdc at no load for maximum component life. If the no load output voltage exceeds 65 Vdc you must change the input line voltage of the ALS-600PS. Refer to the "Line Voltage Modifications" section in this manual. The ALS-600SPS no load voltage should stay within .1 volt of 50 volts.

INTERCONNECTIONS

1. Connect the RF output (ant) of the exciter to the RF IN (SO-239) of the ALS-600 with a good quality 50 ohm cable capable of handling 100 watts.
2. Connect the station antenna system to the RF OUT (SO-239) connector with 50 ohm coax that will safely carry 600 watts. This is where the Low-Pass filter, antenna tuner, antenna switch and other accessories connect.
3. Use shielded audio type cable with standard male phono (RCA) connectors to connect the RELAY jack of the ALS-600 to the transceiver or transmitter, normally open, amplifier relay terminal. This connection has 12 volts open circuit and supplies less than 100 mA of current when pulled to ground. There is a back pulse canceling diode in the amplifier for exciter protection.
4. Connect the ground stud (GND) on the amplifier to the station ground buss with as short a lead as practical.

5. Connect the ALC jack to the exciter ALC terminals with a shielded audio type cable and standard phono connector.
6. Connect the female power connector from the ALS-600PS/SPS supply to the multi-pin male connector on the ALS-600 rear chassis.
7. The 12V connector can be used to supply 12-14 Vdc at less than 200 mA for station accessories.



OPERATION

This amplifier is equipped with a switch on the front of the Amplifier's Power Supply labeled Normal/RTTY. This switch is used in the normal position for SSB and CW operation. The RTTY position is used for continuous carrier modes. This position will limit the voltage to about 42Vdc no load. This will limit the output power to 350 watts. In the RTTY position, the amplifier can be operated with 10 minute key down with 50% duty cycle.

The Amplifier's back panel has an ALC limit control. This control is to limit the amount of ALC voltage sent to the transceiver. This is necessary due to there is not a standardize ALC voltage on transceivers. To set the ALC limit control, adjust the ALC set knob on front of the amplifier to 10 (fully clockwise). Apply enough drive into the amplifier until the amplifier's power meter reads about 400 to 500 watts. **Note: The amplifier's power meter should never exceed 700 watts at anytime.** Plug the ALC into the back of the amplifier (if not already done). Turn the ALC set knob (on front of amplifier) to 0 (counter-clockwise). Key amplifier with RF applied. Adjust the ALC limit control (on back of amplifier) until the ALC light on front of amplifier just comes on. No other adjustment needs to be done to the ALC limit control, unless a different transceiver is used. The only adjustments for ALC will be done on front of the amplifier. Follow the operator's manual for ALC adjustment.

The following sections describe how to adjust the exciter and ALC control for proper operation. If the ALC is not used the exciter output controls must be used to limit the power to the levels described in the text that follows.

SSB Operation

SSB voice operation normally does not have transmit time limits. Reflected power levels should be kept below 50 watts peak on SSB.

The most accurate way to maintain linear operation on SSB is with an oscilloscope. The output waveform should be closely observed for clipping or reduction of peaks and should closely resemble the waveform that the exciter produces barefoot.

If any peak clipping is evident the output power should be reduced until peak clipping is at a minimum.

The proper operating level can also be determined by operating the exciter at full power output (not to exceed 100 watts peak) and normal voice modulation with the amplifier "ALC SET" control fully clockwise. The "ALC SET" control should be adjusted until the amplifier's RF output meter just begins to drop.

The exciter output level should then be reduced with the audio gain control or output control until the desired amount of ALC compression is obtained. See the ALC (Automatic Level Control) section for more details.

CW Operation

The exciter output should be restricted to a level that limits the amplifier to 500 watts output on a steady carrier or 50 watts reflected power, whichever is greater.

The ALC should not be used to control the power level more than a few percent on CW. The "ALC" LED should just barely light or flash on CW.

RTTY, FM and Other High Duty Cycle

The transmitting duty cycle, ambient temperature, supply voltage, fan speed and the load SWR all play important roles in determining the transmit time limit on high duty cycle modes.

To minimize noise, Ameritron uses only enough fan speed to cool this amplifier for typical amateur usage. If heavy duty cycle operation is planned the following guidelines should be followed.

The output power can be reduced to assist with cooling. This is not the most effective method of improving performance since the power must be reduced 5 times to cut the heat dissipation in half. The exciter output should be restricted to a power level where less than 200 watts output or 25 watts reflected power is obtained on long duty cycle modes.

The fan speed should be increased by replacing or supplementing the airflow from the standard fan. A fan that delivers at least 80 CFM airflow at .1" of static pressure, such as the EBM W2S107-AA15-39, will double the cooling and allow 500 watt RTTY transmissions with 2 minute on, one minute off duty cycles.

The high voltage power supply can be reduced to increase the efficiency at lower output levels. At 30 volts the ALS-600 will deliver 275 watts of output power. This will allow a 100% duty cycle with any fan delivering more than 40 CFM at .08" of static pressure, such as the EBM W2S107-AD21-39, or a 5 minute on, two minute off duty cycle with the standard fan.

Either the exciter drive level or the amplifier "ALC SET" control can be adjusted to limit the power output in the RTTY and FM modes.

AM Operation

The carrier power of any linear amplifier is restricted on AM to one fourth of the peak envelope output power. With this amplifier the maximum carrier power on AM will be around 150 watts.

Proper modulation AM is indicated by observing the ratio of unmodulated carrier power to the power indicated on voice modulation peaks. This rotation should be approximately 4:1.

