Link Progress.....

She's A Little Flyer !!!!

by Joe Pauling

Progress continues on the restoration of the "Link Trainer" flight instrument simulator.

To recap, it started life being manufactured in 1950 by "Air Trainers, Bicester Road, Aylesbury, Bucks" under licence to the United States "Link" Company. This particular machine was in operation for many years at RAF Benson until it was replaced with a more modern simulator to suit the aircraft at that base.

Benson gave the ageing "Link" to the Wallingford Air Training Corps (ATC) until they, in turn, wanted to dispose of it after many years of being put to very good use. Being rather large, bulky and very heavy they wondered how they would get rid of it. Enter the **RMARG** team, most willing to acquire it for our relatively new museum at Welford. This was undertaken one Sunday morning with the aid of several members and a WWII GMC 6x6 US Army cargo truck owned by **RMARG** and **MVT** member Ian "Dinger" Bell. (see **AhMargazine** No.11, October 1996.)



Ian's "Jimmy", and yes, it did completely block the road for over an hour while we loaded the very heavy "Link".

The restoration of the "Link" is still ongoing, and various parts are still missing, but on occasion various RMARG members come up with all sorts of valuable bits and pieces. However, it is now in "flying" condition :- So now follows a series of short articles (not too technical) of what our "Link" trainer can actually do.

Part one. The Instrument Flying Trainer Type D4 Mk.1, No.034 is classed as ground equipment used in teaching all phases of elementary and advanced instrument flying, including radio navigation, radio range and loop orientation, instrument landing systems, voice proceedure and flight and engine instrument familiarisation.

Remember, it is over 50 year old technology, and as such employs vacuum, mechanical and electrical systems with the radio systems utilizing glass vacuum valves. It has a fully equipped cockpit similar to most single engined aircraft of that period (Chipmunk etc.)



Pickfords we aint ! Loretta, ATC, Don, Nigel, Ian, ATC, Les, ATC. Mike Berrie was taking the photographs.

The whole thing rotates on a base and the flying part is supported on four main bellows. There are many more bellows as the American originator, Mr. Link, was an organ builder !

All the main controls operate through these bellows with the principal being if vacuum is supplied to the front bellows and atmosphere to the rear bellows, the nose of the trainer will adopt a dive position.

Electrical power is required to work the systems with a three phase 415 volt supply driving a 1.5 kw motor to run the vacuum turbine at over 7000 RPM to provide vacuum in the cockpit of 4.5" H.g. to 5.5" H.g. As the trainer is of American origin the operating voltage is 110 volts therefore a 30 Amp 240 volt input to a constant voltage transformer produces the required 110 volts. Various other transformers in the trainer produce voltages from 6 to 32 volts.

The various flight characteristics built into the trainers are as follows :

"Bank", left and right ailerons via pilots control wheel.

"Pitch", dive and climb elevators via pilots control wheel.

"Turning", left and right via rudder foot pedals.

"Nose heaviness" during turns.

"Automatic bank with turn".

"Automatic turn with bank" after inbuilt slight delay.

"Trim tabs" to control ailerons, elevator & rudder.

"Control loading", tendency of controls and control surfaces of aircraft to return to neutral of the centred position. Also to vary, according to the airspeed, a change in resistance to control movement.

"Hunting & Weathercocking", Inherant directional stability. Inherant longtitudinal stability. (This facility is not working at present due to the weathercocking follow up motor and vacuum valve missing).

"Rough air turbulence bumps" actual pitching, banking and yawing.

"Stalling and Mushing". Mushing condition preceedes a stall which occurs when the airspeed drops to an indicated 75 - 80 knots with an abrupt and rapid nose down attitude.

