

SAPC 18431
COPY 3 OF 4

August 7, 1957

To: R. M. Bissell
From: C. L. Johnson
Subject: U-2 PROGRESS REPORT

*file
SP-1913
T+P
Carpenter*

1. AIRPLANE STATUS

There are presently five project airplanes in our possession which are in flight test or undergoing modifications.

- 343 C & B Camera flight tests
- 349 Thermos modifications being applied
- 351 Slipper tank flight tests
- 355 Thermos flight test
- 367 Thermos modifications being applied

Both 344 and 355 have had all the Thermos modifications incorporated to date and Aircraft 349 and 367 are presently undergoing the treatment at Bakersfield. The thermocouple instrumentation installed on article 344 indicated that the engine shrouds were satisfactory and that all structure temperatures were within tolerance with the exception of the tail wheel bulkhead. An additional shroud was made for this bulkhead and installed before delivery.

The slipper tanks installed on 351 have not yet flown due to higher priority tests. They have been static and fuel flow tested with good results.

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DATE: 120541 REVIEWER: 010956

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The -31 engine bleed valves have been operating erratically in operations and flight tests have been made to determine a fix. The most obvious solution was to eliminate the bleed valve which has been done. This has proven satisfactory on the -31 production engine installations at Edwards. No deviation of flight procedures from the handbook are required when using the engine in this configuration. The only minor difference noted thus far has been that one engine has slightly more chugging when accelerated at low altitude as for a go-around. But this chugging is no worse than previously experienced on other engines with bleed valves.

As a result of this, all bleed valves on -31 production engines are being removed at Edwards in order to gain flight experience quickly with this configuration. At present, the elimination of the bleed valve appears to be the solution.

FOG Airplanes. The following airplanes have been delivered and are now on flying status with FOG.

361	6 December 56	369	4 June 57
362	12 December 56	370	19 March 57
363	23 July 56	371	4 April 57
364	19 February 57	372	22 July 57
365	6 February 57	373	3 May 57
366	31 January 57	374	10 May 57
368	4 April 57 ARDC	375	22 July 57

Note that 363 has been repaired and returned to FOG. It was originally delivered on 19 December 56. Airplane 367 is no longer a FOG article. It has been traded for a lower serial airplane as yet undetermined.

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FOG Airplanes 376 thru 382 are in flight test at the present time. The status of aircraft checking out specialized equipment is as follows.

Airplane 376 has been testing Radan and ASN-6. These installations in the last few days have been checking out very well on latitude and longitude checks from point to point. If Radan and ASN-6 continue to operate in a satisfactory manner this ship may be delivered the week of August 12th.

Airplane 367 which has been used for C Camera flight tests has been traded to the first group and is no longer available for the C Camera flight test work. Airplane 343 is being used for this program at present.

Airplane 377 is in flight test awaiting the receipt of the Stanley downward ejection seat for installation in the equipment bay. This seat and its related hatch is expected to be in flight test about August 15th at which time a downward ejection seat program will be initiated.

2. FLIGHT TEST PROGRAM

The anticipated flight test programs are shown on the attached chart.

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3. STATE OF VEHICLE & COMPONENTS

Provisions for recording voice on the System I recorder are now incorporated in production and are ready on several articles with the exception that the voice filters are not yet available. These filters which will complete the voice systems are promised for delivery about September 16th, at which time complete kits can be sent out for all aircraft already delivered.

The installation of an ARC-3 radio in all aircraft has been requested and incorporated in those articles. The radio components themselves have not been received but the cabling and brackets has been incorporated in the articles.

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An informal mockup conference was held to determine what type of ejection seat system would be desirable for the U-2. The following ejection seat provisions are to be made for the U-2 using a T2V aircraft production seat.

These provisions will be such that this seat can be readily removed and replaced with the present U-2 lightweight seat. The following features will be included on the ejection T2V seat to make it useable with the U-2.

1. Provide the foot stirrups presently installed on the T2V seat. These stirrups are readily removable in the field

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if they are not desired by the pilots.

