DRIVING, MECHANICAL & KNOWLEDGE
REFERENCE 1 – R18
SAN ANTONIO JAM TRACTOR RESTORATION SHOW

Entry ID _____Class # _____

TRACTOR _____ Year _____

Mechanical Pts. _____/ 40 Knowledge Pts_____/10 Complexity Factor (CF) _____
Team 2 is also evaluating Mechanical Pts and should share with Team 1 to record pts.

SYSTEM	Points	COMMENTS
Driving/Observations – ___ /6 pts Proper governor control. Tire inflation. Clutch and Brake operation. Listen for abnormal sounds. In addition to components evaluation when driving contestant may be instructed to demonstrate basic driving skills. Skills may include: starting, shifting gears, engaging PTO, hydraulic lifts, and turning on/off lights. Driving and backing tractor into a designated area, braking tractor and turning engine off and securing tractor in a safe mode prior to dismounting. Unloading procedure evaluated by Team 3		Preliminary Driving Check List Notes • __Safe Driving • __Governor and Idle Speed • __Clutch • __Brakes • __PTO • __Hydraulic Lift • __Steering System • __Power Train Functions • __Abnormal noise / smoke etc. • __Fluid Levels - coolant, lub, trans, hyd . (Team 3) • __Fluid Leaks • __Air Filter (oil level if oil bath) • __Lights • __Safety items are addressed on Check Sheet 3
Engine – _____ **/8 pts**. For 7 to 8 pts, engine should have been disassembled, analyzed and new parts needed and gaskets and/or seals installed. Check Sub systems including: Lubricant and coolant levels, air filters and air intake, fuel, and exhaust. No signs of leaks. Any mechanical work, performed by others such as valve jobs should be identified in mechanics report with invoices in expense accounts. Any work done for no charge should be identified as (OC) opportunity costs in expenses report. Make evaluations on Knowledge as you inspect each topic.		Pictures should be labeled with exhibitor in them included documentation illustrating engine work being done. Measuring crank journals, cylinder taper and out of round, piston fit and ring end gap are examples. Using micrometers vs. plastic gauge for measuring crank journals. Pictures of head work including valves, valve train and valve guides are additional example of mechanical work to be validated with pictures. Activities shown in pictures should be identified with label on each picture. CF points may be given if tractor was tested on PTO dynamometer. There should be no evidence of sandblasting on engine, transmission or final drive.
Electrical – _____ /4 pts To include lights, charging, cranking and ignition (magneto or distributor) systems including instrument panel and other controls and switches. All gauges must function properly and have correct colored faces with original fonts.		Wiring Diagram of tractors having generator and starter should be included in Documentation. Generators should not be replaced with alternators. Descriptions or pictures of checks (tests) made on electrical system, starter, generator, distributor or magneto, spark plugs and cutout relay should be provided in documentation. CF points may be awarded if work on tractor with cab and AC.
Transmission –_____ **/4 pts**. For 3 to 4 pts must have been inspected and new gaskets and/or seals installed. Check Transmission lubricant level. No signs of leaks. Transmission to be put in different gears when driving for evaluation.		Documentation should include pictures of inside transmission or disassembled with student analyzing components. See comments on final drive below. CF points could be given for work on sophisticated transmissions

Clutch – _____ **/4 pts** Will be evaluated when driving tractor and by engaging clutch with tractor in a low gear and brakes applied. Clutch free travel checked. Clutch disk, Throw out and Pilot bearings should have been replaced for 4 pts.		For tractors with automatic transmissions (power-train without a clutch) these 4 points added to the Transmission points (4 + 4 = 8 points) There should be pictures of clutch work with exhibitor in picture to validate work done.
Final Drive – _____ **/4 pts** For 3 to 4 pts must have been inspected and new gaskets and/or seals installed. Lubricant level checked. No signs of leaks.		Pictures of inside differential and final drive should be included with labels of what is being evaluated. Gear teeth condition, gear backlash, end play should be inspected and measured. Bearings should be evaluated.
PTO / lift / hydraulics- ____ /4 pts All must function properly. Fluids checked for proper level and cleanness. No signs of leaks. Should have inspected PTO and tested in driving. All fluid levels are checked by judging team 3		Tractors without hydraulics/PTO will have these 4 points added to the Engine points (8 + 4 = 12 points) Work or tests made on hydraulics including pumps should be identified in documentation. If tractor was tested on a PTO dynamometer, identify procedure and results. See Engines.
Steering _____ **/3 Pts** Steering should have been observed in the driving. For example tracking of front wheels and slack in steering wheel should be observed.		See Critique Sheet 1 for elements of Steering. Documentation pictures should have shown how steering gears – sector and worm gear - are adjusted in the gear box.
Brakes – _____/3 pts Will be evaluated when driving and when evaluating clutch. Brakes on both wheels checked. Determine if they should be locked together when driving. Is equal pressure required on both R and L Brakes?		Brake work and adjustments should be explained with pictures included.
Safety – Will be evaluated under Safety Equipment found on Tractor Evaluation Sheet 3. Provide your safety evaluations to Team 3. Driving safety is also evaluated during both the unloading and driving process		NOTE: Safety Points are recorded by Team 3 Safety Equipment and Safe Practices used in unloading tractor is evaluated on Check Sheet 3. Safety points are awarded/deducted for unloading even if someone other than exhibitor offloaded the tractor.
Knowledge _____/ 10 Pts	**Points**	**Comments**
Ask general and technical questions of exhibitor/s. • General Questions • Specific/Technical Questions –use prepared questions also. Examples of General Questions: What were total costs of restoration, what mechanical work did you have done by someone else, approximately how many hours did you use in the restoration, and where did you get the tractor?		Note: Exhibitor is responsible for knowledge of all work conducted on tractor even that which was done by others, shown as repair costs (RC). Team 2 will also evaluate knowledge and share with Team1. Examples of technical questions: What is interference angle on engine valve seat, what is pilot bearing and where is it found in power train, how is cylinder taper measured, how is fit of valve stem to guide measured, what measuring tool is used to measure gear run out and back lash and how is taper and out of round measured on a crank journal bearing?