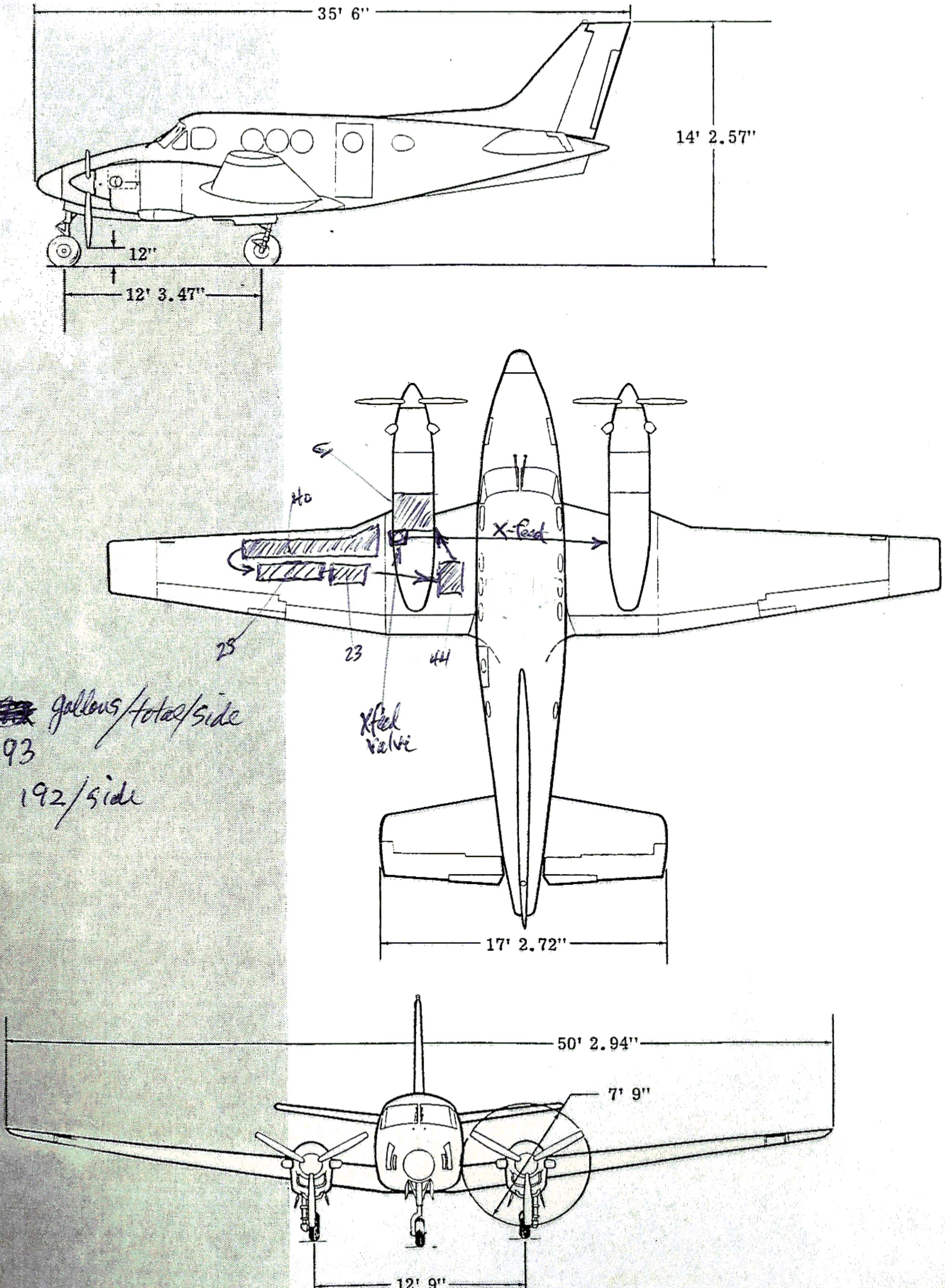
1973 Beech C-90 LJ-591



Cap. ~~[illegible]~~ gallons/total/side
193
usable 192/side

NOTE

As the propeller blades rotate toward feather, the torque load will increase above switch setting and the system will cycle during ground test giving a flashing indication on the Armed lights.