2. A head guard mounted on the top of the seat will be provided to break open the canopy in cases where it has not been manually jettisoned prior to seat ejection. This feature has previously been proven on the T2V tests.
3. The control wheel will be snatched forward as the seat begins its upward travel in order to provide better clearance for the pilot's knees. This will be done by interlocking the seat and the elevator bell-crank which is behind the seat so that as the seat starts up, the wheel bangs forward and the elevator goes down.
4. The ejection sequence will be manual and will be initiated with a handle between the driver's legs. This handle of "D" ring is to have enough free travel to permit the ring to be clear of the driver's legs when the ejection procedure is started.

A parallel program to the ejection seat program should be accomplished on the seat packs. The seat pack modification will consist of the following items:

1. Use of a new seat pan (F-104) so that the pack will fit the T2V ejection seat without seat modifications. The U-2 oxygen equipment will fit in the F-104 seat pan in the same manner as it presently does in the U-2 pan.

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2. By providing both right and left outlet holes for the oxygen hoses in the seat pan and a new, separate longer chest bladder hose this seat pack can be made so that it will work with pressure suits with either right or left side connections with the chest bladders.
3. Provisions should be made on the seat pack so that manual or automatic actuation of the Green Apple can be accomplished upon ejection of the seat.
4. All hoses into the seat pan are to be clipped solidly to the pan.

The present oxygen quick disconnect on the left hand side of the cockpit will be retained for the ejection seat. The only change to this disconnect is that it is to have an improved manual actuated lock which should be made retroactive to all aircraft whether they have ejection seat installations or not. No provisions are being made to automatically disengage the oxygen system upon ejection. The hose will simply pull loose from its connection at that time. This oxygen quick disconnect modification and the above seat pack modifications should probably be done by Firewel.

The above seat ejection items are to be incorporated as soon as possible into a prototype installation. This will be installed in a flight test article. There will be several ground fires to check the system operation and a method of

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breaking open the canopy. After these tests we expect to build approximately 20 of these units for use in the U-2 during training and other non-critical operations.

Leading edge slipper tanks have been designed for the U-2 which carry 200 more gallons of fuel. The prototype tanks are presently installed on Airplane 351 but have not yet been flight tested. These tanks are expected to give an increase of about 10% overall range. These are designed to be installed on any existing U-2 but will require about a two week lay up to do so.

During service flights in the last year it has become apparent that the hydraulic system has been operating at higher temperatures than desired. This has resulted in a gradual service breakdown of "O" rings, seals and pumps. To correct this, a hydraulic radiator has been designed and is now installed in production airplanes and is to be retrofitted by kits to all existing aircraft. These kits are available in the month of August.

4. SPECIAL EQUIPMENT

The Radan and ASN-6 combination presently flying in Article 376 has been operating fairly satisfactorily and has been checking latitude and longitude on short legs on the order of 100 miles. The ground speed has been found to be in error by approximately 3%. This has been calibrated and

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it is hoped that future flights will give the 1% guarantee.

The Radan transmission appears to be just barely strong enough for operations from our cruising altitude. This is indicated by the fact that it loses lock-on rather readily, particularly in very shallow turns with approximately 5° bank angle. It also loses lock-on when flying over weather, particularly when thunderheads are encountered under the article. It, of course, always loses lock-on when flying over fairly smooth water. The above losses of lock-on indicate to us that the Radan transmissions probably should be stronger in order to permit the all weather operation for which this system was originally installed in the aircraft. As stated previously, this article with the Radan and ASN-6 system will be delivered shortly, as soon as operation is satisfactory except for these poor lock-on characteristics.

The C Camera is still undergoing flight test work although it is apparently reaching a point where it may be used operationally. Mechanically and electrically it appears to be working satisfactorily but the optical definition leaves much to be desired. It is felt that this C Camera has been improved about as far as possible with the present glass installed. Tests to be conducted during the week of August 5th should terminate the tests on this particular camera at the present time. C Camera tests are not expected to begin again until a new unit is available in October.

B Camera tests have been put off because of higher priority work in flight test but it appears that the work load should permit B test work to begin on approximately a two flight a week basis starting on August 12th.