Never use the ALC to control the power on AM. The "ALC SET" control should be set in the maximum clockwise position.

Drive Power Requirements

The ALS-600 requires less than 100 watts of drive to produce full output power. Exceeding 100 watts of drive for long periods of time may cause component failures. Exceeding 100 watts of drive for short periods will cause distortion and increase the bandwidth of the transmitted signal.

Follow these instructions in numerical order. Consult the manual for the exciter, if necessary.

Be sure the power supply transformer is correctly wired for your line voltage. See the "Line Voltage Modifications" section for wiring details.

1. Set the ALS-600 front panel switches as follows:
ON-OFF to OFF
OPERATE-STANDBY to STANDBY
2. Plug the AC line cord into the proper voltage outlet.
3. Place the power switch in the ON position. The meter lamps should light and the power supply fans and the amplifier should start.
4. Check the voltage on the power supply meter. The **ALS-600PS** voltage should be between 55 and 65 volts at this step. **ALS-600SPS** should be between 4.9 to 5.1 volts at this step. If the voltage is outside this range then check the line voltage with an accurate meter and make sure the power supply primary wiring is correct.
5. Set the amplifier's frequency range switch to the same frequency as the exciter.
6. With the amplifier still in STANDBY, transmit into the expected 50 ohm RF load with the exciter. Measure the SWR on the amplifier's SWR scale or with an external SWR indicator.

Caution: *Do not operate this amplifier at full power with an SWR above 2:1. See the SWR Considerations section.*

7. Place the amplifier in the OPERATE position. The TRANSMIT LED should light when the exciter is keyed. With no RF drive the idling current should be less than 1 amp on the power supply meter.

8. The ALC control is usually properly adjusted if the ALC LED just flashes when the desired peak output power is reached. The audio or power output control on the exciter can be adjusted to control how "heavily" the ALC is used. The higher the exciter power (gain) control is adjusted the more compression the ALC circuit provides.

The best signal quality occurs when the ALC LED occasionally flashes. The most SSB signal "punch" will occur if the LED continuously flashes.

Full output levels of 500 watts CW should be obtained with drive levels of under 100 watts. Peak envelope output levels on SSB may reach as high as 800 watts depending on voice and exciter characteristics. The lowest IMD and splatter will be obtained if the amplifier is operated at an output level slightly below the maximum level obtainable.

Periodic Maintenance

The lack of extremely high voltages in this unit eliminates the chance of dirt and dust causing high voltage arcing. The only requirement for periodic maintenance is to monitor the amount of dirt and dust in the amplifier and the power supply. Whenever there is a noticeable accumulation of dust that may affect cooling, air can be used to blowout the equipment.

The fan area on the amplifier should be inspected every few months if the amplifier is operated in a very dusty environment. If there is a large amount of dust on the fan it is probably a good time to blow the dust out of the amplifier and power supply with moderate air pressure.

A soft bristled brush and a small amount of alcohol can be used to clean stubborn dust from the fan screen or the other components. Be careful not to get any cleaning compounds on the relay contacts or the switches.

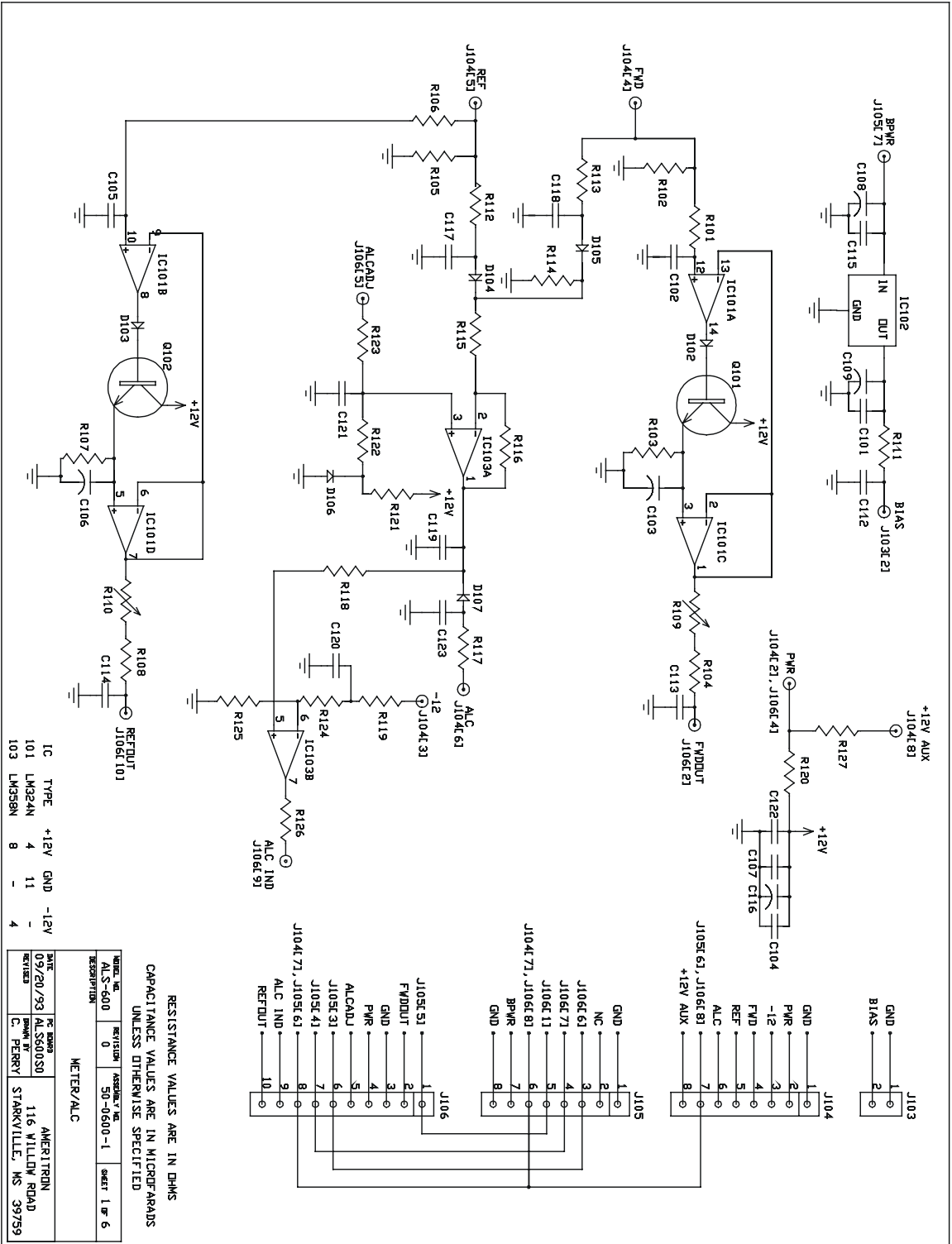
Caution: Never remove the cover of the amplifier or the power supply, with the power supply plugged in to the electrical outlet.

