

Tractor Operator Shield

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The tractor operator shield was designed to meet the specific needs of citrus grove maintenance. Orange and grapefruit trees are hemispherical in shape and extend from ground level to thirty feet in height. When a grove is young a tractor has no trouble maneuvering through. But as the grove matures trees planted twenty-five feet apart begin to fill in row centers until lack of clearance becomes a hazard to the operator. When he disks, circling each tree individually, he has no warning of projecting branches which may brush off glasses, injure eyes or even cause the operator to lose control of the tractor. Compounding this problem is the dangerous tendency of branches to ride over the cowling and come down on the hand throttle forcing it to the wide open position just prior to the branches hitting the operator in the face.

The tractor-operator shield design had to meet five criteria:

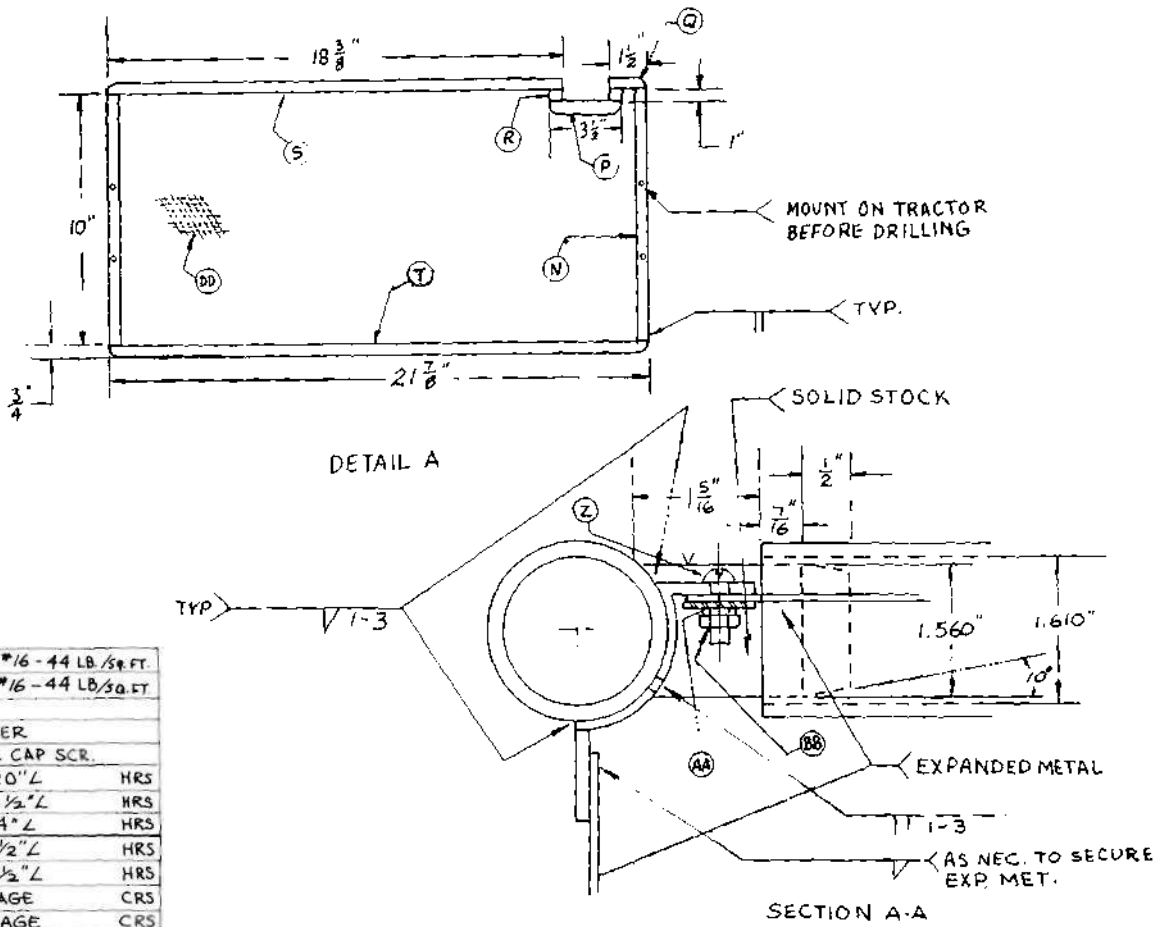
1. protect the driver from branches
2. protect the hand throttle
3. be designed as small and smooth as possible to minimize damage to fruit and foliage
4. meet the above criteria without restricting the operator's vision
5. be easily removable

