THAI**PAPERWORK**

DIFFICULTY LEVEL

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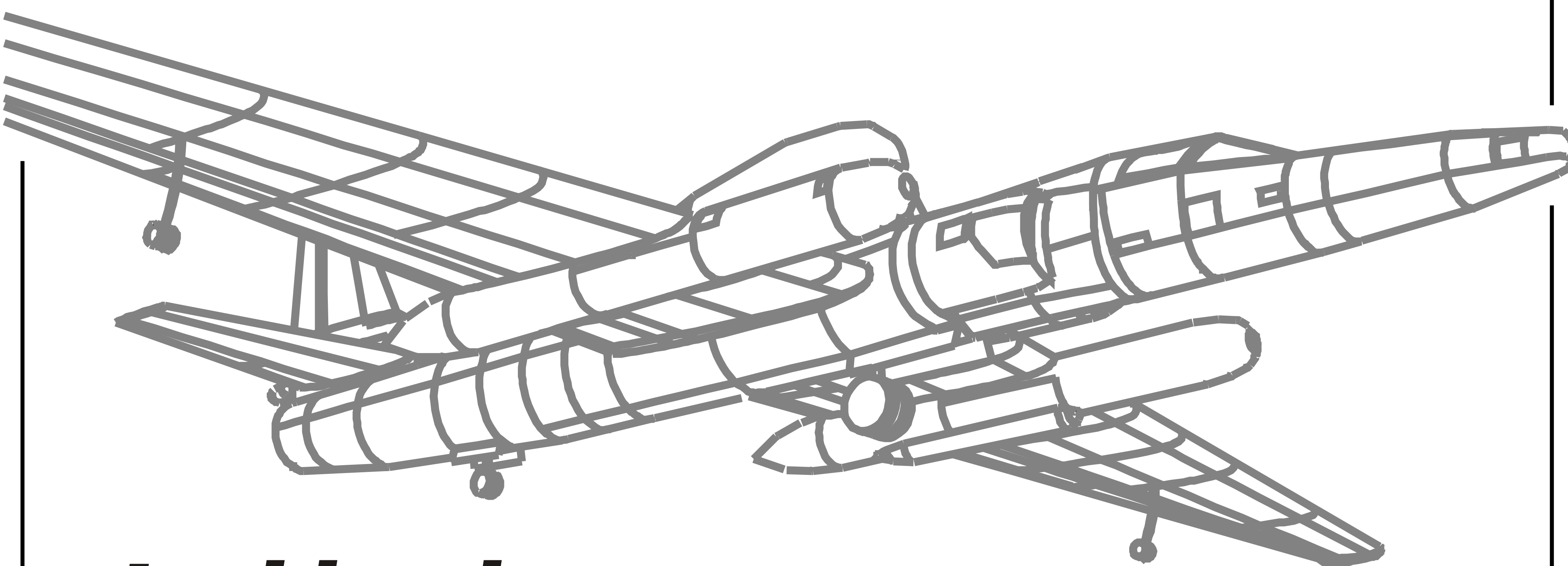
MODERNS SERIES **7**



Lockheed
U-2R "Senior Span"

Lockheed U-2R "Senior Span"

The U-2 provides continuous day or night, high-altitude, all-weather, stand-off surveillance of an area in direct support of U.S. and allied ground and air forces. It provides critical intelligence to decision makers through all phases of conflict, including peacetime indications and warnings, crises, low-intensity conflict and large-scale hostilities. When requested, the U-2 also has provided photographs to the Federal Emergency Management Agency in support of disaster relief.

The U-2 is a single-seat, single-engine, high-altitude, reconnaissance aircraft. Long, wide, straight wings give the U-2 glider-like characteristics. It can carry a variety of sensors and cameras, is an extremely reliable reconnaissance aircraft, and enjoys a high mission completion rate. However, the aircraft can be a difficult aircraft to fly due to its unusual landing characteristics. Because of its high altitude mission, the pilot must wear a full pressure suit.

Early Operations

The product of a remarkable collaboration between the Central Intelligence Agency, the United States Air Force, Lockheed Corporation, and other suppliers, the U-2 collected intelligence that revolutionized American intelligence analysis of the Soviet threat. The Lockheed Skunkworks CL-282 aircraft was approved for production by the CIA, under the code-name AQUATONE, with Richard M. Bissell as the CIA program manager. President Dwight D. Eisenhower authorized Operation OVERFLIGHT -- covert reconnaissance missions over the Soviet Union -- after the Soviets flatly rejected his Open Skies plan, which would have allowed aircraft from both countries to openly overfly each other's territory.

An unusual single-engine aircraft with sailplane-like wings, it was the product of a team headed by Clarence L. "Kelly" Johnson at Lockheed's "Skunk Works" in Burbank, CA. The U-2 made its first flight in August 1955, with famed Lockheed test pilot Tony LeVier, at the controls, and began operational service in 1956.

Members of a unit innocuously designated 2nd Weather Reconnaissance Squadron (Provisional), began to arrive at Adana Air Base in Turkey in August 1956. The extremely sensitive nature of the mission dictated the construction of a secure compound within the base, which did not yet have a perimeter fence. Detachment 10-10 under the Turkey Cover Plan arrive to support a new operation, Project TL-10. The Air Force provided the squadron commander and logistical support, while the Central Intelligence Agency provided the operations officer, pilots, and mission planners. The unit's mission, contrary to its name, had nothing to do with weather. It flew U-2 aircraft at extremely high altitudes to gather photographic imagery and electronic signals for intelligence purposes. The main target of these flights was the Soviet Union.

The American intelligence community would come to rely on this information to assess Soviet technological advances. However, the Soviet Union was not the sole objective of the operation. For instance, in September 1956, Francis Gary Powers flew over the eastern Mediterranean to determine the position of British and French warships poised to assist Israel's invasion of Egypt after Egyptian forces seized the Suez Canal. Other flights followed to gather data on military activity during crises involving Syria, Iraq, Saudi Arabia, Lebanon, and Yemen.

By late 1957, Adana AB (renamed Incirlik AB on 28 February 1958) had become the main U-2 operating location, having absorbed the resources of a unit in Germany. One of the tasks the unit performed involved flying over missile sites in the Soviet Union from forward operating locations at Lahore and Peshawar in Pakistan. For every mission that penetrated Soviet airspace, there was at least one surveillance flight along the border to divert Soviet air defense attention from the intruder. These diversionary flights typically departed Adana AB traveling over Van (in eastern Turkey), Iran, and the southern Caspian Sea to the Pakistan-Afghanistan border; they returned along a similar route. These periphery missions usually collected communications and electronic signals instead of photographic imagery.

The U-2 operation continued at the base for several years in the utmost secrecy, until 1 May 1960. On that morning Gary Powers, then a veteran of 27 missions, took off from Peshawar destined for Вшdo, Norway. He was to overfly and photograph two major intercontinental ballistic missile test sites in the Soviet Union en route, one at Sverdlovsk, the other at Plesetsk. Heavy antiaircraft missile concentrations guarded both sites. Powers took off on time, as did the diversionary flight from Incirlik, and the mission continued as planned until he reached Sverdlovsk. While on the photo run at 67,000 feet, the Soviets launched a volley of 14 SA-2 surface-to-air missiles at Powers' aircraft. Although the SA-2s could not achieve the same altitude as the U-2, the aircraft disintegrated in the shock waves caused by the exploding missiles. Soviet authorities subsequently arrested Powers after he successfully ejected from the plane, and held him on espionage charges for nearly 2 years. The Turkish, Pakistani, and Norwegian governments claimed to have no knowledge of the American U-2 overflights, and shortly afterwards all U-2s and support personnel quietly returned to the United States.

On October 15, 1962, Maj. Richard S. Heyser piloted a U-2 over Cuba to obtain the first photos of Soviet offensive missile sites. Major Rudolph Anderson, Jr. was killed on a similar mission on October 27, 1962, when his U-2 was shot down.

Variants

Current models are derived from the original version that made its first flight in August 1955. On Oct. 14, 1962, it was the U-2 that photographed the Soviet military installing offensive missiles in Cuba.