ALS-600 PARTS LISTS & SCHEMATICS

Meter/ALC Board

50-0600-1

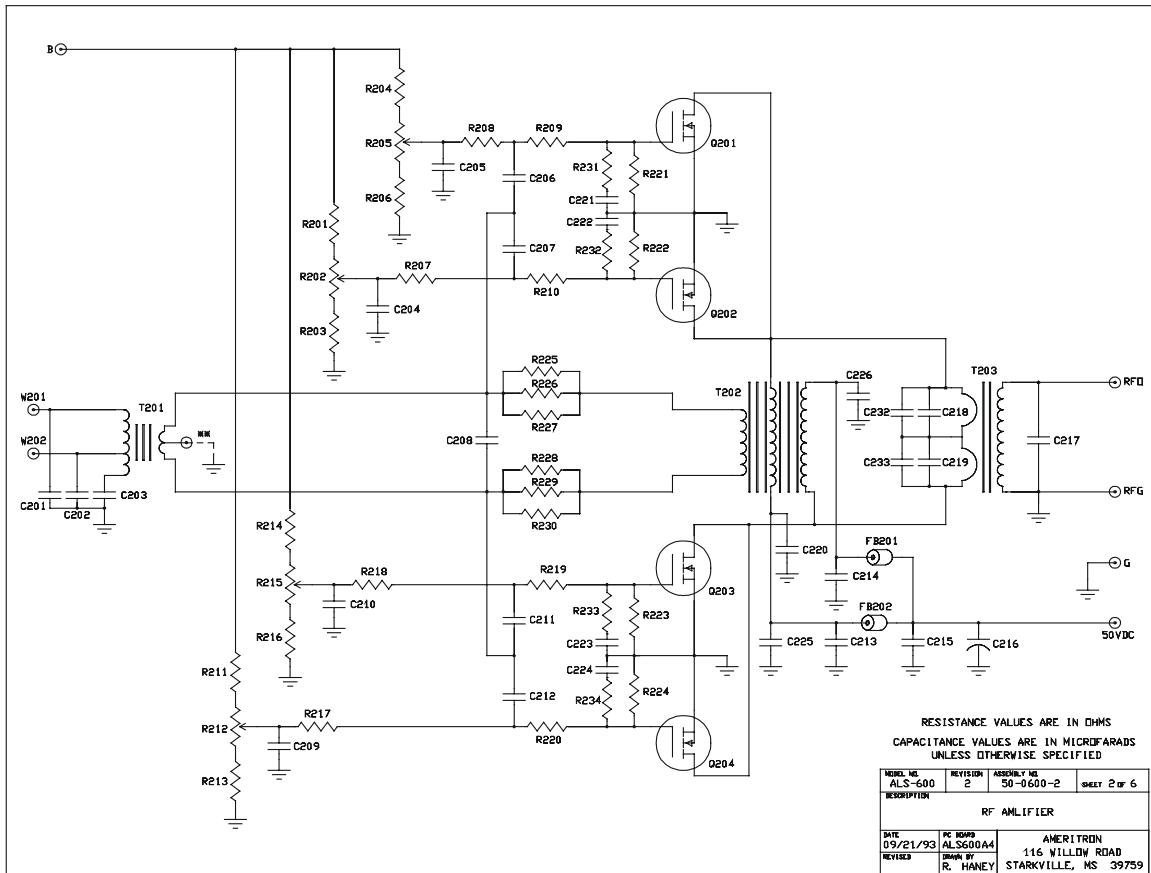
| Designator | Description | Part number |
|--|-------------------------------------|-------------|
| C101,102,104,105,109, 107,112-115,117-123 | .01 uF 50V disc | 200-0416 |
| C103,106 | 2.2 uF 50V radial lead electrolytic | 203-0225 |
| C108,116 | 47 uF 50V tantalum | 203-0530 |
| C110,111 | not used | |
| D101 | not used | |
| D102-105,107 | 1N34A diode | 300-0346 |
| D106 | 5.1V 1/2W Zener diode 1N4734 | 301-4734 |
| IC101 | quad op-amp LM324N | 311-0324 |
| IC102 | 8V REG 75L08ACP | 307-0012 |
| IC103 | dual op-amp LM358AN | 311-0725 |
| J103 | 2 pin header | 612-0102 |
| J104,105 | 8 pin header | 612-0108 |
| J106 | 10 pin header | 612-0110 |
| Q101,102 | 2N3904 | 305-0645 |
| R101,106,115 | 4.7K 1/2 watt | 101-3470 |
| R102 | 1M 1/4 watt | 100-6100 |
| R103,107 | 470K 1/4 watt | 100-2470 |
| R104,105,108,113 | 22K 1/4 watt | 100-4220 |
| R109 | 50K trim pot | 104-0400 |
| R110 | 5K trim pot | 104-5020 |
| R111,119,120,123,127 | 10 ohm 1/2 watt | 101-1100 |
| R112 | 3.3K ohm 1/4 watt | 100-3330 |
| R114 | 6.8K 1/4 watt | 100-3680 |
| R115 | 100K ohm 1/4 watt | 100-5100 |
| R116 | 220K 1/4 watt | 100-5220 |
| R117,118,125 | 1K 1/4 watt | 100-3100 |
| R121 | 33 ohm 1/2 watt | 101-1330 |
| R122 | 2.2K 1/4 watt | 100-3200 |
| R124 | 1M ohm 1/4 watt | 100-6100 |
| R126 | 470 ohm 1/4 watt | 100-2470 |