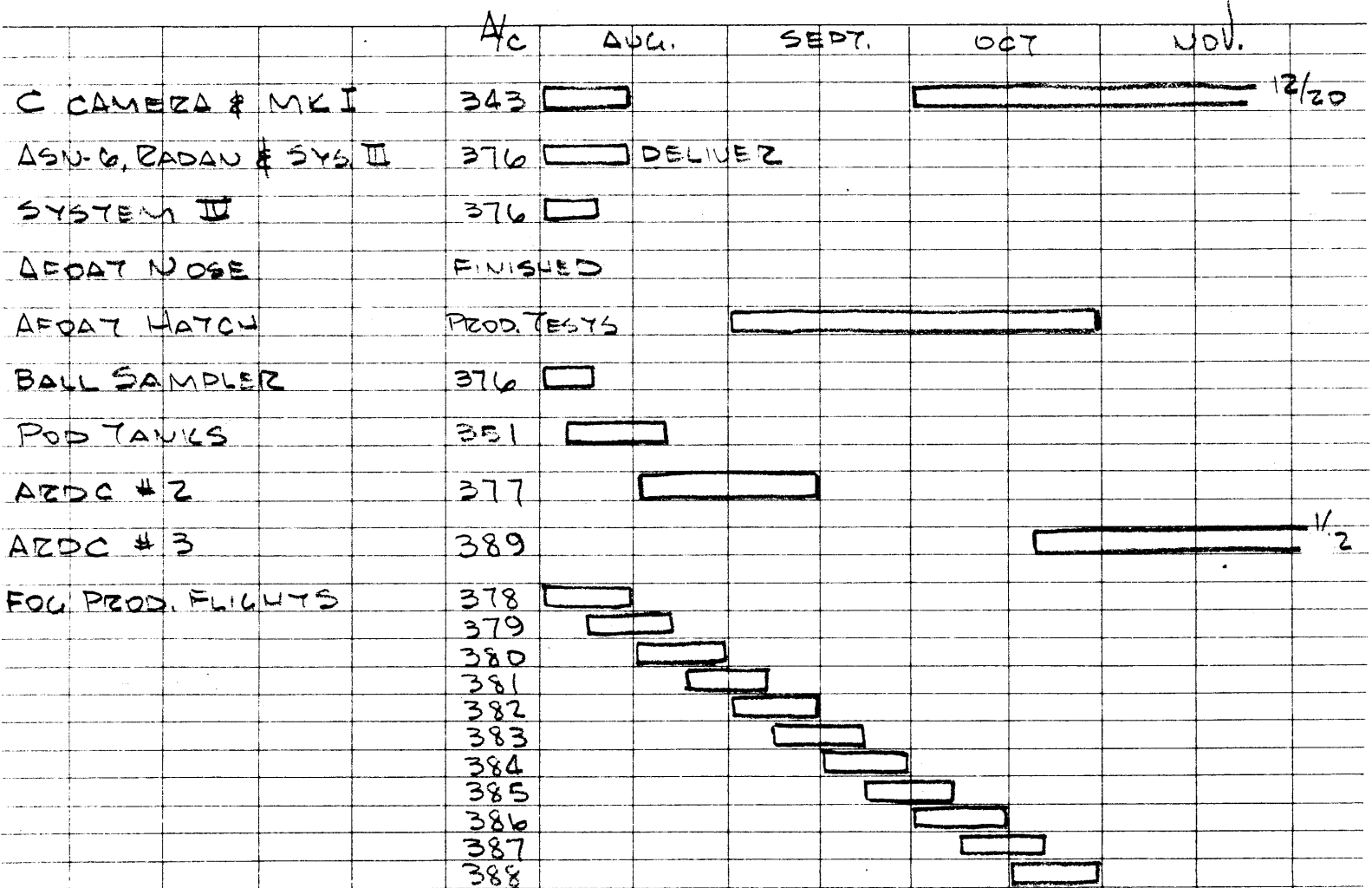
System IV has been working satisfactorily and requires two more flights, one short and one high, to make it ready to go. The most recent problem with this system was overheating of a recording camera. This has been cured now and the system should be operational shortly.

5. COSTS

Estimated and actual costs to date are shown in the attached charts.

