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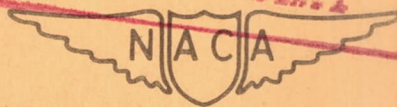
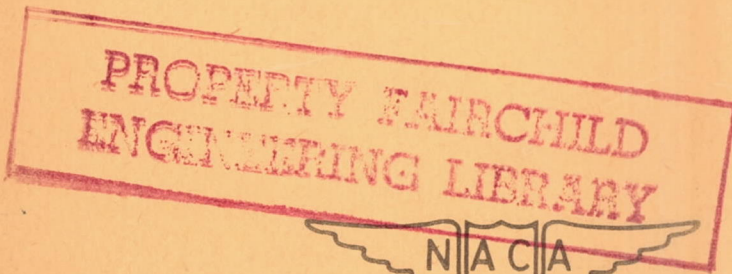
TECHNICAL NOTE

No. 1143

CHARTS FOR DETERMINING THE CHARACTERISTICS OF
SHARP-NOSE AIRFOILS IN TWO-DIMENSIONAL
FLOW AT SUPERSONIC SPEEDS

By H. Reese Ivey, George W. Stickle,
and Alberta Schuettler

Langley Memorial Aeronautical Laboratory
Langley Field, Va.



Washington
January 1947

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CHARTS FOR DETERMINING THE CHARACTERISTICS OF
SHARP-NOSE AIRFOILS IN TWO-DIMENSIONAL
FLOW AT SUPERSONIC SPEEDS

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By H. Reese Ivey, George W. Stickle,
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September 1947

Since Technical Note No. 1143 was completed, the need for a more extensive version of table I, "Values of Local Mach Number, Pressure Ratio, and Pressure Coefficient across Shock Waves," has become apparent. This table is now available in expanded form; and a copy of the expanded table is included in this supplement to supersede the original table I.

Errors in the original publication are as follows:

Page 11: The first sentence of the last paragraph should begin "Tables I and III . . ." instead of "Tables I and II . . ."

Corrections in tables II and III are as follows:

Table II.--

M_b	$-\beta$	M_a
2.3	23°	3.4225
2.6	10°	3.0867
4.3	3°	4.5658
4.7	7°	5.4669
4.7	8°	5.5922
4.7	9°	5.7240
6.2	9°	7.9200

Table III.--

M_b	$-\beta$	p_a/p_b
1.4	14°	0.49071
4.7	24°	.02350

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Cleveland, Ohio

Figure 13.— Each vertical space along the scale label for pressure coefficient $\Delta p/q$ should represent 0.125 instead of 20; thus, the vertical scale should appear:

-.500
-.375
-.250
-.125
0
.125
.250
.375
.500
.625
.750
.875
1.000

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES

θ (deg)	β (deg)	M_0	M_1	$\frac{P_1}{P_0}$	$\frac{\Delta p_{A,B}}{q_0}$	θ (deg)	β (deg)	M_0	M_1	$\frac{P_1}{P_0}$	$\frac{\Delta p_{A,B}}{q_0}$
8	0	7.18546	7.18546	1.00000	0	18	0	3.23604	3.23604	1.00000	0
	1	7.80125	7.57479	1.20854	.00490		1	3.35720	3.29834	1.08900	.01128
	2	8.60430	8.07261	1.50622	.00977		2	3.49146	3.36878	1.19145	.02244
9	0	6.39264	6.39264	1.00000	0	4	3	3.64174	3.44868	1.31087	.03349
	1	6.87407	6.69357	1.18235	.00551		4	3.81150	3.53948	1.45184	.04443
	2	7.48067	7.06770	1.43092	.01100		5	4.00564	3.64318	1.62091	.05528
10	0	5.75871	5.75871	1.00000	0	6	6	4.23083	3.76221	1.82753	.06604
	1	6.14639	5.99785	1.16236	.00614		7	4.37062	3.89495	2.16071	.07937
	2	6.62119	6.28846	1.37565	.01224		8	4.51743	4.05749	2.44888	.08734
11	0	5.24082	5.24082	1.00000	0	10	9	5.21582	4.29598	2.86418	.09789
	1	5.55967	5.43448	1.14629	.00676		11	5.72912	4.47828	3.49010	.10838
	2	5.94262	5.66634	1.33336	.01349		12	6.42781	4.75694	4.43641	.11882
12	0	4.80977	4.80977	1.00000	0	12	13	7.46024	5.10668	6.03381	.12921
	1	5.07739	4.96951	1.13344	.00739		19	8.22255	5.56127	9.30925	.13956
	2	5.39281	5.25796	1.23999	.01474		0	3.07154	3.07154	1.00000	0
13	0	4.44543	4.44543	1.00000	0	1	1	3.18101	3.12594	1.08465	.01195
	1	4.67339	4.57891	1.12271	.00803		2	3.30163	3.18741	1.18134	.02377
	2	4.93834	4.73465	1.27307	.01600		3	3.43552	3.25671	1.29288	.03545
14	0	4.13360	4.13360	1.00000	0	4	4	3.58559	3.33514	1.42320	.04702
	1	4.33044	4.24248	1.11376	.00867		5	3.75551	3.42421	1.57743	.05849
	2	4.56638	4.37683	1.25087	.01726		6	3.95028	3.52573	1.76303	.06985
15	0	3.86369	3.86369	1.00000	0	7	7	4.17683	3.64210	1.99073	.08113
	1	4.03562	3.95993	1.10614	.00931		8	4.44535	3.77664	2.27703	.09232
	2	4.14555	3.98829	1.23231	.01931		9	4.77075	3.93351	2.64786	.10343
16	0	3.62792	3.62792	1.00000	0	10	10	5.17739	4.11880	3.14812	.11448
	1	3.77964	3.71064	1.09962	.00986		11	5.70582	4.34078	3.89929	.12547
	2	3.95037	3.80507	1.21661	.01983		12	6.43414	4.61223	4.95273	.13640
17	0	3.42032	3.42032	1.00000	0	13	13	7.53249	4.95273	6.84971	.14729
	1	3.55532	3.49188	1.09391	.01061		14	8.48326	5.39507	10.95449	.15813
	2	3.70612	3.57318	1.20313	.02134		20	0	2.92381	2.92381	1.00000
18	0	3.87615	3.66580	1.33170	.03154	1	1	3.02334	2.97148	1.08078	.01263
	1	4.07015	3.77171	1.48543	.04186		2	3.13239	3.02492	1.17239	.02510
	2	4.29455	3.89345	1.67261	.05210		3	3.25271	3.08575	1.27725	.03744
19	0	4.29455	3.89345	1.67261	.05210	2	4	3.38650	3.15392	1.39847	.04964
	1	4.55860	4.03450	1.90576	.06227		5	3.53676	3.23092	1.54042	.06172
	2	4.87573	4.19924	2.20412	.07236		6	3.70716	3.31824	1.70890	.07369
20	0	5.26736	4.39418	2.60026	.08240	3	7	3.90296	3.41765	1.91224	.08555
	1	5.76803	4.62799	3.15127	.09237		8	4.13158	3.53157	2.16293	.09732
	2	6.44180	4.91440	3.97167	.10230		9	4.40349	3.66307	2.47965	.10901
21	0	6.44180	4.91440	3.97167	.10230	4	10	4.73461	3.81626	2.89260	.12061
	1	7.41936	5.27398	5.32300	.11219		11	5.15114	3.99719	3.45455	.13215
	2	9.03211	5.73979	7.96901	.12204		12	5.69739	4.21372	4.26333	.14362
22	0	3.42032	3.42032	1.00000	0	5	13	6.46071	4.47840	5.52986	.15503
	1	3.55532	3.49188	1.09391	.01061		14	7.63854	4.81027	7.79624	.16640
	2	3.70612	3.57318	1.20313	.02134		15	9.83090	5.24117	13.02305	.17772
23	0	3.87615	3.66580	1.33170	.03154	6	0	2.79041	2.79041	1.00000	0
	1	4.07015	3.77171	1.48543	.04186		1	2.88143	2.83236	1.07736	.01331
	2	4.29455	3.89345	1.67261	.05210		2	2.98066	2.87953	1.16450	.02645
24	0	4.29455	3.89345	1.67261	.05210	7	3	3.08951	2.93292	1.26352	.03944
	1	4.55860	4.03450	1.90576	.06227		4	3.20981	2.99660	1.37704	.05228
	2	4.87573	4.19924	2.20412	.07236		5	3.34375	3.09910	1.50857	.06498
25	0	5.26736	4.39418	2.60026	.08240	8	6	3.47911	3.12563	1.64697	.07636
	1	5.76803	4.62799	3.15127	.09237		7	3.66576	3.28034	1.84678	.09002
	2	6.44180	4.91440	3.97167	.10230		8	3.86318	3.31777	2.06648	.10237
26	0	6.44180	4.91440	3.97167	.10230	9	9	4.09428	3.42921	2.34504	.11463
	1	7.41936	5.27398	5.32300	.11219		10	4.37040	3.55785	2.69521	.12679
	2	9.03211	5.73979	7.96901	.12204		11	4.70837	3.70760	3.15498	.13887
27	0	3.62792	3.62792	1.00000	0	12	12	5.13650	3.88429	3.78653	.15088
	1	3.77964	3.71064	1.09962	.00986		13	5.70365	4.09575	4.70770	.16282
	2	3.95037	3.80507	1.21661	.01983		14	6.50821	4.35408	6.17984	.17470
28	0	4.14479	3.91330	1.35610	.02961	15	15	7.78248	4.67780	8.90838	.18653
	1	4.36900	4.03782	1.52531	.03931		16	10.29326	5.09813	15.70811	.19831
	2	4.63202	4.18238	1.73515	.04895		22	0	2.66944	2.66944	1.00000
29	0	4.63202	4.18238	1.73515	.04895	1	1	2.75318	2.70504	1.07435	.014012
	1	4.94653	4.35137	2.00221	.05851		2	2.84397	2.74795	1.15755	.027827
	2	5.33290	4.51514	2.35426	.06803		3	2.94308	2.79453	1.25145	.041472
30	0	5.82325	4.79190	2.83915	.07748	2	4	3.05197	2.84677	1.35832	.054956
	1	6.47624	5.08655	3.55104	.08659		5	3.17242	2.90542	1.48108	.068287
	2	7.40814	5.45674	4.69797	.09626		6	3.30680	2.97131	1.62361	.081470
31	0	8.90088	5.93848	6.85594	.10559	3	7	3.44826	3.04552	1.79138	.094530
	1	3.42032	3.42032	1.00000	0		8	3.63087	3.12950	1.99170	.10746
	2	3.55532	3.49188	1.09391	.01061		9	3.83033	3.22498	2.23535	.12029
32	0	3.70612	3.57318	1.20313	.02134	4	10	4.06462	3.33411	2.53821	.13301
	1	3.87615	3.66580	1.33170	.03154		11	4.34571	3.45998	2.92528	.14564
	2	4.07015	3.77171	1.48543	.04186		12	4.69181	3.60650	3.43734	.15817
33	0	4.29455	3.89345	1.67261	.05210	5	13	5.13349	3.77921	4.14788	.17065
	1	4.55860	4.03450	1.90576	.06227		14	5.72501	3.98579	5.19944	.18304
	2	4.87573	4.19924	2.20412	.07236		15	6.57835	4.23809	6.91836	.19538
34	0	5.26736	4.39418	2.60026	.08240	6	16	7.97050	4.55413	10.23118	.20765
	1	5.76803	4.62799	3.15127	.09237		17	10.91166	4.96439	19.32636	.21989
	2	6.44180	4.91440	3.97167	.10230						

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_0	M_1	$\frac{P_1}{P_0}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_0	M_1	$\frac{P_1}{P_0}$	$\frac{\Delta P_{a,b}}{q_b}$
23	0	2.55931	2.55931	1.00000	0	27	5	2.54085	2.32939	1.38571	.08535
	1	2.63663	2.59191	1.07155	.014703		6	2.62517	2.36445	1.45044	.10167
	2	2.72021	2.62854	1.15131	.029212		7	2.71711	2.40346	1.60857	.11776
	3	2.81097	2.66964	1.24071	.043519		8	2.81810	2.44693	1.74297	.13365
	4	2.91011	2.71559	1.34175	.057649		9	2.92984	2.49534	1.89742	.14935
	5	3.01917	2.76708	1.45693	.071610		10	3.05449	2.54944	2.07680	.16488
	6	3.14004	2.82478	1.58952	.085414		11	3.19487	2.60990	2.28776	.18023
	7	3.27510	2.88954	1.74384	.099068		12	3.35498	2.67778	2.53991	.19544
	8	3.42766	2.95435	1.92598	.11259		13	3.53985	2.75428	2.84643	.21051
	9	3.60192	3.04481	2.14416	.12628		14	3.75706	2.84104	3.22752	.22544
	10	3.80388	3.13837	2.41057	.13927		15	4.01751	2.93990	3.71441	.24025
	11	4.04200	3.24533	2.74332	.15244		16	4.33830	3.05365	4.35596	.25496
	12	4.32897	3.36862	3.17120	.16551		17	4.74742	3.18578	5.25280	.26956
	13	4.66441	3.51192	3.74184	.17850		18	5.29553	3.34120	6.57644	.28408
14	5.14181	3.68084	4.54240	.19141	19	6.08998	3.52689	8.73972	.29851		
15	5.76160	3.88284	5.74666	.20424	20	7.37622	3.75323	12.91636	.31288		
16	6.67259	4.12943	7.76366	.21702	21	10.10296	4.03644	24.37689	.32718		
17	8.21184	4.43824	11.84447	.22974							
24	0	2.45897	2.45897	1.00000	0	28	0	2.13006	2.13006	1.00000	0
	1	2.53038	2.48739	1.06915	.015428		1	2.18546	2.14729	1.06148	.01839
	2	2.60761	2.51974	1.14773	.030617		2	2.24436	2.16689	1.12856	.03646
	3	2.69120	2.55602	1.23122	.045607		3	2.30713	2.18917	1.20202	.05422
	4	2.78202	2.59660	1.32117	.060389		4	2.37434	2.21407	1.28293	.07170
	5	2.88137	2.64194	1.43578	.074985		5	2.44661	2.24198	1.37252	.08890
	6	2.99085	2.69267	1.55985	.089410		6	2.52465	2.27308	1.47228	.10585
	7	3.11233	2.74947	1.70294	.10367		7	2.60945	2.30767	1.58425	.12288
	8	3.24831	2.81309	1.86990	.11778		8	2.70205	2.34617	1.71071	.13906
	9	3.40126	2.88381	2.06753	.13183		9	2.89976	2.37065	1.85492	.15485
	10	3.57857	2.96449	2.30507	.14559		10	2.91678	2.43671	2.02095	.17143
	11	3.78354	3.05730	2.59633	.15930		11	3.04296	2.48992	2.21432	.18735
	12	4.02611	3.16209	2.96196	.17291		12	3.18538	2.54937	2.44239	.20308
	13	4.31993	3.28285	3.43525	.18642		13	3.34818	2.61606	2.71591	.21866
14	4.66616	3.42314	4.07188	.19984	14	3.53684	2.69124	3.04990	.23410		
15	5.16169	3.58857	4.97374	.21317	15	3.75932	2.77404	3.46732	.24941		
16	5.81451	3.78616	6.35862	.22643	16	4.02749	2.87344	4.00428	.26459		
17	6.79454	4.02728	8.74365	.23962	17	4.35986	2.98504	4.72109	.27966		
18	8.51947	4.32922	13.84205	.25276	18	4.78758	3.11464	5.72715	.29463		
19					19	5.36603	3.26703	7.24894	.30950		
25	0	2.36619	2.36619	1.00000	0	29	20	6.22241	3.44906	9.78928	.32429
	1	2.43311	2.39158	1.06692	.016149		21	7.67074	3.67090	14.96338	.33901
	2	2.50490	2.42023	1.14078	.032053		22	11.04280	3.94841	31.18958	.35367
	3	2.58225	2.45239	1.22268	.047707						
	4	2.66584	2.48815	1.31421	.063162		0	2.06266	2.06266	1.00000	0
	5	2.75692	2.52825	1.41711	.078398		1	2.11505	2.07774	1.06001	.01916
	6	2.85665	2.57296	1.53377	.093442		2	2.17054	2.09496	1.12523	.03797
	7	2.96666	2.62291	1.66728	.10831		3	2.22957	2.11455	1.19647	.05646
	8	3.08899	2.67881	1.82163	.12301		4	2.29236	2.13521	1.27431	.07457
	9	3.22621	2.74136	2.00218	.13755		5	2.36005	2.16131	1.36067	.09251
	10	3.38185	2.81164	2.21653	.15196		6	2.43270	2.18895	1.45616	.11011
	11	3.56060	2.89100	2.47509	.16622		7	2.51121	2.21966	1.56258	.12744
	12	3.76908	2.98103	2.79352	.18036		8	2.59664	2.25386	1.68225	.14455
	13	4.01684	3.08381	3.19547	.19438		9	2.69398	2.29151	1.82347	.16209
14	4.31849	3.20211	3.71940	.20831	10	2.79292	2.33402	1.97234	.17808		
15	4.69712	3.33960	4.43072	.22214	11	2.90717	2.38101	2.15090	.19454		
16	5.19339	3.50148	5.45345	.23588	12	3.03508	2.43337	2.35935	.21081		
17	5.88489	3.69496	7.04972	.24955	13	3.17984	2.49153	2.60608	.22690		
18	6.94816	3.93093	9.89298	.26315	14	3.34576	2.55740	2.90292	.24285		
19	8.51314	4.22633	16.38741	.27670	15	3.53866	2.63123	3.26710	.25864		
26	0	2.28118	2.28118	1.00000	0	30	16	3.76717	2.71487	3.72486	.27429
	1	2.34380	2.30354	1.06492	.01688		17	4.04402	2.81017	4.31785	.28982
	2	2.41071	2.32880	1.13624	.03349		18	4.38959	2.91970	5.11702	.30524
	3	2.48254	2.35720	1.21505	.04985		19	4.83865	3.04685	6.25337	.32055
	4	2.55994	2.38897	1.30255	.06595		20	5.45687	3.19634	7.99871	.33576
	5	2.64389	2.42442	1.40051	.08185		21	6.38835	3.37485	11.02428	.35090
	6	2.73534	2.46403	1.51078	.09752		22	8.04043	3.59235	17.56086	.36595
	7	2.83560	2.50808	1.63601	.11300						
	8	2.94639	2.55727	1.77964	.12830		0	2.00000	2.00000	1.00000	0
	9	3.06978	2.61226	1.94606	.14342		1	2.04970	2.01309	1.05869	.01996
	10	3.20843	2.64370	2.14123	.15838		2	2.10220	2.02817	1.12228	.03953
	11	3.36513	2.74282	2.37366	.17319		3	2.15786	2.04536	1.19144	.05873
	12	3.54771	2.80717	2.65513	.18786		4	2.21712	2.06489	1.26706	.07743
	13	3.76027	2.90907	3.00338	.20241		5	2.28038	2.08676	1.35004	.09616
14	4.01396	3.00988	3.44555	.21684	6	2.34824	2.11124	1.44166	.11442		
15	4.32457	3.12584	4.02623	.23116	7	2.42132	2.13897	1.54331	.13239		
16	4.71747	3.26064	4.82275	.24539	8	2.50046	2.16931	1.65693	.15010		
17	5.23773	3.41920	5.98393	.25953	9	2.58664	2.20269	1.78480	.16757		
18	5.97457	3.60871	7.83617	.27359	10	2.68100	2.24016	1.92978	.18479		
19	7.13932	3.83975	11.26064	.28758	11	2.78510	2.28175	2.09572	.20180		
20	9.42386	4.12892	19.74410	.30152	12	2.90088	2.32799	2.28775	.21861		
27	0	2.20269	2.20269	1.00000	0	13	3.03082	2.37953	2.51256	.23523	
	1	2.26150	2.22239	1.06314	.01764	14	3.17820	2.43701	2.77947	.25167	
	2	2.32415	2.24468	1.13222	.03497	15	3.34766	2.50149	3.10201	.26795	
	3	2.39117	2.26979	1.20820	.05202	16	3.54542	2.57407	3.49958	.28408	
	4	2.46318	2.29795	1.29226	.06881	17	3.78065	2.65620	4.00222	.30006	
					18	4.06734	2.74978	4.65845	.31592		
					19	4.42795	2.85731	5.55196	.33166		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$
30	20	4.90159	3.00520	6.84081	0.34730	34	0	1.78829	1.78829	1.00000	0
	21	5.56424	3.12879	8.86354	.36284		1	1.82960	1.79493	1.05453	.023271
	22	6.58991	3.30392	12.49954	.37829		2	1.87291	1.80309	1.11302	.046028
	23	8.51233	3.51725	20.96744	.39367		3	1.91837	1.81285	1.17591	.060285
							4	1.96630	1.82427	1.24382	.090089
31	0	1.94160	1.94160	1.00000	0	5	2.01688	1.83741	1.31735	.11145	
	1	1.98886	1.95286	1.05748	.02076	6	2.07054	1.85237	1.39734	.13240	
	2	2.03868	1.96598	1.11958	.04110	7	2.12758	1.86926	1.48470	.15297	
	3	2.09138	1.98107	1.18694	.06106	8	2.18849	1.88824	1.58061	.17318	
	4	2.14730	1.99823	1.26029	.08064	9	2.25376	1.90935	1.68638	.19304	
	5	2.20684	2.01760	1.34052	.09989	10	2.32403	1.93285	1.80374	.21259	
	6	2.27049	2.03933	1.42871	.11880	11	2.40006	1.95894	1.93476	.23182	
	7	2.33880	2.06359	1.52616	.13741	12	2.48279	1.98784	2.08213	.25078	
	8	2.41247	2.09061	1.63449	.15574	13	2.57339	2.01986	2.24923	.26948	
	9	2.49232	2.12062	1.75569	.17379	14	2.67317	2.05523	2.44024	.28793	
	10	2.57936	2.15392	1.89230	.19160	15	2.78406	2.07055	2.66102	.30614	
	11	2.67484	2.19086	2.04755	.20916	16	2.90844	2.13794	2.91930	.32413	
	12	2.78034	2.23185	2.22567	.22651	17	3.04938	2.16628	3.22562	.34192	
	13	2.89789	2.27739	2.43223	.24364	18	3.21114	2.24018	3.59506	.35953	
	14	3.03011	2.32809	2.67480	.26058	19	3.39964	2.30049	4.04968	.37692	
	15	3.18052	2.38468	2.96390	.27735	20	3.62346	2.36828	4.62314	.39422	
	16	3.35393	2.44806	3.31456	.29394	21	3.89559	2.44492	5.36960	.41134	
	17	3.55709	2.51939	3.74909	.31038	22	4.23683	2.53215	6.38199	.42831	
	18	3.79995	2.60008	4.30204	.32668	23	4.68311	2.63228	7.83424	.44517	
19	4.09778	2.69201	5.02997	.34285	24	5.30348	2.76697	10.09437	.46191		
20	4.47555	2.79760	6.03228	.35890	35	0	1.74345	1.74345	1.00000	0	
21	4.97767	2.92012	7.50125	.37484		1	1.78316	1.74876	1.05375	.02415	
22	5.63902	3.06409	9.86355	.39068		2	1.82468	1.75553	1.11226	.04774	
23	6.83565	3.23596	14.29389	.40644		3	1.86822	1.76380	1.17296	.07079	
24	9.13076	3.44528	25.63452	.42212		4	1.91398	1.77361	1.23939	.09336	
0	1.88707	1.88707	1.00000	0		5	1.96221	1.78504	1.31116	.11545	
1	1.93213	1.89664	1.05639	.02158		6	2.01321	1.79815	1.38897	.13710	
2	1.97956	1.90799	1.11716	.04271		7	2.06730	1.81304	1.47368	.15834	
3	2.02958	1.92112	1.18287	.06342		8	2.12487	1.82981	1.56632	.17918	
4	2.08253	1.93620	1.25420	.08373		9	2.18638	1.84899	1.66810	.19966	
5	2.13875	1.95330	1.33195	.10367	10	2.25232	1.86953	1.78054	.21979		
6	2.19868	1.97256	1.41711	.12326	11	2.32352	1.89278	1.90548	.23960		
7	2.26277	2.00680	1.51078	.14251	12	2.40058	1.91855	2.04521	.25910		
8	2.33163	2.04807	1.61445	.16146	13	2.48453	1.94707	2.20263	.27832		
9	2.40596	2.08478	1.72982	.18011	14	2.57658	1.97862	2.38143	.29727		
10	2.48665	2.07445	1.85915	.19849	15	2.67822	2.01351	2.58644	.31596		
11	2.57474	2.10730	2.00522	.21662	16	2.79139	2.05215	2.82401	.33442		
12	2.67149	2.14373	2.17150	.23450	17	2.91858	2.09498	3.10277	.35266		
13	2.77856	2.18409	2.36269	.25215	18	3.06314	2.14258	3.43466	.37069		
14	2.89612	2.22897	2.58506	.26960	19	3.22962	2.19562	3.83675	.38853		
15	3.03292	2.27884	2.84700	.28684	20	3.42442	2.25495	4.33427	.40619		
16	3.18672	2.33454	3.16033	.30390	21	3.65692	2.32162	4.96621	.42369		
17	3.36459	2.39688	3.54210	.32080	22	3.94150	2.39697	5.79616	.44103		
18	3.57385	2.46700	4.01779	.33753	23	4.30153	2.48272	6.93226	.45824		
19	3.82931	2.54630	4.62734	.35413	24	4.77837	2.58113	8.59705	.47532		
20	4.13577	2.63661	5.43708	.37058	25	5.45400	2.69523	11.25052	.49229		
21	4.53321	2.74033	6.56985	.38692	26	6.23305	2.82921	16.16503	.50915		
22	5.06850	2.88280	8.24971	.40315	27	8.62546	2.98903	28.38910	.52591		
23	5.84704	3.00200	11.03386	.41927	36	0	1.70130	1.70130	1.00000	0	
24	7.13785	3.17071	16.52504	.43531		1	1.73955	1.70539	1.05304	.025040	
25	9.97414	3.37616	32.42577	.45127		2	1.77947	1.71085	1.10969	.049487	
0	1.83608	1.83608	1.00000	0		3	1.82126	1.71772	1.17033	.073358	
1	1.87918	1.84413	1.05541	.02242		4	1.86536	1.72606	1.23585	.096830	
2	1.92442	1.85381	1.11497	.04435		5	1.91119	1.73654	1.30563	.11953	
3	1.97206	1.86350	1.17920	.06583		6	1.95980	1.74734	1.38147	.14189	
4	2.02235	1.87836	1.24872	.08688		7	2.01124	1.76042	1.46381	.16380	
5	2.07561	1.89338	1.32426	.10752		8	2.06585	1.77522	1.55356	.18530	
6	2.13221	1.91039	1.40668	.12779		9	2.12402	1.79185	1.65178	.20639	
7	2.19258	1.92947	1.49703	.14770	10	2.18626	1.81048	1.75992	.22713		
8	2.25722	1.95082	1.59657	.16727	11	2.25305	1.83118	1.87943	.24793		
9	2.32674	1.97459	1.70686	.18653	12	2.32517	1.85438	2.01251	.26754		
10	2.40188	2.00099	1.82982	.20796	13	2.40336	1.87960	2.16155	.28728		
11	2.48351	2.03026	1.96784	.22417	14	2.48870	1.90778	2.32982	.30673		
12	2.57274	2.06268	2.12398	.24259	15	2.58245	1.93889	2.52146	.32591		
13	2.67094	2.09859	2.30217	.26076	16	2.68612	1.97330	2.74161	.34483		
14	2.77983	2.13838	2.50757	.27870	17	2.80180	2.01136	2.99750	.36351		
15	2.90165	2.18255	2.74709	.29643	18	2.93216	2.05355	3.29879	.38197		
16	3.03936	2.23168	3.03020	.31396	19	3.08076	2.10040	3.65894	.40022		
17	3.19689	2.28644	3.37020	.33131	20	3.25251	2.15260	4.09738	.41827		
18	3.37977	2.34775	3.78644	.34848	21	3.45439	2.21098	4.64313	.43615		
19	3.59589	2.41669	4.30816	.36549	22	3.69669	2.27656	5.31355	.45386		
20	3.85704	2.49464	4.98175	.38235	23	3.99543	2.35065	6.26779	.47141		
21	4.18188	2.58339	5.88545	.39908	24	4.37714	2.43496	7.55997	.48883		
22	4.60196	2.68528	7.16241	.41569	25	4.89989	2.53169	9.47123	.50612		
23	5.17619	2.80347	9.10556	.43218	26	5.63298	2.66431	12.62122	.52329		
24	6.03149	2.94229	12.42298	.44857							
25	7.51479	3.10795	19.37661	.46487							
26	11.19767	3.53991	43.22636	.48109							

TABLE I - VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$
36	27	6.85490	2.77549	18.77364	0.54035	39	17	2.51649	1.79765	2.75938	0.39689
	28	9.49197	2.93252	36.14927	0.5732		18	2.61643	1.82749	2.99641	0.41661
37	0	1.66164	1.66164	1.00000	0	20	19	2.72771	1.86043	3.27119	0.43607
	1	1.69857	1.66458	1.05244	0.02997		20	2.85280	1.89684	3.59373	0.45229
2	1.73706	1.66883	1.10831	0.05128	21	21	2.99499	1.93714	3.97793	0.47427	
	3	1.77726	1.67443	1.16800		0.07598	22	3.15879	1.98195	4.44366	0.49304
3	1.81934	1.68140	1.23196	0.10011	23	23	3.35052	2.03163	5.02033	0.51161	
	4	1.86351	1.68980	1.30070		0.12370	24	3.68530	2.09759	6.03867	0.52999
5	1.91000	1.69967	1.37483	0.14678	25	25	3.85991	2.14968	6.71741	0.54821	
	6	1.95907	1.71107	1.45505		0.16938	26	4.21505	2.22019	8.04246	0.56627
7	2.01103	1.72408	1.54221	0.19153	27	27	4.68611	2.30037	9.97979	0.58418	
	8	2.06623	1.73879	1.63730		0.21225	28	5.35512	2.39231	13.08374	0.60196
10	2.12508	1.75530	1.74154	0.23458	29	29	6.41824	2.49885	18.86698	0.61961	
	11	2.18809	1.77373	1.85637		0.25552	30	30	8.52952	2.62389	33.44886
12	2.25584	1.79422	1.98358	0.27612	40	0		1.55572	1.55572	1.00000	0
	13	2.32903	1.81694	2.12538		0.29638	1	1.58940	1.55556	1.05106	0.02887
14	2.40896	1.84205	2.28941	0.31643	2	2	1.62431	1.55660	1.10515	0.05693	
	15	2.49541	1.86986	2.46456		0.33599	3	1.66120	1.55877	1.16355	0.08467
16	2.59099	1.90054	2.66997	0.35337	4	4	1.69841	1.56224	1.22384	0.11085	
	17	2.69694	1.93445	2.90670		0.37449	5	5	1.73791	1.56694	1.28916
18	2.81543	1.97195	3.18269	0.39337	6	6		1.77912	1.57276	1.35914	0.16209
	19	2.94931	2.01350	3.50881		0.41203	7	1.82243	1.57923	1.43431	0.18681
20	3.10242	2.05963	3.90033	0.43043	8	8	1.86797	1.58641	1.51532	0.20988	
	21	3.26008	2.11101	4.37946		0.44873	9	1.91599	1.59826	1.60291	0.23462
22	3.42991	2.16844	4.97971	0.46679	10	10	1.96679	1.60950	1.69799	0.25777	
	23	3.74331	2.23295	5.75420		0.48469	11	2.02072	1.62230	1.80165	0.28046
24	4.05825	2.30583	6.72940	0.50244	12	12	2.07818	1.63666	1.91519	0.30272	
	25	4.46512	2.38873	8.25775		0.52004	13	2.13960	1.65272	2.04007	0.32456
26	5.02050	2.48383	10.48377	0.53751	14	14	2.20564	1.67062	2.17838	0.34603	
	27	5.84590	2.59406	14.27360		0.55487	15	15	2.27684	1.69040	2.33224
28	7.27143	2.72345	22.17482	0.57211	16	16		2.35412	1.71233	2.50474	0.38789
	29	10.76973	2.87776	48.84307		0.58927	17	2.43844	1.73651	2.69953	0.40833
38	0	1.62427	1.62427	1.00000	0	18	18	2.53106	1.76318	2.92139	0.42846
	1	1.66000	1.62610	1.05191	0.02691		19	2.63355	1.79260	3.17655	0.44832
2	1.69720	1.68925	1.10711	0.05312	20	20	2.74794	1.82507	3.47330	0.46791	
	3	1.73595	1.63363	1.16595		0.07867	21	2.87691	1.86290	3.82297	0.48766
3	1.77646	1.63934	1.22888	0.10361	22	22	3.02399	1.90062	4.24135	0.50637	
	4	1.81891	1.64639	1.29635		0.12796	23	3.19412	1.94465	4.75127	0.52527
5	1.86348	1.65484	1.36892	0.15177	24	24	3.39425	1.99364	5.36888	0.54396	
	6	1.91042	1.66471	1.44727		0.17507	25	25	3.63476	2.04837	6.20177
7	1.95999	1.67607	1.53211	0.19788	26	26		3.93174	2.10980	7.28497	0.58081
	8	2.01254	1.68903	1.62441		0.22023	27	4.31206	2.17916	8.79667	0.59899
10	2.06839	1.70361	1.72524	0.24217	28	28	4.82461	2.25802	11.05366	0.61702	
	11	2.12800	1.71988	1.83585		0.26369	29	5.57095	2.34844	14.79363	0.63492
12	2.19194	1.73827	1.95797	0.28484	30	30	6.81144	2.47200	22.19783	0.65270	
	13	2.26069	1.75849	2.09337		0.30562	31	9.55562	2.57613	43.84821	0.67037
14	2.33512	1.77819	2.24461	0.32607	41	0	1.52425	1.52425	1.00000	0	
	15	2.41604	1.80577	2.41463		0.34621	1	1.55704	1.82319	1.05073	0.02989
16	2.50464	1.83315	2.60744	0.36605	2	2	1.59100	1.82320	1.10441	0.05892	
	17	2.60229	1.86344	2.82795		0.38566	3	1.62623	1.82450	1.16133	0.08714
18	2.71076	1.89686	3.08280	0.40492	4	4	1.66286	1.82688	1.22183	0.11461	
	19	2.83237	1.93381	3.38091		0.42398	5	5	1.70103	1.83043	1.28631
20	2.97018	1.97473	3.73452	0.44281	6	6		1.74090	1.83516	1.35521	0.16743
	21	3.12834	2.02015	4.16184		0.46143	7	1.78264	1.84110	1.42906	0.19288
22	3.31262	2.07072	4.68994	0.47985	8	8	1.82644	1.84829	1.50845	0.21774	
	23	3.51443	2.12723	5.34815		0.49809	9	1.87255	1.85677	1.59408	0.24204
24	3.79744	2.19070	6.21029	0.51616	10	10	1.92121	1.86658	1.68679	0.26581	
	25	4.13102	2.26238	7.37982		0.53407	11	1.97274	1.87780	1.78755	0.28910
26	4.58731	2.34390	9.05803	0.55184	12	12	2.02749	1.89049	1.89753	0.31191	
	27	5.17392	2.43741	11.67110		0.56947	13	2.08588	1.90474	2.01813	0.33429
28	6.10326	2.56549	16.30565	0.58699	14	14	2.14839	1.92004	2.15104	0.35626	
	29	7.80868	2.67296	26.79741		0.60440	15	15	2.21562	1.93631	2.29837
30	12.89714	2.82462	73.38925	0.62171	16	16		2.28827	1.95788	2.46267	0.39906
	0	1.58902	1.58902	1.00000		0	17	2.36721	1.97951	2.64721	0.41993
1	1.62367	1.58985	1.05145	0.02788	18	18	2.45349	1.70337	2.85608	0.44048	
	2	1.65967	1.59190	1.10605		0.05500	19	2.54845	1.72968	3.09460	0.46073
3	1.69713	1.59517	1.16416	0.08142	20	20	2.65378	1.75868	3.36974	0.48070	
	4	1.73622	1.59970	1.22617		0.10718	21	2.77164	1.79068	3.69085	0.50040
5	1.77709	1.60550	1.29251	0.13232	22	22	2.90492	1.82601	4.07076	0.51985	
	6	1.81992	1.61261	1.36371		0.15687	23	3.05749	1.86509	4.52755	0.53907
7	1.86495	1.62107	1.44036	0.18087	24	24	3.23473	1.90844	5.08756	0.55807	
	8	1.91239	1.63094	1.52317		0.20436	25	25	3.44438	1.95667	5.79072
9	1.96255	1.64227	1.61298	0.22735	26	26		3.69807	2.01053	6.70059	0.59549
	10	2.01575	1.65514	1.71076		0.24989	27	4.01421	2.07098	7.92491	0.61355
11	2.07236	1.66963	1.81770	0.27200	28	28	4.42429	2.13921	9.66250	0.63221	
	12	2.13285	1.68584	1.93523		0.29370	29	4.98692	2.21677	12.32147	0.65034
13	2.19774	1.70390	2.06508	0.31501	30	30	5.83108	2.30570	16.90715	0.66834	
	14	2.26769	1.72394	2.20939		0.33597	31	7.31588	2.40871	26.70940	0.68622
15	2.34345	1.74612	2.37081	0.35699	32	32	11.16425	2.52958	62.42147	0.70398	
	16	2.42599	1.77061	2.55271		0.37689					

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	
42	0	1.49448	1.49448	1.00000	0	44	15	2.05902	1.50014	2.22011	0.41113	
	1	1.52646	1.49254	1.05047	.03094		16	2.12085	1.51398	2.36559	.43372	
	2	1.55953	1.49172	1.10379	.06096		17	2.18729	1.52938	2.52675	.45889	
	3	1.59084	1.48920	1.16026	.09046		18	2.25905	1.54644	2.70637	.47767	
	4	1.63013	1.49331	1.22140	.11902		19	2.33696	1.56530	2.90795	.49908	
	5	1.66642	1.49592	1.28389	.14604		20	2.42205	1.58610	3.13593	.52014	
	6	1.70602	1.50047	1.35186	.17270		21	2.51562	1.60901	3.39602	.54088	
	7	1.74533	1.50437	1.42453	.19909		22	2.61929	1.63424	3.69573	.56132	
	8	1.78759	1.51037	1.50251	.22465		23	2.73518	1.66202	4.04507	.58147	
	9	1.83196	1.51758	1.58642	.24962		24	2.86606	1.69262	4.45777	.60135	
	10	1.87871	1.52603	1.67703	.27402		25	3.01565	1.72639	4.95312	.62098	
	11	1.92809	1.53583	1.77522	.29790		26	3.18913	1.76371	5.55910	.64038	
	12	1.98043	1.54697	1.88207	.32128		27	3.39390	1.80508	6.31798	.65956	
	13	2.03608	1.55958	1.99882	.34419		28	3.64100	1.85107	7.29665	.67853	
	14	2.09550	1.57370	2.12706	.36667		29	3.94787	1.90240	8.60767	.69731	
	15	2.15919	1.58941	2.26861	.38873		30	4.34390	1.95998	10.45639	.71592	
	16	2.22779	1.60689	2.42582	.41041		31	4.88378	2.02495	13.26101	.73437	
	17	2.30202	1.62622	2.60146	.43172		32	5.60455	2.09877	16.02541	.75267	
	18	2.38280	1.64758	2.79914	.45268		33	7.06275	2.18337	27.91591	.77084	
	19	2.47126	1.67112	3.02345	.47332		34	10.41342	2.29901	60.88204	.78888	
	20	2.56883	1.69707	3.28032	.49366		45	0	1.41421	1.41421	1.00000	0
	21	2.67731	1.72566	3.57758	.51371			1	1.44426	1.40982	1.05010	.03431
	22	2.79904	1.75719	3.92581	.53350			2	1.47521	1.40648	1.10280	.06748
	23	2.93714	1.79199	4.33962	.55303			3	1.50714	1.40419	1.15836	.09960
	24	3.09586	1.83048	4.83980	.57233			4	1.54015	1.40293	1.21704	.13071
	25	3.28113	1.87316	5.45696	.59142			5	1.57434	1.40269	1.27916	.16090
	26	3.50161	1.92063	6.23811	.61030			6	1.60983	1.40348	1.34507	.19022
	27	3.77045	1.97364	7.25935	.62899			7	1.64673	1.40529	1.41516	.21871
	28	4.10893	2.03111	8.65247	.64751			8	1.68518	1.40814	1.48991	.24645
	29	4.55417	2.10024	10.66728	.66587			9	1.72536	1.41205	1.56983	.27346
	30	5.17863	2.17653	13.84204	.68408			10	1.76742	1.41703	1.65554	.29979
	31	6.14967	2.26399	19.58813	.70216			11	1.81159	1.42311	1.74775	.32549
	32	7.98864	2.38362	33.16941	.72011			12	1.85809	1.43032	1.84730	.35059
33	14.19485	2.48414	105.08535	.73795	13	1.90720		1.43872	1.95535	.37513		
14	1.95922	1.44834	2.07248	.39914	14	1.95922		1.44834	2.07248	.39914		
43	0	1.46628	1.46628	1.00000	0	46	0	1.39016	1.39016	1.00000	0	
	1	1.49755	1.46349	1.05029	.03203		1	1.41969	1.38498	1.05010	.03551	
	2	1.52984	1.46179	1.10333	.06307		2	1.45008	1.38088	1.10274	.06980	
	3	1.56325	1.46118	1.15941	.09319		3	1.48138	1.37779	1.15813	.10294	
	4	1.59788	1.46165	1.21882	.12243		4	1.51372	1.37573	1.21661	.13505	
	5	1.63385	1.46320	1.28190	.15086		5	1.54715	1.37464	1.27839	.16615	
	6	1.67130	1.46584	1.34907	.17853		6	1.58181	1.37460	1.34384	.19631	
	7	1.71037	1.46959	1.42075	.20547		7	1.61778	1.37540	1.41334	.22562	
	8	1.75122	1.47447	1.49749	.23174		8	1.65521	1.37744	1.48728	.25408	
	9	1.79404	1.48050	1.57988	.25738		9	1.69426	1.38037	1.56626	.28181	
	10	1.83906	1.48772	1.66862	.28242		10	1.73507	1.38431	1.65076	.30881	
	11	1.88651	1.49617	1.76495	.30690		11	1.77783	1.38936	1.74144	.33512	
	12	1.93668	1.50591	1.86864	.33085		12	1.82279	1.39545	1.83945	.36080	
	13	1.98991	1.51698	1.98205	.35430		13	1.87015	1.40266	1.94474	.38589	
	14	2.04657	1.52947	2.10617	.37728		14	1.92023	1.41102	2.05931	.41041	
	15	2.10714	1.54345	2.24267	.39983		15	1.97330	1.42055	2.18408	.43441	
	16	2.17214	1.55902	2.39362	.42196		16	2.02982	1.43138	2.32064	.45790	
	17	2.24223	1.57629	2.56152	.44370		17	2.09018	1.44353	2.47077	.48093	
	18	2.31820	1.59539	2.74953	.46507		18	2.15495	1.45708	2.63675	.50351	
	19	2.40103	1.61646	2.96164	.48610		19	2.22476	1.47212	2.82133	.52568	
	20	2.49191	1.63969	3.20294	.50680		20	2.30039	1.48878	3.02795	.54746	
	21	2.59237	1.66528	3.48010	.52720		21	2.38282	1.50715	3.26098	.56888	
	22	2.70435	1.69346	3.80196	.54731		22	2.47321	1.52740	3.52598	.58994	
	23	2.83381	1.72502	4.18819	.56715		23	2.57309	1.54968	3.83023	.61068	
	24	2.97391	1.75881	4.63254	.58675		24	2.68435	1.57449	4.18338	.63112	
	25	3.13997	1.79676	5.13317	.60612		25	2.80952	1.60116	4.59891	.65127	
	26	3.33394	1.83873	5.66488	.62526							
	27	3.56680	1.88545	6.33684	.64420							
	28	3.85318	1.93762	7.18996	.66295							
	29	4.21794	1.99614	8.28750	.68152							
	30	4.70573	2.06218	11.84954	.69994							
	31	5.40747	2.13722	15.70056	.71820							
	32	6.34844	2.22324	23.10298	.73634							
33	8.93919	2.32287	43.19541	.75435								
44	0	1.43955	1.43955	1.00000	0	47	0	1.43955	1.43955	1.00000	0	
	1	1.47017	1.43595	1.05016	.03315		1	1.46117	1.43245	1.09984	.03615	
	2	1.50175	1.43340	1.10300	.06524		2	1.48438	1.43044	1.16044	.07044	
	3	1.53439	1.43194	1.15878	.09634		3	1.50915	1.42890	1.22844	.10644	
	4	1.56816	1.43154	1.21777	.12651		4	1.53548	1.42782	1.30344	.15444	
	5	1.60320	1.43215	1.28033	.15581		5	1.56339	1.42710	1.38644	.21644	
	6	1.63960	1.43385	1.34680	.18429		6	1.59289	1.42674	1.47844	.29444	
	7	1.67754	1.43659	1.41765	.21202		7	1.62400	1.42674	1.58044	.39044	
	8	1.71712	1.44044	1.49329	.23900		8	1.65674	1.42708	1.69444	.50644	
	9	1.75855	1.44536	1.57435	.26532		9	1.69114	1.42766	1.82044	.64444	
	10	1.80201	1.45143	1.66148	.29101		10	1.72714	1.42848	1.95844	.80644	
	11	1.84775	1.45868	1.75542	.31608		11	1.76474	1.42954	2.10844	.99444	
	12	1.89597	1.46707	1.85710	.34062		12	1.80394	1.43084	2.27244	1.21044	
	13	1.94702	1.47675	1.96754	.36461		13	1.84474	1.43238	2.45044	1.45644	
14	2.00123	1.48774	2.08804	.37474	14	1.88714	1.43418	2.64444	1.72844			

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$		
46	26	2.95193	1.63086	5.09384	0.67115	48	32	4.06049	1.78024	10.45639	0.81935		
	27	3.11618	1.66361	5.69551	.69078		33	4.49758	1.76836	12.86653	.83805		
	28	3.30874	1.69980	6.44239	.71018		34	5.10813	1.82230	16.64529	.85657		
	29	3.53915	1.73988	7.39491	.72936		35	6.05125	1.88312	23.42636	.87492		
	30	3.82213	1.78442	8.65246	.74833		36	7.18289	1.95221	39.16270	.89314		
	31	4.18188	1.83413	10.39077	.76711		37	8.43954	2.03135	116.20903	.91121		
	32	4.66173	1.88987	12.95259	.78572		49	0	1.32501	1.32501	1.00000	0	
	33	5.34930	1.95274	17.10800	.80417			1	1.35337	1.31763	1.05048	.03937	
	34	6.45951	2.02416	25.02251	.82247			2	1.38245	1.31130	1.10333	.07724	
	35	8.74799	2.10599	46.03221	.84064			3	1.41230	1.30598	1.15878	.11372	
	47	0	1.36733	1.36733	1.00000			0	4	1.44301	1.30164	1.21704	.14891
		1	1.39641	1.36141	1.05016			.03675	5	1.47465	1.29827	1.27839	.18288
		2	1.42630	1.35654	1.10280			.07219	6	1.50731	1.29585	1.34310	.21573
		3	1.45706	1.35269	1.15815			.10642	7	1.54108	1.29435	1.41151	.24753
4		1.48878	1.34984	1.21646	.13951	8		1.57607	1.29378	1.48399	.27835		
5		1.52154	1.34797	1.27800	.17155	9		1.61239	1.29413	1.56096	.30824		
6		1.55544	1.34708	1.34310	.20259	10		1.65019	1.29540	1.64290	.33727		
7		1.59060	1.34716	1.41211	.23270	11		1.68966	1.29760	1.73037	.36549		
8		1.62712	1.34821	1.48545	.26195	12		1.73080	1.30074	1.82401	.39295		
9		1.66516	1.35024	1.56359	.29037	13		1.77397	1.30483	1.92455	.41970		
10		1.70485	1.35326	1.64707	.31804	14	1.81933	1.30991	2.03286	.44578			
11		1.74637	1.35727	1.73650	.34498	15	1.86712	1.31599	2.14994	.47123			
12		1.78993	1.36232	1.83261	.37125	16	1.91764	1.32311	2.27699	.49609			
13		1.83573	1.36841	1.93624	.39689	17	1.97121	1.33132	2.41543	.52038			
14	1.88405	1.37560	2.04839	.42193	18	2.02822	1.34065	2.56696	.54416				
15	1.93516	1.38391	2.17022	.44641	19	2.08914	1.35117	2.73362	.56744				
16	1.98943	1.39339	2.30313	.47036	20	2.15449	1.36293	2.91792	.59026				
17	2.04726	1.40411	2.44879	.49381	21	2.22495	1.37602	3.12296	.61264				
18	2.10912	1.41614	2.60825	.51680	22	2.30130	1.39053	3.35260	.63461				
19	2.17560	1.42954	2.78698	.53934	23	2.38451	1.40654	3.61170	.65619				
20	2.24736	1.44440	2.98505	.56147	24	2.47579	1.42419	3.90652	.67740				
21	2.32526	1.46084	3.20733	.58321	25	2.57667	1.44360	4.24521	.69828				
22	2.41032	1.47898	3.45670	.60458	26	2.68909	1.46494	4.63861	.71883				
23	2.50383	1.49895	3.74545	.62561	27	2.81562	1.48840	5.08146	.73908				
24	2.60741	1.52092	4.07583	.64632	28	2.95967	1.51417	5.58428	.75904				
25	2.72317	1.54507	4.46089	.66671	29	3.12592	1.54254	6.32660	.77875				
26	2.85386	1.57165	4.91572	.68683	30	3.32102	1.57379	7.16241	.79820				
27	3.00320	1.60090	5.46154	.70667	31	3.55475	1.60830	8.23036	.81742				
28	3.17632	1.63314	6.12913	.72627	32	3.84229	1.64650	9.64375	.83642				
29	3.38059	1.66877	6.96494	.74563	33	4.20868	1.68894	11.60395	.85522				
30	3.62700	1.70822	8.04246	.76477	34	4.69905	1.73628	14.50661	.87383				
31	3.93285	1.75205	9.48532	.78371	35	5.40551	1.78933	19.25024	.89227				
32	4.32733	1.80096	11.51871	.80246	36	6.57478	1.84915	28.40795	.91055				
33	4.86465	1.85579	14.60078	.82104	37	8.98915	1.89961	53.52952	.92869				
34	5.66067	1.91764	19.82908	.83945	50	0	1.30541	1.30541	1.00000	0			
35	7.02769	1.98788	30.65294	.85772		1	1.33348	1.29731	1.05072	.04075			
36	10.33190	2.06836	66.44672	.87585		2	1.36225	1.29028	1.10380	.07991			
48	0	1.34562	1.34562	1.00000		0	3	1.39174	1.28425	1.15940	.11756		
	1	1.37431	1.33897	1.05028		.03803	4	1.42204	1.27920	1.21777	.15384		
	2	1.40376	1.33334	1.10299		.07466	5	1.45322	1.27510	1.27916	.18884		
	3	1.43404	1.32876	1.15835		.11000	6	1.48536	1.27194	1.34383	.22263		
	4	1.46522	1.32515	1.21660		.14413	7	1.51856	1.26972	1.41210	.25529		
	5	1.49738	1.32253	1.27799		.17712	8	1.55292	1.26837	1.48436	.28693		
	6	1.53062	1.32084	1.34285		.20960	9	1.58854	1.26795	1.56095	.31756		
	7	1.56467	1.32016	1.41075		.23968	10	1.62554	1.26843	1.64237	.34729		
	8	1.60075	1.32034	1.48134		.27003	11	1.66408	1.26977	1.72917	.37617		
	9	1.63789	1.32151	1.56185		.29919	12	1.70426	1.27204	1.82185	.40422		
	10	1.67658	1.32364	1.64444		.32752	13	1.74634	1.27525	1.92125	.43154		
	11	1.71700	1.32672	1.73283	.35511	14	1.79047	1.27937	2.02809	.45814			
	12	1.75929	1.33077	1.82758	.38198	15	1.83687	1.28445	2.14331	.48407			
	13	1.80370	1.33585	1.92951	.40816	16	1.88581	1.29052	2.26807	.50939			
14	1.85044	1.34190	2.03959	.43372	17	1.93761	1.29760	2.40364	.53411				
15	1.89980	1.34908	2.15885	.45868	18	1.99260	1.30574	2.55161	.55827				
16	1.95212	1.35736	2.28864	.48308	19	2.05120	1.31499	2.71386	.58192				
17	2.00769	1.36677	2.43042	.50696	20	2.11391	1.32540	2.89268	.60507				
18	2.06698	1.37739	2.58609	.53034	21	2.18131	1.33703	3.09086	.62776				
19	2.13050	1.38929	2.75788	.55326	22	2.25409	1.34997	3.31189	.65002				
20	2.19886	1.40253	2.94856	.57573	23	2.33313	1.36428	3.56009	.67186				
21	2.27280	1.41722	3.16158	.59779	24	2.41947	1.38009	3.84102	.69333				
22	2.35321	1.43345	3.40126	.61947	25	2.51443	1.39749	4.16179	.71442				
23	2.44121	1.45134	3.67309	.64078	26	2.61969	1.41662	4.53177	.73518				
24	2.53819	1.47103	3.98424	.66174	27	2.73741	1.43765	4.96552	.75562				
25	2.64594	1.49269	4.34413	.68238	28	2.87044	1.46075	5.47426	.77576				
26	2.76675	1.51649	4.76946	.70272	29	3.02262	1.48613	6.08224	.79562				
27	2.90369	1.54266	5.26577	.72277	30	3.19929	1.51406	6.84082	.81521				
28	3.06091	1.57147	5.84997	.74255	31	3.40813	1.54482	7.78552	.83555				
29	3.24422	1.60322	6.61467	.76209	32	3.66064	1.57878	9.00756	.85366				
30	3.46207	1.63828	7.55598	.78139	33	3.97506	1.61636	10.65120	.87256				
31	3.72728	1.67711	8.78447	.80047	34	4.38240	1.65811	12.98191	.89126				