The U-2R, first flown in 1967, is 40 percent larger than the original U-2 designed by Kelly Johnson in the mid fifties. Current U-2R models are being reengined and will be designated as a U-2S/ST. The Air Force accepted the first U-2S in October, 1994. The last R model trainer will be converted to an S model trainer in 1999.

A tactical reconnaissance version, the TR-1A, first flew in August 1981 and was delivered to the Air Force the next month. Designed for stand-off tactical reconnaissance in Europe, the TR-1 was structurally identical to the U-2R. Operational TR-1A's were used by the 17th Reconnaissance Wing, Royal Air Force Station Alconbury, England, starting in February 1983. The last U-2 and TR-1 aircraft were delivered to the Air Force in October 1989. In 1992 all TR-1s and U-2s were redesignated U-2R.

U-2s are based at Beale Air Force Base, Calif. and support national and tactical requirements from four operational detachments located throughout the world. U-2R/U-2S crew members are trained at Beale using three U-2ST aircraft.

Sensors

The U-2's modular payload design allows the aircraft to be reconfigured to perform various missions which include; mapping studies, atmospheric sampling, and collection of crop and land management photographic data for the Department of Energy. The U-2 is capable of collecting multi-sensor photo, electro-optic, infrared and radar imagery, as well as performing other types of reconnaissance functions. An Air Force initiative following Desert Storm demonstrated the ability to locate relocatable targets from the U-2 all weather reconnaissance platform and transfer the data to a precision weapon platform within minutes enabling accurate targeting among multiple items.

The HR-329 (H-cam) uses a high resolution, gyro- stabilized framing system with a 66-inch focal length and folded optical path. Traditionally, the H-cam operates at an angle to provide greater coverage. During Desert Storm, planners experimented with the camera aimed straight down. The detail and clarity impressed planners and amazed theater commanders. Commanders were disappointed, however. that the system could not cover a greater range and still maintain the same detail and clarity. Although the H-cam imagery is especially useful for targeting, battle damage and order-of-battle assessment, targets must be preselected and the technicians must process the film after the aircraft lands.6.

The Intelligence Reconnaissance Imagery System III (IRIS-III) is an optical imagery system that uses a high resolution, panoramic camera with a 24-inch focal length. Employing a folded optical path system mounted on a rotating optical bar assembly, the IRIS-III laterally scans through 140 degrees of the total viewing area. This camera covers a 32-nautical-mile swath on both sides of the aircraft. The IRIS-III provides wider "synoptic" coverage than the H-cam, but it does not have the resolution or NIIRS quality.

Other sensors include:

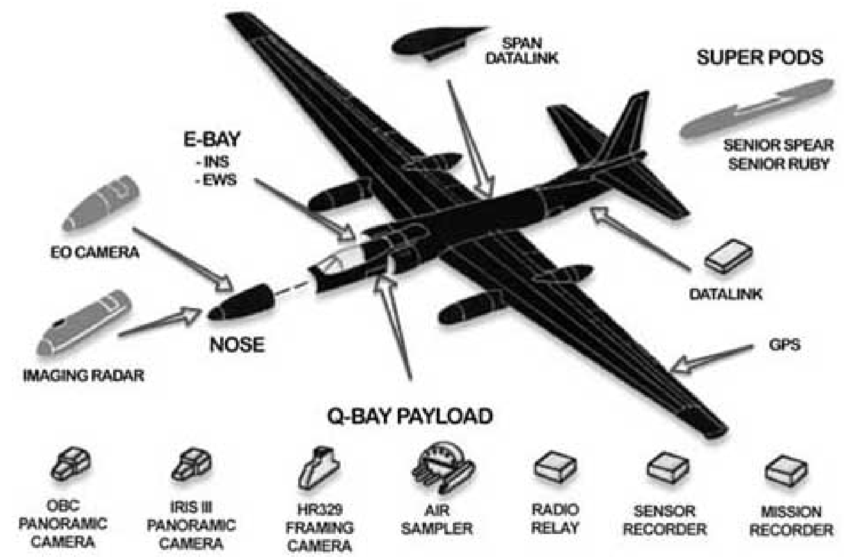
- *SENIOR YEAR Electro-optical Reconnaissance Systems (SYERS) with SENIOR BLADE Advanced Synthetic Aperture Radar System (ASARS) with Tactical Radar Correlator (TRAC)*
- *SENIOR GLASS*
- *SENIOR RUBY*
- *SENIOR SPEAR*

Upgrades

The Air Force plans to keep the U-2 in service through the year 2020. The U-2A was initially currently powered by the 11,200-lb (5,080-kg) static thrust J57-P-37A engine, which was soon replaced by the U-2B's Pratt and Whitney J-75-13B engine, the engine that powered the F-105. The J-75, due to its age, was becoming increasingly difficult and expensive to maintain and operate. Additionally, increased sensor weight and the J-75's high fuel consumption made it difficult to meet 24-hour coverage requirments in wartime taskings. The aircraft has been upgraded with a lighter, more powerful and more fuel-efficient engine (the General Electric F-118-101). The entire fleet was reengined by 1998. The new engine is cheaper to maintain making the U-2 a more cost effective and responsive reconnaissance platform.

Under Secretary of Defense for Acquisition Druyun has directed that a new Defensive System for the U-2 by acquired using the new "Lighting Bolt" acquisition reform

U-2 MODULAR PAYLOAD ARRANGEMENT



initiatives. The Acquisition decision Memorandum (ADM) directed that an ORD be ready for CSAF signature by 31 Dec 95, however, this was unrealistic. AFMC/CC has been designated as the Defense Acquisition Executive. The ADM also directed a preferred systems concept (PSC) be determined. DRF has requested ASC/RA to conduct a study to determine a PSC. The program consists of a reprogramable Radar Warning Receiver and Jammer capable of detecting and defeating modern threats, cockpit modifications to improve pilot situational awareness, and airframe Infra-Red (I/R) signature reduction. These modifications will greatly increase U-2 survivability, reduce dependence on HVAA and SEAD protection, and greatly increase a CINC's flexibility in employing the U-2.

As of 1996 the "special" [aka SIGINT] sensors had not been upgraded since 1991 and were in several different configurations. The multi-sensor role of the aircraft was limited because the Advanced Synthetic Aperture Radar System (ASARS) and Senior Year Electro-optical Reconnaissance Systems (SYERS) sensors could not operate simultaneously. And because of older technologies and implementations, geolocation for precision strike targeting was insufficient for required operations.

Thus in 1996 the House Intelligence Committee directed a budget increase of $57 million for critical U-2 sensor upgrades. Of this amount, $10 million was for improving and downsizing the SYERS sensor such that SYERS and ASARS can be flown simultaneously, and to improve geolocational accuracies by adding a Global Positioning System that will superimpose geo-coordinates directly on collected images. The Committee directed *that up to $7 million be used for the ASARS Improvement Program (AIP) to ensure this upgrade can be fielded by fiscal year 1998. The remainder of the funding was applied to SENIOR RUBY, SENIOR SPEAR, and SENIOR GLASS commonality upgrades. The Committee directed the Air Force to upgrade the SPEAR/RUBY sensors to the GLASS configuration, and upgrade the SENIOR GLASS systems to an open architecture configuration consistent with an architectural approach approved by the Defense Cryptologic Program manager.*

The SENIOR YEAR Defensive System upgrades the U-2 aircraft to survive against current and expected threats and effectively meet growing intelligence requirements of the National Command Authority and warfighting CINCs. The initiative improves threat warning, RF countermeasures, and situation awareness capabilities. Provides group A wiring for all PAI U-2s plus 20 defensive systems with spares. Additionally all aircraft will receive I/R signature reduction and cockpit modifications. Growth provisions for IR warning and countermeasures are currently planned. Upgrades the 'BANDAID' defensive capability procured for the U-2 as a result of DESERT STORM operations. The U-2 operates in hostile territory within the engagement envelope of long range SAM and airborne interceptor threats. Currently the platform relies on limited on-board situational awareness, political factors, and the inherent protection of high altitude as its only means of defense. The changing technological and international political environments require the pilot to have greater situational awareness and a modern defensive system to continue to operate and survive. Without survivability upgrades, the U-2 must rely on limited CAP and SEAD air assets for protection or maintain stand-off orbits which significantly reduce its ability to collect intelligence information on critical targets. This initiative is migratable to the Tier 2+ Global Hawk UAV. In a response to Joint Staff request for command input on use of U-2 as a penetrator, all CINCs queried stated they intend to employ the U-2 as a penetrating reconnaissance aircraft in future conflicts and unanimously support the fielding of an advanced defensive system capability for the U-2