PA Board

50-0600-2

| Designator | Description | Part Number |
|--------------------------|--------------------------------------|-------------|
| C201-203,217 | not used | |
| C204-207,209-212 | .1 uF 50V disc | 200-0745 |
| C208 | 470 pF 500V DM 15 | 208-5440 |
| C213,214,220-226 | .33 uF 100V multiplayer | 205-1334 |
| C215 | 47 uF 100V mylar | 201-1474 |
| C216 | 100 uF 100V radial lead electrolytic | 203-1007 |
| C218,219,232,233 | 360 pF 500V | 208-5688-1 |
| FB201,202 | ferrite bead w/Teflon sleeving | 403-0508 |
| Q201-204 | MRF-150 RF TMOS FET | 305-6150 |
| R201,204,214,211 | 3.3K 1/4 watt | 100-3330 |
| R202,205,212,215 | 5K trim pot | 104-2520 |
| R203,206,213,216,221-224 | 1K 1/2 watt | 100-3100 |
| R207,208,217,218,231-234 | 18 ohm 1/2 watt | 101-1180 |
| R209,210,219,220 | 1 ohm 1/2 watt | 101-1010 |
| R225-230 | 22 ohm 2 watt MOX | 103-2220 |
| T201 | input transformer | 406-2600 |
| T202 | feedback transformer | 406-2601 |
| T203 | output transformer pair | 406-2602 |