The most difficult problem to deal with was the close tolerances required. The holes in the tractor transmission housing were factory drilled and tapped thus requiring that plates fitting up to this housing be precisely drilled. Since the holes were blind it was impossible to mark the plates using the holes directly. The problem was solved by placing a piece of aluminum foil over the holes and gently pushing down on them leaving marks on the foil. The centers of these marks were then found and the template used to center punch the half inch plates. The holes matched exactly.

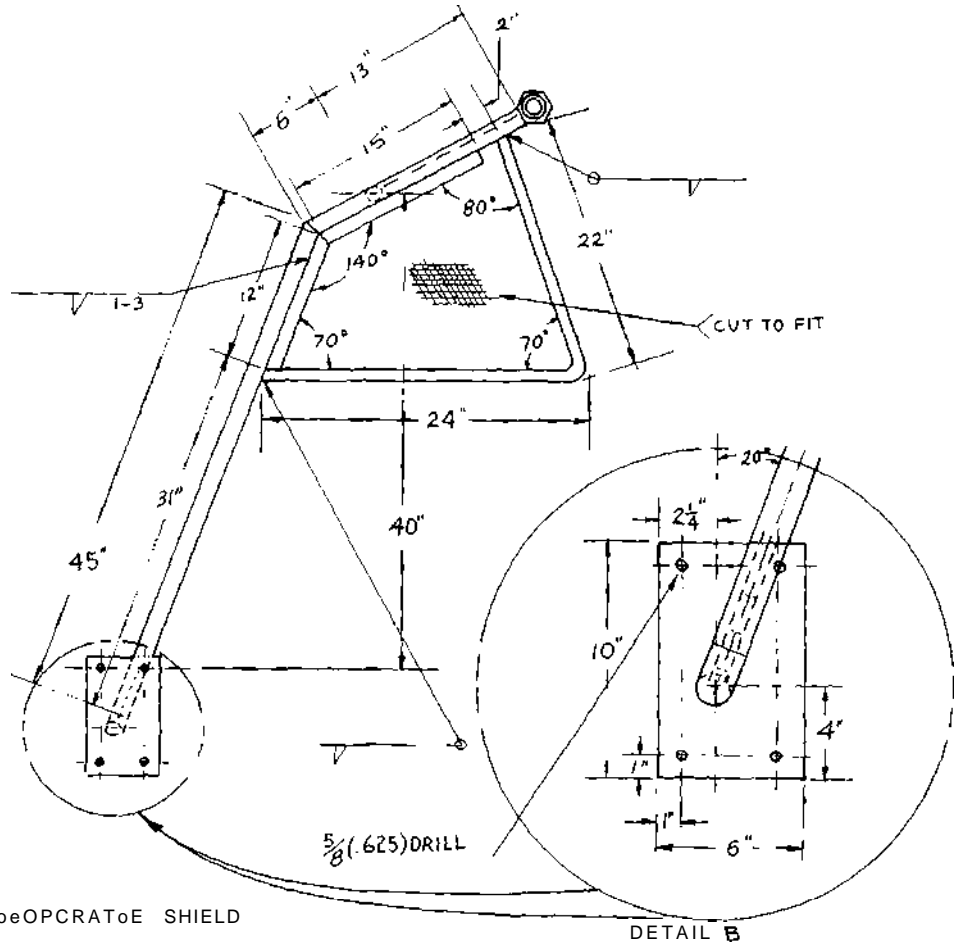
The pipe framework could now be done separately assuming the two halves were kept in correct relationship with each other and exact spacing was maintained where the pipes were to be welded to the half inch plates. This was accomplished by clamping an angle iron across the