The Power Distribution Backbone initiative installs a power distribution backbone which makes the increased electrical capacity available to the sensor payload. The U-2 reengining effort provided increased electrical capacity from 22 KVA to 36 KVA. The power distribution was initially part of the 'SENIOR SMART' program which was canceled in 1995. Advanced sensors currently in development require increased power to provide on-board processing and utilize additional capabilities. Failure to upgrade the power distribution will result in inability to conduct some simultaneous sensor operations and to fully utilize sensor capability. A related issue is rewiring and electro-magnetic interference improvements (U2007) to reduce the platform electrical emissions 'noise' floor and permit advanced sensors to receive and process intelligence signals to their full capability. Further savings can be realized by doing mod during PDM together with rewire and JPTS/JP-8 mods.

Rewire and Electro-Magnetic Interference Reduction efforts are intended to remove legacy wiring and cabling throughout the aircraft and replaces it with shielded, grounded, low emission copper and fiber optic wiring. Will take advantage of modern wiring technology to reduce weight and inherent electro-magnetic interference with on board systems. Block upgrade includes single piece windscreen and windscreen de-icer mod. As the U-2 avionics and sensor suites evolved, wiring was added to existing cables and harnesses until it became too expensive to identify and remove old wiring before new wiring was added. As a result, platform integrators have run out of space and weight to introduce wiring for new components. In addition, many of the old systems were grounded to the airframe. This initiative is required to lower the platform electrical emissions 'noise' floor and permit advanced sensors to receive and process new and developing high interest intelligence signals to the necessary degree. Windscreen changes greatly improve pilot visibility and maintenance access to the cockpit, reduce weight, and conserve power.

Conversion from JPTS to JP-8+100 converts aircraft fuel seals and adds fuel warmers and circulators to current fuel system to allow use of high-test JP-8 fuel rather than thermally stable fuel (JPTS) currently used. This initiative reduces fuel cost to nearly 1/2 of what is currently paid for JPTS. Reduces some special fuel storage and handling requirements at operating locations. Retrofitted aircraft are backwards compatible with JPTS. Further savings can be realized by doing mod during PDM together with rewire and power distribution mods.

The Full Motion Simulator provides a full motion simulator to allow realistic training in flight conditions that are impractical or hazardous to practice. Loss of 15% of the U-2 fleet in the last 5 years signaled the need for safety improvements to compensate for a less experienced pilot force. Many flight conditions in the U-2 such as high cross wind landings or heavy weight flame-out landings cannot be safely practiced in actual flight. The Air Force is awaiting for fidelity studies to determine whether simulation of the U-2's low level handling characteristics can be accurately portrayed.

The Angle of Attack Indicator (AOA), the 9th Reconnaissance Wing's first priority safety need, is a cockpit indicator which provides the pilot with a visual and audio warning of approach-to-stall. Because the U-2 operates very close to stall during most phases of flight, this tool will greatly increase pilot warning of an approaching stall. Lack of stall warning was indicated as a possible contributing factor to two of the last four U-2 mishaps. The AOA alerts the pilot to approach-to-stall during landings, takeoffs, and operations stages of flight. The U-2 has been termed by CSAF as the "most challenging of Air Force aircraft." It operates within 5 knots of stall speed through most phases of flight. It also performs unique maneuvers, such as low altitude angle of attack changes to release "auxiliary gear" (wing 'pogos'). Preferred contractor has agreed to provide prototype hardware for testing, however the Senior Year program does not have sufficient funds to conduct test flights or acquisition.

U-2 Oil Quantity Gauge provides a gauge within the cockpit to maintain pilot awareness of engine oil quantity remaining. Several instances have occurred where U-2s were found during post-flight inspections to be extremely low on oil. The U-2 System Safety Group reviewed the incidents and recommended installation of an oil quantity gauge. Little to no non-recurring engineering is required since the prototype U-2S aircraft was designed with an oil quantity gauge, but it was not included in the production program. The oil quantity guage is third priority on the 9th Reconnaissance Wing's list of safety issues.

The U-2 Crash Survivable Cockpit Data Recorder records aircraft systems data during flight to assist in mishap assessment after a crash. Other than four two-seat trainer aircraft, the U-2 is a single seat platform which often operates far from normal flight routes. The aircraft systems are extremely complex due to a wide array of sensor systems which interact with each other as well as some platform systems. The data recorder will be invaluable in identifying contributing causes after platform mishaps. The recorder is fourth on the 9th Reconnaissance Wing's Safety Priorities list.

U2 Life Support purchases initial issue and spare S-1034 space suit helmets, coveralls, gas retainer liners, and gloves, for U-2 high altitude operations to replace the no longer supportable S-1031 space suit. Also supports on-board life support and survival kits. Includes an SR-71 type oxygen line to the space suit which will greatly improve pilot comfort and safety. The space suit is necessary for high altitude operations which

Provide the U-2 both it's mission capability as well as its primary defense against hostile forces. The special survival kits are necessary for the high altitude environment and compensate for the space suited pilot's lack of mobility. A survival kit replacement is needed due to age and wear. The original kits were fabricated in 1967/1968 for the U-2R with additional kits fabricated in 1980/1981 for the TR-1. Money was saved over the years by using a four year overhaul interval instead of replacing kits. The basic components are quickly approaching the end of their serviceable life.) A recent Beale ORI levied a finding that U-2 pilots were being provided suits that did not provide chemical protection. According to the inspection report, this violated WMP, Annex S, Appendix 10, and could "result in loss of life/U-2 asset in wartime or degraded mission effectiveness."

The System Integration Laboratory (SIL) provides a ground electronic test bed of U-2 airframe and sensor systems to enable more thorough integration testing prior to flight testing. The U-2 has experienced significant flight test schedule overruns of one to 24 months for new and upgraded sensor and ground station integration, airframe improvement, discrepancy and mishap follow-ups, and ancillary equipment integration. The SIL could reduce flight testing by 20 to 30 percent. It would provide more visibility of software and hardware anomalies in systems and interfaces developed by more than 20 different providers. These anomalies might otherwise be hard to detect and/or isolate in an independent developer's test facility prior to flight testing. Even during flight testing the ability to monitor, adjust, and restart test routines is limited. Additionally, flight tests are limited by aircraft availability, flight/weather restraints, and conflicting test requirements.

Airborne Information Transmission System (ABIT) is the next generation of the Common Data Link, providing an extended wide band data link relay to move imagery and other intelligence information from collection platforms to ground stations and/or other airborne platforms anywhere in theater. It provides secure, selectable bandwidth, two way air-to-air-to-surface link with lop probability of detection/low probability of intercept. ABIT offers beyond line of sight range and improved timeliness for real time operations without further taxing already heavily used orbital communications systems. The U-2 is to be used as a test bed for the critical component miniaturization phase of the demonstration for later migration to UAVs.

U-2 UHF SATCOM would provide the U-2 with secure worldwide communications capability. It would also provide for U-2 participation in the Demand Assigned Multiple Access and Future Air Navigation System programs. The U-2S mission profile requires single pilot, single aircraft trans-oceanic flight, and operations far from normal flight routes. Neither current nor proposed UHF radios meet the size, weight, power, and performance requirements necessary to allow the U-2 to in the changing civil and military communications architectures. However, follow-on programs to the UHF DAMA SATCOM Airborne Integration Terminal appear to meet the required parameters. The U-2 previously received funding for beyond line of sight communications and is currently procuring the ARC 217 HF radio. The incumbent HF does not provide worldwide coverage, and UHF trans-oceanic air traffic control networks are not available until after 2000.

