

DEVELOPMENT HISTORY OF *Cyclone 18*

DATES FOR SHIPMENT OF FIRST INSTALLATION ENGINE



COMMERCIAL TURBO COMPOUND

Shipment
File

WAD PRODUCTION

<u>Model</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>To July 1 1961</u>	<u>Total</u>
972TC18DA1	95	263	234	4	-	-	-	-	-	-	596
DA2	10	192	172	-	-	-	-	-	-	-	374
DA3	-	-	90	287	169	50	18	-	-	-	614
DA4	-	-	24	195	146	273	4	-	-	-	642
988TC18EA1	-	-	-	35	411	424	33	-	-	-	903
EA2	-	-	-	-	53	218	12	-	-	-	283
EA3	-	-	-	-	113	175	6	-	-	-	294
EA4	-	-	-	-	-	70	89	-	-	-	159
EA5	NONE EVER BUILT										
*EA6	-	-	-	-	-	4	*76	-	-	-	*80
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TOTAL	105	455	520	521	892	1,214	238	-	-	-	3,945

LICENSEE PRODUCTION (CHEVROLET)

R3350-85	-	486	409	-	-	-	-	-	-	-	895
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* Note - 80 Engines accepted - 78 shipped to date. Last 2 being held on appropriation request # 1-7540-AB.

cc: R. E. Johnson, G. Guillot

Hickok 7/18/61

MILITARY

<u>Model</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>To July 1 1961</u>	<u>Totals</u>
DA - Type														
YR3350-30W	3	4	-	-	-	-	-	-	-	-	-	-	-	7
R3350-30W	-	218	334	-	-	-	-	-	-	-	-	-	-	552
R3350-77	-	1	-	-	-	-	-	-	-	-	-	-	-	1
R3350-30WA	-	-	9	432	820	87	-	-	-	-	-	-	-	1,348
R3350-85	-	-	23	582	743	152	-	-	-	-	-	-	-	1,500
R3350-34	-	-	-	58	510	384	345	238	105	-	-	-	-	1,640
R3350-30WB	-	-	-	37	24	-	-	-	-	-	-	-	-	61
R3350-89	-	-	-	-	-	-	24	-	-	-	-	-	-	24
R3350-91	-	-	-	-	-	-	424	39	-	-	-	-	-	463
EA - Type														
R3350-32W	(Commercial Order - Military Model						-	-	-	-	-	-	8	8
R3350-32WA	Lockheed P2V-7-Royal Dutch Navy)						-	-	-	-	-	-	8	8
R3350-32W	-	-	-	-	50	386	228	167	75	87	113	93	79	1,278

TOTAL	3	223	366	1,109	2,147	1,009	1,021	444	180	87	113	93	95	6,890
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MILITARY - COMMERCIAL GRAND TOTAL ALL MODELS BY YEAR (INCLUDING CHEVROLET)

	3	223	366	1,214	3,088	1,938	1,542	1,336	1,394	325	113	93	95	11,730
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TURBO COMPOUND ENGINE STATUS

June 1, 1956

MODEL TEST HISTORY

Mar 1950	-Military 150-hr model test 3250 HP
Jan 1951	-Military 150-hr model test 3500 HP
Mar 1952	-Commercial 150-hr model test 3250 HP
Aug 1952	-Military 150-hr model test 3700 HP
Aug 1953	-Military 150-hr model test 3500 HP (with fuel injection)
Aug 1954	-Commercial 150-hr model test, 972TC18DA4
Jul 1955	-Commercial 150-hr model test, 988TC18EA1, 3400 HP
Oct 1955	-Military 150-hr model test, 981TC18EA1, 3700 HP

TIME SUMMARY • ENGINE HOURS

A. Flight Time

R7V, P2V, P5M, C-119, and RC-121	3,484,000
1049 and DC-7	4,067,440
Flight Test & Production (Lockheed, Douglas, Fairchild & Martin)	44,496
WAD Flight Test	1,422
Total	7,597,358

B. Test Stand Time

WAD Experimental Test	27,397
WAD Production Test	98,615
Total	126,012

GRAND TOTAL, Engine Hours

7,723,370

DEVELOPMENT TESTING HIGHLIGHTS

Seven 150-hr model tests at 3250 HP
Two 150-hr model test at 3400 HP
Eleven 150-hr model tests at 3500 HP
Ten 150-hr model tests at 3700 HP

PRODUCTION STATUS

Number of TC18 engines ordered	10653
Number of TC18 engines accepted to date	8965
Number of TC18 powered aircraft delivered to date	2023

BACKGROUND

The design of the basic engine is substantiated by approximately 13,600,000 hours of C18ED, CA, CB, and -26W flight operation.