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$
50	35	4.94092	1.70467	16.54698	0.90977	52	35	4.31141	1.55729	13.29968	0.94527
	36	5.77744	1.75684	22.68537	.92811		36	4.83682	1.59767	16.78182	.96369
	37	7.24492	1.81567	35.76860	.94629		37	5.60756	1.64269	22.61361	.98193
	38	11.02198	1.88247	63.00475	.96432		38	6.90708	1.69313	34.39544	1.00000
	39						39	9.89463	1.74999	70.76037	1.01791
51	0	1.28676	1.28676	1.00000	0	53	0	1.25214	1.25214	1.00000	0
	1	1.31461	1.27794	1.05105	.04220		1	1.27969	1.24189	1.05190	.04528
	2	1.34310	1.27020	1.10441	.08268		2	1.30781	1.23275	1.10605	.08258
	3	1.37229	1.26347	1.16026	.12157		3	1.33656	1.22465	1.16262	.13005
	4	1.40225	1.25773	1.21882	.15898		4	1.36600	1.21756	1.22183	.16983
	5	1.43304	1.25294	1.28033	.19501		5	1.39619	1.21142	1.28389	.20805
	6	1.46474	1.24908	1.34507	.22976		6	1.42721	1.20621	1.34907	.24481
	7	1.49745	1.24613	1.41333	.26333		7	1.45914	1.20190	1.41763	.28022
	8	1.53125	1.24408	1.48545	.29577		8	1.49205	1.19846	1.48991	.31438
	9	1.56624	1.24290	1.56183	.32718		9	1.52604	1.19589	1.56625	.34736
	10	1.60255	1.24260	1.64290	.35762		10	1.56122	1.19415	1.64707	.37925
	11	1.64030	1.24317	1.72916	.38715		11	1.59770	1.19325	1.73281	.41011
	12	1.67964	1.24463	1.82118	.41582		12	1.63560	1.19319	1.82401	.44003
	13	1.72072	1.24696	1.91962	.44370		13	1.67508	1.19395	1.92126	.46904
	14	1.76374	1.25020	2.02525	.47082		14	1.71629	1.19555	2.02525	.49722
	15	1.80891	1.25434	2.13895	.49725		15	1.75941	1.19800	2.13677	.52462
	16	1.85646	1.25943	2.26176	.52301		16	1.80465	1.20130	2.25676	.55127
	17	1.90668	1.26547	2.39492	.54814		17	1.85225	1.20547	2.38689	.57724
	18	1.95988	1.27251	2.53987	.57270		18	1.90248	1.21053	2.52664	.60255
	19	2.01645	1.28059	2.69635	.59670		19	1.95566	1.21652	2.67932	.62726
	20	2.07682	1.28975	2.87247	.62018		20	2.01216	1.22346	2.84613	.65139
	21	2.14152	1.30005	3.06478	.64318		21	2.07241	1.23140	3.02926	.67497
	22	2.21139	1.31155	3.27844	.66572		22	2.13693	1.24037	3.23135	.69805
	23	2.28657	1.32432	3.51734	.68782		23	2.20633	1.25044	3.45565	.72065
	24	2.36861	1.33845	3.78644	.70952		24	2.28136	1.26166	3.70619	.74280
	25	2.45845	1.35403	4.09202	.73084		25	2.36292	1.27410	3.98804	.76453
	26	2.55756	1.37119	4.44229	.75179		26	2.45212	1.28784	4.30767	.78585
	27	2.66777	1.39005	4.84808	.77241		27	2.55039	1.30299	4.67348	.80680
	28	2.79151	1.41076	5.32406	.79271		28	2.65951	1.31965	5.09652	.82739
	29	2.93197	1.43350	5.89051	.81271		29	2.78180	1.33795	5.59167	.84766
	30	3.09353	1.45850	6.57643	.83244		30	2.92034	1.35803	6.17951	.86761
	31	3.28233	1.48598	7.42463	.85190		31	3.07931	1.38008	6.88921	.88726
	32	3.50735	1.51625	8.50117	.87111		32	3.26455	1.40429	7.76366	.90664
	33	3.78233	1.54966	9.91359	.89009		33	3.48454	1.43090	8.86847	.92577
	34	4.12960	1.58664	11.84954	.90886		34	3.75215	1.46019	10.30955	.94465
	35	4.58848	1.62770	14.66843	.92743		35	4.08807	1.49252	12.26935	.96330
	36	5.23674	1.67349	19.15633	.94582		36	4.52825	1.52828	15.09156	.98175
	37	6.25775	1.72479	27.42567	.96403		37	5.14217	1.56798	19.50936	1.00000
	38	8.24709	1.78263	47.75734	.98209		38	6.08831	1.61224	27.41609	1.01807
	39						39	7.84757	1.66183	45.69954	1.03597
52	0	1.26902	1.26902	1.00000	0	54	0	1.23606	1.23606	1.00000	0
	1	1.29670	1.25948	1.05144	.04370		1	1.26333	1.22509	1.05243	.04691
	2	1.32498	1.25103	1.10516	.08557		2	1.29155	1.21520	1.10740	.09172
	3	1.35392	1.24364	1.16131	.12571		3	1.32016	1.20650	1.16416	.13456
	4	1.38359	1.23720	1.22017	.16430		4	1.34943	1.19873	1.22383	.17560
	5	1.41404	1.23173	1.28189	.20140		5	1.37942	1.19194	1.28631	.21495
	6	1.44538	1.22720	1.34680	.23715		6	1.41018	1.18607	1.35186	.25277
	7	1.47766	1.22354	1.41513	.27163		7	1.44181	1.18109	1.42075	.28914
	8	1.51097	1.22079	1.48728	.30491		8	1.47440	1.17701	1.49329	.32417
	9	1.54543	1.21891	1.56357	.33709		9	1.50801	1.17379	1.56982	.35796
	10	1.58114	1.21788	1.64446	.36826		10	1.54274	1.17135	1.65074	.39059
	11	1.61820	1.21769	1.73036	.39845		11	1.57871	1.16978	1.73648	.42214
	12	1.65677	1.21837	1.82188	.42775		12	1.61605	1.16899	1.82758	.45269
	13	1.69700	1.21989	1.91963	.45620		13	1.65487	1.16904	1.92455	.48229
	14	1.73905	1.22229	2.02429	.48384		14	1.69536	1.17087	2.02809	.51099
	15	1.78314	1.22557	2.13679	.51075		15	1.73765	1.17155	2.13897	.53888
	16	1.82945	1.22972	2.25801	.53696		16	1.78195	1.17404	2.25801	.56597
	17	1.87828	1.23480	2.38915	.56251		17	1.82848	1.17737	2.38689	.59234
	18	1.92990	1.24082	2.53157	.58745		18	1.87750	1.18154	2.52900	.61803
	19	1.98467	1.24781	2.68688	.61180		19	1.92929	1.18659	2.67556	.64308
	20	2.04298	1.25582	2.85703	.63561		20	1.98421	1.19254	2.83966	.66752
	21	2.10531	1.26489	3.04435	.65891		21	2.04264	1.19943	3.01932	.69139
	22	2.17223	1.27507	3.25173	.68172		22	2.10505	1.20729	3.21701	.71473
	23	2.24442	1.28643	3.48272	.70408		23	2.17202	1.21616	3.43570	.73756
	24	2.32271	1.29904	3.74176	.72601		24	2.24420	1.22610	3.67910	.75992
	25	2.40812	1.31298	4.03448	.74753		25	2.32241	1.23718	3.95183	.78184
	26	2.50192	1.32835	4.36812	.76868		26	2.40765	1.24945	4.25971	.80333
	27	2.60571	1.34526	4.75217	.78947		27	2.50117	1.26300	4.61025	.82443
	28	2.72156	1.36383	5.19927	.80992		28	2.60453	1.27793	5.01322	.84516
	29	2.85217	1.38423	5.72668	.83006		29	2.71975	1.29434	5.48166	.86553
	30	3.00119	1.40663	6.35861	.84990		30	2.84947	1.31236	6.03330	.88558
	31	3.17365	1.43123	7.13007	.86946						
	32	3.37670	1.45827	8.09364	.88872						
	33	3.62101	1.48806	9.33218	.90782						
	34	3.92327	1.52092	10.98415	.92665						

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$		
54	31	2.99721	1.33213	6.69290	0.90532	56	25	2.25415	1.16852	3.90771	0.81750		
	32	3.16784	1.35382	7.49613	.92477		26	2.33300	1.17822	4.19775	.83930		
	33	3.36824	1.37764	8.49634	.94394		27	2.41891	1.18899	4.52508	.86066		
	34	3.60863	1.40381	9.77698	.96286		28	2.51311	1.20092	4.89763	.88161		
							29	2.61718	1.21408	5.32572	.90218		
	35	3.90484	1.43262	11.47643	.98154		30	2.73312	1.22856	5.82313	.92239		
	36	4.28320	1.46441	13.84205	1.00000			31	2.86357	1.24447	6.40854	.94225	
	37	4.79140	1.49957	17.36357	1.01825			32	3.01204	1.26192	7.10806	.96180	
	38	5.52791	1.53859	23.16703	1.03631			33	3.18337	1.28106	7.95920	.98104	
	39	6.74212	1.58209	34.54341	1.05418			34	3.38442	1.30205	9.01802	1.00000	
		40	9.37684	1.63082	66.97239			1.07189	35	3.62531	1.32508	10.37199	1.01869
	55	0	1.22077	1.22077	1.00000			0		36	3.92173	1.35038	12.16581
1		1.24822	1.20908	1.05305	.04864	37		4.29964		1.37822	14.65711	1.05535	
2		1.27618	1.19855	1.10831	.09501	38		4.80594		1.40893	18.35382	1.07335	
3		1.30471	1.18909	1.16595	.13927	39		5.53675		1.44289	24.41461	1.09114	
4		1.33386	1.18067	1.22617	.18160	40		6.73301		1.48057	36.18410	1.10874	
5		1.36370	1.17322	1.28917	.22214			41		9.28385	1.52236	68.94509	1.12617
6		1.39429	1.16672	1.35521	.26103		57	0		1.19236	1.19236	1.00000	0
7		1.42570	1.16111	1.42455	.29839			1		1.21991	1.17918	1.05453	.05235
8		1.45800	1.15638	1.49749	.33432			2		1.24792	1.16722	1.11126	.10206
9		1.49130	1.15249	1.57436	.36894			3		1.27644	1.15640	1.17033	.14935
10		1.52567	1.14943	1.65554	.40233			4		1.30553	1.14665	1.23196	.19442
11		1.56123	1.14719	1.74186	.43457			5	1.33524	1.13792	1.29634	.23745	
12	1.59808	1.14574	1.83261	.46574	6			1.36563	1.13015	1.36371	.27860		
13	1.63636	1.14509	1.92853	.49592	7			1.39678	1.12330	1.43431	.31802		
14	1.67620	1.14522	2.03286	.52516	8			1.42875	1.11733	1.50845	.35582		
15	1.71778	1.14615	2.14332	.55352	9			1.46163	1.11221	1.58643	.39214		
16	1.76127	1.14787	2.26176	.58107	10	1.49550		1.10791	1.66862	.42708			
17	1.80687	1.15039	2.38915	.60785		11		1.53046	1.10441	1.75543	.46073		
18	1.85483	1.15373	2.52664	.63391		12	1.56661	1.10169	1.84730	.49319			
19	1.90542	1.15791	2.67556	.65929		13	1.60407	1.09973	1.94475	.52454			
20	1.95896	1.16294	2.83751	.68404		14	1.64296	1.09854	2.04839	.55484			
21	2.01580	1.16885	3.01438	.70819		15	1.68344	1.09810	2.15888	.58418			
22	2.07639	1.17567	3.20848	.73178			16	1.72566	1.09841	2.27699	.61260		
23	2.14123	1.18345	3.42257	.75483			17	1.76982	1.09947	2.40364	.64018		
24	2.21094	1.19222	3.66007	.77740			18	1.81611	1.10128	2.53987	.66696		
25	2.28625	1.20204	3.92521	.79949			19	1.86478	1.10387	2.68688	.69300		
26	2.36806	1.21297	4.22330	.82114			20	1.91611	1.10723	2.84613	.71833		
27	2.45748	1.22508	4.56111	.84238				21	1.97041	1.11138	3.01932	.74301	
28	2.55591	1.23843	4.94742	.86322	22			2.02806	1.11636	3.20848	.76707		
29	2.66511	1.25313	5.39374	.88370	23			2.08950	1.12218	3.41605	.79054		
30	2.78737	1.26929	5.91560	.90383	24			2.15523	1.12887	3.64502	.81347		
31	2.92572	1.28703	6.53435	.92364	25			2.22588	1.13647	3.89903	.83589		
32	3.08425	1.30648	7.28025	.94314				26	2.30220	1.14503	4.18260	.85782	
33	3.26370	1.32762	8.19757	.96236		27		2.38509	1.15459	4.50144	.87930		
34	3.48734	1.35125	9.33933	.98131		28		2.47569	1.16522	4.86278	.90035		
35	3.75267	1.37698	10.85776	1.00000		29		2.57338	1.17697	5.27601	.92100		
36	4.08469	1.40531	12.89486	1.01846		30		2.68597	1.18993	5.75347	.94126		
37	4.51787	1.43656	15.81213	1.03670				31	2.80977	1.20419	6.31177	.96117	
38	5.11821	1.47111	20.34079	1.05473			32	2.94984	1.21984	6.97378	.98074		
39	6.03358	1.50947	28.33208	1.07257			33	3.11033	1.23700	7.77189	1.00000		
40	7.69872	1.55221	46.23275	1.09023			34	3.29703	1.25582	8.75357	1.01896		
41	12.52648	1.60009	122.67166	1.10773			35	3.51833	1.27646	9.99121	1.03764		
56	0	1.20621	1.20621	1.00000				0	36	3.78688	1.29910	11.60109	1.05606
	1	1.23369	1.19378	1.05375	.05045			37	4.12294	1.32397	13.78232	1.07423	
	2	1.26164	1.18252	1.10969	.09845			38	4.56142	1.35132	16.90714	1.09218	
	3	1.29013	1.17238	1.16799	.14419			39	5.16924	1.38149	21.76052	1.10991	
	4	1.31923	1.16331	1.22887	.18787			40	6.09646	1.41485	30.33227	1.12744	
	5	1.34896	1.15521	1.29250	.22963				41	7.78514	1.45186	49.56835	1.14478
	6	1.37943	1.14807	1.35916	.26964	42			12.70348	1.49310	132.25979	1.16195	
	7	1.41067	1.14184	1.42906	.30801	58			0	1.17918	1.17918	1.00000	0
	8	1.44280	1.13650	1.50253	.34487				1	1.20686	1.16522	1.05542	.05436
	9	1.47583	1.13198	1.57987	.38033				2	1.23498	1.15255	1.11302	.10586
	10	1.50992	1.12828	1.66148	.41449				3	1.26357	1.14102	1.17297	.15476
	11	1.54513	1.12540	1.74774	.44743		4		1.29271	1.13061	1.23547	.20130	
12	1.58159	1.12331	1.83915	.47924	5		1.32244		1.12122	1.30071	.24564		
13	1.61925	1.12200	1.93582	.50988	6		1.35284		1.11285	1.36892	.28796		
14	1.65874	1.12144	2.03961	.53978	7		1.38394		1.10538	1.44036	.32846		
15	1.69971	1.12167	2.14992	.56822	8		1.41585		1.09881	1.51533	.36724		
16	1.74252	1.12268	2.26607	.59661	9		1.44863	1.09309	1.59409	.40443			
17	1.78734	1.12446	2.39492	.62379	10		1.48236	1.08819	1.67705	.44017			
18	1.83439	1.12701	2.53157	.65021			11	1.51713	1.08408	1.76457	.47454		
19	1.88395	1.13036	2.67932	.67592		12	1.55305	1.08076	1.85710	.50765			
20	1.93629	1.13453	2.83966	.70097		13	1.59024	1.07821	1.95517	.53958			
21	1.99176	1.13954	3.01438	.72539		14	1.62880	1.07640	2.05932	.57042			
22	2.05077	1.14540	3.20565	.74921		15	1.66888	1.07531	2.17022	.60023			
23	2.11377	1.15216	3.41605	.77249			16	1.71064	1.07496	2.28864	.62909		
24	2.18134	1.15986	3.64877	.79524									

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$		
58	17	1.75425	1.07535	2.41543	0.69706	60	10	1.45981	1.05056	1.69801	0.46792		
	18	1.79992	1.07647	2.55161	.68419		11	1.49446	1.04530	1.78756	.50375		
	19	1.84786	1.07832	2.69835	.71054		12	1.53015	1.04083	1.88204	.53817		
	20	1.89834	1.08093	2.85702	.73616		13	1.56705	1.03711	1.98204	.57130		
	21	1.95166	1.08429	3.02926	.76108		14	1.60524	1.03411	2.08804	.60321		
	22	2.00817	1.08843	3.21701	.78536		15	1.64485	1.03183	2.20066	.63397		
	23	2.06827	1.09337	3.42257	.80903		16	1.68601	1.03028	2.32064	.66369		
	24	2.13245	1.09914	3.64877	.83213		17	1.72890	1.02941	2.44879	.69242		
	25	2.20127	1.10576	3.89903	.85469		18	1.77370	1.02924	2.58609	.72023		
	26	2.27543	1.11327	4.17758	.87674		19	1.82061	1.02976	2.73362	.74715		
	27	2.35576	1.12172	4.48973	.89832		20	1.86986	1.03098	2.89268	.77332		
	28	2.44329	1.13115	4.84226	.91945		21	1.92174	1.03290	3.06478	.79871		
	29	2.53928	1.14162	5.24346	.94016		22	1.97655	1.03553	3.25173	.82339		
	30	2.64534	1.15319	5.70487	.96047		23	2.03465	1.03889	3.45565	.84740		
	31	2.76355	1.16595	6.24133	.98041		24	2.09647	1.04299	3.67910	.87080		
	32	2.89660	1.17998	6.87320	1.00000		25	2.16251	1.04785	3.92521	.89360		
	33	3.04811	1.19537	7.62890	1.01926		26	2.23336	1.05350	4.19775	.91586		
	34	3.22305	1.21225	8.54944	1.03820		27	2.30976	1.05996	4.50144	.93760		
	35	3.42282	1.23075	9.69613	1.05686		28	2.39257	1.06728	4.84216	.95885		
	36	3.67496	1.25103	11.16500	1.07523		29	2.48286	1.07550	5.22736	.97964		
	37	3.97868	1.27328	13.11538	1.09336		30	2.58199	1.08465	5.66667	1.00000		
	38	4.36671	1.29771	15.83248	1.11124		31	2.69164	1.09480	6.17065	1.01995		
	39	4.88820	1.32458	19.88200	1.12889		32	2.81401	1.10602	6.76214	1.03953		
	40	5.64473	1.35421	26.56793	1.14638		33	2.95196	1.11836	7.45813	1.05874		
	41	6.89470	1.38696	39.71914	1.16358		34	3.10935	1.13192	8.29290	1.07761		
	42	9.62343	1.42330	77.53810	1.18065		35	3.29153	1.14680	9.31323	1.09617		
	59	0	1.16663	1.16663	1.00000		0	61	0	1.14335	1.14335	1.00000	0
		1	1.19450	1.15189	1.05639		.05646		1	1.17176	1.12694	1.05868	.06106
		2	1.22277	1.13845	1.11497		.10985		2	1.20052	1.11195	1.11958	.11853
		3	1.25150	1.12623	1.17591		.16045		3	1.22970	1.09828	1.18287	.17276
		4	1.28075	1.11515	1.23939		.20849		4	1.25935	1.08582	1.24872	.22404
		5	1.31056	1.10513	1.30562		.25420		5	1.28951	1.07449	1.31735	.27264
		6	1.34101	1.09611	1.37482		.29776		6	1.32026	1.06422	1.38897	.31878
		7	1.37215	1.08804	1.44725		.33935		7	1.35166	1.05494	1.46383	.36268
		8	1.40405	1.08087	1.52317		.37912		8	1.38376	1.04660	1.54221	.40452
		9	1.43680	1.07457	1.60290		.41722		9	1.41665	1.03914	1.62410	.44447
		10	1.47046	1.06909	1.68679		.45376		10	1.45040	1.03253	1.71076	.48267
		11	1.50513	1.06440	1.77523		.48886		11	1.48515	1.02672	1.80166	.51925
		12	1.54091	1.06050	1.86864		.52263		12	1.52084	1.02170	1.89753	.55435
13		1.57790	1.05735	1.96754	.55515	13	1.55772		1.01742	1.99885	.58807		
14		1.61623	1.05493	2.07248	.58652	14	1.59585		1.01388	2.10617	.62050		
15		1.65602	1.05324	2.18409	.61682	15	1.63536		1.01104	2.22011	.65174		
16		1.69743	1.05228	2.30313	.64611	16	1.67639		1.00890	2.34137	.68187		
17		1.74062	1.05202	2.43042	.67446	17	1.71909		1.00745	2.47077	.71097		
18		1.78579	1.05248	2.56696	.70194	18	1.76364		1.00668	2.60925	.73910		
19		1.83315	1.05365	2.71386	.72859	19	1.81024		1.00659	2.75788	.76633		
20		1.88294	1.05554	2.87247	.75447	20	1.85911		1.00717	2.91792	.79272		
21		1.93545	1.05816	3.04435	.77964	21	1.91052		1.00843	3.09086	.81832		
22		1.99101	1.06152	3.23135	.80412	22	1.96476		1.01038	3.27844	.84318		
23		2.05001	1.06564	3.43570	.82797	23	2.02217		1.01302	3.48272	.86735		
24		2.11288	1.07055	3.66007	.85122	24	2.08316		1.01636	3.70619	.89087		
25		2.18018	1.07625	3.90771	.87392	25	2.14821		1.02043	3.95183	.91378		
26		2.25252	1.08280	4.18260	.89608	26	2.21788		1.02525	4.22330	.93611		
27		2.33070	1.09022	4.48973	.91774	27	2.29285		1.03083	4.52508	.95790		
28		2.41564	1.09855	4.83353	.93894	28	2.37393		1.03722	4.86278	.97919		
29		2.50852	1.10717	5.22736	.95970	29	2.46213		1.04444	5.24316	1.00000		
30		2.61079	1.11616	5.67616	.98005	30	2.55870		1.05253	5.67616	1.02036		
31		2.72432	1.12574	6.19535	1.00000	31	2.66519		1.06154	6.17265	1.04030		
32		2.85152	1.14210	6.80332	1.01959	32	2.78362		1.07153	6.74855	1.05984		
33		2.99559	1.15590	7.52541	1.03883	33	2.91659		1.08256	7.42498	1.07900		
34		3.16089	1.16997	8.39771	1.05775	34	3.06758		1.09469	8.21136	1.09782		
35		3.35349	1.18762	9.47325	1.07636	35	3.24135		1.10802	9.20976	1.11630		
36		3.58227	1.20980	10.83337	1.09468	36	3.44462		1.12263	10.42262	1.13447		
37		3.86065	1.21834	12.60945	1.11274	37	3.68722		1.13863	11.96675	1.15234		
38		4.21032	1.24758	15.02857	1.13054	38	3.98431		1.15617	14.00080	1.16994		
39	4.66898	1.27157	18.51961	1.14810	39	4.36069	1.17537	16.80389	1.18729				
40	5.30993	1.29796	24.00218	1.16545	40	4.86049	1.19643	20.91698	1.20438				
41	6.30127	1.32704	33.86900	1.18258	41	5.57221	1.21953	27.54355	1.22125				
42	8.15969	1.35920	56.90567	1.19953	42	6.70976	1.24494	40.01234	1.23791				
60	0	1.15470	1.15470	1.00000	0	62	0	1.13257	1.13257	1.00000	0		
	1	1.18281	1.13913	1.05748	.05869		1	1.16134	1.11527	1.06001	.06356		
	2	1.21128	1.12492	1.11715	.11407		2	1.19044	1.09945	1.12228	.12326		
	3	1.24021	1.11200	1.17919	.16643		3	1.22000	1.08480	1.18000	.18000		
	4	1.26963	1.10024	1.24379	.21666		4	1.25000	1.07125	1.23750	.23750		
	5	1.29959	1.08956	1.31115	.26418		5	1.28125	1.05875	1.29375	.29375		
	6	1.33016	1.07991	1.38149	.30802		6	1.31375	1.04725	1.35000	.35000		
	7	1.36239	1.07123	1.45505	.35075		7	1.34750	1.03675	1.40625	.40625		
	8	1.39336	1.06349	1.53211	.39149		8	1.38250	1.02725	1.46250	.46250		
9	1.42614	1.05661	1.61296	.43053	9	1.41875	1.01875	1.51875	.51875				

TABLE I.—VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES — Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
62	3	1.21994	1.08503	1.18693	0.17943	63	40	4.50533	1.10545	18.68088	1.24438
	4	1.24988	1.07187	1.25420	.23246		41	5.17503	1.12513	24.63807	1.26092
	5	1.28033	1.05987	1.32425	.28258		42	6.02443	1.14538	33.44890	1.27723
	6	1.31132	1.04897	1.39734	.33010		43	7.47513	1.16759	51.58766	1.29333
	7	1.34294	1.03907	1.47368	.37521		44	10.93593	1.19201	110.60283	1.30922
	8	1.37527	1.03015	1.55357	.41812		0	1.11260	1.11260	1.00000	0
	9	1.40834	1.02212	1.63730	.45902		1	1.14230	1.09339	1.06311	.06909
	10	1.44225	1.01497	1.72524	.49808		2	1.17229	1.07586	1.12854	.13362
	11	1.48051	1.01097	1.81770	.53293		3	1.20263	1.05981	1.19646	.19405
	12	1.51292	1.00303	1.91519	.57190		4	1.23329	1.04513	1.26705	.25082
	13	1.54988	.99818	2.01313	.60549		5	1.26458	1.03183	1.34052	.30420
	14	1.58806	.99416	2.12710	.63846		6	1.29631	1.01963	1.41710	.35459
	15	1.62757	.99077	2.24268	.67016		7	1.32862	1.00852	1.49702	.40223
	16	1.66858	.98809	2.36559	.70070		8	1.36159	.99844	1.58060	.44739
	17	1.71121	.98608	2.49664	.73016		9	1.39526	.98927	1.66809	.49026
	18	1.75564	.98474	2.63675	.75860		10	1.42974	.98100	1.75989	.53105
	19	1.80207	.98406	2.78698	.78610		11	1.46509	.97358	1.85635	.56993
	20	1.85070	.98404	2.94856	.81272		12	1.50142	.96697	1.95793	.60706
	21	1.90180	.98467	3.12296	.83852		13	1.53881	.96113	2.06507	.64295
	22	1.95565	.98597	3.31189	.86355		14	1.57739	.95602	2.17835	.67655
	23	2.01258	.98794	3.51734	.88785		15	1.61725	.95161	2.29836	.70916
	24	2.07297	.99058	3.74176	.91148		16	1.65854	.94788	2.42529	.74129
	25	2.13728	.99391	3.98804	.93447		17	1.70139	.94482	2.56152	.77062
	26	2.20605	.99795	4.25971	.95686		18	1.74597	.94241	2.70637	.79965
	27	2.27992	1.00272	4.56111	.97869		19	1.79247	.94064	2.86144	.82765
	28	2.35967	1.00824	4.89763	1.00000		20	1.84109	.93951	3.02795	.85469
	29	2.44623	1.01454	5.27601	1.02081		21	1.89208	.93899	3.20733	.88083
	30	2.54078	1.02165	5.70487	1.04115		22	1.94569	.93910	3.40126	.90613
	31	2.64478	1.02962	6.19535	1.06106		23	2.00225	.93984	3.61170	.93065
	32	2.76008	1.03849	6.76214	1.08055		24	2.06212	.94120	3.84102	.95444
	33	2.88908	1.04831	7.42498	1.09965		25	2.12571	.94319	4.09202	.97754
	34	3.03498	1.05914	8.21107	1.11839		26	2.19354	.94583	4.36812	1.00000
	35	3.20207	1.07107	9.15895	1.13678		27	2.26619	.94912	4.67348	1.02185
	36	3.39638	1.08415	10.32510	1.15484		28	2.34437	.95308	5.01322	1.04314
	37	3.62660	1.09850	11.79568	1.17261		29	2.42896	.95774	5.39374	1.06389
	38	3.90591	1.11421	13.70921	1.19008		30	2.52100	.96311	5.82313	1.08414
	39	4.25535	1.13141	16.30313	1.20729		31	2.62181	.96923	6.31177	1.10392
	40	4.71130	1.15025	20.02154	1.22442		32	2.73306	.97612	6.87320	1.12326
	41	5.34344	1.17090	25.80256	1.24096		33	2.85668	.98383	7.52541	1.14218
42	6.30846	1.19357	36.02861	1.25745	34	2.99599	.99240	8.29290	1.16070		
43	8.06950	1.21848	59.05900	1.27373	35	3.15417	1.00188	9.20976	1.17886		
63	0	1.12233	1.12233	1.00000	0	36	3.33650	1.01233	10.32509	1.19667	
	1	1.15152	1.10410	1.06149	.06625	37	3.55019	1.02382	11.71209	1.21415	
	2	1.18103	1.08726	1.12523	.12826	38	3.80592	1.03642	13.48501	1.23132	
	3	1.21092	1.07223	1.19146	.18653	39	4.12018	1.05022	15.83259	1.24821	
	4	1.24123	1.05835	1.26029	.24135	40	4.52027	1.06533	19.09064	1.26482	
	5	1.27201	1.04567	1.33195	.29309	41	5.05539	1.08187	23.91996	1.28117	
	6	1.30334	1.03413	1.40668	.34201	42	5.82618	1.09997	31.88475	1.29728	
	7	1.33527	1.02363	1.48471	.38837	43	7.08398	1.11961	47.12911	1.31317	
	8	1.36786	1.01412	1.56632	.43239	44	9.74915	1.14157	89.41118	1.32885	
	9	1.40120	1.00553	1.65181	.47427	0	1.10338	1.10338	1.00000	0	
	10	1.43535	.99781	1.74154	.51418	1	1.13366	1.08314	1.06492	.07216	
	11	1.47040	.99093	1.83587	.55229	2	1.16422	1.06468	1.13220	.13934	
	12	1.50644	.98483	1.93523	.58873	3	1.19510	1.04782	1.20202	.20207	
	13	1.54357	.97949	2.04011	.62364	4	1.22634	1.03224	1.27451	.26076	
	14	1.58189	.97488	2.15104	.65712	5	1.25807	1.01833	1.35006	.31596	
	15	1.62152	.97098	2.26865	.68928	6	1.29028	1.00547	1.42871	.36888	
	16	1.66261	.96777	2.39362	.72022	7	1.32305	.99374	1.51079	.41686	
	17	1.70529	.96522	2.52675	.75022	8	1.35646	.98305	1.59657	.46318	
	18	1.74973	.96334	2.66897	.77877	9	1.39057	.97333	1.68638	.50708	
	19	1.79612	.96210	2.82133	.80653	10	1.42547	.96453	1.78054	.54876	
	20	1.84467	.96151	2.98505	.83336	11	1.46123	.95659	1.87947	.58842	
	21	1.89563	.96155	3.16158	.85934	12	1.49794	.94946	1.98358	.62621	
	22	1.94927	.96224	3.35260	.88452	13	1.53571	.94311	2.09337	.66230	
	23	2.00591	.96357	3.56009	.90894	14	1.57463	.93749	2.20939	.69680	
	24	2.06593	.96555	3.78644	.93266	15	1.61483	.93259	2.33225	.72985	
	25	2.12976	.96819	4.03448	.95571	16	1.65643	.92837	2.46267	.76155	
	26	2.19791	.97151	4.30767	.97815	17	1.69959	.92482	2.60146	.79201	
	27	2.27101	.97551	4.61025	1.00000	18	1.74445	.92191	2.74953	.82131	
	28	2.34979	.98023	4.94742	1.02131	19	1.79121	.91963	2.90795	.84953	
	29	2.43515	.98567	5.32572	1.04210	20	1.84006	.91797	3.07796	.87674	
	30	2.52820	.99188	5.75347	1.06240	21	1.89125	.91693	3.26098	.90303	
	31	2.63031	.99889	6.24133	1.08226	22	1.94503	.91649	3.45870	.92844	
	32	2.74323	1.00673	6.80332	1.10168	23	2.00172	.91666	3.67309	.95304	
	33	2.86919	1.01545	7.45813	1.12070	24	2.06166	.91743	3.90652	.97688	
	34	3.01116	1.02510	8.23136	1.13934	25	2.12529	.91882	4.16179	1.00000	
	35	3.17311	1.03575	9.15895	1.15762	26	2.19307	.92082	4.44229	1.02246	
	36	3.36051	1.04745	10.29303	1.17557	27	2.26559	.92345	4.75217	1.04429	
	37	3.58122	1.06030	11.71209	1.19320	28	2.34356	.92671	5.09652	1.06532	
	38	3.84695	1.07437	13.54033	1.21053	29	2.42779	.93063	5.48166	1.08622	
39	4.17610	1.08976	15.98624	1.22759	30	2.51932	.93523	5.91560	1.10640		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$
65	31	2.61942	0.94052	6.40854	1.12608	67	23	2.01077	0.87166	3.83024	1.00000
	32	2.72969	.94655	6.97378	1.14531		24	2.07163	.87136	4.07583	1.02386
	33	2.85217	.95332	7.62890	1.16411		25	2.13613	.87164	4.34413	1.04696
	34	2.98950	.96090	8.39771	1.18250		26	2.20475	.87248	4.63861	1.06935
	35	3.14523	.96931	9.31323	1.20051		27	2.27807	.87390	4.96352	1.09106
	36	3.32418	.97862	10.42262	1.21816		28	2.35676	.87591	5.32406	1.11215
	37	3.53313	.98887	11.79568	1.23547		29	2.44164	.87851	5.72668	1.13265
	38	3.78200	1.00013	13.54033	1.25247		30	2.53371	.88171	6.17951	1.15260
	39	4.08602	1.01248	15.83259	1.26916		31	2.63420	.88553	6.69290	1.17203
	40	4.46996	1.02600	18.98054	1.28558		32	2.74466	.89000	7.28024	1.19097
	41	4.97763	1.04081	23.57679	1.30172		33	2.86705	.89513	7.95920	1.20946
	42	5.69607	1.05701	30.92529	1.31762		34	3.00392	.90094	8.73357	1.22751
43	6.83227	1.07474	44.56640	1.33329	35	3.15864	.90748	9.69613	1.24516		
44	9.07019	1.09416	78.67052	1.34873	36	3.33578	.91478	10.83337	1.26244		
66	0	1.09463	1.09463	1.00000	0	37	3.66703	.92888	13.12645	1.28827	
	1	1.12559	1.07331	1.06691	.07545	38	3.78570	.93181	14.00080	1.29592	
	2	1.15678	1.05388	1.13626	.14547	39	4.08173	.94165	16.30312	1.31218	
	3	1.18829	1.03613	1.20818	.21662	40	4.45226	.95245	19.42902	1.32814	
	4	1.21761	1.01850	1.27689	.26680	41	4.93615	.96429	23.91966	1.34381	
	5	1.25245	1.00511	1.36067	.32847	42	5.60821	.97725	30.95228	1.35922	
	6	1.28523	.99157	1.44166	.38197	43	6.63773	.99143	43.38829	1.37439	
	7	1.31856	.97920	1.52616	.43233	44	8.53138	1.00694	71.78450	1.38932	
	8	1.35250	.96785	1.61445	.47936	68	0	1.07854	1.07854	1.00000	0
	9	1.38715	.95764	1.70686	.52374	1	1.11113	1.05481	1.07157	.08281	
	10	1.42256	.94829	1.80374	.56738	2	1.14398	1.03325	1.14574	.15911	
	11	1.45777	.94000	1.89681	.60453	3	1.17698	1.01361	1.22268	.22964	
12	1.49264	.93219	2.01255	.64630	4	1.21035	.99570	1.30259	.29508		
13	1.53428	.92535	2.12537	.68296	5	1.24412	.97935	1.38571	.35599		
14	1.57368	.92268	2.24461	.71796	6	1.27834	.96440	1.47229	.41287		
15	1.61434	.91388	2.37080	.75142	7	1.31308	.95070	1.56259	.46613		
16	1.65641	.90177	2.50474	.78349	8	1.34843	.93821	1.65696	.51616		
17	1.70000	.90514	2.64721	.81424	9	1.38446	.92678	1.75568	.56322		
18	1.74529	.90175	2.79914	.84378	10	1.42122	.91635	1.85916	.60765		
19	1.79247	.89898	2.96164	.87221	11	1.45885	.90685	1.96784	.64966		
20	1.84172	.89683	3.13593	.89958	12	1.49741	.89825	2.08216	.68946		
21	1.89329	.89528	3.32348	.92599	13	1.53698	.89042	2.20262	.72727		
22	1.94745	.89432	3.52598	.95148	14	1.57772	.88338	2.32987	.76322		
23	2.00448	.89396	3.74545	.97614	15	1.61972	.87707	2.46455	.79749		
24	2.06475	.89418	3.98424	1.00000	16	1.66311	.87146	2.60744	.83022		
25	2.12867	.89499	4.24521	1.02312	17	1.70805	.86652	2.75938	.86151		
26	2.19671	.89640	4.53177	1.04556	18	1.75470	.86222	2.92139	.89148		
27	2.26945	.89840	4.84808	1.06734	19	1.80324	.85854	3.09460	.92023		
28	2.34757	.90102	5.19927	1.08852	20	1.85387	.85546	3.28032	.94784		
29	2.43190	.90425	5.59167	1.10913	21	1.90684	.85297	3.48010	.97441		
30	2.52343	.90813	6.03330	1.12920	22	1.96241	.85105	3.69573	1.00000		
31	2.62341	.91266	6.53435	1.14778	23	2.02088	.84970	3.92832	1.02468		
32	2.73341	.91787	7.10806	1.16787	24	2.08261	.84891	4.18338	1.04852		
33	2.85540	.92379	7.77189	1.18653	25	2.14801	.84867	4.46089	1.07156		
34	2.99197	.93046	8.54944	1.20476	26	2.21757	.84899	4.76546	1.09387		
35	3.14654	.93789	9.47325	1.22260	27	2.29186	.84987	5.10146	1.11548		
36	3.32375	.94615	10.58964	1.24000	28	2.37157	.85130	5.47426	1.13645		
37	3.53011	.95527	11.96675	1.25720	29	2.45751	.85330	5.89051	1.15682		
38	3.77508	.96532	13.70921	1.27398	30	2.55070	.85588	6.35861	1.17661		
39	4.07307	.97635	15.98624	1.29048	31	2.65238	.85905	6.88921	1.19588		
40	4.44728	.98845	19.09064	1.30667	32	2.76410	.86282	7.49614	1.21464		
41	4.93380	1.00170	23.57679	1.32260	33	2.88785	.86721	8.19757	1.23293		
42	5.62467	1.01619	30.63690	1.33826	34	3.02617	.87225	9.01802	1.25079		
43	6.88829	1.03204	43.38830	1.35368	35	3.18245	.87796	9.99121	1.26822		
44	8.69172	1.04940	73.38936	1.36888	36	3.36130	.88437	11.16501	1.28527		
67	0	1.08636	1.08636	1.00000	0	37	3.56911	.89152	12.60945	1.30195	
	1	1.11808	1.06387	1.06913	.07899	38	3.81516	.89944	14.43171	1.31828	
	2	1.15002	1.04340	1.14075	.15203	39	4.11348	.90820	16.80390	1.33428	
	3	1.18225	1.02474	1.21505	.21979	40	4.46652	.91782	20.02153	1.34998	
	4	1.21482	1.00770	1.29222	.28287	41	4.97311	.92839	24.63806	1.36533	
	5	1.24780	.99213	1.37250	.34178	42	5.64778	.93997	31.82475	1.38053	
	6	1.28120	.97773	1.45602	.39637	43	6.67844	.95264	44.56641	1.39542	
	7	1.31523	.96487	1.54335	.44873	44	8.56387	.96650	73.38937	1.41006	
	8	1.34982	.95298	1.63449	.49748	69	0	1.07115	1.07115	1.00000	0
	9	1.38509	.94213	1.72985	.54347	1	1.10473	1.04607	1.07431	.08699	
	10	1.42113	.93225	1.82982	.58697	2	1.13849	1.02334	1.15131	.16677	
	11	1.45801	.92327	1.93479	.62819	3	1.17248	1.00268	1.23120	.24025	
12	1.49583	.91514	2.04521	.66733	4	1.20678	.98385	1.31418	.30819		
13	1.53468	.90781	2.16160	.70457	5	1.24146	.96667	1.40050	.37122		
14	1.57467	.90123	2.28454	.74006	6	1.27656	.95098	1.49041	.42990		
15	1.61593	.89538	2.41466	.77395	7	1.31221	.93662	1.58421	.48469		
16	1.65858	.89022	2.55271	.80635	8	1.34837	.92334	1.68204	.53591		
17	1.70276	.88573	2.69923	.83738	9	1.38533	.91149	1.78478	.58418		
18	1.74864	.88187	2.85608	.86715	10	1.42298	.90052	1.89230	.62952		
19	1.79640	.87864	3.02345	.89575	11	1.46147	.89051	2.00520	.67231		
20	1.84625	.87602	3.20294	.92326	12	1.50091	.88139	2.12398	.71277		
21	1.89841	.87398	3.39602	.94976	13	1.54138	.87311	2.24818	.75112		
22	1.95315	.87254	3.60444	.97532	14	1.58301	.86562	2.38443	.78753		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$				
69	15	1.62591	0.85887	2.52143	0.82217	71	3	1.16604	0.98128	1.25145	0.26420				
	16	1.67023	.85282	2.66997	.85516		4	1.20260	.96047	1.34178	.33760				
	17	1.71611	.84745	2.82795	.88670		5	1.23951	.94154	1.43579	.40521				
	18	1.76372	.84272	2.99641	.91684			6	1.27684	.92427	1.53378	.46772			
	19	1.81325	.83861	3.17655	.94571			7	1.31468	.90850	1.63605	.52572			
	20	1.86490	.83510	3.36974	.97340			8	1.35311	.89409	1.74297	.57971			
		21	1.91892	.83217	3.57758			1.00000	9	1.39220	.88089	1.85492	.63012		
		22	1.97558	.82981	3.80196			1.02559	10	1.43197	.86869	1.97206	.67722		
		23	2.03519	.82800	4.04507			1.05024		11	1.47200	.85779	2.09576	.72165	
		24	2.09812	.82674	4.30955			1.07401		12	1.51449	.84770	2.22567	.76338	
		25	2.16478	.82603	4.59851			1.09697		13	1.55727	.83849	2.36271	.80275	
			26	2.23568	.82585			4.91572		1.11917	14	1.60124	.83011	2.50757	.83998
			27	2.31139	.82621		5.26577	1.14066		15	1.64655	.82250	2.66104	.87525	
			28	2.39261	.82711		5.64428	1.16146			16	1.69333	.81562	2.82401	.90876
			29	2.48019	.82855		6.08824	1.18168			17	1.74175	.80942	2.99750	.94063
	30		2.57516	.83054	6.57643		1.20129	18			1.79200	.80388	3.18269	.97100	
			31	2.67879	.83310		7.13007	1.22036			19	1.84426	.79896	3.38091	1.00000
			32	2.79267	.83622		7.76366	1.23892	20		1.89877	.79464	3.59373	1.02773	
			33	2.91883	.83993		8.49634	1.25699			21	1.95759	.79089	3.82297	1.05429
			34	3.05990	.84425		9.35393	1.27461			22	2.01562	.78771	4.07076	1.07977
		35	3.21935	.84920	10.37199		1.29181	23			2.07858	.78506	4.33962	1.10425	
			36	3.40190	.85480		11.60108	1.30861			24	2.14507	.78295	4.63254	1.12719
			37	3.61416	.86108		13.11538	1.32503		25	2.21556	.78135	4.95312	1.15047	
			38	3.86570	.86808		15.02857	1.34109			26	2.29057	.78027	5.30568	1.17235
			39	4.17105	.87583		17.52384	1.35682			27	2.37075	.77969	5.69551	1.19347
	40		4.55352	.88439	20.91698		1.37224	28			2.45687	.77962	6.12913	1.21390	
			41	5.05364	.89380		25.80256	1.38736			29	2.54985	.78005	6.61467	1.23367
			42	5.74970	.90413		33.44889	1.40221	30		2.65083	.78099	7.16241	1.25282	
			43	6.82003	.91544		47.12910	1.41679			31	2.76121	.78244	7.75552	1.27111
			44	8.80523	.92782		78.67054	1.43112			32	2.88278	.78441	8.50117	1.28946
		70	0	1.06418	1.06418		1.00000	0			33	3.01781	.78690	9.33218	1.30700
			1	1.09890	1.03765		1.07737	.09153			34	3.16927	.78993	10.30955	1.32408
			2	1.13406	1.01384		1.15827	.17580		35	3.34111	.79352	11.47643	1.34071	
			3	1.16883	.99194		1.24074	.25174			36	3.53878	.79758	12.89426	1.35692
			4	1.20418	.97213		1.32717	.32233			37	3.76995	.80242	14.65711	1.37274
	5		1.23990	.95409	1.41710		.38759	38			4.04596	.80778	16.90714	1.38820	
			6	1.27606	.93764		1.51080	.44814			39	4.38429	.81379	19.88200	1.40330
			7	1.31270	.92400		1.60854	.50450	40		4.81376	.82047	24.00217	1.41808	
			8	1.34994	.90880		1.71071	.55714			41	5.33613	.82787	30.09139	1.43256
			9	1.38786	.89621		1.81765	.60643			42	6.00663	.83646	40.01235	1.44674
10		1.42754	.88510	1.93274	.65386	43	7.53549	.84499			59.05905	1.46066			
		11	1.46606	.87417	2.04755	.69626	44	10.30545			.85482	110.60291	1.47432		
		12	1.50653	.86458	2.17147	.73736	72	0		1.05146	1.05146	1.00000	0		
		13	1.54805	.85582	2.30216	.77624		1		1.08893	1.02164	1.08464	.10196		
		14	1.59076	.84788	2.44024	.81307		2		1.12648	.99485	1.17240	.19409		
	15	1.63475	.84069	2.58643	.84805	3		1.16448		.97069	1.26354	.27778			
		16	1.68019	.83423	2.74161	.88132		4		1.20213	.94880	1.35830	.35420		
		17	1.72722	.82844	2.90670	.91304		5	1.24041	.92893	1.45696	.42428			
		18	1.77602	.82330	3.08280	.94331			6	1.27910	.91083	1.55924	.48883		
		19	1.82677	.81877	3.27119	.97227			7	1.31830	.89432	1.66728	.54851		
20		1.87971	.81485	3.47330	1.00000	8			1.35809	.87923	1.77966	.60388			
		21	1.93506	.81150	3.69085	1.02660			9	1.39856	.86543	1.89739	.65422		
		22	1.99312	.80872	3.92581	1.05216	10		1.43982	.85281	2.02096	.70355			
		23	2.05421	.80648	4.18053	1.07674			11	1.48183	.84112	2.15050	.74850		
		24	2.11870	.80478	4.45777	1.10042			12	1.52509	.83068	2.28775	.79094		
	25	2.18704	.80361	4.76088	1.12326	13			1.56933	.82102	2.43223	.83078			
		26	2.25972	.80297	5.09384	1.14531			14	1.61482	.81221	2.58506	.86836		
		27	2.33736	.80284	5.46154	1.16664		15	1.66168	.80418	2.74709	.90391			
		28	2.42069	.80324	5.86997	1.18728			16	1.71008	.79690	2.91930	.93759		
		29	2.51057	.80416	6.32660	1.20728			17	1.76018	.79031	3.10277	.96957		
30		2.60809	.80561	6.84082	1.22668	18			1.81218	.78439	3.29879	1.00000			
		31	2.71456	.80759	7.42463	1.24553			19	1.86628	.77909	3.50881	1.02900		
		32	2.83165	.81012	8.09364	1.26384	20		1.92273	.77439	3.73452	1.05669			
		33	2.96148	.81320	8.86847	1.28167			21	1.98181	.77026	3.97793	1.08316		
		34	3.10680	.81685	9.77698	1.29903			22	2.04382	.76670	4.24135	1.10852		
	35	3.27129	.82109	10.85776	1.31596	23			2.10912	.76367	4.52755	1.13285			
		36	3.45992	.82594	12.16581	1.33248			24	2.17814	.76116	4.83980	1.15622		
		37	3.67970	.83142	13.72832	1.34861		25	2.25136	.75916	5.18206	1.17869			
		38	3.94084	.83756	15.58248	1.36439			26	2.32936	.75766	5.59910	1.20035		
		39	4.25895	.84441	18.51961	1.37982			27	2.41283	.75666	6.07680	1.22223		
40		4.65930	.85199	22.19785	1.39493	28			2.50259	.75615	6.61239	1.24440			
		41	5.18634	.86035	27.54355	1.40974			29	2.59964	.75613	7.21494	1.26690		
		42	5.92752	.86954	36.02962	1.42427	30		2.70523	.75659	7.55598	1.27977			
		43	7.08784	.87962	51.58763	1.43853			31	2.82087	.75754	8.23036	1.29806		
		44	9.32463	.89066	89.41117	1.45254			32	2.94853	.75899	9.00756	1.31881		
	71	0	1.05762	1.05762	1.00000	0			33	3.09069	.76094	9.91359	1.33304		
		1	1.09363	1.02952	1.08079	.09649			34	3.25068	.76339	10.98415	1.34979		
		2	1.12974	1.00419	1.16453	.18416									