4. Repeat the preceding check with the right engine.

5. Return the autofeather arm switch to the ARM position.

FUEL SYSTEM

The fuel system consists of two separate systems connected by a crossfeed system.

Fuel for each engine is supplied from a nacelle tank and four interconnected wing tanks for a total of 192 gallons of usable fuel for each side with all tanks full. The wing tanks supply the center section tank by gravity flow. The nacelle tank draws its fuel supply from the center section tank. A crossfeed system allows a total of 384 gallons to be supplied to either engine for single engine operation.

Each system has two filler openings, one in the nacelle tank and one in the leading edge tank. To assure that the system is properly filled, service the nacelle tank first, then the wing tanks.

The system is vented through a recessed ram scoop vent, coupled to a heated extended vent, located on the underside of the wing adjacent to the nacelle. The external vent is heated to prevent icing. The ram scoop acts as a backup vent should the heated vent become blocked.

BOOST PUMPS

The boost pumps, crossfeed and firewall valves receive their power from a dual power source. If the master switch is turned OFF, these systems will continue to operate from the battery bus. The boost pump and crossfeed switches must be shut off after each flight to prevent discharging the battery.

FUEL TRANSFER PUMP

Automatic fuel transfer from the wing tanks to the nacelle tanks begins when the TRANSFER PUMP switches are turned on, unless the nacelle tanks are full. A TRANSFER TEST switch (placarded L and R) is provided to check the operation of each pump when its tank is full.

The nacelle tank will continue to fill until the fuel reaches the upper transfer limit and a float switch turns the pump off. As the engine burns fuel from the nacelle tank, fuel from the wing tanks transfers automatically into the nacelle tank each time its level drops approximately ten gallons.

When the 132 gallons are used from the wing tanks, a pressure sensing switch reacts to a pressure drop in the fuel transfer line. After 30 seconds, the transfer pump shuts off and the annunciator panel illuminates, showing a NO FUEL TRANSFER light. The NO FUEL TRANSFER light also functions as an operation indicator for the transfer pump. If the light comes on and the wing tank is not empty, the transfer pump has stopped transferring fuel into the nacelle tank. Extinguishing the NO FUEL TRANSFER light is accomplished by turning the transfer switch OFF.

If the transfer pump fails to operate during flight, gravity feed will take over its work. When the nacelle tank level drops to approximately 3/8 full, the gravity feed port in the nacelle tank opens and gravity flow from the wing tank starts. All wing fuel except 28 gallons from each wing will transfer during gravity feed.

FUEL DRAINS

During each preflight, the fuel sumps on the tanks, pumps and filters should be drained to check for fuel contamination. There are four sump drains and one filter drain in each wing and are located as follows:

NUMBER	DRAINS	LOCATION
1	Leading Edge Tank	Outboard of nacelle underside of wing.
1	Firewall Fuel Filter Drain	Pull ring located on firewall under cowling cover, right side of engine.
1	Boost Pump	Bottom center of nacelle forward of wheel well.
1	Transfer Pump Filter Drain	Just outboard of wing root, fwd of flap.
1	Gravity Feed Line	Inside wheel well.

CROSSFEED

CAUTION

Operation with the fuel pressure light on is limited to 10 hours between engine pump overhaul and replacement. When operating with Aviation Gasoline, operation on suction lift is permitted up to 8,000 feet for a period not to exceed 10 hours. Operation above 8,000 feet requires boost or crossfeed.

The crossfeed system is controlled by a three position switch placarded: OPEN, CLOSED, and AUTO. The valve can be manually opened or closed, but under normal flight conditions it is left in the AUTO position. In this position, fuel pressure switches are connected into the crossfeed control circuit. These switches open the crossfeed valve automatically if boost pump failure causes a drop in line pressure. This allows the remaining boost pump to supply both engines with pressure during emergency operations.

If a boost pump fails after take-off, the crossfeed may be closed and engine operation continued on suction feed for a limited time. This type of operation is limited to 10 hours of operation between any overhaul or replacement period of the engine driven high pressure pump.