CONSTELLATION AND DC-7 AIRPLANE ORDERS AS OF JUNE 1, 1956

43 TURBO COMPOUND AIRLINES - FIRM

CUSTOMER - COMMERCIAL	CONSTELLATIONS			DC-7's		
	FIRM ORDERS	ORDERS PENDING	A/C DEL'D	FIRM ORDERS	ORDERS PENDING	A/C DEL'D
Air France	34	0	20			
Air-India International	8	0	5			
Alitalia				4	0	0
American				58	0	31
Avianca	4	0	4			
BOAC				10	0	0
Braniff				7	0	0
Calif. Eastern	3	0	0			
CMA				0	4	0
Continental				0	5	0
Cubana	3	0	3			
Delta				21	0	11
Dollar Associates	1	0	0			
Eastern	26	0	16	50	0	12
Flying Tigers	10	0	0			
Iberia	3	2	3			
Japan				4	0	0
KLM	17	0	17	10	0	0
LAI	4	0	0			
LAV	3	0	3			
Lufthansa	8	0	6			
National				4	4	4
Northwest	4	0	4	12	0	0
Pakistan International	3	0	3			
Pan American				32	0	9
Panagra				6	0	5
Panair Do Brasil				0	4	0
Qantas	14	0	12			
Real-Aerovias Brasil				0	3	0
Resort	2	0	0			
SAA				4	0	3
SABENA				9	0	0
SAS				14	0	0
Seaboard & Western	9	0	4			
SwissAir				4	0	0
TAI				0	2	0
TAP	3	0	3			
Thai Airways	2	0	0			
Trans-Canada	10	0	10			
TWA	53	0	20			
United				48	0	27
U.S. Overseas (Lockheed Confidential)	2	0	0			
VARIG	3	0	3			
Total	229	2	136	297	22	102
CUSTOMER - NON COMMERCIAL						
Douglas				2	0	2
Lockheed	1	0	0			
Private Owner	1	0	1			
USAF	100	0	75			
USN	179	33	100			
Total	281	33	176	2	0	2
GRAND TOTAL	510	35	312	299	22	104

TURBO-COMPOUND OVERHAUL PERIODS

June 1, 1956

<u>CUSTOMER</u>	<u>AUTHORIZED OVERHAUL PERIOD-HOURS</u>	<u>RANGE OF CRUISE POWER</u>
KIM	*1600	1400-1775
Air France	1400	1300-1750
QANTAS	1400	1500-1700
Eastern	1200 (DAL) 1100 (DAL)	1730-1830
IBERIA	1200	-
Northwest	1200	1500-1850
Cubana	1100	1600-1650
Delta	1100	1750-1820
National	1100	1700-1800
Seaboard & Western	1100	Maximum
Pakistan Int'l	1050	1525-1700
American	1030	1800-1910
Air India Int'l	1000	1625-1715
Avianca	1000	1700-1775
Lufthansa	1000 (New Engines) 800 (O.H. Engines)	1300-1750
LAV	1000	1525-1725
Panagra	1000	1700-1800
Pan American	1000	1200-1800
SAA	1000	-
TCA	1000	1400-1700
TWA	900	Maximum
United	** 900	1500-1910

* Impeller Drive change at 550 and 1050 hours.

** Impeller Drive change at 450 hours.

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COMMERCIAL SALES PRICE HISTORY

<u>Engine Model</u>	<u>Year</u>	<u>Gross Weight</u>	<u>Take-off BHP</u>	<u>Low Net Price</u>	<u>\$/lb.</u>	<u>\$/BHP.</u>
GRL820E	1930	910	575	6,750.	7.42	11.74
GRL820E	1931	910	620	6,750.	7.42	10.89
GRL820F1	1934 (2)	1030	700	6,705.	6.51	9.58
	1932 (9)	920	670	7,000.	7.61	10.45
GRL820F2	1937 (1)	1050	750	7,245.	6.90	9.66
GRL820F52	1935 (8)	1060	804	7,305.	6.89	9.09 -
GRL820F52	1937 (9)	1085	875	7,785.	7.18	8.90 -
	1940 (1)	1095	875	8,250.	7.53	9.43 -
GRL820G2	1935 (12)	1163	1000	7,845.	6.75	7.85 -
	1940 (1)	1198	1000	8,730.	7.29	8.73 -
GRL820G2	1938 (3)	1198	1000	8,565.	7.15	8.57 -
GRL820G102	1936 (9)	1275	1100	8,345.	6.55	7.59 -
	1938 (5)	1275	1100	8,880.	6.96	8.07 -
GRL820G102A	1940 (1)	1275	1100	9,180.	7.20	8.35 -
GRL820G202A	1939 (2)	1290	1200	9,075.	7.03	7.56 -
	1940 (4)	1310	1200	9,750.	7.44	8.13 -
GRL820G202A	1942 (3)	1310	1200	10,022.	7.65	8.35 -
	1945 (5)	1320	1200	9,991.97	7.64	8.34 -
GRL820 (C9HD)	1946 (2)	1360	1425	15,000.	11.00	10.50 -
GRL820 (C9HD)	1946 (10)	1368	1425			
GR3350BA1	1945 (9)	2595	2200	24,781.20	9.55	11.30 -
GR3350BA2	1946	2651	2200	26,671.20	10.0	12.10 -
GR3350BA3	1946 (4)	2780	2200	32,073.00	11.5	14.60 -
GR3350BA3	1946 (10)	2780	2200	34,824.	12.5	15.80

REJ:om
10/21/46