Pilot Life Support

The full pressure suit truly stands between life and death for the U-2 aviator. It is the "life vest" of the skies. The U-2 can be a difficult aircraft to fly, and the suit adds one more system that can be a distracter. With decreased visual field of view due to the helmet and aircraft design, landing requires a second U-2 pilot (the mobile officer) to help bring the mission pilot down. Crew coordination [i.e., Crew Resource Management (CRM)] is critical to a successful landing after dealing with the hazards discussed earlier and other mission hazards. A breakdown in teamwork significantly compromises flight safety and can have catastrophic results.

To ensure absolute safety, every screw, bolt, nut, seam, thread, and system gets inspected each time before the aircraft flies. High altitude physiological and life support training associated with the U-2 space suit are vital to protecting the pilot. Every time a Dragon Lady takes off, the life-sustaining physiological equipment enables the pilot to successfully accomplish the mission and come home safely.

As a physical environment, space begins around 125 miles above the earth; but as a physiological environment, it begins at 50,000 feet - the space equivalent zone. Flying in this zone requires the protection of a full pressure suit to protect from the high altitude hazards of hypoxia, decompression sickness, Armstrong's Line, and extreme cold. It is these threats - where regular life support equipment is unable to sustain life - that add a new element to pilot safety. The physiological support equipment the pilot wears creates an environment that minimizes the impact (both physically and physiologically) of flying at extreme altitudes.

While in flight, the pilot's "cocoon" provides 100% oxygen at all times - even during an ejection. The pressure suit prevents hypoxia that would be present at the normal U-2 cabin altitude of 29,500 feet. Hypoxia is caused by a lack of oxygen reaching the bodily tissues. The symptoms of hypoxia include blurred or tunnel vision, dizziness, slow reaction time, as well as poor muscle coordination. Without a full pressure suit to provide supplemental oxygen, the pilot has 30 to 60 seconds before becoming incapacitated.

In addition to preventing hypoxia, the 100% oxygen provided to the pilot at least 1 hour before takeoff as well as during flight decreases the high probability of getting decompression sickness by eliminating most of the nitrogen from the aviator's body. Decompression sickness - or the "bends" - occurs when bubbles of nitrogen develop in a person's blood and tissues. This happens after a rapid reduction in surrounding pressure, is exhibited by pain in the joints, and has the potential of being fatal.

The next threat that the space suit protects pilots from is Armstrong's Line. Water boils at a higher temperature at sea level than it does in the Colorado Rockies, and at 63,000 feet in the sky, water boils at 98.6 degrees Fahrenheit - body temperature. In fact, at FL 630, atmospheric pressure equals the water pressure in hte human. As a result, without a pressure suit to protect the pilot in the event of cabin pressurization loss, the water in the aviator's body would escape as a gas thereby causing damage to tissues and blocking blood flow. In this scenario, the air trapped inside the pressure suit protects the pilot from decompression. Therefore, as the cabin altitude goes from FL 295 to FL 700+, the pressure inside the suit increases to maintain a physiological altitude of 35,000 feet - much better than FL 700.

The last high altitude hazard that the space suit protects against is extreme cold. At operational altitudes, the air temperature is 70 degrees below zero. The suit prevents hypothermia, frostbite, and keeps eyeballs from freezing in the event the pilot ejects or loses cabin heat.

Despite all this protection, flying at extreme altitudes still takes a toll physiologically. Heat build-up in the suit due to physical activity - especially during taxi, pattern work, and landing - can be rapid and incapacitating. Discomfort, profuse sweating, *fatigue, dizziness, and decreased situational awareness make flying the U-2 even more "interesting." Dehydration is a constant threat due to breathing dry aviator's oxygen for extended periods of time and the sweating associated with wearing a sealed rubber suit. Since going 9+ hours without drinking also compounds physiological problems, fluid intake is vital. All normal physiological maintenance activities - eating, drinking, urination - are complicated in the suit and can increase the stress and fatigue already associated with flying.*

Operating Locations

Air Force U-2s have been used for various missions, with primary operations originating out of Air Force Plant 42 in Palmdale, CA, Beale Air Force Base, CA, and Alconbury, UK. Beale AFB serves as the U-2's Home station. Besides a full compliment of flightline support, Beale AFB provides full backshop support functions as well as the capability to access depot facilities. Training and operational missions are flown from Beale AFB. It normally supports 12-16 aircraft on-station. All ACC special purpose U-2 aircraft deploy all over the world. These bases have flightline support capabilities, but are limited in back-shop support.

ACTIVE LOCATIONS

Air Force Plant 42 - Palmdale, CA,
Beale Air Force Base, CA
Osan Air Base, South Korea
RAF Alconbury, UK
RAF Akrotiri Air Base, Cyprus
INACTIVE LOCATIONS
Area 51, Groom Lake, NV
Taif Air Base, Saudi Arabia

Specifications

Manufacturer	LockheedMartin (USA)
Name	U-2R
Wing Span	102.99 ft. / 31.39 M
Length	62.76 ft. / 19.13 M
Height	16.01 ft. / 4.88 M
Wing Area	999.97 Sq ft. / 92.90 Sq M
Aspect Ratio	0
Weight Empty	9,601 lb. / 4,355 Kg
Weight Takeoff	0 lb. / 0 Kg
Powerplant(s)	1 x Pratt & Whitney J75-P-13B turbojet
Max Thrust	17,000 lb. / 0 Kg
Military Thrust	0 lb. / 0 Kg
Internal Fuel	0 lb. / 0 Kg
Fuel Fraction	0
Max. Thrust Loading	0
Wing Loading	0 lb. / 0 Kg
VMax High Altitude / VMax Low Altitude	373 kts /
Operational Ceiling	70,000 ft. / 0 M
Rate of Climb	0 ft. / 0 M

LOCKHEED U-2R "Senior Span"

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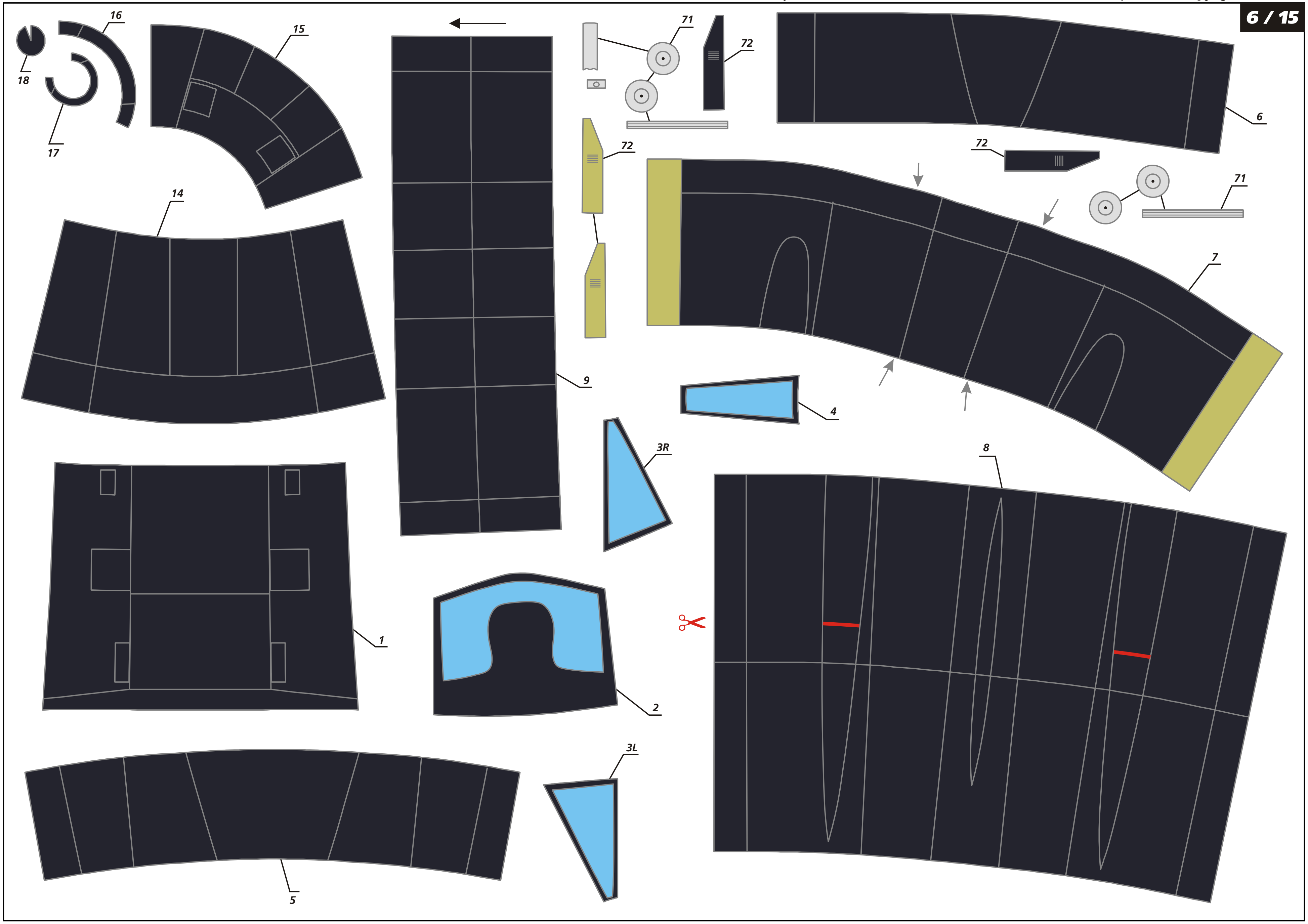