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$		
72	35	3.43290	0.76637	12.26935	1.36609	74	28	2.63118	0.70929	7.29665	1.29930		
	36	3.64351	.76988	13.84205	1.38197		29	2.74053	.70845	7.92987	1.31813		
	37	3.89128	.77395	15.81213	1.39745		75	0	1.03528	1.03528	1.00000	0.	
	38	4.18935	.77859	18.35382	1.41255			1	1.07856	.99910	1.09961	1.12232	
	39	4.55839	.78383	21.76052	1.42730			2	1.12179	.96707	1.20313	.23060	
	73	40	5.03335	.78969	26.56793			1.44173	3	1.16508	.93853	1.31088	.32718
		41	5.67920	.79621	33.86900			1.45584	4	1.20854	.91294	1.42319	.41392
		42	6.63532	.80342	46.29378			1.46966	5	1.25231	.88990	1.54043	.49229
		43	8.27973	.81137	72.17562			1.48320	6	1.29649	.86906	1.66300	.56348
		0	1.04569	1.04569	1.00000			0.	7	1.34120	.85016	1.79136	.62848
1		1.08484	1.01397	1.08899	1.08002	8		1.38655	.83295	1.92601	.68810		
2		1.12402	.98560	1.18132	1.20502	9		1.43266	.81727	2.06752	.74301		
3		1.16333	.96009	1.27725	1.29267	76	0	1.03061	1.03061	1.00000	0.		
4		1.20286	.93705	1.37706	1.37229		1	1.07648	.99179	1.10615	.13086		
5		1.24271	.91618	1.48105	1.44999		2	1.12221	.95764	1.21660	.24571		
6	1.28298	.89721	1.58955	1.51166	3		1.16798	.92737	1.33171	.34738			
7	1.32375	.87993	1.70293	1.57307	4		1.21390	.90036	1.45185	.43806			
8	1.36512	.86416	1.82162	1.62984	77		5	1.26011	.87613	1.57743	.51950		
9	1.40719	.84974	1.94606	1.68252			6	1.30675	.85428	1.70892	.59309		
10	1.45006	.83908	2.07677	1.73156			7	1.35393	.83451	1.84682	.65993		
11	1.49385	.82448	2.21431	1.77735			8	1.40180	.81657	1.99171	.72096		
12	1.53853	.81330	2.35884	1.82009			9	1.45048	.80023	2.14422	.77694		
13	1.58466	.80333	2.51256	1.86049		78	10	1.50012	.78532	2.30509	.82850		
14	1.63193	.79409	2.67480	1.89838			11	1.55085	.77170	2.47511	.87616		
15	1.68065	.78566	2.84700	1.93414			12	1.60284	.75924	2.65280	.92039		
16	1.73098	.77799	3.03020	1.96796			13	1.65626	.74783	2.84642	.96156		
17	1.78310	.77102	3.22562	1.00000			14	1.71128	.73738	3.04994	1.00000		
18	1.83722	.76473	3.43466	1.03043	79		15	1.76783	.72770	3.26602	1.03583		
19	1.89357	.75907	3.65894	1.05937			16	1.82698	.71906	3.49758	1.06980		
20	1.95239	.75401	3.90033	1.08696			17	1.88812	.71106	3.74909	1.10162		
21	2.01400	.74953	4.16104	1.11330			18	1.95183	.70376	4.01779	1.13164		
22	2.07872	.74560	4.44366	1.13849			19	2.01842	.69711	4.30816	1.16002		
23	2.14695	.74220	4.75127	1.16262		80	20	2.08825	.69109	4.62314	1.18693		
24	2.21914	.73932	5.08756	1.18576			21	2.16174	.68565	4.96621	1.21247		
25	2.29582	.73695	5.45696	1.20799			22	2.23938	.68076	5.34155	1.23678		
26	2.37763	.73507	5.86488	1.22938			81	0	1.00000	1.00000	1.00000	0.	
27	2.46532	.73366	6.31798	1.24998				1	1.04000	.99000	1.08000	.16000	
28	2.55980	.73274	6.82452	1.26984	2			1.08000	.98000	1.16000	.32000		
29	2.66217	.73229	7.39491	1.28903	3			1.12000	.97000	1.24000	.48000		
30	2.77382	.73231	8.02466	1.30758	4			1.16000	.96000	1.32000	.64000		
31	2.89647	.73280	8.78447	1.32554	5			1.20000	.95000	1.40000	.80000		
32	3.03231	.73376	9.64375	1.34294	6			1.24000	.94000	1.48000	.96000		
33	3.18421	.73520	10.61220	1.35982	7	1.28000		.93000	1.56000	1.12000			
34	3.35594	.73713	11.84954	1.37621	8	1.32000		.92000	1.64000	1.28000			
35	3.55267	.73954	13.28968	1.39215	9	1.36000		.91000	1.72000	1.44000			
36	3.78166	.74246	15.09156	1.40766	82	10	1.40000	.90000	1.80000	1.60000			
37	4.05344	.74590	17.36356	1.42276		11	1.44000	.89000	1.88000	1.76000			
38	4.38416	.74988	20.34079	1.43749		12	1.48000	.88000	1.96000	1.92000			
39	4.79990	.75441	24.41461	1.45186		13	1.52000	.87000	2.04000	2.08000			
40	5.34654	.75951	30.33228	1.46589		14	1.56000	.86000	2.12000	2.24000			
41	6.11420	.76523	39.71928	1.47962		15	1.60000	.85000	2.20000	2.40000			
42	7.31380	.77158	56.90569	1.49304		16	1.64000	.84000	2.28000	2.56000			
43	9.61969	.77860	98.56608	1.50619		17	1.68000	.83000	2.36000	2.72000			
74	0	1.04030	1.04030	1.00000		0.	18	1.72000	.82000	2.44000	2.88000		
	1	1.08137	1.00647	1.09394		1.11476	19	1.76000	.81000	2.52000	3.04000		
	2	1.12243	.97676	1.19148	1.21712	20	1.80000	.80000	2.60000	3.20000			
	3	1.16358	.94940	1.29290	1.30905	21	1.84000	.79000	2.68000	3.36000			
	4	1.20494	.92514	1.39851	1.39211	22	1.88000	.78000	2.76000	3.52000			
	5	1.24661	.90321	1.50862	1.46756	83	0	1.00000	1.00000	1.00000	0.		
	6	1.28868	.88333	1.62362	1.53655		1	1.04000	.99000	1.08000	.16000		
	7	1.33127	.86525	1.74390	1.59964		2	1.08000	.98000	1.16000	.32000		
	8	1.37448	.84878	1.86994	1.65783		3	1.12000	.97000	1.24000	.48000		
	9	1.41841	.83373	2.00221	1.71163		4	1.16000	.96000	1.32000	.64000		
10	1.46318	.81997	2.14129	1.76155	5		1.20000	.95000	1.40000	.80000			
11	1.50891	.80738	2.28780	1.80802	6		1.24000	.94000	1.48000	.96000			
12	1.55573	.79586	2.44246	1.85141	7		1.28000	.93000	1.56000	1.12000			
13	1.60358	.78518	2.60544	1.89190	8		1.32000	.92000	1.64000	1.28000			
14	1.65317	.77566	2.77956	1.93021	9		1.36000	.91000	1.72000	1.44000			
15	1.70411	.76684	2.96390	1.96611	84	10	1.40000	.90000	1.80000	1.60000			
16	1.75676	.75879	3.16033	1.00000		11	1.44000	.89000	1.88000	1.76000			
17	1.81132	.75146	3.37020	1.03204		12	1.48000	.88000	1.96000	1.92000			
18	1.86801	.74481	3.59506	1.06241		13	1.52000	.87000	2.04000	2.08000			
19	1.92708	.73881	3.83675	1.09125		14	1.56000	.86000	2.12000	2.24000			
20	1.98882	.73341	4.09738	1.11862		15	1.60000	.85000	2.20000	2.40000			
21	2.05355	.72856	4.37946	1.14422		16	1.64000	.84000	2.28000	2.56000			
22	2.12164	.72431	4.68594	1.16978		17	1.68000	.83000	2.36000	2.72000			
23	2.19353	.72058	5.02033	1.19361		18	1.72000	.82000	2.44000	2.88000			
24	2.26971	.71735	5.38688	1.21651		19	1.76000	.81000	2.52000	3.04000			
25	2.35078	.71462	5.79072	1.23845	85	0	1.00000	1.00000	1.00000	0.			
26	2.43746	.71237	6.23811	1.25951		1	1.04000	.99000	1.08000	.16000			
27	2.53058	.71060	6.73624	1.27978		2	1.08000	.98000	1.16000	.32000			

TABLE I.—VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES — Continued

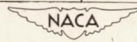
θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
76	23	2.32175	0.67640	5.75420	1.25994	78	22	2.42213	0.63503	6.38199	1.31053
	24	2.40951	.67255	6.21029	1.28605		23	2.52238	.63015	6.93526	1.33267
	25	2.50349	.66919	6.71741	1.30220		24	2.63030	.62577	7.55597	1.35372
	26	2.60464	.66629	7.23497	1.32345		25	2.74721	.62187	8.25775	1.37379
	27	2.71418	.66385	7.82491	1.34288		26	2.87474	.61842	9.05803	1.39295
	28	2.83358	.66186	8.49247	1.36155		27	3.01495	.61542	9.97980	1.41127
	29	2.96469	.66030	9.24750	1.37950		28	3.17048	.61285	11.05366	1.42882
	30	3.10991	.65916	10.45638	1.39680		29	3.34481	.61069	12.32147	1.44565
	31	3.27231	.65846	11.59425	1.41348		30	3.54259	.60893	13.84204	1.46182
	32	3.45603	.65817	12.95259	1.42958		31	3.77027	.60758	15.70056	1.47737
33	3.66670	.65830	14.60078	1.44516	32	4.03704	.60661	18.02541	1.49236		
34	3.91229	.65885	16.64528	1.46023	33	4.35658	.60603	21.01928	1.50681		
35	4.20448	.65982	19.25024	1.47484	34	4.75039	.60583	25.02251	1.52076		
36	4.56126	.66121	22.68536	1.48901	35	5.25455	.60602	30.65293	1.53426		
37	5.01207	.66304	27.42567	1.50278	36	5.93582	.60659	39.12666	1.54732		
38	5.60948	.66631	34.39544	1.51618	37	6.93576	.60754	53.52950	1.55997		
39	6.45921	.66803	45.65955	1.52918	38	8.63195	.60889	83.00466	1.57225		
77	40	7.81826	.67122	66.97238	1.54186	79	0	1.01872	1.01872	1.00000	0
	41	10.57522	.67488	122.67154	1.55422		1	1.07539	.96940	1.13341	.16480
	0	1.02630	1.02630	1.00000	0		2	1.13167	.92718	1.27305	.30458
	1	1.07518	.98447	1.11376	.14058		3	1.18782	.89057	1.41947	.42472
	2	1.12385	.94795	1.23232	.26277		4	1.24407	.85852	1.57326	.52913
	3	1.17251	.91578	1.35608	.37001		5	1.30065	.83019	1.73511	.62078
	4	1.22130	.88723	1.48545	.46495		6	1.35775	.80499	1.90576	.70190
	5	1.27039	.86172	1.62092	.54963		7	1.41558	.78244	2.08607	.77426
	6	1.31992	.83882	1.76302	.62567		8	1.47435	.76214	2.27699	.83925
	7	1.37003	.81815	1.91234	.69438		9	1.53426	.74381	2.47964	.89796
8	1.42088	.79944	2.06953	.75630	10	1.59554	.72718	2.69524	.95130		
9	1.47262	.78244	2.23335	.81379	11	1.65841	.71206	2.92524	1.00000		
10	1.52541	.76696	2.41064	.86606	12	1.72313	.69827	3.17127	1.04467		
11	1.57940	.75283	2.59634	.91240	13	1.78997	.68568	3.43524	1.08580		
12	1.63479	.73991	2.79353	.95270	14	1.85923	.67415	3.71937	1.12384		
13	1.69177	.72809	3.00345	1.00000	15	1.93125	.66360	4.02626	1.15913		
14	1.75053	.71726	3.22752	1.03844	16	2.00641	.65390	4.35896	1.19198		
15	1.81133	.70734	3.46736	1.07434	17	2.08514	.64508	4.72109	1.22265		
16	1.87404	.69815	3.72334	1.10777	18	2.16731	.63687	5.11390	1.25117		
17	1.94005	.68995	4.00223	1.13951	19	2.25441	.62954	5.55196	1.27835		
18	2.00860	.68235	4.30203	1.16922	20	2.34822	.62253	6.03228	1.30373		
19	2.08042	.67543	4.62734	1.19725	21	2.44720	.61657	6.56585	1.32769		
20	2.15595	.66912	4.98175	1.22376	22	2.55332	.61094	7.16241	1.35034		
21	2.23569	.66340	5.36960	1.24888	23	2.66778	.60584	7.83424	1.37181		
22	2.32022	.65824	5.79616	1.27274	24	2.79206	.60124	8.59705	1.39219		
23	2.41023	.65361	6.26779	1.29543	25	2.92800	.59711	9.47123	1.41158		
24	2.50656	.64948	6.79240	1.31706	26	3.07796	.59343	10.46376	1.43006		
25	2.61021	.64583	7.37982	1.33770	27	3.24500	.59019	11.67110	1.44771		
26	2.72239	.64265	8.04246	1.35745	28	3.43317	.58737	13.08374	1.46458		
27	2.84464	.63992	8.79627	1.37636	29	3.64796	.58496	14.79364	1.48075		
28	2.97686	.63762	9.66203	1.39451	30	3.89713	.58294	16.90716	1.49625		
29	3.12749	.63575	10.66728	1.41193	31	4.19195	.58130	19.58312	1.51144		
30	3.29372	.63429	11.84954	1.42870	32	4.54062	.58004	23.10298	1.52547		
31	3.48179	.63324	13.26101	1.44485	33	4.99802	.57915	27.91590	1.53927		
32	3.69754	.63260	14.97662	1.46042	34	5.58619	.57863	34.91428	1.55258		
33	3.94518	.63236	17.10800	1.47546	35	6.41056	.57848	46.03221	1.56543		
34	4.24885	.63252	19.82909	1.49001	36	7.69747	.57868	66.44284	1.57786		
35	4.61524	.63308	23.42636	1.50408	37	10.17446	.57926	116.20905	1.58989		
36	5.07917	.63404	28.40796	1.51772	80	0	1.01543	1.01543	1.00000	0	
37	5.69592	.63542	35.76668	1.53096		1	1.07723	.96137	1.14634	.18015	
38	6.57778	.63720	47.75735	1.54381		2	1.13851	.91567	1.29998	.33061	
39	8.00217	.63941	70.76019	1.55630		3	1.19961	.87645	1.46160	.45824	
0	1.02234	1.02234	1.00000	0		4	1.26079	.84239	1.63194	.56792	
1	1.07477	.97704	1.12272	.15178		5	1.32234	.81250	1.81183	.66326	
2	1.12691	.93785	1.25087	.28221		6	1.38450	.78607	2.00222	.74693	
3	1.17898	.90359	1.38490	.39558		7	1.44753	.76251	2.20418	.82099	
4	1.23118	.87336	1.52531	.49509		8	1.51167	.74141	2.41895	.88706	
5	1.28367	.84649	1.67266	.58317		9	1.57718	.72241	2.64791	.94639	
6	1.33663	.82247	1.82757	.66174	10	1.64433	.70523	2.89262	1.00000		
7	1.39024	.80088	1.99075	.73203	11	1.71341	.68964	3.15512	1.04870		
8	1.44466	.78138	2.16297	.79605	12	1.78472	.67546	3.43739	1.09316		
9	1.50008	.76372	2.34513	.85396	13	1.85862	.66252	3.74202	1.13394		
10	1.55668	.74766	2.53824	.90684	14	1.93548	.65069	4.07199	1.17150		
11	1.61464	.73302	2.74344	.95533	15	2.01575	.63987	4.433083	1.20623		
12	1.67419	.71966	2.96203	1.00000	16	2.09991	.62996	4.82875	1.23845		
13	1.73554	.70744	3.19554	1.04130	17	2.18853	.62088	5.25280	1.26844		
14	1.79894	.69626	3.44568	1.07961	18	2.28230	.61255	5.72715	1.29645		
15	1.86467	.68601	3.71447	1.11528	19	2.38112	.60483	6.24855	1.32245		
16	1.93303	.67662	4.00428	1.14859	20	2.48860	.59795	6.84081	1.34730		
17	2.00390	.66792	4.31572	1.17958	21	2.60324	.59216	7.50125	1.37048		
18	2.07910	.66016	4.65845	1.20906	22	2.72733	.58757	8.24971	1.39235		
19	2.15766	.65392	5.02997	1.23662	23	2.86264	.58406	9.10556	1.41303		
20	2.24058	.64841	5.43708	1.26263	24	3.01142	.57567	10.09437	1.43263		
21	2.32850	.64444	5.88545	1.28723	25	3.17654	.57135	11.25052	1.45124		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	
80	26	3.36182	0.56747	12.62123	1.46894	83	0	1.00751	1.00751	1.00000	0	
	27	3.57242	.56403	14.27360	1.48582		1	1.09383	.93218	1.20849	.24893	
	28	3.81551	.56099	16.30565	1.50193		2	1.17898	.87206	1.43090	.44286	
	29	4.10144	.55835	18.86699	1.51733		3	1.26372	.82273	1.66883	.59890	
							4	1.34874	.78138	1.92411	.72572	
	30	4.44585	.55610	22.19784	1.53209							
	31	4.87369	.55421	26.70940	1.54624		5	1.43464	.74614	2.19890	.83214	
	32	5.42791	.55269	33.16942	1.55984		6	1.52198	.71570	2.49570	.92242	
	33	6.19057	.55153	43.19544	1.57292		7	1.61134	.68911	2.81748	1.00000	
	34	7.34537	.55072	60.88209	1.58552		8	1.70328	.66568	3.16775	1.06743	
							9	1.79843	.64487	3.55072	1.12661	
	35	9.43104	.55025	100.47298	1.59767		10	1.89748	.62627	3.97144	1.17901	
	81	0	1.01247	1.01247	1.00000		0	11	2.00118	.60955	4.43611	1.22974
		1	1.08059	.95273	1.16228		.19853	12	2.11041	.59447	4.95229	1.27770
2		1.14803	.90300	1.33333	.36130	13	2.22621	.58080	5.52947	1.32562		
3		1.21520	.86083	1.51400	.49725	14	2.34981	.56838	6.17952	1.34007		
4		1.28248	.82457	1.70525	.61256							
5		1.35020	.79307	1.90817	.71166	15	2.48270	.55705	6.91764	1.37152		
6		1.41868	.76527	2.12398	.79779	16	2.62677	.54671	7.76366	1.40036		
7		1.48824	.74071	2.35410	.87339	17	2.78134	.53725	8.74365	1.42693		
8		1.55918	.71880	2.60016	.94031	18	2.95847	.52888	9.89298	1.45149		
9		1.63184	.69915	2.86404	1.00000	19	3.15317	.52064	11.26604	1.47428		
10		1.70656	.68144	3.14793	1.05361	20	3.37388	.51336	12.91636	1.49550		
11		1.78371	.66542	3.45440	1.10204	21	3.62824	.50668	14.96338	1.51531		
12		1.86370	.65087	3.78644	1.14604	22	3.92270	.50048	17.51892	1.53360		
13		1.94698	.63763	4.14764	1.18621	23	4.28813	.49496	20.96744	1.55127		
14	2.03408	.62554	4.54226	1.22306	24	4.73801	.49281	25.63451	1.56767			
15	2.12558	.61449	4.97544	1.25699	25	5.2518	.48517	32.42573	1.58314			
16	2.22218	.60438	5.45345	1.28837	26	6.14449	.48093	43.22632	1.59777			
17	2.32469	.59511	5.98393	1.31748	27	7.11885	.47703	63.09215	1.61163			
18	2.43409	.58662	6.57644	1.34458	28	8.26743	.47342	111.74018	1.62480			
19	2.55155	.57883	7.24294	1.36988	84	0	1.00551	1.00551	1.00000	0		
20	2.67718	.57161	7.99053	1.39334		1	1.10555	.91901	1.24370	.28484		
21	2.81680	.56517	8.86354	1.41582		2	1.20403	.85207	1.50615	.49878		
22	2.96867	.55959	9.86355	1.43877		3	1.30210	.79835	1.78977	.66545		
23	3.13708	.55476	11.03386	1.45653		4	1.40075	.75410	2.09743	.79902		
24	3.32593	.54882	12.42298	1.47521		5	1.50083	.71689	2.43252	.90853		
25	3.54049	.54434	14.09971	1.49292		6	1.60319	.68510	2.79915	1.00000		
26	3.78811	.54030	16.16503	1.50973		7	1.70865	.65758	3.20220	1.07758		
27	4.07344	.53668	18.77364	1.52573		8	1.81813	.63350	3.64771	1.14426		
28	4.43066	.53346	22.17482	1.54098		9	1.93258	.61225	4.14307	1.20221		
29	4.86743	.53063	26.79740	1.55553		10	2.05312	.59336	4.69748	1.25307		
30	5.43471	.52817	33.44887	1.56945		11	2.18107	.57646	5.32259	1.29810		
31	6.21880	.52607	43.84824	1.58278		12	2.31797	.56125	6.03330	1.33826		
32	7.41570	.52433	62.42139	1.59557		13	2.46574	.54752	6.84903	1.37333		
33	9.61661	.52292	105.08534	1.60786	14	2.62621	.53507	7.79593	1.40692			
82	0	1.00983	1.00983	1.00000	0	15	2.80428	.52375	8.90771	1.43652		
	1	1.08589	.94316	1.18238	.22096	16	3.00225	.51342	10.23417	1.46355		
	2	1.16106	.88669	1.37561	.39804	17	3.22630	.50399	11.84448	1.48834		
	3	1.23589	.84318	1.58082	.54323	18	3.48427	.49535	13.84205	1.51117		
	4	1.31088	.80449	1.79930	.66449	19	3.78761	.48744	16.38741	1.53228		
	5	1.38645	.77094	2.03252	.76734	20	4.15390	.48019	19.74410	1.55187		
	6	1.46304	.74207	2.28218	.85974	21	4.61191	.47354	24.37688	1.57010		
	7	1.54104	.71648	2.55026	.93257	22	5.21284	.46744	31.18958	1.58712		
	8	1.62087	.69379	2.83905	1.00000	23	6.04172	.46177	41.95460	1.60280		
	9	1.70297	.67352	3.15125	1.05969	24	7.40162	.45673	63.04968	1.61803		
	10	1.78780	.65533	3.49004	1.11294	25	10.10199	.45480	117.59103	1.63212		
	11	1.87587	.63893	3.85920	1.16075	85	0	1.00322	1.00322	1.00000	0	
	12	1.96776	.62407	4.26328	1.20395		1	1.12309	.90238	1.29371	.33266	
	13	2.06412	.61058	4.70774	1.24320		2	1.24028	.82702	1.61438	.57056	
14	2.16569	.59829	5.19927	1.27904	3		1.35724	.76228	1.96611	.74924		
					4		1.47548	.70991	2.35391	.88844		
15	2.27337	.58706	5.74613	1.31190								
16	2.38822	.57680	6.35862	1.34217	5		1.59637	.68174	2.78387	1.00000		
17	2.51150	.56740	7.04972	1.37016	6		1.72126	.66470	3.26362	1.09147		
18	2.64482	.55879	7.83617	1.39612	7		1.85157	.64801	3.80263	1.16786		
19	2.79013	.55089	8.73972	1.42029	8		1.98885	.59586	4.41305	1.23265		
					9		2.13493	.57436	5.11052	1.28834		
20	2.94995	.54365	9.78928	1.44286	10		2.29200	.55535	5.91560	1.33674		
21	3.12533	.53694	11.00824	1.46375	11		2.46281	.53843	6.85590	1.37922		
22	3.32734	.53095	12.49953	1.48384	12		2.65087	.52328	7.96937	1.41683		
23	3.55522	.52559	14.29389	1.50252	13	2.86089	.50964	9.30959	1.45037			
24	3.81965	.52035	16.52503	1.52015	14	3.09929	.49731	10.95474	1.48050			
25	4.13307	.51575	19.37661	1.53682								
26	4.51462	.51155	23.15148	1.55261	15	3.37530	.48612	13.02379	1.50771			
27	4.99598	.50783	28.30911	1.56761	16	3.70268	.47594	15.70664	1.53244			
28	5.63407	.50447	36.14927	1.58188	17	4.10319	.46666	19.32635	1.55501			
29	6.54508	.50149	48.84302	1.59548	18	4.61399	.45817	24.46172	1.57972			
					19	5.30513	.45040	32.43900	1.59479			

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Concluded

θ (deg)	β (deg)	M_b	M_A	$\frac{P_A}{P_b}$	$\frac{\Delta P_{A,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_A	$\frac{P_A}{P_b}$	$\frac{\Delta P_{A,b}}{q_b}$	
85	20	6.33047	0.44327	46.23224	1.61242	87	5	2.01291	0.58128	4.54750	1.25076	
	21	8.12762	.43674	76.31580	1.62878		6	2.25574	.54695	5.75347	1.33456	
86	0	1.00244	1.00244	1.00000	0	7	2.52995	.51836	7.28229	1.40171		
	1	1.15055	.87994	1.37020	.39951	8	2.84902	.49410	9.27715	1.45677		
	2	1.29591	.79401	1.78307	.66612	9	3.23409	.47324	12.00248	1.50275		
	3	1.44179	.72957	2.24675	.85680	10	3.72148	.45507	15.94670	1.54176		
	4	1.59085	.67901	2.77155	1.00000	11	4.38141	.43910	22.16816	1.57528		
	5	1.74555	.63805	3.37082	1.11156	12	5.37519	.42495	33.44909	1.60442		
	6	1.90850	.60405	4.06208	1.20098	13	7.20410	.41232	60.21636	1.62999		
	7	2.08259	.57529	4.86377	1.27428	14	13.26155	.40099	204.45147	1.65262		
	8	2.27139	.55060	5.82313	1.33551	88	0	1.00061	1.00061	1.00000	0	
	9	2.47941	.52914	6.97050	1.38744		1	1.29222	.79143	1.77909	.66653	
	10	2.71274	.51031	8.37701	1.43208		2	1.58355	.67540	2.75534	1.00000	
	11	2.97992	.49265	10.14282	1.47087		3	1.89445	.59221	4.01532	1.20025	
	12	3.29358	.47680	12.42734	1.50491		4	2.24475	.54437	5.70487	1.33388	
	13	3.67355	.46548	15.50082	1.53505		5	2.66202	.50254	8.09068	1.42944	
	14	4.15329	.45349	19.86017	1.56194		6	3.19358	.46933	11.71764	1.50122	
	15	4.79538	.44264	26.53113	1.58608		7	3.93752	.44219	17.89940	1.57174	
	16	5.73559	.43279	38.02639	1.60789		8	5.15650	.41950	30.81660	1.60196	
	17	7.35053	.42382	62.56201	1.62771		9	8.01593	.40020	74.70644	1.63870	
18	11.43133	.41564	151.54614	1.64580	89		0	1.00015	1.00015	1.00000	0	
87	0	1.00137	1.00137	1.00000			0	1	1.58174	.67450	2.75133	1.00000
	1	1.19742	.84687	1.50153			.49969	2	2.23822	.54284	5.67614	1.33347
	2	1.39022	.74753	2.08199			.79976	3	3.17002	.46702	11.55363	1.50031
	3	1.58658	.67690	2.76207	1.00000		4	5.03780	.41629	29.43369	1.60049	
4	1.79219	.62346	3.57035	1.14321								



SUPPLEMENT

NACA TECHNICAL NOTE NO. 1143

CHARTS FOR DETERMINING THE CHARACTERISTICS OF
SHARP-NOSE AIRFOILS IN TWO-DIMENSIONAL
FLOW AT SUPERSONIC SPEEDS

By H. Reese Ivey, George W. Stickle,
and Alberta Schuettler

September 1947

Since Technical Note No. 1143 was completed, the need for a more extensive version of table I, "Values of Local Mach Number, Pressure Ratio, and Pressure Coefficient across Shock Waves," has become apparent. This table is now available in expanded form; and a copy of the expanded table is included in this supplement to supersede the original table I.

Errors in the original publication are as follows:

Page 11: The first sentence of the last paragraph should begin "Tables I and III . . ." instead of "Tables I and II"

Corrections in tables II and III are as follows:

Table II.--

M_b	$-\beta$	M_a
2.3	23°	3.4225
2.6	10°	3.0867
4.3	3°	4.5658
4.7	7°	5.4669
4.7	8°	5.5922
4.7	9°	5.7240
6.2	9°	7.9200

Table III.--

M_b	$-\beta$	p_a/p_b
1.4	14°	0.49071
4.7	24°	.02350

Figure 13.- Each vertical space along the scale label for pressure coefficient $\Delta p/q$ should represent 0.125 instead of 20; thus, the vertical scale should appear:

-.500
-.375
-.250
-.125
0
.125
.250
.375
.500
.625
.750
.875
1.000

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES

θ (deg)	β (deg)	M_0	M_1	$\frac{P_1}{P_0}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_0	M_1	$\frac{P_1}{P_0}$	$\frac{\Delta p_{a,b}}{q_b}$
8	0	7.18546	7.18546	1.00000	0	18	0	3.23604	3.23604	1.00000	0
	1	7.80125	7.57479	1.20854	.00490		1	3.35720	3.29834	1.08900	.01128
	2	8.60430	8.07261	1.50622	.00977		2	3.49146	3.36878	1.19145	.02244
9	0	6.39264	6.39264	1.00000	0	19	0	3.64174	3.44868	1.31087	.03349
	1	6.87407	6.69357	1.18235	.00551		1	3.81150	3.53948	1.45184	.04443
	2	7.48067	7.06779	1.43092	.01100		2	4.00564	3.64318	1.62091	.05528
	3	8.27834	7.54385	1.78981	.01646		3	4.23083	3.76221	1.82753	.06604
10	0	5.75871	5.75871	1.00000	0	20	4	4.57062	3.89495	2.16071	.07937
	1	6.14639	5.99785	1.16236	.00614		5	4.81743	4.05749	2.41888	.08734
	2	6.62119	6.28846	1.37565	.01224		6	5.21582	4.25058	2.66418	.09789
	3	7.22344	6.64849	1.66896	.01832		7	5.72912	4.47828	3.49010	.10838
	4	8.02263	7.10485	2.09762	.02436		8	6.42781	4.43641	4.43641	.11882
11	0	5.24082	5.24082	1.00000	0	21	9	7.46024	5.10668	6.03381	.12921
	1	5.59567	5.43448	1.14629	.00676		10	8.02255	5.56127	9.30925	.13956
	2	5.94262	5.66634	1.33338	.01349		11	3.07154	3.07154	1.00000	0
	3	6.42373	5.95118	1.58610	.02059		12	3.18101	3.12594	1.08465	.01195
	4	7.01599	6.29392	1.98421	.02832		13	3.30163	3.18741	1.18134	.02377
	5	7.83581	6.73948	2.44137	.03354		14	3.43552	3.25671	1.29288	.03545
	6	8.98638	7.30617	3.26353	.04004		15	3.58599	3.33514	1.42320	.04702
12	0	4.80977	4.80977	1.00000	0	22	5	3.75551	3.42821	1.57743	.05849
	1	5.07739	4.96951	1.13344	.00739		6	3.95028	3.52573	1.76303	.06985
	2	5.30281	5.15796	1.29999	.01474		7	4.17683	3.64210	1.99073	.08113
	3	5.77302	5.38268	1.51411	.02204		8	4.44535	3.76664	2.27703	.09232
	4	6.24375	5.65433	1.79936	.02929		9	4.77075	3.93351	2.64786	.10343
	5	6.84911	5.98883	2.19908	.03652		10	5.17739	4.11880	3.14812	.11448
	6	7.66903	6.41123	2.79939	.04371		11	5.70582	4.34078	3.85929	.12547
13	0	4.44543	4.44543	1.00000	0	23	12	6.43414	4.61223	4.95273	.13640
	1	4.67339	4.57891	1.12271	.00803		13	7.53249	4.95273	6.84971	.14729
	2	4.93834	4.73465	1.27307	.01600		14	9.48326	5.39507	10.95449	.15813
	3	5.24983	4.91619	1.46158	.02393		0	2.92381	2.92381	1.00000	0
	4	5.63112	5.13596	1.70535	.03178		1	3.02334	2.97148	1.08078	.01263
	5	6.10349	5.39892	2.03258	.03960		2	3.13239	3.02492	1.17239	.02510
	6	6.71567	5.72228	2.49588	.04738		3	3.25271	3.08575	1.27725	.03744
	7	7.55439	6.12986	3.20247	.05513		4	3.38650	3.15392	1.39847	.04964
14	0	4.13360	4.13360	1.00000	0	24	5	3.53676	3.23092	1.54042	.06172
	1	4.33044	4.24248	1.11376	.00867		6	3.70716	3.31824	1.70890	.07369
	2	4.55638	4.37683	1.25087	.01726		7	3.90296	3.41765	1.91224	.08555
	3	4.81978	4.52876	1.41949	.02500		8	4.13158	3.53157	2.16393	.09732
	4	5.13240	4.70707	1.63192	.03427		9	4.40349	3.66307	2.47965	.10901
	5	5.51261	4.91882	1.90886	.04270		10	4.73461	3.81626	2.89260	.12061
	6	5.98884	5.17368	2.28225	.05107		11	5.15114	3.95971	3.45155	.13215
	7	6.62228	5.49587	2.81769	.05921		12	5.68739	4.21372	4.26333	.14362
	8	7.47450	5.88074	3.64800	.06771		13	6.46071	4.47840	5.28986	.15503
15	0	3.86369	3.86369	1.00000	0	25	14	7.63854	4.81027	7.79624	.16640
	1	4.03562	3.95993	1.10614	.00931		15	9.83090	5.24117	13.02305	.17772
	2	4.14555	3.98829	1.23231	.01931		0	2.79041	2.79041	1.00000	0
	3	4.45565	4.19791	1.38489	.02770		1	2.88143	2.83236	1.07736	.01331
	4	4.71842	4.34601	1.57329	.03679		2	2.98066	2.87953	1.16450	.02645
	5	5.03145	4.51957	1.81179	.04587		3	3.08951	2.93282	1.26352	.03944
	6	5.41400	4.72539	2.12408	.05479		4	3.20981	2.99660	1.37704	.05228
	7	5.89618	5.04264	2.55029	.06370		5	3.34375	3.05910	1.50857	.06498
	8	6.53211	5.27618	3.16796	.07258		6	3.47911	3.12563	1.64697	.07636
	9	7.42624	5.65781	4.14339	.08143		7	3.66576	3.22034	1.84678	.09002
16	0	8.82181	6.14628	5.91549	.09023	26	8	3.86318	3.31771	2.06948	.10237
	1	3.62792	3.62792	1.00000	0		9	4.09428	3.42921	2.34504	.11463
	2	3.77964	3.71064	1.09962	.00996		10	4.37040	3.55785	2.69521	.12679
	3	3.95037	3.80507	1.21661	.01983		11	4.70837	3.70760	3.15498	.13887
	4	4.14479	3.91330	1.35610	.02961		12	5.13650	3.88429	3.78653	.15088
	5	4.36900	4.03782	1.52531	.03931		13	5.70365	4.09575	4.70770	.16282
	6	4.63202	4.18238	1.73515	.04895		14	6.50821	4.35408	6.17984	.17470
	7	4.94653	4.35137	2.00221	.05891		15	7.78248	4.67780	8.90838	.18653
	8	5.33290	4.55154	2.35426	.06803		16	10.29326	5.09613	15.70811	.19831
	9	5.82325	4.79190	2.83915	.07748		0	2.66944	2.66944	1.00000	0
	17	0	3.42032	3.42032	1.00000		0	27	1	2.75318	2.70504
1		3.55532	3.49188	1.09391	.01061	2	2.84397		2.74795	1.15755	.027827
2		3.70612	3.57318	1.20313	.02113	3	2.94308		2.79453	1.25145	.041472
3		3.87615	3.66580	1.33170	.03154	4	3.05197		2.86727	1.35832	.054956
4		4.07015	3.77171	1.48543	.04186	5	3.17242		2.90542	1.48108	.068287
5		4.29455	3.89345	1.67261	.05210	6	3.30680		2.97131	1.62361	.081470
6		4.55860	4.03450	1.90576	.06227	7	3.45826		3.04552	1.79138	.094530
7		4.87573	4.19924	2.20412	.07236	8	3.63087		3.12950	1.99170	.10746
8		5.26736	4.39418	2.60026	.08240	9	3.83033		3.22498	2.23335	.12029
9		5.76803	4.62799	3.15127	.09237	10	4.06462		3.33411	2.53821	.13301
10		6.44180	4.91440	3.97167	.10230	11	4.34571		3.45998	2.92528	.14564
11		7.41936	5.27398	5.32300	.11219	12	4.69181		3.60650	3.43734	.15817
12	9.03211	5.73979	7.96901	.12204	13	5.13349	3.77921	4.14788	.17065		
					14	5.72501	3.98579	5.19941	.18304		
					15	6.57835	4.23809	6.91836	.19538		
					16	7.97050	4.55413	10.23418	.20765		
					17	10.91166	4.96439	19.32636	.21989		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	
23	0	2.55931	2.55931	1.00000	0	27	5	2.54085	2.32939	1.38571	.08535	
	1	2.63663	2.59191	1.07155	.014703		6	6	2.62517	2.36445	1.49044	.10167
	2	2.72021	2.62854	1.15131	.029212		7	7	2.71711	2.40346	1.60857	.11776
	3	2.81097	2.66964	1.24071	.043519		8	8	2.81810	2.44693	1.74297	.13365
	4	2.91011	2.71559	1.34175	.057649		9	9	2.92984	2.49534	1.89742	.14935
	5	3.01917	2.76708	1.45693	.071610		10	10	3.05449	2.54944	2.07680	.16488
	6	3.14004	2.82478	1.58952	.085414		11	11	3.19487	2.60990	2.28776	.18023
	7	3.27510	2.88954	1.74384	.099068		12	12	3.35498	2.67778	2.53991	.19544
	8	3.42766	2.95435	1.92598	.11259		13	13	3.53985	2.75428	2.84643	.21051
	9	3.60192	3.04481	2.14416	.12628		14	14	3.75706	2.84104	3.22752	.22544
	10	3.80388	3.13837	2.41057	.13927		15	15	4.01751	2.93990	3.71441	.24025
	11	4.04200	3.24533	2.74332	.15244		16	16	4.33830	3.05365	4.35996	.25496
	12	4.32897	3.36862	3.17120	.16551		17	17	4.74742	3.18578	5.25280	.26954
	13	4.66441	3.51192	3.74184	.17850		18	18	5.29553	3.34180	6.57644	.28408
	14	5.14181	3.68084	4.54240	.19141		19	19	6.08998	3.52689	8.73972	.29851
	15	5.76160	3.88284	5.74606	.20424		20	20	7.37622	3.75323	12.91636	.31288
	16	6.67299	4.12943	7.76366	.21702		21	21	10.10296	4.03644	24.37689	.32718
17	8.21184	4.43824	11.84447	.22974	28	0	2.13006	2.13006	1.00000	0		
24	0	2.45897	2.45897	1.00000		0	1	2.18546	2.14729	1.06148	.01839	
	1	2.53038	2.42739	1.06915		.015488	2	2	2.24436	2.16698	1.12856	.03646
	2	2.60761	2.51974	1.14573		.030617	3	3	2.30713	2.18917	1.20202	.05422
	3	2.69120	2.55602	1.23122		.045607	4	4	2.37434	2.21407	1.28293	.07170
	4	2.78202	2.59660	1.32717		.060389	5	5	2.44661	2.24198	1.37252	.08890
	5	2.88137	2.64194	1.43578		.074985	6	6	2.52465	2.27308	1.47228	.10585
	6	2.99085	2.69267	1.55985		.089410	7	7	2.60945	2.30767	1.58425	.12258
	7	3.11233	2.74947	1.70294		.10367	8	8	2.70205	2.34617	1.71071	.13906
	8	3.24831	2.81309	1.86990		.11778	9	9	2.89976	2.37065	1.85492	.15525
9	3.40126	2.88381	2.06753	.13183		10	10	2.91678	2.43671	2.02095	.17143	
10	3.57897	2.96549	2.30507	.14559		11	11	3.04296	2.48992	2.21432	.18735	
11	3.78354	3.07330	2.59633	.15930		12	12	3.18538	2.54937	2.44239	.20308	
12	4.02611	3.16209	2.96196	.17291		13	13	3.34818	2.61606	2.71591	.21866	
13	4.31993	3.22825	3.43525	.18642		14	14	3.53684	2.69124	3.04990	.23410	
14	4.66616	3.42314	4.07188	.19984		15	15	3.75932	2.77640	3.46732	.24941	
15	5.16169	3.58897	4.97974	.21317		16	16	4.02749	2.87344	4.00428	.26459	
16	5.81451	3.76616	6.35862	.22643	17	17	4.35986	2.98504	4.72109	.27966		
17	6.79454	4.02728	8.74365	.23962	18	18	4.78758	3.11464	5.72715	.29463		
18	8.51947	4.32922	13.84205	.25276	19	19	5.36803	3.26703	7.24894	.30950		
25	0	2.36619	2.36619	1.00000	0	20	6.22241	3.44906	9.78928	.32429		
	1	2.43311	2.39158	1.06692	.016149	21	21	7.67074	3.67090	14.96338	.33901	
	2	2.50490	2.42023	1.14078	.032053	22	22	11.04280	3.94841	31.18958	.35367	
	3	2.58225	2.45239	1.22268	.047707	29	0	2.06266	2.06266	1.00000	0	
	4	2.66584	2.48815	1.31421	.063162		1	1	2.11505	2.07774	1.06001	.01916
	5	2.75692	2.52825	1.41711	.078398		2	2	2.17054	2.09466	1.12523	.03797
	6	2.85665	2.57296	1.53377	.093442		3	3	2.22957	2.11455	1.19647	.05646
	7	2.96666	2.62291	1.66728	.10831		4	4	2.29236	2.13521	1.27431	.07457
	8	3.08899	2.67881	1.82163	.12301		5	5	2.36005	2.16131	1.36067	.09251
	9	3.22621	2.74136	2.00218	.13755		6	6	2.43270	2.18895	1.45616	.11011
10	3.38185	2.81164	2.21653	.15196	7		7	2.51121	2.21966	1.56898	.12744	
11	3.56060	2.89100	2.47509	.16622	8		8	2.59664	2.25386	1.68825	.14455	
12	3.76908	2.98103	2.79352	.18036	9		9	2.69398	2.29151	1.82347	.16209	
13	4.01684	3.08381	3.19547	.19438	10	10	2.79292	2.33402	1.97234	.17808		
14	4.31849	3.20211	3.71940	.20831	11	11	2.90717	2.38101	2.15090	.19454		
15	4.69712	3.33960	4.43072	.22214	12	12	3.03508	2.43337	2.35935	.21081		
16	5.19339	3.50148	5.45345	.23588	13	13	3.17984	2.49183	2.60608	.22690		
17	5.88489	3.69496	7.04972	.24955	14	14	3.34376	2.55740	2.90292	.24285		
18	6.94816	3.93093	9.89298	.26315	15	15	3.53866	2.63123	3.26710	.25864		
19	8.91314	4.22633	16.38741	.27670	16	16	3.78717	2.71487	3.72426	.27429		
26	0	2.28118	2.28118	1.00000	0	17	4.04402	2.81017	4.31785	.28982		
	1	2.34380	2.30354	1.06492	.01688	18	18	4.38959	2.91970	5.11702	.30524	
	2	2.41071	2.32880	1.13624	.03349	19	19	4.83865	3.04685	6.25337	.32055	
	3	2.48254	2.35720	1.21505	.04985	20	20	5.46867	3.19634	7.99871	.33576	
	4	2.55994	2.38897	1.30255	.06595	21	21	6.38835	3.37485	11.02428	.35090	
	5	2.64389	2.42442	1.40051	.08185	22	22	8.04043	3.59235	17.56086	.36595	
	6	2.73534	2.46403	1.51078	.09752	30	0	2.00000	2.00000	1.00000	0	
	7	2.83560	2.50808	1.63601	.11300		1	1	2.04970	2.01309	1.05869	.01996
	8	2.94639	2.55727	1.77964	.12830		2	2	2.10220	2.02817	1.12228	.03953
	9	3.06978	2.61226	1.94606	.14342		3	3	2.15786	2.04536	1.19144	.05873
10	3.20843	2.64370	2.14123	.15838	4		4	2.21712	2.06469	1.26706	.07743	
11	3.36613	2.74282	2.37366	.17319	5		5	2.28038	2.08676	1.35004	.09616	
12	3.54771	2.82071	2.65133	.18786	6		6	2.34824	2.11124	1.44166	.11442	
13	3.76027	2.90907	3.00338	.20241	7		7	2.42132	2.13897	1.54331	.13239	
14	4.01396	3.00988	3.44555	.21684	8		8	2.50046	2.16931	1.65693	.15010	
15	4.32457	3.12584	4.02623	.23116	9		9	2.58664	2.20269	1.78480	.16757	
16	4.71747	3.26064	4.82275	.24539	10	10	2.68100	2.24016	1.92978	.18479		
17	5.23773	3.41920	5.98393	.25953	11	11	2.78510	2.28175	2.09578	.20180		
18	5.97457	3.60871	7.83617	.27359	12	12	2.90088	2.32799	2.28775	.21861		
19	7.13932	3.83975	11.26064	.28758	13	13	3.03082	2.37953	2.51256	.23523		
20	9.42386	4.12892	19.74410	.30152	14	14	3.17820	2.43701	2.77947	.25167		
27	0	2.20269	2.20269	1.00000	0	15	3.34766	2.50149	3.10201	.26795		
	1	2.26150	2.22239	1.06314	.01764	16	16	3.54542	2.57407	3.49958	.28408	
	2	2.32415	2.24468	1.13222	.03497	17	17	3.78065	2.65620	4.0222	.30006	
	3	2.39117	2.26979	1.20820	.05202	18	18	4.06734	2.74978	4.65453	.31592	
	4	2.46318	2.29795	1.29226	.06831	19	19	4.42795	2.85731	5.55196	.33166	

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
30	20	4.90159	3.00520	6.84081	0.34730	34	0	1.78829	1.78829	1.00000	0
	21	5.56424	3.12879	8.86354	.36284		1	1.82960	1.79493	1.05453	.023271
	22	6.58991	3.30392	12.44954	.37829		2	1.87291	1.80309	1.11302	.046028
	23	8.51233	3.51725	20.96744	.39367		3	1.91837	1.81285	1.17591	.060285
31	0	1.94160	1.94160	1.00000	0	4	1.96630	1.82427	1.24382	.090089	
	1	1.98886	1.95286	1.05748	.02076	5	2.01688	1.87341	1.31735	.11145	
	2	2.03868	1.96598	1.11958	.04110	6	2.07054	1.85237	1.39734	.13240	
	3	2.09138	1.98107	1.18694	.06106	7	2.12758	1.86926	1.48470	.15297	
	4	2.14730	1.99823	1.26029	.08064	8	2.18849	1.88824	1.58061	.17318	
	5	2.20684	2.01760	1.34052	.09989	9	2.25376	1.90935	1.68638	.19304	
	6	2.27049	2.03933	1.42871	.11880	10	2.32403	1.93285	1.80374	.21259	
	7	2.33880	2.06359	1.52616	.13741	11	2.40006	1.95894	1.93476	.23182	
	8	2.41247	2.09061	1.63449	.15574	12	2.48279	1.98734	2.08213	.25078	
	9	2.49232	2.12062	1.75569	.17379	13	2.57339	2.01896	2.24923	.26948	
	10	2.57936	2.15392	1.89230	.19160	14	2.67317	2.05252	2.44024	.28793	
	11	2.67484	2.19086	2.04755	.20916	15	2.78406	2.07055	2.66102	.30614	
	12	2.78034	2.23185	2.22567	.22651	16	2.90844	2.13794	2.91930	.32413	
	13	2.89789	2.27739	2.43223	.24364	17	3.04938	2.18688	3.22562	.34192	
	14	3.03011	2.32809	2.67480	.26058	18	3.21124	2.24018	3.59506	.35953	
	15	3.18052	2.38468	2.96390	.27735	19	3.39964	2.30049	4.04968	.37696	
16	3.35393	2.44806	3.31456	.29394	20	3.62346	2.36828	4.62314	.39422		
17	3.55709	2.51939	3.74909	.31038	21	3.89559	2.44492	5.36960	.41134		
18	3.79995	2.60008	4.30204	.32668	22	4.23683	2.53215	6.38199	.42831		
19	4.09778	2.69201	5.02997	.34285	23	4.68311	2.63228	7.83424	.44517		
20	4.47555	2.79760	6.03228	.35890	24	5.30348	2.76967	10.09437	.46191		
21	4.97767	2.92012	7.50125	.37484	25	6.25348	2.88475	14.09971	.47854		
22	5.69302	3.06409	9.86355	.39068	26	7.99488	3.04745	23.15148	.49509		
23	6.83565	3.23596	14.29389	.40644	35	0	1.74345	1.74345	1.00000	0	
24	9.13076	3.44528	25.63452	.42212		1	1.78316	1.74876	1.05375	.02415	
0	1.88707	1.88707	1.00000	0		2	1.82468	1.75553	1.11126	.04774	
1	1.93213	1.89664	1.05639	.02158		3	1.86822	1.76380	1.17296	.07079	
2	1.97956	1.90799	1.11716	.04271		4	1.91398	1.77361	1.23939	.09336	
3	2.02958	1.92112	1.18287	.06342		5	1.96221	1.78504	1.31116	.11545	
4	2.08253	1.93620	1.25420	.08373		6	2.01321	1.79815	1.38897	.13710	
5	2.13875	1.95330	1.33195	.10367		7	2.06730	1.81304	1.47365	.15834	
6	2.19868	1.97256	1.41711	.12326		8	2.12487	1.82981	1.56632	.17918	
7	2.26277	2.00630	1.51078	.14251		9	2.18638	1.84899	1.66810	.19966	
8	2.33163	2.04607	1.61445	.16146		10	2.25238	1.86993	1.78054	.21979	
9	2.40596	2.04478	1.72982	.18011		11	2.32352	1.89278	1.90548	.23960	
10	2.48665	2.07445	1.85915	.19849		12	2.40058	1.91855	2.04521	.25910	
11	2.57474	2.10730	2.00522	.21662		13	2.48453	1.94707	2.20263	.27832	
12	2.67149	2.14373	2.17150	.23450		14	2.57658	1.97862	2.38143	.29727	
13	2.77856	2.18409	2.36269	.25215		15	2.67822	2.01351	2.58644	.31596	
14	2.89612	2.22897	2.58506	.26960	16	2.79139	2.05215	2.82401	.33442		
15	3.02992	2.27884	2.84700	.28684	17	2.91858	2.09498	3.10277	.35266		
16	3.18672	2.33454	3.16033	.30390	18	3.06314	2.14258	3.43466	.37069		
17	3.36459	2.39688	3.54210	.32080	19	3.22962	2.19562	3.83675	.38853		
18	3.57385	2.46700	4.01779	.33753	20	3.42442	2.25495	4.33427	.40619		
19	3.82531	2.54630	4.62734	.35413	21	3.65692	2.32162	4.96621	.42369		
20	4.13577	2.63661	5.43708	.37058	22	3.94150	2.39697	5.79616	.44103		
21	4.53321	2.74033	6.56585	.38692	23	4.30153	2.48272	6.93262	.45824		
22	5.06850	2.88280	8.24971	.40315	24	4.77837	2.58113	8.59705	.47532		
23	5.84704	3.00200	11.03386	.41927	25	5.45400	2.69523	11.25052	.49229		
24	7.13785	3.17071	16.52504	.43531	26	6.52305	2.83921	16.16903	.50915		
25	9.97414	3.37616	32.42577	.45127	27	8.62546	2.98903	28.38910	.52591		
33	0	1.83608	1.83608	1.00000	0	36	0	1.70130	1.70130	1.00000	0
	1	1.87918	1.84413	1.05541	.02242		1	1.73955	1.70539	1.05304	.025040
	2	1.92442	1.85381	1.11497	.04435		2	1.77947	1.71085	1.10969	.049487
	3	1.97206	1.86350	1.17920	.06583		3	1.82126	1.71772	1.17033	.073358
	4	2.02235	1.87836	1.24872	.08688		4	1.86536	1.72606	1.23585	.096830
	5	2.07561	1.89338	1.32426	.10752		5	1.91119	1.73654	1.30563	.11953
	6	2.13221	1.91039	1.40668	.12779		6	1.95980	1.74734	1.38147	.14189
	7	2.19258	1.92947	1.49703	.14770		7	2.01124	1.76042	1.46381	.16380
	8	2.25722	1.95082	1.59657	.16727		8	2.06585	1.77522	1.55356	.18530
	9	2.32674	1.97459	1.70686	.18653		9	2.12402	1.79185	1.65178	.20639
	10	2.40188	2.00099	1.82982	.20796		10	2.18662	1.81048	1.75992	.22713
	11	2.48351	2.03026	1.96784	.22417		11	2.25305	1.83118	1.87943	.24749
	12	2.57274	2.06268	2.12398	.24259		12	2.32517	1.85418	2.01251	.26754
	13	2.67094	2.09859	2.30217	.26076		13	2.40336	1.87960	2.16155	.28728
	14	2.77983	2.13838	2.50757	.27870		14	2.48870	1.90778	2.32982	.30673
	15	2.90165	2.18255	2.74709	.29643		15	2.58245	1.93889	2.52146	.32591
16	3.03936	2.23168	3.03020	.31396	16	2.68612	1.97330	2.74161	.34483		
17	3.19689	2.28644	3.37020	.33131	17	2.80180	2.01136	2.99750	.36351		
18	3.37977	2.34775	3.78644	.34848	18	2.93216	2.05355	3.29879	.38197		
19	3.59589	2.41669	4.30816	.36549	19	3.08076	2.10040	3.65894	.40022		
20	3.85704	2.49464	4.98175	.38235	20	3.25251	2.15260	4.09738	.41827		
21	4.18188	2.58339	5.82545	.39908	21	3.45439	2.21098	4.64313	.43615		
22	4.60196	2.68528	7.16241	.41569	22	3.69669	2.27636	5.34355	.45365		
23	5.17619	2.80347	9.10556	.43218	23	3.99543	2.35065	6.26779	.47111		
24	6.03149	2.94229	12.42298	.44857	24	4.37714	2.43496	7.55597	.48883		
25	7.51479	3.10795	19.37661	.46487	25	4.89989	2.53169	9.47123	.50612		
26	11.19767	3.53991	43.22636	.48109	26	5.63258	2.66431	12.62122	.52329		