FIREWALL SHUT-OFF

The system incorporates two firewall shutoff valves controlled by two switches, one on each side of the fuel system circuit breaker panel on the fuel control panel. These switches, respectively LEFT and RIGHT are placarded FUEL FIREWALL VALVE - OPEN - CLOSED. A red guard over each switch is an aid in preventing accidental operation. Like the boost pumps, the firewall shutoff valves receive electrical power from the main buses and also the essential buses which are connected directly to the battery.

Just forward of the firewall shutoff valve is the main fuel filter. From the main fuel filter, the fuel is routed through the fuel flow indicator transmitter, and then through a fuel heater that utilizes heat from the engine oil to warm the fuel. The fuel is then routed to the fuel control unit.

FUEL GAGING SYSTEMS

FLOAT TYPE SYSTEM

The fuel panel for airplanes equipped with the float type fuel gaging systems utilizes four fuel quantity indicators; two for wing tank fuel and two for nacelle tank fuel. These indicators can be read in gallons or pounds.

CAPACITANCE TYPE SYSTEM

On airplanes with capacitance fuel gaging systems, the fuel panel utilizes only two fuel quantity indicators, one for each side. A toggle switch, located between the two fuel quantity indicators, can be placed in the TOTAL position to provide an indication of all fuel in the system, or in the NACELLE position to show fuel quantity in the nacelle tanks only. These indicators read in pounds of fuel.

ELECTRICAL SYSTEM

The King Air C90 is equipped with a 24 volt, 45 ampere-hour nickel-cadmium battery, located in the right wing center section, which provides current for starting and essential loads. The battery is directly connected to the battery emergency bus which supplies power for essential loads such as boost pumps and firewall shutoff valves. Essential loads are also provided with a power source from the No. 1 and No. 2 subpanel feeder buses. Diodes, which are solid state electronic devices that permit current flow in one direction only, on each side of the essential components, prevent a failure of one of the circuits from disabling the other. Further protection of the battery emergency bus is provided by a panel of fuses in the underside of the right wing center section just forward of the battery.

A battery relay, controlled by a cockpit switch, connects the battery to the battery bus. Isolation diodes permit the battery relay to be energized by external power or generators in the event the battery charge is insufficient to activate the relay. A normal system potential of 28.25 volts maintains the battery at full charge. An overvoltage relay opens the field circuit at 32 to 34 volts to provide overvoltage protection.

During engine starts, the battery bus is connected directly to the starter/generator by the starter relay. The starter/generator drives the compressor section of the engine through accessory gearing. The starter/generator initially draws approximately 700 amperes and then drops rapidly to about 300 amperes as the engine reaches 20% gas generator speed.

When operated as generators, the two starter/generators provide a capability of 250 amperes each at 28.25 volts. The generators are paralleled by utilizing the voltage developed between the "D" terminal of the generator and ground. This terminal of each generator is connected from its respective voltage regulator to that of the opposite generator through the intervening voltage regulators. The paralleling circuit also includes the overvoltage relays and a paralleling relay. The field power of the generator carrying the higher current is reduced while that of the generator carrying the lower current is increased until the load on each is equal. When one generator is on the line and the other is off the line at the same voltage, the voltage of the former is depressed and that of the latter is increased through the paralleling circuit until both generators are on the line. Should an overvoltage condition occur, the paralleling circuit acts through the overvoltage relays to lower the trip voltage on the overvoltage generator to take the overvoltage unit off the line, leaving the other generator to supply the entire load.

Each generator is connected to its respective bus (see Electrical System Schematic) through reverse current diodes. Both sides of the system are tied together through 325 ampere current limiters at the isolation limiter bus. The right subpanel feeder bus and the left subpanel feeder bus are tied together with diodes to protect the circuits in case either of the current limiters (fuses) blows. No provisions are made for replacing the limiters in flight, but the system is designed so that the loads can be supplied from the opposite buses. The condition of the current limiters can be checked by reducing the electrical load to single generator capacity, turning off the left generator and depressing the loadmeter test button for the left engine. If a loadmeter reading is observed, the current limiter is still good. If no reading is observed, the limiter is bad. The check is the same for the right-hand current limiter using the opposite control switches.

FUEL SYSTEM SCHEMATIC