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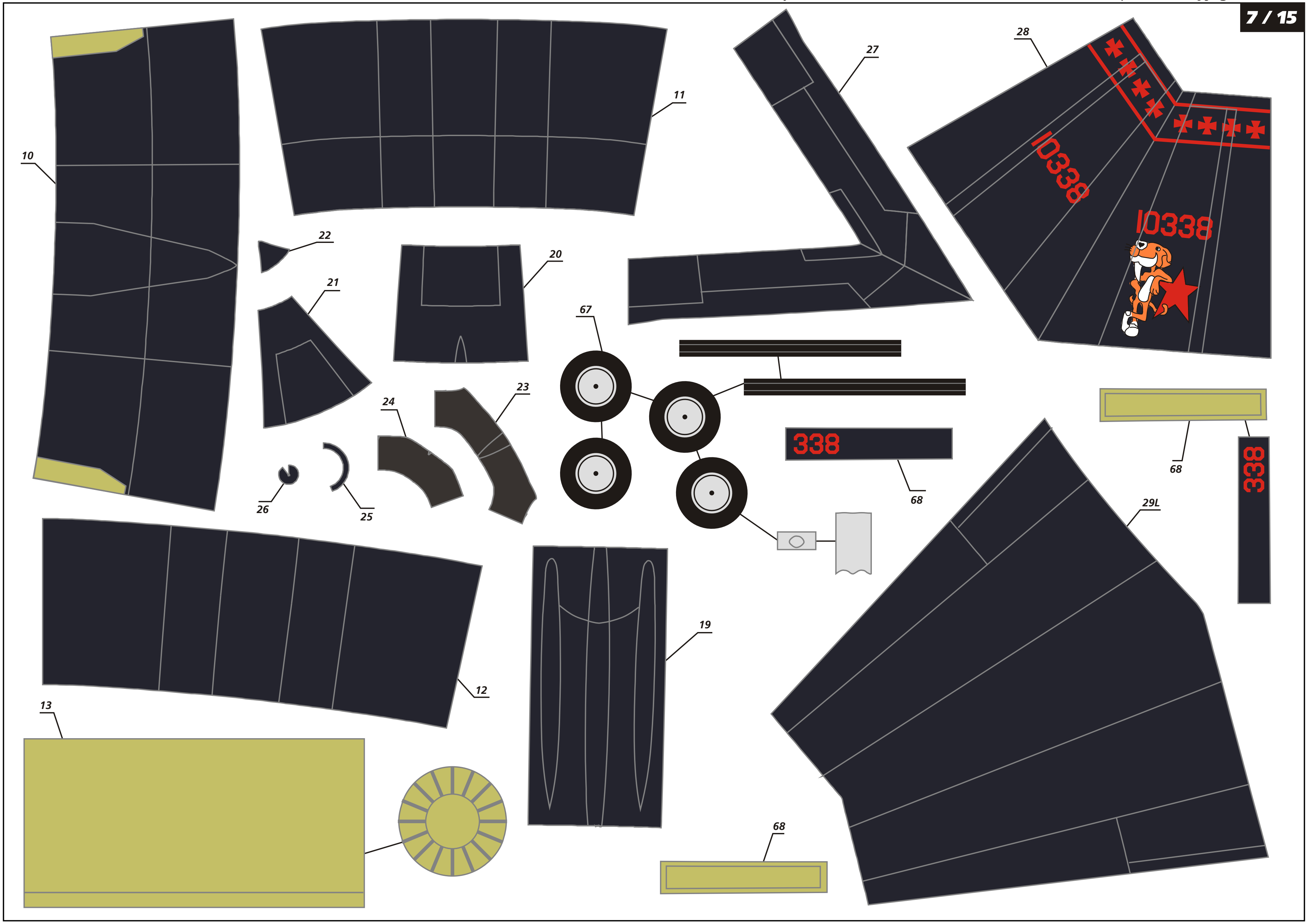