TABLE I - VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
36	27	6.85490	2.77549	18.77364	0.54035	39	17	2.51649	1.79765	2.75938	0.39689
	28	9.49197	2.93252	36.14927	.53732		18	2.61643	1.82749	2.99641	.41661
37	0	1.66164	1.66164	1.00000	0	40	19	2.72771	1.86043	3.27119	.43607
	1	1.69857	1.66458	1.05244	.02597		0	2.85280	1.89684	3.59373	.45529
2	1.73706	1.66883	1.10831	.05128		20	2.99499	1.93714	3.97793	.47427	
3	1.77726	1.67443	1.16800	.07598		21	3.15879	1.98185	4.44366	.49304	
4	1.81934	1.68140	1.23196	.10011		22	3.35052	2.03163	5.02033	.51161	
						23	3.58530	2.09759	6.03867	.52999	
5	1.86351	1.68980	1.30070	.12370		24	3.85991	2.14968	6.71741	.54821	
6	1.91000	1.69967	1.37483	.14678		25	4.21505	2.22019	8.04246	.56627	
7	1.95907	1.71107	1.45505	.16938		26	4.68611	2.30037	9.97979	.58418	
8	2.01103	1.72408	1.54221	.19153		27	5.35512	2.39231	13.06374	.60196	
9	2.06623	1.73879	1.63730	.21325		28	6.41824	2.49885	18.86698	.61961	
10	2.12508	1.75530	1.74154	.23458		29					
11	2.18809	1.77373	1.85637	.25552		30	8.52952	2.62389	33.44886	.63716	
12	2.25584	1.79422	1.98358	.27612		0	1.55572	1.55572	1.00000	0	
13	2.32903	1.81694	2.12538	.29638		1	1.58940	1.55556	1.05106	.02887	
14	2.40896	1.84205	2.28541	.31643		2	1.62431	1.55660	1.10515	.05693	
15	2.49541	1.86986	2.46456	.33599		3	1.66120	1.55877	1.16355	.08467	
16	2.59099	1.90054	2.66997	.35537		4	1.69841	1.56224	1.22384	.11085	
17	2.69694	1.93445	2.90670	.37449		5	1.73791	1.56694	1.28916	.13677	
18	2.81543	1.97195	3.18269	.39337		6	1.77912	1.57276	1.35914	.16209	
19	2.94931	2.01350	3.50881	.41203		7	1.82243	1.57893	1.43431	.18681	
20	3.10242	2.05963	3.90033	.43048		8	1.86797	1.58841	1.51532	.21098	
21	3.28008	2.11101	4.37946	.44873		9	1.91599	1.59826	1.60291	.23462	
22	3.48991	2.16844	4.97971	.46679		10	1.96679	1.60950	1.69799	.25777	
23	3.74331	2.23295	5.75420	.48469		11	2.02072	1.62230	1.80165	.28046	
24	4.05825	2.30583	6.79240	.50244		12	2.07818	1.63666	1.91519	.30272	
25	4.46512	2.38873	8.25775	.52004		13	2.13960	1.65272	2.04007	.32456	
26	5.02050	2.48383	10.48377	.53751		14	2.20564	1.67062	2.17838	.34603	
27	5.84590	2.59406	14.27360	.55487		15	2.27684	1.69040	2.33224	.36713	
28	7.27143	2.72345	22.17482	.57211		16	2.35412	1.71233	2.50474	.38789	
29	10.76973	2.87776	48.84307	.58927		17	2.43844	1.73651	2.69953	.40833	
38	0	1.62427	1.62427	1.00000	0	18	2.53106	1.76318	2.92139	.42846	
	1	1.66000	1.62610	1.05191	.02691	19	2.63355	1.79260	3.17655	.44832	
2	1.69720	1.62925	1.10711	.05312		20	2.74794	1.82507	3.47330	.46791	
3	1.73595	1.63363	1.16595	.07867		21	2.87691	1.86290	3.82297	.48766	
4	1.77646	1.63934	1.22888	.10361		22	3.02399	1.90062	4.24135	.50637	
5	1.81891	1.64639	1.29635	.12796		23	3.19412	1.94465	4.75127	.52527	
6	1.86348	1.65484	1.36892	.15177		24	3.39425	1.99364	5.38688	.54396	
7	1.91042	1.66471	1.44727	.17507		25	3.63476	2.04837	6.20177	.56247	
8	1.95999	1.67607	1.53211	.19788		26	3.91174	2.10980	7.28497	.58081	
9	2.01254	1.68903	1.62441	.22023		27	4.31206	2.17916	8.79627	.59989	
10	2.06839	1.70361	1.72524	.24217		28	4.82461	2.25802	11.05366	.61702	
11	2.12800	1.71998	1.83585	.26369		29	5.57095	2.34844	14.79363	.63492	
12	2.19194	1.73827	1.95797	.28484		30	6.81144	2.47220	22.19783	.65270	
13	2.26065	1.75849	2.09337	.30562		31	9.55562	2.57613	43.84821	.67037	
14	2.33512	1.77819	2.24461	.32607		41	0	1.52425	1.52425	1.00000	0
15	2.41604	1.80577	2.41463	.34621			1	1.55704	1.52319	1.05073	.02899
16	2.50464	1.83315	2.60744	.36605		2	1.59100	1.52328	1.10441	.05892	
17	2.60229	1.86344	2.82795	.38562		3	1.62623	1.52450	1.16133	.08714	
18	2.71076	1.89686	3.08280	.40492		4	1.66286	1.52688	1.22183	.11461	
19	2.83237	1.93381	3.38091	.42398		5	1.70103	1.53043	1.28631	.14135	
20	2.97018	1.97473	3.73452	.44281		6	1.74090	1.53516	1.35521	.16743	
21	3.12634	2.02015	4.15144	.46143		7	1.78264	1.54110	1.42906	.19288	
22	3.31262	2.07072	4.63994	.47989		8	1.82644	1.54829	1.50845	.21774	
23	3.53143	2.12723	5.24815	.49809		9	1.87255	1.55677	1.59408	.24204	
24	3.79744	2.19070	6.21029	.51616		10	1.92121	1.56658	1.68679	.26581	
25	4.13102	2.26238	7.37982	.53407		11	1.97274	1.57780	1.78755	.28910	
26	4.56731	2.34390	9.05803	.55184		12	2.02749	1.59049	1.89753	.31191	
27	5.17392	2.43741	11.67110	.56947		13	2.08588	1.60474	2.01813	.33429	
28	6.10326	2.56549	16.30565	.58699		14	2.14839	1.62064	2.15104	.35626	
29	7.80868	2.67296	26.79741	.60440		15	2.21562	1.63831	2.29837	.37784	
30	12.89714	2.82462	73.38925	.62171		16	2.28827	1.65788	2.46267	.39906	
39	0	1.58902	1.58902	1.00000	0	17	2.36721	1.67951	2.64721	.41993	
	1	1.62367	1.58985	1.05145	.02788	18	2.45349	1.70337	2.85608	.44048	
2	1.65967	1.59190	1.10605	.05500		19	2.54845	1.72968	3.09460	.46073	
3	1.69713	1.59517	1.16416	.08142		20	2.65378	1.75868	3.36974	.48070	
4	1.73622	1.59970	1.22617	.10718		21	2.77164	1.79068	3.69085	.50040	
5	1.77709	1.60550	1.29251	.13232		22	2.90492	1.82601	4.07076	.51985	
6	1.81992	1.61261	1.36371	.15687		23	3.05749	1.86509	4.52755	.53907	
7	1.86495	1.62107	1.44036	.18087		24	3.23473	1.90844	5.08756	.55807	
8	1.91239	1.63094	1.52317	.20436		25	3.44438	1.95667	5.79072	.57687	
9	1.96255	1.64227	1.61298	.22735		26	3.69807	2.01053	6.70059	.59549	
10	2.01575	1.65514	1.71076	.24989		27	4.01421	2.07098	7.92491	.61355	
11	2.07236	1.66963	1.81770	.27200		28	4.42429	2.13921	9.66250	.63221	
12	2.13285	1.68584	1.93523	.29370		29	4.98692	2.21677	12.32147	.65034	
13	2.19774	1.70390	2.06508	.31501		30	5.83108	2.30570	16.90715	.66834	
14	2.26769	1.72394	2.20939	.33597		31	7.31588	2.40871	26.70940	.68622	
15	2.34345	1.74612	2.37081	.35659		32	11.16425	2.52958	62.42147	.70398	
16	2.42599	1.77061	2.55271	.37689							

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	
42	0	1.49448	1.49448	1.00000	0	44	15	2.05902	1.50014	2.22011	0.41113	
	1	1.52646	1.49254	1.05047	.03094		16	2.12085	1.51398	2.36559	.43372	
	2	1.55953	1.49172	1.10379	.06096		17	2.18729	1.52938	2.52675	.45889	
	3	1.59084	1.48920	1.16026	.09046		18	2.25905	1.54644	2.70637	.47767	
	4	1.63013	1.49331	1.22140	.11902		19	2.33696	1.56530	2.90795	.49908	
	5	1.66642	1.49592	1.28389	.14604		20	2.42205	1.58610	3.13593	.52014	
	6	1.70602	1.50047	1.35186	.17270		21	2.51562	1.60901	3.39602	.54088	
	7	1.74533	1.50437	1.42453	.19909		22	2.61929	1.63424	3.69573	.56132	
	8	1.78759	1.51037	1.50251	.22465		23	2.73518	1.66202	4.04507	.58147	
	9	1.83196	1.51758	1.58642	.24962		24	2.86606	1.69262	4.45777	.60135	
	10	1.87871	1.52603	1.67703	.27402		25	3.01565	1.72639	4.95312	.62098	
	11	1.92809	1.53583	1.77522	.29790		26	3.18913	1.76371	5.55910	.64038	
	12	1.98043	1.54697	1.88207	.32128		27	3.39390	1.80508	6.31798	.65956	
	13	2.03608	1.55958	1.99882	.34419		28	3.64100	1.85107	7.29665	.67953	
	14	2.09550	1.57370	2.12706	.36667		29	3.94787	1.90240	8.60767	.69731	
	15	2.15919	1.58941	2.26861	.38873		30	4.34390	1.95998	10.45639	.71592	
	16	2.22779	1.60689	2.42582	.41041		31	4.88378	2.02495	13.26101	.73437	
	17	2.30202	1.62622	2.60116	.43172		32	5.68455	2.09877	18.02951	.75267	
	18	2.38280	1.64758	2.79914	.45268		33	7.06275	2.18337	27.91591	.77084	
	19	2.47126	1.67112	3.02345	.47332		34	10.41342	2.29901	60.88204	.78888	
	20	2.56883	1.69707	3.28032	.49366		45	0	1.41421	1.41421	1.00000	0
	21	2.67731	1.72566	3.57758	.51371			1	1.44426	1.40982	1.05010	.03431
	22	2.79904	1.75719	3.92581	.53350			2	1.47521	1.40648	1.10280	.06748
	23	2.93714	1.79199	4.33962	.55303			3	1.50714	1.40419	1.15836	.09960
	24	3.09586	1.83048	4.83980	.57233			4	1.54015	1.40293	1.21704	.13071
	25	3.28113	1.87316	5.43696	.59142			5	1.57434	1.40269	1.27916	.16090
	26	3.50161	1.92063	6.23811	.61030			6	1.60983	1.40348	1.34507	.19022
	27	3.77045	1.97364	7.29595	.62899			7	1.64673	1.40529	1.41516	.21871
	28	4.10893	2.03311	8.65247	.64751			8	1.68518	1.40814	1.48991	.24645
	29	4.55417	2.10024	10.66728	.66587			9	1.72536	1.41205	1.56983	.27346
	30	5.17863	2.17693	13.84204	.68408			10	1.76742	1.41703	1.65554	.29979
	31	6.14967	2.26399	19.58813	.70216			11	1.81159	1.42311	1.74775	.32549
	32	7.98864	2.38362	33.16941	.72011			12	1.85809	1.43032	1.84730	.35059
33	14.19485	2.48414	105.08535	.73795	13	1.90720		1.43872	1.95515	.37513		
14	14.19485	2.48414	105.08535	.73795	14	1.95922		1.44834	2.07248	.39914		
43	0	1.46628	1.46628	1.00000	0	46	15	2.01452	1.45925	2.20066	.42265	
	1	1.49755	1.46349	1.05029	.03203		16	2.07352	1.47151	2.34137	.44569	
	2	1.52984	1.46179	1.10333	.06307		17	2.13674	1.48521	2.49664	.46829	
	3	1.56325	1.46118	1.15941	.09319		18	2.20479	1.50043	2.66897	.49047	
	4	1.59788	1.46165	1.21882	.12243		19	2.27839	1.51729	2.86144	.51227	
	5	1.63385	1.46320	1.28190	.15086		20	2.35843	1.53591	3.07796	.53369	
	6	1.67130	1.46584	1.34907	.17853		21	2.44604	1.55643	3.32348	.55477	
	7	1.71037	1.46959	1.42075	.20547		22	2.54259	1.57903	3.60444	.57553	
	8	1.75122	1.47447	1.49719	.23174		23	2.64985	1.60390	3.92932	.59597	
	9	1.79404	1.48050	1.57988	.25738		24	2.77011	1.63127	4.30955	.61614	
	10	1.83906	1.48772	1.66862	.28242		25	2.90641	1.66142	4.76088	.63603	
	11	1.88661	1.49617	1.76455	.30690		26	3.06287	1.69468	5.30568	.65567	
	12	1.93668	1.50591	1.86864	.33085		27	3.24525	1.73143	5.97680	.67508	
	13	1.98991	1.51698	1.98205	.35430		28	3.46192	1.77215	6.82452	.69427	
	14	2.04657	1.52947	2.10617	.37728		29	3.72556	1.81741	7.92987	.71325	
	15	2.10714	1.54345	2.24267	.39983		30	4.05655	1.86793	9.43244	.73205	
	16	2.17214	1.55902	2.39366	.42196		31	4.49028	1.92458	11.59485	.75067	
	17	2.24223	1.57629	2.56152	.44370		32	5.09509	1.98849	14.97662	.76913	
	18	2.31820	1.59539	2.74953	.46507		33	6.02650	2.06110	21.01927	.78744	
	19	2.40103	1.61646	2.96164	.48610		34	7.75492	2.14431	34.91488	.80562	
	20	2.49191	1.63969	3.20294	.50680		46	35	13.13487	2.24066	100.47277	.82367
	21	2.59237	1.66528	3.48010	.52720			0	1.39016	1.39016	1.00000	0
	22	2.70435	1.69346	3.80196	.54731			1	1.41969	1.38488	1.05010	.03551
	23	2.83381	1.72502	4.18819	.56716			2	1.45008	1.37808	1.10274	.06980
	24	2.97391	1.75881	4.63254	.58675			3	1.48138	1.37079	1.15813	.10294
	25	3.13997	1.79676	5.18317	.60612			4	1.51372	1.37573	1.21661	.13505
	26	3.33394	1.83873	5.86488	.62526			5	1.54715	1.37464	1.27839	.16615
	27	3.56680	1.88545	6.73684	.64420			6	1.58181	1.37460	1.34384	.19631
	28	3.85318	1.93762	7.88996	.66295			7	1.61778	1.37540	1.41334	.22562
	29	4.21794	1.99614	9.48750	.68152			8	1.65521	1.37744	1.48728	.25408
	30	4.70573	2.06218	11.84954	.69994			9	1.69426	1.38037	1.56626	.28181
	31	5.40747	2.13722	15.70056	.71820			10	1.73507	1.38431	1.65076	.30881
	32	6.54884	2.22324	23.10298	.73634			11	1.77783	1.38936	1.74144	.33512
33	8.93919	2.32287	43.19541	.75435	12	1.82279		1.39545	1.83915	.36080		
44	0	1.43955	1.43955	1.00000	0	13		1.87015	1.40266	1.94474	.38589	
	1	1.47017	1.43595	1.05016	.03315	14	1.92023	1.41102	2.05931	.41041		
	2	1.50175	1.43340	1.10300	.06524	15	1.97330	1.42055	2.18408	.43441		
	3	1.53439	1.43194	1.15878	.09634	16	2.02982	1.43138	2.32064	.45790		
	4	1.56816	1.43154	1.21777	.12651	17	2.09018	1.44353	2.47077	.48093		
	5	1.60320	1.43215	1.28033	.15581	18	2.15495	1.45708	2.63675	.50351		
	6	1.63960	1.43385	1.34680	.18429	19	2.22476	1.47212	2.82133	.52568		
	7	1.67754	1.43659	1.41765	.21202	20	2.30039	1.48878	3.02795	.54746		
	8	1.71712	1.44044	1.49329	.23900	21	2.38282	1.50715	3.26098	.56880		
	9	1.75855	1.44536	1.57435	.26532	22	2.47321	1.52740	3.52998	.58994		
	10	1.80201	1.45143	1.66148	.29101	23	2.57309	1.54969	3.83023	.61068		
	11	1.84775	1.45868	1.75542	.31608	24	2.68435	1.57419	4.18338	.63112		
	12	1.89597	1.46707	1.85710	.34062	25	2.80952	1.60116	4.59851	.65127		
	13	1.94702	1.47675	1.96754	.36461							
	14	2.00123	1.48774	2.08804	.37474							

TABLE I.-- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$		
46	26	2.95193	1.63086	5.09384	0.67115	48	32	4.06049	1.72024	10.45639	0.81935		
	27	3.11618	1.66361	5.69551	.69078		33	4.49758	1.76836	12.86653	.83805		
	28	3.30874	1.69980	6.44239	.71018		34	5.10813	1.82230	16.64529	.85657		
	29	3.53915	1.73988	7.39491	.72936		35	6.05125	1.88312	23.42636	.87492		
	30	3.82213	1.78442	8.65246	.74833		36	7.81289	1.95221	39.16270	.89314		
	31	4.18188	1.83413	10.39077	.76711		37	13.43954	2.03135	116.20903	.91121		
	32	4.66173	1.88987	12.95259	.78572		49	0	1.32501	1.32501	1.00000	0	
	33	5.34930	1.95274	17.10800	.80417			1	1.35337	1.31763	1.05048	.03937	
	34	6.45951	2.02416	25.02251	.82247			2	1.38245	1.31130	1.10333	.07724	
	35	8.74799	2.10599	46.03221	.84064			3	1.41230	1.30598	1.15878	.11372	
	47	0	1.36733	1.36733	1.00000			0	4	1.44301	1.30164	1.21704	.14891
		1	1.39641	1.36141	1.05016			.03675	5	1.47465	1.29827	1.27839	.18288
		2	1.42630	1.35654	1.10280			.07219	6	1.50731	1.29585	1.34310	.21573
		3	1.45706	1.35269	1.15815			.10642	7	1.54108	1.29435	1.41151	.24793
4		1.48878	1.34984	1.21646	.13951	8		1.57607	1.29378	1.48399	.27835		
5		1.52154	1.34797	1.27800	.17155	9		1.61239	1.29413	1.56096	.30824		
6		1.55544	1.34708	1.34310	.20299	10		1.65019	1.29540	1.64290	.33727		
7		1.59060	1.34716	1.41211	.23270	11		1.68960	1.29760	1.73037	.36549		
8		1.62712	1.34821	1.48545	.26195	12		1.73080	1.30074	1.82401	.39295		
9		1.66516	1.35024	1.56359	.29037	13		1.77397	1.30483	1.92455	.41970		
10		1.70485	1.35326	1.64707	.31804	14	1.81933	1.30991	2.03286	.44578			
11		1.74637	1.35727	1.73650	.34498	15	1.86712	1.31599	2.14994	.47123			
12		1.78993	1.36232	1.83261	.37125	16	1.91764	1.32311	2.27699	.49609			
13		1.83573	1.36841	1.93624	.39689	17	1.97121	1.33132	2.41543	.52038			
14	1.88405	1.37560	2.04839	.42193	18	2.02822	1.34065	2.56696	.54416				
15	1.93516	1.38391	2.17022	.44641	19	2.08914	1.35117	2.73362	.56744				
16	1.98943	1.39339	2.30313	.47036	20	2.15449	1.36293	2.91792	.59026				
17	2.04726	1.40411	2.44879	.49381	21	2.22495	1.37602	3.12296	.61264				
18	2.10912	1.41614	2.60925	.51680	22	2.30130	1.39053	3.35260	.63461				
19	2.17560	1.42954	2.78698	.53934	23	2.38451	1.40654	3.61170	.65619				
20	2.24736	1.44440	2.98505	.56147	24	2.47579	1.42419	3.90652	.67740				
21	2.32526	1.46084	3.20733	.58321	25	2.57667	1.44360	4.24521	.69823				
22	2.41032	1.47898	3.45870	.60458	26	2.68909	1.46494	4.63861	.71883				
23	2.50383	1.49895	3.74545	.62561	27	2.81562	1.48840	5.10146	.73908				
24	2.60741	1.52092	4.07583	.64632	28	2.95967	1.51417	5.65428	.75904				
25	2.72317	1.54507	4.46089	.66671	29	3.12592	1.54254	6.32660	.77875				
26	2.85386	1.57165	4.91572	.68683	30	3.32102	1.57379	7.12621	.79820				
27	3.00320	1.60090	5.44154	.70667	31	3.55475	1.60830	8.03036	.81742				
28	3.17632	1.63314	6.12913	.72627	32	3.84229	1.64650	9.04375	.83642				
29	3.38059	1.66877	6.96494	.74563	33	4.20868	1.68894	11.60395	.85522				
30	3.62700	1.70822	8.04246	.76477	34	4.69905	1.73628	14.50661	.87383				
31	3.93285	1.75205	9.48532	.78371	35	5.40551	1.78933	19.25024	.89227				
32	4.32733	1.80096	11.51871	.80246	36	6.57748	1.84915	28.40795	.91055				
33	4.86465	1.85579	14.60078	.82104	37	8.98915	1.89961	53.52952	.92869				
34	5.66067	1.66877	19.82908	.83945	50	0	1.30541	1.30541	1.00000	0			
35	7.02769	1.98788	30.65294	.85772		1	1.33348	1.29731	1.05072	.04075			
36	10.33190	2.06836	66.44672	.87585		2	1.36225	1.29028	1.10380	.07991			
48	0	1.34562	1.34562	1.00000		0	3	1.39174	1.28425	1.15940	.11756		
	1	1.37431	1.33897	1.05028		.03803	4	1.42204	1.27920	1.21777	.15384		
	2	1.40376	1.33334	1.10299		.07466	5	1.45322	1.27510	1.27916	.18884		
	3	1.43404	1.32876	1.15835		.11000	6	1.48536	1.27194	1.34383	.22263		
	4	1.46522	1.32515	1.21660		.14413	7	1.51856	1.26972	1.41210	.25529		
	5	1.49738	1.32253	1.27799		.17712	8	1.55292	1.26837	1.48436	.28693		
	6	1.53062	1.32084	1.34285		.20906	9	1.58854	1.26795	1.56095	.31756		
	7	1.56467	1.32016	1.41075		.23968	10	1.62554	1.26843	1.64237	.34729		
	8	1.60075	1.32034	1.48434		.27003	11	1.66408	1.26977	1.72917	.37617		
	9	1.63789	1.32151	1.56185		.29919	12	1.70426	1.27204	1.82185	.40422		
	10	1.67658	1.32364	1.64444		.32752	13	1.74634	1.27525	1.92125	.43154		
	11	1.71700	1.32672	1.73283	.35511	14	1.79047	1.27937	2.02809	.45814			
	12	1.75929	1.33077	1.82758	.38198	15	1.83687	1.28445	2.14331	.48407			
	13	1.80370	1.33585	1.92951	.40816	16	1.88581	1.29052	2.26807	.50939			
14	1.85044	1.34190	2.03959	.43372	17	1.93761	1.29760	2.40364	.53411				
15	1.89980	1.34908	2.15885	.45868	18	1.99260	1.30574	2.55161	.55827				
16	1.95212	1.35736	2.28864	.48308	19	2.05120	1.31499	2.71386	.58192				
17	2.00769	1.36677	2.43042	.50696	20	2.11391	1.32540	2.89068	.60507				
18	2.06689	1.37739	2.58609	.53034	21	2.18131	1.33703	3.09086	.62776				
19	2.13050	1.38929	2.75788	.55326	22	2.25409	1.34997	3.31189	.65002				
20	2.19886	1.40253	2.94856	.57573	23	2.33313	1.36428	3.56009	.67186				
21	2.27280	1.41722	3.16158	.59779	24	2.41947	1.38009	3.84102	.69333				
22	2.35321	1.43345	3.40126	.61947	25	2.51443	1.39749	4.16179	.71442				
23	2.44121	1.45134	3.67309	.64078	26	2.61969	1.41662	4.53177	.73518				
24	2.53819	1.47103	3.98424	.66174	27	2.73741	1.43765	4.96552	.75562				
25	2.64594	1.49269	4.34413	.68238	28	2.87044	1.46075	5.47426	.77576				
26	2.76675	1.51649	4.76546	.70272	29	3.02262	1.48613	6.06824	.79562				
27	2.90369	1.54266	5.26577	.72277	30	3.19929	1.51406	6.84082	.81521				
28	3.06091	1.57147	5.86997	.74255	31	3.40813	1.54482	7.78552	.83455				
29	3.24422	1.60322	6.61467	.76209	32	3.66046	1.57878	9.00756	.85366				
30	3.46207	1.63828	7.55998	.78139	33	3.97506	1.61636	10.65120	.87256				
31	3.72728	1.67711	8.78447	.80047	34	4.38240	1.65811	12.98191	.89126				

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
50	35	4.94092	1.70467	16.54698	0.90977	52	35	4.31141	1.55729	13.29968	0.94527
	36	5.77744	1.75684	22.68537	.92811		36	4.83682	1.59767	16.78182	.96369
	37	7.24492	1.81567	35.76868	.94629		37	5.60756	1.64269	22.61361	.98193
	38	11.02198	1.88247	83.00475	.96432		38	6.90708	1.69313	34.39544	1.00000
51	0	1.28676	1.28676	1.00000	0	53	39	9.89463	1.74999	70.76017	1.01791
	1	1.31461	1.27794	1.05105	.04220		0	1.25214	1.25214	1.00000	0
	2	1.34310	1.27020	1.10441	.08268		1	1.27969	1.24189	1.05190	.04528
	3	1.37229	1.26347	1.16026	.12157		2	1.30781	1.23275	1.10605	.08858
	4	1.40225	1.25773	1.21882	.15698		3	1.33656	1.22465	1.16262	.13005
	5	1.43304	1.25294	1.28033	.19501		4	1.36600	1.21756	1.22183	.16983
	6	1.46474	1.24908	1.34507	.22976		5	1.39619	1.21142	1.28389	.20805
	7	1.49745	1.24613	1.41333	.26333		6	1.42721	1.20621	1.20621	.24481
	8	1.53125	1.24408	1.48545	.29577		7	1.45914	1.20190	1.41763	.28022
	9	1.56624	1.24290	1.56183	.32718		8	1.49205	1.19846	1.49891	.31438
	10	1.60255	1.24260	1.64290	.35762		9	1.52604	1.19589	1.56625	.34736
	11	1.64030	1.24317	1.72916	.38715		10	1.56122	1.19415	1.64707	.37925
	12	1.67964	1.24463	1.82118	.41582		11	1.59770	1.19325	1.73281	.41011
	13	1.72072	1.24696	1.91962	.44370		12	1.63560	1.19319	1.82401	.44003
	14	1.76374	1.25020	2.02525	.47082		13	1.67508	1.19395	1.92126	.46904
	15	1.80891	1.25434	2.13895	.49725		14	1.71629	1.19555	2.02525	.49722
	16	1.85646	1.25943	2.26176	.52301		15	1.75941	1.19800	2.13677	.52462
	17	1.90668	1.26547	2.39492	.54814		16	1.80465	1.20130	2.25676	.55127
	18	1.95988	1.27251	2.53937	.57270		17	1.85225	1.20547	2.38629	.57724
19	2.01645	1.28059	2.69835	.59670	18	1.90248	1.21053	2.52664	.60255		
20	2.07682	1.28975	2.87247	.62018	19	1.95566	1.21652	2.67932	.62726		
21	2.14152	1.30005	3.06478	.64318	20	2.01216	1.22346	2.84613	.65139		
22	2.21119	1.31155	3.27844	.66572	21	2.07241	1.23140	3.02926	.67497		
23	2.28657	1.32432	3.51734	.68782	22	2.13693	1.24037	3.23135	.69805		
24	2.36861	1.33845	3.78644	.70952	23	2.20633	1.25044	3.45565	.72065		
25	2.45845	1.35403	4.09202	.73084	24	2.28136	1.26166	3.70619	.74280		
26	2.55756	1.37119	4.44229	.75179	25	2.36292	1.27410	3.98804	.76453		
27	2.66777	1.39005	4.84808	.77241	26	2.45212	1.28784	4.30767	.78585		
28	2.79151	1.41076	5.32406	.79271	27	2.55039	1.30299	4.67348	.80680		
29	2.93197	1.43350	5.89051	.81271	28	2.65951	1.31965	5.09652	.82739		
30	3.09353	1.45850	6.57643	.83244	29	2.78180	1.33795	5.59167	.84766		
31	3.28233	1.48598	7.42463	.85190	30	2.92034	1.35803	6.17951	.86761		
32	3.50735	1.51625	8.50117	.87111	31	3.07931	1.38008	6.88921	.88726		
33	3.78233	1.54966	9.91359	.89009	32	3.26455	1.40429	7.76366	.90664		
34	4.12960	1.58664	11.84954	.90886	33	3.48454	1.43090	8.86847	.92577		
35	4.58848	1.62770	14.66843	.92743	34	3.75215	1.46019	10.30955	.94465		
36	5.23674	1.67349	19.15633	.94582	35	4.08807	1.49252	12.26935	.96330		
37	6.25775	1.72479	27.42567	.96403	36	4.52825	1.52828	15.09156	.98175		
38	8.24709	1.78263	47.75734	.98209	37	5.14217	1.56798	19.50936	1.00000		
52	0	1.26902	1.26902	1.00000	0	38	6.08831	1.61224	27.41609	1.01807	
	1	1.29670	1.25948	1.05144	.04370	39	7.84757	1.66183	45.65954	1.03597	
	2	1.32498	1.25103	1.10516	.08557	40	13.37365	1.71693	132.92279	1.05371	
	3	1.35392	1.24364	1.16131	.12571	54	0	1.23606	1.23606	1.00000	0
	4	1.38359	1.23720	1.22017	.16430		1	1.26353	1.22509	1.05243	.04691
	5	1.41404	1.23173	1.28189	.20140		2	1.29155	1.21520	1.10710	.09172
	6	1.44538	1.22720	1.34680	.23715		3	1.32016	1.20650	1.16416	.13456
	7	1.47766	1.22354	1.41517	.27163		4	1.34943	1.19873	1.22383	.17560
	8	1.51097	1.22079	1.48728	.30491		5	1.37942	1.19194	1.28631	.21495
	9	1.54543	1.21891	1.56357	.33709		6	1.41018	1.18607	1.35186	.25277
	10	1.58114	1.21788	1.64446	.36826		7	1.44181	1.18109	1.42075	.28914
	11	1.61820	1.21769	1.73036	.39845		8	1.47440	1.17701	1.49329	.32417
	12	1.65677	1.21837	1.82188	.42775		9	1.50801	1.17379	1.56982	.35796
	13	1.69700	1.21989	1.91963	.45620		10	1.54274	1.17135	1.65074	.39059
	14	1.73905	1.22229	2.02429	.48384		11	1.57871	1.16976	1.73648	.42214
	15	1.78314	1.22557	2.13679	.51075		12	1.61605	1.16899	1.82758	.45269
	16	1.82945	1.22972	2.25801	.53691		13	1.65487	1.16904	1.92455	.48229
	17	1.87828	1.23480	2.38915	.56251		14	1.69536	1.17087	2.02809	.51099
	18	1.92990	1.24082	2.53157	.58745		15	1.73765	1.17155	2.13897	.53888
19	1.98467	1.24781	2.68688	.61180	16		1.78195	1.17404	2.25801	.56597	
20	2.04298	1.25582	2.85703	.63561	17		1.82848	1.17737	2.38629	.59234	
21	2.10531	1.26489	3.04435	.65891	18		1.87750	1.18154	2.52500	.61803	
22	2.17223	1.27507	3.25173	.68172	19	1.92929	1.18699	2.67556	.64308		
23	2.24442	1.28643	3.48272	.70408	20	1.98421	1.19254	2.83966	.66752		
24	2.32271	1.29904	3.74176	.72601	21	2.04264	1.19943	3.01932	.69139		
25	2.40812	1.31298	4.03448	.74753	22	2.10505	1.20729	3.21701	.71473		
26	2.50192	1.32835	4.36812	.76868	23	2.17202	1.21616	3.43570	.73756		
27	2.60571	1.34526	4.75217	.78947	24	2.24420	1.22610	3.67910	.75992		
28	2.72156	1.36383	5.19927	.80992	25	2.32241	1.23718	3.95183	.78184		
29	2.85217	1.38423	5.72660	.83006	26	2.40765	1.24945	4.25971	.80333		
30	3.00119	1.40663	6.35861	.84990	27	2.50117	1.26300	4.61025	.82443		
31	3.17365	1.43123	7.13007	.86946	28	2.60453	1.27793	5.01322	.84516		
32	3.37670	1.45827	8.09364	.88876	29	2.71975	1.29434	5.48166	.86553		
33	3.62101	1.48806	9.33218	.90782	30	2.84947	1.31236	6.03330	.88558		
34	3.92327	1.52092	10.98415	.92665							

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	
54	31	2.99721	1.33213	6.69290	0.90532	56	25	2.25415	1.16852	3.90771	0.81750	
	32	3.16784	1.35382	7.49613	.92477		26	2.33300	1.17822	4.19775	.83930	
	33	3.36824	1.37764	8.49634	.94394		27	2.41891	1.18899	4.52508	.86066	
	34	3.60863	1.40381	9.77698	.96286		28	2.51311	1.20092	4.89763	.88161	
	35	3.90484	1.43262	11.47643	.98154		29	2.61718	1.21408	5.32572	.90218	
	36	4.28320	1.46441	13.84205	1.00000		30	2.73312	1.22856	5.82313	.92239	
	37	4.79140	1.49957	17.36357	1.01825		31	2.86357	1.24447	6.40854	.94225	
	38	5.52791	1.53859	23.16703	1.03631		32	3.01204	1.26192	7.10806	.96180	
	39	6.74212	1.58209	34.54341	1.05418		33	3.18337	1.28106	7.95920	.98104	
	40	9.37684	1.63082	66.97239	1.07129		34	3.38442	1.30205	9.01802	1.00000	
	55	0	1.22077	1.22077	1.00000		0	35	3.62531	1.32508	10.37199	1.01869
		1	1.24822	1.20908	1.05305		.04864	36	3.92173	1.35038	12.16581	1.03714
2		1.27618	1.19855	1.10831	.09501	37	4.29964	1.37822	14.69711	1.05535		
3		1.30471	1.18909	1.16595	.13927	38	4.80594	1.40893	18.35382	1.07335		
4		1.33386	1.18067	1.22617	.18160	39	5.53675	1.44289	24.41461	1.09114		
5		1.36370	1.17322	1.28917	.22214	40	6.73301	1.48057	36.18410	1.10874		
6		1.39429	1.16672	1.35521	.26103	41	9.28385	1.52256	68.94509	1.12617		
7		1.42570	1.16111	1.42455	.29839	57	0	1.19236	1.19236	1.00000	0	
8		1.45800	1.15638	1.49749	.33432		1	1.21991	1.17918	1.05453	.05235	
9		1.49130	1.15249	1.57436	.36894		2	1.24792	1.16722	1.11126	.10206	
10		1.52567	1.14943	1.65554	.40233		3	1.27644	1.15640	1.17033	.14935	
11		1.56123	1.14719	1.74146	.43457		4	1.30553	1.14665	1.23196	.19442	
12	1.59808	1.14574	1.83261	.46574	5		1.33524	1.13792	1.29634	.23745		
13	1.63636	1.14509	1.92953	.49592	6		1.36563	1.13015	1.36371	.27860		
14	1.67620	1.14522	2.03286	.52516	7		1.39678	1.12330	1.43431	.31802		
15	1.71778	1.14635	2.14332	.55352	8		1.42875	1.11733	1.50845	.35582		
16	1.76127	1.14787	2.26176	.58107	9		1.46163	1.11221	1.58643	.39214		
17	1.80687	1.15039	2.38915	.60785	10		1.49550	1.10791	1.66862	.42708		
18	1.85483	1.15373	2.52664	.63391	11		1.53046	1.10441	1.75543	.46073		
19	1.90542	1.15791	2.67556	.65929	12	1.56661	1.10169	1.84730	.49319			
20	1.95896	1.16294	2.83751	.68404	13	1.60407	1.09973	1.94475	.52454			
21	2.01580	1.16885	3.01438	.70819	14	1.64296	1.09854	2.04839	.55484			
22	2.07639	1.17567	3.20848	.73178	15	1.68344	1.09810	2.15888	.58418			
23	2.14123	1.18345	3.42257	.75483	16	1.72566	1.09841	2.27699	.61260			
24	2.21094	1.19222	3.66007	.77740	17	1.76982	1.09947	2.40364	.64018			
25	2.28625	1.20204	3.92521	.79949	18	1.81611	1.10128	2.53987	.66696			
26	2.36806	1.21297	4.22330	.82114	19	1.86478	1.10387	2.68688	.69300			
27	2.45748	1.22508	4.56111	.84238	20	1.91611	1.10723	2.84613	.71833			
28	2.55591	1.23843	4.94742	.86322	21	1.97041	1.11138	3.01932	.74301			
29	2.66511	1.25313	5.39374	.88370	22	2.02806	1.11636	3.20848	.76707			
30	2.78737	1.26929	5.91560	.90383	23	2.08950	1.12218	3.41605	.79054			
31	2.92572	1.28703	6.53435	.92364	24	2.15523	1.12887	3.64502	.81347			
32	3.08125	1.30648	7.26025	.94314	25	2.22588	1.13647	3.89903	.83589			
33	3.26870	1.32782	8.19757	.96236	26	2.30220	1.14503	4.18260	.85782			
34	3.48734	1.35125	9.35393	.98131	27	2.38509	1.15459	4.50144	.87930			
35	3.75267	1.37698	10.85776	1.00000	28	2.47569	1.16522	4.86278	.90035			
36	4.08469	1.40531	12.89486	1.01846	29	2.57338	1.17697	5.27601	.92100			
37	4.51787	1.43656	15.81213	1.03670	30	2.68597	1.18993	5.75347	.94126			
38	5.11821	1.47111	20.34079	1.05473	31	2.80977	1.20419	6.31177	.96117			
39	6.03358	1.50947	28.33208	1.07257	32	2.94984	1.21984	6.97378	.98074			
40	7.69872	1.55221	46.23275	1.09023	33	3.11033	1.23700	7.77189	1.00000			
41	12.52648	1.60009	122.67166	1.10773	34	3.29703	1.25582	8.75357	1.01896			
56	0	1.20621	1.20621	1.00000	0	35	3.51833	1.27646	9.99121	1.03764		
	1	1.23369	1.19378	1.05375	.05045	36	3.78688	1.29910	11.60109	1.05606		
	2	1.26164	1.18252	1.10969	.09845	37	4.12294	1.32397	13.78232	1.07423		
	3	1.29013	1.17238	1.16799	.14419	38	4.56142	1.35132	16.90714	1.09218		
	4	1.31923	1.16331	1.22887	.18787	39	5.16924	1.38149	21.76052	1.10991		
	5	1.34896	1.15521	1.29250	.22963	40	6.09646	1.41485	30.33227	1.12744		
	6	1.37943	1.14807	1.35916	.26964	41	7.78514	1.45186	49.56835	1.14478		
	7	1.41067	1.14154	1.42906	.30801	42	12.70348	1.49310	132.25979	1.16195		
	8	1.44280	1.13650	1.50253	.34487	0	1.17918	1.17918	1.00000	0		
	9	1.47583	1.13198	1.57987	.38033	1	1.20686	1.16522	1.05442	.05436		
	10	1.50992	1.12828	1.66148	.41449	2	1.23498	1.15255	1.11302	.10586		
	11	1.54513	1.12540	1.74774	.44743	3	1.26357	1.14102	1.17297	.15476		
12	1.58159	1.12311	1.83915	.47924	4	1.29271	1.13061	1.23547	.20130			
13	1.61925	1.12100	1.93582	.50988	5	1.32244	1.12122	1.30071	.24564			
14	1.65874	1.11914	2.03961	.53978	6	1.35284	1.11285	1.36892	.28796			
15	1.69971	1.11767	2.14992	.56822	7	1.38394	1.10538	1.44036	.32846			
16	1.74252	1.11668	2.26607	.59667	8	1.41585	1.09881	1.51533	.36724			
17	1.78734	1.11606	2.39492	.62379	9	1.44863	1.09309	1.59409	.40443			
18	1.83439	1.11571	2.53157	.65021	10	1.48236	1.08819	1.67705	.44017			
19	1.88395	1.11566	2.67932	.67592	11	1.51713	1.08408	1.76457	.47454			
20	1.93629	1.11583	2.83966	.70097	12	1.55305	1.08076	1.85710	.50765			
21	1.99176	1.11625	3.01438	.72539	13	1.59024	1.07821	1.95517	.53958			
22	2.05077	1.11691	3.20565	.74921	14	1.62880	1.07640	2.05932	.57042			
23	2.11377	1.11781	3.41605	.77249	15	1.66888	1.07531	2.17022	.60023			
24	2.18134	1.11896	3.64877	.79524	16	1.71064	1.07496	2.28864	.62909			

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$		
58	17	1.75425	1.07535	2.44543	0.65706	60	10	1.45981	1.05056	1.69801	0.46792		
	18	1.79992	1.07647	2.55161	.68419		11	1.49446	1.04530	1.78756	.50375		
	19	1.84786	1.07832	2.69835	.71054		12	1.53015	1.04083	1.88204	.53817		
	20	1.89834	1.08093	2.85702	.73616		13	1.56705	1.03711	1.98204	.57130		
	21	1.95166	1.08429	3.02926	.76108		14	1.60524	1.03411	2.08804	.60321		
	22	2.00817	1.08843	3.21701	.78536		15	1.64485	1.03183	2.20066	.63397		
	23	2.06827	1.09337	3.42257	.80903		16	1.68601	1.03025	2.32064	.66359		
	24	2.13245	1.09914	3.64877	.83213		17	1.72890	1.02941	2.44879	.69242		
	25	2.20127	1.10576	3.89903	.85469		18	1.77370	1.02924	2.58609	.72023		
	26	2.27543	1.11327	4.17758	.87674		19	1.82061	1.02976	2.73362	.74718		
	27	2.35576	1.12172	4.48973	.89832		20	1.86986	1.03098	2.89268	.77332		
	28	2.44329	1.13115	4.84216	.91945		21	1.92174	1.03290	3.06478	.79871		
	29	2.53928	1.14162	5.24346	.94016		22	1.97655	1.03553	3.25173	.82339		
	30	2.64534	1.15319	5.70487	.96047		23	2.03465	1.03889	3.45565	.84740		
	31	2.76355	1.16595	6.24133	.98041		24	2.09647	1.04299	3.67910	.87080		
	32	2.89660	1.17998	6.87320	1.00000		25	2.16251	1.04785	3.92521	.89360		
	33	3.04811	1.19537	7.62890	1.01926		26	2.23336	1.05350	4.19775	.91586		
	34	3.22305	1.21225	8.54944	1.03820		27	2.30976	1.05996	4.50144	.93760		
	35	3.42852	1.23075	9.66133	1.05686		28	2.39257	1.06728	4.84216	.95885		
	36	3.67496	1.25103	11.16500	1.07523		29	2.48286	1.07550	5.22736	.97964		
	37	3.97868	1.27328	13.11538	1.09336		30	2.58199	1.08465	5.66667	1.00000		
	38	4.36671	1.29771	15.83248	1.11124		31	2.69164	1.09480	6.17265	1.01995		
	39	4.88820	1.32458	19.88200	1.12889		32	2.81401	1.10602	6.76214	1.03953		
	40	5.64473	1.35421	26.56793	1.14638		33	2.95196	1.11836	7.43813	1.05974		
	41	6.89470	1.38696	39.71914	1.16358		34	3.10935	1.13192	8.29290	1.07761		
	42	9.62343	1.42330	77.53810	1.18065		35	3.29153	1.14680	9.31323	1.09617		
	59	0	1.16663	1.16663	1.00000		0	36	3.50613	1.16310	10.58965	1.11442	
		1	1.19450	1.15189	1.05639		.05646	37	3.76452	1.18095	12.23349	1.13239	
		2	1.22277	1.13845	1.11497		.10985	38	4.08459	1.20052	14.43171	1.15010	
		3	1.25150	1.12623	1.17591		.16045	39	4.49641	1.22197	17.52384	1.16756	
		4	1.28075	1.11515	1.23939		.20849	40	5.05564	1.24552	22.19785	1.18479	
		5	1.31056	1.10513	1.30562		.25420	41	5.88093	1.27142	30.09140	1.20180	
		6	1.34201	1.09621	1.37482		.29776	42	7.28682	1.29997	46.29381	1.21861	
		7	1.37525	1.08804	1.44725		.33935	43	10.62250	1.33152	98.56617	1.23523	
		8	1.41045	1.08087	1.52317		.37912	61	0	1.14335	1.14335	1.00000	0
		9	1.43680	1.07457	1.60290		.41722		1	1.17176	1.12694	1.05868	.06106
		10	1.47046	1.06909	1.68679		.45376		2	1.20052	1.11195	1.11958	.11853
		11	1.50513	1.06440	1.77523		.48886		3	1.22970	1.09828	1.18287	.17276
		12	1.54091	1.06050	1.86864		.52263		4	1.25935	1.08582	1.24872	.22404
13		1.57790	1.05735	1.96754	.55515	5	1.28951		1.07449	1.31735	.27264		
14		1.61623	1.05493	2.07248	.58652	6	1.32026		1.06422	1.38897	.31878		
15		1.65602	1.05324	2.18409	.61682	7	1.35166		1.05494	1.46383	.36268		
16		1.69743	1.05228	2.30313	.64611	8	1.38376		1.04660	1.54221	.40452		
17		1.74062	1.05202	2.43042	.67446	9	1.41665		1.03914	1.62440	.44447		
18		1.78579	1.05248	2.56696	.70194	10	1.45040		1.03253	1.71076	.48267		
19		1.83315	1.05365	2.71386	.72859	11	1.48510		1.02672	1.80166	.51925		
20		1.88294	1.05554	2.87247	.75447	12	1.52084		1.02170	1.89753	.55435		
21		1.93545	1.05816	3.04435	.77964	13	1.55772		1.01742	1.99885	.58807		
22		1.99101	1.06152	3.23135	.80412	14	1.59585		1.01388	2.10617	.62050		
23		2.05001	1.06564	3.43570	.82797	15	1.63536		1.01104	2.22011	.65174		
24		2.11288	1.07055	3.66007	.85122	16	1.67639		1.00890	2.34137	.68187		
25		2.18018	1.07625	3.90771	.87392	17	1.71909		1.00745	2.47075	.71097		
26		2.25252	1.08280	4.18260	.89608	18	1.76364		1.00668	2.60925	.73910		
27		2.33070	1.09022	4.48973	.91774	19	1.81024		1.00659	2.75788	.76633		
28		2.41564	1.09855	4.83533	.93894	20	1.85911		1.00717	2.91792	.79272		
29		2.50892	1.10717	5.22736	.95970	21	1.91052		1.00843	3.09086	.81832		
30		2.61079	1.11616	5.67616	.98005	22	1.96476		1.01038	3.27844	.84318		
31		2.72432	1.12574	6.19535	1.00000	23	2.02217		1.01302	3.48272	.86735		
32		2.85152	1.14210	6.80332	1.01959	24	2.08316		1.01636	3.70619	.89087		
33		2.99559	1.15990	7.52541	1.03883	25	2.14821		1.02043	3.95183	.91378		
34		3.16089	1.16997	8.39771	1.05775	26	2.21788		1.02525	4.22330	.93611		
35		3.35349	1.18762	9.47325	1.07636	27	2.29285		1.03083	4.52508	.95790		
36		3.58227	1.20580	10.83337	1.09468	28	2.37393		1.03722	4.86278	.97919		
37		3.86065	1.21834	12.60945	1.11274	29	2.46213		1.04444	5.24346	1.00000		
38		4.21032	1.24758	15.02857	1.13054	30	2.55870		1.05253	5.67616	1.02036		
39	4.66898	1.27157	18.51961	1.14810	31	2.66519	1.06154		6.17265	1.04030			
40	5.30993	1.29796	24.00218	1.16545	32	2.78362	1.07153		6.74855	1.05984			
41	6.30127	1.32704	33.86900	1.18258	33	2.91659	1.08256		7.42498	1.07900			
42	8.15969	1.35920	56.90567	1.19953	34	3.06758	1.09469		8.21336	1.09782			
60	0	1.15470	1.15470	1.00000	0	35	3.24135		1.10802	9.20976	1.11630		
	1	1.18281	1.13913	1.05748	.05869	36	3.44462		1.12263	10.42262	1.13447		
	2	1.21128	1.12492	1.11715	.11407	37	3.68722		1.13863	11.96675	1.15234		
	3	1.24021	1.11200	1.17919	.16643	38	3.98431		1.15617	14.00080	1.16994		
	4	1.26963	1.10024	1.24379	.21606	39	4.36069	1.17537	16.80389	1.18729			
	5	1.29959	1.08956	1.31115	.26318	40	4.86049	1.19643	20.91699	1.20438			
	6	1.33016	1.07991	1.38149	.30802	41	5.57221	1.21953	27.54355	1.22125			
	7	1.36139	1.07123	1.45505	.35075	42	6.70976	1.24494	40.01234	1.23791			
	8	1.39336	1.06349	1.53211	.39149	43	9.00334	1.27294	72.17563	1.25437			
9	1.42614	1.05661	1.61296	.43053	62	0	1.13257	1.00000	0	0			
					1	1.16134	1.11527	1.06001	.06356				
					2	1.19044	1.09945	1.12228	.12326				

