Gin stands	Equation
70-12, 80-12, 90-12, 100-12, 120-12	GSC = .021 X
177-12, 178-12, 200-12, 224-12, 252-12	GSC = .029 X
88-12, 108-12, 128-12, 158-12	GSC = .057 X
75-14, 75-16, 79-16, 90-16, 93-16, 100-16, 119-16, 140-16, 141-16, 80-18, 90-18, 94-18, 120-18, 142-18	GSC = .05 X

TEXAS A&M UNIVERSITY
COLLEGE OF AGRICULTURE
COLLEGE STATION, TEXAS 77843

Texas Agricultural Market Research and Development Center

November 4, 1975

Mr. Joe Ghetti
Commodity Economics Division
Economic Research Service
U.S. Department of Agriculture
Delta Branch Experiment Station
Stoneville, Mississippi 38776

Dear Joe:

Enclosed is a copy of the gin capacity figures based on the gin stand saw configuration which was developed by Calvin Parnell. We indicated that we would send a copy to you since it may be useful for your studies as well.

I visited with Parnell somewhat at length regarding the development of this information. He indicated that he has also checked it with the manufacturers of the gin equipment. They approved his method of calculations. Therefore, it seems that this is about the best available calculation to use. Will appreciate any comments or suggestions you may have.

Work on the coding of the gin equipment schedules is still underway. The AMS set which covers the 1974 data is almost completed. We will now revert to the ERS set and proceed with it. Our work on this was delayed considerably by a number of other analyses we have felt advisable before selecting the gin sample we will use in the study for Cotton Incorporated.

Thanks again for all of the assistance you have provided.

Sincerely,

Robert E. Branson
Coordinator

Enclosure

TEXAS AGRICULTURAL EXTENSION SERVICE
THE TEXAS A&M UNIVERSITY SYSTEM
303 Agricultural Engineering Building
College Station
Texas 77843

October 14, 1975

MEMORANDUM

TO: DR. DEAN ETHRIDGE
MR. CHARLEY HODGES

SUBJECT: CALCULATIONS OF GIN STAND CAPACITY ACCORDING TO A MATHEMATICAL FORMULA GIVEN THE NUMBER OF SAWS AND SAW DIAMETER

FROM: CALVIN B. PARNELL, JR.

The model for determining gin stand capacity is given by equation 1.

$$GSC = F(\text{No of saws, saw diameter, saw speed (RPM), saw loading}) \quad (1)$$

In reviewing the literature on this subject I was able to find a publication by Griffin 1/ that indicated values for saw loading that ranged from 5 to 34 pounds lint per saw per hour. By telephone conversation with representatives of the four manufacturers of gin stands, I obtained information on RPM and recommended gin stand capacities. These data are listed in Table 1. Griffin's study was based on 700 RPM for a 12 inch diameter saw cylinder which corresponds to 2200 ft/min peripheral velocity. Expanding equation 1, the model was as follows:

$$GSC = X \cdot \frac{\pi \cdot D \cdot RPM}{12} \cdot Y / (2200 \cdot 478) \quad (2)$$

Where, GSC = gin stand capacity in bales per hour,
X = number of saws,
D = diameter of saw in inches,
RPM = manufacturers recommended revolutions per minute, and
Y = saw loading factor in lbs. lint per hour.

The 2200 corresponds to peripheral speed in ft/min for a 12 inch saw at 700 RPM. The 478 corresponds to the lint weight in a 500-pound bale.

Solving for Y and using manufacturers rated capacities, I was able to group these into 5 groupings hence 5 equations. These are as follows:

1/ Griffin, A. C. and O. L. McCaskill. Gin-Stand Research at Stoneville, Miss. 1956-66. Agricultural Research Service, United States Department of Agriculture.

Sincerely yours,

Calvin B. Parnell Jr.

Calvin B. Parnell, Jr., Ph.D., P.E.
Agricultural Engineer
Cotton Ginning and Mechanization

Table 1. Gin Stand Properties and Manufacturers

MANUFACTURER	SAWS	SAW DIAMETER (inches)	RPM	SAW CYLINDERS	SEED ROLL AGITATOR	MANUF. RATED CAP (bales/hr)	CALCULATED CAP (bales/hr)	MODEL NO
Continental Gin Co.	90	12	650	1	no	2	2.07**	1
	120	12	650	1	no	3	2.8	1
	79	16	700	1	no	4.0	4.0	4
	93	16	700	1	no	4.5	4.7	4
	119	16	700	1	no	6.0	5.0	4
	141	16	700	1	no	7.5	7.1	4
Moss Gordon Co.	75	16	700	1	no	3.5	3.8	4
	140	16	700	1	no	6-8	7.0	4
Hardwicke Etter Co.	100	12	700	1	no	1-1½	2.3	1
	120	12	700	1	no	3	2.8	1
	177	12	700	2	no	5	5.2	2
	178	12	700	2	no	5-5.5	5.2	2
	200	12	700	2	no	6	5.9	2
	224	12	700	2	no	7	6.6	2
	252	12	700	2	no	7-8	7.4	2
Lummus Gin Co.	90	12	700	1	no	2	2.07**	1
	88(Super)	12	700	1	yes	4-5	5.4*	3
	88 (Imp)	12	825	1	yes	5-6	5.4*	3
	128	12	825	1	yes	8	7.9	3
Murray Piratininga	80	12	700	1	no	1-1.5	1.8	1
	120	12	700	1	no	2-2.5	2.8	1
	80	18	540	1	no	4	3.9	5
	120	18	540	1	no	6	5.8	5
	142	18	540	1	no	6.5-7	6.9	5

*There is no way that you can distinguish this from your input information. The Super 88 (Lummus) has a capacity of 4-5 while the Imperial 88 has a capacity of 5-6. Both will be calculated as 5.4 @825 RPM. (Equation 3)

**There is no way you can distinguish Cont 90 & 120 from Lummus 90 and Murray 120. Hence using 700 RPM for both will yield good data.

	Gins Included	Equations
Group 1		
Old Gin Stands all 12" diam., all at 700 RPM	C90-12, C120-12, HE 100-12, HE120-12, L90-12, M80-12, M120-12	GSC=X·11/478 GSC=0.023X
Group 2		
Dual-Saw Gin Stands, all 12" diam, and 700 RPM	HE177-12, HE178-12, HE200-12, HE224-12, HE252-12	GSC=X·14/478 GSC=0.029X
Group 3		
Gin Stands with Seed Roll Agitators, all 12" diam, all at 825 RPM	L88-12(Super), L88-12(Imperial) L128-12(Imperial)	GSC=X·25·825/(700)(478) GSC=0.062X
Group 4		
16" diam Saws, all 700 RPM	C79-16, C93-16, C119-16, C141-16, MG75-16, MG140-16	$GSC=\frac{(X\cdot 18)(\frac{\pi 16\cdot 700}{12})}{(478)(2200)}$ GSC=0.05X
Group 5		
18" diam Saws all at 540 RPM	M80-18, M120-18, M142-18	$GSC=\frac{(X\cdot 20)(\frac{\pi 18\cdot RPM}{12})}{(478)(2200)}$ * GSC=.048X

*Although equation 4 and 5 were arrived at by different paths, I would recommend that the same equation GSC = .05X be used.