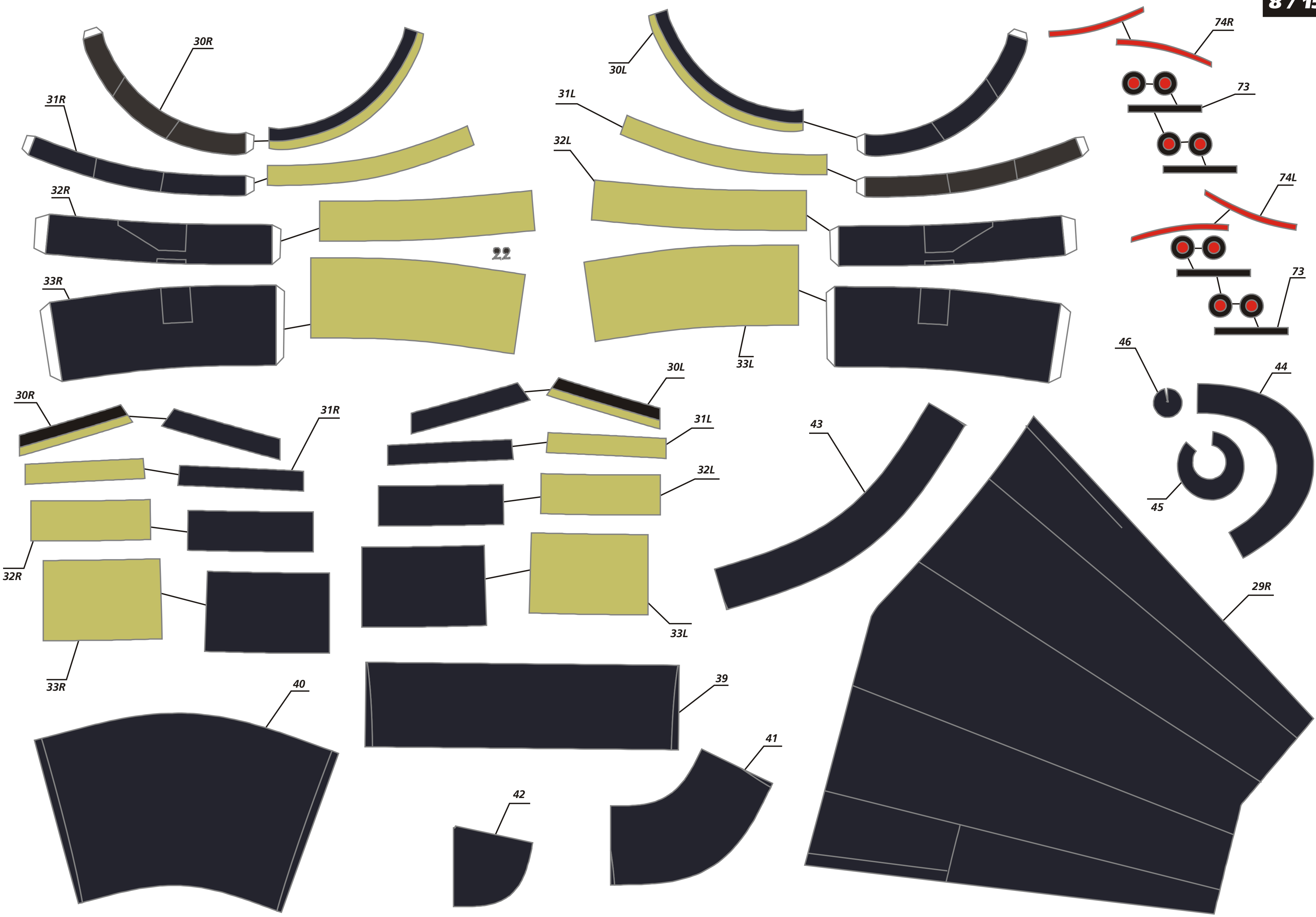
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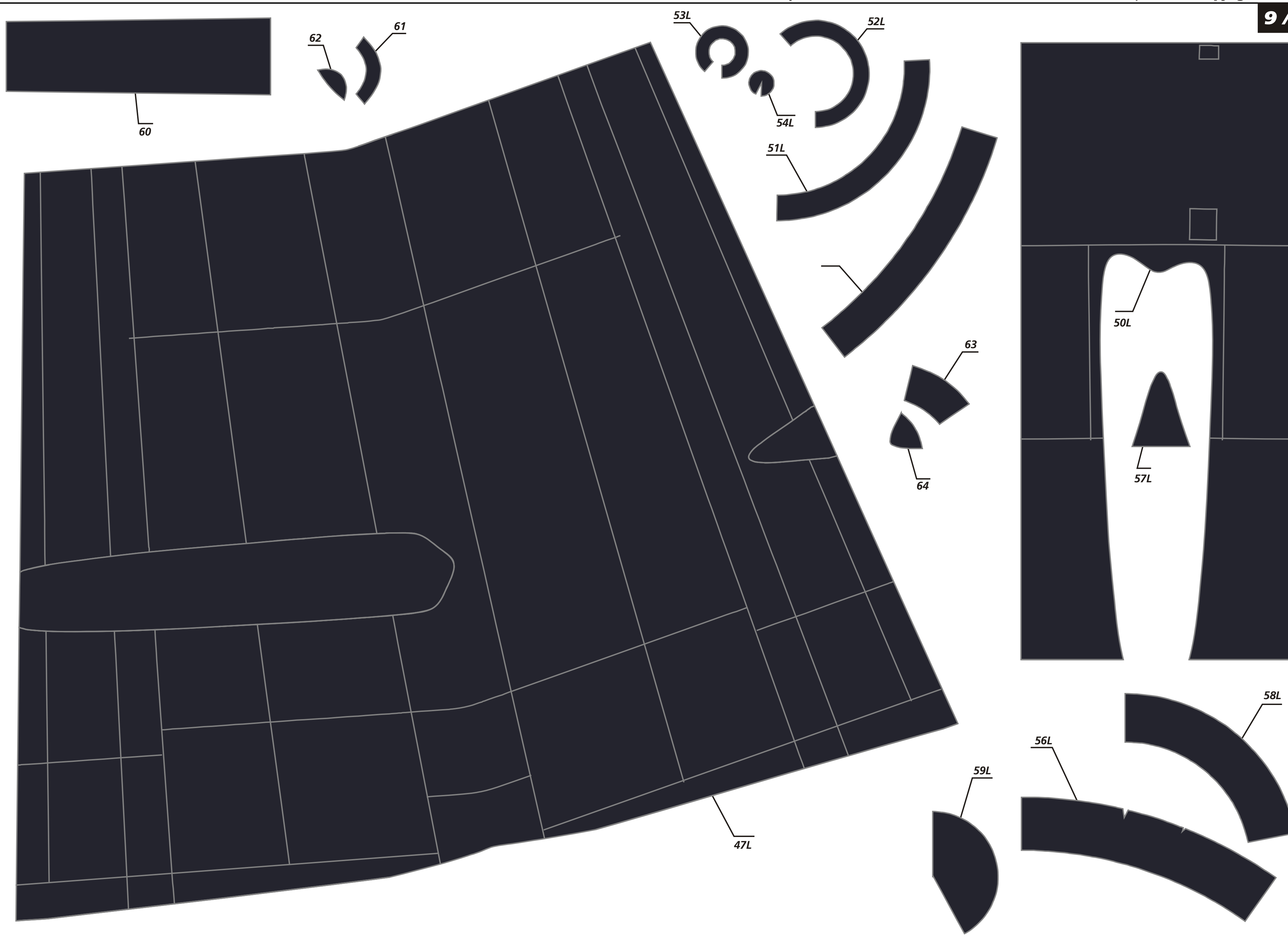