TABLE I.—VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES — Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
62	3	1.21994	1.08503	1.18693	0.17943	63	40	4.50533	1.10545	18.68088	1.24438
	4	1.24988	1.07187	1.25420	.23246		41	5.17503	1.12513	24.63807	1.26092
	5	1.28033	1.05987	1.32425	.28258		42	6.02443	1.14538	33.44890	1.27723
	6	1.31132	1.04897	1.39734	.33010		43	7.47513	1.16759	51.58764	1.29333
	7	1.34294	1.03907	1.47368	.37521		44	10.93593	1.19201	110.60283	1.30922
	8	1.37527	1.03015	1.55357	.41812		0	1.11260	1.11260	1.00000	0
	9	1.40834	1.02212	1.63730	.45902		1	1.14230	1.09339	1.06311	.06909
	10	1.44225	1.01497	1.72524	.49808		2	1.17229	1.07586	1.12854	.13362
	11	1.48051	1.01097	1.81770	.53293		3	1.20263	1.05981	1.19646	.19405
	12	1.51292	1.00303	1.91519	.57190		4	1.23329	1.04513	1.26705	.25082
	13	1.54988	.99818	2.01813	.60549		5	1.26458	1.03183	1.34052	.30420
	14	1.58806	.99416	2.12710	.63846		6	1.29631	1.01963	1.41710	.35459
	15	1.62757	.99077	2.24268	.67016		7	1.32862	1.00852	1.49702	.40223
	16	1.66858	.98809	2.36559	.70070		8	1.36159	.99844	1.58060	.44739
	17	1.71121	.98608	2.49664	.73016		9	1.39526	.98927	1.66809	.49026
	18	1.75564	.98474	2.63675	.75860		10	1.42974	.98100	1.75989	.53105
	19	1.80207	.98406	2.78698	.78610		11	1.46509	.97358	1.85635	.56993
	20	1.85070	.98404	2.94856	.81272		12	1.50142	.96697	1.95793	.60706
	21	1.90180	.98467	3.12296	.83852		13	1.53881	.96113	2.06507	.64295
	22	1.95565	.98597	3.31189	.86355		14	1.57739	.95602	2.17835	.67855
	23	2.01258	.98794	3.51734	.88785		15	1.61725	.95161	2.29836	.70916
	24	2.07297	.99058	3.74476	.91148		16	1.65854	.94788	2.42582	.74189
	25	2.13728	.99391	3.98804	.93447		17	1.70139	.94482	2.56152	.77062
	26	2.20605	.99795	4.25971	.95686		18	1.74597	.94241	2.70637	.79965
	27	2.27992	1.00272	4.56111	.97869		19	1.79247	.94064	2.86144	.82765
	28	2.35967	1.00824	4.89763	1.00000		20	1.84109	.93951	3.02795	.85469
	29	2.44623	1.01454	5.27601	1.02081		21	1.89208	.93899	3.20733	.88083
	30	2.54078	1.02165	5.70487	1.04115		22	1.94569	.93910	3.40126	.90613
	31	2.64478	1.02962	6.19535	1.06106		23	2.00225	.93984	3.61170	.93065
	32	2.76008	1.03849	6.76244	1.08055		24	2.06212	.94120	3.84102	.95444
	33	2.88998	1.04831	7.42498	1.09966		25	2.12571	.94319	4.09202	.97754
	34	3.03498	1.05914	8.21107	1.11839		26	2.19354	.94583	4.36812	1.00000
	35	3.20207	1.07107	9.15895	1.13678		27	2.26619	.94912	4.67348	1.02185
	36	3.39638	1.08415	10.32510	1.15484		28	2.34437	.95308	5.01322	1.04314
	37	3.62660	1.09850	11.79568	1.17261		29	2.42896	.95774	5.39374	1.06389
	38	3.90591	1.11421	13.70921	1.19008		30	2.52100	.96311	5.82313	1.08414
	39	4.25535	1.13141	16.30313	1.20729		31	2.62181	.96923	6.31177	1.10392
	40	4.71130	1.15025	20.02154	1.22424		32	2.73306	.97612	6.87320	1.12326
	41	5.34344	1.17090	25.80256	1.24096		33	2.85686	.98383	7.52541	1.14218
42	6.30846	1.19357	36.02961	1.25745	34	2.99599	.99240	8.29290	1.16070		
43	8.06950	1.21848	59.05900	1.27373	35	3.15417	1.00188	9.20976	1.17886		
63	0	1.12233	1.12233	1.00000	0	36	3.33650	1.01233	10.32509	1.19667	
	1	1.15152	1.10410	1.06149	.06625	37	3.55019	1.02382	11.71209	1.21415	
	2	1.18103	1.08726	1.12523	.12826	38	3.80592	1.03642	13.48501	1.23132	
	3	1.21092	1.07223	1.19146	.18633	39	4.12018	1.05022	15.83259	1.24821	
	4	1.24123	1.05835	1.26029	.24135	40	4.52027	1.06533	19.09064	1.26482	
	5	1.27201	1.04567	1.33195	.29309	41	5.05339	1.08187	23.91096	1.28117	
	6	1.30334	1.03413	1.40668	.34201	42	5.82618	1.09997	31.82875	1.29728	
	7	1.33527	1.02363	1.48471	.38837	43	7.08399	1.11981	47.12911	1.31317	
	8	1.36786	1.01412	1.56632	.43239	44	9.74915	1.14157	89.41118	1.32885	
	9	1.40120	1.00553	1.65181	.47427	0	1.10338	1.10338	1.00000	0	
	10	1.43535	.99781	1.74154	.51418	1	1.13366	1.08314	1.06492	.07216	
	11	1.47040	.99093	1.83587	.55229	2	1.16422	1.06468	1.13220	.13934	
	12	1.50644	.98483	1.93523	.58873	3	1.19510	1.04782	1.20202	.20207	
	13	1.54357	.97949	2.04101	.62364	4	1.22634	1.03224	1.27451	.26076	
	14	1.58189	.97488	2.15104	.65712	5	1.25807	1.01833	1.35006	.31596	
	15	1.62152	.97098	2.26665	.68928	6	1.29028	1.00547	1.42871	.36788	
	16	1.66261	.96777	2.39362	.72022	7	1.32305	.99374	1.51079	.41686	
	17	1.70529	.96522	2.52675	.75002	8	1.35646	.98305	1.59657	.46318	
	18	1.74973	.96334	2.66897	.77877	9	1.39057	.97333	1.68638	.50708	
	19	1.79612	.96210	2.82133	.80653	10	1.42547	.96453	1.78054	.54876	
	20	1.84467	.96151	2.98505	.83336	11	1.46123	.95659	1.87947	.58842	
	21	1.89563	.96155	3.16158	.85934	12	1.49794	.94946	1.98358	.62621	
	22	1.94927	.96224	3.35260	.88452	13	1.53571	.94311	2.09337	.66230	
	23	2.00591	.96357	3.56009	.90894	14	1.57463	.93749	2.20939	.69680	
	24	2.06593	.96555	3.78644	.93266	15	1.61483	.93259	2.33225	.72985	
	25	2.12976	.96819	4.03448	.95571	16	1.65643	.92837	2.46267	.76155	
	26	2.19791	.97151	4.30761	.97815	17	1.69959	.92482	2.60146	.79201	
	27	2.27101	.97551	4.61025	1.00000	18	1.74445	.92191	2.74953	.82131	
	28	2.34979	.98023	4.94742	1.02131	19	1.79121	.91963	2.90795	.84953	
	29	2.43515	.98567	5.32572	1.04210	20	1.84006	.91797	3.07796	.87674	
	30	2.52820	.99188	5.75347	1.06240	21	1.89125	.91693	3.26098	.90303	
	31	2.63031	.99889	6.24133	1.08226	22	1.94503	.91649	3.45870	.92844	
	32	2.74323	1.00673	6.80332	1.10168	23	2.00172	.91666	3.67309	.95304	
	33	2.86919	1.01545	7.45813	1.12070	24	2.06166	.91743	3.90652	.97688	
	34	3.01116	1.02510	8.23136	1.13934	25	2.12529	.91882	4.16179	1.00000	
	35	3.17311	1.03575	9.15895	1.15762	26	2.19307	.92082	4.44227	1.02246	
	36	3.36051	1.04745	10.29303	1.17557	27	2.26559	.92345	4.75217	1.04429	
	37	3.58122	1.06030	11.71209	1.19320	28	2.34356	.92671	5.09652	1.06553	
	38	3.84695	1.07437	13.54033	1.21053	29	2.42779	.93063	5.48166	1.08622	
39	4.17610	1.08978	15.98624	1.22759	30	2.51932	.93523	5.91560	1.10640		

TABLE I.— VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES — Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	
65	31	2.61942	0.94052	6.40854	1.12608	67	23	2.01077	0.87166	3.83024	1.00000	
	32	2.72969	.94655	6.97378	1.14531		24	2.07163	.87136	4.07583	1.02386	
	33	2.85217	.95332	7.62890	1.16411		25	2.13613	.87164	4.34413	1.04696	
	34	2.98950	.96090	8.39771	1.18250		26	2.20475	.87248	4.63861	1.06935	
	35	3.14523	.96931	9.31323	1.20051		27	2.27807	.87390	4.96352	1.09106	
	36	3.32418	.97862	10.42262	1.21816		28	2.35676	.87591	5.32406	1.11215	
	37	3.53313	.98887	11.79568	1.23547		29	2.44164	.87851	5.72668	1.13265	
	38	3.78200	1.00013	13.54033	1.25247		30	2.53371	.88171	6.17951	1.15260	
	39	4.08602	1.01248	15.83259	1.26916		31	2.63420	.88553	6.69290	1.17203	
	40	4.46996	1.02600	18.98054	1.28558		32	2.74466	.89000	7.28024	1.19097	
	41	4.97763	1.04081	23.57679	1.30172		33	2.86705	.89513	7.95290	1.20946	
	42	5.69607	1.05701	30.92529	1.31762		34	3.00392	.90094	8.75357	1.22751	
	43	6.83227	1.07474	44.56640	1.33329		35	3.15864	.90748	9.69613	1.24516	
	44	9.07019	1.09416	78.67052	1.34873		36	3.33578	.91478	10.83337	1.26244	
	66	0	1.09463	1.09463	1.00000		0	37	3.66703	.92888	13.12845	1.28827
		1	1.12559	1.07331	1.06691		.07545	38	3.78570	.93181	14.00080	1.29592
		2	1.15678	1.05388	1.13626		.14547	39	4.08173	.94165	16.30312	1.31218
		3	1.18829	1.03613	1.20818		.21062	40	4.45226	.95245	19.42902	1.32814
		4	1.21761	1.01850	1.27689		.26680	41	4.93615	.96429	23.91996	1.34381
5		1.25245	1.00511	1.36067	.32847	42	5.60821	.97725	30.92528	1.35922		
6		1.28523	.99157	1.44166	.38197	43	6.63773	.99143	43.38829	1.37439		
7		1.31856	.97920	1.52616	.43233	44	8.53138	1.00694	71.78450	1.38932		
8		1.35250	.96785	1.61445	.47986	68	0	1.07854	1.07854	1.00000	0	
9		1.38715	.95764	1.70686	.52374	1	1.11113	1.09481	1.07157	.08281		
10		1.42296	.94829	1.80374	.56738	2	1.14392	1.03325	1.14574	.15911		
11		1.45577	.94000	1.89681	.60453	3	1.17698	1.01361	1.22268	.22964		
12		1.49604	.93219	2.01255	.64630	4	1.21035	.99570	1.30259	.29508		
13		1.53428	.92535	2.12537	.68296	5	1.24412	.97935	1.38571	.35599		
14		1.57368	.92260	2.24461	.71796	6	1.27834	.96440	1.47229	.41287		
15		1.61434	.91388	2.37080	.75142	7	1.31308	.95070	1.56259	.46613		
16		1.65641	.90917	2.50474	.78349	8	1.34843	.93821	1.65696	.51616		
17		1.70000	.90514	2.64721	.81424	9	1.38446	.92678	1.75568	.56322		
18		1.74529	.90175	2.79914	.84378	10	1.42122	.91635	1.85916	.60765		
19	1.79247	.89898	2.96164	.87221	11	1.45885	.90685	1.96784	.64966			
20	1.84172	.89683	3.13593	.89958	12	1.49741	.89825	2.08216	.68946			
21	1.89329	.89528	3.32348	.92599	13	1.53698	.89042	2.20262	.72727			
22	1.94745	.89432	3.52598	.95148	14	1.57772	.88338	2.32987	.76322			
23	2.00448	.89396	3.74545	.97614	15	1.61972	.87707	2.46455	.79749			
24	2.06475	.89418	3.98424	1.00000	16	1.66311	.87146	2.60744	.83022			
25	2.12867	.89499	4.24521	1.02312	17	1.70805	.86652	2.75938	.86151			
26	2.19671	.89640	4.53177	1.04556	18	1.75470	.86222	2.92139	.89148			
27	2.26945	.89840	4.84808	1.06734	19	1.80324	.85854	3.09460	.92023			
28	2.34757	.90102	5.19927	1.08852	20	1.85387	.85546	3.28032	.94784			
29	2.43190	.90425	5.59167	1.10913	21	1.90684	.85297	3.48010	.97441			
30	2.52343	.90813	6.03330	1.12920	22	1.96241	.85105	3.69573	1.00000			
31	2.62341	.91266	6.53435	1.14878	23	2.02088	.84970	3.92932	1.02468			
32	2.73341	.91787	7.10806	1.16787	24	2.08261	.84891	4.18338	1.04852			
33	2.85540	.92379	7.77189	1.18653	25	2.14801	.84867	4.45689	1.07156			
34	2.99197	.93046	8.54944	1.20476	26	2.21757	.84899	4.74616	1.09387			
35	3.14654	.93789	9.44725	1.22260	27	2.29186	.84987	5.10146	1.11548			
36	3.32375	.94615	10.58964	1.24000	28	2.37157	.85130	5.49746	1.13645			
37	3.53011	.95527	11.96675	1.25728	29	2.45751	.85330	5.94052	1.15682			
38	3.77508	.96532	13.70921	1.27399	30	2.55070	.85588	6.35861	1.17661			
39	4.07307	.97635	15.98624	1.29048	31	2.65238	.85905	6.82921	1.19588			
40	4.44728	.98845	19.09064	1.30667	32	2.76410	.86282	7.46144	1.21464			
41	4.93820	1.00170	23.57679	1.32260	33	2.88785	.86721	8.19757	1.23293			
42	5.62467	1.01619	30.63690	1.33826	34	3.02617	.87225	9.01802	1.25079			
43	6.68829	1.03204	43.38830	1.35368	35	3.18245	.87796	9.99121	1.26822			
44	8.69172	1.04940	73.38936	1.36888	36	3.36130	.88437	11.16501	1.28527			
67	0	1.08636	1.08636	1.00000	0	37	3.56911	.89152	12.60945	1.30195		
	1	1.11808	1.06387	1.06913	.07899	38	3.81516	.89944	14.43171	1.31828		
	2	1.15002	1.04340	1.14075	.15203	39	4.11348	.90820	16.80390	1.33428		
	3	1.18225	1.02474	1.21505	.21979	40	4.48652	.91782	20.02153	1.34998		
	4	1.21482	1.00770	1.29222	.28287	41	4.97311	.92839	24.68006	1.36539		
	5	1.24780	.99213	1.37250	.34178	42	5.64778	.93997	31.82475	1.38053		
	6	1.28120	.97773	1.45602	.39687	43	6.67844	.95264	44.56641	1.39542		
	7	1.31523	.96487	1.54335	.44873	44	8.56387	.96650	73.38937	1.41006		
	8	1.34982	.95298	1.63449	.49748	69	0	1.07115	1.07115	1.00000	0	
	9	1.38509	.94213	1.72985	.54347	1	1.10473	1.04607	1.07431	.08699		
	10	1.42113	.93225	1.82982	.58697	2	1.13849	1.02334	1.15131	.16677		
	11	1.45801	.92327	1.93479	.62819	3	1.17248	1.00268	1.23120	.24025		
	12	1.49583	.91514	2.04521	.66733	4	1.20678	.98385	1.31418	.30819		
	13	1.53468	.90781	2.16160	.70457	5	1.24146	.96667	1.40050	.37122		
	14	1.57467	.90123	2.28454	.74006	6	1.27658	.95098	1.49041	.42990		
	15	1.61593	.89538	2.41466	.77395	7	1.31221	.93666	1.58421	.48469		
	16	1.65858	.89022	2.55271	.80635	8	1.34837	.92334	1.68204	.53591		
	17	1.70276	.88573	2.69953	.83738	9	1.38533	.91149	1.78478	.58418		
	18	1.74864	.88187	2.85608	.86715	10	1.42298	.90052	1.89230	.62952		
19	1.79640	.87864	3.02345	.89575	11	1.46147	.89051	2.00520	.67231			
20	1.84625	.87602	3.20294	.92326	12	1.50091	.88139	2.12398	.71277			
21	1.89841	.87398	3.39602	.94976	13	1.54138	.87311	2.24918	.75112			
22	1.95315	.87254	3.60444	.97532	14	1.58301	.86562	2.38143	.78753			

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$		
69	15	1.62591	0.85887	2.52143	0.82217	71	3	1.16604	0.98128	1.25145	0.26420		
	16	1.67023	.85282	2.66997	.85518		4	1.20260	.96047	1.34178	.33760		
	17	1.71611	.84745	2.82795	.86870		5	1.23951	.94154	1.43579	.40521		
	18	1.76372	.84272	2.99641	.91684		6	1.27684	.92427	1.53378	.46772		
	19	1.81325	.83861	3.17655	.94571		7	1.31468	.90850	1.63605	.52572		
	20	1.86490	.83510	3.36974	.97340		8	1.35311	.89409	1.74297	.57971		
	21	1.91892	.83217	3.57758	1.00000		9	1.39220	.88089	1.85492	.63012		
	22	1.97558	.82981	3.80196	1.02559		10	1.43197	.86869	1.97206	.67122		
	23	2.03519	.82800	4.04507	1.05024		11	1.47280	.85779	2.09576	.72165		
	24	2.09812	.82674	4.30955	1.07401		12	1.51449	.84770	2.22567	.76338		
	25	2.16478	.82603	4.59851	1.09697		13	1.55727	.83849	2.36271	.80275		
	26	2.23568	.82585	4.91572	1.11917		14	1.60124	.83011	2.50757	.83998		
	27	2.31139	.82621	5.26577	1.14066		15	1.64655	.82250	2.66104	.87525		
	28	2.39261	.82711	5.65428	1.16148		16	1.69333	.81562	2.82401	.90876		
	29	2.48019	.82855	6.08824	1.18168		17	1.74175	.80942	2.99750	.94063		
	30	2.57516	.83054	6.57643	1.20129		18	1.79200	.80388	3.18269	.97100		
	31	2.67879	.83310	7.13007	1.22036		19	1.84426	.79896	3.38091	1.00000		
	32	2.79267	.83622	7.76366	1.23892		20	1.89877	.79464	3.59373	1.02773		
	33	2.91883	.83993	8.49634	1.25699		21	1.95579	.79089	3.82297	1.05429		
	34	3.05990	.84425	9.35393	1.27461		22	2.01562	.78771	4.07076	1.07977		
	35	3.21935	.84920	10.37199	1.29181		23	2.07858	.78506	4.33962	1.10425		
	36	3.40190	.85480	11.60108	1.30861		24	2.14507	.78295	4.63254	1.12779		
	37	3.61416	.86108	13.12538	1.32503		25	2.21556	.78135	4.95312	1.15047		
	38	3.86570	.86808	15.02857	1.34109		26	2.29057	.78027	5.30568	1.17235		
	39	4.17105	.87583	17.52384	1.35682		27	2.37075	.77969	5.69551	1.19347		
	40	4.55352	.88439	20.91698	1.37244		28	2.45687	.77962	6.12913	1.21390		
	41	5.05364	.89380	25.80256	1.38736		29	2.54985	.78005	6.61467	1.23367		
	42	5.74970	.90413	33.44889	1.40221		30	2.65083	.78099	7.16211	1.25282		
	43	6.82003	.91544	47.12910	1.41679		31	2.76121	.78244	7.78552	1.27141		
	44	8.80523	.92782	78.67054	1.43112		32	2.88278	.78441	8.50117	1.28946		
	70	0	1.06418	1.06418	1.00000		0	72	0	1.05146	1.05146	1.00000	0
		1	1.09890	1.03765	1.07737		.09153		1	1.08893	1.02161	1.08464	.10196
		2	1.13406	1.01384	1.15827		.17580		2	1.12648	.99485	1.17240	.19409
		3	1.16883	.99194	1.24074		.25174		3	1.16418	.97069	1.26354	.27778
		4	1.20418	.97213	1.32717		.32233		4	1.20213	.94880	1.35830	.35420
		5	1.23990	.95409	1.41710		.38759		5	1.24041	.92893	1.45696	.42828
		6	1.27606	.93764	1.51080		.44814		6	1.27910	.91083	1.55984	.48883
		7	1.31270	.92400	1.60854		.50550		7	1.31830	.89432	1.66728	.54851
		8	1.34994	.90880	1.71071		.55714		8	1.35809	.87923	1.77966	.60388
		9	1.38786	.89621	1.81765		.60643		9	1.39856	.86543	1.89739	.65542
		10	1.42754	.88510	1.93274		.65386		10	1.43982	.85281	2.02096	.70355
		11	1.46660	.87417	2.04755		.69626		11	1.48183	.84112	2.15050	.74850
		12	1.50653	.86458	2.17147		.73736		12	1.52509	.83068	2.28775	.79094
		13	1.54805	.85582	2.30216		.77624		13	1.56933	.82102	2.43223	.83078
14		1.59076	.84788	2.44024	.81307	14	1.61482		.81221	2.58506	.86836		
15		1.63475	.84069	2.58643	.84805	15	1.66168		.80418	2.74709	.90391		
16		1.68019	.83423	2.74161	.88132	16	1.71008		.79690	2.91930	.93759		
17		1.72722	.82844	2.90670	.91304	17	1.76018		.79031	3.10277	.96957		
18		1.77602	.82330	3.08280	.94331	18	1.81218		.78439	3.29879	1.00000		
19		1.82677	.81877	3.27119	.97227	19	1.86628		.77909	3.50881	1.02900		
20		1.87971	.81485	3.47330	1.00000	20	1.92273		.77439	3.73452	1.05669		
21		1.93506	.81150	3.69085	1.02660	21	1.98181		.77026	3.97793	1.08316		
22		1.99312	.80872	3.92581	1.05216	22	2.04382		.76670	4.24135	1.10852		
23		2.05421	.80648	4.18053	1.07674	23	2.10912		.76367	4.52755	1.13285		
24		2.11870	.80478	4.45777	1.10042	24	2.17814		.76116	4.83980	1.15622		
25		2.18704	.80361	4.76088	1.12326	25	2.25136		.75916	5.18206	1.17869		
26		2.25972	.80297	5.09384	1.14531	26	2.32936		.75766	5.55910	1.20035		
27		2.33736	.80284	5.46154	1.16664	27	2.41283		.75666	5.97680	1.22123		
28		2.42069	.80324	5.86927	1.18728	28	2.50259		.75615	6.44239	1.24140		
29		2.51057	.80416	6.32660	1.20728	29	2.59964		.75613	6.96494	1.26090		
30		2.60809	.80561	6.84082	1.22668	30	2.70523		.75659	7.55598	1.27977		
31		2.71456	.80759	7.42463	1.24553	31	2.82087		.75754	8.23036	1.29806		
32		2.83165	.81012	8.09364	1.26384	32	2.94853		.75899	9.00756	1.31581		
33		2.96148	.81320	8.86647	1.28167	33	3.09069		.76094	9.91359	1.33304		
34		3.10680	.81685	9.77698	1.29903	34	3.25068		.76339	10.98415	1.34979		
35		3.27129	.82109	10.85776	1.31596								
36		3.45992	.82594	12.16581	1.33248								
37		3.67970	.83142	13.78232	1.34861								
38		3.94084	.83756	15.83248	1.36439								
39		4.25895	.84441	18.51961	1.37982								
40		4.65930	.85199	22.19785	1.39493								
41		5.18634	.86035	27.54355	1.40974								
42		5.92752	.86954	36.02866	1.42427								
43		7.08784	.87962	51.58763	1.43853								
44	9.32483	.89066	89.41117	1.45254									
71	0	1.05762	1.05762	1.00000	0								
	1	1.09363	1.02952	1.08079	.09649								
	2	1.12974	1.00419	1.16453	.18416								

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND
PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	
72	35	3.43290	0.76637	12.26937	1.36609	74	28	2.63118	0.70929	7.29665	1.29930	
	36	3.64351	.76988	13.84205	1.38197		29	2.74053	.70845	7.92987	1.31813	
	37	3.89128	.77395	15.81213	1.39745		30	2.86021	.70805	8.65246	1.33631	
	38	4.18935	.77859	18.35382	1.41255		31	2.99222	.70811	9.48532	1.35389	
	39	4.55839	.78383	21.76052	1.42730		32	3.13913	.70863	10.45639	1.37091	
	40	5.03335	.78969	26.56793	1.44173		33	3.30434	.70959	11.60395	1.38740	
	41	5.67920	.79621	33.86900	1.45584		34	3.49240	.71102	12.98191	1.40339	
	42	6.63532	.80342	46.29378	1.46966		35	3.70963	.71292	14.66843	1.41893	
	43	8.27973	.81137	72.17562	1.48320		36	3.96507	.71529	16.78182	1.43403	
	73	0	1.04569	1.04569	1.00000		0	37	4.27222	.71815	19.50936	1.44873
		1	1.08484	1.01397	1.08899		.10802	38	4.65240	.72151	23.16702	1.46304
		2	1.12402	.98560	1.18132		.20502	39	5.14159	.72539	28.33207	1.47699
		3	1.16333	.96009	1.27725		.29267	40	5.80687	.72980	36.18410	1.49061
		4	1.20286	.93705	1.37706		.37229	41	6.79229	.73477	49.56836	1.50391
5		1.24271	.91618	1.48105	.44499	42	8.49002	.74033	77.53807	1.51692		
6		1.28298	.89721	1.58955	.51166	75	0	1.03528	1.03528	1.00000	0	
7		1.32375	.87993	1.70293	.57307		1	1.07856	1.09910	1.09961	1.12232	
8		1.36512	.86416	1.82162	.62984		2	1.12179	.96707	1.20313	.23060	
9		1.40719	.84974	1.94606	.68252		3	1.16508	.93853	1.31088	.32718	
10		1.45006	.83908	2.07677	.73156		4	1.20854	.91294	1.42319	.41392	
11		1.49385	.82448	2.21431	.77735		5	1.25231	.88990	1.54043	.49229	
12		1.53835	.81330	2.35884	.82009		6	1.29649	.86906	1.66300	.56348	
13		1.58466	.80333	2.51256	.86049		7	1.34120	.85016	1.79136	.62848	
14	1.63193	.79409	2.67480	.89838	8		1.38655	.83296	1.92601	.68810		
15	1.68065	.78566	2.84700	.93414	9		1.43266	.81727	2.06752	.74301		
16	1.73098	.77799	3.03020	.96796	10		1.47966	.80294	2.21651	.79377		
17	1.78310	.77102	3.22562	1.00000	11		1.52767	.78984	2.37369	.84087		
18	1.83722	.76473	3.43466	1.03043	12		1.57685	.77785	2.53987	.88472		
19	1.89357	.75907	3.65894	1.05937	13		1.62733	.76686	2.71594	.92566		
20	1.95239	.75401	3.90033	1.08696	14	1.67905	.75668	2.90209	.96384			
21	2.01400	.74953	4.16104	1.11330	15	1.73288	.74760	3.10202	1.00000			
22	2.07872	.74560	4.44366	1.13849	16	1.78834	.73919	3.31456	1.03389			
23	2.14695	.74220	4.75127	1.16262	17	1.84585	.73151	3.54210	1.06596			
24	2.21914	.73932	5.08756	1.18576	18	1.90569	.72453	3.78644	1.09609			
25	2.29582	.73695	5.45696	1.20799	19	1.96812	.71820	4.04968	1.12475			
26	2.37763	.73507	5.86488	1.22938	20	2.03345	.71247	4.33427	1.15195			
27	2.46532	.73366	6.31798	1.24998	21	2.10206	.70733	4.63433	1.17783			
28	2.55980	.73274	6.82452	1.26984	22	2.17437	.70274	4.97971	1.20250			
29	2.66217	.73229	7.39491	1.28903	23	2.25086	.69868	5.34815	1.22605			
30	2.77382	.73231	8.02426	1.30758	24	2.33211	.69513	5.75346	1.24858			
31	2.89647	.73280	8.78447	1.32554	76	0	1.03061	1.03061	1.00000	0		
32	3.03231	.73376	9.64375	1.34294		1	1.07648	.99179	1.10615	1.13086		
33	3.18421	.73520	10.61220	1.35982		2	1.12221	.95764	1.21660	.24571		
34	3.35594	.73713	11.84954	1.37621		3	1.16798	.92737	1.33171	.34738		
35	3.55267	.73954	13.29968	1.39215		4	1.21390	.90036	1.45185	.43806		
36	3.78166	.74246	15.09156	1.40766		5	1.26011	.87613	1.57743	.51950		
37	4.05344	.74590	17.36356	1.42276		6	1.30675	.85428	1.70892	.59309		
38	4.38416	.74988	20.34079	1.43749		7	1.35393	.83451	1.84682	.65993		
39	4.79990	.75441	24.43461	1.45186		8	1.40180	.81657	1.99171	.72096		
40	5.34654	.75951	30.33228	1.46589		9	1.45048	.80023	2.14422	.77694		
41	6.11420	.76523	39.71928	1.47962		10	1.50012	.78532	2.30509	.82850		
42	7.31380	.77158	56.90569	1.49304		11	1.55085	.77170	2.47511	.87616		
43	9.61969	.77860	98.56608	1.50619		12	1.60284	.75924	2.65520	.92039		
74	0	1.04030	1.04030	1.00000		0	13	1.65626	.74783	2.84642	.96156	
	1	1.08137	1.00647	1.09394	.11476	14	1.71128	.73738	3.04994	1.00000		
	2	1.12243	.97676	1.19148	.21712	15	1.76783	.72770	3.26602	1.03583		
	3	1.16358	.94940	1.29290	.30905	16	1.82698	.71906	3.49958	1.06980		
	4	1.20494	.92514	1.39851	.39211	17	1.88812	.71106	3.74909	1.10162		
	5	1.24661	.90321	1.50862	.46756	18	1.95183	.70376	4.01779	1.13164		
	6	1.28868	.88333	1.62362	.53645	19	2.01842	.69711	4.30816	1.16002		
	7	1.33127	.86525	1.74390	.59964	20	2.08825	.69109	4.62314	1.18693		
	8	1.37448	.84878	1.86994	.65783	21	2.16174	.68565	4.96621	1.21247		
	9	1.41841	.83373	2.00221	.71163	22	2.23938	.68076	5.34155	1.23678		
	10	1.46318	.81997	2.14129	.76155							
	11	1.50891	.80738	2.28780	.80802							
	12	1.55573	.79586	2.44246	.85111							
	13	1.60358	.78518	2.60544	.89190							
14	1.65317	.77566	2.77956	.93021								
15	1.70411	.76624	2.96390	.96611								
16	1.75676	.75789	3.16033	1.00000								
17	1.81132	.75146	3.37020	1.03204								
18	1.86801	.74481	3.59506	1.06241								
19	1.92708	.73881	3.83675	1.09125								
20	1.98882	.73341	4.09738	1.11860								
21	2.05355	.72858	4.37946	1.14422								
22	2.12164	.72431	4.68594	1.16978								
23	2.19353	.72058	5.02033	1.19361								
24	2.26971	.71735	5.38688	1.21651								
25	2.35078	.71462	5.79072	1.23845								
26	2.43746	.71237	6.23811	1.25951								
27	2.53058	.71060	6.73624	1.27978								

TABLE I.-VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

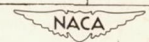
θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	
76	23	2.32175	0.67640	5.75420	1.25994	78	22	2.42213	0.63503	6.38199	1.31053	
	24	2.40951	.67255	6.21029	1.28805		23	2.52238	.63015	6.93526	1.33267	
	25	2.50349	.66919	6.71741	1.30320		24	2.63030	.62577	7.55597	1.35372	
	26	2.60464	.66629	7.28497	1.32345		25	2.74721	.62187	8.25775	1.37379	
	27	2.71418	.66385	7.92491	1.34288		26	2.87474	.61842	9.05803	1.39295	
	28	2.83358	.66186	8.65247	1.36155		27	3.01495	.61542	9.97980	1.41127	
	29	2.96469	.66030	9.48750	1.37950		28	3.17048	.61285	11.05366	1.42882	
	30	3.10991	.65916	10.45638	1.39680		29	3.34481	.61069	12.32147	1.44565	
	31	3.27231	.65846	11.59485	1.41348		30	3.54259	.60893	13.84204	1.46182	
	32	3.45603	.65817	12.95259	1.42958		31	3.77027	.60758	15.70056	1.47737	
	33	3.66670	.65830	14.60078	1.44516		32	4.03704	.60661	18.02541	1.49232	
	34	3.91229	.65885	16.64528	1.46023		33	4.35658	.60603	21.01928	1.50681	
	35	4.20448	.65982	19.25024	1.47484		34	4.75039	.60583	25.02251	1.52076	
	36	4.56126	.66121	22.68536	1.48901		35	5.25455	.60602	30.65293	1.53426	
	37	5.01207	.66304	27.42567	1.50278		36	5.93582	.60659	39.16266	1.54732	
	38	5.60948	.66531	34.39544	1.51616		37	6.93576	.60754	53.52950	1.55997	
	39	6.45921	.66803	45.69951	1.52918		38	8.63195	.60889	83.00466	1.57225	
	40	7.81826	.67122	66.97238	1.54186		79	0	1.01872	1.01872	1.00000	0
	41	10.57522	.67488	122.67154	1.55422			1	1.07539	.96940	1.13341	.16480
77	0	1.02630	1.02630	1.00000	0	1.13167		.92718	1.27305	.30458		
	1	1.07518	.98447	1.11376	.26277	2		1.18782	.89057	1.41947	.42472	
	2	1.12305	.94795	1.23232	.37001	3		1.24407	.85852	1.57326	.52913	
	3	1.17251	.91578	1.35668	.46495	4		1.30065	.83019	1.73511	.62078	
	4	1.22130	.88723	1.48545	.54963	5		1.35775	.80499	1.90576	.70190	
	5	1.27039	.86172	1.62092	.62567	6		1.41558	.78244	2.08607	.77426	
	6	1.31992	.83882	1.76302	.69438	7		1.47435	.76214	2.27699	.83225	
	7	1.37003	.81815	1.91234	.75680	8		1.53426	.74381	2.47964	.89796	
	8	1.42088	.79944	2.06953	.81379	9		1.59554	.72718	2.69524	.95130	
	9	1.47262	.78244	2.23535	.86509	10		1.65841	.71206	2.92524	1.00000	
	10	1.52541	.76696	2.41064	.91240	11		1.72313	.69827	3.17127	1.04467	
	11	1.57940	.75283	2.59634	.95870	12		1.78997	.68568	3.43524	1.08580	
	12	1.63479	.73991	2.79353	.99570	13		1.85923	.67415	3.71937	1.12384	
	13	1.69177	.72809	3.00345	1.00000	14		1.93125	.66360	4.02626	1.15913	
	14	1.75053	.71726	3.22752	1.03844	15		2.00641	.65394	4.35896	1.19198	
	15	1.81133	.70734	3.46736	1.07434	16		2.08514	.64508	4.72109	1.22265	
	16	1.87404	.69815	3.72334	1.10777	17		2.16731	.63687	5.11390	1.25117	
	17	1.94005	.68995	4.00223	1.13951	18	2.25441	.62954	5.53196	1.27835		
	18	2.00860	.68235	4.30203	1.16922	19	2.34822	.62253	6.03228	1.30373		
19	2.08042	.67543	4.62734	1.19725	20	2.44720	.61657	6.56585	1.32769			
20	2.15595	.66912	4.98175	1.22376	21	2.55332	.61094	7.12641	1.35034			
21	2.23569	.66340	5.36960	1.24888	22	2.66778	.60584	7.83424	1.37181			
22	2.32022	.65824	5.79616	1.27274	23	2.79206	.60124	8.59705	1.39219			
23	2.41023	.65361	6.26779	1.29543	24	2.92800	.59711	9.47123	1.41158			
24	2.50656	.64948	6.79240	1.31706	25	3.07796	.59343	10.43736	1.43006			
25	2.61021	.64583	7.37982	1.33770	26	3.24500	.59019	11.67110	1.44771			
26	2.72239	.64265	8.04246	1.35745	27	3.43317	.58737	13.08374	1.46458			
27	2.84464	.63992	8.79627	1.37636	28	3.64796	.58496	14.79364	1.48075			
28	2.97886	.63762	9.66203	1.39451	29	3.89713	.58294	16.90716	1.49625			
29	3.12749	.63575	10.66728	1.41193	30	4.19195	.58130	19.58812	1.51144			
30	3.29372	.63409	11.84954	1.42870	31	4.54962	.58004	23.10298	1.52547			
31	3.48379	.63264	13.26101	1.44485	32	4.99802	.57915	27.91990	1.53927			
32	3.69754	.63136	14.97662	1.46042	33	5.58619	.57863	34.91428	1.55258			
33	3.94918	.63036	17.10800	1.47546	34	6.41056	.57848	46.03221	1.56543			
34	4.24885	.62952	19.82909	1.49001	35	7.69747	.57868	66.44284	1.57786			
35	4.61524	.62908	23.42636	1.50408	36	10.17446	.57926	116.20905	1.58989			
36	5.07917	.62904	28.40796	1.51772	80	0	1.01543	1.01543	1.00000	0		
37	5.65992	.62942	35.76668	1.53096		1	1.07723	.96137	1.14634	.18015		
38	6.37778	.63020	47.75735	1.54381		2	1.13851	.91567	1.29992	.33061		
39	8.00217	.63041	70.76019	1.55630		3	1.19961	.87645	1.46160	.45284		
0	1.02234	1.02234	1.00000	0		4	1.26079	.84239	1.63194	.56792		
1	1.07477	.97704	1.12272	.15178		5	1.32234	.81250	1.81183	.66326		
2	1.12691	.93785	1.25087	.28221		6	1.38450	.78607	2.00222	.74693		
3	1.17898	.90359	1.38490	.39558		7	1.44753	.76251	2.20418	.82099		
4	1.23118	.87336	1.52531	.49509		8	1.51167	.74141	2.41895	.89706		
5	1.28367	.84649	1.67266	.58317		9	1.57718	.72241	2.64791	.94639		
6	1.33663	.82247	1.82757	.66174		10	1.64433	.70523	2.89262	1.00000		
7	1.39024	.80088	1.99075	.73230		11	1.71341	.68964	3.15512	1.04870		
8	1.44466	.78138	2.16297	.79605		12	1.78472	.67546	3.43739	1.09316		
9	1.50008	.76372	2.34513	.85396		13	1.85862	.66252	3.73402	1.13394		
10	1.55668	.74766	2.53824	.90684		14	1.93548	.65069	4.07199	1.17150		
11	1.61464	.73302	2.74344	.95533		15	2.01575	.63987	4.43083	1.20623		
12	1.67419	.71966	2.96203	1.00000		16	2.09991	.62996	4.82275	1.23845		
13	1.73554	.70744	3.19554	1.04130		17	2.18853	.62088	5.25280	1.26844		
14	1.79894	.69626	3.44568	1.07961		18	2.28230	.61255	5.72715	1.29645		
15	1.86467	.68601	3.71447	1.11528	19	2.38112	.60483	6.24855	1.32245			
16	1.93303	.67662	4.00428	1.14859	20	2.48660	.59795	6.84081	1.34730			
17	2.00390	.66792	4.31572	1.17958	21	2.60324	.59156	7.50128	1.37048			
18	2.07910	.66016	4.65845	1.20906	22	2.72733	.58575	8.24971	1.39235			
19	2.15766	.65362	5.02997	1.23662	23	2.86264	.58046	9.10556	1.41303			
20	2.24058	.64841	5.43708	1.26263	24	3.01142	.57567	10.09437	1.43263			
21	2.32850	.64044	5.88545	1.28723	25	3.17654	.57135	11.25052	1.45124			

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_0	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_0	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta p_{a,b}}{q_b}$
80	26	3.36182	.56747	12.62123	1.46894	83	0	1.00751	1.00751	1.00000	0
	27	3.57242	.56403	14.27360	1.48582		1	1.09383	.93218	1.20849	.24893
	28	3.81551	.56099	16.30565	1.50193		2	1.17898	.87206	1.43090	.44286
	29	4.10144	.55835	18.86699	1.51733		3	1.26372	.82273	1.66883	.59879
							4	1.34874	.78138	1.92411	.72572
							5	1.43464	.74614	2.19890	.83214
							6	1.52198	.71570	2.49570	.92242
							7	1.61134	.68911	2.81748	1.00000
							8	1.70328	.66568	3.16773	1.06743
							9	1.79843	.64487	3.55072	1.12661
							10	1.89748	.62627	3.97144	1.17901
							11	2.00118	.60955	4.43611	1.22574
							12	2.11041	.59447	4.95229	1.26770
							13	2.22621	.58080	5.52947	1.30562
					14	2.34981	.56838	6.17952	1.34007		
81	0	1.01247	1.01247	1.00000	0	15	2.48270	.55705	6.91764	1.37152	
	1	1.08059	.95273	1.16228	.18953	16	2.62677	.54671	7.76366	1.40036	
	2	1.14803	.90300	1.33333	.36130	17	2.78434	.53725	8.74365	1.42693	
	3	1.21520	.86083	1.51400	.49725	18	2.95847	.52858	9.82928	1.45149	
	4	1.28248	.82457	1.70525	.61256	19	3.15317	.52064	11.02604	1.47428	
	5	1.35020	.79307	1.90817	.71166	20	3.37388	.51336	12.31636	1.49550	
	6	1.41868	.76527	2.12398	.79779	21	3.62824	.50668	14.96338	1.51531	
	7	1.48824	.74071	2.35410	.87339	22	3.92270	.50048	17.53182	1.53360	
	8	1.55918	.71880	2.60016	.94031	23	4.26813	.49466	20.96744	1.55127	
	9	1.63184	.69915	2.86404	1.00000	24	4.73801	.49281	25.63451	1.56767	
	10	1.70656	.68144	3.14793	1.05361	25	5.32518	.48517	32.42973	1.58314	
	11	1.78371	.66542	3.45440	1.10204	26	6.14449	.48093	43.22632	1.59777	
	12	1.86370	.65087	3.78644	1.14604	27	7.41885	.47703	63.09215	1.61163	
	13	1.94698	.63763	4.14764	1.18621	28	9.86743	.47342	111.74018	1.62480	
14	2.03408	.62554	4.54226	1.22306	84	0	1.00551	1.00551	1.00000	0	
15	2.12558	.61449	4.97544	1.25699		1	1.10555	.91901	1.24370	.28484	
16	2.22218	.60438	5.45345	1.28837		2	1.20403	.85207	1.50615	.49878	
17	2.32469	.59511	5.98393	1.31748		3	1.30210	.79835	1.78977	.66545	
18	2.43409	.58663	6.57644	1.34458		4	1.40075	.75410	2.09743	.79902	
19	2.55155	.57883	7.22944	1.36988		5	1.50083	.71689	2.43252	.90853	
20	2.67718	.57161	7.99073	1.39334		6	1.60319	.68510	2.79915	1.00000	
21	2.81680	.56517	8.86354	1.41582		7	1.70865	.65758	3.20220	1.07758	
22	2.96867	.56259	9.86355	1.43677		8	1.81813	.63350	3.64771	1.14426	
23	3.13708	.55376	11.03386	1.45653		9	1.93258	.61225	4.14307	1.20221	
24	3.32593	.54882	12.42298	1.47521		10	2.05312	.59336	4.69748	1.25307	
25	3.54049	.54434	14.09971	1.49292		11	2.18107	.57646	5.32259	1.29810	
26	3.78811	.54030	16.16503	1.50973		12	2.31797	.56125	6.03330	1.33826	
27	4.07944	.53668	18.77364	1.52573		13	2.46574	.54752	6.84903	1.37433	
28	4.43060	.53346	22.17482	1.54098	14	2.62681	.53507	7.79553	1.40692		
29	4.86743	.53063	26.79740	1.55553	15	2.80428	.52375	8.90771	1.43652		
30	5.43471	.52817	33.44887	1.56945	16	3.00225	.51342	10.23417	1.46355		
31	6.21880	.52607	43.84824	1.58278	17	3.22630	.50399	11.84448	1.48834		
32	7.41570	.52433	62.42139	1.59557	18	3.48427	.49535	13.84205	1.51117		
33	9.61661	.52292	105.08534	1.60786	19	3.78761	.48744	16.38741	1.53228		
82	0	1.00983	1.00983	1.00000	0	20	4.15390	.48019	19.74410	1.55187	
	1	1.08589	.94316	1.18238	.22096	21	4.61191	.47354	24.37688	1.57010	
	2	1.16106	.88869	1.37561	.39804	22	5.21284	.46744	31.18958	1.58712	
	3	1.23589	.84318	1.58082	.54323	23	6.04172	.46177	41.95408	1.60280	
	4	1.31088	.80449	1.79930	.66449	24	7.40162	.45673	63.04960	1.61803	
	5	1.38645	.77094	2.03252	.76734	25	10.10199	.45480	117.59103	1.63212	
	6	1.46304	.74207	2.28218	.85574	85	0	1.00382	1.00382	1.00000	0
	7	1.54104	.71648	2.55026	.93257		1	1.12309	.90238	1.20371	.33266
	8	1.62087	.69379	2.83905	1.00000		2	1.24028	.82702	1.61438	.57056
	9	1.70297	.67352	3.15125	1.05969		3	1.35724	.76828	1.96611	.74924
	10	1.78780	.65533	3.49004	1.11294		4	1.47548	.72091	2.35391	.88844
	11	1.87587	.63893	3.85920	1.16075		5	1.59637	.68174	2.78387	1.00000
	12	1.96776	.62407	4.26328	1.20395		6	1.72126	.64870	3.26362	1.09147
	13	2.06412	.61058	4.70774	1.24320		7	1.85157	.62041	3.80263	1.16786
14	2.16569	.59829	5.19927	1.27904	8		1.98885	.59586	4.41305	1.23265	
15	2.27337	.58706	5.74613	1.31190	9		2.13493	.57436	5.11052	1.28634	
16	2.38822	.57680	6.35862	1.34217	10		2.29200	.55535	5.91560	1.33674	
17	2.51150	.56740	7.04972	1.37016	11		2.46281	.53843	6.85590	1.37922	
18	2.64482	.55879	7.83617	1.39612	12		2.65087	.52328	7.96937	1.41683	
19	2.79013	.55089	8.73972	1.42029	13		2.86039	.50964	9.30959	1.45037	
20	2.94995	.54365	9.78928	1.44286	14	3.09929	.49731	10.95474	1.48050		
21	3.12533	.53694	11.00824	1.46375	15	3.37530	.48612	13.02379	1.50771		
22	3.32734	.53095	12.49953	1.48384	16	3.70268	.47594	15.70664	1.53244		
23	3.55522	.52559	14.29389	1.50252	17	4.10310	.46666	19.32635	1.55501		
24	3.81965	.52035	16.52503	1.52015	18	4.61399	.45817	24.48172	1.57572		
25	4.13307	.51575	19.37661	1.53682	19	5.30513	.45040	32.41900	1.59479		
26	4.51462	.51158	23.15148	1.55261							
27	4.99598	.50783	28.33911	1.56761							
28	5.63407	.50447	36.14927	1.58108							
29	6.54508	.50149	48.84302	1.59348							
30	8.01831	.49887	73.38928	1.60846							

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO, AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Concluded

θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{P_a}{P_b}$	$\frac{\Delta P_{a,b}}{q_b}$
85	20	6.33047	0.44327	46.23224	1.61242	87	5	2.01291	0.58128	4.54750	1.25076
	21	8.12762	.43674	76.31580	1.62878		6	2.25574	.54695	5.75347	1.33456
86	0	1.00244	1.00244	1.00000	0	7	2.52995	.51836	7.28029	1.40171	
	1	1.15055	.87994	1.37020	.39951	8	2.84902	.49410	9.27715	1.45677	
	2	1.29591	.79401	1.78307	.66612	9	3.23409	.47324	12.00248	1.50275	
	3	1.44179	.72957	2.24675	.85680	10	3.72148	.45507	15.94670	1.54176	
	4	1.59085	.67901	2.77155	1.00000	11	4.38141	.43910	22.16816	1.57528	
	5	1.74555	.63805	3.37082	1.11156	12	5.37519	.42495	33.44909	1.60442	
	6	1.90850	.60405	4.06208	1.20098	13	7.20410	.41232	60.21636	1.62999	
	7	2.08259	.57529	4.86877	1.27428	14	13.26155	.40099	204.45147	1.65262	
	8	2.27139	.55060	5.82313	1.33551	88	0	1.00061	1.00000	0	0
	9	2.47941	.52914	6.97050	1.38744		1	1.29222	.79143	1.77909	.66653
10	2.71274	.51031	8.37701	1.43208	2		1.58355	.67540	2.75534	1.00000	
11	2.97992	.49365	10.14282	1.47087	3		1.89445	.59921	4.01532	1.20025	
12	3.29358	.47880	12.42734	1.50491	4	2.24475	.54437	5.70487	1.33388		
13	3.67355	.46548	15.50082	1.53505	5	2.66202	.50254	8.09068	1.42944		
14	4.15329	.45349	19.86017	1.56194	6	3.19358	.46933	11.71764	1.50122		
15	4.79538	.44264	26.53113	1.58608	7	3.93752	.44219	17.89940	1.55714		
16	5.73559	.43279	38.02639	1.60789	8	5.15650	.41950	30.81660	1.60196		
17	7.35053	.42382	62.56201	1.62771	9	8.01993	.40020	74.70644	1.63870		
18	11.43133	.41564	151.54614	1.64580	89	0	1.00015	1.00015	1.00000	0	
87	0	1.00137	1.00137	1.00000		0	1	1.58174	.67450	2.75133	1.00000
	1	1.19742	.84687	1.50153		.49969	2	2.23822	.54284	5.67614	1.33347
	2	1.39022	.74753	2.08199		.73976	3	3.17002	.46702	11.55363	1.50031
	3	1.58658	.67690	2.76207	1.00000	4	5.03780	.41629	29.43369	1.60049	
4	1.79219	.62346	3.57035	1.14321							



CHARTS FOR DETERMINING THE CHARACTERISTICS OF
SHARP-NOSE AIRFOILS IN TWO-DIMENSIONAL
FLOW AT SUPERSONIC SPEEDS

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and Alberta Schuettler

SUMMARY

Solutions of the Hugoniot shock equations and Meyer expansion equations are plotted in such a manner as to permit the pressure distribution, the local Mach number, and the angles of shock waves on arbitrary sharp-nose airfoils at supersonic speeds to be obtained directly.