pipes that fasten directly to the plates, butting up to the long vertical pipes. This allowed a roll movement for adjustment while maintaining the required space. The pipe framework was welded using the uphill mode and 'At' root opening to assure complete penetration. The plumbing union was welded into place, again requiring very careful alignment. Once the union was welded the pipe framework could be welded to the half inch plates. Since any distortion from welding would change the relationship of the holes of one plate to the other it was necessary to tack the pipes with the plates bolted securely to the tractor. It was important that the tacks be sound to minimize distortion. There remained one more piece of the basic frame to be welded on, the machined solid round stock. This could only be put on after the union was welded in place, the pipes welded to the plates and the plates fastened to the tractor. The unit was now a rigid extension of the tractor. Anything that was to fit between the two halves of the unit must be in precise alignment with both of them as they were when permanently mounted. It is for this reason that the machined round stock could not be welded earlier. It very likely would have thrown the union threads of the bolt holes out of alignment. To weld on the round stock the right side had to be removed from the tractor, the piece inserted into pipe on the left hand side, the right side put back on the tractor and the round stock welded. The basic framework was then complete. What remained was to make a framework for the expanded metal. This was done with 1" angle iron that was welded to the pipe and then bent to conform to its shape. The removable frame was welded together and the expanded metal welded to it. The 1/2" pipes were heated and bent and welded on. The expanded metal was welded onto the sides. Holes were drilled to hold the removable frame in place. Again since both sides were rigid these holes had to be drilled while the unit was bolted to the tractor.

It was subsequently found that all five of the previously stated criteria were effectively met. The unit has shown no sign of cracks from the heavy fatigue forces imposed by diesel tractor vibration. In short, it has fulfilled the design requirements.



DD	1	1 1/2" X 2 1/2" - 1" - #16 - 44 LB. / SQ. FT.	
CC	2	24" X 24" - 1" - #16 - 44 LB. / SQ. FT.	
BB	10	10 - HEX NUT	
AA	10	10 - LOCKWASHER	
Z	10	10 - 24N.C. 1" RD. CAP SCR.	
Y	1	1/8" X 1" X 1" X 20" L	HRS
X	1	1/8" X 1" X 1" X 9 1/2" L	HRS
W	1	1/8" X 1" X 1" X 14" L	HRS
V	1	1/8" X 1" X 1" X 1 1/2" L	HRS
U	1	1/8" X 1" X 1" X 7 1/2" L	HRS
T	1	3/4" X 2 1/8" - 16 GAGE	CRS
S	1	3/4" X 18 3/8" - 16 GAGE	CRS
R	2	3/4" X 1" - 16 GAGE	CRS
Q	1	3/4" X 1 1/2" - 16 GAGE	CRS
P	1	3/4" X 3 1/2" - 16 GAGE	CRS
N	2	3/4" X 10" - 16 GAGE	CRS
M	1	1 5/8" X 2 1/2" RD. STK.	HRS
L	2	1/4" X 5 1/8" X 6" R	HRS
K	2	1/2" X 45" SQED. 40 PIPE	
J	1	1 1/2" X 22" SQED. 40 PIPE	
H	1	1 1/2" X 16" SQED. 40 PIPE	
G	1	1 1/2" PIPE UNION	STL
E	1	1 1/2" X 3" SQED. 40 PIPE	
E	2	1 1/2" X 19" SQED. 40 PIPE	
D	2	1 1/2" X 45" SQED. 40 PIPE	
C	4	1 1/2" X 3" SQED. 40 PIPE	
B	2	1 1/2" X 4 1/2" SQED. 40 PIPE	
A	2	1/2" X 6" X 10" R	HRS
ITEM NO.		DESCRIPTION	MAT.



TRACTOR OPERATOR SHIELD

DETAIL B