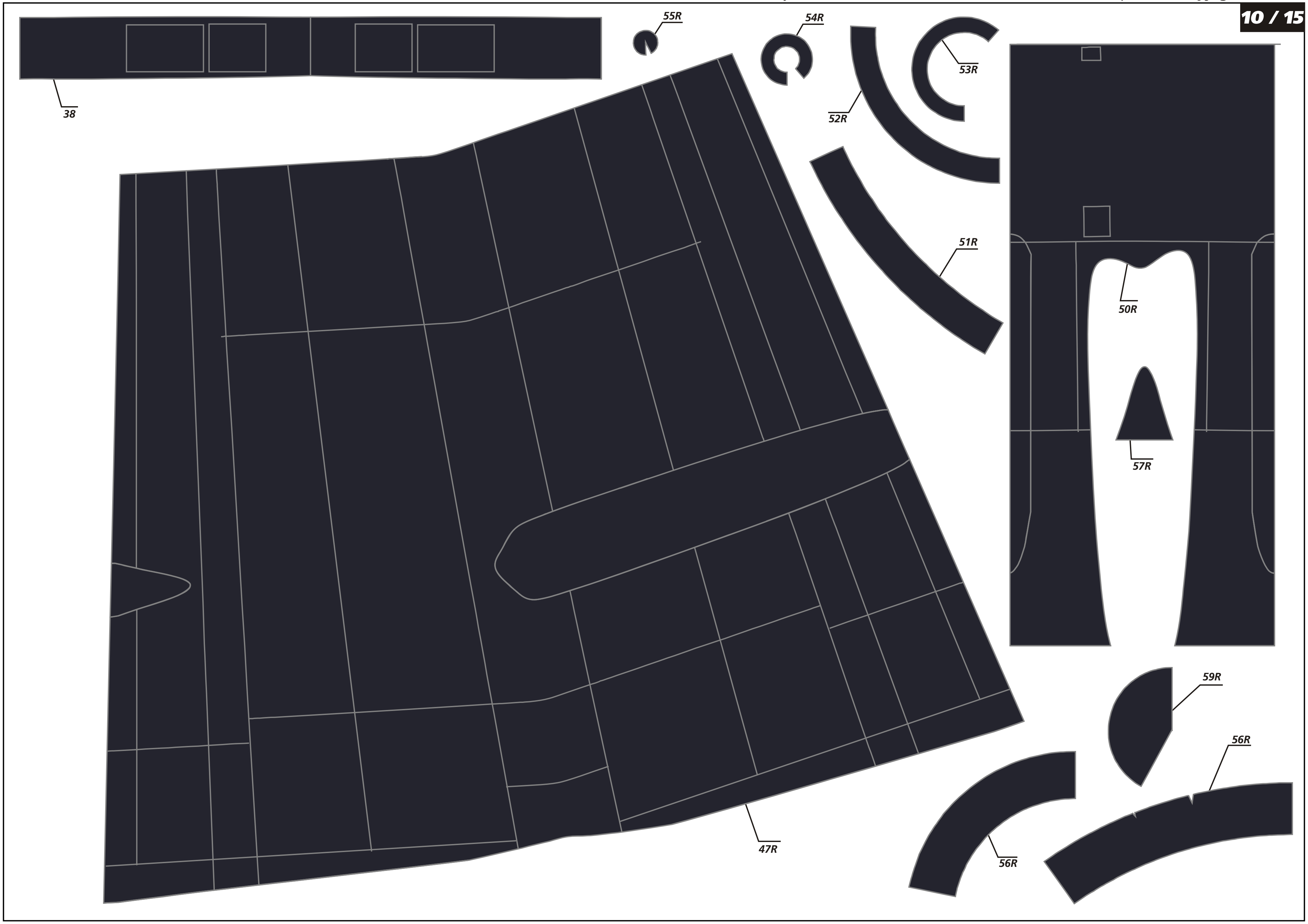
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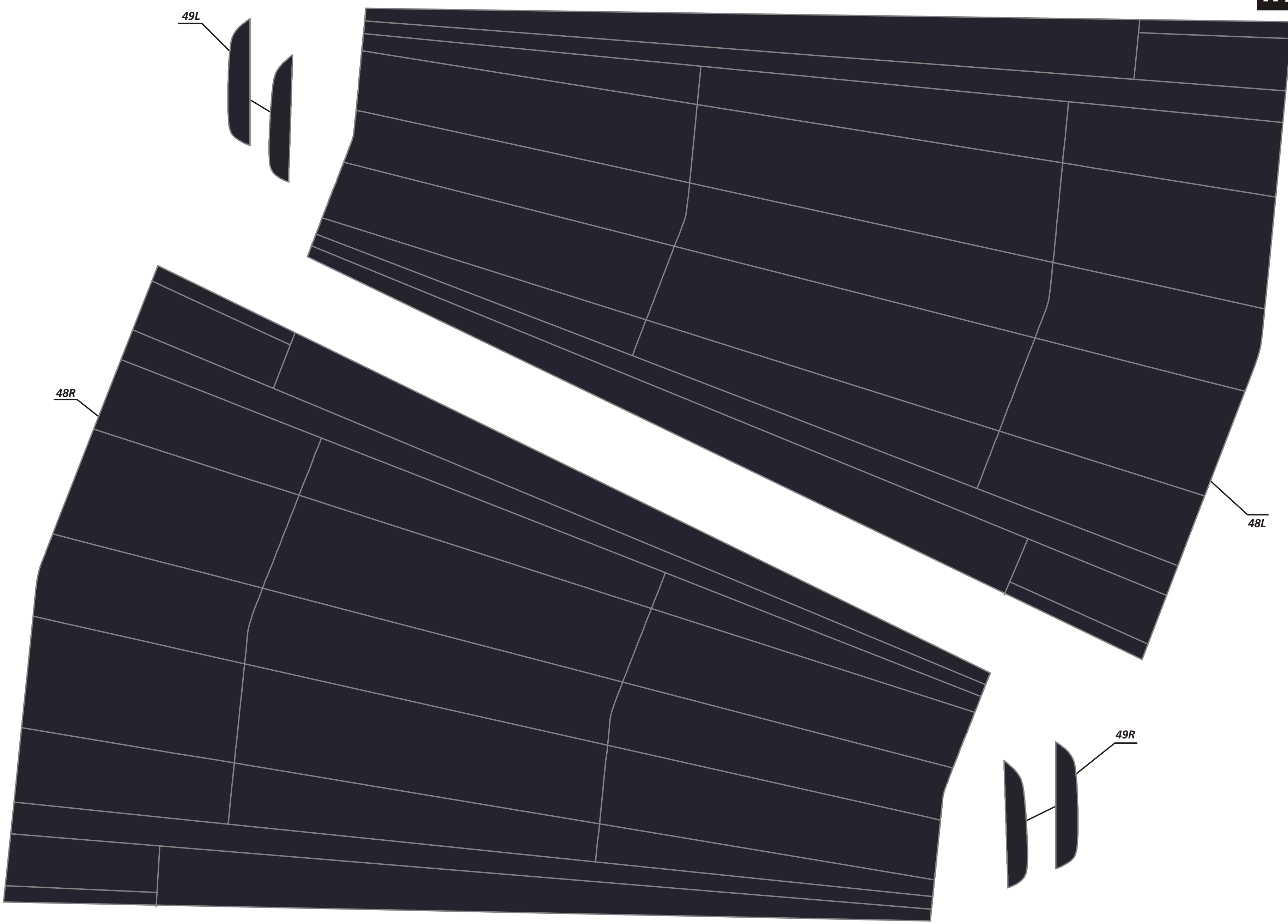

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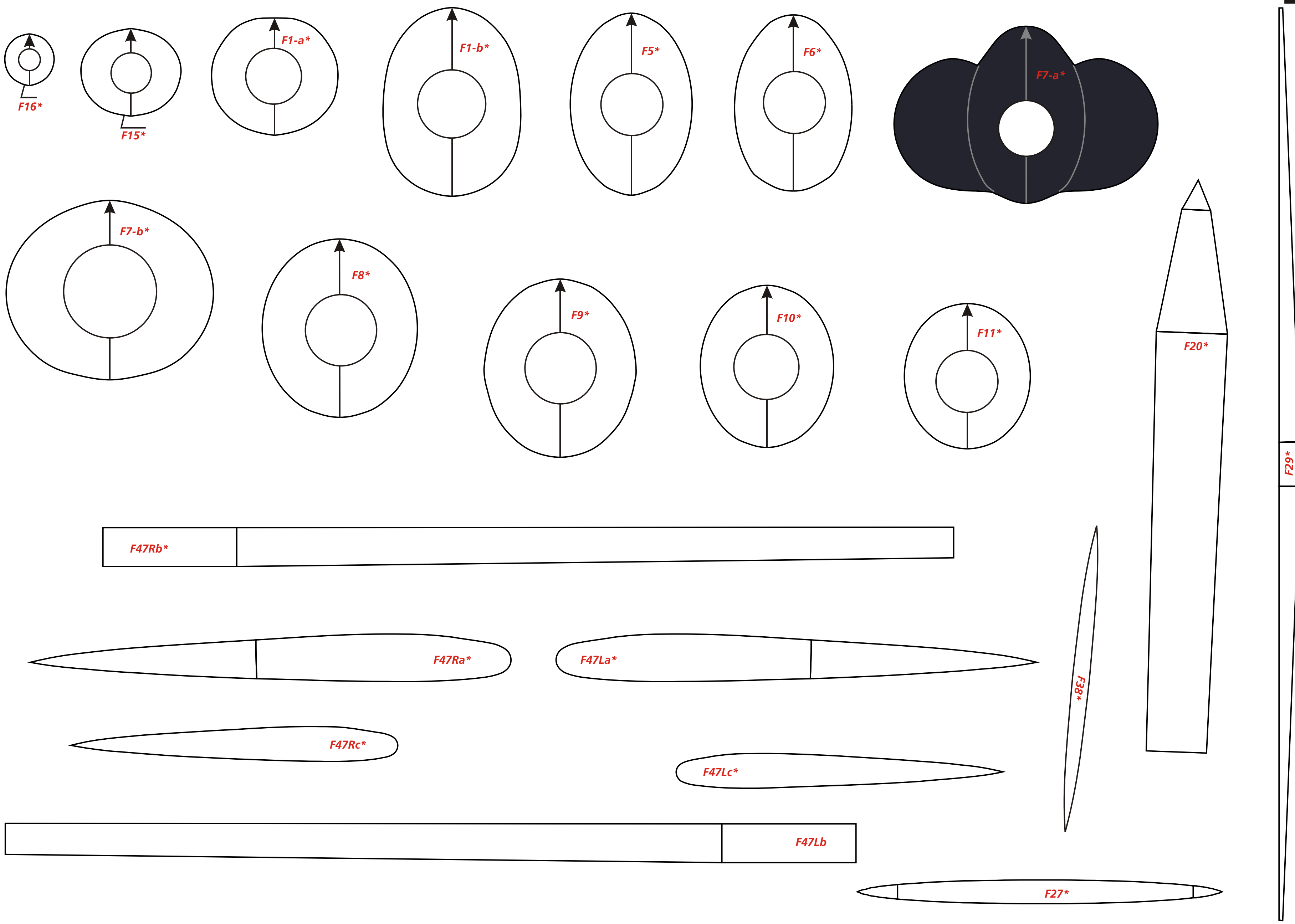