INTRODUCTION

Ackeret, in reference 1, gives a method for calculating the pressure distribution over thin, sharp, two-dimensional airfoils at supersonic speeds. This method, based on the theory of small disturbances, is only a first approximation and therefore is most accurate for thin airfoils.

The exact relationship for the pressure rise through a normal shock wave, as given by Hugoniot, is discussed in reference 2. According to reference 3, the corresponding relations which apply directly to the pressures on a straight surface of an airfoil immediately behind an oblique shock were obtained by Meyer as early as 1908. A discussion of Meyer's equations for the expansion of supersonic flow around an infinite corner is also given in reference 3. Frequently, interference exists between

shock and expansion waves caused by the intersection of two or more of these waves. When this intersection is close to the airfoil, as, for instance, when the airfoil has considerable curvature, the calculations yielded by the aforementioned equations are not exact.

It has been shown by Ferri (reference 4) that the equations for an oblique shock combined with the expansion equations give a close approximation to experimental results as reviewed in the section "Presentation of Figures" in this report. The use of the equations, however, involves long and difficult computations. The purpose of this paper is to give graphic solutions of these equations in a form suitable for rapid calculation. Because the size of the graphs limits their accuracy, tables are given from which computational graphs of much greater accuracy may be plotted. The relations given herein apply directly to a two-dimensional, or cylindrical, flow in which the transverse velocity is supersonic. As pointed out by Busemann (reference 5) they may be adapted to the case of oblique motion of the cylindrical airfoil by the addition of an arbitrary axial velocity. Thus, as in reference 5, the relations may be applied to the case of a swept-back airfoil lying ahead of the Mach lines, in which case the velocities and Mach numbers used in the calculation are those corresponding to the transverse component of the flight velocity. In case the airfoil is swept behind the Mach lines the flow will be of a different type as discussed in reference 6.

SYMBOLS

M	Mach number
p	static pressure
q	dynamic pressure
β	change in direction of flow (see fig. 1)
γ	ratio of specific heat at constant pressure to specific heat at constant volume = 1.4 for air
θ	angle of shock wave relative to direction of flow before shock

ν angle around which the flow would have to expand from $M = 1$ to the given local Mach number

ρ density of gas

Subscripts:

a for conditions after a disturbance

b for conditions before a disturbance

n for local condition under consideration

o free stream

PRESENTATION OF FIGURES

A supersonic two-dimensional air flow around an airfoil may change its direction either by deflection or by expansion around a corner. In case the change in air-flow direction occurs by deflection, a shock wave is set up, and in case the change is by expansion, an expansion wave is set up. In either case, the change of state of the gas can be presented as a function of the local Mach number before the disturbance and the change in direction of the gas.

The equations from which the charts presented herein are derived are given in the appendix. Values of local Mach number, pressure ratio, and pressure coefficient across shock waves are given in table I. The local Mach numbers before and after expansions are presented in table II and the static relations across expansion waves, in table III. Table IV gives the pressure ratios based on free-stream dynamic pressure for various Mach numbers.

Before the method of determining pressure distribution, lift, drag, and moments may be discussed, a method of measuring the angles that cause expansions and shocks must be selected. Figure 1 shows the method used in the present paper for measuring angles causing expansions; figure 2 shows that for measuring angles causing shocks. The angle causing the disturbance is designated β in both cases; β is considered negative if the disturbance set up is an expansion wave and positive if it is a shock wave.

Figure 3 shows the manner in which the flow changes when the angles are made too large for the given speeds. If the angle causing the shock is too great, the shock wave separates from the airfoil surface. In figure 4 are given the maximum angles that may exist before the shock wave separates, calculated as the boundary condition between the region giving two solutions and the region for which no solution exists. If the trailing portion of the airfoil is too blunt, the flow may separate from the airfoil and leave a turbulent wake. Figure 3(b) shows that the expansion of the flow outside the wake is actually less than it would have been had it followed the surface. The pressure on the back of the airfoil does not decrease so much as it would if the flow failed to separate. The drags calculated if no separation is assumed will therefore be higher than those actually experienced.

The local Mach number after a disturbance (shock or expansion) is shown in figure 5 to be a function of the local Mach number before the disturbance and the angle causing the disturbance. For example, if a flow at a Mach number of 4.0 impinges on a surface set at 5° to that flow, a shock wave is set up behind which the local Mach number is 3.64, while the flow behind the shock wave is parallel to the surface. On the other hand, the same flow expanding around a 5° corner produces a local Mach number equal to 4.4 on the surface behind the expansion.

Figure 6 gives the ratio of static pressures across shock and expansion waves. For example, assume that a flow at a local Mach number of 4.0 is shocked by a surface slope change of $\beta = 5^\circ$. From figure 6 the pressure ratio across the shock is 1.61, which means that the pressure is much higher on the surface behind the shock than on the surface before it. If the flow at $M = 4.0$ had expanded 5° , then the pressure would have dropped to 0.588. From this example it is seen that the 5° shock increased the pressure by 61 percent, whereas the 5° expansion decreased the pressure only 41 percent. Ackeret's method in reference 1 predicts equal changes in pressure for both the shock and the expansion, since it is based on small disturbances. Present results indicate, therefore, that angles as large as 5° require a more accurate approximation than that given by Ackeret.

The use of figures 5 and 6 can be demonstrated by solving for the local Mach numbers and pressures on the simple airfoil shown in figure 7. The coordinates of figures 5 and 6 are based on conditions before the disturbance and conditions after the disturbance. In figure 7 the conditions after one disturbance are noted to be the conditions before another disturbance. The numerical subscripts found in the symbols of figure 7 are to be associated, therefore, for use in the charts of figures 5 and 6, with the subscripts a and b, according to their relative positions with respect to the disturbance. The airfoil of figure 7 is a symmetrical, double-wedge airfoil having a 2° included angle at the leading and trailing edges. For use in this example the airfoil is at a positive angle of attack of 3° and is moving at a free-stream Mach number of 4.0. The pertinent angles as well as the conditions to be determined are shown on figure 7.

Enter figure 5 at $M_0 = 4.0$ and $\beta_1 = -2^\circ$, and read off $M_1 = 4.16$. This Mach number is used to obtain $M_2 = 4.33$. Values for the lower surface of the airfoil are obtained in a similar manner. At coordinates of $M_0 = 4.0$ and $\beta_3 = 4^\circ$, $M_3 = 3.70$; and, similarly, when the flow at M_3 is expanded 2° , M_4 is found to be 3.84. A shock wave and an expansion wave are shown at the trailing edge; however, since these disturbances do not affect the pressures on the airfoil, they will be neglected, and M_1 , M_2 , M_3 , and M_4 are the only Mach numbers which are discussed.

The pressure ratios across the shock and expansion waves can be determined from figure 6. Enter figure 6 at $M_0 = 4.0$ and an expansion angle of 2° and read

$$\frac{p_1}{p_0} = 0.817. \quad \text{At coordinates of } M_1 = 4.16 \quad \text{and } \beta_2 = -2^\circ,$$

$$\frac{p_2}{p_1} \text{ is found to be } 0.809. \quad \text{Then}$$

$$\frac{p_2}{p_0} = \frac{p_1}{p_0} \frac{p_2}{p_1} = 0.817 \times 0.809 = 0.661$$

For the lower surface of the airfoil, p_3/p_0 is found at coordinates $M_0 = 4.0$, $\beta_3 = 4^\circ$ to be $\frac{p_3}{p_0} = 1.47$.

At $M_3 = 3.70$, $\beta_4 = -2^\circ$, $\frac{p_4}{p_3} = 0.829$. Then

$$\frac{p_4}{p_0} = \frac{p_4}{p_3} \times \frac{p_3}{p_0} = 1.219$$

The pressure ratios $\frac{p_a}{p_b}$ may be converted to local pressure coefficients $\frac{\Delta p}{q_0}$ by the use of the plot given in figure 8. The results obtained for the local Mach numbers, pressure ratios, and pressure coefficients are illustrated in figure 9.

Once the pressure distribution is determined, the lift, drag, and moment coefficients can be obtained by integrating plots of the types given in figures 10, 11, and 12. The lift coefficient is obtained by integrating the projection of the airfoil pressure distribution on a plane parallel to free-stream direction. For the example airfoil at Mach number 4.0 and angle of attack 3° , the lift coefficient is 0.0540. The drag coefficient is found in the same manner except that the integration is over the projection of the airfoil pressure distribution on a plane perpendicular to free stream. The pressure drag coefficient for the example airfoil is 0.00315. The total section drag coefficient is the sum of the viscous and pressure-drag coefficients; for instance, if the viscous-drag coefficient is 0.0060, then the total drag coefficient is $0.0060 + 0.00315 = 0.00915$. The moment coefficient, obtained by integrating the elemental moments about the point desired, becomes 0.001112 when taken about the center for the example airfoil.

In the preceding examples step-by-step calculations were made along the airfoil, in which case the results obtained at any point are dependent on the accuracy of those at the preceding points. The results thus obtained on the rear of the airfoil may be subject to greater inaccuracies than are necessary. A method is consequently

given for determining the conditions behind each of a series of expansions independently of the conditions existing at intermediate points. For the example airfoil of figure 7, the free-stream flow was expanded around a 2° corner to obtain the conditions on the front of the upper surface and these conditions were then expanded around the second 2° corner to give the conditions on the rear of the upper surface. These last conditions, however, could have been found directly by referring the rear of the upper surface to the free-stream conditions and expanding through the total angle (4°) at once. Theoretically the results obtained are exactly the same regardless of which method is used, provided no shock waves are present between the end-points of the calculation. This method of adding angles does not apply when these are intermediate shock waves because of loss of total head in the shock wave.

If it is desired to calculate only the pressure distribution, it is not necessary to find M_1 , M_2 , M_4 , or p_2/p_1 for an airfoil similar to the type in the example given.

Figure 13 is taken from reference 4 to compare the experimental pressure distribution on an airfoil with the calculated distribution. Even though the wind-tunnel tests were of a very small model and although the airfoil is not of a type particularly suitable for calculations, the calculated and experimental values seem to compare favorably except for the region of separated flow near the upper trailing edge of the airfoil. The method of the present report is not exact for an airfoil of this type, which has considerable curvature along its entire length. The inaccuracy caused by the curvature, however, seems to be small. The thickness ratio and angle of attack of the example airfoil are somewhat higher than those for which the method is recommended. Reference 4 explains the separated region of flow.

Langley Memorial Aeronautical Laboratory
National Advisory Committee for Aeronautics
Langley Field, Va., April 4, 1946

APPENDIX

METHOD OF ANALYSIS

Shock Waves

Supersonic air flow about an airfoil may be said to consist of expansions and shocks. Reference 2 mentions the fact that a change in entropy occurs through a shock wave. Three conditions are shown, however, to apply to the velocities, pressures, and densities at the two sides of the shock wave, namely:

(a) Continuity of mass

(b) Balance between pressure difference and change of momentum

(c) Conservation of energy

These conditions lead to the three basic equations:

or

$$\left. \begin{aligned} \frac{\rho_a}{\rho_b} &= \frac{\tan \theta}{\tan (\theta - \beta)} \\ \frac{\Delta p}{\rho_a} &= \frac{\sin \beta}{\sin \theta \times \cos (\theta - \beta)} \end{aligned} \right\} (1)$$

$$\left. \begin{aligned} \frac{\Delta p}{q_b} &= 2 \sin^2 \theta \frac{\Delta p}{\rho_a} \\ &= \frac{2 \sin \beta \times \sin \theta}{\cos (\theta - \beta)} \end{aligned} \right\} (2)$$

$$\frac{\Delta p}{\Delta \rho} = \gamma \frac{p_b + \frac{\Delta p}{2}}{\rho_b + \frac{\Delta \rho}{2}} \quad (3)$$

Then, by use of the relation

$$\frac{\Delta p}{\rho_b} = \frac{2}{\gamma M_b^2} \left(\frac{p_a}{p_b} - 1 \right) \quad (4)$$

it follows that

$$\frac{p_a}{p_b} = \frac{\gamma M_b^2 \sin \beta \sin \theta}{\cos(\theta - \beta)} + 1 \quad (5)$$

$$\frac{1}{M_b^2} = \sin^2 \theta - \frac{\gamma + 1}{2} \frac{\sin \beta \sin \theta}{\cos(\theta - \beta)} \quad (6)$$

$$M_a = M_b \frac{\cos \theta}{\cos(\theta - \beta)} \sqrt{\frac{p_b \rho_a}{p_a \rho_b}} \quad (7)$$

By substitution of arbitrary values of θ and β in equations (1) and (6), the corresponding values of density ratio across the shock and Mach number before the shock are obtained. If the simultaneous values of θ , β , and M_b are used with equations (5) and (7), the pressure ratio across the shock and the Mach number after the shock are obtained.

Figure 14 shows the angle of the shock wave as a function of the Mach number before the shock M_b and the angle defining the change in direction of the flow β .

The pressure ratios and the Mach numbers after the shock have already been discussed for figures 5 and 6. Use of the ratio of pressure after any shock wave to free-stream static pressure, together with free-stream Mach number in equation (4), makes possible the determination of the pressure coefficient behind that shock wave. Figure 8 has shown the graph for converting pressure ratios to pressure coefficients.

Expansion Waves

The flow after the shock wave may be considered adiabatic as long as the flow is expanding. By the use of such flow conditions, the velocities, densities, and pressures may be calculated. Experimentally some trouble is encountered when extremely large angles of expansion are used. The flow may break down and form a turbulent wake of somewhat higher static pressure than might be expected if the flow had continued to expand around the corner.

Reference 3 considers that a flow at a Mach number of 1 expands around some angle v and reaches a higher Mach number M defined by the relation

$$v = \sqrt{\frac{\gamma + 1}{\gamma - 1}} \tan^{-1} \left(\sqrt{M^2 - 1} \sqrt{\frac{\gamma - 1}{\gamma + 1}} \right) - \cos^{-1} \frac{1}{M} \quad (8)$$

By expanding around an angle v_b , the flow reaches a Mach number M_b ; and by expanding around some larger angle v_a , the flow reaches some higher Mach number M_a . A flow at the first Mach number M_b can then reach the higher Mach number M_a by expanding around the small angle,

$$-\beta = v_a - v_b \quad (9)$$

Equations (8) and (9) serve as the basis for calculating the expansion lines in figure 5 showing the variation of local Mach number with change in surface slope.

Another equation derived from the work of reference 3 gives the pressure ratio across expansion waves as

$$\frac{p_a}{p_b} = \left[\frac{2 + (\gamma - 1) M_b^2}{2 + (\gamma - 1) M_a^2} \right]^{\frac{\gamma}{\gamma - 1}} \quad (10)$$

From equations (8), (9), and (10), it is possible to calculate the part of figure 6 that gives the pressure ratio across expansion waves as a function of the local Mach number before the expansion and the change in surface slopes.

The figures shown in this report, because of their limited size, may not be accurate enough for routine calculations. It may be desirable to plot the graphs to a larger scale before using them. For this reason the values are listed in tabular form for the main graphs.

Tables I and III should be accurate to all the figures shown, but table II may not be exact in the last figure since the expansion calculations required graphical interpolation between very close computed points.

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See supplement table

TABLE I. - VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES

θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_b}$	θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$
8	0	7.18546	7.18546	1.00000	0	16	6	4.94653	4.35137	2.00221	0.05851
↓	1	7.80125	7.54749	1.20854	.00490	↓	7	5.33290	4.55154	2.35426	.06803
↓	2	8.60430	8.07261	1.50622	.00977	↓	8	5.82325	4.79190	2.83915	.07748
9	0	6.39264	6.39264	1.00000	0	↓	9	6.47624	5.08655	3.55104	.08689
↓	1	6.87407	6.69357	1.18235	.00551	↓	10	7.40814	5.45674	4.69797	.09626
↓	2	7.48067	7.06779	1.43092	.01100	↓	11	8.90088	5.93848	6.85594	.10559
↓	3	8.27834	7.54385	1.78981	.01646	17	0	3.42032	3.42032	1.00000	0
10	0	5.75876	5.75876	1.00000	0	↓	1	3.49188	3.49188	1.09391	.01061
↓	1	6.14639	5.99875	1.16236	.00614	↓	2	3.70612	3.57318	1.20313	.02113
↓	2	6.62119	6.28846	1.37565	.01224	↓	3	3.87615	3.66580	1.33170	.03154
↓	3	7.22344	6.64849	1.66896	.01832	↓	4	4.07015	3.77171	1.48543	.04186
↓	4	8.02263	7.10485	2.09762	.02436	↓	5	4.29455	3.89345	1.67261	.05210
11	0	5.24082	5.24082	1.00000	0	↓	6	4.55860	4.03450	1.90576	.06227
↓	1	5.55967	5.43448	1.14629	.00676	↓	7	4.87573	4.19924	2.20412	.07236
↓	2	5.94262	5.66634	1.33338	.01349	↓	8	5.26736	4.39418	2.60026	.08240
↓	3	6.42373	5.95318	1.58610	.02029	↓	9	5.76803	4.62799	3.15127	.09237
↓	4	7.01599	6.29392	1.92421	.02682	↓	10	6.44180	4.91440	3.97167	.10230
↓	5	7.83581	6.73948	2.44137	.03354	↓	11	7.41936	5.27398	5.32300	.11219
↓	6	8.98638	7.30617	3.26353	.04004	↓	12	9.03211	5.73979	7.96900	.12204
12	0	9.80977	4.80977	1.00000	0	18	0	3.23604	3.23604	1.00000	0
↓	1	5.07739	4.96951	1.13344	.00739	↓	1	3.35720	3.29834	1.08900	.01128
↓	2	5.39281	5.15796	1.29999	.01474	↓	2	3.49146	3.36878	1.19145	.02244
↓	3	5.77302	5.38268	1.51411	.02204	↓	3	3.64174	3.44868	1.31087	.03349
↓	4	6.24375	5.65433	1.79936	.02929	↓	4	3.81150	3.53948	1.45184	.04443
↓	5	6.84911	5.98883	2.19908	.03652	↓	5	4.00564	3.64318	1.62091	.05528
↓	6	7.66903	6.41123	2.73939	.04371	↓	6	4.23083	3.76221	1.82753	.06604
↓	7	8.87172	6.96292	3.80262	.05087	↓	7	4.57062	3.89495	2.16071	.07937
13	0	4.44543	4.44543	1.00000	0	↓	8	4.81743	4.05749	2.44888	.08734
↓	1	4.67339	4.57891	1.12271	.00803	↓	9	5.21582	4.25058	2.86418	.09789
↓	2	4.93834	4.73465	1.27307	.01600	↓	10	5.72912	4.47828	3.49010	.10838
↓	3	5.24983	4.91619	1.46158	.02393	↓	11	6.42781	4.75694	4.43641	.11882
↓	4	5.63112	5.13596	1.70535	.03178	↓	12	7.46024	5.10668	6.03381	.12921
↓	5	6.10349	5.39892	2.03258	.03960	↓	13	9.22255	5.56127	9.30925	.13956
↓	6	6.71567	5.72228	2.49588	.04738	19	0	3.07154	3.07154	1.00000	0
↓	7	7.55439	6.12986	3.20247	.05513	↓	1	3.18101	3.12594	1.08465	.01195
↓	8	8.80760	6.66172	4.41302	.06285	↓	2	3.30163	3.18741	1.18134	.02377
14	0	4.13360	4.13360	1.00000	0	↓	3	3.43552	3.25671	1.29288	.03545
↓	1	4.33044	4.24248	1.11376	.00667	↓	4	3.58559	3.35514	1.42320	.04702
↓	2	4.55638	4.37683	1.25087	.01726	↓	5	3.75551	3.42421	1.57743	.05849
↓	3	4.81978	4.52876	1.41949	.02560	↓	6	3.95028	3.52573	1.76303	.06985
↓	4	5.13240	4.70707	1.63192	.03427	↓	7	4.17663	3.64210	1.99073	.08113
↓	5	5.51261	4.91882	1.90826	.04270	↓	8	4.44535	3.77664	2.27703	.09232
↓	6	5.98884	5.17368	2.28225	.05107	↓	9	4.77075	3.93351	2.64786	.03430
↓	7	6.62228	5.49587	2.81769	.05921	↓	10	5.17739	4.11880	3.14812	.11448
↓	8	7.47450	5.88074	3.64800	.06771	↓	11	5.70582	4.34078	3.85929	.12547
↓	9	8.79126	6.39434	5.11042	.07598	↓	12	6.43414	4.61223	4.95273	.13640
15	0	3.86369	3.86369	1.00000	0	↓	13	7.33249	4.95273	6.84971	.14729
↓	1	4.03562	3.95993	1.10614	.00931	↓	14	9.48326	5.39507	10.95449	.15813
↓	2	4.14555	3.98829	1.23231	.01931	20	0	2.92381	2.92381	1.00000	0
↓	3	4.45565	4.19791	1.38489	.02770	↓	1	3.02334	2.97148	1.08078	.01263
↓	4	4.71842	4.34601	1.57329	.03679	↓	2	3.13239	3.02492	1.17239	.02510
↓	5	5.03145	4.51957	1.81179	.04587	↓	3	3.25271	3.08575	1.27225	.03744
↓	6	5.41400	4.72539	2.12408	.05479	↓	4	3.38650	3.15392	1.39847	.04964
↓	7	5.80618	5.04264	2.55029	.06370	↓	5	3.53676	3.23092	1.54402	.06172
↓	8	6.33211	5.27618	3.16796	.07258	↓	6	3.70716	3.31824	1.70890	.07369
↓	9	7.02624	5.65781	4.14339	.08143	↓	7	3.90296	3.41765	1.91224	.08555
↓	10	8.02181	6.14628	5.91549	.09023	↓	8	4.13158	3.53157	2.16293	.09732
16	0	3.62792	3.62792	1.00000	0	↓	9	4.40349	3.66307	2.47965	.10901
↓	1	3.77964	3.71064	1.09962	.00996	↓	10	4.73461	3.81626	2.89260	.12061
↓	2	3.95037	3.80507	1.21661	.01983	↓	11	5.15114	3.99719	3.45455	.13215
↓	3	4.14479	3.91330	1.35610	.02961	↓	12	5.69739	4.21372	4.26333	.14362
↓	4	4.36900	4.03782	1.52531	.03931	↓	13	6.46071	4.47840	5.29386	.15503
↓	5	4.63202	4.18238	1.73515	.04895	↓	14	7.63854	4.81027	7.79624	.16640
↓						↓	15	9.83090	5.24117	13.02305	.17772

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_o}$	θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_o}$	
21	0	2.79041	2.79041	1.00000	0	25	0	2.36619	2.36619	1.00000	0	
	1	2.88143	2.83236	1.07736	.01331		1	1	2.43311	2.39158	1.06692	.016149
	2	2.98066	2.87953	1.16150	.02645		2	2	2.50490	2.42023	1.14078	.032053
	3	3.08951	2.93252	1.26352	.03944		3	3	2.58225	2.45239	1.22268	.047707
	4	3.20981	2.99660	1.37704	.05228		4	4	2.66584	2.48815	1.31421	.063162
	5	3.34375	3.05910	1.50857	.06498		5	5	2.75692	2.52825	1.41711	.078398
	6	3.47911	3.12563	1.64697	.07636		6	6	2.85665	2.57296	1.53377	.093442
	7	3.66576	3.22034	1.84678	.09002		7	7	2.96666	2.62291	1.66728	.10831
	8	3.86318	3.31777	2.06948	.10237		8	8	3.08899	2.67881	1.82163	.12301
	9	4.09428	3.42921	2.34504	.11463		9	9	3.22162	2.74136	2.00218	.13755
	10	4.37010	3.55785	2.67984	.12679		10	10	3.38185	2.81164	2.21653	.15196
	11	4.70837	3.70460	3.15498	.13887		11	11	3.56060	2.89100	2.47509	.16622
	12	5.13650	3.88429	3.78653	.15088		12	12	3.76908	2.98103	2.79352	.18036
	13	5.70365	4.09575	4.70770	.16282		13	13	4.01684	3.08381	3.19547	.19438
	14	6.50821	4.35408	6.17984	.17470		14	14	4.31849	3.20211	3.71940	.20831
15	7.78248	4.6778	8.90838	.18653	15	15	4.69712	3.33960	4.43072	.22214		
22	0	2.66944	2.66944	1.00000	0	26	0	2.28118	2.28118	1.00000	0	
	1	2.75318	2.70503	1.07435	.014012		1	1	2.34464	2.30339	1.06582	.01710
	2	2.84397	2.74795	1.15755	.027827		2	2	2.41071	2.32880	1.13624	.03349
	3	2.94308	2.79453	1.25145	.041472		3	3	2.48254	2.35720	1.21505	.04985
	4	3.05197	2.84677	1.35832	.054956		4	4	2.55994	2.38897	1.30255	.06595
	5	3.17242	2.90542	1.48108	.068287		5	5	2.64389	2.42442	1.40051	.08185
	6	3.30680	2.97131	1.62361	.081470		6	6	2.73534	2.46403	1.51078	.09752
	7	3.45826	3.04552	1.79138	.094530		7	7	2.83560	2.50807	1.63601	.11300
	8	3.63087	3.12950	1.99170	.10746		8	8	2.94639	2.55727	1.77964	.12830
	9	3.83033	3.22498	2.23535	.12029		9	9	3.06978	2.61226	1.94606	.14342
	10	4.06462	3.33411	2.53821	.13301		10	10	3.20843	2.68370	2.14123	.15838
	11	4.34571	3.45998	2.92528	.14564		11	11	3.36613	2.77282	2.37366	.17319
	12	4.69181	3.60650	3.43734	.15817		12	12	3.54771	2.82071	2.65513	.18786
	13	5.13349	3.77921	4.14788	.17065		13	13	3.76027	2.90907	3.00338	.20241
	14	5.72501	3.98579	5.19945	.18304		14	14	4.00005	2.99945	3.44555	.21635
15	6.57835	4.23809	6.91836	.19538	15	15	4.32457	3.10529	4.02623	.23116		
23	0	2.55931	2.55931	1.00000	0	27	0	2.20269	2.20269	1.00000	0	
	1	2.63663	2.59191	1.07155	.014703		1	1	2.34209	2.30158	1.06314	.01644
	2	2.72021	2.62854	1.15131	.029212		2	2	2.40696	2.32466	1.13222	.03260
	3	2.81097	2.66964	1.24071	.043519		3	3	2.48322	2.35717	1.20820	.04823
	4	2.91011	2.71559	1.34175	.057849		4	4	2.55095	2.37983	1.29226	.06416
	5	3.01917	2.76708	1.45693	.071610		5	5	2.63139	2.41239	1.38571	.07958
	6	3.14004	2.82478	1.58952	.085444		6	6	2.71871	2.44871	1.49044	.09479
	7	3.27510	2.88954	1.74384	.099068		7	7	2.81293	2.48911	1.60857	.10980
	8	3.42766	2.95435	1.92598	.11259		8	8	2.91852	2.53412	1.74297	.12461
	9	3.60192	3.04481	2.14416	.12628		9	9	3.03424	2.58426	1.89742	.13925
	10	3.80388	3.13837	2.41057	.13927		10	10	3.16334	2.64029	2.07680	.15373
	11	4.04200	3.24533	2.74332	.15244		11	11	3.30871	2.70290	2.28776	.16804
	12	4.32897	3.36662	3.17120	.16551		12	12	3.47453	2.77291	2.53991	.18222
	13	4.68441	3.51192	3.74184	.17850		13	13	3.66599	2.85242	2.84643	.19627
	14	5.11181	3.68084	4.54240	.19141		14	14	3.89094	2.94227	3.22752	.21019
15	5.76160	3.88284	5.74606	.20424	15	15	4.16067	3.04466	3.71441	.22400		
24	0	2.45857	2.45857	1.00000	0	28	0	2.13006	2.13006	1.00000	0	
	1	2.53038	2.48739	1.06915	.015428		1	1	2.18546	2.14729	1.06148	.01839
	2	2.60761	2.51974	1.14573	.030617		2	2	2.24436	2.16698	1.12856	.03446
	3	2.69120	2.55602	1.23122	.045607		3	3	2.30713	2.18917	1.20202	.05122
	4	2.78202	2.59660	1.32717	.060389		4	4	2.37434	2.21407	1.28293	.07170
	5	2.88137	2.64194	1.43578	.074985		5	5	2.44461	2.24198	1.37252	.08890
	6	2.99085	2.69267	1.55985	.089410		6	6	2.52465	2.27308	1.47228	.10585
	7	3.11233	2.74947	1.70294	.10367		7	7	2.60945	2.30767	1.58425	.12258
	8	3.24831	2.81309	1.86990	.11778		8	8	2.70205	2.34617	1.71071	.13906
	9	3.40126	2.88381	2.06753	.13183		9	9	2.89976	2.37065	1.85492	.14525
	10	3.57857	2.96549	2.30507	.14559		10	10	2.91678	2.43671	2.02095	.17143
	11	3.78354	3.05730	2.59633	.15930		11	11	3.04296	2.48992	2.21432	.18735
	12	4.02611	3.16209	2.96196	.17291		12	12	3.18538	2.54937	2.44239	.20308
	13	4.31993	3.28285	3.43525	.18642		13	13	3.34818	2.61606	2.71591	.21866
	14	4.68616	3.42344	4.07188	.19984		14	14	3.53684	2.69124	3.04990	.23410
15	5.16169	3.58857	4.97574	.21317	15	15	3.75932	2.77640	3.46732	.24941		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$	θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$
29	0	2.06266	2.06266	1.00000	0.	36	0	1.70130	1.70130	1.00000	0.
	1	2.11505	2.07774	1.06001	.01910		1	1.73955	1.70539	1.05304	.025040
	2	2.17054	2.09496	1.12523	.03797		2	1.77947	1.71085	1.10969	.049487
	3	2.22957	2.11455	1.19647	.05646		3	1.82126	1.71772	1.17033	.073358
	4	2.29236	2.13521	1.27431	.07457		4	1.86536	1.72606	1.23585	.096850
	5	2.36005	2.16131	1.36067	.09251		5	1.91119	1.73654	1.30563	.11953
	6	2.43270	2.18895	1.45616	.11011		6	1.95980	1.74734	1.38147	.14189
	7	2.51121	2.21966	1.56258	.12744		7	2.01124	1.76042	1.46381	.16380
	8	2.59664	2.25386	1.68225	.14455		8	2.06585	1.77522	1.55356	.18530
	9	2.69398	2.29151	1.82347	.16209		9	2.12402	1.79185	1.65178	.20639
	10	2.79292	2.33402	1.97234	.17808		10	2.18626	1.81048	1.75992	.22713
	11	2.90717	2.38101	2.15090	.19454		11	2.25305	1.83118	1.87943	.24749
	12	3.03508	2.43337	2.35935	.21081		12	2.32517	1.85418	2.01251	.26754
	13	3.17984	2.49183	2.60602	.22690		13	2.40336	1.87960	2.16155	.28728
	14	3.34576	2.55740	2.90292	.24285		14	2.48870	1.90778	2.32982	.30673
15	3.53866	2.63123	3.26710	.25864	15	2.58245	1.93889	2.52146	.32591		
30	0	2.00000	2.00000	1.00000	0.	38	0	1.62427	1.62427	1.00000	0.
	1	2.04970	2.01309	1.05869	.01996		1	1.66000	1.62610	1.05191	.02691
	2	2.10220	2.02817	1.12228	.03953		2	1.69720	1.62925	1.10711	.05312
	3	2.15786	2.04536	1.19144	.05873		3	1.73595	1.63363	1.16595	.07867
	4	2.21712	2.06489	1.26706	.07743		4	1.77646	1.63934	1.22888	.10361
	5	2.28038	2.08676	1.35004	.09616		5	1.81891	1.64639	1.29635	.12796
	6	2.34624	2.11124	1.44166	.11442		6	1.86348	1.65484	1.36892	.15177
	7	2.41232	2.13857	1.54331	.13239		7	1.91042	1.66471	1.44727	.17507
	8	2.50046	2.16931	1.65693	.15010		8	1.95999	1.67607	1.53211	.19788
	9	2.58664	2.20269	1.78480	.16757		9	2.01254	1.68903	1.62441	.22023
	10	2.68100	2.24016	1.92978	.18479		10	2.06839	1.70361	1.72524	.24217
	11	2.78510	2.28175	2.09572	.20160		11	2.12800	1.71998	1.83585	.26369
	12	2.90088	2.32799	2.28775	.21861		12	2.19194	1.73827	1.95797	.28484
	13	3.03082	2.37953	2.51256	.23523		13	2.26069	1.75849	2.09337	.30562
	14	3.17820	2.43701	2.77947	.25167		14	2.33512	1.77819	2.24461	.32607
15	3.34766	2.50149	3.10201	.26795	15	2.41604	1.80577	2.41463	.34621		
32	0	1.88707	1.88707	1.00000	0.	40	0	1.55572	1.55572	1.00000	0.
	1	1.93213	1.89664	1.05639	.02158		1	1.58940	1.55556	1.05106	.02887
	2	1.97956	1.90799	1.11716	.04271		2	1.62431	1.55660	1.10515	.05693
	3	2.02958	1.92112	1.18287	.06342		3	1.66120	1.55877	1.16355	.08467
	4	2.08253	1.93620	1.25420	.08373		4	1.69841	1.56224	1.22384	.11085
	5	2.13875	1.95330	1.33195	.10367		5	1.73791	1.56694	1.28916	.13677
	6	2.19868	1.97256	1.41711	.12326		6	1.77912	1.57276	1.35914	.16209
	7	2.26277	2.00680	1.51078	.14251		7	1.82243	1.57993	1.43431	.18681
	8	2.33163	2.01807	1.61445	.16146		8	1.86797	1.58811	1.51532	.21098
	9	2.40596	2.04478	1.72982	.18011		9	1.91577	1.59826	1.60291	.23462
	10	2.48665	2.07445	1.85915	.19849		10	1.96679	1.60950	1.69799	.25777
	11	2.57474	2.10730	2.00522	.21662		11	2.02072	1.62230	1.80165	.28046
	12	2.67149	2.14373	2.17150	.23450		12	2.07818	1.63666	1.91519	.30272
	13	2.77856	2.18409	2.36269	.25215		13	2.13960	1.65272	2.04007	.32456
	14	2.89812	2.22897	2.58506	.26960		14	2.20564	1.67062	2.17838	.34603
15	3.03292	2.27684	2.84700	.28684	15	2.27684	1.69040	2.33224	.36713		
34	0	1.78829	1.78829	1.00000	0.	42	0	1.49448	1.49448	1.00000	0.
	1	1.82960	1.79493	1.05453	.023271		1	1.52616	1.49254	1.05047	.03094
	2	1.87291	1.80309	1.11302	.046028		2	1.55953	1.49172	1.10379	.06096
	3	1.91837	1.81285	1.17591	.060285		3	1.59084	1.48920	1.16026	.09046
	4	1.96630	1.82427	1.24382	.090089		4	1.63013	1.49331	1.22140	.11902
	5	2.01688	1.83741	1.31735	.11445		5	1.66642	1.49592	1.28389	.14604
	6	2.07054	1.85237	1.39734	.13240		6	1.70602	1.50047	1.35186	.17270
	7	2.12758	1.86926	1.48470	.15297		7	1.74533	1.50437	1.42453	.19909
	8	2.18849	1.88824	1.58061	.17318		8	1.78759	1.51037	1.50251	.22465
	9	2.25376	1.90935	1.68638	.19304		9	1.83196	1.51758	1.58642	.24962
	10	2.32403	1.93285	1.80374	.21259		10	1.87871	1.52603	1.67703	.27402
	11	2.40006	1.95894	1.93476	.23182		11	1.92809	1.53583	1.77522	.29790
	12	2.48279	1.98784	2.08213	.25078		12	1.98043	1.54697	1.88207	.32128
	13	2.57339	2.01986	2.24923	.26948		13	2.03608	1.55958	1.99882	.34419
	14	2.67317	2.05523	2.44024	.28793		14	2.09550	1.57370	2.12706	.36667
15	2.78406	2.07055	2.66102	.30614	15	2.15919	1.58941	2.26861	.38873		

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Continued

θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$	θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$
44	0	1.43955	1.43955	1.00000	0	52	0	1.26902	1.26902	1.00000	0
	1	1.47017	1.43595	1.05016	.03315		1	1.29670	1.25948	1.05144	.04370
	2	1.50175	1.43340	1.10300	.06524		2	1.32498	1.25103	1.10516	.08557
	3	1.53439	1.43194	1.15878	.09634		3	1.35392	1.24364	1.16131	.12571
	4	1.56816	1.43154	1.21777	.12651		4	1.38359	1.23720	1.22017	.16430
	5	1.60320	1.43215	1.28033	.15581		5	1.41404	1.23173	1.28189	.20140
	6	1.63960	1.43385	1.34680	.18429		6	1.44538	1.22720	1.34680	.23715
	7	1.67754	1.43659	1.41765	.21202		7	1.47766	1.22354	1.41517	.27163
	8	1.71712	1.44044	1.49329	.23900		8	1.51097	1.22079	1.48728	.30491
	9	1.75855	1.44536	1.57435	.26532		9	1.54543	1.21981	1.56357	.33709
	10	1.80201	1.45143	1.66148	.29101		10	1.58144	1.21788	1.64446	.36826
	11	1.84775	1.45868	1.75542	.31608		11	1.61819	1.21844	1.73036	.39845
	12	1.89597	1.46707	1.85710	.34062		12	1.65677	1.21866	1.82188	.42775
	13	1.94702	1.47675	1.96754	.36461		13	1.69700	1.21989	1.91963	.45620
	14	2.00123	1.48774	2.08804	.37474		14	1.73905	1.22229	2.02439	.48384
	15	2.05902	1.50014	2.22011	.41113		15	1.78314	1.22557	2.13679	.51075
46	0	1.39016	1.39016	1.00000	0	54	0	1.23606	1.23606	1.00000	0
	1	1.41969	1.38498	1.05010	.03551		1	1.26353	1.22509	1.05243	.04691
	2	1.45008	1.38088	1.10274	.06980		2	1.29155	1.21520	1.10710	.09172
	3	1.48138	1.37779	1.15813	.10294		3	1.32016	1.20650	1.16416	.13456
	4	1.51372	1.37573	1.21661	.13505		4	1.34943	1.19873	1.22383	.17560
	5	1.54715	1.37464	1.27839	.16615		5	1.37942	1.19194	1.28631	.21495
	6	1.58181	1.37460	1.34384	.19631		6	1.41018	1.18607	1.35186	.25277
	7	1.61778	1.37540	1.41334	.22562		7	1.44181	1.18109	1.42075	.28914
	8	1.65521	1.37744	1.48728	.25408		8	1.47440	1.17701	1.49329	.32417
	9	1.69426	1.38037	1.56626	.28181		9	1.50801	1.17379	1.56982	.35796
	10	1.73507	1.38431	1.65076	.30881		10	1.54274	1.17135	1.65074	.39059
	11	1.77783	1.38936	1.74144	.33512		11	1.57871	1.16978	1.73648	.42214
	12	1.82279	1.39545	1.83915	.36080		12	1.61605	1.16899	1.82758	.45269
	13	1.87015	1.40266	1.94474	.38589		13	1.65487	1.16904	1.92455	.48229
	14	1.92023	1.41102	2.05931	.41041		14	1.69536	1.17087	2.02805	.51099
	15	1.97330	1.42055	2.18408	.43441		15	1.73765	1.17155	2.13897	.53888
48	0	1.34562	1.34562	1.00000	0	56	0	1.20621	1.20621	1.00000	0
	1	1.37431	1.33897	1.05028	.03803		1	1.23369	1.19378	1.05375	.05045
	2	1.40376	1.33334	1.10299	.07466		2	1.26164	1.18252	1.10969	.09845
	3	1.43404	1.32876	1.15835	.11000		3	1.29013	1.17238	1.16799	.14419
	4	1.46522	1.32515	1.21660	.14413		4	1.31923	1.16331	1.22887	.18787
	5	1.49738	1.32253	1.27799	.17712		5	1.34896	1.15521	1.29250	.22963
	6	1.53062	1.32084	1.34285	.20906		6	1.37943	1.14807	1.35916	.26964
	7	1.56467	1.32016	1.41075	.23968		7	1.41067	1.14184	1.42906	.30601
	8	1.60075	1.32034	1.48434	.27003		8	1.44280	1.13650	1.50253	.34187
	9	1.63789	1.32151	1.56185	.29919		9	1.47583	1.13198	1.57987	.38033
	10	1.67658	1.32364	1.64444	.32752		10	1.50992	1.12828	1.66148	.41449
	11	1.71700	1.32672	1.73283	.35511		11	1.54513	1.12540	1.74774	.44743
	12	1.75929	1.33077	1.82758	.38198		12	1.58159	1.12331	1.83915	.47924
	13	1.80370	1.33585	1.92951	.40816		13	1.61925	1.12200	1.93582	.50988
	14	1.85044	1.34190	2.03959	.43372		14	1.65874	1.12144	2.03961	.53978
	15	1.89980	1.34908	2.15885	.45868		15	1.69971	1.12167	2.14992	.56862
50	0	1.30541	1.30541	1.00000	0	58	0	1.17918	1.17918	1.00000	0
	1	1.33348	1.29731	1.05072	.04075		1	1.20686	1.16522	1.05542	.05436
	2	1.36225	1.29028	1.10380	.07991		2	1.23498	1.15255	1.11302	.10586
	3	1.39174	1.28425	1.15940	.11756		3	1.26357	1.14102	1.17297	.15476
	4	1.42204	1.27920	1.21777	.15384		4	1.29271	1.13061	1.23547	.20130
	5	1.45322	1.27510	1.27916	.18884		5	1.32244	1.12122	1.30071	.24564
	6	1.48536	1.27194	1.34383	.22263		6	1.35284	1.11285	1.36892	.28796
	7	1.51856	1.26972	1.41210	.25529		7	1.38394	1.10536	1.44036	.32846
	8	1.55292	1.26837	1.48436	.28693		8	1.41585	1.09881	1.51533	.36724
	9	1.58854	1.26795	1.56095	.31756		9	1.44863	1.09309	1.59409	.40443
	10	1.62554	1.26843	1.64237	.34729		10	1.48236	1.08819	1.67705	.44107
	11	1.66408	1.27385	1.72917	.37617		11	1.51713	1.08408	1.76457	.47454
	12	1.70426	1.27204	1.82185	.40422		12	1.55305	1.08076	1.85710	.50765
	13	1.74634	1.27525	1.92125	.43154		13	1.59024	1.07821	1.95517	.53958
	14	1.79047	1.27937	2.02809	.45814		14	1.62880	1.07640	2.05932	.57042
	15	1.83687	1.27004	2.14331	.48407		15	1.66888	1.07531	2.17022	.60023

TABLE I.- VALUES OF LOCAL MACH NUMBER, PRESSURE RATIO,
AND PRESSURE COEFFICIENT ACROSS SHOCK WAVES - Concluded

θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$	θ (deg)	β (deg)	M_b	M_a	$\frac{p_a}{p_b}$	$\frac{\Delta p_{a,b}}{q_0}$
60 ↓	0	1.15470	1.15470	1.00000	0	66 ↓	0	1.09463	1.09463	1.00000	0
	1	1.16281	1.13913	1.05748	.05869		1	1.12559	1.07331	1.06691	.07545
	2	1.21128	1.12492	1.11715	.11407		2	1.15678	1.05388	1.13626	.14547
	3	1.24021	1.11200	1.17919	.16643		3	1.18829	1.03613	1.20818	.21062
	4	1.26963	1.10024	1.24379	.21606		4	1.21761	1.01850	1.27689	.26680
	5	1.29959	1.08956	1.31115	.26318		5	1.25245	1.00511	1.36067	.32847
	6	1.33016	1.07991	1.38199	.30802		6	1.28523	.99157	1.44166	.38197
	7	1.36139	1.07123	1.45505	.35075		7	1.31856	.97920	1.52616	.43233
	8	1.39336	1.06349	1.53211	.39149		8	1.35250	.96785	1.61145	.47986
	9	1.42614	1.05661	1.61296	.43053		9	1.38715	.95764	1.70686	.52374
	10	1.45981	1.05056	1.69801	.46792		10	1.42256	.94829	1.80374	.56738
	11	1.49446	1.04530	1.78756	.50375		11	1.45577	.94000	1.89687	.60453
	12	1.53015	1.04083	1.88204	.53817		12	1.49040	.93219	2.01255	.64630
	13	1.56705	1.03711	1.98204	.57130		13	1.53428	.92535	2.12537	.68296
	14	1.60524	1.03411	2.08804	.60321		14	1.57368	.92268	2.24461	.71796
15	1.64485	1.03183	2.20066	.63397	15	1.61434	.91388	2.37080	.75142		
62 ↓	0	1.13257	1.13257	1.00000	0	68 ↓	0	1.07854	1.07854	1.00000	0
	1	1.16134	1.11527	1.06001	.06356		1	1.11113	1.05481	1.07157	.08281
	2	1.19044	1.09945	1.12228	.12326		2	1.14392	1.03325	1.14574	.15911
	3	1.21994	1.08503	1.18693	.17943		3	1.17698	1.01361	1.22268	.22964
	4	1.24988	1.07187	1.25420	.23246		4	1.21035	.99570	1.30259	.29508
	5	1.28033	1.05987	1.32425	.28258		5	1.24412	.97935	1.38571	.35599
	6	1.31132	1.04897	1.39734	.33010		6	1.27834	.96440	1.47229	.41287
	7	1.34294	1.03907	1.47368	.37521		7	1.31308	.95070	1.56259	.46613
	8	1.37527	1.03015	1.55357	.41812		8	1.34843	.93821	1.65696	.51616
	9	1.40834	1.02212	1.63730	.45902		9	1.38446	.92678	1.75568	.56322
	10	1.44225	1.01497	1.72524	.49808		10	1.42122	.91635	1.85916	.60756
	11	1.48051	1.01097	1.81770	.53293		11	1.45885	.90685	1.96784	.64966
	12	1.51292	1.00303	1.91519	.57190		12	1.49741	.89825	2.08216	.68895
	13	1.54988	.99818	2.01613	.60549		13	1.53696	.89042	2.20262	.72727
	14	1.58806	.99416	2.12710	.63846		14	1.57772	.88338	2.32987	.76322
15	1.62757	.99077	2.24268	.67016	15	1.61972	.87707	2.46455	.79749		
64 ↓	0	1.11260	1.11260	1.00000	0	70 ↓	0	1.06418	1.06418	1.00000	0
	1	1.14230	1.09339	1.06311	.06909		1	1.09890	1.03765	1.07737	.09153
	2	1.17229	1.07586	1.12854	.13362		2	1.13406	1.01384	1.15827	.17580
	3	1.20263	1.05981	1.19646	.19405		3	1.16883	.99194	1.24074	.25174
	4	1.23329	1.04513	1.26705	.25082		4	1.20118	.97213	1.32717	.32233
	5	1.26458	1.03183	1.34052	.30420		5	1.23390	.95409	1.41710	.38759
	6	1.29631	1.01963	1.41710	.35459		6	1.27606	.93764	1.51080	.44814
	7	1.32862	1.00852	1.49702	.40223		7	1.31270	.92400	1.60854	.50450
	8	1.36159	.99844	1.58060	.44739		8	1.34994	.90880	1.71071	.55714
	9	1.39526	.98927	1.66809	.49026		9	1.38786	.89621	1.81765	.60643
	10	1.42974	.98100	1.75989	.53105		10	1.42754	.88510	1.93274	.65386
	11	1.46509	.97358	1.85635	.56993		11	1.46606	.87417	2.04755	.69626
	12	1.50142	.96697	1.95793	.60706		12	1.50653	.86458	2.17147	.73736
	13	1.53881	.96113	2.06507	.64255		13	1.54805	.85582	2.30216	.77624
	14	1.57739	.95602	2.17835	.67655		14	1.59076	.84788	2.44024	.81307
15	1.61725	.95161	2.29836	.70916	15	1.63475	.84069	2.58643	.84805		