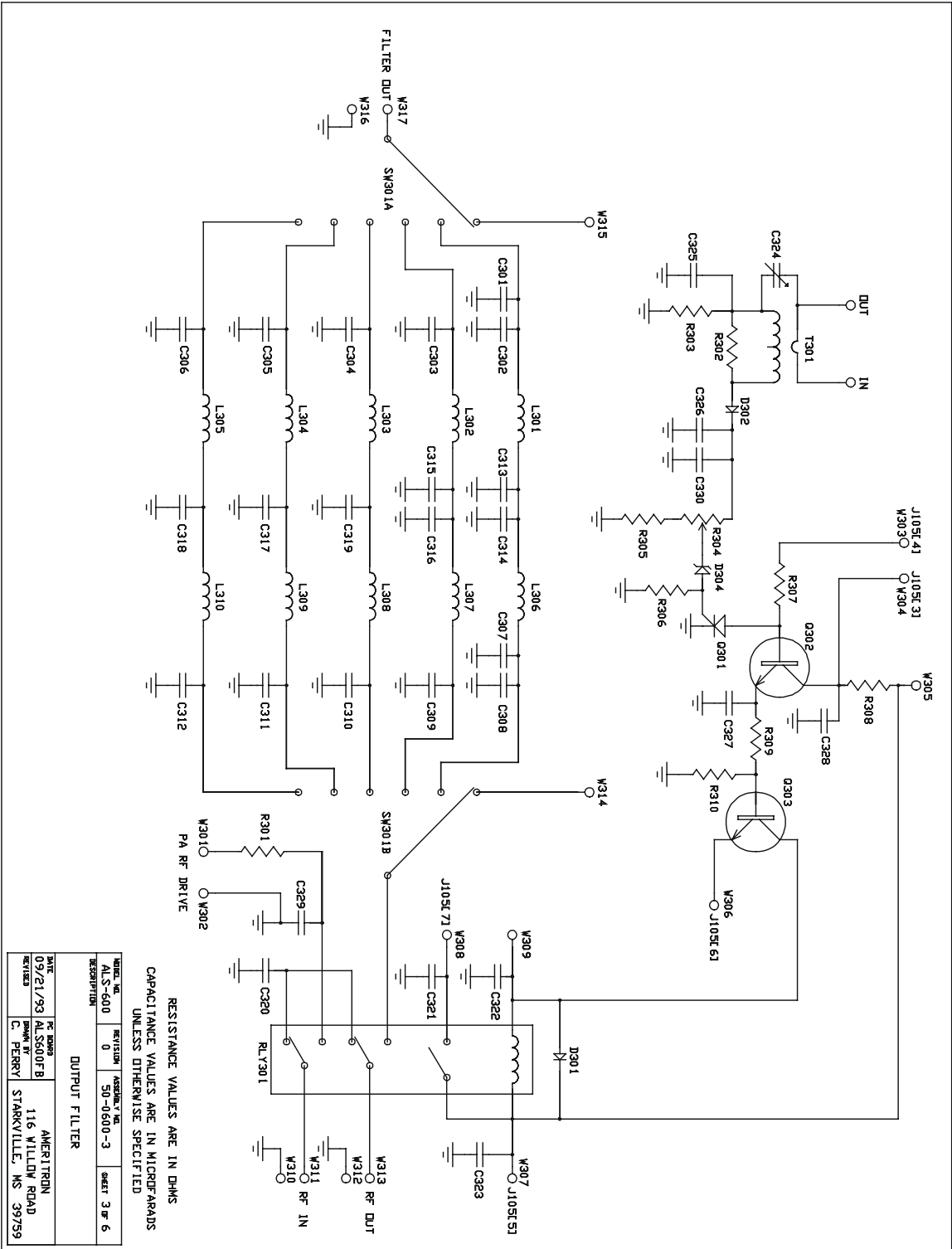


Output Filter Board

50-0600-3

| Designator | Description | Part Number |
|------------------|--------------------------------------|-------------|
| C301,308 | not used | |
| C302,307 | 180 pF* 1000V CDV-30 | 208-6181 |
| C303,309 | 270 pF* 1000V CDV-30 | 208-6271 |
| C304,310 | 360 pF* 1000V CDV-30 | 208-6361 |
| C305,311,319 | 680 pF* 1000V CDV-30 | 208-6681 |
| C306,312,317 | 1500 pF* 1000V CDV-30 | 208-6152 |
| C313,314 | 160 pF* CDV-30 | 208-6161 |
| C315,316 | 220 pF* CDV-30 | 208-6221 |
| C318 | 2700 pF* CDV-30 | 208-6272 |
| C320 | 27 pF 500V mica | 208-5270 |
| C321-323,326-328 | .01 uF 50V disc | 200-0416 |
| C324 | 3-12 pF 500V trim cap | 204-0150 |
| C325,329 | 150 pF 500V DM15 | 208-5396 |
| C330 | 33 uF 50V Multilayer | 205-2233-1 |
| D301 | 2N6564 | 321-6564 |
| D302,303 | 2N3904 | 305-0645 |
| D304 | 1N34A | 300-0346 |
| L301,306 | 8.5 turn 1/2" ID air wound | 10-13850 |
| L302,307 | 8 pass toroid | 10-14168 |
| L303,308 | 10 pass toroid | 10-14161 |
| L304,309 | 14 pass toroid | 10-14214 |
| L305,310 | 22 pass toroid | 10-14222 |
| RLY301 | 3PDT 12 Vdc coil relay | 408-6140 |
| R301 | 35 ohm 50watt non-inductive resistor | 103-2230 |
| R302 | 82 ohm 1/2 watt | 101-1820 |
| R303 | 3.3K 1/4 watt | 100-3330 |
| R304 | 2.5K sub horz. Trimpot | 104-2520 |
| R305 | 2.2K 1/4 watt | 100-3220 |
| R306 | 10K ohm 1/4 watt | 100-4100 |
| R307 | 470 ohm 1/4 watt | 100-2470 |
| R308 | 10 ohm 1/2 watt | 101-1100 |
| R309 | 1K 1/4 watt | 100-3100 |
| R310 | 10K 1/4 watt | 100-4100 |
| SW301 | bandswitch | SW25000448 |

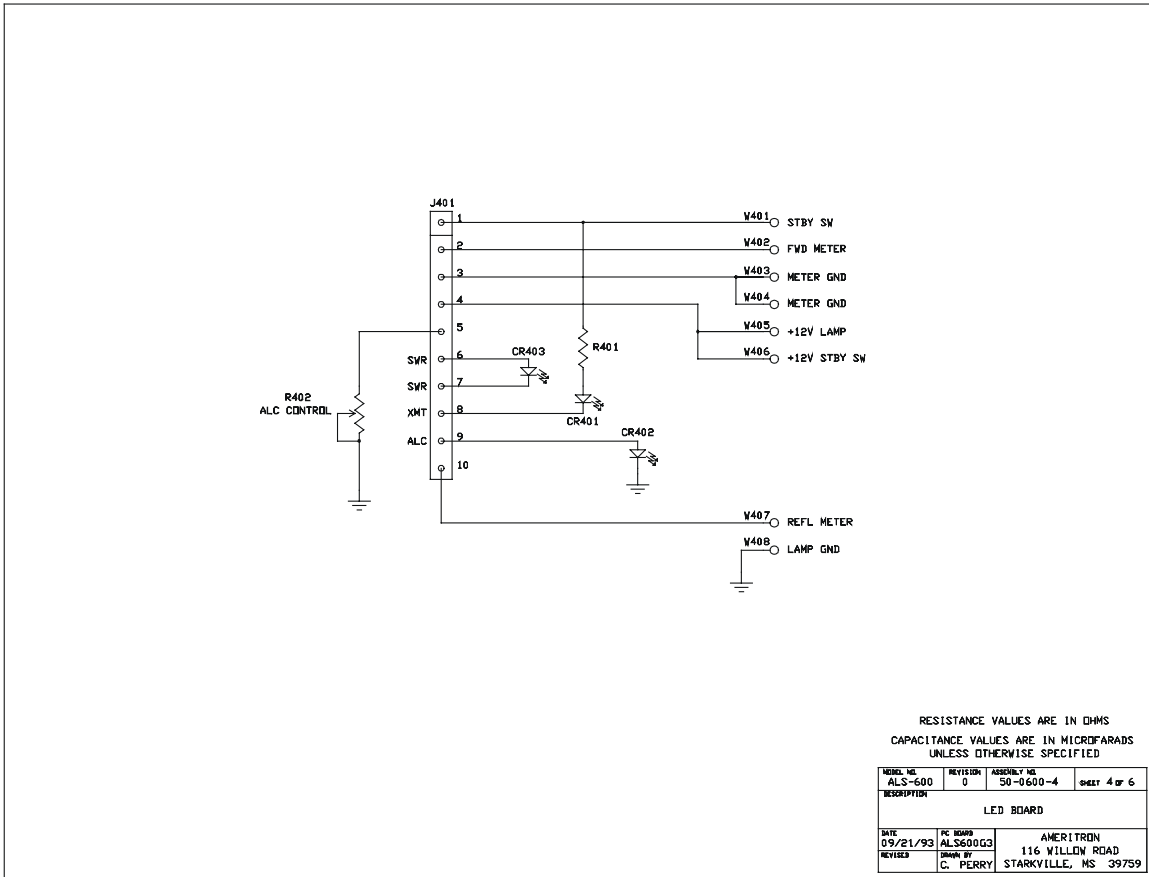
* Critical components.