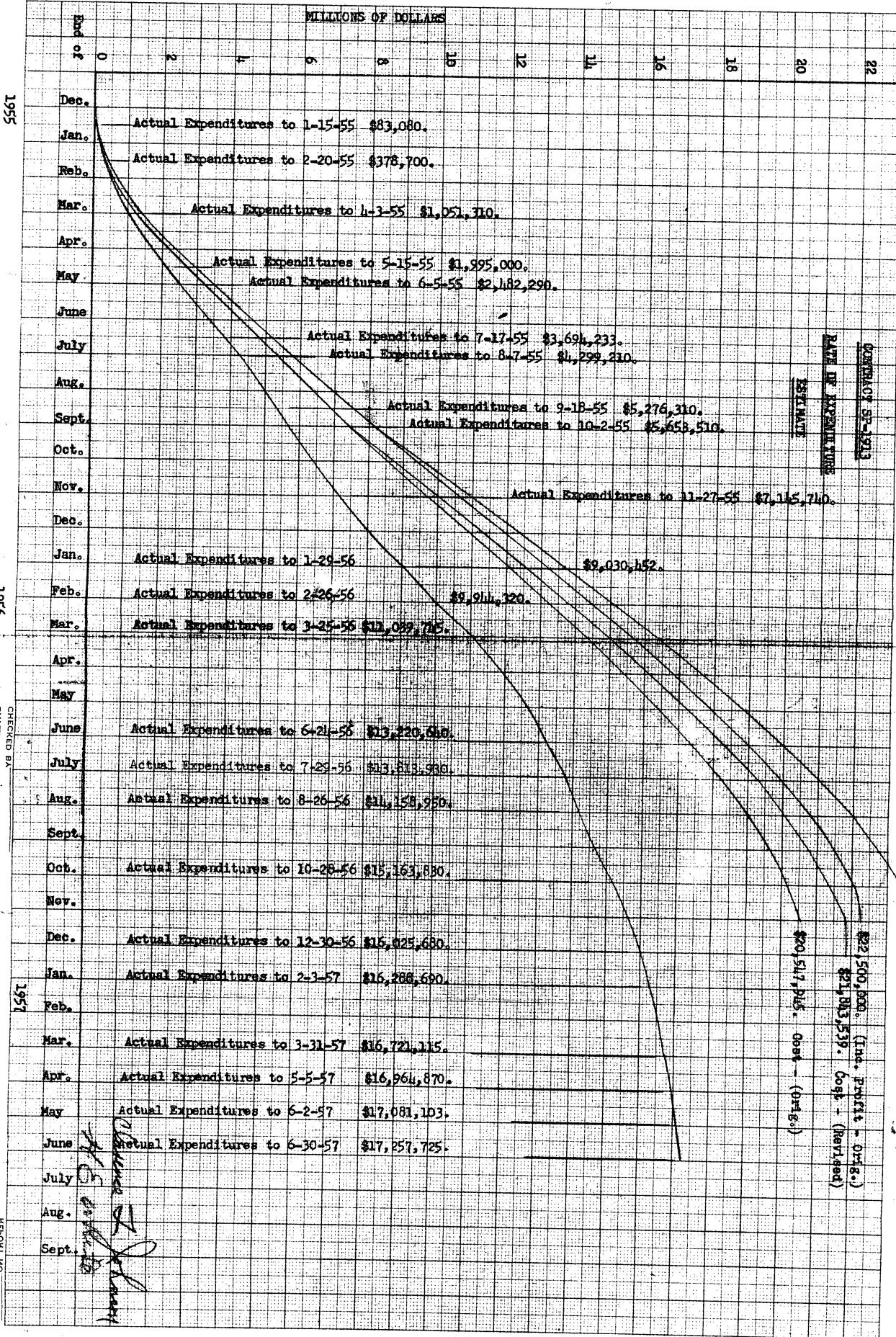
A handwritten signature in cursive script, appearing to read "Kelly", is written over a horizontal line.

CURRENT FLIGHT TEST PROGRAM





FORM 55-50



CONTRACT SF-513
RATE OF EXPENDITURES
ESTIMATE

\$20,517,915. (Est. - (D+1.5%))
\$21,013,539. (Est. - (D+1.5%))
\$22,500,000. (Inc. Profit - (D+1.5%))

\$23,918,670. (Inc. Profit - Revised)

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DATE

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