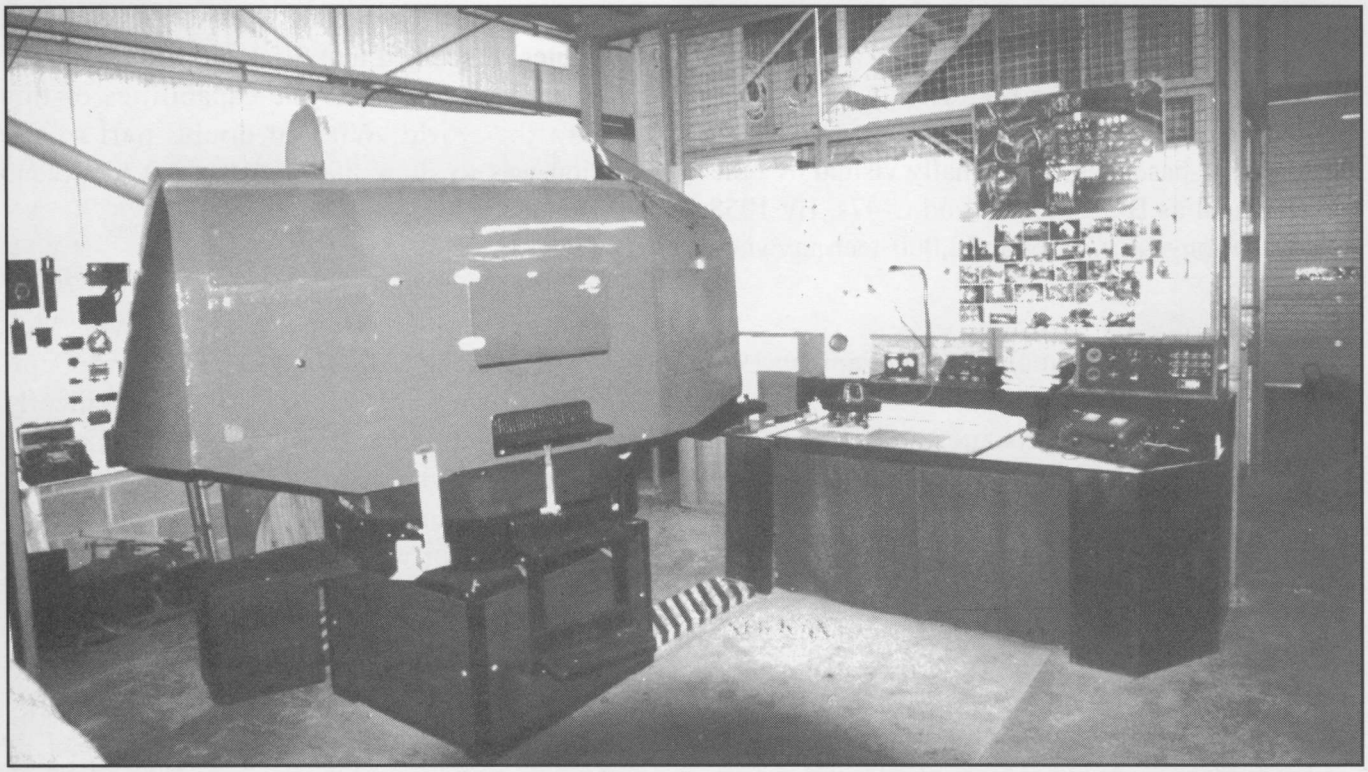
Equipment.

"Under Carriage". Up and down control buttons with indicator lamps, a warning buzzer if undercarriage is "up" and speed is low. Putting undercarriage "down" decreases indicated air-speed. Repeat indicator lamps on the instructors desk.

"Wing Flaps". A lever controls the simulated flaps and with an indicator on the instrument panel showing degree of operation. An indicator lamp also informs the instructor at his desk. Putting flaps fully "up"increases the indicated air-speed by about 8 knots, whilst putting the undercarriage or flaps "down" gives a slight tendency for the trainer to "nose down".

"Engine Vibration". A variable transformer controls a vibrator motor which simulates engine noise and vibration and is controlled by the throttle and RPM levers. Irregularity of engine vibration similar to a faulty engine caused by extremely high or low engine or carburrettor temperature is simulated by a cycle of interuptions to the vibrator motor. There are high and low indicator lamps on the instructors desk.

Part two continues in the next edition of *RMARGazine* with :- **Instruments, Propeller, Flight Indications and Torque.**



The almost finished "Link Trainer" type D4 Mk.1, Serial No. 034. ex. Benson, Wallingford ATC and now Welford.