LED Board

50-0600-4

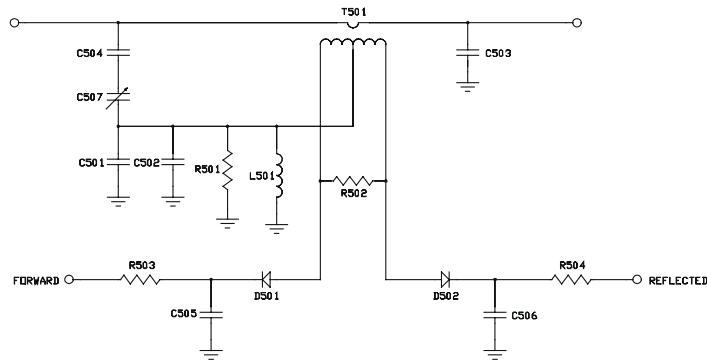
| Designator | Description | Part Number |
|------------|------------------|-------------|
| CR401 | Green LED | 320-0500 |
| CR402 | Yellow LED | 320-0300 |
| CR403 | Red LED | 320-0522-1 |
| J401 | 10 pin header | 612-0110 |
| R401 | 470 ohm 1/4 watt | 100-2470 |
| R402 | 1K potentiometer | 105-1301 |



SWR Detect Board

50-0600-5

| Designator | Description | Part Number |
|------------|----------------------|-------------|
| C501,502 | 150 pF 1KV disc cap | 200-2150 |
| C503 | not used | |
| C504 | 33 pF 1KV Disc | 200-2033 |
| C505,506 | .01 uF 50 Vdc | 200-0416 |
| C507 | 3-12 pF 500V TrimCap | 200-0416 |
| D501,502 | 1N34A or equiv. | 300-0346 |
| R501 | 3.3K 1/4 watt | 100-3330 |
| R502 | 68 ohm 2 watt mox | 103-6800 |
| R503,504 | not used | |
| T501 | Pickup Toroid | 10-14136 |