TABLE II.- LOCAL MACH NUMBERS BEFORE AND AFTER EXPANSION

		Local Mach number after expansion, M_B														
M_B	β	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°
1.0	1.0	1.0813	1.1327	1.1764	1.2185	1.2577	1.2938	1.3298	1.3648	1.4000	1.4350	1.4690	1.5032	1.5368	1.5706	
1.1	1.1	1.1474	1.1908	1.2313	1.2694	1.3056	1.3413	1.3772	1.4124	1.4467	1.4806	1.5142	1.5475	1.5806	1.6132	1.6456
1.2	1.2	1.2203	1.2760	1.3111	1.3497	1.3850	1.4200	1.4544	1.4882	1.5222	1.5566	1.5906	1.6243	1.6572	1.6912	1.7250
1.3	1.3	1.3363	1.3711	1.4064	1.4406	1.4747	1.5090	1.5433	1.5768	1.6107	1.6441	1.6772	1.7102	1.7426	1.7808	1.8188
1.4	1.4	1.4345	1.4686	1.5026	1.5368	1.5708	1.6044	1.6388	1.6727	1.7062	1.7408	1.7747	1.8092	1.8432	1.8788	1.9144
1.5	1.5	1.5338	1.5675	1.6016	1.6361	1.6698	1.7036	1.7388	1.7725	1.8066	1.8420	1.8762	1.9113	1.9460	1.9827	2.0192
1.6	1.6	1.6335	1.6675	1.7020	1.7359	1.7703	1.8045	1.8395	1.8739	1.9096	1.9453	1.9808	2.0175	2.0540	2.0912	2.1292
1.7	1.7	1.7339	1.7684	1.8026	1.8371	1.8712	1.9052	1.9395	1.9739	2.0096	2.0453	2.0808	2.1175	2.1540	2.1912	2.2292
1.8	1.8	1.8329	1.8684	1.9026	1.9371	1.9712	2.0052	2.0395	2.0739	2.1096	2.1453	2.1808	2.2175	2.2540	2.2912	2.3292
1.9	1.9	1.9361	1.9720	2.0077	2.0432	2.0789	2.1144	2.1500	2.1857	2.2216	2.2576	2.2938	2.3302	2.3668	2.4036	2.4406
2.0	2.0	2.0363	2.0732	2.1105	2.1493	2.1869	2.2256	2.2641	2.3028	2.3420	2.3815	2.4212	2.4612	2.5015	2.5422	2.5832
2.1	2.1	2.1372	2.1753	2.2128	2.2525	2.2924	2.3324	2.3727	2.4134	2.4546	2.4962	2.5382	2.5806	2.6234	2.6666	2.7102
2.2	2.2	2.2384	2.2778	2.3161	2.3583	2.3997	2.4410	2.4829	2.5256	2.5688	2.6126	2.6568	2.7015	2.7466	2.7922	2.8382
2.3	2.3	2.3392	2.3805	2.4218	2.4640	2.5061	2.5486	2.5917	2.6352	2.6792	2.7236	2.7684	2.8136	2.8592	2.9052	2.9516
2.4	2.4	2.4415	2.4852	2.5284	2.5720	2.6161	2.6606	2.7057	2.7512	2.7972	2.8436	2.8904	2.9376	2.9852	3.0332	3.0816
2.5	2.5	2.5429	2.5888	2.6339	2.6775	2.7235	2.7702	2.8190	2.8677	2.9167	2.9665	3.0193	3.0722	3.1263	3.1812	3.2368
2.6	2.6	2.6447	2.6920	2.7377	2.7824	2.8294	2.8782	2.9319	2.9826	3.0339	3.0867	3.1415	3.1966	3.2530	3.3112	3.3702
2.7	2.7	2.7470	2.7943	2.8421	2.8915	2.9415	2.9929	3.0450	3.0985	3.1533	3.2092	3.2666	3.3252	3.3852	3.4466	3.5092
2.8	2.8	2.8494	2.8976	2.9461	2.9959	3.0451	3.0955	3.1502	3.2118	3.2710	3.3316	3.3905	3.4507	3.5137	3.5782	3.6442
2.9	2.9	2.9500	3.0020	3.0532	3.1078	3.1625	3.2175	3.2744	3.3337	3.3930	3.4527	3.5127	3.5730	3.6346	3.7130	3.7830
3.0	3.0	3.0527	3.1060	3.1593	3.2163	3.2728	3.3305	3.3907	3.4527	3.5142	3.5778	3.6410	3.7107	3.7792	3.8510	3.9242
3.1	3.1	3.1546	3.2098	3.2660	3.3248	3.3844	3.4444	3.5074	3.5714	3.6365	3.7010	3.7725	3.8422	3.9157	3.9897	4.0642
3.2	3.2	3.2568	3.3143	3.3730	3.4314	3.4914	3.5602	3.6244	3.6929	3.7597	3.8302	3.9022	3.9766	4.0532	4.1310	4.2102
3.3	3.3	3.3588	3.4188	3.4798	3.5411	3.6031	3.6754	3.7424	3.8124	3.8840	3.9568	4.0328	4.1108	4.1910	4.2730	4.3562
3.4	3.4	3.4614	3.5236	3.5876	3.6524	3.7194	3.7904	3.8620	3.9348	4.0089	4.0858	4.1662	4.2468	4.3316	4.4112	4.4932
3.5	3.5	3.5642	3.6300	3.6957	3.7645	3.8335	3.9067	3.9811	4.0564	4.1348	4.2161	4.2992	4.3847	4.4730	4.5632	4.6542
3.6	3.6	3.6666	3.7333	3.8055	3.8750	3.9474	4.0210	4.1008	4.1804	4.2624	4.3483	4.4376	4.5292	4.6230	4.7182	4.8142
3.7	3.7	3.7693	3.8385	3.9116	3.9859	4.0611	4.1407	4.2213	4.3044	4.3904	4.4806	4.5746	4.6722	4.7722	4.8742	4.9782
3.8	3.8	3.8717	3.9437	4.0200	4.0973	4.1762	4.2594	4.3418	4.4280	4.5193	4.6146	4.7142	4.8172	4.9232	5.0322	5.1432
3.9	3.9	3.9742	4.0491	4.1293	4.2084	4.2913	4.3766	4.4664	4.5608	4.6592	4.7624	4.8706	4.9822	5.0972	5.2142	5.3332
4.0	4.0	4.0768	4.1547	4.2372	4.3220	4.4072	4.4960	4.5874	4.6820	4.7808	4.8803	4.9806	5.0915	5.2042	5.3192	5.4362
4.1	4.1	4.1800	4.2670	4.3462	4.4286	4.5124	4.5996	4.6912	4.7860	4.8840	4.9852	5.0896	5.1962	5.3052	5.4162	5.5292
4.2	4.2	4.2823	4.3668	4.4562	4.5466	4.6384	4.7326	4.8312	4.9324	5.0362	5.1426	5.2516	5.3632	5.4772	5.5932	5.7112
4.3	4.3	4.3860	4.4733	4.5658	4.6582	4.7524	4.8486	4.9480	5.0506	5.1564	5.2656	5.3782	5.4942	5.6132	5.7352	5.8592
4.4	4.4	4.4896	4.5800	4.6756	4.7720	4.8733	4.9771	5.0855	5.1971	5.3112	5.4282	5.5482	5.6712	5.7972	5.9262	6.0582
4.5	4.5	4.5922	4.6864	4.7851	4.8857	4.9900	5.0993	5.2108	5.3278	5.4490	5.5730	5.7006	5.8312	5.9642	6.1002	6.2392
4.6	4.6	4.6951	4.7927	4.8951	5.0001	5.1085	5.2220	5.3376	5.4601	5.5882	5.7206	5.8562	5.9952	6.1372	6.2822	6.4292
4.7	4.7	4.7989	4.9005	5.0050	5.1146	5.2275	5.3440	5.4669	5.5922	5.7240	5.8632	6.0062	6.1522	6.3012	6.4532	6.6082
4.8	4.8	4.9004	5.0072	5.1161	5.2296	5.3469	5.4682	5.5940	5.7250	5.8624	6.0047	6.1526	6.3042	6.4592	6.6172	6.7782
4.9	4.9	5.0054	5.1147	5.2264	5.3412	5.4650	5.5921	5.7234	5.8592	6.0010	6.1500	6.3052	6.4666	6.6332	6.8052	6.9832
5.0	5.0	5.1081	5.2220	5.3382	5.4600	5.5859	5.7168	5.8522	5.9951	6.1440	6.2979	6.4586	6.6275	6.8038	6.9902	7.1882
5.1	5.1	5.2121	5.3293	5.4490	5.5760	5.7062	5.8410	5.9823	6.1314	6.2840	6.4412	6.6136	6.7906	6.9732	7.1612	7.3552
5.2	5.2	5.3160	5.4370	5.5621	5.6913	5.8266	5.9677	6.1157	6.2677	6.4280	6.5958	6.7707	6.9542	7.1470	7.3482	7.5562
5.3	5.3	5.4196	5.5443	5.6731	5.8082	5.9489	6.0946	6.2466	6.4058	6.5720	6.7462	6.9282	7.1192	7.3192	7.5282	7.7452
5.4	5.4	5.5238	5.6522	5.7853	5.9248	6.0702	6.2220	6.3792	6.5437	6.7178	6.8983	7.0852	7.2782	7.4782	7.6852	7.8992
5.5	5.5	5.6271	5.7610	5.8982	6.0418	6.1920	6.3489	6.5127	6.6844	6.8632	7.0513	7.2563	7.4672	7.6842	7.9072	8.1372
5.6	5.6	5.7315	5.8688	6.0111	6.1597	6.3147	6.4774	6.6472	6.8243	7.0117	7.2072	7.4125	7.6296	7.8582	8.0982	8.3492
5.7	5.7	5.8349	5.9772	6.1248	6.2780	6.4382	6.6068	6.7819	6.9668	7.1600	7.3634	7.5774	7.8022	8.0382	8.2852	8.5432
5.8	5.8	5.9391	6.0858	6.2382	6.3966	6.5612	6.7355	6.9170	7.1088	7.3093	7.5192	7.7413	7.9752	8.2212	8.4782	8.7462
5.9	5.9	6.0434	6.1942	6.3519	6.5157	6.6864	6.8653	7.0535	7.2519	7.4600	7.6782	7.9062	8.1452	8.3952	8.6562	8.9282
6.0	6.0	6.1480	6.3030	6.4652	6.6338	6.8115	6.9970	7.1920	7.3970	7.6127	7.8396	8.0815	8.3360	8.6055	8.8902	9.1912
6.1	6.1	6.2522	6.4120	6.5800	6.7532	6.9360	7.1290	7.3309	7.5421	7.7660	8.0029	8.2515	8.5132	8.7882	9.0762	9.3772
6.2	6.2	6.3561	6.5216	6.6932	6.8732	7.0620	7.2593	7.4682	7.6889	7.9200	8.1648	8.4250	8.6982	8.9852	9.2862	9.6002
6.3	6.3	6.4608	6.6300	6.8070	6.9939	7.1880	7.3920	7.6081	7.8350	8.0760	8.3313	8.6012	8.8862	9.1862	9.5012	9.8312
6.4	6.4	6.5657	6.7400	6.9229	7.1146	7.3147	7.5260	7.7500	7.9842	8.2326	8.4968	8.7782	9.0782	9.3972	9.7362	10.0962
6.5	6.5	6.6710	6.8500	7.0381	7.2348	7.4421	7.6600	7.8914	8.1334	8.3913	8.6634	8.9547	9.2630	9.5932	9.9462	10.3232
6.6	6.6	6.7755	6.9600	7.1532	7.3560	7.5698	7.7952	8.0324	8.2816	8.5450	8.8232	9.1166	9.4262	9.7532	10.1082	10.4932
6.7	6.7	6.8797	7.0680	7.2672	7.4764	7.6970	7.9306	8.1764	8.4346	8.7120	9.0052	9.3166	9.6462	10.0042	10.3912	10.8062
6.8	6.8	6.9847	7.1789	7.3838	7.5996	7.8262	8.0660	8.3195	8.5862	8.8740	9.1774	9.5002	9.8432	10.2172	10.6232	11.0632
6.9	6.9	7.0898	7.2898	7.5009	7.7224	7.9561	8.2030	8.4638	8.7430	9.0460	9.3652	9.7022	10.0682	10.4642	10.8912	11.3502
7.0	7.0	7.1949	7.4000	7.6158	7.8431	8.0810	8.3305	8.6022	8.8968	9.2030	9.5286	9.8747	10.2432	10.6462	11.0862	11.5632
7.1	7.1	7.3006	7.5109	7.7336	7.9690	8.2166	8.4766	8.7595	9.0652	9.3939	9.7414	10.1132	10.5202	10.9642	11.4462	11.9682
7.2	7.2	7.4052	7.6210	7.8507	8.0909	8.3461	8.6166	8.9098	9.2252	9.5639	9.9214	10.3032	10.7112	11.1562	11.6392	12.1632
7.3	7.3	7.5110	7.7334	7.9669	8.2152	8.4769	8.7560	9.0566	9.3792	9.7240	10.0962	10.4982	10.9322	11.4002	11.9042	12.4462
7.4	7.4	7.6172	7.8440	8.0852	8.3359	8.6097	8.8966									

TABLE II.- LOCAL MACH NUMBERS BEFORE AND AFTER EXPANSIONS - Concluded

M _b ^{-β}	Local Mach number after expansion, M _a															
	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°
1.0	1.6046	1.6382	1.6721	1.7064	1.7408	1.7753	1.8098	1.8444	1.8796	1.9148	1.9503	1.9860	2.0235	2.0600	2.0968	2.1320
1.1	1.6498	1.6837	1.7179	1.7522	1.7867	1.8208	1.8550	1.8905	1.9268	1.9621	1.9978	2.0340	2.0712	2.1092	2.1465	2.1852
1.2	1.7256	1.7598	1.7941	1.8292	1.8644	1.8990	1.9352	1.9705	2.0065	2.0431	2.0800	2.1179	2.1560	2.1938	2.2322	2.2709
1.3	1.8158	1.8509	1.8861	1.9213	1.9570	1.9928	2.0288	2.0655	2.1025	2.1402	2.1781	2.2164	2.2557	2.2960	2.3361	2.3769
1.4	1.9140	1.9498	1.9859	2.0223	2.0590	2.0958	2.1338	2.1715	2.2100	2.2491	2.2886	2.3287	2.3689	2.4100	2.4506	2.4940
1.5	2.0192	2.0558	2.0927	2.1308	2.1686	2.2064	2.2455	2.2855	2.3250	2.3647	2.4065	2.4484	2.4900	2.5325	2.5765	2.6238
1.6	2.1288	2.1667	2.2047	2.2438	2.2830	2.3232	2.3630	2.4042	2.4460	2.4882	2.5320	2.5759	2.6200	2.6655	2.7108	2.7570
1.7	2.2418	2.2812	2.3213	2.3628	2.4027	2.4433	2.4860	2.5294	2.5735	2.6182	2.6635	2.7092	2.7561	2.8032	2.8510	2.9015
1.8	2.3582	2.3988	2.4408	2.4828	2.5253	2.5688	2.6140	2.6590	2.7052	2.7515	2.7989	2.8480	2.8970	2.9470	2.9985	3.0495
1.9	2.4768	2.5193	2.5627	2.6072	2.6528	2.6980	2.7460	2.7926	2.8401	2.8899	2.9401	2.9912	3.0422	3.0959	3.1497	3.2069
2.0	2.5984	2.6436	2.6892	2.7357	2.7823	2.8305	2.8795	2.9292	2.9801	3.0320	3.0850	3.1395	3.1945	3.2515	3.3090	3.3702
2.1	2.7220	2.7690	2.8164	2.8648	2.9155	2.9659	3.0182	3.0715	3.1240	3.1788	3.2359	3.2955	3.3510	3.4082	3.4670	3.5309
2.2	2.8473	2.8972	2.9472	2.9987	3.0504	3.1050	3.1582	3.2150	3.2720	3.3296	3.3895	3.4506	3.5128	3.5762	3.6424	3.7085
2.3	2.9752	3.0281	3.0804	3.1335	3.1890	3.2450	3.3036	3.3619	3.4225	3.4842	3.5470	3.6130	3.6795	3.7470	3.8170	3.8875
2.4	3.1056	3.1601	3.2155	3.2720	3.3305	3.3908	3.4501	3.5135	3.5775	3.6421	3.7105	3.7795	3.8495	3.9225	3.9972	4.0730
2.5	3.2368	3.2947	3.3537	3.4140	3.4752	3.5370	3.6030	3.6692	3.7362	3.8070	3.8778	3.9518	4.0262	4.1042	4.1838	4.2652
2.6	3.3703	3.4312	3.4930	3.5561	3.6210	3.6880	3.7560	3.8260	3.8985	3.9725	4.0480	4.1260	4.2066	4.2900	4.3750	4.4630
2.7	3.5056	3.5690	3.6350	3.7018	3.7702	3.8408	3.9139	3.9879	4.0635	4.1422	4.2239	4.3075	4.3922	4.4805	4.5725	4.6650
2.8	3.6425	3.7102	3.7794	3.8493	3.9222	3.9970	4.0704	4.1518	4.2335	4.3180	4.4035	4.4921	4.5855	4.6822	4.7750	4.8768
2.9	3.7818	3.8536	3.9262	4.0005	4.0767	4.1565	4.2375	4.3220	4.4100	4.4962	4.5880	4.6855	4.7804	4.8821	4.9860	5.0955
3.0	3.9235	3.9977	4.0752	4.1534	4.2352	4.3180	4.4050	4.4940	4.5845	4.6800	4.7765	4.8785	4.9822	5.0900	5.2030	5.3179
3.1	4.0657	4.1457	4.2258	4.3092	4.3948	4.4832	4.5748	4.6680	4.7632	4.8680	4.9710	5.0792	5.1900	5.3052	5.4252	5.5520
3.2	4.2118	4.2942	4.3792	4.4681	4.5578	4.6515	4.7485	4.8485	4.9530	5.0590	5.1700	5.2840	5.4010	5.5280	5.6570	5.7890
3.3	4.3573	4.4420	4.5354	4.6288	4.7240	4.8240	4.9260	5.0320	5.1425	5.2561	5.3740	5.4970	5.6240	5.7569	5.8958	6.0390
3.4	4.5071	4.5930	4.6855	4.7920	4.8937	4.9990	5.1080	5.2196	5.3370	5.4581	5.5838	5.7150	5.8502	5.9931	6.1400	6.2933
3.5	4.6575	4.7466	4.8357	4.9586	5.0662	5.1768	5.2918	5.4115	5.5352	5.6645	5.7995	5.9385	6.0840	6.2365	6.3955	6.5600
3.6	4.8105	4.9029	5.0183	5.1279	5.2410	5.3580	5.4809	5.6085	5.7380	5.8770	6.0205	6.1680	6.3245	6.4880	6.6567	6.8350
3.7	4.9643	5.0733	5.1840	5.3000	5.4200	5.5435	5.6730	5.8080	5.9468	6.0945	6.2460	6.4059	6.5720	6.7460	6.9285	7.1220
3.8	5.1223	5.2365	5.3528	5.4750	5.6015	5.7325	5.8700	6.0130	6.1619	6.3175	6.4780	6.6485	6.8275	7.0250	7.2100	7.4160
3.9	5.2810	5.4007	5.5248	5.6521	5.7870	5.9255	6.0710	6.2220	6.3800	6.5455	6.7190	6.8985	7.0900	7.2895	7.5000	7.7200
4.0	5.4432	5.5682	5.6983	5.8349	5.9747	6.1225	6.2753	6.4360	6.6040	6.7800	6.9650	7.1575	7.3600	7.5755	7.8000	8.0400
4.1	5.6066	5.7380	5.8760	6.0184	6.1672	6.3230	6.4860	6.6565	6.8345	7.0200	7.2185	7.4215	7.6112	7.8700	8.1120	8.3695
4.2	5.7718	5.9105	6.0560	6.2058	6.3628	6.5270	6.6990	6.8800	7.0700	7.2680	7.4775	7.6985	7.9300	8.1760	8.4350	8.7120
4.3	5.9407	6.0855	6.2373	6.3964	6.5622	6.7375	6.9180	7.1100	7.3095	7.5210	7.7439	7.9795	8.2265	8.4900	8.7718	9.0695
4.4	6.1106	6.2638	6.4245	6.5913	6.7657	6.9490	7.1410	7.3410	7.5575	7.7830	8.0210	8.2710	8.5360	8.8195	9.1218	9.4385
4.5	6.2830	6.4440	6.6125	6.7880	6.9725	7.1667	7.3700	7.5850	7.8120	8.0500	8.3025	8.5705	8.8545	9.1580	9.4820	9.8260
4.6	6.4580	6.6282	6.8044	6.9895	7.1845	7.3887	7.6033	7.8300	8.0730	8.3235	8.5955	8.8800	9.1845	9.5095	9.8550	10.2373
4.7	6.6355	6.8134	6.9995	7.1950	7.3998	7.6161	7.8440	8.0820	8.3400	8.6085	8.8965	9.2020	9.5270	9.8710	10.2465	10.6480
4.8	6.8158	7.0026	7.1972	7.4028	7.6189	7.8471	8.0875	8.3420	8.6135	8.9020	9.2035	9.5298	9.8805	10.2500	10.6530	11.0850
4.9	6.9997	7.1940	7.3938	7.6170	7.8445	8.0845	8.3395	8.6060	8.8960	9.2025	9.5240	9.8715	10.2465	10.6465	11.0770	11.5400
5.0	7.1850	7.3895	7.6037	7.8313	8.0722	8.3257	8.5960	8.8800	9.1840	9.5100	9.8542	10.2270	10.6265	11.0560	11.5160	12.0220
5.1	7.3751	7.5872	7.8130	8.0416	8.3053	8.5740	8.8550	9.1500	9.4820	9.8250	10.1944	10.5940	11.0180	11.4760	11.978	
5.2	7.5640	7.7886	8.0250	8.2767	8.5428	8.8250	9.1270	9.4470	9.7890	10.1580	10.5672	10.9680	11.4260	11.9220		
5.3	7.7576	7.9930	8.2409	8.5068	8.7868	9.0850	9.4010	9.7385	10.1040	10.4920	10.9108	11.3620	11.8515			
5.4	7.9545	8.2006	8.4620	8.7395	9.0345	9.3490	9.6820	10.0420	10.4280	10.8400	11.2893	11.7680				
5.5	8.1532	8.4115	8.6867	8.9772	9.2893	9.6190	9.9760	10.3530	10.7600	11.2040	11.6763					
5.6	8.3550	8.6270	8.9150	9.2207	9.5480	9.8950	10.2707	10.6700	11.1040	11.5740						
5.7	8.5620	8.8417	9.1368	9.4468	9.8123	10.1800	10.5740	10.9980	11.4570	11.9550						
5.8	8.7695	9.0664	9.3827	9.7218	10.0824	10.4687	10.8860	11.3340	11.8200							
5.9	8.9793	9.2930	9.6235	9.9784	10.3580	10.7670	11.2060	11.6820								
6.0	9.1966	9.5212	9.8690	10.2410	10.6410	11.0710	11.5340									
6.1	9.4152	9.7552	10.1188	10.5085	10.9297	11.3820	11.8714									
6.2	9.6356	9.9920	10.3732	10.7820	11.2232	11.7025										
6.3	9.8628	10.2340	10.6311	11.0648	11.5272											
6.4	10.0896	10.4790	10.8990	11.3462	11.8354											
6.5	10.3226	10.7288	11.1668	11.6397												
6.6	10.5590	10.9825	11.4413	11.9380												
6.7	10.7995	11.2410	11.7214													
6.8	11.0450	11.5067	12.0092													
6.9	11.2938	11.7748														
7.0	11.5424	12.0465														
7.1	11.8010															
7.2	12.0600															

TABLE III.- STATIC PRESSURE RATIO ACROSS EXPANSION WAVES

		Ratio of static pressure after to static pressure before expansion, p_a/p_b														
M_b	β	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°
		1.0	1	0.90724	0.85100	0.80486	0.76192	0.72329	0.68896	0.65588	0.62488	0.59484	0.56608	0.53921	0.51325	0.48875
1.1	1	.94222	.89109	.84500	.80315	.76474	.72819	.69275	.65930	.62796	.59815	.56975	.54234	.51571	.49054	
1.2	1	.94939	.90167	.85851	.81779	.77827	.74080	.70538	.67194	.63907	.60823	.57938	.55105	.52394	.49764	
1.3	1	.95151	.90630	.86285	.82202	.78284	.74496	.70863	.67461	.64159	.61019	.58005	.55075	.52301	.49658	
1.4	1	.95232	.90701	.86361	.82165	.78169	.74383	.70671	.67176	.63872	.60612	.57500	.54510	.51755	.49071	
1.5	1	.95205	.90613	.86205	.81855	.77832	.73967	.70135	.66630	.63249	.59908	.56706	.53637	.50692	.47871	
1.6	1	.95145	.90424	.85851	.81561	.77403	.73369	.69266	.66041	.62988	.59939	.56966	.54063	.51229	.48463	
1.7	1	.95003	.90151	.85533	.81159	.76833	.72739	.68686	.65180	.61772	.58411	.55111	.51886	.48729	.45648	
1.8	1	.95084	.89979	.85116	.80630	.76189	.72019	.68066	.64211	.60556	.57090	.53752	.50571	.47560	.44681	
1.9	1	.94568	.89444	.84615	.79856	.75373	.71173	.67047	.63225	.59566	.56048	.52573	.49248	.46063	.43028	
2.0	1	.94504	.89218	.84172	.79217	.74492	.70301	.66159	.62203	.58523	.54831	.51391	.48134	.45060	.42098	
2.1	1	.94353	.88893	.83644	.78776	.74007	.69517	.65234	.61110	.57282	.53622	.50140	.46847	.43697	.40684	
2.2	1	.94169	.88533	.83124	.78061	.73179	.68604	.64269	.60121	.56152	.52471	.48940	.45533	.42376	.39425	
2.3	1	.94051	.88174	.82668	.77403	.72460	.67861	.63479	.59205	.55043	.51023	.47230	.43663	.40317	.37111	
2.4	1	.93730	.87832	.82126	.76729	.71632	.66824	.62225	.57905	.53839	.50097	.46415	.42926	.39524	.36283	
2.5	1	.93553	.87396	.81507	.75970	.70781	.65891	.61160	.56795	.52732	.48915	.45288	.41744	.38331	.35051	
2.6	1	.93326	.87003	.80943	.75322	.69983	.64981	.60185	.55743	.51641	.47724	.43999	.40353	.36847	.33491	
2.7	1	.93040	.86544	.80426	.74619	.69139	.64068	.59257	.54717	.50601	.46763	.43061	.39442	.35942	.32599	
2.8	1	.92819	.86210	.79888	.73977	.68525	.63318	.58309	.53716	.49476	.45430	.41510	.37767	.34178	.30753	
2.9	1	.92725	.85954	.79430	.73520	.67938	.62585	.57313	.52252	.48269	.44310	.40476	.36792	.33268	.29925	
3.0	1	.92417	.85269	.78891	.72544	.66790	.61119	.56305	.51517	.47200	.43145	.39323	.35841	.32461	.29166	
3.1	1	.92232	.85032	.78316	.71897	.65964	.60524	.55329	.50543	.46134	.41998	.38213	.34740	.31388	.28140	
3.2	1	.92044	.84624	.77736	.71173	.65139	.59522	.54390	.49504	.45083	.40936	.37115	.33610	.30238	.26970	
3.3	1	.91833	.84237	.77205	.70478	.64379	.58651	.53348	.48358	.43704	.39266	.35075	.31533	.28105	.24837	
3.4	1	.91562	.83832	.76596	.69828	.63618	.57808	.52329	.47158	.42301	.37663	.33263	.29074	.25024	.21061	
3.5	1	.91317	.83493	.75984	.69097	.62874	.56930	.51495	.46607	.42036	.37797	.33972	.30465	.27159	.23991	
3.6	1	.91113	.83069	.75433	.68436	.62068	.56032	.50620	.45713	.41205	.36944	.32991	.29256	.25740	.22403	
3.7	1	.90881	.82674	.74877	.67771	.61325	.55226	.49724	.44769	.40244	.35936	.31944	.28193	.24640	.21261	
3.8	1	.90695	.82299	.74320	.67034	.60509	.54325	.48682	.43714	.39091	.34883	.31040	.27338	.23820	.20469	
3.9	1	.90506	.81916	.73702	.66478	.59735	.53577	.47962	.43031	.38192	.33683	.30117	.26628	.23250	.20011	
4.0	1	.90344	.81531	.73244	.65834	.58945	.52725	.47074	.41923	.37201	.32836	.28917	.25220	.21760	.18469	
4.1	1	.90057	.81090	.72705	.65172	.58216	.52192	.46511	.41008	.36326	.32086	.28055	.24248	.20688	.17351	
4.2	1	.89917	.80717	.72102	.64463	.57525	.51084	.45159	.40159	.35466	.31140	.27145	.23423	.20088	.16821	
4.3	1	.89622	.80232	.71533	.63879	.56711	.50343	.44742	.39324	.34578	.30060	.26074	.22392	.19012	.15710	
4.4	1	.89351	.79861	.71027	.63205	.55989	.49552	.44174	.38449	.33726	.29518	.25736	.22364	.19149	.16011	
4.5	1	.89199	.79481	.70543	.62568	.55343	.48754	.42920	.37624	.32879	.28733	.24945	.21636	.18557	.15562	
4.6	1	.89018	.79125	.70037	.61909	.54603	.47970	.42124	.36783	.32078	.27891	.24155	.20871	.17950	.15077	
4.7	1	.88755	.78643	.69482	.61275	.53871	.47264	.41259	.36009	.31265	.27111	.23395	.20088	.17251	.14511	
4.8	1	.88735	.78281	.69011	.60634	.53206	.46677	.40538	.35236	.30495	.26326	.22659	.19111	.16576	.14019	
4.9	1	.88360	.77862	.68548	.60051	.52542	.45755	.39757	.34465	.29765	.25590	.21926	.18731	.15923	.13488	
5.0	1	.88232	.77476	.67988	.59444	.51803	.45026	.39045	.33680	.28954	.24859	.21226	.18055	.15288	.12895	
5.1	1	.87976	.77103	.67527	.58794	.51132	.44357	.38117	.32662	.28274	.24143	.20543	.17404	.14681	.12333	
5.2	1	.87740	.76710	.66916	.57908	.50508	.43609	.37304	.31815	.27527	.23426	.19867	.16774	.14096	.11798	
5.3	1	.87542	.76370	.66480	.57251	.49959	.42890	.36649	.31188	.26826	.22755	.19216	.16145	.13529	.11262	
5.4	1	.87294	.75993	.65977	.56705	.49444	.42187	.35823	.30310	.26122	.22099	.18588	.15565	.12955	.10758	
5.5	1	.87136	.75556	.65448	.56163	.48819	.41536	.35128	.30087	.25470	.21155	.17966	.14997	.12441	.10268	
5.6	1	.86885	.75213	.64936	.55661	.48279	.40955	.34735	.29293	.24786	.20803	.17380	.14455	.11926	.09798	
5.7	1	.86733	.74837	.64397	.55060	.47633	.40312	.34070	.28736	.24116	.20187	.16794	.13901	.11280	.09350	
5.8	1	.86512	.74459	.63897	.54501	.47071	.39748	.33529	.28152	.23524	.19573	.16220	.13379	.10962	.08913	
5.9	1	.86292	.74111	.63395	.54076	.46631	.39313	.32778	.27463	.22910	.19003	.15677	.12862	.10488	.08502	
6.0	1	.86052	.73744	.62939	.53445	.45939	.38243	.32103	.26819	.22294	.18442	.15142	.12372	.10046	.08101	
6.1	1	.85855	.73377	.62410	.52936	.45375	.37593	.31550	.26209	.21702	.17863	.14639	.11899	.09613	.07720	
6.2	1	.85688	.72976	.61939	.52429	.44815	.37031	.30875	.25595	.21091	.17340	.14131	.11450	.09211	.07353	
6.3	1	.85466	.72674	.61557	.51951	.44359	.36518	.30250	.24916	.20563	.16789	.13628	.10996	.08791	.06993	
6.4	1	.85222	.72277	.61019	.51329	.43790	.35929	.29629	.24330	.20016	.16284	.13153	.10583	.08424	.06664	
6.5	1	.84960	.71889	.60548	.50786	.43279	.35396	.29033	.23864	.19461	.15796	.12709	.10164	.08059	.06315	
6.6	1	.84770	.71516	.60082	.50297	.42790	.34854	.28484	.23291	.18922	.15305	.12262	.09761	.07700	.06031	
6.7	1	.84603	.71282	.59702	.49771	.42270	.34312	.27942	.22770	.18419	.14801	.11784	.09373	.07361	.05731	
6.8	1	.84463	.70974	.59317	.49361	.41869	.33912	.27542	.22405	.18054	.14437	.11420	.09001	.07032	.05445	
6.9	1	.84168	.70778	.58886	.48913	.41421	.33464	.27094	.21968	.17617	.14000	.11083	.08651	.06715	.05173	
7.0	1	.83952	.70335	.58302	.48215	.40723	.32766	.26396	.21266	.16931	.13314	.10306	.08283	.06125	.04914	
7.1	1	.83705	.69763	.57789	.47594	.40102	.32145	.25775	.20645	.16310	.12693	.10222	.07961	.06165	.04663	
7.2	1	.83539	.69477	.57527	.47145	.39653	.31696	.25326	.20196	.15861	.12244	.09854	.07629	.05844	.04426	
7.3	1	.83296	.69044	.56923	.46465	.38973	.30916	.24546	.19416	.15081	.11464	.09075	.07133	.05474	.04196	
7.4	1	.83026	.68692	.56438	.46118	.38526	.30469	.24100	.18970	.14635	.11018	.08629	.07133	.05514	.03979	
7.5	1	.83125	.68388	.55986	.45621	.38129	.29972	.23602	.18472	.14137	.10520	.08131				

TABLE III.- STATIC PRESSURE RATIO ACROSS EXPANSION WAVES - Concluded

M _b	Ratio of static pressure after to static pressure before expansion, P _a /P _b															
	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°
1.0	0.11233	0.12075	0.13099	0.17981	0.36055	0.31210	0.32450	0.30768	0.29152	0.27610	0.26136	0.24727	0.23324	0.22024	0.20805	0.19690
1.1	.16646	.11333	.12102	.39970	.37923	.35996	.34101	.32335	.30572	.28941	.27384	.25882	.24421	.23017	.21711	.20436
1.2	.17264	.11874	.12587	.40358	.38232	.36216	.34272	.32416	.30680	.28978	.27359	.25786	.24293	.22898	.21563	.20297
1.3	.17071	.11602	.12247	.40011	.37858	.35814	.33858	.31975	.30180	.28453	.26818	.25256	.23750	.22299	.20941	.19649
1.4	.16477	.113970	.11572	.39283	.37099	.35021	.33009	.31119	.29300	.27559	.25909	.24323	.22850	.21430	.20114	.18800
1.5	.15535	.112962	.110601	.38257	.36062	.33989	.31972	.30032	.28234	.26522	.24860	.23285	.21823	.20427	.19078	.17732
1.6	.14433	.11877	.39159	.37117	.34903	.32778	.30802	.28883	.27059	.25358	.23670	.22110	.20551	.19051	.17551	.16688
1.7	.13239	.110652	.38151	.35782	.33620	.31561	.29525	.27590	.25773	.24050	.22427	.20900	.19452	.18059	.16830	.15588
1.8	.11953	.39375	.36878	.34512	.32323	.30233	.28179	.26287	.24482	.22801	.21200	.19680	.18123	.16959	.15677	.14525
1.9	.10659	.38058	.35578	.33209	.30950	.28869	.26818	.24971	.23228	.21535	.19965	.18403	.17125	.15808	.14596	.13417
2.0	.39310	.36657	.34170	.31813	.29622	.27521	.25516	.23696	.21947	.20305	.18768	.17304	.15955	.14675	.13497	.12354
2.1	.38097	.35331	.32865	.30531	.28274	.26204	.24225	.22372	.20693	.19082	.17546	.16134	.14804	.13593	.12467	.11411
2.2	.36662	.33886	.31514	.29186	.26939	.24888	.22903	.21058	.19455	.17902	.16419	.15001	.13766	.12608	.11573	.10655
2.3	.35333	.32638	.30188	.27901	.25707	.23679	.21739	.19979	.18311	.16767	.15339	.13978	.12711	.11604	.10542	.09579
2.4	.33998	.31363	.28907	.26614	.24445	.22407	.20581	.18804	.17180	.15691	.14289	.12975	.11792	.10682	.09665	.08740
2.5	.32745	.30091	.27624	.25328	.23206	.21256	.19370	.17660	.16095	.14604	.13261	.12003	.10867	.09802	.08833	.07950
2.6	.31199	.28558	.26123	.23865	.22059	.20392	.18829	.16617	.15059	.13633	.12329	.11124	.10011	.08993	.08069	.07221
2.7	.30285	.27687	.25210	.22999	.20928	.19003	.17210	.15584	.14094	.12703	.11426	.10261	.09212	.08243	.07352	.06565
2.8	.29113	.26598	.24088	.21895	.19938	.18045	.16202	.14527	.13154	.11800	.10584	.09469	.08433	.07530	.06696	.05929
2.9	.27951	.25441	.22971	.20760	.18795	.16925	.15235	.13668	.12253	.10969	.09788	.08700	.07745	.06859	.06070	.05321
3.0	.26604	.24267	.21895	.19758	.17765	.15972	.14300	.12787	.11429	.10167	.09047	.08009	.07088	.06255	.05496	.04828
3.1	.25741	.23471	.20878	.18710	.16817	.15048	.13416	.11977	.10634	.09415	.08338	.07352	.06476	.05686	.04976	.04332
3.2	.24646	.22461	.19881	.17777	.15988	.14167	.12593	.11171	.09872	.08725	.07680	.06750	.05905	.05194	.04534	.03898
3.3	.23669	.21580	.18918	.16859	.15013	.13312	.11795	.10419	.09172	.08062	.07065	.06170	.05377	.04667	.04035	.03412
3.4	.22843	.20808	.18002	.15982	.14159	.12511	.11027	.09708	.08507	.07440	.06488	.05637	.04839	.04127	.03533	.02950
3.5	.21697	.19886	.17087	.15131	.13318	.11757	.10323	.09035	.07890	.06863	.05948	.05116	.04353	.03680	.03124	.02576
3.6	.20768	.18988	.16251	.14319	.12689	.11041	.09640	.08333	.07309	.06317	.05448	.04662	.03917	.03285	.02716	.02168
3.7	.19885	.17288	.15438	.13512	.11850	.10351	.09004	.07805	.06755	.05809	.04990	.04264	.03633	.03082	.02560	.02035
3.8	.19012	.16693	.14651	.12802	.11157	.09699	.08335	.07243	.06229	.05336	.04563	.03877	.03279	.02768	.02219	.01736
3.9	.18189	.15916	.13869	.12106	.10490	.09079	.07821	.06719	.05750	.04899	.04156	.03518	.02957	.02477	.02004	.01533
4.0	.17368	.15153	.13178	.11409	.09870	.08491	.07288	.06226	.05298	.04490	.03786	.03183	.02663	.02213	.01833	.01506
4.1	.16597	.14424	.12478	.10774	.09267	.07938	.06773	.05755	.04873	.04112	.03443	.02875	.02389	.01975	.01622	.01323
4.2	.15861	.13721	.11817	.10161	.08700	.07420	.06301	.05325	.04479	.03756	.03130	.02595	.02142	.01756	.01433	.01160
4.3	.15130	.13047	.11203	.09578	.08162	.06915	.05850	.04917	.04130	.03431	.02842	.02341	.01920	.01562	.01261	.01012
4.4	.14447	.12333	.10585	.09016	.07649	.06451	.05431	.04510	.03735	.03125	.02570	.02105	.01713	.01382	.01107	.008831
4.5	.13787	.11776	.10018	.08494	.07168	.06018	.05033	.04184	.03459	.02847	.02328	.01891	.01527	.01223	.009713	.007665
4.6	.13150	.11172	.09469	.07989	.06705	.05605	.04659	.03857	.03163	.02592	.02100	.01696	.01358	.01079	.008508	.006601
4.7	.12539	.10612	.08946	.07507	.06273	.05212	.04308	.03549	.02892	.02350	.01893	.01515	.01204	.009492	.007114	.005337
4.8	.11946	.10065	.08453	.07059	.05866	.04848	.03986	.03257	.02641	.02127	.01708	.01356	.01066	.008346	.006147	.004593
4.9	.11367	.09545	.07972	.06619	.05473	.04501	.03676	.02992	.02407	.01925	.01533	.01206	.009423	.007292	.005588	.004211
5.0	.10825	.09046	.07528	.06222	.05112	.04179	.03391	.02739	.02194	.01741	.01375	.01073	.008304	.006365	.004837	.003617
5.1	.10301	.08572	.07093	.05831	.04769	.03872	.03133	.02506	.01994	.01575	.01230	.009519	.007315	.005560	.004164	.003133
5.2	.09802	.08116	.06686	.05468	.04416	.03592	.02878	.02291	.01809	.01414	.01099	.008455	.006420	.004819	.003619	.002733
5.3	.09323	.07681	.06297	.05117	.04138	.03321	.02649	.02096	.01610	.01245	.009804	.007465	.005615			
5.4	.08860	.07267	.05921	.04792	.03852	.03072	.02416	.01910	.01485	.01145	.008712	.006584				
5.5	.08424	.06873	.05566	.04483	.03577	.02839	.02228	.01733	.01343	.01023	.007748					
5.6	.08006	.06491	.05231	.04188	.03324	.02622	.02045	.01584	.01212	.009124	.0068195					
5.7	.07592	.06134	.04916	.03911	.03086	.02415	.01873	.01439	.01092							
5.8	.07212	.05792	.04617	.03648	.02862	.02226	.01713	.01306	.00987							
5.9	.06852	.05462	.04332	.03405	.02653	.02047	.01645	.01182								
6.0	.06487	.05156	.04062	.03174	.02456	.01882	.01428									
6.1	.06118	.04858	.03807	.02957	.02272	.01729	.01302									
6.2	.05831	.04579	.03566	.02752	.02102	.01586										
6.3	.05515	.04310	.03340	.02554	.01939	.01454										
6.4	.05228	.04059	.03119	.02379	.01790											
6.5	.04945	.03819	.02918	.02207												
6.6	.04677	.03592	.02727	.02047												
6.7	.04425	.03376	.02546													
6.8	.04173	.03167	.02373													
6.9	.03939	.02973														
7.0	.03727	.02792														
7.1	.03511															
7.2	.03315															

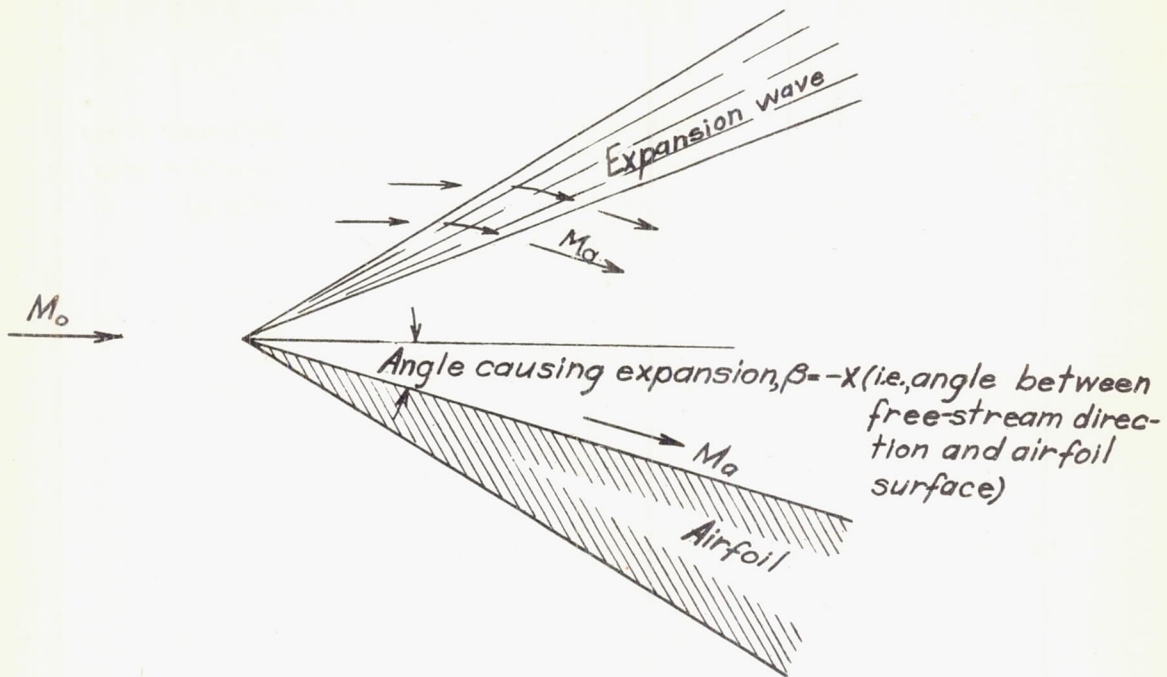
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TABLE IV.- PRESSURE COEFFICIENT BASED ON FREE-STREAM DYNAMIC PRESSURE

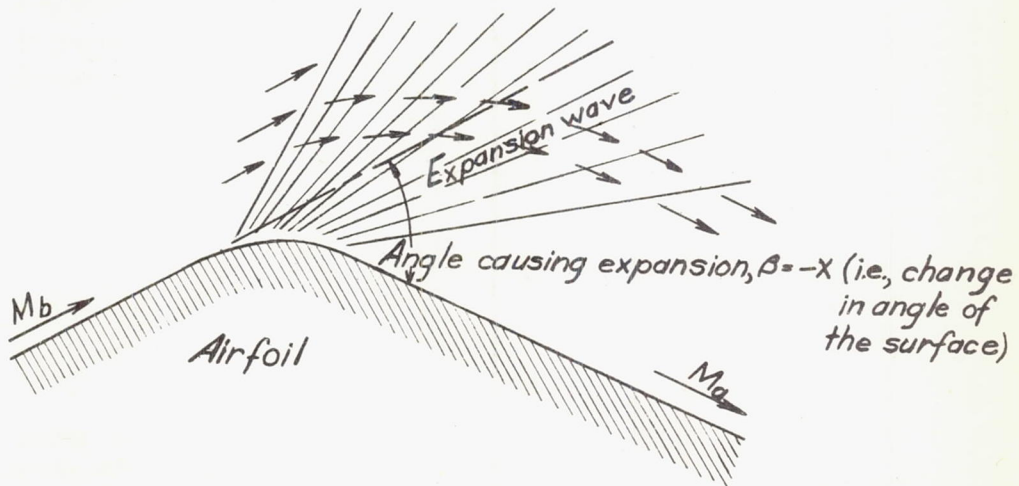
		Pressure coefficient, $\Delta p_n/q_0$							
M_0	P_n/P_0	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5
0		-1.42857	-0.91429	-0.63492	-0.47579	-0.35714	-0.22857	-0.15873	-0.11662
.05		-1.35714	-.86857	-.60317	-.45200	-.33929	-.21714	-.15079	-.11079
.1		-1.28571	-.82286	-.57143	-.42821	-.32143	-.20571	-.14286	-.10496
.2		-1.14286	-.73143	-.50794	-.38064	-.28571	-.18286	-.12698	-.093294
.3		-1.00000	-.64000	-.44144	-.33306	-.25000	-.16000	-.11111	-.081633
.4		-.85714	-.54857	-.38095	-.28548	-.21429	-.13714	-.095238	-.069971
.5		-.71429	-.45714	-.31746	-.23790	-.17857	-.11429	-.079365	-.058309
.6		-.57143	-.36571	-.25397	-.19032	-.14286	-.091429	-.063492	-.046647
.7		-.42857	-.27429	-.19048	-.14274	-.10714	-.068571	-.047619	-.034985
.8		-.28571	-.18286	-.12698	-.095159	-.071429	-.045714	-.031746	-.023324
.9		-.14286	-.091429	-.063492	-.047579	-.035714	-.022857	-.015873	-.011662
1.0	0	0	0	0	0	0	0	0	0
1.1		.14286	.091429	.063492	.047579	.035714	.022857	.015873	.011662
1.2		.28571	.18286	.12698	.095159	.071429	.045714	.031746	.023324
1.3		.42857	.27429	.19048	.14274	.10714	.068571	.047619	.034985
1.4		.57143	.36571	.25397	.19032	.14286	.091429	.063492	.046647
1.5		.71429	.45714	.31746	.23790	.17857	.11429	.079365	.058309
1.6		.85714	.54857	.38095	.28548	.21429	.13714	.095238	.069971
1.7		1.00000	.64000	.44144	.33306	.25000	.16000	.11111	.081633
1.8		1.14286	.73143	.50794	.38064	.28571	.18286	.12698	.093294
1.9		1.28571	.82286	.57143	.42821	.32143	.20571	.14286	.10496
2.0		1.42857	.91429	.63492	.47579	.35714	.22857	.15873	.11662
2.2		1.71429	1.09714	.76190	.57095	.42857	.27429	.19048	.13994
2.4		2.00000	1.28000	.88889	.66611	.50000	.32000	.22222	.16327
2.6		2.28571	1.46286	1.01587	.76127	.57143	.36571	.25397	.18659
2.8		2.57143	1.64571	1.14286	.85643	.64286	.41143	.28571	.20991
3.0		2.85714	1.82857	1.26984	.95159	.71429	.45714	.31746	.23324
3.2		3.14286	2.01143	1.39683	1.04675	.78571	.50286	.34921	.25656
3.4		3.42857	2.19429	1.52381	1.14191	.85714	.54857	.38095	.27988
3.6		3.71429	2.37714	1.65079	1.23706	.92857	.59429	.41270	.30321
3.8		4.00000	2.56000	1.77778	1.33222	1.00000	.64000	.44144	.32653
4.0		4.28571	2.74286	1.90476	1.42738	1.07143	.68571	.47619	.34985
4.2		4.57143	2.92571	2.03175	1.52254	1.14286	.73143	.50794	.37318
4.4		4.85714	3.10857	2.15873	1.61770	1.21429	.77714	.53968	.39650
4.6		5.14286	3.29143	2.28571	1.71286	1.28571	.82286	.57143	.41983
4.8		5.42857	3.47429	2.41270	1.80802	1.35714	.86857	.60317	.44315
5.0		5.71429	3.65714	2.53968	1.90318	1.42857	.91429	.63492	.46647
5.2		6.00000	3.84000	2.66667	1.99833	1.50000	.96000	.66667	.48980
5.4		6.28511	4.02286	2.79365	2.09349	1.57143	1.00571	.69841	.51312
5.6		6.57113	4.20571	2.92063	2.18865	1.64286	1.05143	.73016	.53644
5.8		6.85714	4.38857	3.04762	2.28381	1.71429	1.09714	.76190	.55977
6.0		7.14286	4.57143	3.17460	2.37897	1.78571	1.14286	.79365	.58309
6.2		7.42857	4.75429	3.30159	2.47413	1.85714	1.18857	.82540	.60641
6.4		7.71429	4.93714	3.42857	2.56929	1.92857	1.23429	.85714	.62974
6.6		8.00000	5.12000	3.55556	2.66445	2.00000	1.28000	.88889	.65306
6.8		8.28571	5.30286	3.68254	2.75960	2.07143	1.32571	.92063	.67638
7.0		8.57143	5.48571	3.80952	2.85476	2.14286	1.37143	.95238	.69971
7.2		8.85714	5.66857	3.93651	2.94992	2.21429	1.41714	.98413	.72303
7.4		9.14286	5.85143	4.06349	3.04508	2.28571	1.46286	1.01587	.74636
7.6		9.42857	6.03428	4.19048	3.14024	2.35714	1.50857	1.04762	.76968
7.8		9.71429	6.21714	4.31746	3.23540	2.42857	1.55429	1.07936	.79300
8.0		10.00000	6.40000	4.44444	3.33056	2.50000	1.60000	1.11111	.81633
8.2		10.28571	6.58286	4.57143	3.42572	2.57143	1.64571	1.14286	.83965
8.4		10.57143	6.76571	4.69841	3.52087	2.64286	1.69143	1.17460	.86297
8.6		10.85714	6.94857	4.82541	3.61603	2.71429	1.73714	1.20635	.88630
8.8		11.14286	7.13143	4.95238	3.71119	2.78571	1.78286	1.23809	.90962
9.0		11.42857	7.31428	5.07936	3.80635	2.85714	1.82857	1.26984	.93294
9.2		11.71429	7.49714	5.20635	3.90151	2.92857	1.87429	1.30159	.95627
9.4		12.00000	7.68000	5.33333	3.99667	3.00000	1.92000	1.33333	.97959
9.6		12.28571	7.86286	5.46032	4.09183	3.07143	1.96571	1.36508	1.00292
9.8		12.57143	8.04571	5.58730	4.18699	3.14286	2.01143	1.39682	1.02624
10.0		12.85714	8.22857	5.71429	4.28215	3.21429	2.05714	1.42857	1.04956