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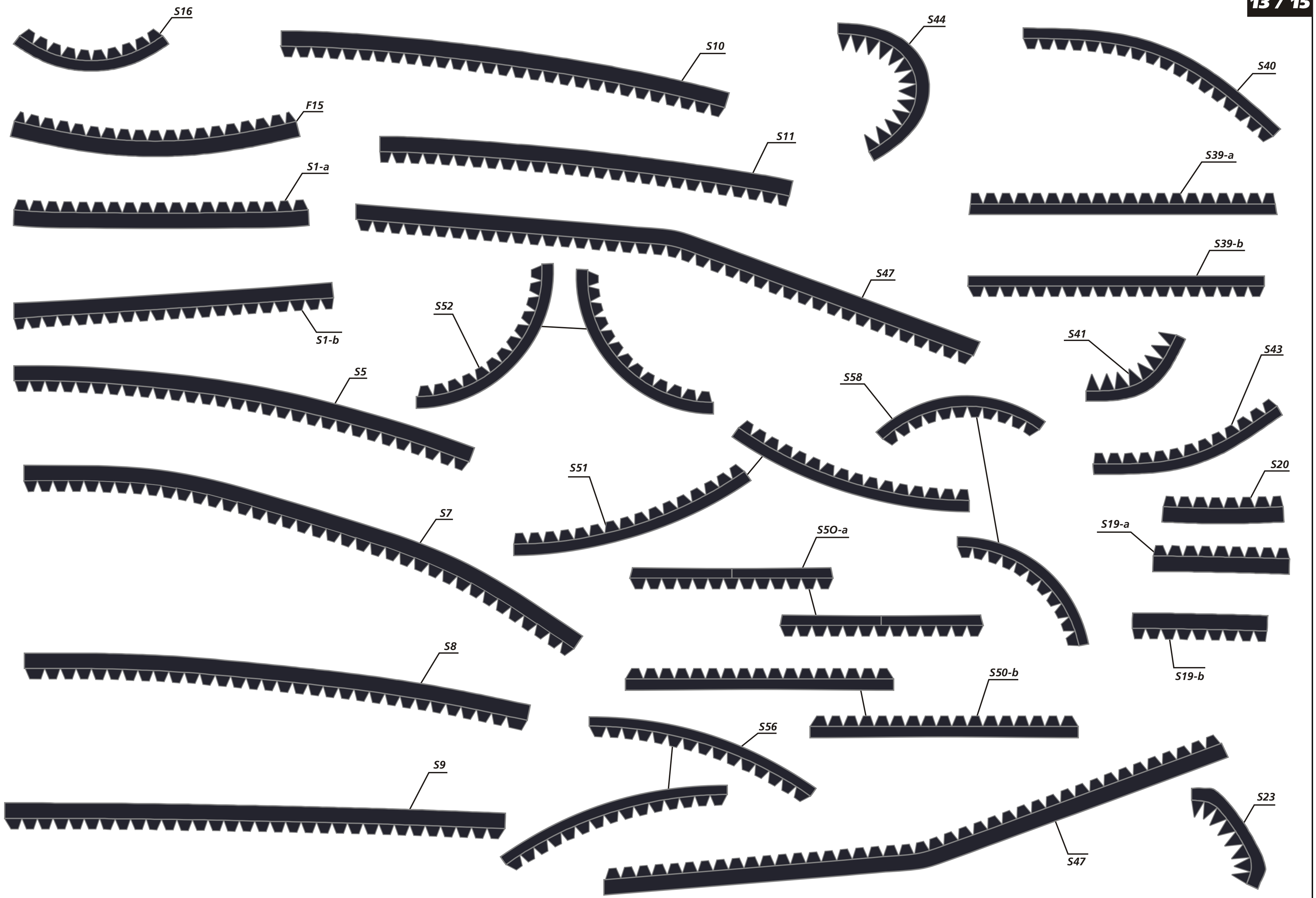

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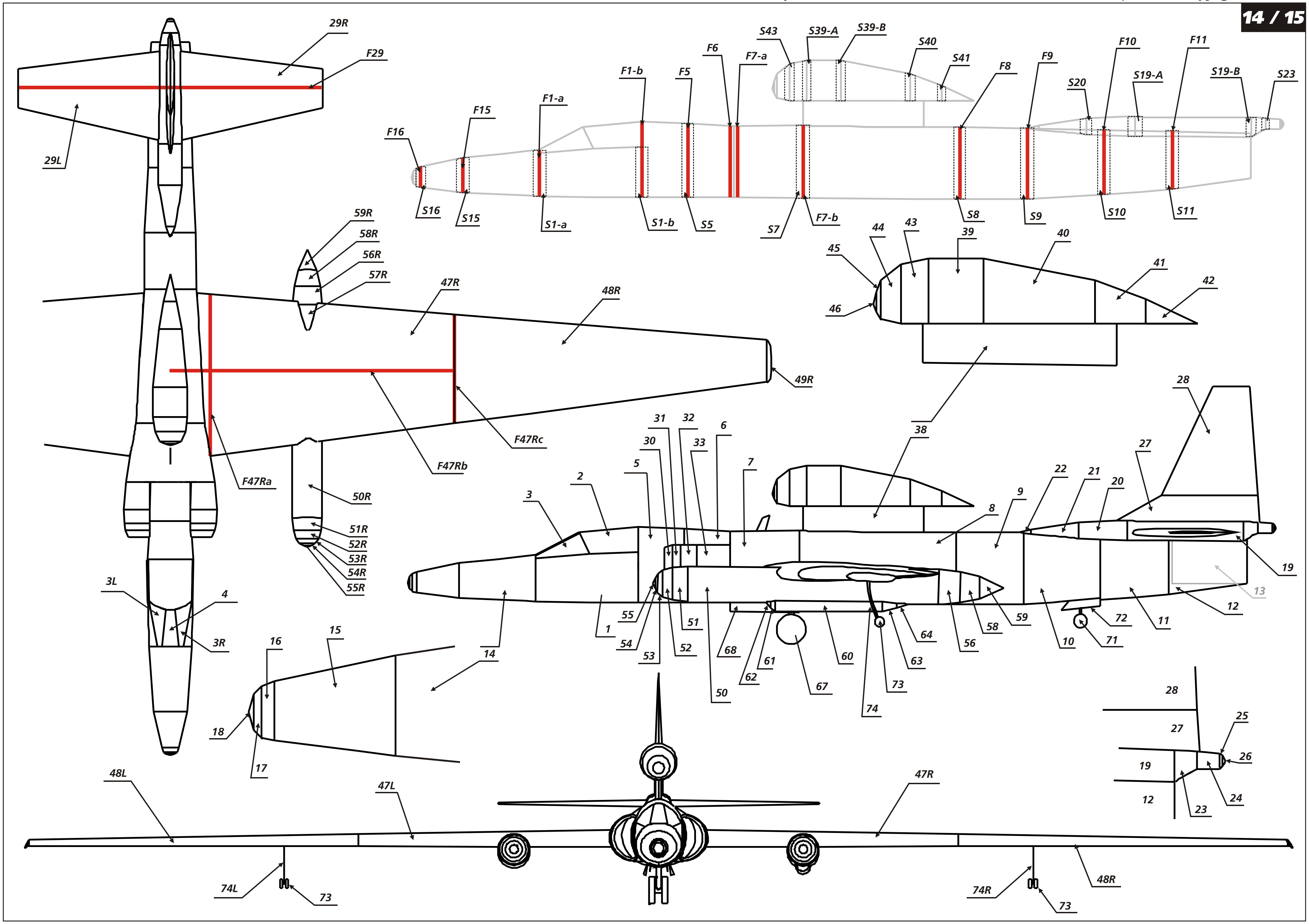

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