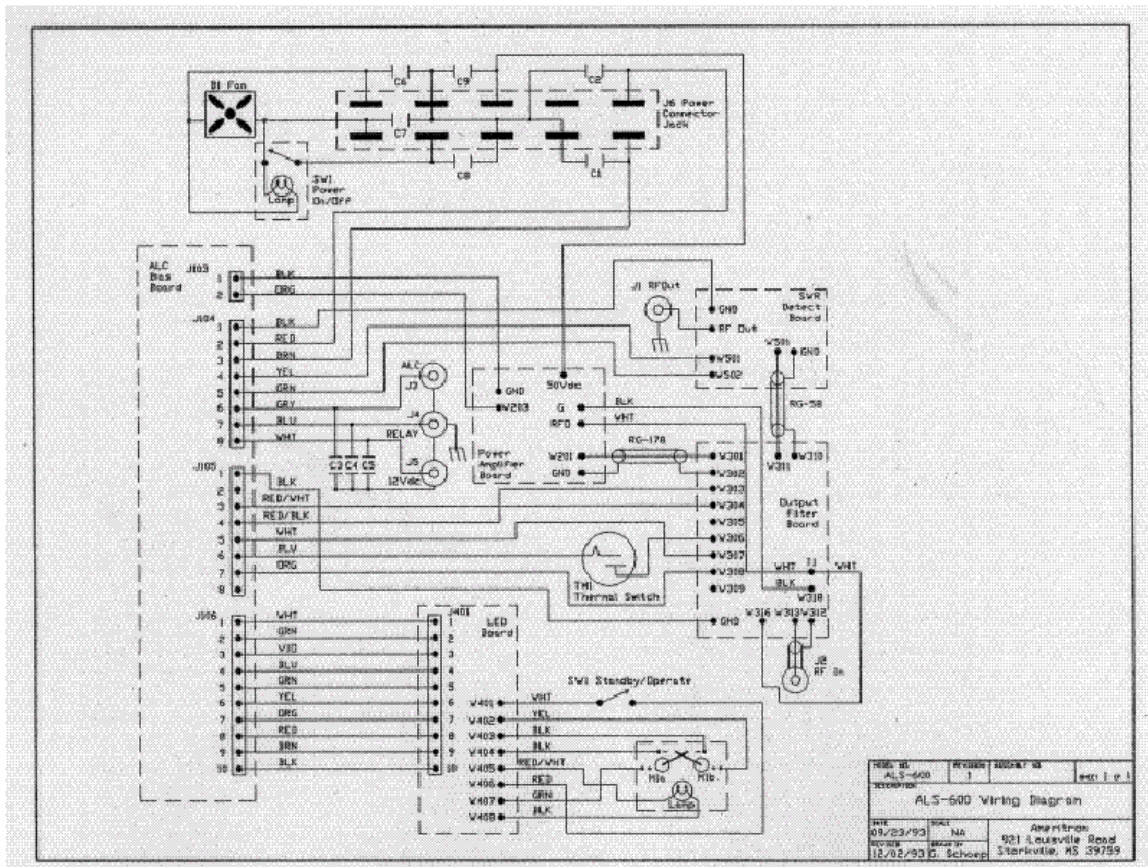


RESISTANCE VALUES ARE IN OHMS
CAPACITANCE VALUES ARE IN MICROFARADS
UNLESS OTHERWISE SPECIFIED

| | | | |
|--------------|----------|----------------------|--------|
| MODEL NO. | REVISION | ASSEMBLY NO. | SHEET |
| ALS-600 | 0 | 50-0600-5 | 5 of 6 |
| DESCRIPTION | | | |
| SWR DETECTOR | | | |
| DATE | PC BOARD | AMERITRON | |
| 09/21/93 | MSWRDC_0 | 116 WILLOW ROAD | |
| DESIGNED BY | DRAWN BY | STARKVILLE, MS 39759 | |
| C. PERRY | | | |

ALS-600 Chassis Components

| Designator | Description | Part Number |
|------------|-------------------------------|-------------|
| B1 | 4.5" fan | 410-3138 |
| for B1 | fan filter screen | 410-4600 |
| C1-C5 | .01 50V disc capacitor | 200-0416 |
| C6-C7 | .01 250Vac capacitor | 200-2122 |
| C8 | .01 KV disc capacitor | 200-2121 |
| J1,J2 | SO-239 jacks | 610-2126 |
| J3-J5 | phonojacks | 600-1225 |
| J6 | Power connector plug | 610-5012 |
| M1a, M1b | 1000W/250W cross needle meter | 400-3588 |
| R1 | 1K Potentiometer | 105-1301 |
| R2 | 470 Ohm 1/4 Watt resistor | 100-2470 |
| SW1,SW2 | rocker switch | 507-1147 |
| TM1 | Thermal overload switch | 510-1170 |