TABLE IV.- PRESSURE COEFFICIENT BASED ON FREE-STREAM DYNAMIC PRESSURE - Concluded

		Pressure coefficient, $\Delta p_n/q_\infty$								
M_0		4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
P_n/P_0										
0		-0.089286	-0.070547	-0.057143	-0.047226	-0.039683	-0.033812	-0.029155	-0.025397	-0.022321
.05		-.081821	-.067019	-.054286	-.044864	-.037698	-.032122	-.027697	-.024127	-.021205
.1		-.080357	-.063492	-.051429	-.042503	-.035714	-.030431	-.026239	-.022857	-.020089
.2		-.071429	-.056437	-.045714	-.037780	-.031746	-.027050	-.023324	-.020317	-.017857
.3		-.062500	-.049383	-.040000	-.033058	-.027778	-.023669	-.020408	-.017778	-.015625
.4		-.053571	-.042328	-.034286	-.028335	-.023810	-.020287	-.017493	-.015238	-.013393
.5		-.044643	-.035273	-.028571	-.023613	-.019841	-.016906	-.014577	-.012698	-.011161
.6		-.035714	-.028219	-.022857	-.018890	-.015873	-.013525	-.011662	-.010159	-.0089286
.7		-.026786	-.021164	-.017143	-.014168	-.011905	-.010144	-.0087464	-.0076190	-.0066964
.8		-.017857	-.014409	-.011429	-.0094451	-.0079365	-.0067625	-.0058309	-.0050794	-.0044643
.9		-.0089286	-.0070547	-.0057143	-.0047226	-.0039683	-.0033812	-.0029155	-.0025397	-.0022321
1.0	0	0	0	0	0	0	0	0	0	0
1.1		.0089286	.0070547	.0057143	.0047226	.0039683	.0033812	.0029155	.0025397	.0022321
1.2		.017857	.014409	.011429	.0094451	.0079365	.0067625	.0058309	.0050794	.0044643
1.3		.026786	.021164	.017143	.014168	.011905	.010144	.0087464	.0076190	.0066964
1.4		.035714	.028219	.022857	.018890	.015873	.013525	.011662	.010159	.0089286
1.5		.044643	.035273	.028571	.023613	.019841	.016906	.014577	.012698	.011161
1.6		.053571	.042328	.034286	.028335	.023810	.020287	.017493	.015238	.013393
1.7		.062500	.049383	.040000	.033058	.027778	.023669	.020408	.017778	.015625
1.8		.071429	.056437	.045714	.037780	.031746	.027050	.023324	.020317	.017857
1.9		.080357	.063492	.051429	.042503	.035714	.030431	.026239	.022857	.020089
2.0		.089286	.070547	.057143	.047226	.039683	.033812	.029155	.025397	.022321
2.2		.10714	.084656	.068571	.056671	.047619	.040575	.034985	.030476	.026786
2.4		.12500	.098765	.080000	.066116	.055556	.047337	.040816	.035556	.031250
2.6		.14286	.11287	.091429	.075561	.063492	.054100	.046617	.040635	.035714
2.8		.16071	.12698	.10286	.085006	.071429	.060862	.052478	.045714	.040179
3.0		.17857	.14109	.11429	.094451	.079365	.067625	.058309	.050794	.044643
3.2		.19653	.15520	.12571	.10390	.087302	.074387	.064440	.055873	.049107
3.4		.21429	.16931	.13714	.11334	.095238	.081150	.069971	.060952	.053571
3.6		.23214	.18342	.14857	.12279	.10317	.087912	.075802	.066032	.058036
3.8		.25000	.19753	.16000	.13223	.11111	.094674	.081633	.071111	.062500
4.0		.26786	.21164	.17143	.14168	.11905	.10144	.087464	.076190	.066964
4.2		.28571	.22575	.18286	.15112	.12698	.10820	.093294	.081270	.071429
4.4		.30357	.23986	.19429	.16057	.13492	.11496	.099125	.086349	.075893
4.6		.32143	.25397	.20571	.17001	.14286	.12172	.10494	.091429	.080357
4.8		.33929	.26808	.21714	.17946	.15079	.12849	.11075	.096508	.084821
5.0		.35714	.28219	.22857	.18890	.15873	.13525	.11656	.10159	.089286
5.2		.37500	.29630	.24000	.19835	.16667	.14201	.12237	.10667	.093750
5.4		.39286	.31041	.25143	.20779	.17460	.14877	.12818	.11175	.098214
5.6		.41071	.32451	.26286	.21724	.18254	.15554	.13399	.11683	.10268
5.8		.42857	.33862	.27429	.22668	.19048	.16230	.13980	.12190	.10714
6.0		.44643	.35273	.28571	.23613	.19841	.16906	.14561	.12698	.11161
6.2		.46429	.36684	.29714	.24557	.20635	.17582	.15142	.13206	.11607
6.4		.48214	.38095	.30857	.25502	.21429	.18259	.15723	.13714	.12054
6.6		.50000	.39506	.32000	.26446	.22222	.18935	.16305	.14222	.12500
6.8		.51786	.40907	.33143	.27391	.23016	.19611	.16886	.14730	.12946
7.0		.53571	.42308	.34286	.28335	.23810	.20287	.17467	.15238	.13393
7.2		.55357	.43709	.35429	.29280	.24603	.20964	.18048	.15746	.13839
7.4		.57143	.45110	.36571	.30224	.25397	.21640	.18629	.16254	.14286
7.6		.58929	.46511	.37714	.31169	.26190	.22316	.19210	.16762	.14732
7.8		.60714	.47912	.38857	.32113	.26984	.22992	.19791	.17270	.15178
8.0		.62500	.49313	.40000	.33058	.27778	.23669	.20372	.17778	.15625
8.2		.64286	.50714	.41143	.34002	.28571	.24345	.20953	.18286	.16071
8.4		.66071	.52115	.42286	.34947	.29365	.25021	.21534	.18794	.16518
8.6		.67857	.53515	.43429	.35891	.30159	.25697	.22115	.19302	.16964
8.8		.69643	.54916	.44571	.36836	.30952	.26374	.22697	.19810	.17411
9.0		.71429	.56317	.45714	.37780	.31746	.27050	.23278	.20317	.17857
9.2		.73214	.57718	.46857	.38725	.32540	.27726	.23859	.20825	.18304
9.4		.75000	.59119	.48000	.39669	.33333	.28402	.24440	.21333	.18750
9.6		.76786	.60520	.49142	.40614	.34127	.29079	.25021	.21841	.19196
9.8		.78571	.61921	.50284	.41558	.34921	.29755	.25602	.22349	.19643
10.0		.80357	.63322	.51426	.42503	.35714	.30431	.26183	.22857	.20089



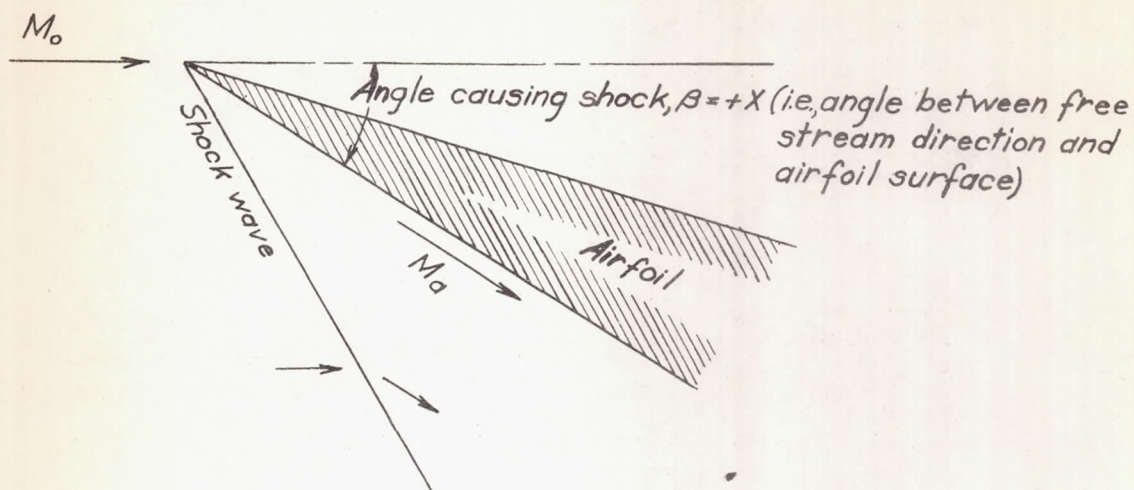
(a) Expansion at leading edge of airfoil.



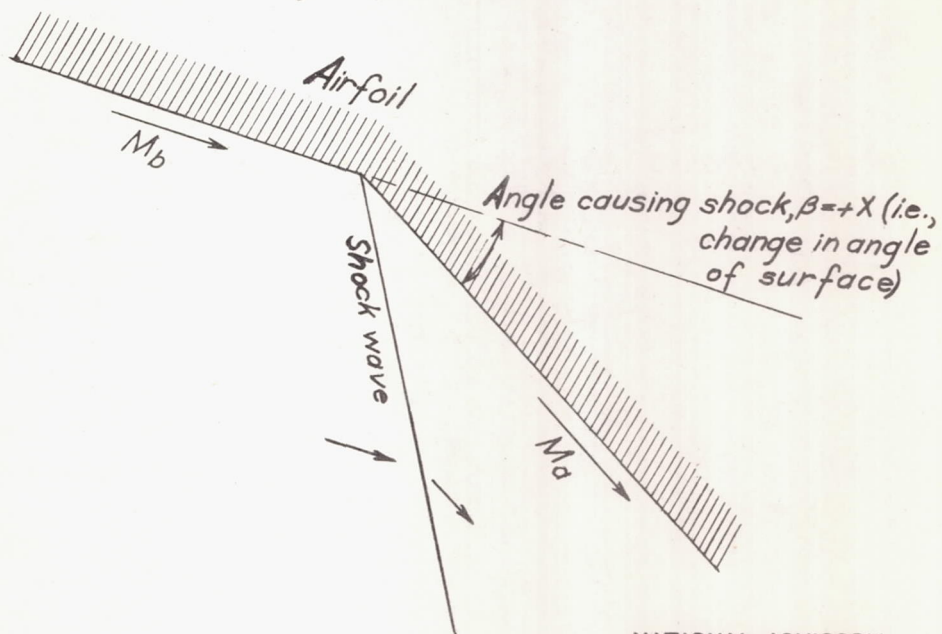
(b) Expansion along the airfoil.

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Figure 1.- Method of measuring angle causing expansion.
The angle causing expansion is always considered negative.



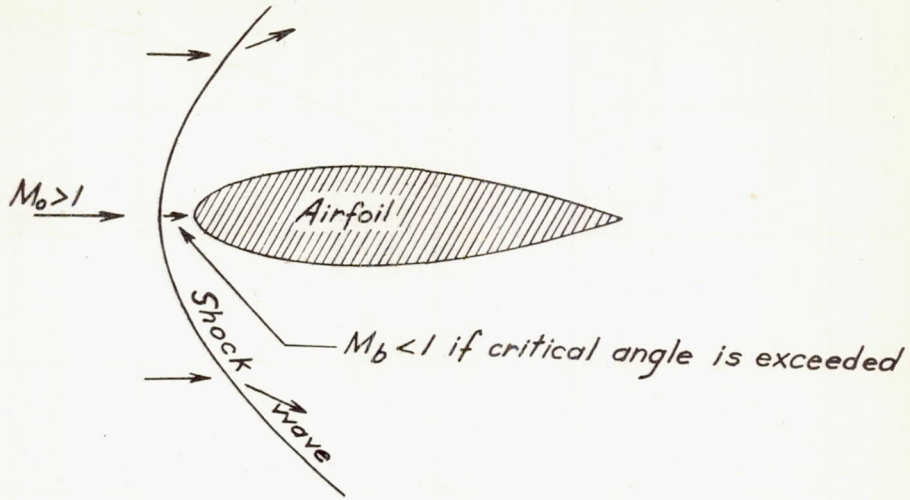
(a) Shock at leading edge of airfoil.



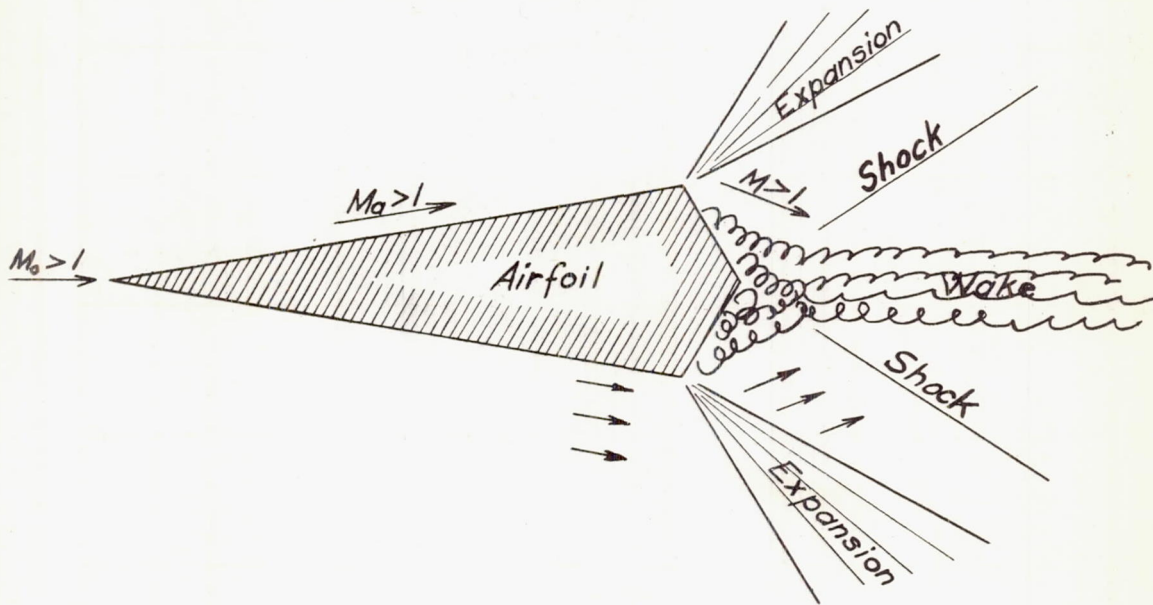
(b) Shock at intermediate point along airfoil.

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Figure 2.- Method of measuring angle causing shock. The angle causing shock is always considered positive.



(a) Shock limitation exceeded.



(b) Expansion limitations exceeded. (Turbulent wake set up)

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Figure 3.- Effect of exceeding the limitation on angles.

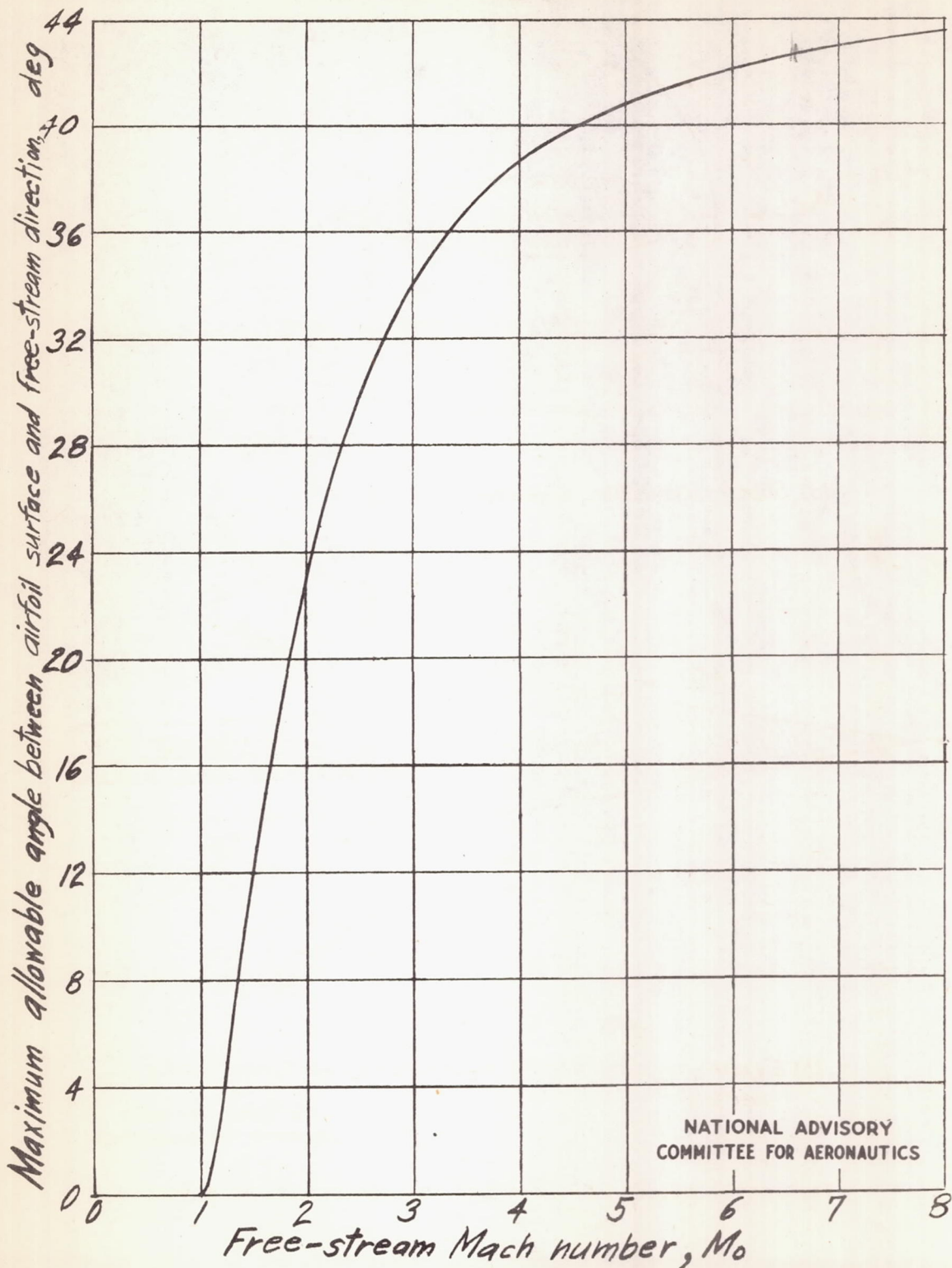


Figure 4.- Surface-angle limitation for attached shock wave.

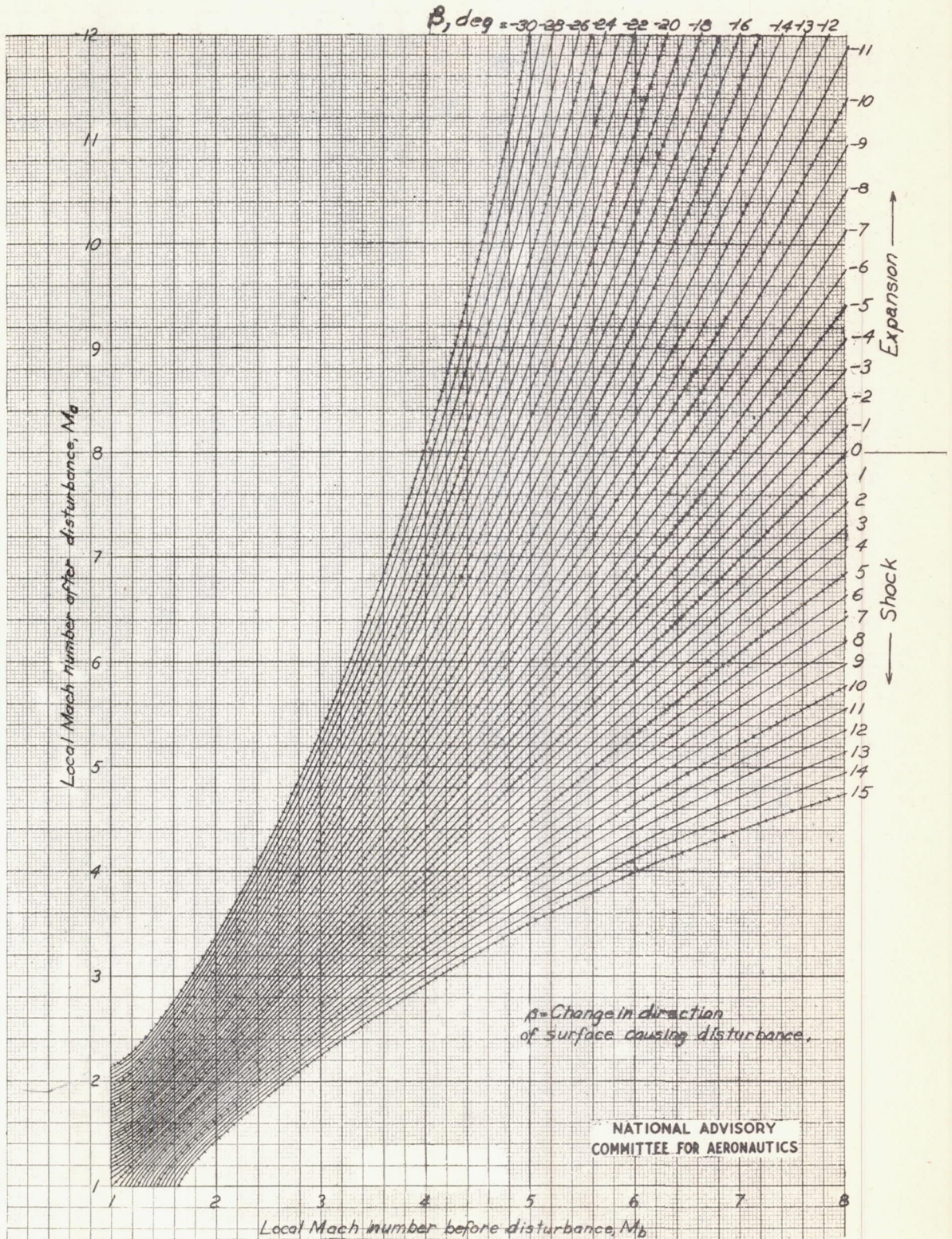


Figure 5.-Local Mach numbers before and after shocks and expansions.

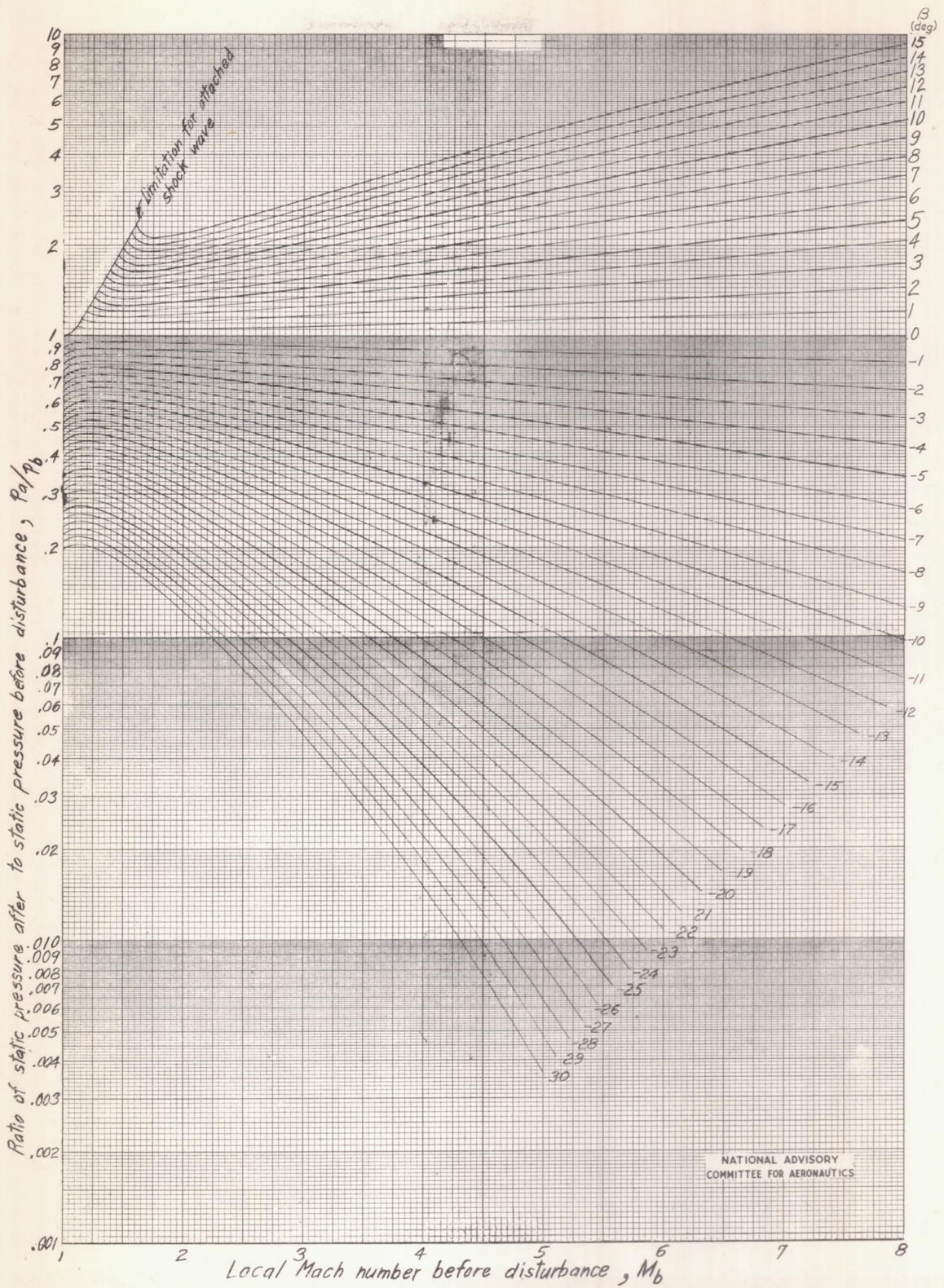
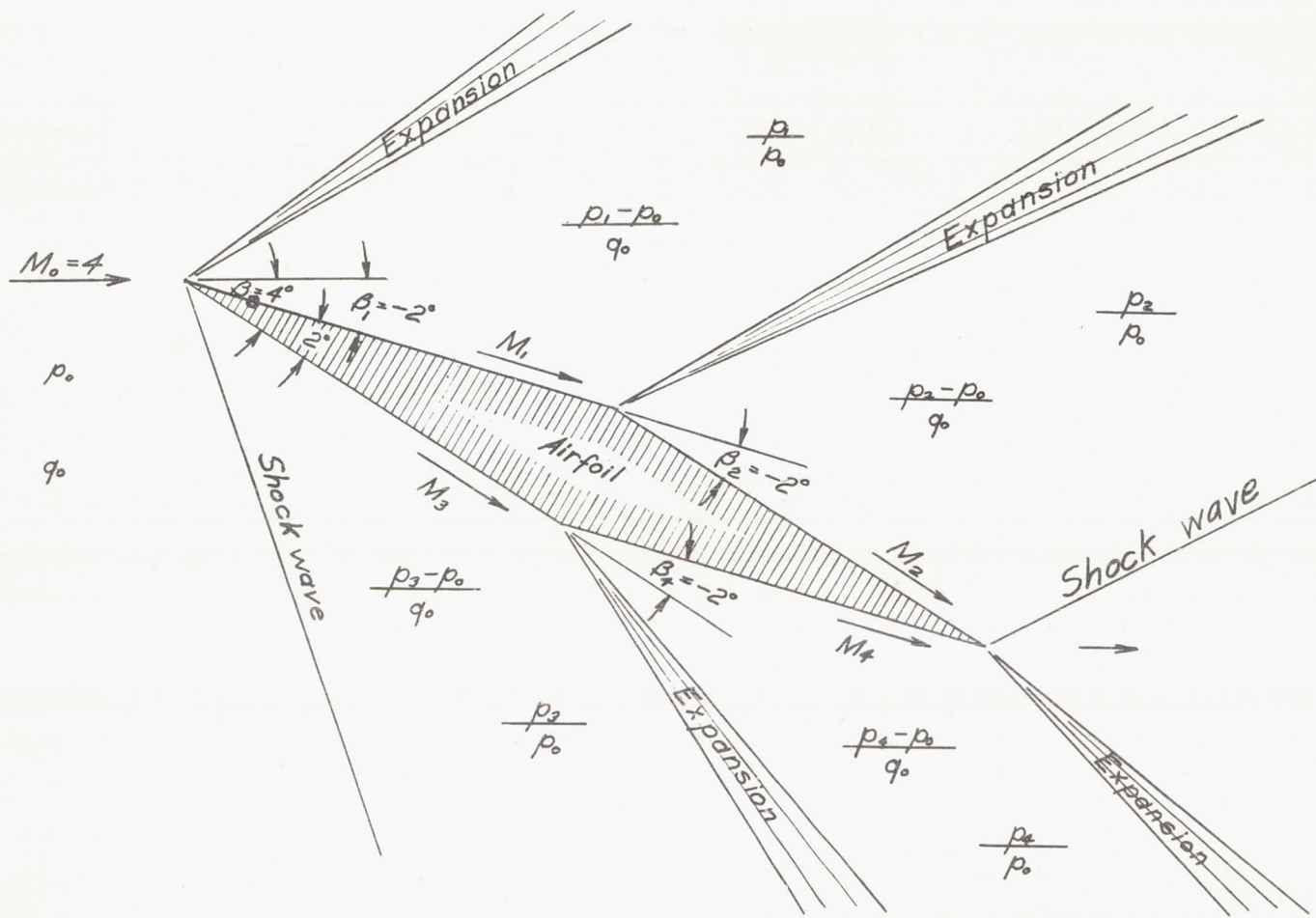


Figure 6.- Static pressure ratio across shock and expansion waves.



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Figure 7.- Example airfoil (showing conditions to be determined).

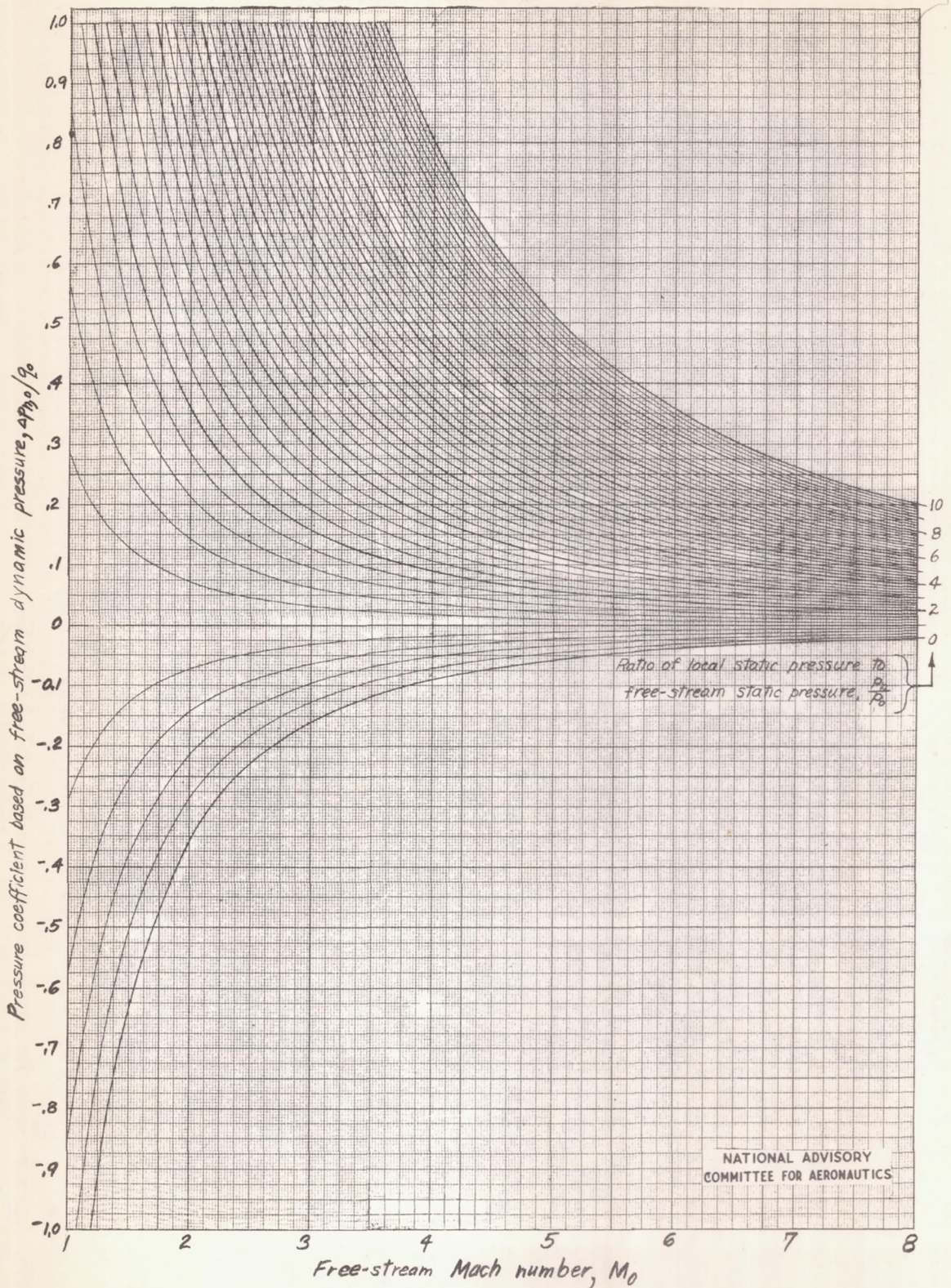
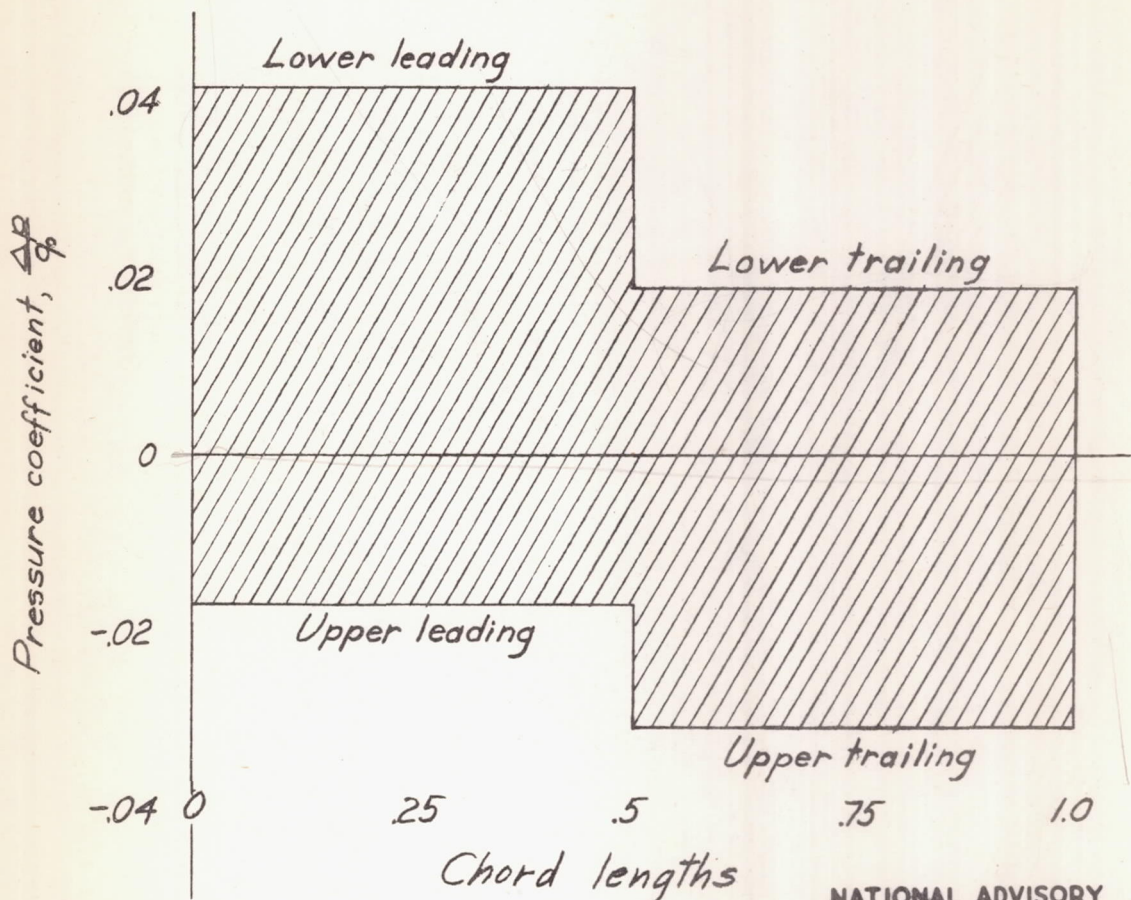
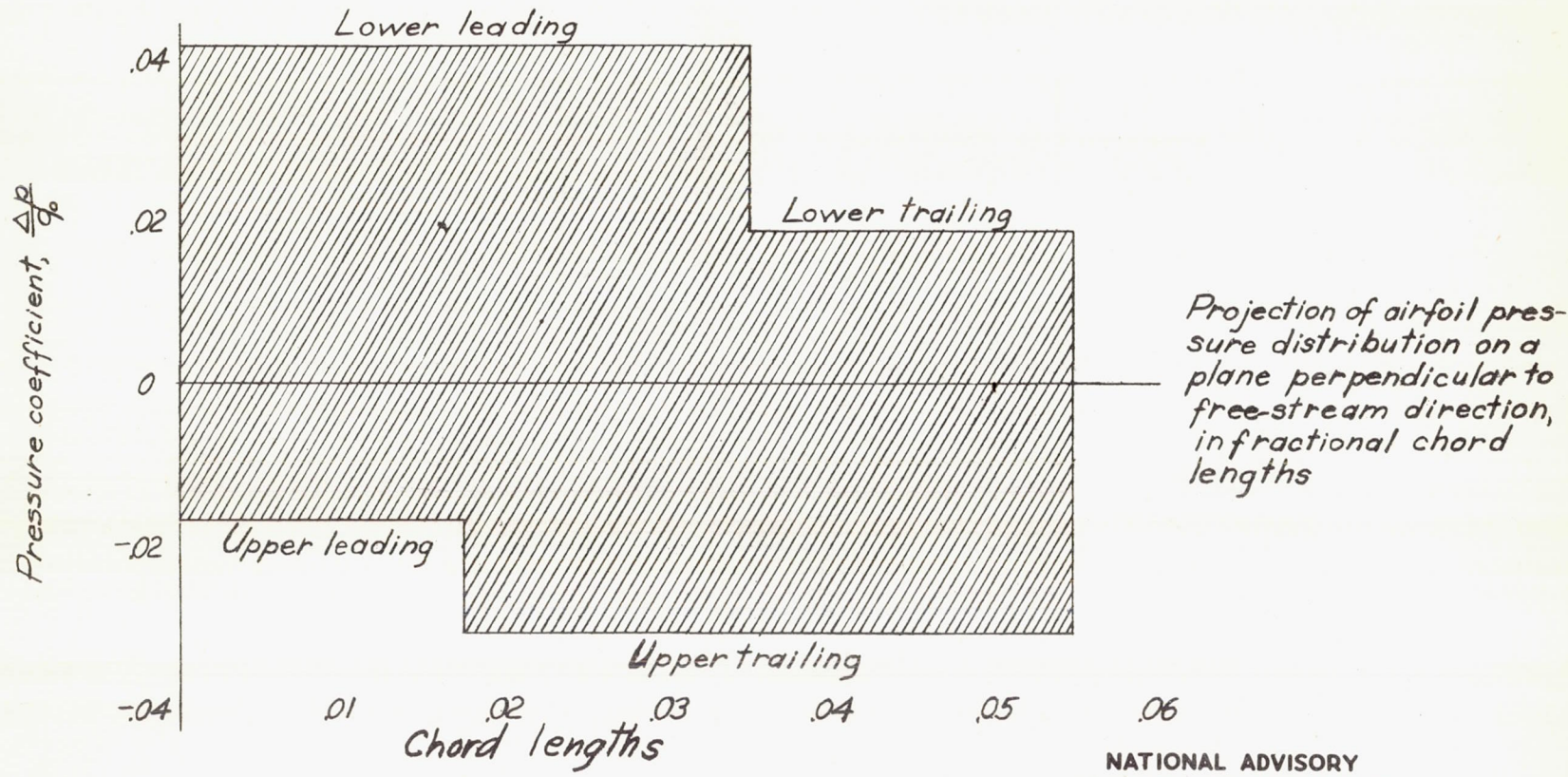


Figure 8.- Determination of pressure coefficients.



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Figure 10.- Determination of lift coefficient from pressure distribution for example airfoil of figures 7 and 9. Value obtained by integrating shaded area gives lift coefficient, 0.0540.



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Figure 11.- Determination of drag coefficient from pressure distribution for example airfoil of figures 7 and 9. Value obtained by integrating shaded area gives pressure drag coefficient, 0.00315.

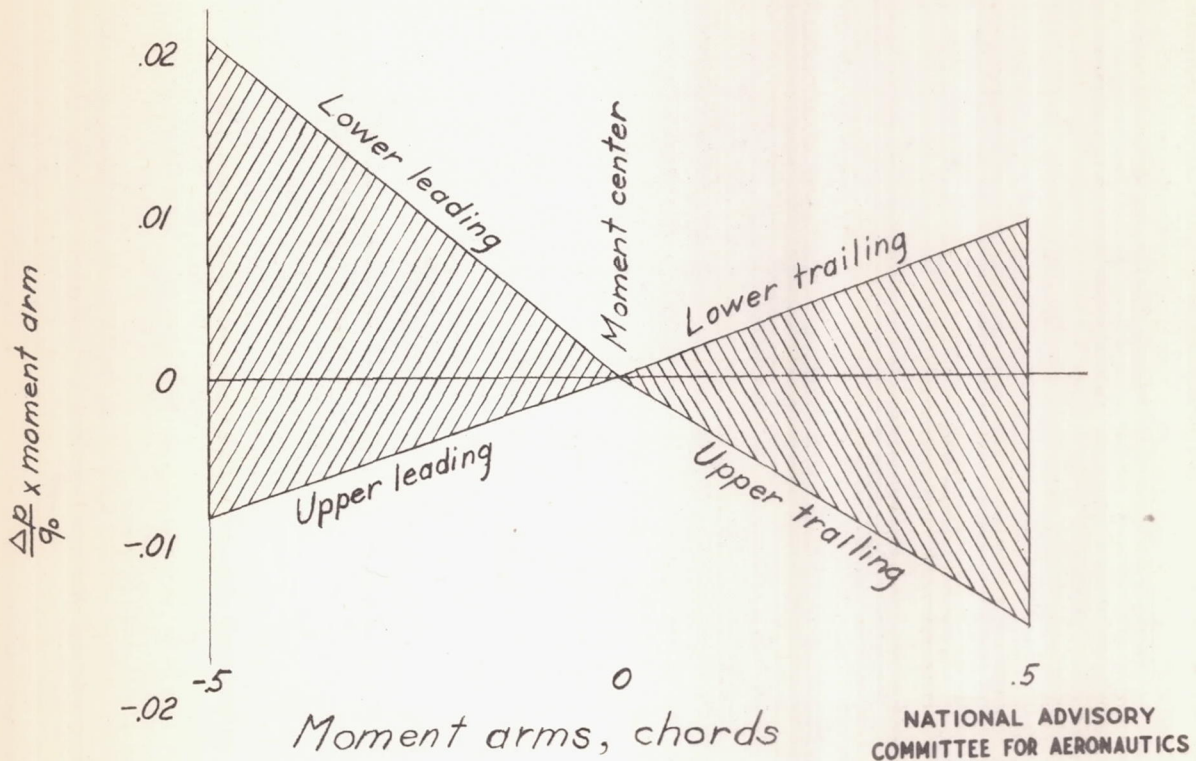


Figure 12.- Determination of moment coefficient from pressure distribution for example airfoil of figures 7 and 9. If leading and trailing surfaces give moments in the same sense add the area between "upper leading" and "lower leading" to that between "upper trailing" and "lower trailing" lines. The value obtained by integrating shaded area gives the moment coefficient about 0.50 chord, 0.0001112.

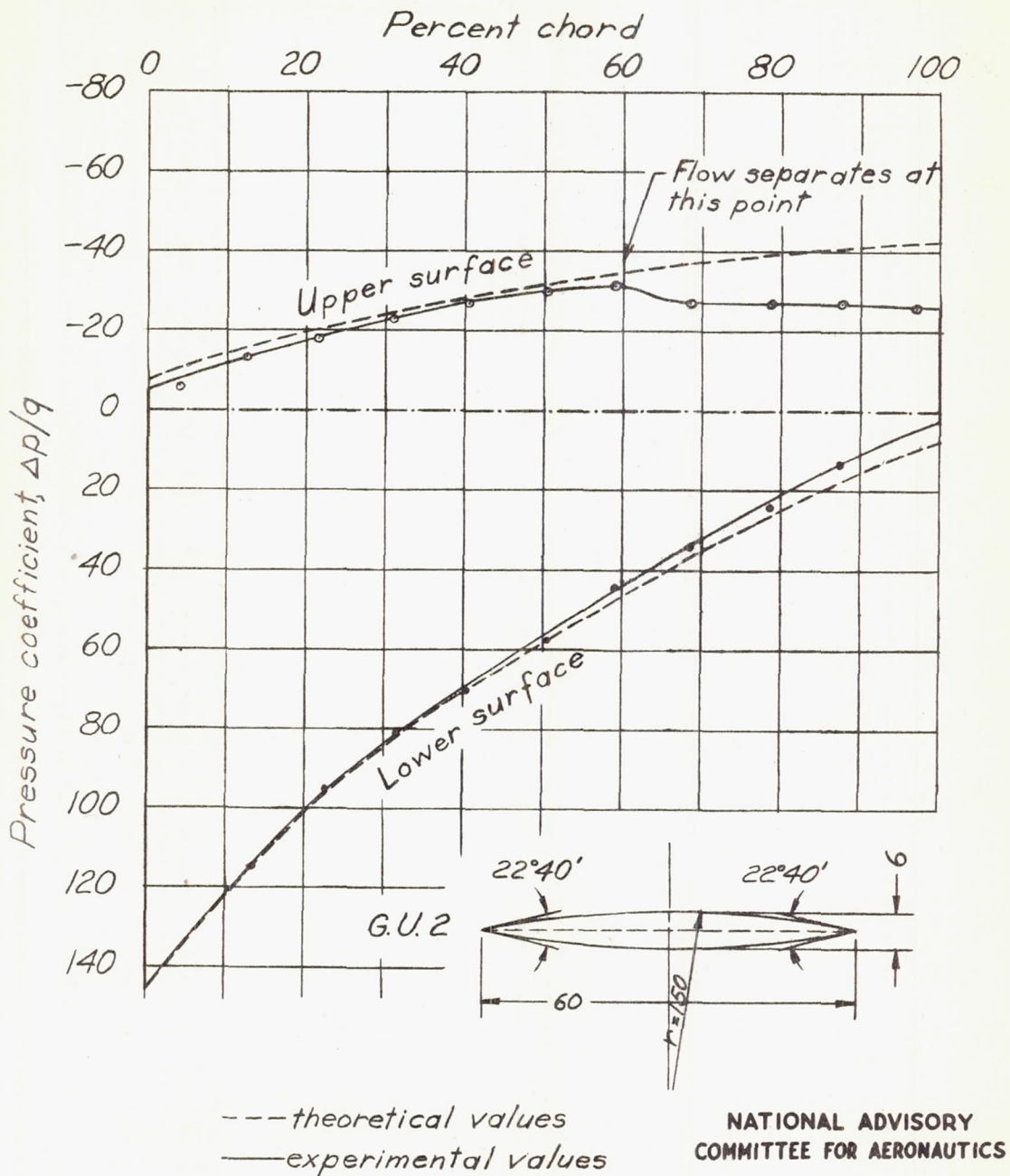


Figure 13.- Comparison of calculated and experimental results from NACA TM No. 946. $\alpha = 14^\circ$; $M_0 = 2.13$; $R = 640,000$; thickness = 0.10 chord.

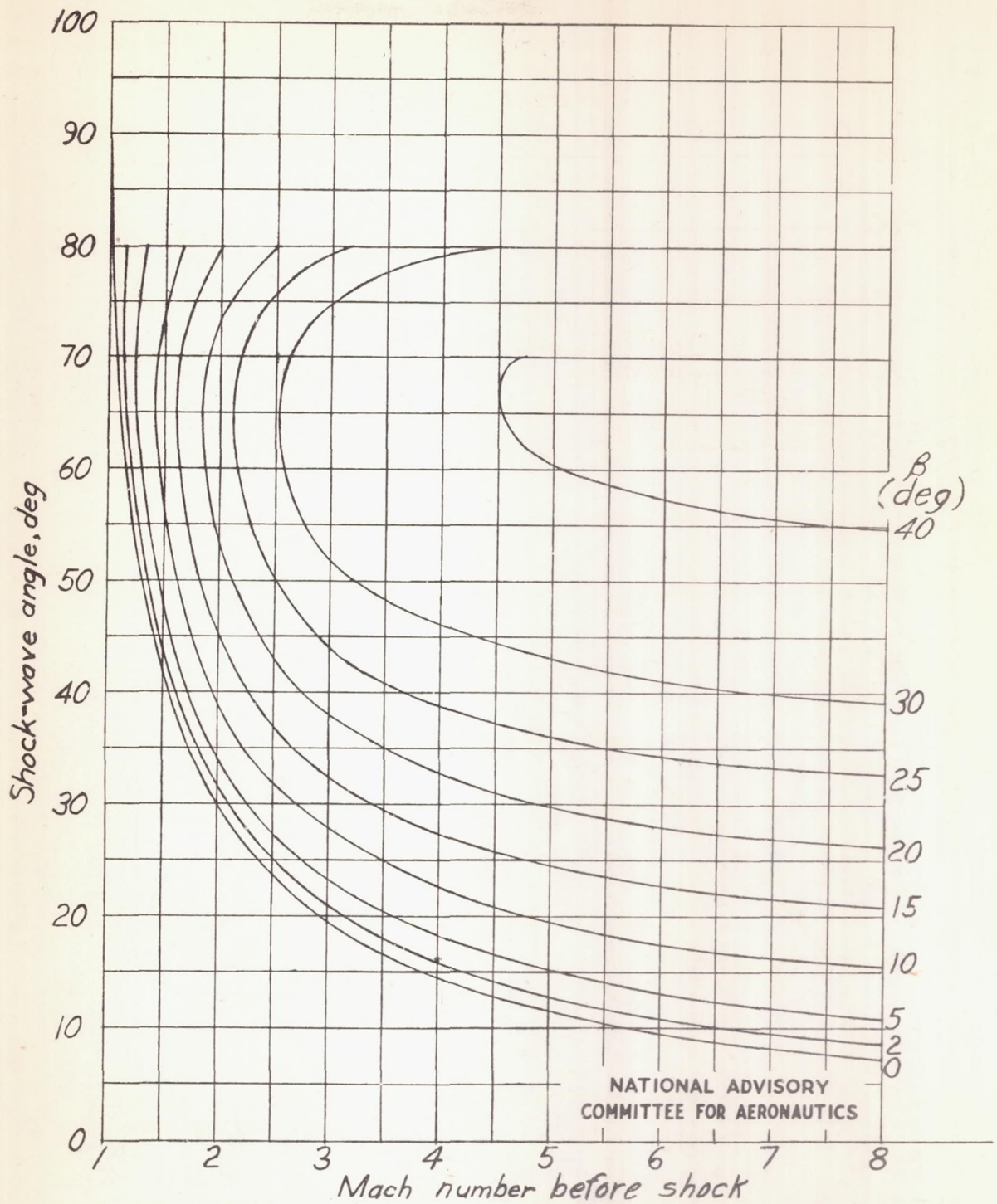


Figure 14.- Shock-wave angle for air.

