FIG. 4. EQUIVALENT LENGTH OF FITTINGS (Concluded)

GROUP 7. REGISTERS (INCLUDING LOSSES IN STACKHEAD AND VELOCITY PRESSURE).

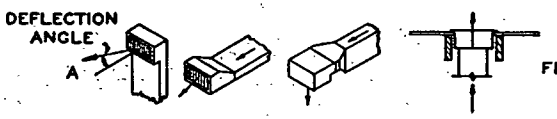

TABLE 4A. EQUIVALENT LENGTH FOR REGISTERS

Deflection Angle A	0°	15°	22°	30°	45°
Baseboard, High or Low Sidewall Registers	Eq. Ft. 35	40	45	60	115
Floor Registers with Box only	25				

For 2-way deflection registers, add the vertical and horizontal deflection angles together and multiply by 0.7. Select closest angle A in Table 4A. For diffuser type registers see manufactures' catalogs.

settings are used for high sidewall register installations, and the higher settings for baseboard register installations. For most satisfactory results these settings should be as low as is feasible.

3. A protective *high limit* control to stop the flow of fuel to the burner independently of the thermostat if the air temperature exceeds 175 F.

4. On oil and gas burner installations, a protective control should be included to cut off the fuel supply if the fire is extinguished, or if there is a failure of the ignition system.

5. On automatic stoker installations, a control is usually included to operate the stoker regardless of thermostat settings whenever the bonnet temperature indicates that the fire is dying, or a time interval contactor is used to cause the stoker to run a few minutes out of each hour.

6. A *humidistat* to regulate the moisture supplied to the rooms, located either in one of the rooms or in the main return duct near the furnace.

ADJUSTMENT OF SYSTEM FOR CONTINUOUS AIR CIRCULATION

This procedure applies to the adjustment of an automatically-fired forced warm air heating system to provide continuous air circulation, when the control arrangement is of the type where the room thermostat controls the fire, and the blower control (fan switch) controls the blower operation. This procedure as outlined in detail in Manual 6 of the *National Warm Air Heating and Air Conditioning Association*, is as follows:[7]

1. Adjust the fuel input in proper relation to the heat loss of the structure.
2. Determine the temperature rise through the furnace.
3. Adjust the air volume to produce a temperature rise through the furnace of about 100 deg.
4. Adjust the fan switch differential to a minimum of about 15 deg.
5. Adjust the fan switch cut-out point as low as practicable.
6. Adjust the room thermostat temperature differential to a minimum which will cause the burner to cycle frequently.
7. Balance the system by adjusting dampers to produce even temperature distribution between rooms.
8. Set the room thermostat at the desired room temperature.

TABLE 5. SELECTION OF BONNET TEMPERATURE, REGISTER TEMPERATURE AND REGISTER DELIVERY (CFM).[a, b]
(For Buildings Having a Heat Loss between 120,000 and 350,000 BTU/Hr.)
Register Delivery Volume in CFM per 1000 BTU per Hr.

Temp. of Bonnet °F	Linear Distance from Bonnet to Register, in Feet																							
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
110	108[a]	107	106	104	103	102	101	100	99	98	97	96	95	94	93	92	91	90	90	89	89	88	88	87
22.1	23.1[b]	23.6	24.2	25.4	26.0	26.6	27.3	28.0	28.8	29.6	30.5	31.5	32.3	33.3	34.6	35.9	37.3	38.6	38.6	39.9	39.9	41.3	41.3	42.7
120	118	116	114	112	111	109	108	106	105	103	102	101	100	99	98	97	96	95	94	93	92	91	90	90
18.4	19.0	19.6	20.3	21.1	21.6	22.5	23.1	24.2	24.8	26.0	26.6	27.3	28.0	28.8	29.6	30.5	31.5	32.3	33.3	34.6	35.9	37.3	38.6	38.6
130	128	126	123	121	119	117	115	113	111	110	108	107	105	104	103	102	101	99	98	97	96	95	94	93
15.9	16.4	16.9	17.6	18.1	18.7	19.3	20.0	20.7	21.6	22.1	23.1	23.6	24.8	25.4	26.0	26.6	27.3	28.8	29.6	30.5	31.5	32.3	33.3	34.6
140	137	134	131	129	126	124	122	120	118	116	114	112	110	109	107	106	105	103	102	101	100	99	98	97
14.0	14.6	15.1	15.7	16.2	16.9	17.3	17.9	18.4	19.0	19.6	20.3	21.1	22.1	22.5	23.6	24.2	24.8	26.0	26.6	27.3	28.0	28.8	29.6	30.5
150	147	143	140	137	134	131	129	127	124	122	120	118	116	114	112	110	109	107	106	105	103	102	101	100
12.6	12.9	13.5	14.0	14.6	15.1	15.7	16.2	16.6	17.3	17.9	18.5	18.4	19.6	20.3	21.1	22.1	22.5	23.6	24.2	24.8	26.0	26.6	27.3	28.0
160	156	152	149	145	142	139	136	133	130	128	126	123	121	119	117	115	113	112	110	108	107	106	104	103
11.4	11.8	12.3	12.7	13.2	13.7	14.2	14.8	15.3	15.9	16.4	16.9	17.6	18.1	18.7	19.3	20.0	20.7	21.1	22.1	23.1	23.6	24.2	25.4	26.0
170	166	161	157	153	150	146	143	140	137	134	131	128	126	124	122	120	118	116	114	112	110	109	107	106
10.5	10.8	11.3	11.7	12.2	12.6	13.1	13.5	14.0	14.6	15.1	15.7	16.4	16.9	17.3	17.9	18.4	19.0	19.6	20.3	21.1	22.1	22.5	23.6	24.2
180	175	170	166	161	157	153	150	146	143	140	137	135	131	128	126	124	122	120	118	116	115	113	111	110
9.7	10.0	10.5	10.8	11.3	11.7	12.2	12.6	13.1	13.5	14.0	14.6	14.9	15.7	16.4	16.9	17.3	17.9	18.4	19.0	19.6	20.0	20.7	21.6	22.1
190	184	179	174	169	165	160	156	153	149	145	142	139	136	133	130	128	126	124	121	119	117	115	113	112
9.1	9.4	9.8	10.1	10.6	10.9	11.4	11.8	12.2	12.7	13.2	13.7	14.2	14.7	15.3	15.9	16.4	16.9	17.3	18.1	18.7	19.3	20.0	20.7	21.1
200	193	187	182	176	171	167	163	158	154	151	147	144	140	138	135	132	129	127	125	122	120	118	116	114
8.6	8.9	9.2	9.6	9.9	10.4	10.7	11.1	11.6	12.1	12.4	12.9	13.4	14.0	14.4	14.9	15.5	16.2	16.6	17.2	17.9	18.4	19.0	19.6	20.3

[a] Register temperature, Fahrenheit. (Use upper value in each group).
[b] Register delivery volume in cubic feet per minute per 1000 Btu. (Use lower value in each group).
[c] Register delivery volumes in column 1 for zero length of duct.