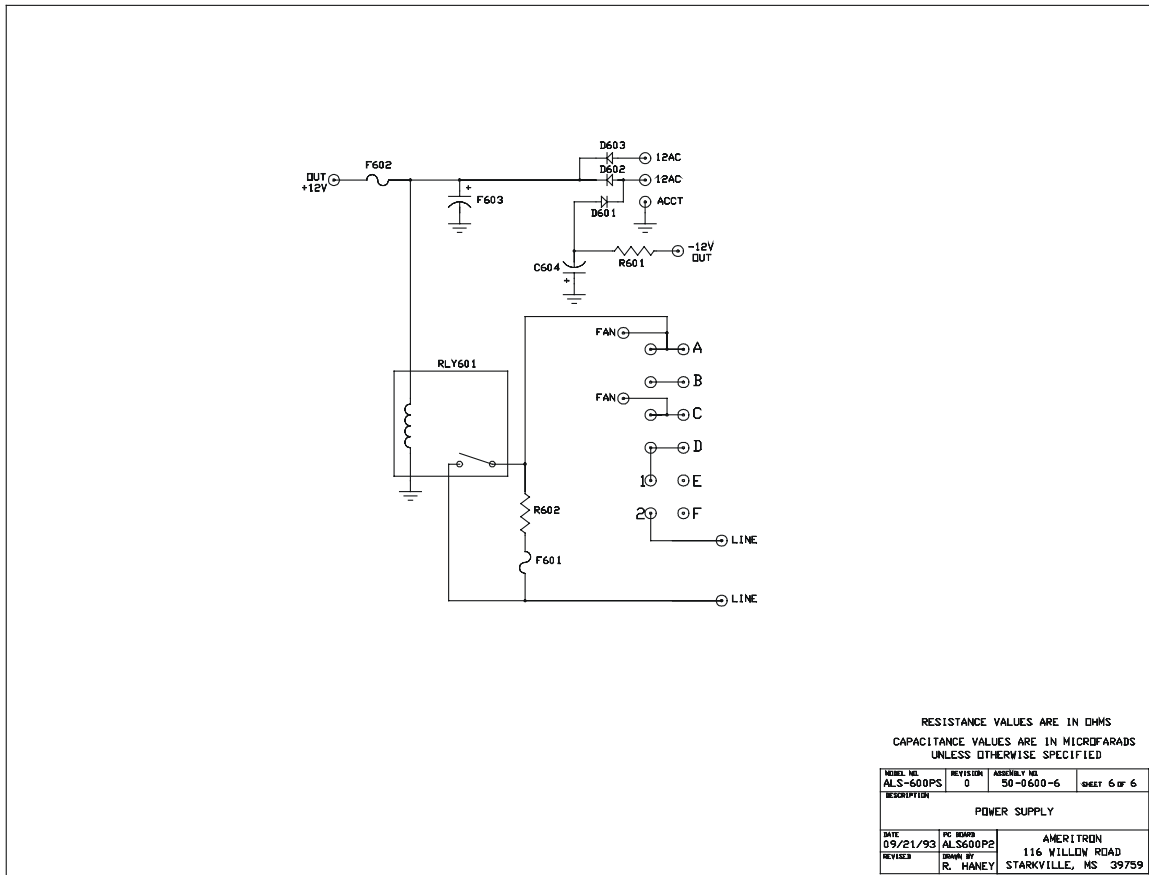


ALS-600PS PARTS LISTS & SCHEMATICS

Power Supply Board

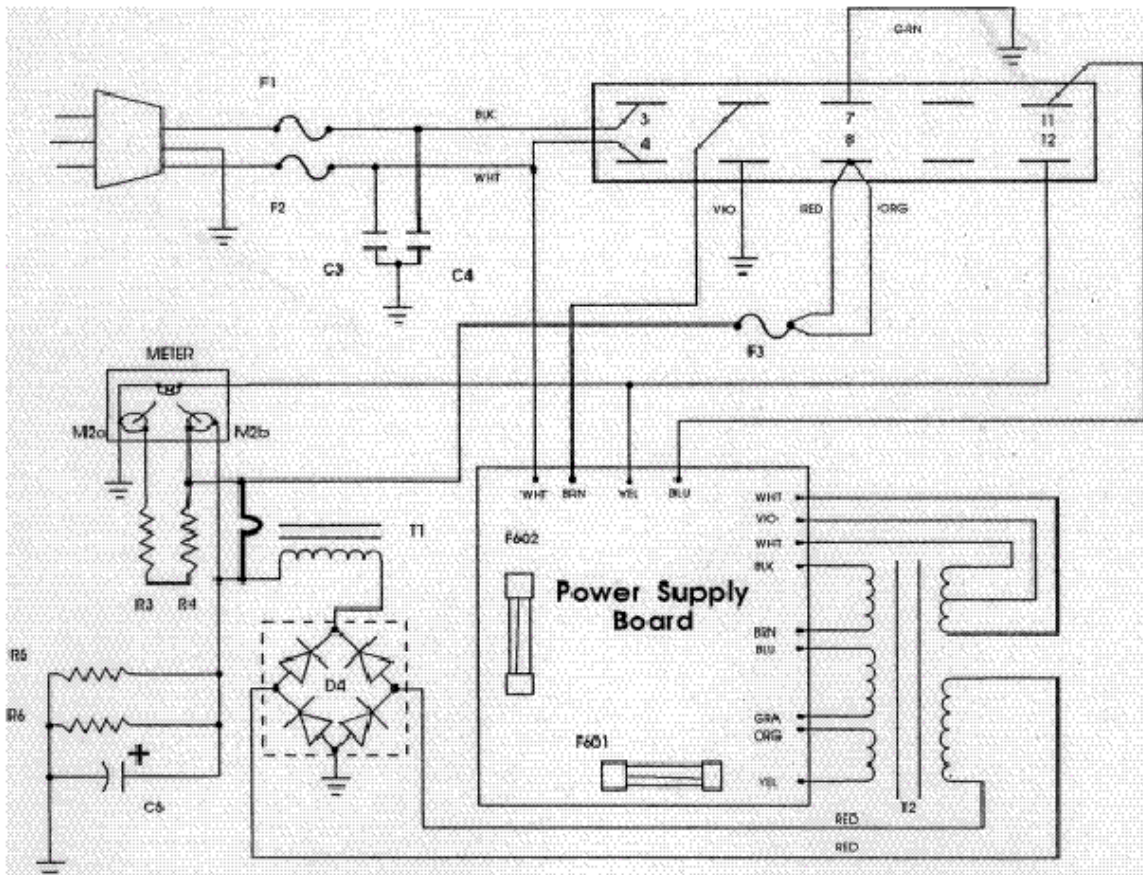
50-0600-6

| Designator | Description | Part Number |
|------------|---------------------------|-------------|
| C603 | 2200 uF 25V radial lead | 203-0207 |
| C604 | 220 uF 25V radial lead | 203-0565 |
| D601-603 | 1N4007 or equiv. | 300-0266 |
| F601 | 2 amp slow blow NIDL type | 755-1102 |
| F602 | 2 amp fast blow | 755-1150 |
| R601 | 10 ohm 1/2 watt | 101-1100 |
| R602 | 10 ohm 10 watt | 103-9702 |
| RLY601 | 12Vdc SPST NO relay | 408-6148 |



ALS-600PS Chassis Components

| Designator | Description | Part Number |
|------------|--|----------------------------------|
| B2 | 3" muffin fan | 410-3583 |
| for B2 | fan guard | 410-4584 |
| C5 | 15000 uF 80 Vdc capacitor & mounting bracket | 203-0680 |
| C3,4 | .01 uF 250 Vac disc capacitor | 200-2122 |
| D1 | 50 amp bridge rectifier | 300-9646 |
| F601 | 2 amp slowblow IvIDL type | 755-1102 |
| F602 | 2 amp AGC | 755-1149 |
| F1,2 | 15 amp fuses for 95-110 Vac, 12 amp fuses for 105-130 Vac or 8 amp fuses for 200-240 Vac operation | 755-1426 755-1412 755-1432 |
| F3 | 25 amp high voltage | 755-1428 |
| for F3-5 | chassis mount fuse holders | 755-2148 |
| M2a, M2b | dual needle 60 volt / 25 ampere scale | 400-3600 |
| P1 | Power supply plug | 610-6012 |
| R3,4 | 150K 1/4 watt resistor | 100-5150 |
| R5,6 | 100 ohm 50 watt resistor | 103-9810 |
| T1 | choke | 406-1646 |
| T2 | power transformer | 406-3002 |



ALS-600SPS WIRING DIAGRAM

